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**Canada's Polymer Corporation:
The crown, technological innovation,
and the pursuit of economic interest, 1942-1990**

By
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A thesis submitted to
the Faculty of Graduate Studies
in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy

Department of History
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Ottawa, Ontario
August 1, 2001

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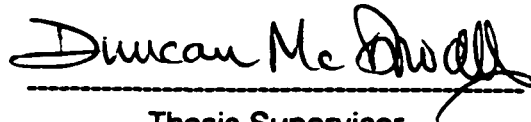
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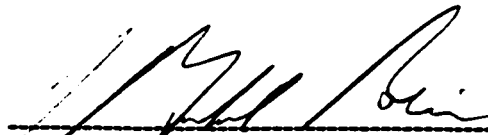
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Abstract

Crown corporations are widely regarded as a quintessentially-Canadian invention. Since 1841, they have been dexterously implemented and hotly debated as instruments of public policy. This is the history of the birth and evolution of one such crown corporation - Canada's leading synthetic rubber producer - and the play of public policy and commercial enterprise upon it.

Rubber has been an indispensable ingredient of modern industry; its malleable properties minimize the wear and tear of mechanical existence. When the Japanese military poured into Southeast Asia in December, 1941, cutting off the Allies' supply of natural rubber, Ottawa's response was to create a crown company, Polymer Corporation Ltd., to oversee the construction and operation of a synthetic rubber plant at Sarnia, Ontario. During the war, Polymer met *all* of Canada's rubber needs. After the war, it became a model of state-owned industrial success. How it did so is the subject of this work.

In Canada, crown corporations have always been expected to perform - albeit somewhat paradoxically - both policy and commercial roles. Polymer was unique in that, for most of its existence, the emphasis was on the latter function. Making money was its *raison d'être*. In the process of turning a profit, however, Polymer incidentally served a public purpose - initially winning the war and latterly giving Canada a leading-edge presence in the global synthetic rubber industry.

Given Polymer's duality of function, this thesis proceeds on two levels. At one level it explores the politics of public enterprise by focusing on developments at Polymer from its inception in 1942 to the time of its purchase by the German-owned A.G. Bayer company in 1990. The questions which are explored here include: the rationale for establishing Polymer; Polymer's changing role as an instrument of policy and the extent to which it fulfilled its mission; the standards to which Polymer was held accountable; and the politics of multi-nationalization and privatization.

On another level this dissertation examines the growth of a firm. It investigates how this unique corporation managed to expand and prosper. It seeks to identify the challenges which Polymer faced as a commercial enterprise and its response to those challenges. It explores Polymer's strategies and structures in the context of international business developments; the role of science and technology in the growth of the firm; the relationship between profits and innovation; and the dynamics of corporate decision making.

Drawing on the rich Polymer collection at the National Archives of Canada and the informed comments and reflections of the men who led the corporation over a period of fifty years, the thesis concludes, that contrary to neo-conservative rhetoric, crown corporations can be *both* effective instruments of public policy *and* dynamic and profitable commercial enterprises.

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A number of people have contributed to making this study possible and I am pleased to acknowledge their assistance. First and foremost I would like to thank my supervisor Dr. Duncan McDowall - teacher, scholar, and gentleman. This project would not have been possible without his assistance. It was he who brought the topic to my attention in the first place and who thereafter faithfully guided me through the ups and downs of academic research. I would also like to thank Dr. Robin Neill for his ongoing interest in my work and Dr. Peter J. Morris at The National Museum of Science & Industry in London, England, for sharing his insights and sources on synthetic rubber science and technology. To the Social Sciences and Humanities Research Council of Canada, the Government of Ontario and Carleton University, I extend my appreciation for the generous financial support provided for my research.

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Introduction

This is the history of the birth of an industry and the growth of a firm within that industry. What makes this firm unique in the annals of Canadian business history is that Polymer - a government-owned and -controlled company which was founded in the heat of war to produce synthetic rubber - was a crown corporation that made money, and lots of it. In Canada, today, Canadians generally do not perceive public corporations as efficient forms of enterprise, especially when it comes to profit maximization. Our *fin de siècle* experience was generally one of expelling the state from the business of running the economy, Air Canada and Canadian National offering two telling examples of privatization. Crown corporations are burdened - the argument goes - by political imperatives, bureaucratic barriers, mixed and sometimes contradictory objectives, and uninspired management. In the past we have tolerated the use of crown corporations because they were necessary to get things done in the face of private industry's incapacity. Our vast land mass, and lack of technology and capital led government to intervene in the economy from time to time so as to hurry the development of certain critical industries, usually for defence or nation-building purposes. We came to rely upon a form of government-induced, economic "defensive expansionism," to mimic the words of Hugh Aitken. In these circumstances, we asked our "crowns" to be accountable and fiscally responsible, but we very rarely expected them to be profit-seeking. Not even the nationalist advocate Herschel Hardin, who in his popular treatise *A Nation Unaware* made the case that it was the use of crown corporations that made us distinctively Canadian, would go that far.¹ But Polymer did just that. For almost fifty years, it was an efficient and innovative commercial animal in the pursuit of economic interest. Making money was its *raison d'être*.

How Polymer grew and made money is the subject of this work. In her classic study,

¹ H. Hardin, *A Nation Unaware: The Canadian Economic Culture* (Vancouver, J.J.

The Theory of the Growth of the Firm, Edith Penrose argued that growth is the consequence of a complicated interaction of a company's resources, capabilities, goals, and market opportunities.² One does not need to be familiar with Penrose, however, to see that Polymer has grown at different rates for different reasons at different times. The pace and direction of its growth has been determined by the company's technical and managerial capabilities as well as by developments in the marketplace. What is unique about Polymer, however, is that its managerial ethos initially encompassed that of government. So instrumental was the Liberal wartime minister of munitions and supply, C.D. Howe, in the wartime formation and early growth of the firm, that it would be tempting to tell the story of Polymer's success solely in terms of his actions. Certainly Howe, a pragmatic activist, has frequently been cast in the role of the "great man" of public enterprise in this country.³ Between 1942 and 1957 he was the minister responsible for Polymer. Initially he provided the strategic vision for the fledgling company, which was then made operational by executives drawn from the ranks of his wartime managers. Once the industry had taken off after the war, however, Howe was content to let Polymer's management run the show with one simple directive: "profit or perish." Howe's hands-off approach to Polymer set the genetic code which all subsequent ministers of the crown overseeing the enterprise would follow. While this work explores the politics of state intervention and the political

Douglas Ltd., 1974).

² E. Penrose, *The Theory of the Growth of the Firm* (Oxford, Blackwell, 1959).

³ See R. Bothwell, *Nucleus: The History of Atomic Energy of Canada Limited* (Toronto, University of Toronto Press, 1988); R. Bothwell, *Eldorado: Canada's National Uranium Company* (Toronto, University of Toronto Press, 1984); R. Bothwell and W. Kilbourn, *C.D. Howe: a biography* (Toronto, McClelland and Stewart, 1979) and S. F. Borins, "World War II Crown Corporations: Their Functions and Their Fate," in J.R.A. Prichard (ed.), *Crown Corporations in Canada: The Calculus of Instrument Choice* (Toronto, Butterworth and Co. and the Ontario Economic Council, 1983), pp. 437-475.

dimension of corporate decision-making at a state-owned enterprise, it does so, ironically, only to show how little politics ultimately came into play in the growth of this firm. Howe was an industrial tactician in political clothing. He might best be viewed as Polymer's first C.E.O. and for that reason Penrose's theorizing, which relates to the growth of *private* enterprise, applies even to this unique government-owned and -controlled corporation.

The fact that Polymer was government owned and controlled does however raise several questions that do not apply to private enterprise. What is the purpose of state enterprise? What is the rationale for commercial crown corporations? How are crown corporations held accountable? Should crown corporations be regarded as profit-seeking institutions whose performances are measured solely in hard corporate terms? Or conversely, should they best be seen as "policy instruments" whose behaviour and performance differ radically from private enterprise? Should public corporations, especially those operating for profit like Polymer, be held to different legal and moral standards than private corporations? How is public enterprise efficiently run? When, why and how are crown corporations denationalized? These and other related questions, as they apply to Polymer, are the concern of this dissertation.

Although the focus of this work is Polymer itself, the company's story provides interesting insights into the growth of Canadian companies in general and the dynamics of the petrochemical industry in particular. In many respects, Polymer's evolution appears to be a paradigm of the development of the post-war Canadian manufacturing corporation. Without the benefit of tariff or subsidy, Polymer first secured a domestic base and then grew aggressively by exporting to markets abroad, first in Europe and later in Asia and less developed countries. In the next phase, it grew through the establishment of plants and marketing facilities overseas, becoming one of Canada's first multinational manufacturing corporations in the process. Growth through investment in new products and new geographical markets was followed by a period of diversification as Polymer expanded into unrelated areas of production and backwards into feedstocks. In its final phase - which is

explored only superficially here - Polymer returned to what it did best, aiming to be one the world's most profitable and innovative petrochemical companies. The company continues to exist in the early twenty-first century as part of the German-owned A.G. Bayer group of companies.

Where Polymer seems to stand out from the mass of Canadian companies was in its determined use of science and technological innovation to grow and prosper. There has been much written of late about the growing productivity gap between Canada and the United States.⁴ According to Roger Martin, the dean of the Rotman School of Management at the University of Toronto, and Harvard University professor, Michael Porter, the gap is a consequence of Canadian business's unwillingness to compete on the basis of uniqueness and innovation. "Innovation is the key today to global competitive advantage... And our firms must develop more distinctive strategies based on relentless innovation."⁵ For Porter and Martin, therefore, innovation is central to the growth of a firm and economic growth in general. The position is not new, of course. In Canada, our most original economists have long recognised the role innovation has played in the growth of the firm and the development of the national economy. As early as 1834, John Rae based his criticism of Adam Smith's *Wealth of Nations*, in part, on the assumption that labour and capital (inputs) were not the only two ingredients that could increase production (output).⁶ Rather, according to Rae - and Innis a century later⁷ - discontinuous technological change, a

⁴ A. Toulon, "Productivity gap is growing worse," *National Post* (June 26, 2001); T. Dattles, "Competitiveness: Time to Shift Gears, Canada," *Globe and Mail* (May 2, 2001); L. Chwialkowska, "Productivity Gap," *National Post*, Quarterly Report on the State of the Nation: Falling farther behind (June 16, 2001).

⁵ R. Martin and M. Porter, "The road not taken," *Globe and Mail*, (April 26, 2001).

⁶ J. Rae, *Statement of Some New Principles on the Subject of Political Economy* in R. Warren James, *John Rae Political Economist* (Toronto, University of Toronto Press, 1965), vol. ii, especially, chap. x.

⁷ H.A. Innis, "The Penetrative Powers of the Price System," in M.Q. Innis (ed.) *Essays in*

product of invention and innovation, was the dynamic force in economic advancement. More recently, a school of economists, the “new growth theorists”, have attempted to unravel the secrets of innovation, believing that innovation is not a mysterious outside force, but an internal one which can be cultivated to increase growth. What follows seems to lend anecdotal support to the theories of Rae, Innis and the “new growth theorists.”

At a time when science-based growth was an enigma to most in Canadian industry, Polymer embraced research and development as part of its corporate strategy. The growth of the firm was based on technologies that emerged in one way or another from scientific discoveries and developments that were particularly susceptible to significant improvement through a scientific approach to problem solving. Scientific investigation and the systematic application of scientific knowledge to the process of production thus became a routine part of Polymer’s operations. Through their ability to harness scientific and technical expertise, Polymer’s technology-conscious managers tried to create a corporate culture that recognized the umbilical relation of science and corporate prosperity. This group of scientist-managers dedicated themselves to transforming Polymer into a powerful and autonomous institution capable of shaping its environment and pursuing independent strategies for growth. They were entrepreneurs in the Schumpeterian sense, that is, not the riskers of capital, since the capital was not theirs to risk (it belonged to the people of Canada), but the formulators of corporate strategy and innovators of new industrial structures and technologies.⁸ The best of them were visionaries, men like Polymer executives Ralph Rowzee, Bill Buckler, Roger Hatch, Stan Wilk, Lee Dougan, and Ian Rush, who could see a future for their industry at the end of the war when the majority of

Canadian Economic History (Toronto, University of Toronto Press, 1956), pp. 252-272.

⁸ J. Schumpeter, *The Theory of Economic Development* (Cambridge, Mass., Harvard University Press, 1934), especially pp. 68, 75, 137; and *idem*, *History of Economic Analysis* (New York, Oxford University Press, 1954), p. 556.

those around them could not. By applying science, Polymer persistently tried to expand its scale and scope.

This was not always easy, however, due to the nature of the Canadian marketplace. The limited size of the domestic market, the general lack of managerial skills and technology, the shortage of investment capital and the branch plant nature of the Canadian economy all combined to make technological innovation in Canada more difficult than in the United States. In addition, Polymer seemed to face the disadvantages of being a medium-size, government-owned firm operating in the same arena as privately-owned petrochemical giants. Despite these obstacles, Polymer innovated, profited and grew. How it did so is the subject of this work.

This research will suggest that Polymer stood at the forefront of many strategic developments partly because of the intrinsically competitive nature of the petrochemical industry, but also because of the company's middling rank among petrochemical producers. Long neglected by academic researchers, the petrochemical industry has recently become the subject of several important books.⁹ As these works have demonstrated, the chemical industry has been unusually dynamic: change has been rapid, constant, and expensive. Since the late nineteenth century, the chemical industry has been

⁹ See D. Dyer and D. Sicilia, *Labours of a Modern Hercules: Evolution of a Modern Chemical Company* (Boston, Harvard Business School Press, 1990); D. Hounshell and J. Smith Jr., *Science and Corporate Strategy: Du Pont R&D, 1902–1980* (New York, Cambridge University Press, 1988); R. Stobaugh, *Innovation and Competition: The Global Management of Petrochemical Products* (Boston, Harvard Business School Press, 1988); P. Spitz, *Petrochemicals: The Rise of an Industry* (New York, John Wiley & Sons, 1988); Sheldon Hochheiser, *Rohm and Hass: History of a Chemical Company* (Philadelphia, 1986); J.L. Bower, *When Markets Quake: The Management Challenge of Restructuring Industry* (Boston, Harvard Business School Press, 1986); K. Chapman, *The International Petrochemical Industry* (Oxford, Basil Blackwell, 1991); and R.H. Quintella, *The Strategic Management of Technology in the Chemical and Petrochemical*

more diversified, technology-dependent, capital-intensive and global than any other industry in the development of modern corporate strategies and management techniques. Perhaps it is not too much to suggest, therefore, that the chemical industry was to the twentieth-century corporation what the railroad was to its nineteenth-century forebear: a wellspring of managerial and technological innovation.

Every successful competitor in the world chemical industry had to be fast on its feet. Polymer, a medium-sized, Canadian competitor, had to be especially nimble. In contrast to larger companies such as Esso and Du Pont in the United States, ICI in the United Kingdom, or any of the great triumvirate in Germany - Bayer, BASF, and Hoechst - Polymer rarely enjoyed a commanding position in major product markets. As a result, it was obliged to choose its opportunities and weigh investments with unusual care and to reorient itself quickly in response to changing market conditions. While Polymer was a pioneer in science-based growth in Canada, it will be suggested here that in the international field of polymer research and development, the company was generally a fast follower, adapting and improving upon the inventions and discoveries of others. Polymer was a *process* innovator rather than a pioneer in the field of *basic* research. In production, Polymer tended to avoid integration (backwards and especially forwards) because its operations lacked sufficient scale and financial resources. And in marketing, the company would attempt to focus on filling particular niches and in providing its customers with a high level of technical support and service.

The chapter sequence of this work attempts to capture the foregoing interplay of organization and environment in Polymer's history. The overall emphasis is on the period 1942-1972, when Polymer was wholly owned and controlled by the government of Canada. Although the treatment is largely chronological, the basic logic of the work reflects the notion that a company grows and changes in response to opportunities and threats. That is, in a given period, a company's performance and fate depend upon how well it deals

Industries (New York, Pinter Publishers, 1993).

with a set of primary challenges, those specific to its business and those generated by its political and social context. When a company is young or small, for example, such challenges might include attracting investment capital, developing a new product or process, or opening or cultivating a new market. As the company grows and matures, the challenges become different: satisfying investors' expectations for growth and profitability; responding to competitive threats; expanding the geographical scope; developing formal planning and management systems; enlarging through vertical integration or diversification; and forming structures and systems to institutionalize innovation.

Such challenges concern every large and growing company. But companies also operate in political and social milieus. Being a state-owned enterprise, this was especially true of Polymer. For North American and European companies in the twentieth century, the context of business has shifted dramatically as a result of wars, depressions and recessions. Long-term trends, such as escalating government intervention in the marketplace, changing demographic patterns, the advent of new technologies and the increasing interdependence of world markets, also affect the way a company conducts its business. Such "external" circumstances pose specific challenges: wartime mobilization and demobilization, post-war expansion and retrenchment, upgrading of skill in public affairs and marketing in the sixties, and development of new strategies for global competition as the century wound down. How well a company responds to the key business problems of a given period is the primary determinant of its survival and success. The organizing principle of this history, therefore, is challenge and response. Each chapter deals with Polymer's growth and change in response to specific historical challenges.

What follows is not an argument for state-run enterprise. Rather it is evidence that - contrary to popular neo-conservative perceptions - such enterprise has been successfully state-run. As such, it is a story in which Canadians might take some pride and instruction.

Chapter One

“Almost a Miracle:” The Birth of the Canadian Synthetic Rubber Industry - From Experimental Dream to Industrial Reality, 1942-1945

I have never undertaken a war project which has caused me as much worry and concern as did that of synthetic rubber. At the time we undertook the project no synthetic rubber had been made on the continent outside of laboratories. We were very much in the dark as to costs and we were not at all sure that sufficient engineering data was available to allow us to work out the process... it was... a race against time with the possibility of disaster if the project did not turn out well.¹

C.D. Howe (1944)

On December 7, 1941, in a coordinated strike without equal in the annals of war, the Japanese almost simultaneously wrought havoc on units of the United States Pacific Fleet in a surprise attack on Pearl Harbor, invaded the Philippines and Hong Kong, assumed control of Saigon and the rest of French Indo-China, accepted the capitulation of the Siamese government under Marshal Pibul Songgram, started preparations for the invasion of Burma, landed invading forces at two points in southern Siam and at Kota Bharu on the north-east coast of Malaya, and bombed Singapore; all in one day. Other units headed for key invasion points in Sarawak, North Borneo and the Dutch East Indies. Using bicycles as their principal means of transport through the Malayan rubber plantations, the Japanese advanced swiftly and silently, outwitting and out-distancing the British, Australians and Indian defenders.

On December 10, one week before the fall of Penang, the capital warships *Prince of Wales* and *Repulse* were sunk off the east coast of Malaya, giving Japan control of the Indian Ocean and severing the artery of the Allied rubber supply. No other loss of an imported commodity caused as much apprehension on both the war and home fronts as did the loss of this strategically-important material. “Rubber alone,” stated Alan H. Williamson, a one-time Bay Street investment dealer who following the fall of Singapore

¹ Canada. House of Commons. *Debates* (March 23, 1944), p. 1775.

was put in charge of regulating the use of rubber in Canada, “constitutes one of the gravest and most ominous problems in our history.”² The loss of the plantations in the Far East, he declared, “has placed the whole Allied war program in jeopardy.”³

Almost exclusively, Asian plantations had been feeding Canadian manufacturers of rubber products since the early twentieth century. The raw rubber was shipped to the rubber-hungry markets in and around Montreal and Toronto where it was then distributed by brokers and middlemen. The first years of the twentieth century witnessed the concentration and centralization of the Canadian rubber industry in southern Ontario and southwestern Quebec. Here manufacturers were well situated to feed Canada’s growing consumer and industrial hunger for rubber. On the eve of the second world war, less than 8% of Canadian rubber manufacturers were located outside of central Canada.

Initially the industry was made up of a large number of small producers. But by 1910, a small number of large firms had come to dominate the marketplace. This was the era of the Laurier boom – a time when the *Combines Investigation Act* was only belatedly created, when self-dealing and stock watering were widespread, when massive infrastructure construction was attracting large amounts of investment capital, and when free trade with the United States was a matter of passionate debate. It was an era when flamboyant venture capitalists like Max Aitken could make a fortune by creating logically coherent business structures that could dominate their protected national market.⁴ One such structure was Canadian Consolidated Rubber Company, which Aitken founded in 1906 through the amalgamation of the six principal rubber plants in Canada.⁵ The company,

² A.H Williamson, “150,000 Cars Off the Road by Next Year,” *Ottawa Journal* (June 15, 1942), pp. 1–2.

³ *Ibid.*

⁴ See G. Marchildon, *Profits and Politics: Beaverbrook and the Gilded Age of Canadian Finance* (Toronto, University of Toronto Press, 1996), esp. chps. 5, 6 and 8.

⁵ The six companies which Canadian Consolidated owned or controlled were the Canadian Rubber Company of Montreal, Granby Rubber Company, Maple Leaf Rubber Company of

however, did not remain in Aitken's hands for long. The following year, United States Rubber Company, the first American rubber and tire manufacture to move aboard, acquired control of Canadian Consolidated Rubber.⁶

Over the next twenty years, all the major American rubber companies – which had become large by building integrated business organizations – established branch plants in Canada, bring with them foreign technology and managerial expertise.⁷ The American presence continued to grow throughout the period, eventually accounting for two thirds of all rubber goods manufacture in the Dominion.⁸ With increasing regularity, these American firms established Canadian subsidiaries to hurdle the tariff wall and supply markets having preferential trade agreements with the Dominion. The Canadian rubber industry thus became increasingly concentrated and foreign dominated during the first two decades of the twentieth century. Throughout the period, the industry relied heavily on imported raw rubber from the Far East.

These rubber companies manufactured a variety of goods that contributed to human comfort and national defence. Indeed, on the eve of the Second World War, rubber was found in more than fifty thousand different products. It was used in surgical gloves, bullet sealing, electrical insulation, pneumatic rafts, footwear, parachutes, telephone receivers, mattresses and cushions, adhesive tape, rubber bands, life-preserver vests, crash-pad linings and an endless array of products at the heart of modern life.⁹ “Rubber,” noted a

Port Dalhousie, Berlin Rubber Manufacturing Company and Merchants Rubber Company, the last two being located in what is today Kitchener.

⁶ Anonymous, “The Rubber Merger,” *Globe and Mail* (June 26, 1907), p. 6.

⁷ M. French, *The U.S. Tire Industry* (Boston, Mass., Twayne Publishers, 1991), pp. 45–56.

⁸ H. Marshal *et al.*, *Canadian-American Industry: A Study in International Investment* (Toronto, McClelland and Stewart, 1976), pp. 30–33.

⁹ W.L. Finger, “Rubber, Vital Need of Defense,” *Scientific Digest* (February, 1942), pp. 89–91.

contemporary observer, “was the fluxing material without which modern living would be either impossible or tremendously restricted.”¹⁰ At a time when mobility of action was the outstanding characteristic of modern warfare, rubber was essential to motorized transport and combat effectiveness. No military vehicle could operate without rubber tires or treads or its innumerable rubber parts. A typical military jeep, for instance, included more than two hundred items of rubber, such as radiator hoses, fan belts, engine mountings, floor mats, running-board covers and seat cushions.¹¹ On the war front, as well as crucially enhancing reliability by reducing vibration, which was machinery’s worst enemy, rubber made for silence and stealth on the battlefield. On the home front, on the other hand, it was essential to making Canada’s wartime factories hum. Rubber, which was used in transmission belts, hoses, conveyer belts and v-belt drives, made wartime production lines move quicker, quieter and more reliably. The fact that it dampened, connected and stretched any number of industrial processes caused one observer to conclude that it was “an industrial sinew of democracy” without which the wheels of wartime industry would come to a jarring halt.¹²

To be sure, the war brought shortages of other critical materials. Steel, timber and electricity all became scarce during the war. But these were commodities produced in Canada and therefore shortages which could be overcome by increasing production and rationing available supplies. Rubber, on the other hand, was a strategically-vulnerable commodity of which about 90% of the world’s supply came from Java, Sumatra, Indochina, the Malay peninsula and the East Indies - a region that as of mid-December 1941 was in the hands of the Japanese. “With Malaya and the Netherlands East Indies out

¹⁰ P. W. Litchfield, “Rubber’s Position in Modern Civilization,” *Scientific Monthly*, vol. 49 (December, 1939), p. 567.

¹¹ C.D. Howe quoted in *Poly-Progress* (December 1942), p. 1.

¹² R.A. Davies, “Rubber is an Industrial Sinew of Democracy,” *Saturday Night* (June 6, 1942), pp. 10-11.

of the picture, due to their subjection by the Japanese," C.E. Beland at the Wartime Bureau of Technical Personnel in Ottawa noted with the coolness of a statistician, "the remaining source of crude rubber will scarcely be able to supply 8 per cent of the world requirements.... Consequently, we are confronted with a serious problem."¹³

Ottawa chose to handle this "serious problem" by giving birth to a whole new industry, a synthetic rubber industry which was to prove to be the most effective combination of government, industry and academia ever assembled up to that point in Canadian history and probably to the present time. If the Japanese had shut Canada off from the rubber plantations of the far east, then the Allies must turn to the laboratory for a replacement - man-made rubber. Never before had synthetic rubber been produced outside of the laboratory. Expediency would however prove to be the mother of considerable invention. Of the 48,200 long tons of rubber consumed in Canada in 1941 none was in synthetic form. By comparison, at the end of the war over 90% of all rubber consumption was in the form of synthetics.

Of all the remarkable people who were involved in the birth of this wartime infant industry, Clarence Decatur Howe, the dynamic minister of munitions and supply, was pre-eminent. It was he who had the courage to say "go ahead" when the words needed to be said. In April of 1940, as the "phoney" war in Europe began to be overtaken by the reality of total warfare, Mackenzie King appointed C.D. Howe to the new federal department - Munitions and Supply - which was to spearhead and co-ordinate Canada's wartime economy. Under his direction, the government intervened into matters of labour, production, distribution, prices and even profits. The market mechanism, such as it was faintly at work in Canada in 1939, was suspended by a government faced with the immediate and daunting task of mobilizing, conserving and coordinating the economic and industrial facilities of the country for the effective prosecution of the war. Various statutes

¹³ C.E. Beland, "The Rubber Problem," *Canadian Chemistry and Process Industries* (August, 1942), p. 457.

reintroduced or ratified during the war, such as the 1914 *War Measures Act* and the 1940 *Munitions and Supply Act*, gave Howe tremendous powers to control the levels of production and consumption. Howe could buy, sell, mobilize, construct, requisition and ration anything he felt was necessary for the production of wartime material. In addition, he could establish corporations without reference to parliament by simply obtaining letters patent under the *Companies Act*. There was seemingly no barrier to his power, not even a constitutional one, for in wartime the provinces were forced to concede jurisdiction over provincial resources to the central government. Howe thus had a *carte blanche* to produce what he thought was needed, when and how he wanted, for the prosecution of total war. This mandate would lead Howe to implement an elaborate system of controls, incentives and direct interventions which reflected his innate pragmatism and foreshadowed the birth of the mixed economy that would be the abiding post-war legacy of the wartime economy.

As a crucial initial step in this process, on June 24 1940, Howe set up the War Industries Control Board to regulate the most essential sectors of the economy and ensure that his supplies got through. With the overseers of wage and price control, the War Industries Control Board formed an economic control mechanism unprecedented in Canadian history.¹⁴ As a result of Howe's measures, Canadian firms ceased to function in a *laissez-faire* environment, setting prices and establishing product lines as they saw fit. Through its controllers, Ottawa stimulated each major industry to develop and implement plans for industrial expansion. Even such a Gladstonian free marketer as Sir James Dunn, the head of the mighty Algoma Steel Corporation, was forced to cede much of his firm's economic sovereignty to Howe and his department of munitions and supply. "On all sides," notes the business historian Duncan McDowall, Algoma was "the apparent captive

¹⁴ C.R. Waddell, "The Wartime Price and Trade Board: Price Control In Canada In World War II," Ph.D. thesis, York University, 1981.

of the federal government.”¹⁵ During the war, Algoma, like Alcan, Eldorado and MacMillan and Bloedel - to name but a few other Canadian companies - became cogs in C.D. Howe’s wartime wheel of production.¹⁶

As Canada’s economic overlord, Howe’s task was to ensure that the nation’s war industries had a sufficient supply of essential raw materials. He needed to secure the supplies to produce the needed munitions, the transport to carry them and power and fuel to make the nation’s factories hum. The rubber problem was therefore his problem and he chose to handle it in two ways. He embarked upon a program of conservation of all supplies and, simultaneously, he developed alternative sources of rubber. The philosophy behind these measures was not complex: in order to meet wartime rubber requirements, it would be necessary to continue expanding sources of supply while curtailing civilian demand. In order to meet its wartime requirements, Canada would need approximately 50,000 long tons of rubber per year. War production had intensified demand beyond its peacetime pattern. The depression had, for instance, dampened consumer demand for cars and had obliged politicians to skimp on defence budgets. In the 1930s rubber’s potential was wholly evident in the marketplace but demand was depressed. War changed this lethargy into surging demand. In 1942 Canadians were consuming twice as much rubber as they had just three years earlier.¹⁷

To oversee the process of conservation, Howe appointed Alan Williamson to the position of rubber controller, one of nineteen control officers that he hurriedly appointed

¹⁵ D. McDowall, *Steel at the Sault: Francis H. Clergue, Sir James Dunn, and the Algoma Steel Corporation 1901-1956* (Toronto, University of Toronto Press, 1984), p. 183.

¹⁶ See: D. Campbell, *Global Mission: The Alcan Story* (Toronto, Ontario Publishing Company, 1985), chp. 7; R. Bothwell, *Eldorado: Canada’s National Uranium Company* (Toronto, University of Toronto Press, 1984), pp. 79-154; and D. MacKay, *Empire of Wood: The MacMillan Bloedel Story* (Toronto, Dougals & McIntyre, 1982), chp. 7.

¹⁷ J. Kennedy, *History of the Department of Munitions and Supply*, p. 191.

during the first few years of the war to regulate the wartime economy. Faced with a rapidly deteriorating rubber supply in Canada, as the war intensified, Ottawa empowered Williamson to conserve existing supplies of natural rubber and to shift the composition of aggregate consumption patterns from civilian to military ends. With that objective in mind, Williamson issued a series of drastic consumption curtailment orders prohibiting the production of such “non-essential” rubber items as ash trays, car mats, garden hoses, rubber bands, erasers, toilet seats, picture screens, combs, arch-supports, buttons, dish drainers and ink wells.¹⁸ By every indication Williamson’s measures were going to have a profound effect on the civilian way of life. “More than any war-born shortage to date,” one pained observer noted in the winter of 1942, “the rubber squeeze is going to reach down into every bureau drawer and corner cupboard...”¹⁹ Nevertheless the department of munitions and supply maintained the measures were necessary. Rubber was needed to keep the war machine turning. In January 1942, in an effort to make Williamson’s orders more palatable, Howe addressed his fellow Canadians, ensuring them that any material discomfort that might result because of his department’s actions would not be in vain. “Every dollar saved, every purchase delayed, every ounce of material saved,” he promised them, “will go to increase the fighting power of those in the forefront of the battle.”²⁰

The department’s conservation policy was guided, in part, by the recommendations of the Rubber Conservation Committee, a body established in December 1941 to advise Ottawa on rubber conservation and suggest alternative sources for crude rubber. The committee was made up of some of the most influential men in the rubber business: Paul Jones of Dominion Rubber, James Simpson of Dunlop, Harold Ireland of Canadian

¹⁸ Canada. Privy Council Office. “Rubber 4,” *Canadian War Orders and Regulations*, vol. 3. (June 30, 1943).

¹⁹ Anonymous, “Rubber—for Some,” *Business Week* (January 31, 1942), p. 22.

²⁰ C.D. Howe, “Civilians to Help by Curbing Buying,” *Globe and Mail* (January 8, 1942), p. 4.

General Rubber, William Funston of Firestone, George W. Sawin of B.F. Goodrich and Godfrey Smith of the Federal Wire and Cable Company. This caucus of business officials met frequently during the war to tackle the primary task set for it by Howe, namely “to confer with and advise the Rubber Controller with respect to rubber and rubber products.”²¹ It was on the advice of the Rubber Conservation Committee that in April 1942 C.D. Howe set up a national scrap rubber division to further bridge the gulf between demand and the available supplies of crude rubber. As in the United States, the program proved productive although there were some problems.²² Over time, the elastic quality of the recycled rubber recovered was progressively reduced and eventually lost all of its “bounce.” In addition, the supply was finite and likely to dry up as the war progressed. Conservation and recycling alone therefore would not be enough to meet the nation’s need for rubber.

These problems caused some to begin investigating the unlikely and desperate possibility of cultivating a domestic source of natural rubber. In the critical, rubber-short environment of 1942, all potential sources of domestically grown natural rubber were examined carefully. Canadian climatic conditions ruled out planting *Hevea Brasiliensis*, the conventional rubber tree, but did foster consideration of other rubber-bearing shrubs and plants, like milkweed and the Russian dandelion, Kok-saghyz. In early 1942, the Dominion Department of Agriculture invited scientists interested in the issue to meet in Ottawa. As a result, a co-operative program was organized to investigate native plants for

²¹ Canada. Privy Council Office. “Rubber 1,” *Canadian War Orders and Regulations*, Vol. 11, (December 21, 1943).

²² During the period from April 1, 1942 to December 31, 1943 over 28,000 tons of scrap rubber were collected, representing three years’ supply for Canadian reclaiming plants. See, Kennedy, *History of the Department of Munitions and Supply*, pp. 191–92.

their rubber content and to study possible production problems.²³ The botany division of the Department of Agriculture in co-operation with the Experimental Farm agreed to undertake a systematic survey of Canadian plants to determine which, if any, were “suitably rubber-bearing.”²⁴ The department of botany at the University of Toronto, on the other hand, agreed to investigate some of the fundamental aspects of production, while the National Research Council (NRC) accepted responsibility for the development of extraction methods and their application to industry and for the compounding and physical testing of the rubber obtained.²⁵ While these co-operative research efforts offered a tantalizing measure of encouragement, it was apparent that a viable domestic source of crude rubber was at least several years away. The rubber problem demanded a much more immediate solution.

Despite some success at curtailing civilian demand and augmenting raw rubber supplies, it was painfully evident to Howe and his advisors by the spring of 1942 that these measures were at best stop-gaps.²⁶ True, for the moment, they were slowing the deterioration of the rubber supply, but they alone would not be enough to halt the alarming shortages that loomed on the horizon. In May 1942, Howe’s deputy controller of supplies, J.R. Nicholson, wrote to Dr. G.H. Duff of the department of botany at the University of

²³ W.H. Cook, “Co-operative work in Progress in Canada in Preparation of Rubber from Native Plants” (January 8, 1942), *Polysar Papers*, vol. 34, file: National Research Council, 1942-1948.

²⁴ “Memorandum re Production of natural rubber in Canada” (January 16, 1943), *Department of Agriculture Papers*, vol. 3398, file: War files, Russian Dandelion (Re. rubber) and Milk Weed Production in Canada, 1943-1947; and Anonymous, “Development of Natural Rubber Resources,” *Canadian Chemistry and Process Industries* (May, 1943), p. 296.

²⁵ W. Eggleton, *National Research in Canada: The NRC, 1916-1966* (Toronto. Clarke, Irwin and Company, 1978), See especially pp. 241, 261 and 325-26.

²⁶ G.K. Sheils to J.R. Nicholson (May 2, 1942), *Polysar Papers*, vol. 17, file: Plants as a source of rubber, 1942-1944.

Toronto advising him that the government was looking for a more immediate solution to the rubber problem than the one he proposed for the cultivation of native, rubber-bearing plants. Among his many tasks, it was Nicholson's job to examine any scheme - however "ivory-towered" it appeared at first glance - that might produce a domestic rubber supply. Following the fall of Singapore, Howe had put Nicholson in charge of solving the rubber problem. "It's your job to get rubber," Howe had instructed him with characteristic brevity at the end 1941. "Go get it."²⁷ With that objective in mind, Nicholson established communications and functional links with scientists and engineers in the university and at the NRC in Ottawa and the Rubber Reserve Corporation (RRC) in the United States. Like many of his compatriots, Nicholson believed that scientific expertise was essential to the effective prosecution of the war.²⁸ The second global conflict of the twentieth century was shaping up to be a war of science; a war in which military supremacy would be determined by the ability to invent and develop new materials and devices. Nicholson realized this, and beginning in the winter of 1942 developed formal and personal relationships with a number of Canadian and American scientists. From the information they provided, Nicholson determined that the chances of obtaining any appreciable amount of rubber in Canada from an investigation such as Duff was suggesting were "very remote."²⁹ Instead, he had formulated a far more radical answer to the rubber problem. "The solution of the rubber shortage," he wrote Duff, "lies in the speedy production of a large quantity of synthetic rubber."³⁰ This rubber was in no way related to botanical endowment.

²⁷ J.R. Nicholson interview with R. Bothwell, *Bothwell Papers*, B88-0074/022.

²⁸ For a discussion of this broad-based belief see A.B. McKillop, *Matters of Mind: The University in Ontario*, pp. 521-546 and D.H. Avery, *The Science of War: Canadian Scientists and Allied Military Technology during the Second World War*, esp. chp. 2.

²⁹ J.R. Nicholson to G.K. Sheils (March 28, 1942), vol. 1, minute book 1; and J.R. Nicholson (May 25, 1942), *Polysar Papers*, vol. 30, file: DMS Canadian Project, part 1.

³⁰ J.R. Nicholson to G.H. Duff (May 8, 1942), *Polysar Papers*, vol. 17, file: Plants as a source of rubber, 1942-1944.

While Nicholson's statement was revolutionary in that he was proposing a huge commercial undertaking, the *idea* of making a synthetic or artificial rubber was not new. Chemists had been trying to develop a man-made substitute for natural rubber for decades. Indeed, the basic roots of synthetic rubber technology can be traced to 1826 when the English physicist and chemist, Michael Faraday, broke down natural rubber to its basic elements and found it to be largely hydrocarbon - five parts carbon to eight parts hydrogen. Later, in 1860, another English chemist, Charles Hanson Greville Williams, who was carrying out extensive pyrolysis^{*} studies at the University of London, determined that the long coils in natural rubber were actually made up of simpler units of a light hydrocarbon which was later identified as isoprene.^{**} Having reduced rubber to individual molecules, Williams produced a colourless liquid which had the same structural formula as natural rubber. Unfortunately, however, Williams was unable to remake the isoprene into the rubber.³¹ Nevertheless, Williams' accomplishment was enough to stimulate additional scientific endeavours.

Over the next forty years, there were various attempts by enterprising chemists to convert isoprene into rubber. In 1879, for example, the French scientist, Gustave Bouchardat, managed to produce a laboratory synthetic rubber by treating pure isoprene with hydrochloric acid. Within a decade, Sir William Tilden had repeated the feat but with isoprene *not* obtained from the pyrolysis of natural rubber.³² After the turn of the century

^{*} *Pyrolysis* = the chemical decomposition of a substance by heat.

^{**} *Isoprene* = a colourless and volatile substance produced by pyrolysis.

³¹ G. Williams, *Proceedings of the Royal Society*, vol. 10, (1860).

³² The best scholarly account of the prewar synthetic rubber development is R. Solo, *Across the High Technology Threshold: The Case of Synthetic Rubber* (Norwood, Norwood Editions, 1980). See also, F. Howard, *Buna Rubber: The Birth of an Industry* (New York, Van Nostrand Company, 1947); and M. Morton, "History of Synthetic Rubber" in R. Seymour, *History of Polymer Science and Technology* (New York, Marcel Dekker Inc., 1982), pp. 225-238.

German and Russian chemists joined in the effort and eventually found that other hydrocarbons could also be made into rubber-like products. In 1910, for instance, the Russian scientist S.V. Lebedev succeeded in polymerizing^{*} butadiene - a colourless, highly flammable gaseous hydrocarbon, C₄H₆, obtained from petroleum or alcohol - into a rubber-like polymer. Despite Lebedev's success in the laboratory, no commercial-scale production of synthetic rubber resulted at that time. There was neither the economic nor political incentive to find a natural rubber substitute.

That changed during the First World War. Cut off by a British blockade, Germany turned its attention to developing a domestic supply of rubber. The project was only moderately successful, however. While a synthetic rubber known as methyl rubber was produced by the slow, spontaneous polymerization of dimethylbutadiene from acetylene,** it proved to be greatly inferior to natural rubber. Its strength and resistance to abrasion and age deterioration were poor compared to its natural counterpart. This problem would plague the embryonic industry for years to come.³³ Indeed, it caused many people to conclude that synthetic rubber of any kind could only be a very inferior substitute for natural rubber. It also set the pattern whereby synthetic rubber was destined to be a child of strategic expediency, its perfection coming at junctures when war or economic crisis made its natural progenitor scarce or unobtainable.

After the First World War, research on synthetic rubber was carried out on a small scale for several years. The increasing demand for automobiles caused recurring shortages of

* *Polymerizing* = the formation of very large molecules from small molecules, normally, using a catalyst. The resulting material is a polymer.

** *Acetylene* = a colourless, highly flammable or explosive gas, C₂H₂, with a characteristic sweet odour. It is the simplest member of the alkyne series of unsaturated hydrocarbons. It can be manufactured by heating methane to 1500°C in the presence of a catalyst. It can be polymerized easily at high temperatures to give a range of products. It is often also called "ethyne."

³³ Morton, "History of Synthetic Rubber," p. 226.

rubber as well as widely fluctuating prices. This was enough to stimulate new research in industrialized nations.³⁴ During the 1920s, synthetic rubber research was given a helping hand by discoveries taking place in the field of organic chemistry and particularly by the work being done by the German scientist Hermann Staudinger. In a series of published papers, Staudinger, who many consider to be the “grandfather” of modern polymer science, argued that polymers were huge molecules with chain-like structures arising from the chemical reaction of a large number of raw material compounds.³⁵ In the individual molecules of any organic polymer, Staudinger maintained, thousands of atoms were bonded together according to the simple principles that governed all inorganic molecules. According to Staudinger, high polymers – of which rubber was one – were not linked in blocks, rings or networks, as had been previously thought, but in enormously long chains or “macromolecules.” Thus, what was occurring in the laboratory during the first attempts to produce a man-made substitute for natural rubber was that the large number of C_5H_8 molecules were being linked together like a chain of safety pins. It was this formation of one “macromolecule” by the linking together of many smaller components that chemists termed “polymerization.” Staudinger’s discovery markedly accelerated the development of synthetic rubber during the 1920s and 1930s.³⁶

At the time of his discovery, Staudinger had little more than logical assertion to support his concept of long-chained molecules. In 1926, however, at a prominent symposium, Staudinger’s long chain theory received its first confirmation when Herman Mark, a Viennese trained in Berlin, announced the results of his structural analysis of long-chained cellulose molecules carried out using the new technique of X-ray crystallography. Although Staudinger’s academic opponents continued to complain that Mark’s results

³⁴ Anonymous, *Journal of the Canadian Bankers’ Association*, vol. 33 (1925–26), pp. 145–47.

³⁵ Y. Furukawa, *Inventing Polymer Science* (Philadelphia, University of Pennsylvania, 1998).

proved nothing, the imperatives of commerce triumphed when, in 1927, the German chemical company, I G Farben, hired Mark to begin systematically exploring synthetic organic polymers along the lines of Staudinger's theory. These initiatives moved artificial rubber to the threshold of commercial production.

Over the next five years, Mark worked assiduously for I G Farben, directing profitable development of such synthetic materials as polystyrene,³⁶ polyvinyl chloride³⁷ and polymethyl methacrylate,³⁸ until the evolving Nazi rise to power led the company to dismiss him because of his Jewish ancestry. Determined to continue developing Staudinger's ideas, Mark returned to Vienna and eventually fled to Canada. Once in North America, he found himself welcomed by a scientific community which was already familiar with Staudinger's thinking and eager to develop polymer science further.³⁷ At a time when scientists were enthusiastically sharing their preliminary discoveries, Mark spent long hours informally discussing theory and method with fellow scientists like William Wiegand and G.S. Whitby. During and after the Second World War, Whitby - who later edited the first comprehensive study of synthetic rubber chemistry³⁸ - would act as a consultant on the Canadian synthetic rubber program.

³⁶ Morton, "History of Synthetic Rubber," pp. 225-238.

³⁶ *Polystyrene* = a polymeric form of styrene used either as a hard, rigid plastic for molded articles, or a white, light, expanded foam for packing and thermal insulation.

³⁷ *Polyvinyl chloride (PVC)* = a thermoplastic resin used in a wide variety of manufactured items including raincoats, garden hoses, phonograph records and floor tiles.

³⁸ *Polymethyl methacrylate* = a clear synthetic material used exclusively as a substitute for plate glass.

³⁷ See, C.J. Warrington and B.T. Newbold, *Chemical Canada, Past and Present* (Ottawa, The Chemical Institute of Canada, 1970) especially pp. 45-69; and C.J. Warrington and R.V. Nicholls, *A History of Chemistry in Canada* (Toronto, Pitman and Sons Ltd, 1949).

³⁸ G.S. Whitby (ed.), *Synthetic Rubber* (New York, John Wiley & Sons, 1954). Whitby also made a number of practical contributions to the rubber industry, laying the basis for

During the 1930s, Herman Mark went to work at Du Pont in the U.S. There, he was introduced to Wallace Hume Carothers, a young, brilliant, yet personally tortured individual, who had made his name in organic chemistry in 1928 by being the first American to confirm Staudinger's long chain theory. At the age of thirty-two, Carothers left his teaching post at Harvard to head Du Pont's new pure-research laboratory – or "Purity Hall" as the cynics dubbed it – at Wilmington, Delaware. After the turn of the century, Du Pont, along with such firms as General Electric, AT&T and Kodak, played a pioneering role in creating formal research organizations that served strategic and corporate goals while maintaining the air, and to a significant extent the reality, of autonomy from the immediate demands of production.³⁹ Like other formal research organizations springing up across North America at that time, "Purity Hall" was established in reaction to competitive threats that could be countered only through the control of deeper and more systematic scientific knowledge.

At "Purity Hall", Carothers and his small group of associates made a number of critical contributions to synthetic rubber research and development. In 1929, Carothers, drawing on the lifetime of pure research done by Julius Nieuland, a chemist at the University of Notre Dame, found that vinyl acetylene could be reacted with hydrochloric acid to produce

the general use of fatty acids in rubber manufacturing. See N. S. Grace, "The Rubber Industry in Canada, Progress from 1935," in L.W. Shemilt (ed.), *Chemical Engineering in Canada – An Historical Perspective* (Ottawa, The Chemical Society for Chemical Engineering, 1991), p. 318.

³⁹ The best accounts are in D. Hounshell and J. Smith, Jr., *Science and Corporate Strategy: Du Pont R&D, 1902–1980* (New York, Cambridge University Press, 1988); L. Reich, *The Making of American Industrial Research: Science and Business at GE and Bell, 1876–1926* (New York, Cambridge University Press, 1985); G. Wise, *Willis R. Whitney, General Electric, and the Origin of U.S. Industrial Research* (New York, Columbia University Press, 1985); and L. Hodges, "Color it Kodachrome," *American Heritage of Invention and Technology*, Vol. 3, (1987), 46–53.

chloroprene, which displayed the ability to join hands with its neighbours to form long chains. The resulting product had rubber-like properties. The Du Pont Company first called it “Duprene” and later “neoprene.”⁴⁰ While this synthetic rubber was more expensive than its natural counterpart to produce, it was more resistant to attack by gasoline, air and sunlight and therefore proved an ideal material for use in gas hoses and gas tank linings.⁴¹

Du Pont’s “neoprene” was the first man-made rubber that was superior to natural rubber when it was put to a specific use. It was, however, more expensive. First introduced to the public in 1932, neoprene sold at \$1.05 per pound. In the same year, the maximum price for a “first quality ribbed smoked sheet” of natural rubber was less than five cents per pound. It would take another world war and a conjunction of historical developments before synthetic rubber could appeal to consumers on both a quality and price basis.⁴² During the 1930s, however, neoprene met a specific industrial demand and, as a result, it was soon being produced at a profit for Du Pont, even in the midst of the depression.

Du Pont’s success with neoprene had several repercussions. First, it confirmed to American corporations that science could be the driving force behind innovation and that investment in science could pay large dividends. Canada, however, lagged behind the U.S. in terms of expenditures on R&D. Due to the branch plant nature of the economy, most R&D continued to be done south of the border with the results shipped to Canada for productive implementation. Second, it demonstrated to rubber producers that there was a ready market for synthetic rubbers that could meet specific needs. As a result, in the years

⁴⁰ Hounshell and Smith, *Science and Corporate Strategy*, pp. 251-257.

⁴¹ Anonymous, “Neoprene,” *Canadian Chemistry and Process Industries* (February, 1938), p. 55; and Anonymous, “Neoprene in Chemical Construction,” *Canadian Chemistry and Process Industries* (October, 1939), p. 532.

that followed, petrochemical companies working in the field began tailoring their products by applying science to specific consumer requirements. In 1937, William J. Sparks and Robert M. Thomas, two chemists working for the Standard Oil Development Company, one of the largest industrial research organizations in the world, discovered that co-polymerization^{*} of a small portion of butadiene (2%) with isobutylene (98%) - a cheap, readily available refinery by-product - produced an artificial rubber with superior properties from the standpoint of resistance to tear, flexing, and ageing.⁴³ Their product, "butyl rubber," was also less permeable than natural rubber to air, gas and water and thus was ideal for use in tire inner tubes, gas masks, waterproof footwear, ground sheets and fire hoses.

Butyl rubber and neoprene constituted one of two basic categories of man-made rubber - those for specialized uses. A second category of artificial rubber was made up of synthetics that were designed to serve more general purposes. While Carothers and his associates at "Purity Hall" were busy developing neoprene for specific uses, two scientists working at I G Farben's university-style research laboratory near Cologne were attempting to perfect the first general-purpose synthetic rubber for use in automobile and aeroplane tires. The objective led Walter Bock and Edward Tschunkur to try co-polymerizing a second monomer, styrene,^{**} with butadiene. The combination produced a rubber which was far superior to the methyl rubber developed in Germany during the First World War.

⁴² Hounshell and Smith, *Science and Corporate Strategy*, pp. 230-257; J.K. Smith, "The Ten-Year Invention: Neoprene and Du Pont Research, 1930-1939," *Technology and Culture*, Vol. 26 (1985), 34-55.

^{*} *Co-polymerization* = a chemical reaction in which two different monomers are joined together to form a molecular chain.

⁴³ V. Herbert and A. Bisio, *Synthetic Rubber: A Project that Had to Succeed* (Westport, Greenwood Press, 1985), p. 36.

^{**} *Styrene* = a colourless oily liquid, C₈H₈, with an earthy smell. It is used extensively in the rubber industry and in the manufacture of drugs and dyes.

The butadiene–styrene co-polymer, which subsequently became the principal general purpose rubber produced in Canada during the war, was designated buna–S and was patented in Germany in 1929.

Executives at I G Farben were excited about the potential of their new product, but realized that if it, or any other general purpose synthetic rubber, was ever to supersede natural rubber, its production cost would have to be significantly reduced. At no time during its short history did estimates of synthetic rubber cost come within hailing distance of natural rubber prices. The only other variable in synthetic rubber’s cost was the security of natural rubber supply, which in the 1930s was not in question. Synthetic rubber persistently proved more expensive to manufacture. Even when the natural rubber cartel, the International Rubber Regulation Commission, occasionally manipulated prices to unreasonably high levels, there did not appear to be any real prospect that the world would move to synthetics.⁴⁴

During the 1930s, German scientists experimented with new raw material bases such as oil rather than coal tar derivatives in an effort to make synthetic rubber more cost competitive. Before the product could be commercially tested, however, the bottom dropped out of the natural rubber market and I G Farben virtually suspended its synthetic rubber operation. When the National Socialist government came to power in Germany in 1933, I G Farben’s buna operation was minimal. That same year, however, the German synthetic rubber industry was given a boost when Hitler’s government adopted a “Four Year Plan” to rebuild the German economy and achieve the maximum degree of national self-sufficiency. Because of its importance, both from a military and economic standpoint, synthetic rubber became one of the pillars of the German program. Germany had been experiencing chronic difficulties in trying to correct its negative balance of trade. Footing the annual bill for crude rubber imports was one of the nation’s worst foreign exchange

⁴⁴ See, A. Coates, *The Commerce in Rubber: The First 250 Years* (Singapore, Oxford University Press, 1987), pp. 205-300.

problems. As a consequence, the production of synthetic rubber became a part of the German program, with the government financing and directing its development. Experimental production of buna rubber was therefore continued and increased. The Germans were thus the first to realize and pursue the strategic and economic possibilities of artificial rubber. Elsewhere, the initiative remained in private, corporate hands and, given the effects of the depression, there was little incentive for hurried development of synthetic rubber. Only in Germany did the imperatives for forced development of artificial rubber exist.

With renewed German political interest in artificial rubber there came new scientific discoveries in that country. Another copolymer, made from butadiene and acrylonitrile^{*} rather than styrene, was manufactured by I G Farben under the name buna-N. Like neoprene, buna-N synthetic rubber, due to its acrylonite content, exhibited good resistance to chemicals and oils. While the Germans made butadiene from oil and coal tar derivatives, there were other raw materials that could be utilized. In 1938, the Russians made 50,000 tons of rubber from ethyl alcohol, which could itself be made from either potatoes, grains, sugar or molasses. The debate over appropriate raw material to be used in the manufacture of synthetic rubber was to have a long life, especially in Canada where regional and agrarian interests had strong representation in government.

The success that I G Farben had in producing buna-N and buna-S rubber inspired Hitler to announce to the world at the seventh Nazi Party Congress in Nuremberg, held on September 11, 1935, that "the problem of producing synthetic rubber can now be regarded as definitely solved."⁴⁵ Hitler, of course, was overstating the case. Synthetic rubber was still inferior in terms of elasticity and tackiness, and it cost far more than natural rubber to

^{*} *Acrylonitrile* = a colourless, liquid organic compound, $H_2C:CHCN$, used to manufacture acrylic rubber and fibers.

⁴⁵ Quoted in Joseph Borkin, *The Crime and Punishment of I G Farben* (New York, Pocket Books, a Division of Gulf and Western Corporation, 1979), p. 79.

produce. However, the basic scientific and technological groundwork had been laid for the rapid development of synthetic rubber research and production which would occur during the Second World War. As Frank A. Howard, the president of Standard Oil Company, noted in his contemporaneous account of the rise of the synthetic rubber industry, the 1930s witnessed some important commercial and scientific developments which “set the stage” for the wartime “leap” into government-subsidized synthetic production.⁴⁶ The pressures behind Hitler’s synthetic rubber drive simply did not obtain in North America. Unaided by the exigency of war and without government assistance, synthetic rubber production remained at negligible levels. In the year prior to the Japanese incursion into south-east Asia, almost 850,000 long tons of rubber were consumed by the North American public but less than one percent of this was in synthetic form. In fact, only 8,383 long tons of synthetic rubber were produced on the continent that year.⁴⁷ Prior to the fall of Singapore, therefore, large scale synthetic rubber production was an experimental dream.

The man that Howe had put in charge of the rubber program, J.R. Nicholson, was profoundly aware of this when he wrote to University of Toronto botanist G.H. Duff in May 1942. Earlier that year he had received a report from a special committee that Howe had authorized to examine the possibility of manufacturing synthetic rubber in Canada.⁴⁸ The report stressed the experimental nature of synthetic rubber production. Despite the momentous scientific discoveries and innovations of chemists like Faraday, Tilden, Staudinger, Mark, Carothers, Sparks, Thomas, Bock and Tschunker, synthetic rubber development had not progressed much over the last century. On the eve of the Second World War, there was still much confusion surrounding production methods and

⁴⁶ Howard, *Buna Rubber*, especially, pp. 35–46.

⁴⁷ Herbert and Bisio, *Synthetic Rubber*, table 11.1, p. 127.

⁴⁸ “Preliminary Investigation of the Possibility of Synthetic Rubber Production in Canada” (January 28, 1942), *Polysar Papers*, vol. 30, file: DMS Canadian Project, part 1.

compounding procedures.⁴⁹ The manufacturing process was cutting-edge and extremely complicated - as was pointed out by one contemporary observer. "The actual manufacture of synthetic rubber," Larry Gough of *Maclean's* magazine stated, "would present complications to even such deft broth blenders as Shakespeare's three witches."⁵⁰ To this day, the manufacture of butyl rubber remains one of the most complicated commercial processes known to humankind. As late as March 1944 there was confusion about which base - alcohol or petroleum - should be used in the manufacture of butadiene-styrene rubber. After the outbreak of the war, a few academics turned their attention to solving some of these problems. At McGill University, for example, the head of organic chemistry, R.V. Nicholls and his young graduate student Roger Hatch worked on polymerizing butadiene and styrene into a general purpose synthetic rubber.⁵¹ The young Hatch would later join the Canadian synthetic rubber project and play a key role as an expeditor of essential wartime materials. Outside the halls of academe, private enterprise was also grappling with these problems. At Goodyear Tire and Rubber Company, for instance, another of Polymer's future faculty, Ralph Rowzee, was busy designing a pilot plant for the production of synthetic rubber. But again it was only on a laboratory scale. Nevertheless, the special committee's report to Nicholson concluded that synthetic rubber production held out the best chance of overcoming the rubber shortage.

Acting on the committee's findings, Howe, in January 1942, authorized the immediate construction of a synthetic rubber plant at Sarnia, Ontario. At the crossroads of the Great Lakes continental economy and as the point of entry for the biggest, most reliable and secure flow of crude oil into Canada from the United States, Sarnia was the perfect

⁴⁹ *Ibid.*, p. 4.

⁵⁰ L. Gough, "Man Made Rubber," *Maclean's* magazine (March 1, 1944), p. 19.

⁵¹ R. Hatch interview (Toronto, May 2000).

location, according to Howe, for the new industry.⁵² There, on the banks of the broad St. Clair River, its first plant would have easy access to the raw materials and markets. The river itself would be a natural source of comparatively low temperature water needed for the plant's cooling system.⁵³ The Imperial Oil refinery next door would supply the required petroleum-cracked gases for the production of butadiene, as well as take back residual hydrocarbons. In addition, ethyl-benzene, from which came styrene, could also easily be brought in by lake boat from the coke ovens of the Steel Company of Canada at Hamilton and from Algoma Steel at the Sault. In terms of markets, the rubber manufacturing industry was located almost entirely in southern Ontario, where a handful of large "multi-divisional" American rubber companies had established themselves early in the twentieth century in response to the Canadian tariff.⁵⁴

Howe's plan called for the construction of an industrial village capable of producing approximately seven million pounds of synthetic rubber each month. That was the equivalent to the output of 14.4 million natural rubber trees covering 120,000 acres in the

⁵² The pipeline, which was fed from the mid-continent field of the United States, was one of only two pipelines into Canada (the other running from Portland into Montreal) and had a turnover of 35,000 bbls per day. It was necessary to use imported oil; the Turner valley fields in Alberta could supply oil in sufficient quantity but it was not suitable for the desired purpose given that it contained a relatively high proportion of butane in the butane-butylene cut, and it was not close to the rest of the raw materials needed to make artificial rubber.

⁵³ The manufacture of synthetic rubber called for enormous amounts of comparatively low temperature water (during its first few years of operation Polymer was using more than 45 billion imperial gallons per year). Many of the synthetic rubber plants in the United States had been saddled with the problem and expense of building huge water cooling towers. But the waters of the St. Clair River, running along the edge of the plateau on which the Polymer plant was to sit, were of such a year-round temperature – ranging from 34° to 70° F – that the construction of water cooling towers was believed to be unnecessary.

⁵⁴ See, A. Chandler, *The Invisible Hand: The Managerial Revolution in American Business* (Cambridge, Mass., Harvard University Press, 1977), pp. 433-38; and Marshal et al., *Canadian-American Industry*, pp. 30-33.

South Pacific - more than enough to meet Canada's wartime needs. Ten factories would be situated within the plant's gates to develop and produce butadiene, styrene and isobutylene as well as both types of synthetic rubber - buna-S (or GR-S, as it was renamed in Canada and the United States) and butyl rubber. Over 125 miles of pipes would be needed to carry steam, petroleum and water. It was estimated that the construction of the plant would take the better part of two years to complete, at a cost of close to \$50 million. The task was Herculean and some, even within the department of munitions and supply, worried that the objective would not be achieved. "Frankly," Alan Williamson stated in the summer of 1942, "I believe it will require almost a miracle to provide the plants to produce synthetic rubber on schedule in Canada...."⁵⁵

To co-ordinate the massive and complicated task of constructing and operating the first fully integrated synthetic rubber plant in the British Empire, Howe decided to employ a familiar instrument: the public enterprise or crown corporation. There had been a long tradition of Canadian public sector enterprises dating back to pre-Confederation days, as for example when the state financed, built and operated the canal system upon which the commercial empire of the St. Lawrence depended.⁵⁶ With the dawning of the railway era, the government became involved in railroad development. Between 1850 and 1910 railways and the government were closely intertwined. In 1919 this notorious and lengthy intimacy was formally acknowledged by the creation of the Canadian National Railway, a publicly-owned and -operated corporation. These early crown interventions were prompted by various factors: Canada's heavy reliance on primary product exports, its chronic

⁵⁵ A.H. Williamson, "150,000 Cars Off the Road by Next Year," *The Ottawa Citizen* (June 15, 1942), pp. 1-2.

⁵⁶ According to J.E. Hodgetts, the first crown corporation in Canada was the Board of Works, which was formed in 1841. See his "Government Enterprise," *Proceedings of Fifth Annual Conference of the Institute of Public Administration of Canada* (1953), p. 389. See also, H.G. Aitken, *The Welland Canal Company, A Study in Canadian Enterprise* (Cambridge, Mass., 1954), esp. pp. 111-138.

deficiency in capital and technology, the necessity to rationalize regional disparate markets, and the need to shore up the national interest in the face of American economic ambition.⁵⁷ State intervention was thus both political and economic, defensive and expansionist.⁵⁸ Furthermore, according to the economic historian Harold Adams Innis, it was quite effectual: "Government ownership was an effective weapon by which the government has been able to bring together the retarded development and possession of vast natural resources, mature technique and a market favourable to the purchasing of raw materials.... Private enterprise was not adequate to the task."⁵⁹ Yet despite these early examples of publicly-owned business ventures, it was not until the 1930s that the federal government displayed any marked inclination to experiment extensively with the device of crown corporations.

The economic depression of the 1930s, which put economics at the forefront of public policy, provided a new and immediate rationale for government intervention into the economy. Increasingly Canadians, of various political persuasions, called on government to abandon, or at least modify, the *laissez-faire* principles of the previous generation and - as Canadian economist, humourist and historian Stephen Leacock put it - "make things happen."⁶⁰ For some, the crown corporation was viewed as the most effective method of intervention. "The problem of the twentieth century is to make economic government responsible to the public weal," the political economist J.A. Corry declared; "...the solution

⁵⁷ J. Laux and M. Molot, *State Capitalism, Public Enterprise in Canada* (Ithaca, Cornell University Press, 1988), esp., chp. 2.

⁵⁸ H.G. Aitken, "Defensive Expansionism: The State and Economic Growth in Canada," in W.T. Easterbrook and M.H. Watkins (eds.), *Approaches to Canadian Economic History* (Toronto, McClelland and Stewart, 1969), p. 184.

⁵⁹ H.A. Innis, *The Problems of Staple Production* (Toronto, Ryerson, 1933), pp. 80-81.

⁶⁰ See, for example, S. Leacock, "What is Left of Adam Smith," *Canadian Journal of Economics and Political Science*, (hereafter *CJEPS*) vol. 1 (1935), 41-51.

is the fusion of government and business in the independent public corporation.”⁶¹ As a result, between 1932 and 1938, central banking, wheat marketing, radio broadcasting, national harbours and air transportation were all brought under partial or complete public ownership and control. The quest for monetary leverage and a national economy as well as the challenge of new technologies were prominent in these decisions.

Howe was the moving spirit behind many of these interventions. A free enterpriser at heart, he was willing to use the full force of government to accelerate development in niche areas of the economy that lacked either capital or technology. Using the power of the state, he put into place an economic structure within which private enterprise could competitively function. The instinct was deeply rooted in the Canadian economic experience. Howe was simply its latest interpreter. For Howe crown corporations did not represent an attempt by the government to encroach on the field of private enterprise. On the contrary, they supplemented and tended to support the private sector of the economy by providing services, raw materials, and technology that would not otherwise be available.⁶² Indeed, Howe’s own career in the private sector had introduced him to the interventionist state; many of the grain storage facilities he had built were the result of government commissions. War accentuated these conditions.

During the war, Howe established twenty-eight crown corporations in order to overcome a number of structural barriers to national economic performance. “Howe’s tenure as minister of supply,” notes the historian J.A. Schultz, “established the corporate form as the instrument of choice for the execution of public policy.”⁶³ His crown corporations served a number of functions. For example, Research Enterprises Ltd. was

⁶¹ J.A. Corry, “The Fusion of Government and Business,” *CJEPS*, vol. 11 (1936), 301–316.

⁶² C.D. Howe, “Why Crown Firms?” *Financial Post* (December 20, 1958), pp. 23–24.

⁶³ J.A. Schultz, “Shell Game: The Politics of Defense Production 1939-1942,” *American Review of Canadian Studies*, vol. 16 (Spring, 1986), p. 41.

set up in July of 1940 to hurry the development of radar and optical instruments - a field in which Canada previously had no facilities or industrial expertise and lacked technology.⁶⁴ Others, like Veneer Log Supply Limited, Howe created to supervise the acquisition and transportation of hardwood logs for aircraft veneers.⁶⁵ Howe's wartime crown corporations thus served a number of production and administrative functions particularly because their corporate form was often more efficient and effective at carrying out their tasks than other instruments of government.⁶⁶

Not everyone, however, supported Howe's use of crown corporations. For instance, the novice Conservative M.P. John Diefenbaker, who denounced big government in all its forms, anticipated that Howe's crown companies would enjoy subsidies after the war that would enable them to compete unfairly with privately owned firms.⁶⁷ Howe's use of the crowns was in his opinion "the first move along the road to socialization."⁶⁸ Ironically, it was in the "Red Tory" urge to employ the state powers to collective economic ends that the "crowns" were ideologically rooted. Conversely, those on the left viewed Howe's crown corporations as capitalist instruments for establishing, at enormous public expense, plants, equipment and technology which at war's end would be sold to private interests at a fraction of their intrinsic value.⁶⁹ The fledgling C.C.F., for example, charged that the "crowns" were in effect the Trojan horses of capitalism. For his part, Howe thought these criticisms patently ideological and therefore misplaced. "This fetish in the minds of some people, that everything is wrong that is private industry, and in the minds of others, that

⁶⁴ Kennedy, *History of the Department of Munitions and Supply*, chp. 36.

⁶⁵ *Ibid.*, chp. 40.

⁶⁶ For more on the function of wartime crown corporations see S.F. Borins, "World War II Crown Corporations: Their Functions and Their Fate," pp. 437-475; and Kennedy, *History of the Department of Munitions and Supply*, pp. 286-519.

⁶⁷ Canada. House of Commons. *Debates* (March 21, 1944), pp.1715-1717.

⁶⁸ *Ibid.*, p. 1715.

⁶⁹ Canada. House of Commons. *Debates* (March 27, 1944), pp. 1868-9.

everything is wrong that is public industry,” he later stated, “is the most ridiculous situation.”⁷⁰ Howe was a pragmatist and in his reading of the Canadian marketplace there were some situations that simply demanded state intervention, not as a panacea in its own right, but to hurry the development or protect the niche areas of the economy that either lacked capital and technology or needed the assistance of quasi-public management to establish themselves. Such was the rationale for the establishment of Polymer Corporation on the banks of the St. Clair River.

Incorporated on February 13, 1942, Polymer Corporation Limited was created to coordinate the massive and complicated task of constructing and operating the first fully integrated synthetic rubber plant in the British Empire. It was established as a private company by letters patent issued under the *Companies Act*.⁷¹ The order-in-council commissioning the project authorized Polymer “to forthwith proceed to acquire, construct, install and establish the necessary land, buildings, machinery, equipment and plant for the manufacture, production and storage of synthetic rubber.”⁷² The corporation would not have title to any assets (these were held in the name of the crown) and would oversee the operation of the plant once it was constructed.⁷³

The technological “know-how,” manpower and management for the project, however, would be provided by private industry. When the war broke out in Europe, only one North American company had a full knowledge of the art of styrene production - Dow Chemical Company. Dow Chemical had a long and distinguished history in the field. The company was founded in 1897 by Herbert Henry Dow to extract bromine and chlorine brine around Midland, Michigan. To chlorine bleach, the company’s first product, Dow slowly added a

⁷⁰ *Ibid.* (May 14, 1946), p. 1517.

⁷¹ These letters patent are reproduced in *Minutes of Committee on Public Accounts*, 1960-1961, p. 436.

⁷² P.C. 2369 (March 27, 1942), p. 1.

⁷³ *Ibid.*, p. 2.

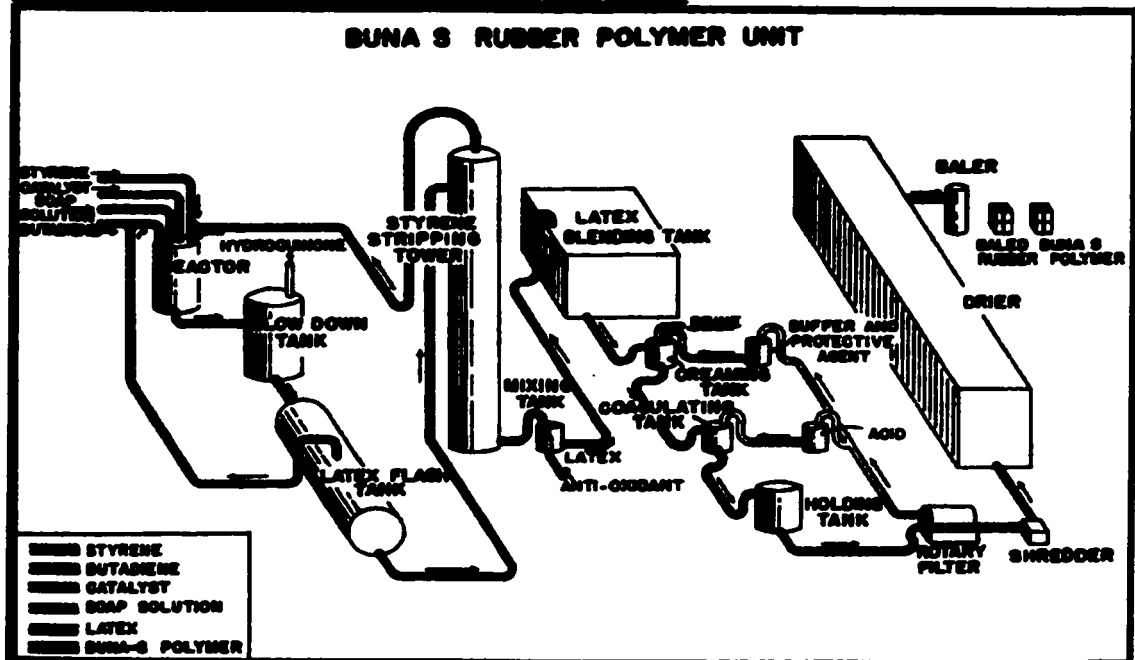
variety of other chemicals: chloroform in 1903, ethylene in 1915, phenol in 1922. In 1937 Dow Chemical invented a process for the commercial production of styrene, a product then used mainly in the manufacture of plastics. At the time of the Japanese advance into southeast Asia, Dow was the only commercial producer of styrene in North America.⁷⁴ With that in mind, in the summer of 1942 Nicholson arranged for Dow Chemical, through its subsidiary Dow Chemical of Canada Limited, to man and operate the styrene plant at Sarnia.⁷⁵

The art of butadiene production, on the other hand, was the purview of Imperial Oil, one of three large-scale, heavily-integrated oil companies operating in Canada. Like Dow, Imperial had a rich history. Imperial was established in 1880 by Joseph Englehart, an emigrant from Cleveland, Ohio, the oil refining capital of the United States. In 1898, the company was acquired by J.D. Rockefeller's huge, vertically-integrated business enterprise, Standard Oil. In 1907, as a result of the U.S. government's anti-trust action, Imperial Oil passed into the hands of Standard Oil Company of New Jersey. Standard Oil was a pioneer in the commercial production of butadiene and on the eve of the Second World War was the world's largest producer of the product. Standard Oil also held patents in the field of butyl rubber production. In March 1941, four years after the initial discovery of butyl rubber by its chemists, William Sparks and Robert Thomas, Standard Oil erected a 10 ton-per-day plant at Baton Rouge, Louisiana. It was the only butyl rubber plant of its kind. The Rubber Substitutes Advisory Committee thus concluded in early 1942 that the Canadian government would also have to obtain the support of Imperial Oil if synthetic

⁷⁴ Herbert and Bisio, *Synthetic Rubber*, p. 90-91.

⁷⁵ "Formal Agreement" (May 1, 1942), *DMS Papers*, series A, vol. 541, file: "Formal Agreement between Polymer Corporation Limited and Dow Chemical of Canada Limited." Also see, Shell Oil Company of Canada, *The Canadian Petrochemical Industry* (Toronto, Ryerson Press, 1956), p. 6.

Figure 1.1
Buna-s (i.e.GR-S) co-polymerization process



Source: St. Clair Processing Corporation, Ltd., *Synthetic Rubber: A Process Digest*, p. 26

rubber production in Canada was to become an industrial reality.⁷⁶ Based on the committee's recommendation, Nicholson negotiated an operating arrangement with Imperial Oil.⁷⁷ When the construction phase of the project was finished, Imperial established a subsidiary, St. Clair Processing Corporation, to oversee the butyl rubber and butadiene units at Sarnia.

Producing butadiene and styrene, however, was only two phases of the overall task of manufacturing GR-S rubber. To manufacture a finished product these two monomers had to be co-polymerized, that is, compounded into synthetic rubber. This third, rubber-compounding stage involved the intricate use of promoters, accelerators, vulcanizers, anti-

⁷⁶ Rubber Substitutes Advisory Committee, "Preliminary Investigation of the Possibility of Synthetic Rubber Production In Canada" (January 28, 1942), *Polysar Papers*, vol. 30, file: DMS Canadian Project, part 1.

⁷⁷ The agreement, which was informal at first, was finally formally ratified at the end of the war. See, "Formal Agreement" (May 23, 1945), *DMS Papers*, series A, vol. 541, file: "Formal Agreement - Imperial Oil Limited - Polymer Corporation Limited."

oxidants, softeners, fillers and other chemical agents which made the rubber suitable for manufacturing tires, tubes and other fabricated products. On the eve of the Second World War, compounding was a highly developed and confidential trade secret confined to those in the rubber industry. Neither the oil or chemical industry had knowledge of this highly-technical trade art. As a result, Nicholson reached an agreement with Canadian Goodrich, Canadian Goodyear, Canadian Firestone and Dominion Rubber, a subsidiary of U.S. Rubber, to manage the co-polymerization and compounding process. On March 26, 1942, the four companies established the Canadian Synthetic Rubber Company (CSR) and selected Ralph Rowzee to manage the operation.⁷⁸ For its services, CSR was to be paid a management fee on the basis of so many cents per pound of product produced.⁷⁹

The structure and organization of the Polymer project thus paralleled other wartime efforts emanating from Ottawa. It was a two-pronged approach with industry contributing management “know-how” and manpower, and with government, through Polymer, coordinating the overall production effort.⁸⁰ The government’s involvement, which was criticized by many at the outset, was a necessity of bringing the divergent chemical, oil and rubber interests together to make synthetic rubber production in Canada a reality. Time was of the essence. The sense of urgency did not afford the luxury of waiting for private enterprise to mobilize. Government initiative was needed.

Three days after incorporating Polymer, Howe invited Colonel Arthur L. Bishop, the president of Consumers Gas Company, to accept the presidency of the new crown

⁷⁸ Shell Oil, *Canadian Petrochemical Industry*, p. 6.

⁷⁹ In keeping with agreements reached between the parent companies and the RRC in the United States, Polymer paid CSR 9 cents per pound for the first 15,000 tons produced, 7.5 cents per pound for the second 15,000 tons, 6 cents per pound for the third, 5 cents per pound for the fourth, 4 cents per pound for the fifth and 3 cents per pound for all rubber produced in excess of 75,000 long tons per year.

⁸⁰ “Notes on the Organization of Polymer Corporation Ltd. for Operations” (March 3, 1943), *DMS Papers*, vol. 6, folder 7.

corporation. Howe often turned to industry to oversee his enterprises. Indeed, much of the operational success of the department of munitions and supply was a result of his decision to retain the services of what became known as the “dollar-a-year” men. These were the senior businessmen of the nation who served the country in some executive capacity for the tokenistic retainer of a dollar a year. So many of these men came to Ottawa during the first few years of the war that the leader of the C.C.F., Major James Coldwell, declared that the ministry of munitions and supply had become a “concentration point for the Canadian Manufacturers’ Association and its friends.” Bishop’s appointment certainly did nothing to deflate the charge. He, like his so many of his fellow “dollar-a-year” men, was a captain of Canadian industry. In addition to being the head of Consumers Gas, he was a director of the Imperial Bank of Canada, Toronto Shipbuilding Co., and Consolidated Mining and Smelting Corporation. In the early part of 1942, Bishop had come to the attention of those at the department of munitions for his criticism of the government’s handling of the war. A member of the Committee for Total War - a hawkish Toronto-centric, pro-Tory group - Bishop wanted the government to get on with the war more energetically. According to Bishop, there was only one way to wage total war: that was with total effort. No half measures, in his opinion, were consistent with national honor. In January he and his fellow committee members signed their names to a full page advertisement in the *Globe and Mail*, pointing out that there was a lot of unused talent around that needed to be put to effective use.⁸¹ The advertisement came to the attention of R.C. Berkinshaw, who recognized Bishop’s name. As chairman of the Wartime Industries Control Board, Berkinshaw had come into contact with Bishop on several occasions. Berkinshaw thought Bishop a “sincere” and “conscientious” individual and admired his “forthright manner.”⁸² In Berkinshaw’s opinion he was well-suited to oversee the Polymer project, and he recommended him to Howe for the top position at Polymer. For some at the department,

⁸¹ *Globe and Mail* (January 12, 1942), p. 3.

⁸² Bertin, “The Long Chain,” p. 49.

however, Bishop was not the ideal choice. His educational experience was not in the chemical field and - as he later confided to C.D. Howe - he knew "next to nothing about synthetic rubber or its manufacture."⁸³ But, then again, who did? With the exception of those on the Rubber Substitutes Advisory Committee and a handful of chemists within academe, no one in Canada knew the secret of synthetic rubber production. Nevertheless, A.H. Williamson, R.A.C. Henry and H.R. MacMillan thought Greville Smith, president of Canadian Industries Limited, a better man for the job. "We are all agreed that if we could get Mr. Greville Smith of Canadian Industries to undertake this responsibility, this would be one of the very best selections that could possibly be made."⁸⁴ Howe, however, had no time for wishful thinking. Wartime conditions demanded management-on-the-run. According to Howe, one simply had to grab the most qualified manager when one could find him and, this time, Bishop was that man. After three frenzied days spent winding up his affairs, Bishop assumed his responsibilities as president and chairman of the board of directors on February 20 and thereafter devoted most of his time to the activities of the company.⁸⁵

There was a slight delay in the appointment of the other directors to the board, as Howe did not consider it desirable to choose anybody from the rubber, petroleum or chemical industries. Yet, he wanted men accomplished in the ways of business. He was a great believer that knowledge derived from experience.⁸⁶ "There is no substitute for having done the job before..." he told J.R. Nicholson.⁸⁷ Thus, if the government was going to build a synthetic rubber plant, Howe thought it wise to put in charge individuals who had some first-hand experience with large-scale industrial construction. In late February 1942,

⁸³ Bishop to Howe (May 18, 1942), *DMS Papers*, vol. 5, folder 1.

⁸⁴ Williamson to Berkinshaw (February 10, 1942), *DMS Papers*, vol. 5, folder 1.

⁸⁵ Nicholson to G.K. Sheils (March 28, 1942), *DMS Papers*, vol. 5, folder 1.

⁸⁶ See Howe's comments to the House of Commons. *Debates* (June 16, 1943), p. 3712.

⁸⁷ Howe to Nicholson (February 8, 1942), *DMS Papers*, vol. 5, folder 1.

Howe asked Nicholson and Berkinshaw to compile a list of such men from the financial and industrial sectors. With one exception, it was from this list that the rest of the directorate was appointed.⁸⁸

Among the first to be selected were Wallace Campbell, president of Ford Motor Company of Canada, and Douglas Ambridge, assistant general manager of Ontario Paper Company. Campbell had been one of the first dollar-a-year men to come to Ottawa in 1939, serving as head of the War Supplies Board.⁸⁹ Ambridge, on the other hand, joined the department of munitions and supply two years later, in October 1941, serving initially as the director of the shipbuilding branch. Howe's decision to appoint Ambridge and Campbell to Polymer's board of directors was by no means unusual as he was frequently moving people between government departments and crown corporations. Ambridge was an alumnus of McGill University, having graduated in 1923 with a B.Sc. in chemical engineering. He had subsequently held a number of executive posts in the Canadian pulp and paper industry. What was appealing about Ambridge, besides his extensive business experience and his background in chemical engineering, was that in 1938 he had overseen the construction of a large-scale pulp and paper plant at Baie Comeau, Quebec. Howe needed such men. The construction of the synthetic rubber plant at Sarnia promised to be one of the most complex and expensive in Canadian history.

Albert C. Guthrie, the next of Howe's appointees, had also overseen the construction of a manufacturing plant and was a veteran of Canadian business. Guthrie had been involved in manufacturing since 1912, and at the time of his appointment was president and general manager of Simmons Ltd. Guthrie shared many characteristics with another of

⁸⁸ Sheils to Pettigrew (February 15, 1942), *DMS Papers*, vol. 5, folder 1.

⁸⁹ There are a number of rich and colourful histories about the dollar-a-year men. Among the best of them are J.L. Granatstein, *The Ottawa Men: The Civil Service Mandarins 1935-1957* (Toronto, Oxford University Press, 1982); and D. Owrarn, *The Government*

Howe's delegates, Gilbert C. LaBine, a hard-nosed mining promoter and president of Eldorado Mines Ltd. Both men had a deep determination to succeed and had demonstrated a willingness to dedicate themselves fully to the job at hand. Of the two, LaBine was the more adventurous. He had started business life as a prospector, searching for copper with his brother Charlie on the Canadian mining frontier. Instead of copper, however, the LaBine brothers found pitchblende at Great Bear Lake in the North West Territories. From pitchblende came radium and uranium. During the 1930s and early 1940s the brothers made, lost and remade a fortune, first peddling radium – which during the 1930s fetched \$75,000 per gram on the world market as a “wonder” cure for cancer – and then by selling uranium to the U.S. Army to make “uranium bombs.”⁹⁰ In the summer of 1942, Howe, sensing the strategic need for uranium, nationalized the LaBine brothers' company, Eldorado Mines Ltd.⁹¹ Eldorado thus came into the fold of C.D. Howe's wartime crown corporations.

The final director appointed was not on Nicholson's list. This was for an obvious reason: A.J. Crawford was not a captain of Canadian industry but rather an agent of organized labour. When he was contacted by Howe six weeks after the other directors had been appointed, Crawford was working in Toronto as the Canadian general representative of the Sheet Metal Workers' International Association. For political and practical reasons, Howe decided that it would be desirable to have a representative of organized labour appointed to Polymer's board of directors.⁹² Howe was particular as to the sort of individual that that labour representative should be. He did not want anyone who might

Generation: Canadian Intellectuals and the State, 1900–1945 (Toronto, University of Toronto Press, 1986).

⁹⁰ R. Bothwell, *Eldorado*. On the relationship between Howe and G. LaBine see pp. 99–102, 120–123 and 157.

⁹¹ *Ibid.*, chp. 4.

⁹² Howe to Crawford (April 24, 1942), *DMS Papers*, vol. 5, folder 1.

take a confrontational approach when dealing with the other directors. The Canadian synthetic rubber project was going to be challenging enough; there was no need to complicate things further, Howe thought, by appointing someone who might “rock the boat.” On the other hand, he wanted labour on the boat paddling away uniformly with business to reach a common wartime goal.⁹³ He did not want labour strife in a key wartime industry. The reports circulating about the department of munitions and supply suggested that Crawford was neither radical nor antagonistic and would accept Howe’s appointment if asked.⁹⁴ “I have been given to understand that you would be a suitable person to serve as a director in this capacity,” Howe wrote to Crawford on April 24, “and that you would be willing to act if requested.”⁹⁵ Crawford wrote back immediately accepting the appointment and assuring Howe that he would “co-operate with the president and directors at all times.”⁹⁶ Crawford and the other directors – whom C.D. Howe celebrated as “the cream of Canadian industrial talent” and Stanley Knowles, a member of C.C.F., condemned as the “usual who’s who of big business”⁹⁷ – would guide the Canadian synthetic rubber program through its crucial initial phase.

The new board met for the first time in its capacity as directors of the crown company on March 10, 1942. The meeting manifested the Promethean nature of the Polymer project. When the special investigating committee presented its report in January 1942, it called for the construction of a plant capable of producing about twenty thousand long tons of synthetic rubber per year. It was estimated that the cost of such a plant would be approximately \$20 million. But by March 1942, Nicholson had come to the conclusion that

⁹³ *Ibid.*

⁹⁴ G.K. Sheils to H. Bordon (March 20, 1942) *DMS Papers*, vol. 5, folder 1; and H. Bordon to A.L Bishop (March 23, 1942), *DMS Papers*, vol. 5., folder 1.

⁹⁵ Howe to Crawford (April 24, 1942), *op. cit.*

⁹⁶ Crawford to Howe, (April, 27, 1942), *DMS Papers*, vol. 5, folder 1.

the plant at Sarnia needed to be bigger. Those with whom he had conferred all felt that it was "neither wise nor sound" for the corporation to spend the large sum of money contemplated on a plant that upon review would not meet Canada's wartime requirements.⁹⁸ This was a conclusion recently reached and reflected the mystification surrounding synthetic rubber production. There was thus confusion and debate about nearly every aspect of the project.

Having heard Nicholson on the matter, Polymer's board recommended increasing the size of the plant to produce 34,000 tons of GR-S and 7,000 tons of butyl rubber per year. In effect they were calling for a doubling in the size of the project. Based on the cost of similar plants in the U.S., it was estimated that the enhanced proposal would cost Ottawa an additional \$20-30 million.⁹⁹ Howe, who like everyone else was struggling to come to terms with the intricacies of the matter, was somewhat concerned by the sudden escalation in the size and cost of the original 20,000 ton/\$20 million project. As a result, he asked Nicholson to have the engineers at the Badger Company and the Kellogg Company, two of the firms which Polymer commissioned to design and construct the plant at Sarnia, prepare new estimates on the basis of producing approximately 20,000 tons per annum of GR-S rubber and approximately 14,000 tons per annum of butyl rubber. Given that butyl rubber could be produced for approximately 60% of the cost per ton of the GR-S rubber, Howe thought the idea of doubling the production of butyl rubber was the fiscally responsible alternative to the board's plan.¹⁰⁰ Polymer's board of directors did not like the idea, however, and recommended against it. In May, Bishop informed Howe of the board's opinion that if it was correct that Canada needed a minimum of 46,000 long tons of rubber

⁹⁷ Canada. House of Commons. *Debates* (June 16, 1943), p. 3715 and p. 3711, respectively.

⁹⁸ Nicholson to Sheils (April 17, 1942), *DMS Papers*, vol. 5, folder 1.

⁹⁹ "Minutes of the Board of Directors" (March 10, 1942), *Polysar Papers*, vol. 1, book 1.

¹⁰⁰ Sheils, "Memorandum" (April 27, 1942), *DMS Papers*, vol. 5, folder 1.

to meet the war requirements and Polymer could produce within 5,000 tons of that amount for a capital investment of approximately \$45 million then that was the “appropriate course” to follow.¹⁰¹ “[A] well balanced program capable of producing that amount is the one we should follow,” wrote Bishop, “rather than one which will call for a capital expenditure of nearly \$35,000,000 and gives you less than half of the GR-S rubber that is required for combat and heavy service tires and more butyl than is required for other purposes.”¹⁰²

Upon reflection, Howe decided to authorize the new, expanded program.¹⁰³ This was the first indication that Howe would give ample leash to his managers. “[An] order-in-council to this effect will be forwarded to the Governor in Council shortly,” Howe wrote to Bishop in mid May. “In the meantime,” he continued, “it will be in order for you to advance your arrangements as rapidly as possible.”¹⁰⁴ Expediency ruled the day. Howe had empowered a board of men he respected, watched them overturn his initial plans and then backed them up, and, in so doing, had manifested his qualities as an industrial tactician in planning. In the months that followed, Polymer’s chief negotiator, J.R. Nicholson, went ahead and signed preliminary contracts with the War Production Board based on the new 41,000 tons per year program.¹⁰⁵ This constituted a real wartime leap of faith.

J.R. Nicholson was crucial to the early success of the Canadian synthetic rubber program – a fact not lost on the new board of directors. Before Polymer was incorporated, Nicholson had been involved in nearly every decision relating to the development of the project. During the winter of 1942, Nicholson worked on obtaining the plans, specifications, technical information and equipment necessary for the production of synthetic rubber in Canada. He had set up and chaired the Rubber Substitutes Advisory

¹⁰¹ A.L. Bishop to C.D. Howe (May 18th, 1942), *DMS Papers*, vol. 5, folder 1.

¹⁰² *Ibid.*

¹⁰³ C.D. Howe to Bishop (May 19th, 1942), *DMS Papers*, vol. 5, folder 1.

¹⁰⁴ *Ibid.*

¹⁰⁵ G.K. Sheils to C.D. Howe (May 1, 1942), *DMS Papers*, vol. 5, folder 1.

Committee, the Synthetic Rubber Technical Committee and the Canadian Technical Advisory Committee. He successfully negotiated with officials at Standard Oil to have the I G Farben patents, which they had acquired for the production of GR-S rubber, made available in Canada on a royalty-free basis for the duration of the war.¹⁰⁶ He established relationships with many of the principal personnel associated with the program in the United States as well as with the heads of the private rubber companies in Canada. In cultivating these alliances, he had gained a sound knowledge of financial, legal and, to a lesser extent, scientific aspects of the synthetic rubber production. By March 1942, Nicholson could claim to be one of only a handful of Canadians who had a broad-based understanding of the synthetic rubber business. Bishop was fully aware of Nicholson's importance and in March had asked him to join Polymer on a full-time basis. In all likelihood Howe would have made the request himself, but the fact that Bishop made the offer before discussing it with authorities at his department annoyed him and his senior staff. In a letter to R.C. Berkinshaw, G.K. Sheils, Howe's deputy minister, voiced the department's disapproval.¹⁰⁷ Bishop's oversight was one in a string that would ultimately lead to his removal as president. This time, however, the ministry dealt with the issue matter-of-factly. "The damage is done and I do not see how we can very well oppose the move," wrote Sheils, "particularly as Nicholson will undoubtedly be making a great contribution to the war effort in the proposed capacity [i.e. general manager] with this Company."¹⁰⁸ As a result, on April 1, 1942, Nicholson wrote to Howe tendering his resignation as deputy controller of supplies. "The need of getting a Canadian synthetic rubber plant into production as quickly as possible is so great," he stated, "that I welcome the opportunity of being able to devote the whole of my energies towards making this

¹⁰⁶ Nicholson to Sheils (April 20, 1942), *DMS Papers*, vol. 5, folder 1.

¹⁰⁷ G.K. Sheils to R.C. Berkinshaw (April 1, 1942), *DMS Papers*, vol. 5, folder 1.

¹⁰⁸ *Ibid.*

venture a success.”¹⁰⁹ From that day forward, until leaving Polymer in 1951, Nicholson devoted all of his time and energy to the Polymer project.

Between April and August 1942, Nicholson and the other officers at Polymer worked to pave the way for the beginning of construction, receiving tenders, establishing agreements and signing contracts for goods and services, fine-tuning design plans, making housing arrangements for the construction workers (who numbered 5,579 at the peak of the project), working to have the machinery and equipment exempt from duties and taxes, and co-ordinating the numerous construction companies that were to be involved. As the end of the summer of 1942 approached, Canadians could take some comfort in knowing that their government had taken the first steps towards resolving the rubber crisis. Nevertheless, the vast majority of the work lay ahead.

In the months leading up to construction at Sarnia, the novel character of the synthetic rubber project again became apparent. This time it was in the debate over the appropriate raw material to be used in the manufacturing of butadiene. The debate was rooted in scientific and technical uncertainty and political and economic interests. When in January 1942 Nicholson contacted his colleagues at the Rubber Reserve Company (RRC) in Washington with the Canadian plan to produce synthetic rubber, he was informed that crude petroleum was the best, that is, the cheapest and most readily available of the raw materials which could be used as a feedstock in the manufacture of butadiene for use in GR-S rubber.¹¹⁰ On this information several critical decisions were made. Sarnia, as the point of entry for the largest flow of crude oil into Canada, was chosen as the site for the new Canadian synthetic rubber plant. Imperial Oil was contracted to manage the butadiene-from-petroleum plant and Standard Oil was hired to do much of the design and engineering work. During the ensuing months, however, a conjunction of technological, economic and

¹⁰⁹ Nicholson to Howe (April 1, 1942), *DMS Papers*, vol. 5, folder 1.

¹¹⁰ “General Report” (January, 28, 1942), *Polysar Papers*, vol. 30, file: DMS Canadian Project, part 1.

political developments gave pause to the initial decision to produce synthetic rubber solely from a petroleum feed stock.

At the time of Polymer's inception in February 1942, butadiene, which constituted approximately seventy-five percent of the rubber co-polymer GR-S, could be manufactured in several different ways. It could be made from oil, natural gas, coal or alcohol. The Canadian decision to use petroleum was made based on advice from the RRC and NRC that the cost of producing butadiene from oil, rather than from any other base, would be appreciably cheaper and would ensure production of synthetic rubber in commercial quantities at the earliest date.¹¹¹ As the summer of 1942 approached, however, there was a growing concern in Canada that the equipment and feed stocks necessary for the production of butadiene from petroleum would be difficult to obtain due to developments taking place in the United States.¹¹² There, changes were being made to the system of "priorities" which had been set up in the summer of 1940 to control the flow of essential materials and equipment.

Nearly everything that went into the plant at Sarnia was on a priority list in Canada and the United States. These lists of priorities – i.e. general government instructions to producers and dealers requiring them to fill orders bearing a higher rating before they filled orders of a lower rating – were generated and administered by the War Production Board (WPB) in the U.S. The WPB had decided early in the war that in order to keep the war machine running certain vital items would have to be restricted for use only in essential war-related industries. Those with a high priority rating, which had been assigned on the basis of military necessity, went directly to the head of the industrial queue, no matter how

¹¹¹ C.Y. Hopkins to J.R. Nicholson (January 7, 1942), *NRC Papers*, vol. 129, file: Proposed manufacture of synthetic rubber in Canada, 1941-1942.

¹¹² "Memorandum for Polymer Board Re. Negotiations with Officials of the War Productions Board at Washington," (May 15, 1942), *Polysar Papers*, vol. 12, file: Directors' Reports, 1942-1943.

many other consumers were there ahead of them. The more vital the item for the allied war effort, the greater priority given to its manufacture and the higher the rating it received.¹¹³ The first priorities categories instituted by the WPB were simply A, B and C, with each letter-section having ten subdivisions. But as the war production effort intensified, the A's began to crowd each other in some factories and a new system of lettering came into effect, with A-1-a etc., and finally AA's and AAA's. Since over half of the items to be used at Sarnia were to be imported from the United States, Polymer understood that it was essential to obtain a high priority rating from the WPB. This was imperative if Polymer was to bring the construction of the plants to a speedy completion. During the winter of 1942, Polymer had received assurances from a number of high-ranking U.S. officials that it would indeed be assigned a high priority rating.¹¹⁴ Despite these assurances, it looked, by the spring of 1942, increasingly unlikely that Canada would get the petroleum and equipment it needed to manufacture synthetic rubber on time. This was not due to any discrimination on the Americans' part. Nor was it the case that the American synthetic rubber program was getting the vital material and equipment it needed while the Polymer project was not. The Americans, in particular the executives at the RRC, considered the

¹¹³ For a more detailed description of this complex and ever-changing wartime system of priorities see R. Warren James, *Wartime Economic Co-operation: A Study of Relations between Canada and the United States* (Toronto, Ryerson Press, 1949), pp. 67-86.

¹¹⁴ On February 6, 1942, for instance, S. T. Crossland, vice-president of the RRC, told J.R. Nicholson that he would assist in every possible way in the building of the Canadian rubber plant. On February 21, Crossland and Clay Johnson assured Nicholson that Canada would be included in the various patent pools which were at the time in the making. Again, in mid March, Crossland informed Douglas Ambridge that U.S. rubber authorities were aiming for a wartime production of 800,000 tons and that the Canadian contribution to this (at Sarnia) was being scheduled to come into production in the first 400,000 tons. See *DMS Papers*, vol. 5, folder 4.

Canadian project part of the larger American synthetic rubber program.¹¹⁵ On both sides of the border, the synthetic rubber program was being delayed because of a broad continental scarcity of wartime resources.

There was thus particular concern in Ottawa that the petroleum feedstock needed to manufacture butadiene would not be available once the plants had been erected.¹¹⁶ Petroleum was, of course, in the highest demand during the war. As well as being an essential ingredient in the manufacture of synthetic rubber, it was used for lighting, heating, lubrication and motor transportation. In mid-1942, it was becoming evident to the wartime authorities that there was not going to be enough crude petroleum to go around. Realizing this, in the United States, the Army and Navy Munitions Board began pressuring Donald Nelson, the chairman of the WPB, to give its programs - particularly the military aviation gasoline program - more of the existing supply of petroleum. Aviation fuel required the use of the same petroleum fractions as butadiene synthetic rubber. Fearful that Nelson might acquiesce, the Canadian rubber authorities began to give serious consideration to using other feed stocks in the manufacture of synthetic rubber. Alcohol was foremost on their minds.

Earlier that year, C.D. Howe had received a letter from the consul general of Poland in New York, Victor Podoski, who was representing Wacław Szukiewicz, a Polish engineer and co-inventor of a catalyst for making butadiene from alcohol in a time-saving single step. Until that time, the use of alcohol in the production of butadiene was both expensive and time consuming. Alcohol first had to be converted to ethylene and then to butadiene. But Szukiewicz claimed to be able to convert alcohol to butadiene in one continuous

¹¹⁵ "Minutes of the RRC." (March 21, 1942), *RFC Papers*, vol. 3, p. 465; *ibid*, vol. 4, p. 6.

¹¹⁶ "Minutes of a Meeting of the Committee on the Use of Alcohol in the Synthetic Rubber Programme," (June 3, 1942) *Polysar Papers*, vol. 40, file: Alcohol as base for butadiene

operation. According to Podoski, Szukiewicz and his compatriot Boleslaw Przedpelski had perfected the method while living in Poland before the war. Following the fall of Warsaw in September 1939, Szukiewicz fled to Italy where he was approached by the local authorities who were eager to learn more about his scientific discovery. Fearful that his invention might fall into the wrong hands, and increasingly concerned for his personal safety, Szukiewicz again took flight, this time to the United States. In January 1942, he contacted Podoski, who, following Szukiewicz's wishes, in turn contacted the Canadian Trade Commissioner in New York, Douglas Cole, with the view of making Szukiewicz's butadiene-from-alcohol method available to Ottawa.¹¹⁷ Excited by the potential of Szukiewicz's breakthrough, Cole immediately forwarded Podoski's letter to C.D. Howe at the department of munitions and supply in Ottawa.

As a man who had dedicated a good deal of his life to the applied sciences, Howe was excited by Szukiewicz's scientific formulations.¹¹⁸ This was not out of character. As his biographers note, Howe was often given to enthusiasms, especially creative schemes with a dash of high technology like this one.¹¹⁹ Nevertheless, Howe wanted the process fully reviewed by his technical experts before making any radical reconsideration regarding the raw materials to be used in the Polymer project. To that end, in February, Nicholson contacted C.J. Mackenzie, the president of the NRC and a former university pupil of Howe's, and asked him "to pursue the matter as expeditiously as possible and let us have

and rubber, 1942-1944; and T.R. Griffith, "Report re Synthetic Rubber from Alcohol" (March 27, 1942), *NRC Papers*, vol. 128, file 17-13R-21.

¹¹⁷ V. Podoski to C.D. Howe (February 5, 1942), *C.D. Howe Papers*, vol. 27, file: Polymer Corp (10), 1942-1943.

¹¹⁸ C.D. Howe to V. Podoski (February 17, 1942), *C.D. Howe Papers*, vol. 27, file: Polymer Corp (10), 1942-1943.

¹¹⁹ Bothwell and Kilbourn, *C.D. Howe: a biography*, especially, pp. 104-113, 159-160, 212-214, 265-266.

the benefit of your opinion as to the merits and possibilities of the Polish process...”¹²⁰ Mackenzie responded immediately since the subject, of late, had been very much on his mind. Indeed, for the past two days he been discussing the merits of the process with Boleslaw Przedpelski - the co-inventor of the Polish method. Mackenzie considered Przedpelski a “very reliable man” and thought his formulations scientifically sound.¹²¹ On that basis, he was willing to endorse the butadiene from alcohol process. However, Mackenzie was quick to add that this was not an issue which could be judged solely on scientific grounds. The question, he maintained, was “a broad one”: which raw source of supply would be “economically most suited to Canada?” There was also the associated problem of material required for the construction of necessary plants. “It appears to me,” Mackenzie wrote to Nicholson in February 1942, “that the fundamental question is whether or not the economic and industrial conditions indicate a preference for alcohol over petroleum as the raw material.”¹²²

If the matter could have been settled solely on scientific grounds, perhaps the alcohol issue would have evaporated. But given that economic and industrial development discussions were involved, politics necessarily came into play. In the spring of 1942, the west began demanding that the federal government take “immediate steps” to establish factories in the west for production of alcohol from grain into synthetic rubber. In Saskatchewan, the municipal councils of Moose Jaw, Duck Lake, Star City, Saskatoon, Regina, Weyburn, North Battlefield and Lloydminster all passed resolutions calling on their provincial and federal representatives “to insist day and night that surplus farm

¹²⁰ J.R. Nicholson to C.J. McKenzie (February 16, 1942), *NRC Papers*, vol. 128, file: 17-13R-21.

¹²¹ Mackenzie to Nicholson (February 18, 1942), *NRC Papers*, vol. 128, file: 17-13R-21.

¹²² *Ibid.*

products shall be used in any industry where they can be economically used.”¹²³ A similar resolution was subsequently adopted by the United Farmers of Alberta and United Farm Women of Alberta.¹²⁴ Later the issue became a centerpiece of Tommy Douglas’s 1944 Saskatchewan C.C.F. election campaign.

The issue resonated with the west’s sense of alienation. During the First World War, the west had become frustrated as a consequence of the government’s unwillingness to decentralize industry out of central Canada and give it a greater role in national defence production.¹²⁵ It was this sense of marginalization that led to the birth of western political protest movements such as the Progressive Party, the C.C.F. and “Bible Bill” Aberhart’s Social Credit - parties that haunted the federal Liberals. In the western mind, the possibility of now producing butadiene from wheat alcohol offered an opportunity to right these past wrongs. “[W]e must recognize the fact that a great deal of capital assistance has been given by the government to set up industry, chiefly in eastern Canada, for the manufacture of war munitions,” stated James Ross, a western farmer who was first federally elected as a Conservative M.P. in 1940. “Factories [for the manufacturing of wheat alcohol into butadiene] should be established in the prairie provinces,” he continued, “to decentralize industry to some extent.”¹²⁶ The west had large amounts of surplus wheat (approximately 400 million bushels in 1942) stored in its grain elevators – many of the same grain elevators that C.D. Howe had helped build in the 1920s and 1930s while in private practice as a consulting engineer. The surplus wheat, Ross and others argued, could be used to manufacture alcohol which could then be converted using the Polish method directly into

¹²³ “Resolution of the City of North Battlefield” (May 17, 1943), *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, folder 8.

¹²⁴ E. Birch to C.D. Howe (February 8, 1943), *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, folder 8.

¹²⁵ J.H. Thompson, *The Harvests of War: The Prairie West, 1914–1918* (Toronto, McClelland and Stewart, 1978), esp. chps. 2, 3 and 7.

¹²⁶ Canada. House of Commons. *Debates* (1942), p. 4752.

butadiene. The possibility of butadiene from wheat therefore offered at one stroke development for an agricultural region and an alternative use for an under-utilized staple crop. In the minds of many western leaders this offered the federal government a tremendous opportunity to solve simultaneously two of the nation's most pressing problems: the wheat problem and the rubber problem.¹²⁷

The department of munitions and supply had not ruled out using alternative raw materials in the manufacturing of synthetic rubber. In May 1942, Sheils wrote to Nicholson asking him if Polymer had made "a thorough investigation" of the possibility of securing butadiene from alcohol.¹²⁸ Given the difficulty in securing materials and equipment from the United States, Sheils felt that it offered "some hope" of obtaining butadiene and synthetic rubber at an earlier date than by the petroleum method which was at that time under consideration.¹²⁹ That same month, Howe appointed Dr. Horace B. Speakman, a chemist and alcohol expert, to examine the butadiene-from-alcohol issue. Howe was skeptical about Polymer's board of directors possessing the technical expertise necessary to rule on the matter. They had been chosen for their managerial skill, not their scientific insights. "We have an enthusiastic Board of Directors in charge of the program," Howe confided to Speakman, "[but] I am afraid that the Board is weak on the technical side...."¹³⁰ Howe was sanguine that Speakman would give him an expert and objective scientific evaluation.

¹²⁷ D. Craven to C.D. Howe (June 8, 1943) *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, folder 8; B.J. O'Connor to W.L.M. King (June 4, 1943), *ibid.*; M.J. Dubois to W.L.M. King (June 3, 1943) *ibid.*; J. Anderson to W.L.M. King (May 27, 1943) *ibid.*; G. Hodgkin to W.L.M. King (June 3, 1943) *ibid.*; P. Hewitt to J. Gardiner (May 17, 1943) *ibid.*; and J.A. McLean to W.L.M. King (May 21, 43), *ibid.*

¹²⁸ Sheils to Nicholson (May 22, 1942), *DMS Papers*, vol. 5, folder 3.

¹²⁹ *Ibid.*

¹³⁰ C.D. Howe to H.B. Speakman (May 29 1942), *C.D. Howe Papers*, vol. 47, file: Polymer Corporation, 1942.

Speakman certainly possessed all the required credentials to do so. He was a scientist by training, having graduated from the University of Manchester with a M.Sc. in 1915. He had taught at the University of Toronto and had held various high-ranking positions in both the British and Canadian governments in the years following the First World War. In 1928, the same year in which he received a Doctorate in Science, he was appointed director of research at the Ontario Research Foundation – a scientific think-tank which was established in 1927 to solve scientific problems of production and processing for Canadian industries and natural resource developers.¹³¹

In May 1942, Speakman travelled to the U.S. capital to meet with J.B. Carswell, director general of the department of munitions and supply resident in Washington, and Sir Clive Baillieu, the chairman of the British section of the Raw Material Committee. Baillieu, an expert on the comparative advantages of producing butadiene from alcohol, was most opportunely in Washington giving testimony before a U.S. Senate subcommittee on the utilization of farm crops in the production of synthetic rubber – a subcommittee which took the name of its chairman, the colourful Guy Gillette, a populist senator from the farm state of Iowa. In the United States, as in Canada, the decision to use petroleum in the manufacture of synthetic rubber was being passionately contested. Farmers, feeling cheated out of their own rubber industry, were pressuring their congressmen – who were facing a mid-term election in November – to make a political issue out of the RRC's decision not to use grain alcohol in the production of butadiene for use in GR-S rubber. Baillieu had done extensive research on synthetics for a report he had submitted to his government on the

¹³¹ For a more detailed discussion of the role and significance of the Ontario Research Foundation, see P. Oliver, "Government, Industry and Science in Ontario: The Case of the Ontario Research Foundation" in Peter Oliver (ed.), *Public Persons: The Ontario Political Culture, 1914–1934* (Toronto, Clarke, 1975), pp. 161–70.

control, conservation and use of rubber in Great Britain.¹³² With regard to the manufacture of butadiene, Baillieu had found that there were benefits to using an alcohol base in that the distilling plant for its production was less complex and involved fewer critical materials than the one for the production of butadiene from petroleum. At a time when critical materials were increasingly hard to come by, Baillieu's findings delighted Speakman and he immediately wrote Howe to report the "momentous news."¹³³

When Speakman's letter arrived, Howe tucked it away in a file with a number of other documents he had recently received on the subject. Just one month earlier he had been sent a report prepared by W.H. Cook, a research scientist at the division of applied biology at the NRC. The report, which considered the merits of several alternative methods for manufacturing rubber from grain, contradicted many of Baillieu's findings. According to Cook, there were no "adequate facts" to support the claim that butadiene might be made from alcohol "more easily, rapidly and cheaply than from petroleum."¹³⁴ Instead, Cook concluded that the plant to produce butadiene from alcohol would be just as complex and exhaust just as many critical materials as would one to produce butadiene from petroleum. Furthermore, Cook maintained, it would cost almost twice as much to produce butadiene from alcohol as it would from petroleum. His conclusions directly challenged those of Boleslaw Przedpelski. At his meeting with C.J. Mackenzie, Przedpelski stated that by using the Polish process one could produce butadiene from alcohol at a cost of 12.5¢ per pound. That was about the same as the cost estimated to produce one pound of butadiene

¹³² Sir Clive Baillieu, "Memorandum on the Measures Adopted in the United Kingdom for the Control and Conservation and Use of Synthetic Rubber" (April 1, 1942), *C.D. Howe Papers*, vol. 43, file: Rubber 1942.

¹³³ H.B. Speakman to C.D. Howe (June 5, 1942) *C.D. Howe Papers*, vol. 47, file: Polymer Corporation, 1942.

¹³⁴ W.H. Cook, "Agricultural Surpluses as Raw Materials for Manufacture of Rubber and Other War Chemicals" (July, 24, 1942), *Polysar Papers*, vol. 34, file: National Research Council, 1942-1948.

from petroleum. At that price, Przedpelski maintained, one could manufacture synthetic rubber at a cost of 25¢ per pound.¹³⁵ However, according to figures produced by Cook, Przedpelski was being overly optimistic. According to Cook, when wheat was 80¢ per bushel at the distillery, the cost of alcohol was 50¢ to 60¢ per gallon to produce. Given that one gallon of alcohol produced about two pounds of butadiene, Cook concluded that it would cost 25¢, not 12.5¢ as Przedpelski maintained, to produce one pound of butadiene from alcohol. Cook's calculations were supported by those of Dr. C.Y. Hopkins, another NRC chemist who was studying industrial uses for agricultural products.¹³⁶

By August 1942, Howe had become impatient and tired of the debate. He had never been one for drawn-out decision making. As a get-up-and-go engineering type, he detested indecision and inaction and as far as he was concerned the alcohol versus petroleum debate, which was now into its seventh month, had gone on long enough. If it could not be conclusively shown that the butadiene from alcohol would guarantee synthetic rubber more easily, quickly and cheaply than from petroleum then he would not sanction it for use in the Polymer project. It was that simple: either it was scientifically proven to be cheaper or faster or it would not be utilized. As a result, on August 17, 1942, one week after the first sod was turned at Sarnia, Howe quashed the butadiene-from-alcohol project. In a memorandum, Howe advised the members of his department "that doubt has been cast on the process for manufacturing any butyl alcohol in existing distilleries to the extent that I have decided to drop the whole project of using butyl alcohol as a base for synthetic rubber."¹³⁷ Three days later, Howe advised Polymer of the same. "The point I wish to

¹³⁵ T.R. Griffith, "Report re Synthetic Rubber from Alcohol" (March 27, 1942), *NRC Papers*, vol. 128, file: 17-13R-21.

¹³⁶ C.Y. Hopkins, "Proposed Production of Alcohol for Manufacture of Synthetic Rubber," (January 7, 1942), *NRC*, vol. 128, file: 17-13R-21.

¹³⁷ "Memorandum" (August 17, 1942) *C.D. Howe Papers*, vol. 47, file: Polymer Corporation, 1942.

make,” he notified Nicholson, “is that the Polymer program is not to concern itself with the manufacture of alcohol into butylene or butadiene.”¹³⁸ Instead, he continued, Polymer was to stick with the original plan to produce butadiene from petroleum.

His decision brought down the wrath of some. In a polemical pamphlet entitled *So that Man May Prosper*, Dyson Carter, a young Canadian research scientist who would later leave the laboratory and become internationally known for his literary writings, argued that Howe’s decision was “an inexcusable and disastrous blunder.”¹³⁹ Carter charged that Howe was in the pocket of the international oil trust, whose object was monopolistic control of Canadian rubber production. “Is it possible,” Carter asked rhetorically, “that the Canadian authorities still cannot wipe the petroleum out of their eyes and see the truth?”¹⁴⁰ According to Carter, the Liberal government had deliberately turned away from a simple, fast wheat-to-rubber process, one which would have been Canadian controlled, for a method that was, in his mind, less efficient and benefited foreign interests.¹⁴¹ But for Howe, who thought it was illusory to talk of Canadian industrial self-sufficiency, there was no turning back.¹⁴² “Sooner or later a stage is reached when a decision must be made,” stated Howe in the House of Commons, “and in this case that decision was made... action was taken; and it is very difficult to turn back the clock at this stage.”¹⁴³ Again, expediency ruled the day.

¹³⁸ C.D. Howe to J.R. Nicholson (August 20, 1942) *C.D. Howe Papers*, vol. 47, file: Polymer Corporation, 1942.

¹³⁹ *Ibid.*

¹⁴⁰ D. Carter, *So that Man May Prosper* (Winnipeg, Contemporary Publishers, 1943), p. 19.

¹⁴¹ *Ibid.*, pp. 30-32.

¹⁴² For a discussion on Howe’s continentalist views, see D. McDowall, *Steel at the Sault*, pp. 169-171 and chp. 8.

¹⁴³ Canada. House of Commons. *Debates* (June 22, 1943), p. 3897.

The action to which Howe was referring was considerable. Based on the decision to use a petroleum feed stock, other concrete steps had been taken. For example, in January 1942, shortly after the initial decision to use petroleum had been made, Howe had sent his wily negotiator J.R. Nicholson to New York to strike a deal with the Standard Oil Development Company to make its patents on the petroleum-rubber process available to Canada. In the late 1920s, Standard Oil began working closely with I G Farben on a process to extract gasoline from coal and to change heavy crude petroleum into more valuable lighter oils. In 1930, the two companies established the Joint American Study Company (JASCO) as a vehicle for the commercial testing and licensing of new processes. It also became the corporate shell holding I G Farben's U.S. patents, including its buna rubber patents, which had been granted to I G Farben in 1933. In 1939, with war clouds gathering over Europe and I G Farben in immediate need of hard currency, Standard Oil bought out I G Farben's interest in JASCO, giving Standard Oil absolute patent-rights to manufacture buna-S and buna-N synthetic rubber in the western hemisphere, the British and French empires and Iraq. Once information-sharing agreements had been worked out, American rubber and chemical companies had the scientific knowledge and technological "know-how" to produce all the principal types of man-made rubber.¹⁴⁴ Nicholson's negotiations took several months, but in the end he managed to secure for Canada the same deal that the RRC had secured from Standard Oil for the United States. Standard Oil agreed to make all of its technological know-how and scientific knowledge regarding the petroleum-rubber process available on a royalty-free basis for the duration of the war and

¹⁴⁴ See W. Tuttle, Jr., "The Birth of an Industry: The Synthetic Rubber 'Mess' in World War II," *Technology and Culture*, vol. 22 (1981), 35-67; and D. Ross "Patents and Bureaucrats: U.S. Synthetic Rubber Development Before Pearl Harbour" in J. Frese and S.J. Judd (eds.), *Business and Government* (New York, Sleepy Hollow Press, 1985), pp. 119-155.

six months thereafter.¹⁴⁵ This deal - as well as the one later reached with the RRC, JASCO, and the Standard Oil Development Company regarding the manufacture of butyl rubber - was essential in the gigantic task of building a synthetic rubber industry in the shortest possible time. To elevate this infant industry to the status of a huge integrated enterprise within a matter of months demanded that all the existing scientific information and technological know-how be pooled and made available to firms in Canada and the United States. It also demanded that Polymer get its hands on essential materials and equipment. This latter problem, however, was proving to be a considerable one.

The difficulty of acquiring materials and equipment from the United States played a significant part in making 1942 a tension-filled year for those involved with the Polymer project. The priority situation south of the border, which paradoxically was both cause and effect of the scarcity of resources, was slowing the pace of progress at Sarnia. This annoyed Howe, who was continually pressing for ground-breaking news. Howe felt that if a higher priority rating was not secured from the WPB, Canada would lose the "race against time."¹⁴⁶ Without the essential supplies from the United States, synthetic rubber production would remain a flight of fancy, with the very real consequence of gravely impeding the allied war machine. Adding to the anxiety was the enormous size and cost of the project. The huge industrial complex was to have eight acres of permanent buildings, six miles of sewers, five miles of roads and a complicated mosaic of pipes, conduits, spheres and towers. The projected cost of all of this was in the region of \$50 million. For a man who later supposedly blurted out in the House of Commons, "What's a million?" in response to opposition questions about a seven-million-dollar estimate for winding up war contracts, this level of expenditure worried even Howe. "My difficulty," Howe informed Polymer's president A.L. Bishop in September 1942, "is that I am at present carrying the

¹⁴⁵ Nicholson to Sheils (March 28, 1942), *Polysar Papers*, vol. 30, file: DMS Canadian Project.

¹⁴⁶ Canada. House of Commons. *Debates* (March 23, 1944).

responsibility for the largest expenditure of public money involved in any single war project..."¹⁴⁷ Perhaps this would not have troubled Howe so much if it had not been for the likelihood of disaster if things did not go according to plan. Bluntly put, Howe had committed \$50 million of the people's money to an experimental idea. Thus far no synthetic rubber had ever been made in Canada outside of the laboratory. But despite all this, despite all the obstacles and potential risk, Howe, whose incurable optimism was only overshadowed by a dogged determination to get things done, never once talked of throwing in the towel. This was a project which he was resolved to see succeed. His synthetic rubber "boys" would simply have to dedicate more of their time and effort to the government's project. And if they could not, if they were unwilling or unable, Howe was confident that others could be found to take their place.

At Polymer, Colonel Bishop was having trouble meeting Howe's expectations. For several months, Bishop had been the butt of Howe's criticism. "Since you were appointed president of the company," Howe scolded Bishop in September 1942, "I think that you have been in my office only once and our correspondence has been almost nil."¹⁴⁸ Unlike the faith he placed in most of his "boys," Howe never fully trusted Bishop's business abilities and rarely relied on his economic judgment. Even on matters relating to the construction of the plant – supposedly Bishop's specialty and certainly an aspect of engineering with which Howe had some personal experience – Howe felt compelled at times to question his wisdom.¹⁴⁹ On one such occasion, Howe chided Bishop for an estimate he considered inordinately high. "I may say that I am rather shocked," Howe rebuked Bishop, "at your estimate for a pumping station... I am sure that with proper appreciation of the type of construction needed... this can be greatly reduced."¹⁵⁰ It was, in

¹⁴⁷ Howe to Bishop (September 26, 1942), *DMS Papers*, vol. 5, folder 3.

¹⁴⁸ *Ibid.*, (September 22, 1942).

¹⁴⁹ *Ibid.*, (May 19, 1942), folder 1.

¹⁵⁰ *Ibid.*

part, this lack of confidence that had caused Howe to go outside the corporation for advice on the butadiene–from–alcohol issue and later for an independent check on construction.¹⁵¹ This was not the usual course of action for Howe. The confident Yankee from Port Arthur, Ontario usually accepted, almost without question, the judgment and recommendations of those who worked for him. He rarely got involved in the day-to-day operational decisions, confining his energies instead to planning Canada's overall strategy for wartime production. The war and his management-on-the-run style demanded this. "I never give instructions," Howe once commented, "I just give responsibilities."¹⁵² Howe was a superb delegator of authority. He recruited men with proven records of achievement from business and bureaucratic circles. Each was then invested with sufficient authority to pursue the goals set for him and left alone.¹⁵³ This was necessary in an expanding department such as munitions and supply, which at mid-war had more than 5,000 people employed by it directly and as many as 25,000 others working for the crown corporations which Howe had set up to handle war production. Above all else, Howe demanded results. If an executive in a wartime crown corporation failed, Howe acted quickly to supplant him. Such was Bishop's fate.

On September 24, Howe wrote to Bishop asking him to step down as president of the corporation.¹⁵⁴ With the Polymer project at a "critical stage," Howe wanted someone he could trust, someone who understood his managerial style, someone who would "get on

¹⁵¹ Howe to D. Stairs, *C.D. Howe Papers*, vol. 47, file: Polymer Corporation, 1942.

¹⁵² C.D. Howe quoted in P.C. Newman, *The Canadian Establishment* (Toronto, Seal Books, 1975), vol. i, p. 375.

¹⁵³ R. Bothwell, interview with Mitchell Sharp, *Bothwell Papers*, B88-0074/002; R. Bothwell, interview with Fred Bull (April 24, 1972), *Bothwell Papers*, B88-0074/002; and R. Bothwell, interview with David Mansur (May 7, 1971), *Bothwell Papers*, B88-0074/002.

¹⁵⁴ C.D. Howe to A.L. Bishop (September 24, 1942), *Polysar Papers*, vol. 12, file: Directors' correspondence, 1942-43.

with the job” and would keep him abreast of key developments. The following day, Bishop tendered his resignation, which Howe accepted without ado.¹⁵⁵ To replace Bishop, Howe appointed Richard Berkinshaw, the chairman of the War Industries Control Board.

Berkinshaw had been involved with the Canadian synthetic rubber program from the beginning. Indeed it was Berkinshaw who had first suggested naming the corporation Polymer, and somewhat ironically, who had recommended Bishop for Polymer’s presidency.¹⁵⁶ A lawyer by training, Berkinshaw joined the department of munitions and supply in 1941. Before coming to Ottawa, Berkinshaw had been general manager at Goodyear Tire and Rubber Company of Canada. Far from being the rubber industry’s Trojan horse in Ottawa, ready to manipulate the levers of wartime government for the advantage of private industry, Berkinshaw pragmatically built up a new and more broadly applicable set of ground rules for the interaction of business and government. Howe was eager to have men like Berkinshaw working for him. He admired the business caste, its members’ ability to clearly define objectives and to achieve their goals efficiently and effectively. He shared their values, spoke their language and knew and appreciated how their minds worked. Thus, when Berkinshaw came to Ottawa in 1941, Howe immediately put him to work as director general of the priorities branch of the department of munitions and supply. Although his stay was brief, the experience gave Berkinshaw an almost unrivalled knowledge of the priority system. This knowledge, C.D. Howe noted at the time of Berkinshaw’s appointment as president of Polymer, “will play an important part in determining the date of completion of the [Polymer] project.”¹⁵⁷

On December 5, 1942, widespread frustration with the existing system of priorities led to a new program being launched in the United States. There, the directors of several programs, including the synthetic rubber program, got together and persuaded Donald

¹⁵⁵ C.D. Howe to A.L. Bishop (September 26, 1942), *DMS Papers*, vol. 5, folder 3.

¹⁵⁶ L. Bertin, “The Long Chain”, pp. 48–49.

¹⁵⁷ C.D. Howe to A.L. Bishop (September 26, 1942), *DMS Papers*, vol. 5, folder 3.

Figure 1.2
The Polymer plant under construction in early 1943



Source: *Polysphere Fifty*, p. 19

Nelson, the chairman of the WPB, to issue a list of fifty-six different vital wartime projects, assigning to each an “urgency number” which was based on their importance to the allied war effort. These numbers were officially declared to outrank any other priority symbol. The new system was initially viewed favorably by those at Polymer. “It should be of considerable assistance to us,” R.C. Berkinshaw wrote to G.K. Sheils in mid-December.¹⁵⁸ But Berkinshaw and the others at Polymer quickly found out in the economic scrum of the war that the new system was not of very much assistance to the company at all.

At the time the new system of urgency numbers was devised, officials at Polymer were working under the impression that the Canadian plant would receive the same rating as the American synthetic rubber plants. But when the first list of urgency numbers was issued the plant at Sarnia was not included. Concerned and somewhat agitated about this, Douglas Ambridge, a bombastic engineer who at times was given to pit-bull-like pugnacity, travelled to Washington to obtain an explanation. There, at the office of the American

¹⁵⁸ R.C. Berkinshaw to G.K. Sheils (December 15, 1942), *DMS Papers*, vol. 5, folder 3.

rubber director, he met with the assistant deputy rubber director, Frank Creedon. Understanding and apologetic, Creedon informed Ambridge that the army and navy board had yet again demanded that their program receive preferential treatment and as a result the office of the rubber director had decided that in order “to get the thin end of the wedge into the door,” it was best to settle for urgency numbers for only the first twenty per cent of rubber plants then under construction.¹⁵⁹ As a consequence, any plant, like the one at Sarnia, with a projected completion date after May 15, 1943 was not on the list. Still, Creedon assured Ambridge that the rubber director’s approach would ultimately compel the army and the navy to permit the extension of “urgency numbers” to the remainder of the rubber projects, including Sarnia.¹⁶⁰ While Ambridge was satisfied with Creedon’s explanation, he and the others at Polymer were unwilling to sit idly by with the Polymer project hanging in the balance. Ambridge felt that it was profoundly “unfair” that due to “administrative bickering” in the U.S., Canada would have to wait months for essential parts before beginning operations, especially since the Canadian government had extended top preference to its synthetic rubber program to such an extent as “seriously to disturb other war programs.”¹⁶¹ Without reducing its efforts of securing an appropriate priority rating from the WPB, Polymer took it upon itself to get the necessary supplies to finish construction on time. In September of 1942, Roger Hatch was brought in to expedite materials along with his fellow engineers Lee Dougan and Jack Sayre. Hatch was a natural for the job, having paid his way through university by selling Fuller brushes door-to-door on the east coast. Peddling brushes had taught Hatch the basic hustling techniques needed

¹⁵⁹ D. W. Ambridge, “Memorandum regarding Polymer Corporation’s Sarnia Project and its Relation to the United States Synthetic Rubber Program,” *C.D. Howe Papers*, vol. 47, file: Polymer Corporation, 1942.

¹⁶⁰ *Ibid.*

¹⁶¹ D. Ambridge, “Memorandum Re: Priority Situation” (February, 3, 1943), *C.D. Howe Papers*, vol. 47, folder 10.

Figure 1.3



On September 29, 1944, at a special ceremonies held to mark the first anniversary of the manufacture of synthetic rubber at Polymer, a representative group of employees presented the 60 millionth pound of rubber to C.D. Howe (right), who promptly sliced it into small pieces for distribution to guests. Presenting the memento were, from the left, James Morrice, of Canadian Synthetic Rubber, Aubrey Bruyca, of St. Clair Processing and Charles Goldsmith, of Dow Chemical. Source: *Polysphere*, (February 1967), p. 3.

to be successful in business and when it came time to expedite materials he put these techniques to effective use. He quickly made friends with the people at Crane industries in Chicago and persuaded them to send some critical materials Polymer's way.¹⁶² During the winter of 1942-1943, he and the others obtained additional equipment from all over Canada and the United States.

Despite all the "trials and tribulations" - as Douglas Ambridge once put it ¹⁶³ -, by June 1943 Polymer's directors were able to report that the GR-S co-polymer plant and the styrene plant were substantially completed. When the U.S. rubber director, William Jeffers, and his deputy, Colonel Dewey, visited the plant at Sarnia later that month, they were amazed by the pace of development. "The progress you and your associates are making in establishing the Number One synthetic rubber plant of the British Empire,"

¹⁶² R.E. Hatch interview (Toronto, May 2000).

¹⁶³ D.W. Ambridge to A.H. Williamson (December 1, 1942), *Polysar Papers*, vol. 33 file: Rubber Controller Correspondence 1942-1944.

Dewey commented to Berkinshaw, "is really fine."¹⁶⁴ The construction work proceeded with drill-sergeant regularity and three months later, on September 29, 1943, thirteen months after the first sod was turned at Sarnia, the first producing unit went into operation without a hitch. In February 1944, the final phase of the construction effort was completed when the butyl rubber plant was brought on stream.

The exigencies of war needs and timing dictated the compression into less than a two-year period the accomplishment of a task that in more normal times might never have been achieved. In the national press the event was celebrated as "little short of being a miracle, even in these days of war-bred industrial records."¹⁶⁵ The *Sarnia Canadian Observer*, which in late February ran a special edition dedicated to those involved in the project, noted that the accomplishment was all the more "remarkable" given the obstacles that had to be overcome.¹⁶⁶ The scale and scope of the project was, for instance, captured in a series of photographs published by the *Moncton Transcript*.¹⁶⁷ One photograph was of Polymer's giant tower, which according to the *Transcript* had taken five days to move on three flat cars from Montreal. The image of the erect tower seemed to symbolize Canada's growing industrial prowess. Both the upward angle of the shot and the sharp contrast between the bright sky and caliginous steel gridwork emphasized Canada's new-found technological proficiency. The men and women of Polymer seemed to have mastered nature, taking control of elemental forces and siphoning them off for human use.

In October 1943, Fairmont Ltd. - the sole buying and selling agent of rubber in Canada - began purchasing all the GR-S and butyl rubber Polymer was able to produce. Fairmont paid 40.5¢ and 37.2¢ per pound of GR-S and butyl, respectively, with freight charges to its

¹⁶⁴ Colonel Dewey to R.C. Berkinshaw (July 7, 1943), *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, folder 9.

¹⁶⁵ L. Gough, "Man-Made Rubber," *Maclean's* magazine (March 1, 1944), p. 20.

¹⁶⁶ The *Sarnia Canadian Observer*, February 23, 1944.

¹⁶⁷ The *Moncton Transcript*, March 9, 1944, p. 2.

designate warehouse being paid by Polymer. Polymer's strategy upon commencement of production was to produce as much rubber as possible. With its plant operating at near capacity, Polymer's corporate focus was thus initially production-oriented. The emphasis was on quantity over quality. This was rubber produced to meet urgent war needs and not to suit the more discerning demands of a consumer market. That objective would come later. Between September 1943 and December 1945, Canadian rubber manufacturers received over 70,000 tons of GR-S rubber and close to 12,000 tons of butyl from the Polymer plant. This was enough, Howe informed the House of Commons near the end of the war, to avoid "a shortage, which would have crippled our production programme."¹⁶⁸ Under the stress of the national emergency, the development of GR-S reached an advanced stage in a remarkably short space of time. By June 1944, production was at such a high rate that all restrictions on the use of this material were removed and later in the year exports to the U.S. commenced.¹⁶⁹ Polymer's products entered the U.S. via Detroit and Niagara Falls on a duty free basis.¹⁷⁰ By war's end, synthetic rubber had gained a spectacular record of production and development.

The project was one in a series of challenges faced by C.D. Howe which produced a government-business collaboration ideally tailored to meet the demands of the wartime economy. The implementation of the plan for the Polymer project paralleled the tried and true method of other wartime efforts, with industry providing management, know-how and manpower and the government providing broad guidance, financing and regulation. The monumental task of giving birth to a cutting-edge industry required the utmost in cooperation among a multitude of competing private companies with the plethora of government agencies that were involved. By bringing business and science together under the umbrella of his crown corporation, Polymer, C.D. Howe had hastened the development

¹⁶⁸ Canada. House of Commons. *Debates* (March 21, 1944), p. 1705.

¹⁶⁹ Kennedy, *History of the Department of Munitions and Supply*, p. 193.

¹⁷⁰ "Minutes of the RRC," (September 13, 1944), *RFC Papers*, vol. 14, p. 359.

of a whole industry and overcome the country's almost total dependence on foreign-grown natural rubber. The project was the biggest wartime bet placed by Howe. At the time Ottawa undertook the project, no synthetic rubber had been made on the continent outside of laboratories. "We were very much in the dark as to costs," Howe later recalled, "and we were not at all sure that sufficient engineering data was available to allow us to work out the process... it was... a race against time with the possibility of disaster if the project did not turn out well."¹⁷¹ But the gamble paid off. In less than two years, synthetic rubber had come to supply about 90% of total rubber requirements. It was an accomplishment in which Howe himself took some pride. "The best brains in science and business," Howe declared on the first anniversary of the opening of the plant, "have been used at Polymer to transform an experimental dream into an industrial reality... Polymer," the minister continued, emphasizing every word, "has kept Canada in the war."¹⁷² As he had done in the past when Canada needed a national airline, C.D. Howe used the full force of his public office to push the country across the high technology threshold. Polymer had served its wartime public purpose, manufacturing the rubber needed to win the war.

¹⁷¹ Canada. House of Commons. *Debates* (March 23, 1944), p. 1775.

¹⁷² C.D. Howe, "Anniversary Address," *Polysphere* (October 1944), p. 5.

Chapter Two

“For the Country at War and the Country at Peace.” 1945-51

[T]he plant at Sarnia is exclusively the property of the government of Canada; it will be operated by the government of Canada; its products will be at the disposal of the government of Canada, they will be owned by the government of Canada and will be sold in the interests of the government of Canada. So far as I know the situation will continue indefinitely... [I]t is the intention of this government to continue to operate the plant at Sarnia to make rubber for the country at war and the country at peace.¹

C.D. Howe (1943)

The war proved to be an expensive time to build a synthetic rubber plant. By most estimates, the fifty million dollar price tag would likely have been half that during peacetime. Yet wartime expediency carried the day and at war's end, few questioned the government's decision to build when it did. Canadians of all political persuasions took pride in the pace and high caliber of the construction effort at Sarnia – a job that C.D. Howe heralded as the “most complex... ever attempted in this country.”² One trade journalist of the time commented that “the building of the plant is remarkable not only for its speed but also for its extent and complexities.”³ Another went further in his solemnization: “the story of Polymer's construction,” he wrote, “is a Canadian classic.”⁴ In the post-war boom, the Sarnia synthetic rubber complex would become an icon of Canada's industrial prowess, eventually finding a place on the back of the ten dollar bill. In the House of Commons, a similar sentiment was expressed. In March 1944, Tommy Douglas, one of the C.C.F.'s ablest parliamentarians and generally a leading critic of C.D.

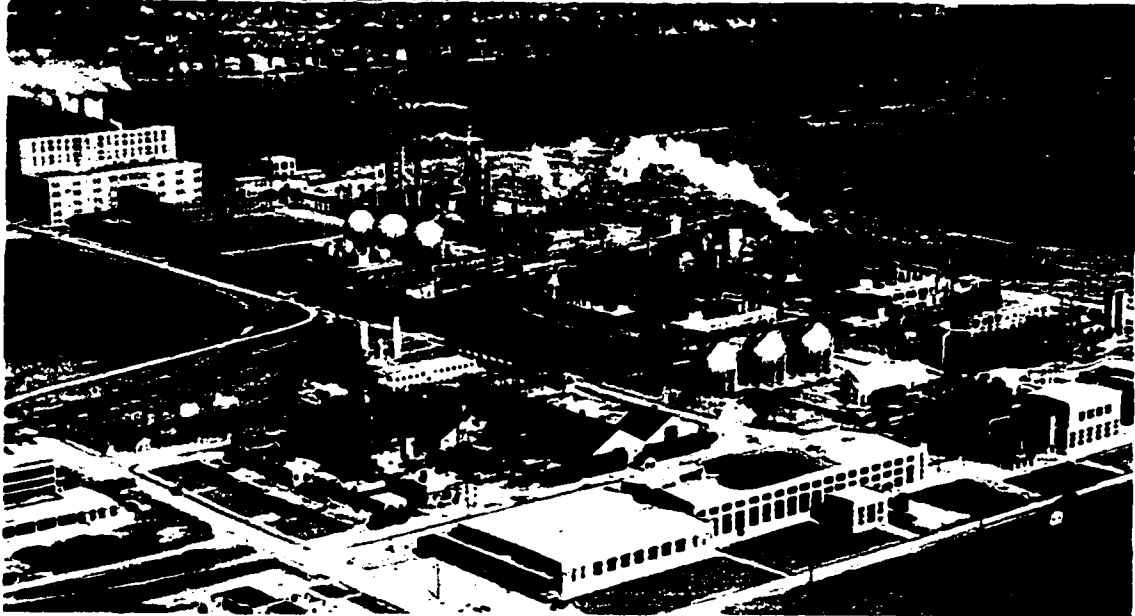
¹ Canada. House of Commons. *Debates* (June 16, 1943), p. 3707.

² C.D. Howe quoted in *Polysphere*, vol. 1 (October 1944), p. 1.

³ Anonymous, “Sarnia Synthetic Rubber: General Review of the Process and Plant,” *Canadian Chemistry and Process Industries* (February, 1944), p. 84.

⁴ L. Gough, “Man-Made Rubber,” *Maclean's* magazine (March 1, 1944), p. 20.

Figure 2.1
The Polymer plant *circa* 1945



Source: *Polysphere Fifty*, p. 27

Howe's handling of the rubber question, judged the plant at Sarnia to be a "splendid piece of engineering."⁵ That same month, Douglas's political confrere, Stanley Knowles, added his congratulations to those already expressed to the engineers and technicians who had designed what was in his words a "thoroughly integrated plant" through which "we have been able to make this very vital contribution to the war effort."⁶ As an instrument of public policy, Polymer had served its wartime purpose well. Between September of 1943 and September of 1945, Polymer had produced 61,000 long tons of GR-S and 9,000 long tons of butyl rubber, which was then manufactured into tires and other finished rubber goods by private enterprise. In so doing, Howe told the House of Commons, Polymer had acted as "the backbone of the rubber industry."⁷ Like earlier crown corporations, Polymer had been

⁵ Canada. House of Commons. *Debates* (March 27, 1944), p. 1906.

⁶ *Ibid.*, p. 1868.

⁷ *Ibid.* (June 4, 1946), p. 2176.

“facilitative” - to borrow a term from Marsha Chandler⁸ - fostering the conditions necessary for the expansion of the private sector; in this case by supplying the rubber once furnished by the plantations of the Far East. Nevertheless, Knowles admitted to having “misgivings” about the future of the plant.⁹ He was not alone.

In the immediate post-war period, a cloud of uncertainty hung over the Polymer project. Those who looked to the future anxiously noted that the plant at Sarnia had a capacity of 50,000 tons per year, yet before the war Canadians were consuming less than half that amount of rubber.¹⁰ There was no guarantee, skeptics argued, that consumption rates would increase after the war. Indeed, if history was any guide, the reverse would occur. After all, that is what had happened following the First World War – a war that had resulted in victory only to see persistent unemployment, economic instability and declining levels of domestic consumption. One of the great bugbears of the Depression had been industrial overcapacity. Canadians had recklessly overbuilt their leading industries like pulp and paper in the 1920s and had to carry much overcapacity and its attendant financial woes through the 1930s.¹¹ The anxiety regarding overcapacity resurfaced at war’s end. Canadians, and especially industrialists, were haunted by the memory of the two pre-war decades and, as a result, after the war, approached the prospect of peace with caution. But even if history did not repeat itself this time around and there was no post-war economic slump as there had been following the First World War, some calculated that the Canadian

⁸ M. Chandler, “State Enterprise and Partisanship in Provincial Politics,” *Canadian Journal of Political Science*, vol. 15 (1982), pp. 711-742.

⁹ *Ibid.*

¹⁰ E.G. Holt, “Long-term Outlook for Natural Rubber,” in *Canadian Chemistry and Process Industries* (June, 1946), pp. 49-51.

¹¹ T. Traves, *The State and Enterprise: Canadian Manufacturers and the Federal Government, 1917-1931* (Toronto, University of Toronto Press, 1979), pp. 31, 102-118, 122-23, and 153-4.

market could absorb only about one-third of Polymer's annual output.¹² By even the most charitable estimates, the maximum post-war domestic market for synthetic rubber would be only 20,000 tons per year, and Polymer had to sell 40,000 tons annually merely to break even. The task would be made additionally difficult, Douglas Ross, the Conservative member for Toronto-St. Paul's predicted, by the fact that synthetic rubber would face competition from natural rubber once the Japanese had been driven out of the plantations of the Far East.¹³ On this point, Ross was echoing the opinion of the majority.

Most industrial observers in Canada and elsewhere believed that natural rubber would dominate the post-war market as it had the pre-war because of its cheaper price and superior qualities.¹⁴ Long inured to what seemed the immutable rhythms of staple-driven economic growth, Canadians tended towards the view that the market for natural products always resonated itself. The more pessimistic of this group even argued that the synthetic rubber industry would vanish as quickly as it had emerged and that it would therefore be best for the Canadian government to divest itself as soon as possible of this technological "white elephant."¹⁵

In the face of this cautious outlook, Polymer's weaknesses were all too apparent. The crown company, which had been set up to meet a wartime emergency, was without a post-war market for roughly two-thirds of its operating capacity. In addition, the corporation's structure was one designed to accommodate tightly-regulated imperatives of war-time production rather than to compete aggressively in a free market economy. The corporation, for instance, was a structurally truncated enterprise. Unlike the successful prewar, private,

¹² M.B. Smith, "Synthetic vs. Natural Rubber After the War," *Saturday Night* (April 29, 1944), pp. 38-9, 47.

¹³ Canada. House of Commons. *Debates* (May 14, 1946), p. 1516.

¹⁴ P.T. Bauer, "Prospects of Rubber," *Pacific Affairs*, vol. 20 (December, 1947), pp. 381-90; and J.G. Cook, "Rubber Riddle," *The Spectator*, vol. 177 (December 6, 1946), p. 606.

¹⁵ Interview with I.C. Rush (Sarnia, November 1999).

petrochemical enterprises, Polymer was without a sales division and a department of research and development, crucial organizational elements in any free-market industrial success. Adding to its troubles, many of the people who had guided the synthetic rubber program to date, men who had volunteered their services for the duration of the war, were now returning to their natural niches in private industry. For example, Richard Berkinshaw, the soft-spoken Torontonion who had so skillfully led the corporation since September of 1942, departed from Polymer in 1945 to resume his full-time duties at Goodyear Tire and Rubber Company. The corporation was thus losing some of its key strategists at a time when it needed seasoned hands-on direction most. In sum, at the end of the war, Polymer was without a natural market for much of its output, without a corporate strategy for post-war survival, and without the necessary organizational structure for successful operation in a consumer-oriented economy. The crown company was without the crucial ingredients which the business historian Alfred Chandler identifies as necessary for any industrial company's survival - a well thought-out business strategy and a corporate structure to enable it to realize its objectives.¹⁶ At war's end, therefore, the economic future of the Polymer project was very much in question.

While Polymer had lost some of its principal personnel, the minister responsible for bringing the company into existence remained. C.D. Howe was re-elected by the people of Port Arthur in the general election of 1945 and thus retained the political authority to determine Polymer's post-war fate. The majority of people in Sarnia - or, Lambton West, to be more exact - did not however vote Liberal in the 1945 election. For various reasons, they supported the Progressive Conservative candidate, Joseph Murphy. A lawyer and successful businessman, Murphy joined sixty-six other Conservatives in the House of Commons. In the years that followed he pressured the government to privatize Polymer, arguing that this would generate additional tax revenue for Sarnia in the form of municipal

¹⁶ See A. Chandler, *Strategy and Structure: Chapters in the History of the Industrial Enterprise* (Cambridge, Massachusetts, M.I.T. Press, 1962), esp. introduction.

taxes - something that prior to 1951 Polymer as a crown corporation did not pay.¹⁷ “Crown Companies should make some contribution,” Murphy stated indignantly in 1949, “by way of taxes to the municipalities in which they do business.”¹⁸ Statements such as these endeared him to the people of Lambton West and he was re-elected in 1949, 1953, 1957 and 1958.

Despite Murphy’s personal success, the Liberals returned to power in 1945 with another majority government - 125 of 220 seats - on the promise that they had the competence and blueprint for post-war reconstruction. Planning for post-war recovery had, however, begun well before Canadians had gone to the polls in June 1945. During the last eighteen months of the war, the Liberal government had taken the initial steps to ensure that there would be no post-war industrial slump as there had been following the First World War. In order to prevent the sharp economic dislocations that accompanied much of the two pre-war decades, Mackenzie King’s Liberals developed a complex series of plans and programs to ensure the smooth transition from economic conditions of war to those of peace. For example, in 1944 an Industrial Development Bank was established as a subsidiary of the Bank of Canada to ensure the availability of credit to small- and medium-size businesses.¹⁹ In June of that same year, a department of veterans’ affairs was created to implement a wide range of benefits for returning soldiers, including subsidized mortgages, health-care benefits, job training and education allowances. As well, in 1944, a monthly family allowance was introduced to put spending dollars in the hands of Canadian consumers as well as to get the hard-pressed Liberal government re-elected. It worked on

¹⁷ Canada. House of Commons, *Debates* (May 1946), p. 1909.

¹⁸ Canada. House of Commons, *Debates* (February, 1949), p. 874.

¹⁹ G.B. Doern and J.F. Devlin, “The Farm Credit Corporation and the Federal Business Development Bank,” in A. Tupper and G.B. Doern (eds.) *Privatization, Public Policy and Public Corporations* (Montreal, The Institute for Research on Public Policy, 1981), pp. 369-370.

both counts.²⁰ All these measures were part of the Liberals' overall strategy for post-war socio-economic reconstruction.

In setting postwar priorities the King government was formatively influenced by Keynesian prescriptions for economic stability which assumed that the federal government would, in the words of the political scientist Donald Smiley, "ensure appropriate levels of aggregated demand through generalized fiscal and monetary policies and through lowering barriers to international trade and investment."²¹ The striking change in general equilibrium theory which the English economist John Maynard Keynes initiated in his 1936 classic treatise *The General Theory of Employment, Interest and Money*²², and which a generation of civil servants embraced, shifted the attention of Canadian opinion makers to the implications of improperly-managed economic policy. As a result, there was a conscious effort on Ottawa's part after the war to regulate the level of demand in the economy by fiscal adjustments and to maintain a "high and stable level of employment" - a phrase enshrined in the Canadian lexicon by the 1945 *White Paper* - via supplementary countercyclical policies. The pursuit of higher levels of welfare - through the implementation of such programs as the Family Allowance - was seen not only as a good in itself but also as a way of sustaining consumer demand. If people could be kept spending, the Keynesian logic went, then their demands would create the jobs and profits necessary

²⁰ For a more complete discussion of the Liberal government's macro-economic strategy for post-war reconstruction see: K. Norrie and D. O'ram, *A History of the Canadian Economy* (Toronto, Harcourt Brace & Co., 1996), pp. 390-94; G.D. Taylor and P.A. Baskerville, *A Concise History of Business in Canada* (Toronto, Oxford University Press, 1994), pp. 392-409; and M. Bliss, *Northern Enterprise: Five Centuries of Canadian Business* (Toronto, McClelland and Stewart, 1987), chp. 16.

²¹ D. Smiley, "Canada and the Quest for a National Policy," *Canadian Journal of Political Science* 8 (March 1975), p. 47.

²² J.M. Keynes, *The General Theory of Employment, Interest and Money* (Cambridge, Cambridge University Press, 1936).

to allow continued consumption. “Success”, in the words of the economic historians Ken Norrie and Doug Owsram, would thus be “self-fulfilling.”²³ In Canada, Keynes’ ideas were embraced and disseminated by a dynamic group of public policy economists who had been recruited into government service during the war. W.C. Clark, Louis Rasminsky, R.B. Bryce, J.J. Deutsch, A.W.F. Plumptre and W.A. Mackintosh each played an active role in aiding in the diffusion of Keynesian doctrines throughout the upper echelons of the Ottawa bureaucracy.²⁴ As a result of their efforts, when the war ended, a strong central authority and a Keynesian mentality pervaded Ottawa thinking.

Among the attractions of Keynesianism was the preeminent role it envisioned for the national government in directing economic activity. Not since the end of the nineteenth century had Ottawa held such sway in the economic affairs of the nation. By the end of the war, Canadians had come not only to accept but also to appreciate the “visible hand” of government intervention. This was certainly the message of the 1945 election. With the exception of the extreme *laissez-faire* Tory fringe, Canadians wanted their national government to take a firmer hand in directing the economy. Unlike after World War One, there was little inclination for a return to normalcy. The political/ideological conundrum lay in just how much “firmer” that grip should be. The June 1945 election seemed to reveal that a majority of Canadians did not favour the super-firm hand of the C.C.F. - “Turn Left, Canada” - but rather the lighter grip of the Liberals - “Let the Liberals finish the job” - on the economy, a grip which still allowed for a variable tenacity.

C.D. Howe, who in 1944 was appointed the minister of reconstruction, was a Liberal who favoured the lightest grip. Unlike the C.C.F. and left-leaning Keynesians within the

²³ Norrie and Owsram, *History of the Canadian Economy*, p. 393.

²⁴ See D. Owsram, *The Government Generation* (Toronto, University of Toronto Press, 1986), pp. 221–317; J. Granatstein, *The Ottawa Men: The Civil Service Mandarins 1935–1957* (Toronto, Oxford University Press, 1982), pp. 134–188; and R. Neill, *History of Canadian Economic Thought* (London, Routledge, 1991), pp. 172–190.

Liberal cabinet and the Ottawa mandarin, Howe was of the view that the market would settle most economic matters. He had confidence in what he called the “judgment of business” to make the right micro-economic decisions.²⁵ “In Canada,” Howe stated shortly after the end of the war, “the initiative to industrial expansion rests largely with private individuals and private companies.”²⁶ This did not mean that the government resigned its role in the economy. On the contrary. “In a world economy characterized by the internationalization of production,” note the political economists J.K. Laux and M.A. Molot, “policy makers in Canada as elsewhere sought to counteract their vulnerability to external change and assert greater control over domestic resources by extending the direct role of the state as investor and producer.”²⁷ Howe’s record as a public servant was full of examples of his using government to boost Canada’s presence in certain strategic or frontier industries. Polymer was simply the latest example of his interventionist bent. Prior to the war he had used the full power of the state on a number of occasions to overcome private industry’s inability or unwillingness to provide critical goods and services. In 1936-37, for example, when Canada was in need of a national inter-city air service, Howe wasted little time before creating Trans-Canada Air Lines as a government-owned and -controlled company.²⁸ In terms of capability, there were no private firms ready to make the

²⁵ C.D. Howe quoted in Bothwell and Kilbourn’s *C.D. Howe: a biography*, p. 263.

²⁶ C.D. Howe, “Industrial Development in Canada,” *Public Affairs* (December, 1948), p. 209.

²⁷ Laux and Molot, *State Capitalism*, p. 4.

²⁸ J.W. Langford, “Air Canada,” in A. Tupper and B. Doern (eds.) *Public Corporations and Public Policy in Canada*, p. 251. There is some debate over the rationale, or lack thereof, for government intervention in the area of aviation. Howe’s biographers Bothwell and Kilbourn (*C.D. Howe: a biography*) and J. Langford (*op. cit.*) argue that Howe was motivated by the pragmatics of the matter rather than any ideological commitment to government intervention. “In the depths of the Depression,” Bothwell and Kilbourn write, “the airways offered hope of dramatic future growth and a way out of despair. They also offered a potential new east-west link for a transcontinental nation reinforcing that of the

leap to a national carrier status, so Howe created his own crown company made up primarily of American aviation men who brought with them practical experience and technological know-how. In this case, as was the case during the war when Canada was in need of a secure source of rubber, Howe used government to put the necessary industrial structure into place, not to compete with private industry but to provide it with goods and services it would otherwise be without. According to Howe, simply priming the market alone, as Keynesians recommended, would not be enough in a small, technology- and capital-deficient economy like Canada to push the economy in a new direction.

In looking beyond the exigencies of wartime, C.D. Howe was generally more optimistic than most Keynesians about Canada's economic prospects.²⁹ The economic dislocations of the great depression would not return, he believed; indeed, the basic problem of the post-war era would be that of ensuring sufficient supply rather than stimulating demand.³⁰ Thus he was less worried than most about Polymer's "excess

railways and counterbalancing the north-south pull of the highways..." (*C.D. Howe*, p. 105). Likewise Langford writes: "Ideologically... Howe and his colleagues were far from the apostles of the Morrisonian vision of government of the ramparts of the economy" (p. 253). Bliss, on the other hand, sees Howe as ideologically committed, bent on government control of Canada's national aviation industry. (*Northern Enterprise*, pp. 442-443). There is, however, a third school of thought. In *Politics and the Airlines* (Toronto, Toronto University Press, 1965) D. Corbett argues that the establishment of Trans-Canada Air Lines was rooted neither in pragmatics nor ideology. In Corbett's opinion, there seemed to have been very little rational thought of any kind behind the establishment of Trans-Canada Air Lines. "...Canada seemed to have established a publicly-owned monopoly of air service," Corbett writes, "in a fit of absence of mind, as Britain is said to have acquired her Empire"(p. 106).

²⁹ R. M. Campbell, *Grand Illusions: The Politics of the Keynesian Experience in Canada, 1945-1975* (Peterborough, Broadview Press, 1987); Bothwell and Kilbourn, *C.D. Howe: a biography*, p. 350.

³⁰ Canada. *White Paper on Employment and Income*, Department of Reconstruction (Ottawa, 1945), p. 13.

capacity." At war's end, Canada was a "nation on the march."³¹ The war had produced new economic opportunities, according to Howe, particularly in the areas of electronics, communications and petrochemicals. It had provided a broadened industrial base and had modernized the technological core of the country. No longer was Canada composed merely of drawers of water and hewers of wood. "Today," Howe stated proudly shortly after the end of the war, "Canadians are both an industrious and an industrialized nation."³² Howe had a point. After all, in less than three decades (decades that paralleled Howe's own business and political career), the Canadian economy had changed its status from one mainly dependent for its livelihood on primary industries to one deriving its main wealth from the processing of primary products and the manufacturing of a variety of capital and consumer goods. In 1919, agriculture was Canada's most important industry, contributing 44% of the total new value of commodity production against 33% for manufacturing. By 1939, this position was almost the reverse, with manufacturing contributing 41% as against 23% for agriculture. When the war ended six years later, manufacturing had increased its lead to 52%. This pleased Howe. In his mind, it was essential for the Canadian economy to be mixed, with manufacturing firms like Polymer playing a leading role.³³

As minister of reconstruction, Howe considered it his task to help maintain the balance and buoyancy of the economy.³⁴ The objective was fully outlined in his department's 1945

³¹ C.D. Howe *et al.*, *Canada: Nation on the March* (Toronto, Clarke, Irwin & Co., 1953).

³² C.D. Howe, "Industrial Development in Canada," *Public Affairs* (December, 1948), p. 209.

³³ C.D. Howe, "Canada's new economic program," *Industrial Canada* (January, 1948), pp. 67-68; *idem*, "Achievements of Canadian manufacturers," *ibid.*, (October, 1948), pp. 71-73; *idem*, "Industrial Development in Canada," *Public Affairs* (December, 1948), pp. 207-213; *idem*, "Canada expands industrially," *Industrial Canada*, (January, 1949), pp. 69-70.

³⁴ Canada. Department of Reconstruction. *Reconstruction* (Ottawa, 1945).

White Paper on Employment and Income.³⁵ “The program of reconstruction,” the *White Paper* stated, “is a complicated task of combining the demobilization of the armed services and war industry with the rebuilding of an ampler and more stable Canadian economy.”³⁶ For six years industry had relied upon a war market, with the government as chief purchaser. But now that the demands of war were no more, it was widely accepted that normal patterns of trade would have to be restored. For Howe and those at the department of reconstruction, this meant first liquidating the industrial and military war effort which at its peak absorbed about half of Canada’s resources and secondly encouraging the expansion of business serving peacetime purposes to take the place of large-scale government buying of munitions and war equipment.³⁷ With his task defined, “Howe moved into action,” noted his biographers Bothwell and Kilbourn, “dismantling Canada’s siege economy, muffling the would-be state planners, and removing the complex of wartime regulations while keeping the key controls over steel and fuels in his hands.”³⁸

³⁵ Canada. Department of Reconstruction. *White Paper on Employment and Income* (Ottawa, 1945).

³⁶ *Ibid.*, p. 1.

³⁷ *Ibid.*

³⁸ R. Bothwell and W. Kilbourn, *C.D. Howe*, pp. 350-351. To stimulate new business investment and thus ensure that industry continued a high level of production once war contracts ended, Howe’s department of reconstruction introduced a series of fiscal incentives to business. Such fiscal aids included: the privilege of writing back or carrying forward losses to allow firms to approach more nearly an average profit basis for taxation purposes; the granting of a flat tax for the first year of operation of newly-established companies; tax concessions to encourage exploration and prospecting; permission to write-off research and development expenses in the year of expenditure; and provision for double depreciation allowances for industries buying new equipment to shift from wartime to peacetime production. These measures proved extremely successful. During the years 1945 to 1948, \$1.6 billion was invested in plants and equipment for manufacturing industries. This was more than Canadian business had invested in the preceding four years of WWII and the corresponding period of the last investment boom of 1926-29 taken together. See

When it came to the demobilization of the war-created industrial structure, Howe had to deal with the question of what to do with the twenty-eight crown corporations he had established during the war. After all, these were designed for a wartime economy and theoretically had no purpose and therefore no place in a peacetime, consumer-oriented world. Howe's own industrial vision acknowledged this. It made sense therefore for him to put his wartime crown corporations into private hands, especially now that the pressures of war were over. The Canadian economy was a free enterprise system and the vast majority of Canadians, like Howe, were committed, at least in principle, to private ownership of industry. This was not the case of course in the United Kingdom and France where industry was nationalized after the war in accordance with the socialist belief that the state should take over "the commanding heights of the economy" and operate them for the benefit of the entire nation rather than for the benefit of a small set of private owners. In the U.K. and France, therefore the trend was towards an ideological commitment to public enterprise.³⁹ But in Canada, when it came to the crown corporations, Howe took a decidedly pragmatic approach. He considered the merits of retaining each one on a discrete basis and kept only those with a strategic post-war purpose; those like Eldorado, Canada's uranium company, whose continued operation was viewed as necessary for reasons of national security after the detonation of the atomic bomb.⁴⁰ Similarly, the continued state

Canada. *White Paper on Employment and Income*, Department of Reconstruction (Ottawa, 1945), p. 10.

³⁹ See J. Foreman-Peck and R. Millward, *Public and Private Ownership of British Industry, 1820-1990* (Oxford, Clarendon Press, 1994), chp. 8 and E. Chadeau, "The Rise and Decline of State-Owned Industry in Twentieth-Century France," in P.A. Toninelli (ed.) *The Rise and Fall of State-Owned Enterprise in the Western World* (Cambridge, Cambridge University Press, 2000) chp. 8, esp. pp. 186-190.

⁴⁰ R. Bothwell, *Eldorado*, pp. 164-197. Eldorado none the less turned out to be a cash cow, generating a good deal of money for the government before the bottom dropped out of the uranium market in the late 1950s. But it was not for the sake of future profit that

operation of Wartime Housing Ltd. - a company which ultimately merged with the National Housing Administration and Central Mortgage Bank to become the CMHC - was seen as warranted given the acute post-war housing shortages, particularly for returning veterans.⁴¹ For the rest, the auction block awaited. By June 1946, only three of the twenty-eight crown corporations which Howe had established during the war were still active, with the majority being sold to private interests through the War Assets Corporation.⁴² Polymer completed the triumvirate.

On the shores of the majestic St. Clair River, the company's state-of-the-art plant continued to churn out synthetic rubber in peace as it had done in war. In mid-1944, Polymer's executive cabal had gone to see Howe to ask that the crown corporation be allowed to continue operations after the end of hostilities.⁴³ Contrary to the skepticism of the majority, Polymer was bullish on its peacetime prospects. As early as 1943, J.R. Nicholson had voiced his belief that synthetic rubber had a place in the post-war world. "I agree... it is unlikely that synthetic will ever wholly supplant crude rubber," he wrote A.H. Williamson in October 1943, "but both products have their uses and a well established synthetic rubber industry will keep this continent away from the mercy of other lands as to stocks and prices."⁴⁴ Douglas Ambridge, who ascended to the presidency in 1945, agreed.

Howe decided to retain Eldorado; this was an industry with peculiar strategic implications that could not be catered to by pure commercial endeavour.

⁴¹ Borins, "World War II Crown Corporations," p. 463.

⁴² Anonymous, "War Plants Going, Going, Almost Gone," *Financial Post* (January 25, 1947), p. 7. The crown corporations that were still active were: Eldorado Mines, Wartime Housing Ltd., and Polymer Corporation Ltd.

⁴³ E.J. Buckler, "Canadian Case History: Polymer Corporation Limited," *Research Management* (July 1963), p.291; interview with E.J. Buckler (Sarnia, November 1999); interview with I.C. Rush (Sarnia, November 1999); and interview with Robert Adams (Sarnia, November 1999).

⁴⁴ Nicholson to Williamson (October 22, 1943), *Polysar Papers*, vol. 33, file: Rubber Controller Correspondence 1942-1944.

"The first thing that strikes me," he wrote to C.D. Howe and R.C. Berkinshaw in November of 1943, "is that we, as Canadians, can never abandon the synthetic rubber business, come what it may [*sic*] in the crude rubber market."⁴⁵ Whether or not Ambridge knew it, he was preaching to the choir. Berkinshaw was among the most bullish when it came to the future of the synthetic rubber industry. In his expert opinion, synthetic rubber would have "a prominent place in Canada's future."⁴⁶ He was sanguine that in the years to come the industry would be able to reduce its costs and improve its products to such an extent that it would become competitive with crude rubber.⁴⁷ "Synthetic rubber must earn its place in the post-war market," he stated in 1945, "but in the competitive field it will not be weaponless."⁴⁸ Of course, Berkinshaw, as a senior executive with Goodyear Rubber and Tire, had a vested interest in seeing the project continue. With Polymer producing rubber, private industry would have an alternative and uninterrupted source of supply when the natural rubber cartel "unfairly" manipulated prices. Likewise, Howe was confident that the Canadian synthetic rubber industry would be well armed to compete in the post war world. "What will happen when natural rubber competes with synthetic rubber, I cannot say," the minister declared in September 1944. "But I do know that synthetic rubber is here

⁴⁵ Ambridge to Berkinshaw (November 26, 1943), *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, 1943-44, (9). Ambridge to Howe (November 26, 1943), *ibid.*

⁴⁶ R.C. Berkinshaw, "The Future of the Synthetic Rubber Industry," *The Canadian Banker*, vol. 52 (1945), p. 157.

⁴⁷ R.C. Berkinshaw, "Rubber production costs among the lowest in Industry," *Polysphere* (October, 1944), p. 2.

⁴⁸ *Ibid.*, p. 156.

and here to stay.”⁴⁹ Howe’s “hard hitting comments” - as the president of the RRC, Colonel Dewey, termed them⁵⁰ - were welcomed by those associated with the Polymer project.⁵¹

The question for Howe, therefore, was not whether synthetic rubber was a viable post-war enterprise. He was sure that it was. Rather the issue for him was in whose hands - the government’s or private industry - the Polymer project would be placed once the hostilities had ended. In August 1942 Howe gave the first clue of his intentions. “I think that operating costs will be low enough,” he confided to a colleague, “to warrant [Polymer’s] peacetime operation as a Government enterprise.”⁵² The following year, when he was asked by Conservative M.P. John Diefenbaker about his post-war plans for the Polymer project, Howe stated that it was his aim to continue to operate the plant at Sarnia as a government-owned and -controlled enterprise “to make rubber for the country at war and the country at peace.”⁵³ Howe felt that he had a “valuable asset” in Polymer.⁵⁴ Since beginning operations in September 1943, the plant at Sarnia had been running to capacity, supplying the needs of Canada in full with a fairly substantial margin for export. “In light of what has been achieved,” Howe stated in September 1944, “Polymer need not fear the

⁴⁹ C.D. Howe, “Anniversary Address” reprinted in *Polysphere* (October, 1944), p. 1 and 5.

⁵⁰ Dewey to Howe (October 20, 1944), *C.D. Howe Papers*, vol 46, file: Polymer Corporation, 1944-1945, (7).

⁵¹ Nicholson to Howe (October 7, 1944), *C.D. Howe Papers*, vol 46, file: Polymer Corporation, 1944-1945, (7).

⁵² Howe to the Minister of National Revenue (August, 1942), *C.D. Howe Papers*, vol. 47, file: Polymer Corporation, 1942, (11).

⁵³ Canada. House of Commons. *Debates* (June 16, 1943), p. 3713.

⁵⁴ Howe to Nicholson (November 25, 1944), *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, 1944-1945, (7).

future.”⁵⁵ Looking ahead, there seemed to be “every reason” for putting Polymer “on its own as a [government] corporation operating for profit.”⁵⁶

The task of determining exactly how profitability was to be accomplished, the minister was willing to leave up to Polymer’s executive team. “It will be the job of Polymer to sell sufficient rubber to keep its operations at an economic level,” he wrote Nicholson in November 1944, “and I am quite willing to leave the method to you and your Board of Governors.”⁵⁷ Howe’s decision to take a hands-off approach to Polymer ultimately guaranteed the long-term success of the firm. The purpose of Polymer was to generate a profit and Howe was willing to give the firm tremendous autonomy to achieve its aim. In so doing, he established a pattern of ministerial behaviour that his successors would emulate. As a post-war government-owned and -operated commercial enterprise, Howe was confident that Polymer would be able to sell enough high value-added goods to turn a profit. Polymer was being asked to produce for profit and given a wide margin of managerial discretion to do so.

While Polymer’s post-war commercial viability was *the* determining factor in Howe’s decision to retain the corporation, there were additional - albeit incidental - reasons for his doing so. In Polymer he saw the possibility of an industrial polymath. As an instrument of state-led development strategy, Polymer would play several roles. First, by being a profitable commercial enterprise Polymer would incidentally generate export earnings. The *White Paper* had stressed the need for increased export markets if the federal government’s demand management policies were to work at home. Polymer would aid the government in this task. The crown company’s synthetic rubber would be sold on world markets, thus taking its place alongside Canadian uranium, aluminum, iron ore, petroleum

⁵⁵ C.D. Howe, “Anniversary Address,” p. 1.

⁵⁶ Howe to Nicholson (November 25, 1944), *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, 1944-1945.

⁵⁷ *Ibid.*

and natural gas as the latest in a long line of products for export. Second, the crown company would act as “pump primer” to a whole new petrochemical industry in Canada. Since being elected to office in 1935, Howe had endeavored to modernize the Canadian economy.⁵⁸ He was especially interested in developing science- and technology-based industry.⁵⁹ In 1945, he expressed to J.R. Nicholson his desire for “making Sarnia a center of Canada’s great organic chemical industry.”⁶⁰ Howe believed that western civilization was on “the dawn of a chemical age” and that the Polymer undertaking could become “the very hub of a group of complementary chemical and other industries.”⁶¹ By the end of the war, Polymer was producing surpluses of styrene, ethylene and butylene, all of which, according to Howe, could be “the basis of substantial industries.”⁶² Polymer would thus be the cornerstone of a whole new petrochemical industry, helping to propel Canada across the high technology threshold.

By 1948, there were already signs that Howe’s industrial strategy was working. In the fall of 1945 Dow Chemical had begun construction on a \$10 million plant on land adjacent to Polymer to polymerize styrene into plastic.⁶³ At that time, an agreement was reached whereby Polymer would supply Dow with its principal raw material. This arrangement proved enormously successful, generating a stable income for Polymer while protecting it from fluctuations in the rubber market. At about the same time Fiberglass (Canada) Ltd.

⁵⁸ R, Bothwell and W. Kilbourn, *C.D. Howe*, esp. chp. 8 and 10.

⁵⁹ *Ibid*, chp. 16. Also see R. Bothwell, *Nucleus, The History of Atomic Energy of Canada Limited* (Toronto, University of Toronto Press, 1988), esp. pp. 67-82.

⁶⁰ Howe to Nicholson (September 25, 1945), *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, 1944-1945, (7).

⁶¹ C.D. Howe, “Anniversary Address,” p. 1.

⁶² Canada. House of Commons. *Debates* (November 20, 1945), p. 2232.

⁶³ E.R. Rowzee, “Sarnia, the birthplace of Canada’s petrochemical industry,” *Chemistry in Canada* (February 1950), 21-27.

announced that it would soon begin construction of a \$2.5 million plant in Sarnia.⁶⁴ Later Standard Chemical Company and the General Aniline and Film Company made similar announcements.⁶⁵ The war had increased Canada's appetite for chemicals. Between 1939 and 1945, chemical consumption had doubled.⁶⁶ After the war, the craving remained. Between 1945 and 1955, chemical consumption as a percentage of G.N.P. averaged 4.5%.⁶⁷ By 1951 the chemical industry in Canada employed 45,644 people.⁶⁸ Of these 2,055 were employed by Polymer.⁶⁹ In more ways than one, therefore, Polymer had catalyzed the industrial development of the region.

Howe's decision to retain Polymer was in marked contrast to that taken by his counterparts in the United States. At the end of the war, Polymer's U.S. counterpart, the RRC, was wound-up and the factories which were under its control were either sold to private interests or shut down for use at a later date. Even before the ultimate ratification of the *Rubber Producing Facilities Disposal Act* of 1953, early steps had been taken in general accord with the belief in the U.S. that the government should get out of the rubber business. Between October 1946 and December 1948, eighteen of the fifty-one original synthetic rubber facilities in the U.S. were sold under authority of the *Surplus Property Act*. By the time Congress passed the *Disposal Act* in 1953, roughly half of the

⁶⁴ J. Elford, "Sarnia, Canada's Chemical Valley," *Canadian Geographical Journal*, vol. 55 (November, 1957), pp. 170-185.

⁶⁵ *Ibid.*

⁶⁶ M. C. Urquhart (ed.), *Historical Statistics of Canada* (Toronto, MacMillan, 1965), p. 474.

⁶⁷ J. Davis, "The Canadian Chemical Industry," *Final Report, Royal Commission of Canada's Economic Prospects* (March 1957), p.157.

⁶⁸ *Ibid.*, p. 167.

⁶⁹ *Annual Report* (1953), p. 18.

government's rubber plants had been sold to private industry.⁷⁰ The remaining plants, those for which a private purchaser could not be found, were mothballed in case of another national emergency. This course of action was never considered by Howe. If the Liberal government had chosen to close its plant, Canadian manufacturers would have again become reliant on foreign supplies of rubber. The dangers associated with this were etched in the national memory. During the war, Canada's dependency on foreign sources had exposed the vulnerability of the Canadian economy to external sourcing. After the war, there was no desire to return to a situation of dependency. When in December 1946 Howe was approached by Peter Campbell, a Liberal Senator and prominent Toronto lawyer who was representing a group of investors interested in purchasing Polymer from the crown, Howe stated that he was "inclined to think that the government should keep Polymer if only as a protection against our rubber supply in future years."⁷¹ Furthermore, mothballing the plant would have been inconsistent with the government's commitment to "a high and stable level of employment and income." In 1946, Polymer was employing almost 2,000 workers directly and, indirectly, was creating employment for thousands of other men and women who worked for the companies that provided Polymer with the necessary brine, soap, benzol, sulphuric acid, petroleum gas and other raw materials used in synthetic rubber production. In the context of the Liberal government's overall post-war strategy for reconstruction, writing-off the plant and closing it was as unpalatable as privatization. Thus, the major argument in favour of Polymer's continued operation as a state-run enterprise was as much a reflection of the macroeconomic downside of all other alternatives as it was its intrinsic desirability.

⁷⁰ Brendan J. O'Callaghan, "The Government's Rubber Projects," vol. II, Reconstruction Finance Corporation Report, 1948, as revised in 1955 under the supervision of Bertram H. Weimar, Office of Synthetic Rubber, Federal Facilities Corporation, (U.S.) National Archives, Record Group 234, file no. 26, pp. 607-651.

⁷¹ Howe to Campbell, (December 24, 1946), *C.D. Howe Papers*, vol. 45, file: Polymer Corporation, 1945-1946, (6).

The government's decision gave Polymer the confidence to plan strategically. Not since the founding of the corporation had there been such a momentous juncture in the firm's short history. But there was no time for self-congratulation. An arduous task lay ahead. The corporation would have to live up to its own high expectations, and those of C.D. Howe. Polymer would have to quickly formulate a strategy for survival and adjust its corporate structure so as to function as a profitable commercial enterprise. Like other enterprising Canadian companies, such as Alcan, which had emerged from the war with excess capacity, Polymer would have to locate and develop new markets, all the while meeting the competition from natural rubber.⁷²

Howe's public declaration that he was retaining Polymer came some months after his private directive to Polymer's board that the corporation would continue operating in pursuit of profit. During this interval, executives at Polymer began formulating a strategy for success in the post-war world. The imperatives of wartime expansion were gone and, if the company was to profit in the post-war economy, it would have to shift from a production-oriented to a diverse product-oriented enterprise. The new corporate mission that emerged had three key elements. Given the plant's overcapacity in relation to Canada's domestic needs, the company needed to develop export markets for synthetic rubber. In addition, it would have to develop a greater variety of products, to meet the needs of peacetime consumers and reduce the cost of producing existing ones. "To insure a long term future for synthetic [rubber]," an internally generated technical paper noted, "prices must definitely be lowered and quality improved until it is directly competitive with crude rubber.... Failing this, the demand will fall off to a negligible volume with a consequence

⁷² In a number of important ways, Alcan's history paralleled Polymer's. To meet wartime demand, Alcan had increased its capacity fivefold to 500,000 tons of ingots per year. When domestic demand dried up at the end of the war, it reorganized and rebuilt its international sales organization, with a principal object of moving a larger volume of Canadian ingots than ever before in peacetime. See Campbell, *Global Mission*, chp. 8.

of writing-off the huge Samia investment.”⁷³ And, finally, the company would have to increase its sales of the by-products and co-products of synthetic rubber production so as to break the dangerous dependency on staple-oriented production.⁷⁴

The implementation of the new strategy necessitated the alteration of the organization’s structure. This, according to the historian of American corporate organization, Alfred Chandler, was a common progression in the growth of the successful industrial enterprises during the twentieth century. It was a necessary development, if the firm was to compete successfully and function effectively in its environment.⁷⁵ “A new strategy,” Chandler writes, “required a new or at least refashioned structure if the enlarged enterprise was to be operated efficiently.”⁷⁶ Structure, in Chandler’s famous dictum, followed strategy. At Polymer, after the war, a similar chain of events occurred.

One of the first organizational changes to be made came in late 1944 when Polymer established a research department to develop and improve products scientifically. It was an objective which was decidedly distinct from the one that led to the establishment of research and development departments at General Electric, America Telephone and Telegraph, and Kodak. All of these firms had organized research laboratories to protect their technological leads from competition.⁷⁷ But Polymer’s rationale was far more activist. From the outset, the goal of the department was to produce, with the greatest possible efficiency, a synthetic rubber which could aggressively compete, both in terms of price and quality, with natural rubber once that product returned to the market place. Polymer was thus among the first

⁷³ “Memorandum Regarding Technical Division” (May 12, 1944), *Polysar Papers*, vol. 34, file: National Research Council, 1942-1948.

⁷⁴ E.R. Rowzee, *Proceedings*, House of Commons Standing Committee on Public Accounts (1958), p. 503.

⁷⁵ A. Chandler, *Strategy and Structure*, esp. pp. xi-xiv and 1-17.

⁷⁶ *Ibid.*, p. 15.

⁷⁷ See, L.S. Reich, *The Making of American Industrial Research Science and Business at GE and Bell, 1876-1926* (New York, Cambridge University Press, 1985).

Canadian firms to acknowledge that economic growth could be knowledge-based and science-driven. The war had taught Polymer the power of science. The establishment of a research department would now put that power toward peacetime, commercial ends. "A well directed research and development program," R.C. Berkinshaw wrote to the president of the NRC, Dr. C.J. Mackenzie, in May 1944, "can be expected to more than justify its cost by its contribution to cost reductions and product improvement and to contribute materially toward ensuring a successful future for Canada's huge synthetic rubber program."⁷⁸ The statement was consistent with the objectives of Howe's department of reconstruction which, in 1947, released a report on research and scientific activity in Canada.⁷⁹ The report reiterated the department's position, which had first been stated in the *White Paper*, that the application of science to industry was "an essential of modern industrial development."⁸⁰ Howe had held such a view since his education at M.I.T.⁸¹ Not only was science transforming older industries but it was creating new ones associated with radio, electronics, combustion processes and petrochemicals. Building on earlier initiatives, the 1947 report promised new funds to firms like Polymer engaged in R&D activity.

To head the new department Berkinshaw chose Ralph Rowzee, the general manager of Canadian Synthetic Rubber Ltd. Rowzee was a strong advocate of the need for a R&D program. "I feel that if Canada's synthetic plant is to compete in world markets after the war," he wrote to Berkinshaw in October 1944, "we will have need of the best research and development facilities that are available to assist in establishing this plant in a

⁷⁸ R.C. Berkinshaw to C.J. Mackenzie (May 12, 1944), *Polysar Papers*, vol. 34, file: National Research Council, 1942-1948.

⁷⁹ Canada. Department of Reconstruction and Supply. *Research and Scientific Activity Canadian Federal Expenditures 1938-1946* (Ottawa, King's Printer, 1947), especially, p. 6.

⁸⁰ *Ibid.*

⁸¹ R. Bothwell and W. Kilbourn, *C.D. Howe*, esp. pp. 20-21.

Figure 2.3



Ralph Rowzee (left) and company president, E.J. Brunning (right), with the Prime Minister Louis St. Laurent, who visited the Polymer Plant in April 1950. Source: *Polysphere* (February 1967), p. 13.

competitive position.”⁸² During the war, Rowzee had overseen the copolymerization process at Sarnia and was generally thought to have done an outstanding job. “The remarkable success which attended his work,” Berkinshaw wrote to Howe of Rowzee in November 1944, “has greatly impressed those of us who have been closely associated with the enterprise.”⁸³ When Berkinshaw proposed Rowzee’s name to C.J. Mackenzie, Mackenzie responded that if the services of Rowzee could be obtained, he would be “an ideal man to head up the Polymer program.”⁸⁴ Rowzee had graduated with honours in chemical engineering from M.I.T. in 1930 and had obtained his Master of Science degree from that institution in 1931. Later that year, he was one of a group selected, on the

⁸² E.R. Rowzee to R.C. Berkinshaw (October, 26, 1944), *Polysar Papers*, vol. 34, file: National Research Council, 1942-1948.

⁸³ R.C. Berkinshaw to C.D. Howe (November 7, 1944), *Polysar Papers*, vol. 34, file: National Research Council, 1942-1948.

⁸⁴ D. Mackenzie to R.C. Berkinshaw (November 3, 1944), *Polysar Papers*, vol. 34, file: National Research Council, 1942-1948.

recommendation of the faculty at M.I.T., to join Goodyear Tire and Rubber Company of Akron, Ohio. His first two years with the company were spent in the chemical engineering division, but in 1933, he was transferred to the research division to do some preliminary work on synthetic rubber. He was there when, in 1934, the news broke of I G Farben's discovery of a new method of synthesizing rubber by polymerization of butadiene and other monomers. The news prompted Goodyear to resume its independent research in the field and Rowzee was assigned to the company's first scale-up program from laboratory work. He was actively engaged in the work of designing, engineering and constructing the plant required and upon its completion was placed in charge of its operation. In 1942, Goodyear loaned Rowzee to Canadian Synthetic Rubber Ltd. for the duration of the war. Rowzee, however, chose not to return to Goodyear once the hostilities had ended. He was convinced that synthetic rubber was "here to stay" and that the crown company on the banks of the St.Clair was going to be a pioneer in the field. In a 1945 address given to the Chemical Institute of Canada - an institute which he would later head - Rowzee outlined the reasons for his optimism. "Again and again," he stated, "time has shown that the synthetic product is capable of supplanting the natural product. It is my belief that history will again repeat itself and eventually Sarnia's products will supplant natural rubber."⁸⁵ The Second World War had revolutionized the chemical industry by greatly accelerating the rate and extent of the displacement of natural substances by synthetic polymers. Rowzee was sanguine that in the succeeding years, natural rubber too would be "on the way to joining natural dyes, natural drugs and other products that have been replaced almost 100 per cent by synthetic products."⁸⁶ His optimism was rooted in a faith in the Promethean power of

⁸⁵ E.R. Rowzee, "Address to the Vancouver, Wellington-Waterloo and Toronto sections, and the Ontario Rubber Section of the Chemical Institute of Canada," (November, 1945), *Polysar Papers*, vol. 43, file: addresses and articles 1940-1963, part 1.

⁸⁶ E.R. Rowzee, "Synthetic Rubber Industry in Germany," *Canadian Chemistry and Process Industries* (December, 1945), p. 816.

science and its practitioners. "The future of the synthetic rubber program," he stated soon after his appointment as director of research, "is squarely in the hands of the rubber chemist... I believe that he will successfully improve the present synthetics and concurrently discover new superior types of synthetics which can be produced economically."⁸⁷ Armed with this belief, in the fall of 1944 Rowzee began recruiting all the chemists that his relatively tiny R&D budget would allow. The department grew steadily after the war and by 1951 was employing over 100 chemists and technicians. This level of growth was not unfamiliar to the industry in other industrialized countries; now Canada's synthetic rubber industry was falling into line with global corporate strategies and structures.⁸⁸

Aided by the federal fiscal incentives that were available to all businesses (e.g. tax deductions for all expenditures and investments made in research facilities), between 1945 and 1951, Polymer's new research department worked to develop a synthetic rubber that would equal or surpass natural rubber in uniformity, special properties, and cost. The post-war petrochemical and polymer developments were monumental, and aggressive techno-economic competition with natural rubber was the order of the day. Under Rowzee's leadership and later under the direction of E.J. Buckler - a brilliant Cambridge-educated chemist, who replaced Rowzee as director of R&D when Rowzee was promoted to general manager in 1946 - the research department played a highly significant part in the translation of pure science to applied industrial use.⁸⁹ Of the six technological "break-

⁸⁷ Rowzee quoted in *Polysphere* (June 1946), p. 5.

⁸⁸ See Chandler, *Strategy and Structure*, pp. 374-378; and *idem*, *Scale and Scope: The Dynamics of Industrial Capitalism* (Cambridge, Mass., Harvard University Press, 1990), pp. 107-108.

⁸⁹ "Review of Accomplishments" (December 1971), *Buckler Papers*, vol. 1. During the period 1945-1951 Polymer's research and development accomplishments included: (1) The first commercial use (1948) of a catalyst for the dehydrogenation of butylenes to butadienes. This development was essential for Sarnia economics and made a significant

throughs” during the period (i.e. cold-resistant butyl rubber, the black masterbatch technique, the improved butadiene catalyst, “cold” rubber, high abrasion carbon blacks and oil-extended buna-s), Polymer, remarkably, played a principal role in three. One of Polymer’s greatest successes came in 1947 when the research and development department solved the problem of “cold weather buckling.” Postwar butyl rubber had a tendency to grow brittle and crack at low temperatures. For this reason extensive difficulties developed in the use of butyl inner tubes by car owners in Canada and the American northwest. Because of the effect on its domestic sales volume, Polymer was especially concerned with the problem, having in mind Canada’s cold winter climate. Polymer manufactured butyl as a licensee of Standard Oil of New Jersey and was bound by agreement to a mutual exchange of patents and technical information. Polymer was thus obliged to turn first to Standard for assistance. But Standard was indifferent to the problem of “cold buckling.”⁹⁰ As a result, Polymer tackled the problem on its own and solved it, incidentally evolving a new theory of the structure of butyl rubber which E.J. Buckler presented to the industry in

contribution for many years. (2) The basic improvement (1949) of a polymerization recipe used to manufacture buna-s type rubber. The recipe was later used by producers worldwide. (3) The prevention of buckling of butyl inner tubes at low temperatures concurrent with a 20% reduction in tube material costs (1949). This development saved and reestablished the prime market for butyl rubber, namely automotive tire inner tubes. (4) The first (1949) large scale production and promotion of a self-reinforced rubber. This was later used universally as a shoe-sole material. (5) The first commercial use (1950) of an improved polymerization recipe for the manufacture of oil-resistant butadiene/acrylonitrile copolymers at low temperature. (6) The first commercial production (1950) of a useful general purpose synthetic rubber containing 30% of low-cost oil as an extender. (7) The first commercial production (1950-52) of types of butyl rubber designed for special purposes such as high-voltage cables and curing bags.

⁹⁰ R. Solo, “Research and development in the Synthetic Rubber Industry,” *Quarterly Journal of Economics* (1954), vol LXVIII, p. 73.

June of 1948.⁹¹ The problem was solved by making a high molecular-weight version of butyl rubber and extending it with oil of a specific composition. Since oil was far cheaper than the other inputs used in the manufacture of butyl rubber, the innovation not only improved the rubber's quality but lowered its cost as well. The net result of this development was to render butyl preeminent as an inner tube rubber under all weather conditions.

Despite these innovations, R&D meant little if markets could not be found for Polymer's product. In 1945, the market for Polymer's output was overwhelmingly North American. That year, less than three per cent of total output was exported to countries outside the United States while domestic consumption totaled approximately 35,000 tons.⁹² Polymer's success at home was largely a result of two factors: stronger than expected post-war demand for rubber products and the protection afforded by ongoing wartime controls. The board of directors anticipated that neither of these phenomena would last for long.⁹³ They were right.

In the spring of 1947, C.D. Howe followed through on his promise to deregulate the rubber industry, ending five years of government controls. After Pearl Harbor, the Canadian government had decided to limit the amount of natural rubber used to manufacture tires and other products. This guaranteed synthetic rubber a certain portion of the market place and in effect protected the nascent industry. The protection was purely incidental, however, as the principal purpose of the government's regulation was to ensure that existing supplies of natural rubber were not depleted unnecessarily. At the end of the war, with access to the rubber plantations of the Far East regained, the rationale for such

⁹¹ E.J. Buckler *et. al.*, "Low Temperature Performance of Butyl Inner Tubes", *Proceedings of the Second Rubber Technology Conference* (Cambridge, England, W. Heffer & Sons Ltd., 1948), pp. 34-48.

⁹² *Annual Report* (March, 1946), p. 6.

⁹³ "Minutes of the Board of Directors" (November, 1945), *DMS Papers*, vol .2.

controls vanished and talk began in Ottawa about bringing an end to the wartime regulations. Howe had never intended to protect Polymer from competition - a point that he had made abundantly clear to the board of directors at the time that they had approached him with their recommendation to keep Polymer in business after the war.⁹⁴ He made a similar declaration before parliament in May of 1946. "The fact that the government owns a synthetic rubber plant," Howe asserted in the House of Commons, "will not be used to deprive anyone from the privilege of purchasing natural rubber."⁹⁵ In Howe's opinion, nothing should interfere with the right of Canadian industry or consumers to purchase either synthetic or natural rubber. He wanted nothing to do with the old "infant industry" mentality that had coddled Canadian industry since the 1870s.

At Polymer, however, the whole notion of de-control sent shivers down the collective spine of the corporation. The board feared that de-control would "throttle the new industry before it... has had a chance to develop continuing peacetime markets and before the public has had a chance to evaluate its good qualities."⁹⁶ It further worried that if the rubber regulations were summarily suspended, as was being suggested, the domestic demand for their product would drop off precipitously. Some of the more pessimistic estimates predicted that if de-control went through synthetic rubber would lose over two-thirds of its domestic market share to natural rubber. In an effort to prevent such a ruinous event from occurring, Polymer's board of directors - in addition to stepping up their efforts to develop new markets abroad while embarking on a campaign at home to heighten public awareness about the qualities of their products⁹⁷ - wrote to Howe asking that the wartime regulations

⁹⁴ Interviews with I.C. Rush and E.J. Buckler (Sarnia, November 1999).

⁹⁵ Canada. House of Commons. *Debates* (May 14, 1946), p. 1516.

⁹⁶ Polymer executive committee to C.D. Howe (November 5, 1946), *DMS Papers*, vol. 7.

⁹⁷ A.P. Mechin, "Address at the Lions Club of Sarnia, Ontario," (October 25, 1946), *DMS Papers*, vol. 7. Similar statements were made by the other members of the corporation. See Nicholson to Howe (October 7, 1944), *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, 1944-1945, (7); E.R. Rowzee, "Address at the Kinsmen's Club of London,

be continued. In true Canadian form, they were asking Ottawa to consider them a needy “infant industry.”

The argument put forth by the board was well-rooted in Canadian economic thought, dating from John Rae’s classic nineteenth century *Statement of Some New Principles on the Subject of Political Economy*.⁹⁸ As an infant enterprise, the board argued, the synthetic rubber industry should not, indeed could not, be expected to compete with a fully-developed industry like that of natural rubber. “The baby should not be treated as a full grown man. We must not suddenly feed it the adult fare of full de-control if we expect it [i.e. the synthetic rubber industry] to reach maturity,” the Polymer board told Howe in true protectionist spirit.⁹⁹ This argument had an honourable lineage in Canadian industrial history. Alexander Galt had used a similar argument as early as 1859 to justify “incidental protection” of Canada’s nascent industrial economy. John A. Macdonald again used it in defence of the National Policy of 1876.¹⁰⁰ Yet C.D. Howe would have none of it. As he had previously instructed the board of directors, Polymer would either “profit or perish” as a competitive agent on the free market. “I feel that there is no excuse for controls after a commodity comes into adequate supply,” Howe wrote to an interested observer at the time.¹⁰¹ “I feel that the Sarnia plant must stand on its own feet, and that it is quite capable of

Ontario,” (March 25, 1946), *DMS Papers*, vol. 7; E.R. Rowzee, “Address at Kiwanis Club of London, Ontario” (August 27, 1946), *DMS Papers*, vol. 7; L.D. Dougan, “Address to the Canadian Manufacturers’ Association,” (Toronto, June 5, 1946), *DMS Papers*, vol. 7.

⁹⁸ Rae, *Statement of Some New Principles on the Subject of Political Economy*, esp., pp. 119-129.

⁹⁹ Polymer’s executive committee to C.D. Howe (November 5, 1946), *DMS Papers*, vol. 7.

¹⁰⁰ Neill, *A History of Canadian Economic Thought*, pp. 72–91.

¹⁰¹ C.D. Howe to G. Bateman (November 1, 1946), *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, 1945-1946, (7).

doing so.”¹⁰² Howe’s position on Polymer was consistent with his general approach to post-war industrial planning. He rejected the old cloistered protectionist outlook that had traditionally governed Canadian industrial development and opted instead for an approach which was largely free of dependency on tariffs, direct government succour, and foreign capital and research and development ideas.

In November of 1946, the board made a final appeal to Howe to extend controls on the purchase and use of natural rubber so as to leave the Canadian market open to them.¹⁰³ The implacable Howe responded that Polymer could expect no more than four additional months of regulation.¹⁰⁴ As it turned out, the company got five. In April 1947, Ottawa removed all wartime restrictions on the use of natural rubber and Canadian rubber-consuming manufacturers became free to use as much natural rubber as they chose in tires and other products. Remarkably, private industry did not abandon synthetic rubber altogether, despite the pent-up consumer demand for natural rubber products and the fact that natural rubber was usually cheaper to purchase than synthetic rubber. According to Arthur Plumptre, a Queen’s University economist who had studied under Keynes at Cambridge before being recruited into government service during the war by the deputy minister of finance W.C. Clark, this was because private industry understood that it was in its long-term interest to have an alternative source to that of natural rubber. Still, Howe’s decision to remove government controls frustrated Plumptre. Commenting in *Saturday Night*, Plumptre put forth a rather complex argument for continued government regulation. Taking into account developments in the United States, consumer demand at home, and long-term levels of employment and income, Plumptre concluded that if one agreed that it was in the “public interest” to continue having a synthetic rubber industry in Canada, then it

¹⁰² *Ibid.*

¹⁰³ Polymer’s executive committee to C.D. Howe (November 5, 1946), *DMS Papers*, vol. 7.

¹⁰⁴ C.D. Howe to J.R. Nicholson (November 9, 1946), *DMS Papers*, vol. 7.

was up to government and not industry to make sure this happened. "This is a matter on which the government should make its own decision," Plumptre stated, "rather than pushing it onto industry."¹⁰⁵ Despite the force of Plumptre's argument, Howe maintained his position. His intransigence was not without its consequences.

Natural rubber's return to the market place, brought on by de-control, led to dramatic shifts in the pattern of domestic consumption. Of the approximately 42,000 tons of rubber consumed in Canada in 1945, 36,100 tons or 85.9% was in the form of synthetics. Two years later, synthetic rubber's share of the marketplace had fallen to almost half of that. Of the 61,455 tons of rubber consumed in Canada in 1947, 32,270 tons, or 52.5%, was in the form of natural rubber.¹⁰⁶ In 1948, only 20,500 tons (or 33.1%) of all rubber consumed in Canada was from Polymer's 50,000 ton capacity plant. This was dismaying news given that the crown company had to sell 40,000 tons just to break-even. This trend continued until 1952 when synthetic rubber once again pulled even with natural rubber, accounting for 50.1% of domestic rubber consumption.¹⁰⁷ By then the superior properties of synthetic rubber in certain applications were fully recognized. The return of natural rubber to the international marketplace therefore had an immediate and almost devastating effect on the crown company. With the plantations of the Far East tapping pre-war levels of natural rubber and synthetic rubber production remaining steady at wartime levels, a glut in the international marketplace occurred. The price of rubber – both natural and synthetic – flattened as a result. In 1947, the price of natural rubber fell to roughly 14¢ a pound – approximately the figure which prevailed in August 1939. In an effort to retain its market share in this "buyer's market", Polymer dropped its price to 15¢ a pound - a rate which was

¹⁰⁵ A.F.W. Plumptre, "Synthetic Tires a Problem for Ottawa, not Industry," *Saturday Night*, vol. 62 (June 28, 1947), pp. 6-7.

¹⁰⁶ Canada. Dominion Bureau of Statistics. *Consumption, Production and Inventories of Rubber*, vol. 20, No. 1. (January, 1966), p. 4.

¹⁰⁷ *Ibid.*

very close to the company's production cost.¹⁰⁸ Price, which had been a secondary consideration during the war, was now a decisive factor in the fierce battle for rubber markets. Howe's determination to de-regulate rubber consumption in Canada had given Polymer a bracing baptism in the post-war marketplace.

Market dynamics had changed dramatically since the end of the war. In 1946 there was still a world-wide shortage of crude rubber and the pent-up demand for rubber products enabled the company to dispose of its entire output at prices which included a reasonable margin of profit. This was reflected in the company's financial position. That year the company reported a net profit of \$3.9 million on sales of \$22.5 million.¹⁰⁹ But in the twelve months that followed, an increase in competition from crude rubber, which was readily available at low prices, weakened the company's financial position. In 1947, Polymer experienced what C.D. Howe termed its "worst year" on record.¹¹⁰ With decreases in domestic sales not matched by increases in sales abroad, the crown company posted a razor-thin net profit of \$25,000 on sales of \$17.3 million - a volume which was only about two-thirds of that recorded in 1945. Still it was a profit - however slight - and as a result there was no talk of shutting the company down. Fortunately, the company's strategy of selling the by-products of production - the "second string" in the company's bow, as Howe had termed it¹¹¹ - had its desired effect of safeguarding the company from uncontrollable fluctuations in the marketplace. During the year, large quantities of styrene, ethylene, butane, toluene, isobutylene, electric power and steam were sold, and the gross realization from such sales amounted to \$2,599,100.¹¹² Looking ahead, officials at

¹⁰⁸ Later, the price of natural rubber moved back to around twenty to twenty-five cents a pound, and Polymer advanced its price to eighteen and nineteen cents per pound.

¹⁰⁹ *Annual Report* (March, 1947), see schedules "C" and "D".

¹¹⁰ Canada. House of Commons. *Debates* (June 19, 1948), p. 5526.

¹¹¹ Canada. House of Commons. *Debates*. (November 20, 1945), p. 2332.

¹¹² *Annual Report* (March, 1948), p. 3.

Table 2.1
Selected statistics of operation, 1945-1951

Year	Production (long tons)	Number of Employees	Sales (\$000s)	Mgt Fees (\$000s)	Profit (\$000s)	Profit as % of Ottawa's Investment
1945	39,700	1835	29,500	846	1,600	3.2
1946	45,200	1806	21,300	958	2,600	6.1
1947	51,700	1852	22,500	649	3,900	8.4
1948	39,700	1767	17,300	390	25	0.01
1949	42,200	1919	21,600	350	700	1.5
1950	47,600	1969	26,000	430	800	1.7
1951	59,100	2055	35,300	471	4,500	9.4

Source: C.A. Ashley, *Canadian Crown Corporations*, p. 237.

Polymer were cautiously optimistic. "We feel confident," E.J. Brunning, who had recently replaced Douglas Ambridge as president, stated, "that a year of steady progress and sound development lies ahead."¹¹³

Part of the reason for Brunning's optimism was the fact that since the end of the war the company had made notable strides developing export markets abroad. Energized by the threat of de-control, in the autumn of 1945, J.R. Nicholson crossed the Atlantic and set up an overseas sales and technical organization to service Europe. Outside of the United States, which Polymer continued to supply at a rate of between 9,000-25,000 tons per year during the period, the war-ravaged countries of Western Europe were the most logical place for Polymer to establish a commercial presence. Both Nicholson and Rowzee had traveled there in the closing days of the war and were struck by the scale and scope of the potential market for Polymer's products.¹¹⁴

The war had left Europeans rubber hungry and rubber starved. Ever since Columbus returned from the new world with stories of the inhabitants playing games using balls prepared from the gum of a tree, Europeans had been fascinated by rubber's properties. This intellectual curiosity turned into a commercial appetite during the industrial revolution and continued to increase thereafter. The quest for rubber was a crucial pressure behind

¹¹³ *Annual Report* (March, 1948), p. 8.

¹¹⁴ Rowzee, "Synthetic Rubber Industry in Germany," pp. 814-816.

European expansion. By the time the world went to war for a second time in the twentieth century, Germany, France, Italy and the United Kingdom were among the world's most voracious consumers of rubber.¹¹⁵ In 1939, these four countries together consumed more than 275,000 tons of raw rubber, nearly one third of all the rubber consumed in the world that year.¹¹⁶ The war only heightened Europe's appetite for rubber, and, according to executives at Polymer, this hunger would soon re-materialize in the peace.

At the end of the war, world demand for rubber was far in excess of supply. Although the plantations of the Far East had been recovered, the Japanese had left them in such a devastated state that it took several years before they were producing natural rubber at prewar levels.¹¹⁷ On the synthetic rubber front, only four countries had substantial production at the end of the Second World War - Germany, Russia, the United States and Canada - and only Canada was in a position to supply European markets. Germany would play no immediate part in meeting post-war demand for rubber because under the terms of the armistice it was not allowed to produce synthetic rubber until 1951. Russia, on the other hand, was engaged in its own rebuilding campaign and demonstrated no interest in exporting what little synthetic rubber it had to Western Europe. Indeed, as Nicholson later wrote to Howe, Russia looked as though it too would soon be a net importer of synthetic rubber since it and its satellite countries were falling far short of their domestic requirements.¹¹⁸ The United States would offer no immediate competition either. South of the border, a political decision was made not to engage in the export of synthetic rubber to Europe - a decision reached primarily for the benefit its wartime ally, Great Britain, which

¹¹⁵ A. Neal, "Rubber and Its Manufacture in Canada," *Canadian Geographic Journal*, (July 1940), p. 40.

¹¹⁶ *Ibid.*

¹¹⁷ Canada. House of Commons, *Debates* (May 14, 1946), p. 1516.

¹¹⁸ Nicholson to Howe (September 28, 1950), *C.D. Howe Papers*, vol. 44, file: Polymer Corporation, 1949-1950, (2).

had a substantial politico-economic interest in seeing the plantations of the Far East return to their prewar prominence. As a result, at the war's end, Canada was the only country in the world with the political will and industrial capacity to aggressively attack the foreign rubber market.¹¹⁹ In light of Ottawa's determination to build post-war prosperity on exports, Polymer was ideally suited to align its corporate strategy with national macro-economic goals.

Nevertheless, the going was initially tough. Nicholson, who proved to be as energetic at selling rubber in the industrial jungles of Europe as he had been in organizing the initial project in Canada, found two formidable obstacles facing him in Europe. The first was an ignorance about and, at times, an outright prejudice against, synthetic products. The very word "synthetic" had come to possess a negative meaning in many European countries after the war. People there associated it with the German word *ersatz* that had been applied to many second and third-rate substitutes during the war. Synthetics symbolized wartime sacrifices on the home front and their continued presence was for many an unwanted reminder of all those items which had been denied them during the war. Much of the ignorance about synthetic rubber stemmed from the fact that during the war Europeans had not suffered the same shortages of natural rubber as North Americans and as a result they had not been forced to use large quantities of the synthetic substitute. Unaware of the steady improvement in its qualities, many Europeans simply tarred synthetic rubber with the same brush as other synthetic products.

Before Nicholson could make any progress in selling Polymer's products in Europe a sales force had therefore to educate potential customers, virtually from scratch, about all aspects - scientific, technological and economic - of the product. During the war, I G Farben had made a point of providing technical advice to users, a fact that Rowzee became aware of on a technical mission to Germany in 1944. Rowzee was taken with the German

¹¹⁹ There was, however, one exception. After the war, Du Pont of the United States resumed exports of its specialized product Neoprene to Europe.

approach and believed that, if combined with an appropriate level of personalized customer service, a consumer-oriented sales strategy could be an important factor in gaining and keeping new markets. Technical assistance would ultimately come from Canadians like Roger Hatch and E.J. Buckler. But it would be communicated to the European manufacturers through the European agents that Polymer contracted to sell its products. Roger Hatch had already demonstrated energy, technical skill and diplomacy as an expediter of material during the construction phase of the project. Having been born in German-speaking Alsace, Hatch had grown up in Paris and was therefore fluently trilingual. His knowledge of the English, German and French languages and cultures played an important role in Polymer's "going global" after the war. Equally significant was the ability he shared with Buckler to explain in easy-to-understand-terms the complex technical and scientific aspects of their products. Both men had backgrounds in the sciences. Hatch, who would later become vice-president in charge of marketing, had graduated from Mount Allison University in 1941 with an honours degree in chemical engineering. After graduation, he had gone on to McGill where he helped Professor R. V. V. Nicholls produce synthetic rubber on a laboratory scale.¹²⁰ Buckler, on the other hand, was a Cambridge University Ph.D. who in the years to follow would become known world-wide for his practical contributions to polymer science. The early efforts of each were essential to establishing a market in Europe.

The second obstacle facing Nicholson was more difficult to overcome. After the war Europe suffered from a shortage of hard currency. While there was a strong emerging European demand for Polymer's products by 1948, thanks largely to the efforts of Nicholson and Hatch, few customers had the ability to pay - an endemic problem in post-war Europe. The situation continued until the summer of 1948 when the American government implemented George C. Marshall's Plan to offer comprehensive economic aid to all European countries. Under the plan, the Americans would provide European

¹²⁰ Interview with R.E. Hatch (Toronto, May 20, 2000).

countries with the necessary hard currency to buy the goods and services to rebuild their industry. Whether or not it “saved” Europe from a post-war economic collapse¹²¹, the Marshall Plan benefited Canada.¹²² As a North American nation, Canada was included in the program and designated a source for what was being called Marshall Plan “off-shore purchasing”. Canada’s good luck under the Marshall Plan was that it permitted American dollars purchases in Canada. The results were astonishing. By June 1950, fully (U.S.) \$1.155 billion had been spent in Canada for European consumption. Marshall Plan dollars, in the words of historians Robert Cuff and Jack Granatstein, “were a major catalyst in the

¹²¹ There is an ongoing historiographical debate over whether the Marshall Plan was actually necessary for European recovery. In *The Reconstruction of Western Europe, 1945-1951* (London, 1984), Alan Milward argues that from an economic perspective Marshall Plan aid was not necessary because economic recovery was already underway by 1948. This conclusion is echoed by Imanuel Wexler in *The Marshall Plan Revisited: The European Recovery Program in Economic Perspective* (Westport, CT, 1983). Opposing Milward and Wexler are those historians who argue that the Marshall Plan “saved” Western Europe from economic collapse. In *The Marshall Plan: America, Britain, and the reconstruction of Western Europe, 1947-1952* (Cambridge, Cambridge University Press, 1987), Michael Hogan argues that had there been no Marshall aid, there would have been “a serious crisis in production that would have come with the collapse of critical dollar imports” (p. 431). In his study of *Economic Ideas and Government Policy* (New York, Routledge, 1996) Alec Cairncross similarly argues “that the Marshall Plan prolonged and underpinned European economic recovery when it was in danger of collapsing for lack of the necessary finance.” (p. 104). In *The Marshall Plan Days* (Winchester, MA, 1987), Charles Kindleberger makes perhaps the most controversial claim, stating stridently that “Marshall plan dollars did save the world” (p. 247).

¹²² J. Granatstein and N. Hillmer, *For Better or Worse: Canada and the United States to the 1990s* (Mississauga, Copp Clark Pitman, 1991), especially pp. 174-75; R. Cuff and J. Granatstein, *Ties That Bind: U.S.-Canada Relations* (Toronto, Samuel Stevens, 1977) especially pp. 142-43; and R.D. Cuff and J.L. Granatstein, *American Dollars-Canadian Prosperity: Canadian American Economic Relations, 1945-1950* (Toronto, Samuel-Stevens, 1978), pp. 83-139

'revolution' in Canadian trade that Howe sought to maintain."¹²³ One of the items Europeans were spending their Marshall Plan dollars on was synthetic rubber. The Marshall Plan benefited Polymer specifically because synthetic rubber was considered essential enough to permit large allocations of U.S. dollars to the European rubber-manufacturing industries.

Marshall Plan aid combined with the company's creative sales approach and strategy of invariably setting the price of its GR-S rubber - which in 1947 was given the trade name "Polysar-S" - at one and one-half cents per pound less than the London and New York price for the top grade natural product, proved a successful mix. Whereas Polymer was shipping less than three per cent of its total rubber production to Europe in 1945, by 1949 roughly one-quarter of its rubber output was destined for the European marketplace.¹²⁴ Polymer had gained a reputation for personalized customer education and service with considerable attention being paid to the importance of the small as well as the large customer. By 1950, Polymer was supplying nearly all of the larger manufacturers of rubber products in Western Europe. Among its principal customers were tire makers Pirelli of Italy (which had factories in England, Spain, Belgium and South America), Michelin and Kleber of France, Continental of Germany, and Trelleborg of Sweden.¹²⁵ Polymer's success abroad was thus the product of aggressive sales and technical service, matched by aggressive product pricing and a fillip from the early Cold War. In March 1950, the company reported a net operating profit of \$800,000 for the preceding twelve months of

¹²³ Cuff and Granatstein, *American Dollars-Canadian Prosperity*, p.138.

¹²⁴ *Annual Reports* (March 1946 and March 1949).

¹²⁵ "Sales Agreement - Polymer and Pirelli Ltd." (June, 1947) *Polysar Papers*, vol. 27, file: operations and sales - Italy; "Sales Agreement - Polymer and Michelin" (December, 1946), *Polysar Papers*, vol. 27, file: operations and sales - France; "Sales Agreement - Polymer and Continental of Germany" (May, 1947), *Polysar Papers*, vol. 26, file: operations and sales in Germany; "Sales Agreement - Polymer and Trelleborg" (July, 1945), *Polysar Papers*, vol. 27, file: operations and sales in Sweden.

operation. While this was a healthy profit, it was still a good deal shy of the multi-million dollar profits the crown corporation had recorded during its first three years of operation.¹²⁶ Polymer, which on December 8, 1948, was transferred from Howe's department of reconstruction and supply to Howe's new department of trade and commerce, continued to face increased competition from natural rubber at home and abroad. That year, world consumption of natural rubber was fifty per cent higher than that of synthetic rubber.¹²⁷ Although from then on the situation improved, the outlook for synthetic rubber did not change materially until war again provided another fillip to the young corporation and its products.

The outbreak of the Korean War in June 1950 provided an immediate stimulus to the Canadian economy and concomitantly the Canadian synthetic rubber industry. The economy boomed as the war created a demand for Canadian products, especially for those with a military purpose like rubber. The general increase in demand for rubber could not be met from natural rubber production alone. This gave Polymer the chance to finally prove to Howe that he had done the right thing four years earlier by extending the crown corporation's lease on industrial life.

The onset of the Korean war resulted in accelerated strategic stockpiling of natural rubber as western democracies looked apprehensively at communist insurgency in and around the rubber plantations of Malaya and Indonesia. At the heart of the Cold War's industrial campaign was the notion that strategic materials had to be hoarded in anticipation of any potential hostility. The Cold War also underlined the shrewdness of having secure sources of strategic material beyond the reach of ideological and national exigencies. The

¹²⁶ *Annual Report* (March 1949). The net profit for the fiscal year 1948 was \$430,542,65 after making provision for a depreciation reserve of \$2,356,711.91. Gross sales revenue for the year amounted to approximately \$21 million, up \$4 million from the previous year.

¹²⁷ C.F. Phillips, *Competition in the Synthetic Rubber Industry* (Chapel Hill, University of North Carolina Press, 1962), Table 38, p. 252.

accelerated stockpiling consequently increased the price of natural rubber. During these post-war years the supply of natural rubber was relatively inelastic and therefore its cost could surge in times of high demand or restrictions of supply. The supply of synthetic rubber was, on the other hand, more elastic (e.g. one could build factories) and therefore its price could fall if demand rose. Thus, any global crisis like the Korean war was likely to play into the hands of synthetic rubber producers. Understanding these market economies made Howe's decision to keep Polymer in business after the war a very prescient one. Given a growing post-war economy and the imperatives of the Cold War, synthetic rubber was bound to prosper while natural rubber was bound to hit a ceiling. This is exactly what happened in 1950. In the early part of the year, natural rubber was priced slightly below its synthetic competitor, at approximately 18¢ per pound. By November, 1950, the price of natural rubber surged to above 85¢ per pound, roughly four times that of synthetic rubber.¹²⁸ The net result was a greatly increased demand for the man-made substitute. In July, a columnist for the *Financial Post* noted that Polymer's plant was "going full blast", producing at an annual rate of more than 50,000 tons.¹²⁹ Polymer's sales position changed markedly as a result. Sales for the year ending March 31, 1951, reached \$35 million dollars, an increase of more than \$9 million over the previous year. The upward swing in sales was responsible for the company recording its largest net profit to date, \$4.2. million. Howe could not have been more pleased. "I congratulate you and your fellow Directors," he wrote to his one-time coal controller and present Polymer president E.J. Brunning, "on the splendid results indicated by this Annual Report. Obviously, the improvements in operating procedures effected since the war days are producing results.... Please convey to

¹²⁸ *Annual Report*, (March 1951), p. 3.

¹²⁹ W.L. Dack, *The Financial Post* (July 29, 1950), pp. 1-3.

your Board the appreciation of myself and the Government for their services so freely and effectively given.”¹³⁰

The favorable “seller’s market” was not without its problems, however. In light of a pre-Korean war forecast that the requirements of the Canadian industry for 1950 would be less than for 1949, the company had increased its efforts to develop new outlets in the United States, Europe and South America in order to offset the anticipated reduction in domestic sales.¹³¹ As a consequence, the company found itself in a difficult supply position when the requirements of the Canadian industry increased unexpectedly early in the year. As a “Canadian government company” operating a plant paid for with Canadian taxpayers’ money and established with the very substantial technological aid of the major rubber manufacturing companies, Polymer was expected by some to satisfy domestic needs first.¹³² Goodyear, Goodrich and Dominion Rubber, and Asbestos Corporation, for instance, demanded that their feedstock requirements first be satisfied before any Canadian rubber was released for sale abroad. The request was certainly reasonable. Howe had rationalized Polymer’s continued operation, in part, on public policy grounds; i.e. that Polymer would guarantee private Canadian tire and rubber manufacturers a stable and affordable supply of rubber. These companies therefore felt justified seeking government support for their position.

Polymer’s board of directors had a different view, however. In its opinion, there were both moral and commercial reasons for Polymer to continue supplying the foreign market. After all, it was the foreign market that had secured Polymer’s post-war survival. There would have been no continuing Canadian synthetic rubber industry at all, the board argued, if the corporation had relied entirely on domestic demand during the post-war years. To survive it had had to acquire markets in Britain, France, Italy, Belgium, Germany and the

¹³⁰ C.D. Howe to E. J. Brunning (May 6, 1951), *DMS Papers*, vol. 3.

¹³¹ *Annual Report* (March 1951), p. 3.

¹³² C.E. Morrison to R.E. Hatch (August 16, 1950), *DMS Papers*, vol. 7.

Scandinavian countries. As a consequence, all these nations were now heavily dependent on Polymer for rubber.¹³³ The board argued that the crown company, therefore, had a moral obligation - one with long-term strategic, commercial implications - to meet foreign requirements.

But, in the opinion of the board, there was an economic as well as a moral imperative for continuing to serve the company's foreign customer base. The board had recently received a strategic report from Ralph Rowzee regarding the short- and long-term sales outlook for synthetic rubber in Europe.¹³⁴ The report predicted that foreign demand for synthetic rubber would reach unprecedented levels in the years ahead as the post-war economic recovery took root in Germany.¹³⁵ Rowzee was of the opinion that Polymer was in a good position to exploit this demand given the relationships the company had established in the previous years. However, he warned, any advantage would be lost if these markets were not supplied at this critical juncture. One of the men who had been instrumental in establishing Polymer's presence in Europe, Roger Hatch, agreed. "If you let them down now you'll never get back in," Hatch cautioned, employing the rhetoric of international business, "they'll never trust you again."¹³⁶ The flip-side of Polymer's imposed dedication to a diversified, global, strategy was therefore the need to wean itself from inflexible reliance on the domestic market.

After a good deal of debate, Polymer's position prevailed in Ottawa - the company would allocate its product as *it* saw fit, according to its own commercial objectives and *not* according to the wishes of government or private enterprise. The development was significant for two reasons. First, it demonstrated the government's increasing willingness to grant the corporation independence to manoeuvre. Second, and perhaps more

¹³³ Interview with I.C. Rush (Sarnia, November 1999).

¹³⁴ E.R. Rowzee, "Report on Trip to Europe" (December 7, 1951), *DMS Papers*, vol. 3.

¹³⁵ *Ibid.*, p. 26.

¹³⁶ R.E. Hatch quoted in "The Long Chain," p. 119.

importantly for students of public enterprise, it illustrated that in Polymer's case, when public policy and commercial goals were at variance, Ottawa would privilege profits over politics. In so doing, Ottawa had taking its steps along the road to state capitalism - when financial results became the principal criterion by which to evaluate performance of public enterprise. Polymer was thus unique and its history challenges accepted paradigms and periodizations. According to Laux and Molot, it was not until the late 1970s that the state took on commercial roles usually assumed by private enterprise and adopted the "logic of business."¹³⁷ In the immediate post-war period, they argue, crown corporations were used primarily as public policy instruments, salvaging jobs and providing infrastructure and services to private enterprise. But by retaining Polymer and privileging profits, the state expanded its role earlier than has traditionally been recognized to become a producer in a competitive and profitable industry. The public policy pundit Bruce Doern is certainly right: crown corporations are and have been "twin-headed creatures", expected to perform both policy and commercial roles.¹³⁸ Remarkably, at Polymer, the emphasis was on the latter function.

Polymer had managed to survive the transition to a peacetime, consumer-oriented economy, despite the aggressive resurgence of natural rubber on the homefront and abroad. It had done so, as Howe had insisted, without the protection afforded by government tariffs and regulations, profiting instead as a competitive agent on the free market. Given virtual freedom of action, the company had overcome its weakness of excess capacity and turned it into a strength. By devising a post-war strategy and creating a multi-divisional organizational structure, Polymer aggressively attacked foreign markets while maintaining sales at home. Driven by global market sensitivity rather than domestic market imperatives,

¹³⁷ Laux and Molot, *State Capitalism*, pp.72-78.

¹³⁸ G.B. Doern and A. Tupper, "Understanding Public Corporations in Canada" *Canadian Business Review*, vol. 9 (Autumn, 1982), p. 33.

Polymer was one of the first Canadian companies to “go global.”¹³⁹ This was no lazy, coddled crown corporation. Like such successful private firms as Alcan, Polymer had discovered strategic planning, reorganizing its growth to be dependent on science and research and development and sales savvy. It was among the first Canadian companies to emphasize the role to be played by science and knowledge in the growth of the firm. It had developed profitable specialty markets and sold electric power, steam, styrene, butane and isobutylene, all as byproducts of the synthetic rubber operation. It had reinvested its profits to expand its operation, and had in part also channeled its profits to the Canadian treasury. Polymer was flexible, diversified and technologically adept. It was a company striking a new path - government-owned but clearly at arm’s length and possessed of a dynamic managerial cadre. The company had silenced its critics, at least for now.

Polymer had thus lived up to the board’s own high expectations and those of C.D. Howe, who was now taking a good deal of the credit for much of the crown corporation’s success.¹⁴⁰ And why not? It was ultimately his decision to keep the crown corporation running after the war and it was his “profit or perish” ultimatum which had provided the motivation for the firm’s immediate post-war success. In becoming a profitable post-war commercial enterprise, Polymer had incidentally fulfilled its public policy purpose of stimulating the growth of the petrochemical industry in Canada. By making Polymer accountable to the bottom line, Howe had managed to have his cake and eat it too. Polymer was indeed a remarkable conjunction of state purpose and industrial initiative.

¹³⁹ The other Canadian companies “going global” at this time included Alcan and Massey Ferguson. See Campbell *Global Mission*, esp. pp. 188-207, 397-418; and E.P. Neufeld, *A Global Corporation: A History of the International Development of Massey Ferguson Limited* (Toronto, University of Toronto Press, 1969), pp. 87-91, 187-90, 290-303.

¹⁴⁰ Canada. House of Commons. *Debates* (March 31, 1950), p. 1429.

Chapter Three

The Prosperous Years, 1951–1957: Chemistry, Consumers and the Great God - Car

By most measures, the period 1951-57 was a prosperous time for Canadians. Total industrial output went up by half and productivity soared thanks to technological innovation like that which was taking place at Polymer Corporation. C.D Howe's incentives to business, together with the hospitable monetary and fiscal environment created by his colleagues in the finance portfolio, led to unprecedented levels of investment. The fact that much of the investment capital was American in origin did not concern Howe as it did others at the time and since.¹ Howe was a firm believer that profit-motivated behaviour was

¹ One of the first to criticize Howe's liberal/continentalist investment policies was fellow Liberal Walter Gordon. In his *Report* (1957) on Canada's economic prospects, Gordon commented that the growing level of American direct investment in Canada was leading to a loss of industrial control (pp. 40-42). Later in such works as *Troubled Canada: The Need for New Domestic Policies* (Toronto, McClelland and Stewart, 1961) and *Storm Signals: New Economic Policies for Canada* (Toronto, McClelland and Stewart, 1975), he criticized Howe's policies more forcefully. In *Storm Signals*, for instance, Gordon argued that: "The Right Honourable C.D. Howe... saw no inherent danger in the continuing sales of Canada's resources and business enterprises to foreigners" (p. 11). Gordon's disciples Libbie and Frank Park, in their study *The Anatomy of Big* (Toronto, Lewis and Samuel, 1962), identify C.D. Howe as one of the "sellers of Canada" (pp. 58-60). Likewise, in *The Canadian Corporate Elite: An Analysis of Economic Power* (Toronto, McClelland and Stewart, 1975) the Canadian political economist Wallace Clement argued that Howe was a menace to Canada because he acted as a kind of instrument of the American takeover of Canadian business (pp. 88-89). There are those on the other end of the ideological spectrum who agreed. In *Canada's First Century* (Toronto, Macmillian, 1970), the conservative historian Donald Creighton, for example, blamed Howe's continentalist policies for relegating Canada to neo-colonial status. "The Liberal government watched the massive postwar accumulation of American capital in Canada apparently without a tremor of apprehension; and C.D. Howe, who was himself an American import and who had held all the vital cabinet posts in industrial development, personified the whole dynamic

not affected by nationality and he was convinced that foreign investment brought net benefits to Canada in the form of added economic growth. If statistics are any guide, he seems to have been correct. Except in 1954, when output actually declined, the rate of economic growth was consistently above 4.5 per cent per annum and reached a dizzying postwar high of 9.5 per cent in 1955. With the economies of Western Europe rebuilding using Marshall Plan dollars, Canada readily found export markets for its goods. After that of the United States, the nation's standard of living was second highest in the world. With the unemployment rate often below 4 per cent, there were jobs for most Canadians looking for work. University graduates, an increasing proportion of whom were in chemistry and chemical engineering, easily found jobs in this sellers' market. The Liberal government's fiscal stabilization and demand management policies continued to have their desired effect. People were working and people were spending. "The picture," the Canadian economist David Slater stated in 1957, "is one of rich people becoming richer, of people with ...many items of household equipment, of a nation... with many automobiles."² It was a kind of Keynesian prophecy come true - steady, high consumption supporting steady, high employment levels.

There were problems, to be sure. University graduates easily found jobs, but few Canadian men and women in the 1950s held a university degree. In many professions, this

process." (p. 286). Similarly in *Lament for a Nation* (Toronto, Macmillan, 1965), George Grant censured Howe and the Liberals for reducing Canada to a branch-plant of the United States. "This was involved in the decisions made by C.D. Howe and his men. Our traditional role - as an exporter of raw materials...- gradually lost its importance in relation to our role as branch-plant of American capitalism." (pp. 8-9). Michael Bliss argues that it is not true that Howe was a menace to Canada by aiding the takeover of Canadian business after the war. Similarly, the overwhelming message of Bothwell and Kilbourn's *C.D. Howe: a biography* is that C.D. Howe was a good Canadian.

² D. Slater, "Consumption Expenditure in Canada," *Royal Commission of Canada's Economic Prospects*, (Ottawa, May 1957), p. 4.

deficit was made up by inflows of highly qualified Europeans. While most people found work, women, Indians, Metis and the non-unionized were paid less than their unionized, white-male counterparts. And in Quebec and the Maritimes, some farmers, incapable of making a living, were forced to leave their land. Yet, for the majority of Canadians, life was better in the 1950s than at any time since the era of the Laurier boom.³

That was certainly the case for those who had come to Sarnia in the post-war period seeking employment in the flourishing petrochemical industry. From an economic perspective, times had never been better. Since the government had embarked on its synthetic rubber project, Sarnia had experienced unprecedented growth and prosperity and as a result by 1951 was, in the words of one observer, “busting out all over.”⁴ As C.D. Howe had intended, Polymer had stimulated the development of the region. Between 1945 and 1955, regional population had doubled, industrial output had tripled and the area of the city had quintupled. “It is not surprising,” noted the *Canadian Geographic Journal* in 1957, “that even lifetime residents feel as if they are now living in some city other than the staid little Sarnia they knew in 1940.”⁵ The city had surely changed. In the south end, where there was once an Indian reserve, a compound of petrochemical plants now stood. When visited, the site often evoked a sublime response: “My delegation and I are amazed by the enormity and complexity of your plants,” noted the Malayan Minister of Commerce and Industry, Tan Siew Sin, when he toured Sarnia in 1958. “It’s all very wonderful.”⁶ As Howe had predicted, the petrochemical industry (i.e. the manufacturers of synthetic commodities and fabricated materials from natural gas and petroleum feedstocks) had

³ D. Owrn, *Born at the Right Time: A History of the Baby Boom Generation* (Toronto, University of Toronto Press, 1996), chp. 4.

⁴ *Saturday Night*, (March 27, 1951), pp. 10-11.

⁵ J. Elford, “Canada’s Chemical Valley,” *Canadian Geographic Journal*, vol. 55 (November, 1957), p. 179.

⁶ T.Siew Sin, quoted in *Polysphere*, (December 1958), p. 6.

Figure 3.1



From left to right are: the Honourable Tan Siew Sin, Malayan minister of commerce and industry, E.R. Rowzee, President of Polymer, P.F. Adams, Malayan secretary of ministry of commerce and industry, and R.E. Hatch, Polymer's Vice President of Marketing. Source: *Polysphere* (December 1958), p. 6.

taken off and was now booming.

The period 1950-1973 was the industry's "golden era." These years represented an apogee in the life cycle of the industry as profit margins and sale volumes grew rapidly.⁷ The growth in the demand for petrochemicals along with the diffusion of technology led to a proliferation of producers. In North America and Western Europe, chemical and oil companies entered the petrochemical field to add value to their products. The charter of Sun Oil, for example, was amended in 1952 to allow it to engage in the manufacture and sale of petrochemicals.⁸ The following year Sun Oil built a plant at Sarnia. Standard Oil (Indiana) was another oil company which, on the basis of research conducted at its Whiting, Indiana refinery, in the late 1940s and early 1950s, gradually extended its involvement in

⁷ Spitz, *Petrochemicals*, chp. 8; Chapman, *The International Petrochemical Industry*, chp. 5; and Quintella, *The Strategic Management of Technology*, pp. 77-78.

⁸ A.M. Johnson, *The Challenge of Change: The Sun Oil Company 1945-1977* (Columbus, Ohio, Ohio State University Press, 1983), p. 201.

petrochemicals, culminating in the construction of a major complex at Chocolate, Bayou Texas in 1968.⁹ The availability of indigenous natural gas provided the boost Italy and France needed to enter the industry in the late 1950s. In West Germany, Bayer renewed its quest for supremacy in synthetic polymer production - a quest that would ultimately bring the German petrochemical giant to Polymer's door.¹⁰ The growth of the polymers market was the main reason behind the petrochemical industry growth as a whole. Polymer science was still relatively young and there were plenty of opportunities for innovation and substitution. From 1949 to 1969 the world of synthetic polymers production grew by an astonishing factor of thirty. Synthetic rubber was one of the main applications for polymers and grew at an equally astonishing rate, with each producer manufacturing several different types of rubbers.

These consequently were Polymer's prosperous years, a time when the prescient strategy of the preceding period set the stage for unparalleled corporate growth and development. The company's earlier decision to "go global," to diversify its product line and improve its research and development efforts, placed it in a position of advantage, so that when the economic boom of the 1950s materialized, it fully capitalized. So profitable were these years that Polymer's new president J.D. Barrington, a miner with the mouth and irrepressible optimism to prove it, felt that there was no need for any change in the corporation's strategy. During the period 1951-1957, sitting on a foundation of unprecedented consumer demand for such large-scale durable goods as automobiles, Polymer witnessed its sales volume increase by approximately 100%. Output doubled, as productivity soared due to technological innovation. By the end of the decade, Polymer represented fully one tenth of world production in synthetic rubber. Net profits concomitantly increased more than 150% during the period, averaging a remarkable 13.2%

⁹ E. Dedman, *Challenge and Response, A Modern History of Standard Oil Company*, (Chicago, Mobium Press, 1984), esp. chp. 4-6.

¹⁰ Chapman, *The International Petrochemical Industry*, pp. 111-115.

return on the government's investment.¹¹ "Our financial statements..." J.D. Barrington proudly boasted in 1953, "give real proof that our industry is permanently established to play a major role in Canada's business."¹² Polymer thus offered an example of a technologically-driven, wholly-Canadian-owned industrial endeavour, a striking departure from the derivative industrialism of the pre-war National Policy-framed economy. Indeed, there was a good deal of evidence of this *after* the Second World War as well, as the branch plant economy continued to grow in many economic sectors.

There were both macro- and micro-economic factors leading to this phenomenal growth. At the macro-economic level, the period witnessed a world-wide economic boom. As a producer's commodity with a derived demand, rubber had its fortune tied to ebbs and flows in the business cycle. When times were good and people were spending, particularly on cars, rubber did well. Needless to say, when rubber did well, Polymer did well. Polymer was also fortunate in that during these years it had to face little competition from other synthetic rubber producers at home and elsewhere. All this created a climate for innovation which was probably the most creative in the company's history. At a time of great confidence in humankind's technocratic ability to govern its material destiny, Polymer's research chemists rearranged the basic elements of their product, which led to new and better chemically-engineered consumer goods. Their success was celebrated in the press and reflected more generally by a new cultural awareness and acceptance of synthetic products.

It has often been said that a business's success is a function of circumstance and purposive action, or - as the business historian Michael Bliss has put it - "the interplay of enterprise and opportunity."¹³ During the 1950s, at Polymer these forces came together to

¹¹ Ashley, *Canadian Crown Corporations*, p. 246.

¹² J.D. Barrington (September 1953), quoted in *Polysphere*, p. 25.

¹³ Bliss, *Northern Enterprise*, p. 8.

produce unprecedented corporate growth and development. These were thus the prosperous years.

When Barrington assumed his position as president of Polymer in June 1951, he ushered in a period of unparalleled prosperity. Barrington was taking over for E.J. Brunning who, while remaining as chairman of the board, was stepping down as president so as to dedicate more time to his principal function as president of the Consumers Glass Company of Montreal. Brunning would be missed, C.D. Howe stated upon his departure, but Howe felt confident that the corporation would continue to thrive under its new president.¹⁴ Howe, who was now working double duties as the minister of defence production and minister of trade and commerce, had seen Barrington at work before. Shortly after the outbreak of the Second World War, Walter Segsworth, the president of Moneta Porcupine Mines Ltd., had gone to see Howe to ask what his firm could do for the war effort. Howe in his usual blunt way told Segsworth that Canada needed magnesium and that if he and his firm really wanted to help they should go out and find mineral deposits containing the substance so crucially needed as an alloy and explosive component. Ultimately, the job fell to the company's manager J.D. Barrington. Ever productive, it did not take Barrington long to discover that the cliffs of Niagara Falls and the surrounding area were composed of rocks that were about one-third magnesium. It just so happened that the technological process for extracting magnesium from this type of ore had recently been worked out by Dr. Roy Pidgeon, a scientist at the University of Toronto. Barrington knew Pidgeon from his days at the university and persuaded him to help design and build a full-scale plant based on his laboratory model. Work started on the project a few months before Pearl Harbor and by August 1942 Barrington was extracting magnesium from the region at a rate of 5,000 tons per year. By helping solve Canada's magnesium problem, Barrington established himself in Howe's eyes not only as a man of science but as a practical man who

¹⁴ C.D. Howe, "Department of Defence Production, Press Release" (June 8, 1951), *DMS Papers*, vol. 7.

could get things done. Thus, when E.J. Brunning resigned as Polymer's president in June 1951, Howe wasted little time seeking out Barrington and appointing him the first full-time president of the Polymer Corporation.¹⁵

Figure 3.2



From left to right are: E.R. Rowzee, J.D. Barrington and Lee Dougan at a banquet in March 1957. Source: *Polysphere* (April 1957), p. 6.

Despite being a man of science, Barrington knew next to nothing about synthetic rubber technology and production at the time of his appointment. This was not a deficiency specific to Barrington alone, of course. With the exception of Douglas Ambridge, all of the preceding presidents of the corporation had assumed their duties without knowing the basics in polymer science, synthetic rubber technology, or the political economy of rubber. This had reflected Howe's penchant for placing a man's ability before his specific knowledge. This approach to executive leadership had not hampered the performance of the corporation in the past and therefore did not dissuade C.D. Howe from looking outside the corporation once again when it came to finding a replacement for E.J. Brunning. To Barrington's credit, he fully acknowledged his lack of understanding in the area of synthetic rubber production. But Barrington was eager to learn and, throughout his presidency, reached out to senior staff and line management for guidance.¹⁶ While there

¹⁵ Bertin, "The Long Chain," pp. 120-121.

¹⁶ Hatch interview (Toronto, July 2000) and Buckler interview (Sarnia, November 1999).

were few, if any, outward signs, Barrington did however initially struggle with the idea of assuming the top job at the crown corporation. He was a firm believer in the merits of working one's way up the corporate ladder and of paying one's dues along the way.¹⁷ Before coming to Polymer, he had spent fifteen years at Moneta Porcupine Mines doing just that. But the temptation of being a part of a corporation on the cutting-edge of technology was too great and when C.D. Howe offered him the presidency, Barrington accepted. "I look forward to being part of your high technology team," he wrote to Howe, shortly before his appointment was made public.¹⁸ Despite the enthusiasm for his new job, Barrington was determined not to rock the boat once he assumed his duties. He recognized that Polymer was on a productive trajectory. He understood that the existing corporate strategy had served the company well in the past and, by all indications and opinions, would serve it well in the future. He was therefore determined not to do anything that might jeopardize the company's performance going forward. In his inaugural address to a gathering of Polymer's working men and women, he stated that there would be no change in corporate strategy; the company would continue to develop and produce quality rubber to customer specification, expand markets at home and abroad and diversify the produce line at both the upper and lower ends of the market.¹⁹ The changes that he made were structural.

It is somewhat ironic that Barrington ultimately proved to be as conservative an executive as he did, given that he headed the corporation at a time of unprecedented corporate freedom and power. Unlike his predecessors, his strategic options were virtually unrestricted. Part of this freedom was the very result of the corporation's postwar performance. Success had silenced the critics. Gone was the chorus of criticism demanding that the government divest itself of the "technological white elephant." Polymer had proved

¹⁷ Bertin, "The Long Chain," pp. 121-23.

¹⁸ J.D. Barrington to C.D. Howe (June 1, 1951), *C.D. Howe Papers*, vol. 44. file: Polymer Corporation, 1950-1951, (1).

¹⁹ J.D. Barrington quoted in *Polysphere* (July, 1951), p. 1

itself a viable commercial enterprise and by the end of 1952 even the omnipotent and omnipresent C.D. Howe was reluctant to intervene in the corporation's affairs. The shift in the external view of Polymer brought two structural changes which furthered the crown corporation's autonomy.

The first occurred in the latter part of 1951, when the last of the contracts with Polymer's operating companies were terminated. The company for the first time became a free-standing, public industrial enterprise. For some time, C.D. Howe had wished to bring these contracts to an end. As early as 1944, he had suggested to J.R. Nicholson terminating the operating agreement with St. Clair Processing Limited - the company which managed Polymer's butadiene and butyl rubber units.²⁰ Howe was not alone in wanting to see these agreements concluded. Many in parliament had long advocated bringing an end to the outside involvement in the plant. In 1944, for instance, a bipartisan parliamentary committee - a committee which had been set up to examine wartime expenditures - recommended that "as soon as possible" after the war, Polymer readjust its relations with the companies administering the different plants "with a view to Polymer as a government-owned company operating and administering all of these plants itself."²¹ Earlier, in the House of Commons, the C.C.F. had recommended a similar change in order to remove suspect private interests from participation in a public enterprise.²² Howe agreed with the C.C.F.'s recommendation, although not for the same reasons. He was not motivated by any suspicion of private interest or any ideological commitment to the position that private and public concerns are always at odds and therefore should be kept separate. Indeed, he had

²⁰ C.D. Howe to J.R. Nicholson (October 28, 1944), *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, 1944-1945, (7).

²¹ Canada. House of Commons. Special Committee on War Expenditures, *Fifth Report*, August 12, 1944 (Ottawa, Queen's Printer, 1944), p. 54.

²² Canada. House of Commons. *Debates*. (June 16, 1943), pp. 3707-08; *Debates* (March 27, 1944), pp. 1867-71.

initially conceived of Trans-Canada Airlines as a mixed enterprise. Rather, Howe had come to the same conclusion as the C.C.F. for more pragmatic reasons. As Howe noted, Canada was now in possession of the necessary people, science and technology to go it alone. Canadian technicians had been trained and were capable of running the plant without outside assistance. In addition, the fundamental scientific knowledge for synthetic rubber development - knowledge which had originated in Germany and the United States - was now in Canadian hands. The day had arrived, therefore, when Polymer could stand entirely on its own feet and control its own operations and destiny.²³

The decision to go it alone made sense from an economic standpoint as well. It was economically inefficient, Howe maintained, to have "a crown company within a crown company."²⁴ The termination of the three operating contracts would eliminate the duplication of services and, ultimately, save Polymer money. From the beginning of operation to the time of Barrington's appointment as president, Polymer had paid out over \$4.3 million in management fees.²⁵ According to Howe, it made little sense to continue to pay such large sums for services that could be, and to a certain extent already were, provided for by Polymer itself. The merger of the companies would thus allow definite economies of scale and improved efficiency. The position was echoed by the company's new president and its board of directors.²⁶

In May 1946, the operating contract with St. Clair Processing was terminated. Four years later, Polymer assumed full responsibility for the operation of the three sections comprising the styrene unit. In 1951, Polymer took over the general purpose rubber unit,

²³ C.D. Howe to A.G. Partridge (October 18, 1951) *DMS Papers*, vol. 7.

²⁴ C.D. Howe to J.D. Barrington (October 5, 1951), *C.D. Howe Papers*, vol. 44, file: Polymer Corporation, 1950-1951, (1).

²⁵ Ashley, *Canadian Crown Corporations*, Table II, p. 237.

²⁶ "Minutes of the Board of Directors" (September 27, 1951), *DMS Papers*, vol. 12.

which to that point had been managed by Canadian Synthetic Rubber Ltd.²⁷ Thus, by the end of 1951, the last of the management contracts had been terminated and Polymer was in full control of the facilities within its gates.

The second structural change occurred on the heels of the first. In March 1952, all the plant's assets, which until then were in the possession of the crown, were transferred to Polymer. Before the transfer occurred, Polymer, from a financial perspective, was a corporation in name only. It owned no assets, and was still dependent upon the government for working capital. This structure, while seen as necessary during the war, came to be viewed as incongruent with the corporation's actual postwar status as a "commercial plant operating in a commercial community."²⁸ Howe did not like such inconsistency and determined that the time had come to put Polymer on a more normative financial footing. In March 1952, after a good deal of preliminary planning, he announced his intentions before parliament. "Now that Polymer Corporation has demonstrated a substantial earning power, which will enable it to pay annual dividends to the crown, it seems desirable to provide a capital structure for the company which will serve as a proper background for the considerations of owner-customer-labour relations....and against which to assess and compare the operations of the company with similar operations."²⁹ Polymer was no longer a production-oriented company, operating in a command economy to meet a wartime emergency; rather it was a product-oriented firm, competing in a consumer-oriented, market economy for the purpose of earning a profit. Given the change in strategic purpose, Howe considered it desirable to create a capital structure that would permit comparability with other commercial enterprises and thereby promote increased productivity and sound management. Since his days at the department of transport, he had

²⁷ *Ibid.* Also see letter of Barrington to Partridge (October 10, 1951), *DMS Papers*, vol . 7.

²⁸ Canada. House of Commons. *Debates* (March 31, 1952), p. 952.

²⁹ *Ibid.*, pp. 952-953.

put a premium on efficiency and accountability. These attributes were essential, he believed, if government and its corporations were to act responsibly for the benefit of all Canadians. At the end of the war, Howe had stated in a letter to J.R. Nicholson that he would like “to demonstrate through Polymer that the government can be efficient and progressive in a government-owned industry.”³⁰ The financial restructuring of Polymer was the latest in a series of steps towards the ultimate realization of that goal.

In June 1951, Howe called Polymer’s board of directors to his office in Ottawa and informed them that it was time the financial arrangements between the government and the company be put on a more “normal investment basis.” To bring this about, he suggested transferring the plant’s assets to the corporation in return for Ottawa getting cash and stock in the firm. For its part, the board felt that Howe’s plan was “highly desirable.”³¹ The company had been given the mandate to prove itself as a commercial undertaking and since the end of the war had made strategic decisions based on business criteria and not necessarily designed to appease public policy makers. To Polymer’s way of thinking, the restructuring would acknowledge all that it had done to date and give it additional freedom to manoeuvre. “The reorganization will give us a greater degree of autonomy,” Barrington stated, echoing the position of the board, “and enhance our position in the eyes of customers, suppliers, distributors and the community.”³² The quest for autonomy was to have a long life in the history of the firm.

With the support of all involved, the restructuring received royal assent on March 31, 1952.³³ As a result, title to all the assets valued at \$53,793,946 passed from the crown to Polymer. In return, the government received \$3 million cash and \$8 million worth of 4% debenture, maturing at a rate of \$1 million per annum. The balance was covered by the

³⁰ C.D. Howe to J.R. Nicholson (September 25, 1945), *C.D. Howe Papers*, vol. 46, file: Polymer Corporation, 1944-1945, (7).

³¹ “Minutes of the Board of Directors” (June 8, 1951), *DMS Papers*, vol. 12.

³² Bertin, “The Long Chain,” pp. 123-24.

issue of 1,999,996 no-par-value shares, of which the government received all but the few held, one a piece, by the directors of the crown corporation during their term in office.³⁴ With respect to the issued shares, a value of \$39,640,916 was placed on them for the purpose of the agreement. The dividends received from the ownership of these shares would pay richly in the years that followed. Nothing in the restructuring agreement was to contravene the financial administration act of 1951 - an act which rationalized the system of government agencies that had evolved over the previous thirty years.³⁵ Polymer would continue to pay income tax, as well as provincial imposts including corporate taxation. Summing up the effects of reorganization in the House of Commons, Howe stated that the re-arrangement of the financial structure made no change in the beneficial ownership of the enterprise.³⁶ It did, however, provide those in charge of the operation with “yardsticks by which the efficiency and success of the enterprise may be considered.”³⁷

Examined in conjunction with the financial administration act of 1951, the restructuring of Polymer was an attempt on the part of the Liberal government to define the terms of Polymer’s public accountability. The financial reorganization had created an individual corporate structure that ensured managerial flexibility and freedom from the rigid framework of government financial and personnel controls. Nevertheless, Polymer, like all other crown companies, was still an instrument of public policy. The firm had been given a job to do - to produce synthetic rubber and, after 1945, to sell it at a profit. The Liberal government wanted some way of making sure that this task, as well as those assigned to its other crown corporations, was being pursued efficiently and effectively. Prior to 1951, there was no common criteria or rationalized system - beyond some vague notion of

³³ P.C. 2279. The agreement was retroactive to April 1, 1951.

³⁴ *Report of the Auditor General, 1951-2*, paragraph 107.

³⁵ *Statutes of Canada 15-16 Geo. VI, c. 12*.

³⁶ Canada. House of Commons. *Debates* (March 31, 1952), p. 953.

³⁷ *Ibid.*

serving the public good - to ensure that any of this was taking place. In Polymer's case, the crown corporation had been responsible to one man: C.D. Howe. Fortunately, although not surprisingly, there was a sort of symbiosis between Howe and executives at the crown company. For the most part, they all shared the same business values and were dedicated to the same strategic objectives. Thus when it came to measuring the effectiveness of the firm, they had all used the same standards, the standards of international business (e.g. operating costs, level of profit or loss, rate of return on investment). Howe's financial restructuring of the firm was an attempt to apply these standards more scientifically. Nevertheless, as before, the company was accountable, first and foremost, to the bottom line. The Liberal government had thus given expression to a kind of hybrid capitalism, accountable to the state but equipped to operate in the free market.

Prior to the ratification of the financial administration act, there was nothing stated in law ensuring that subsequent ministers of the crown would apply Howe's standards. This concerned Louis St. Laurent's Liberals. They worried about the day when Howe was gone and they were no longer the governing party. They worried that a less "responsible" party in power would employ different standards of accountability, perhaps personal standards which, God forbid, might actually be as arbitrary as Howe's own. For his part, Howe too was concerned about the prospect of a less "business-oriented" party assuming the reins of power. He had once stated that the only danger to public ownership was that the C.C.F. might actually get into a position of political responsibility someday and allow its prejudices to interfere with its "obligation" to keep the management of the nation's crown corporations in an "efficient state."³⁸ "That", declared Howe, "was the real menace to government ownership."³⁹

The financial administration act, which among other things established the minimum standards of financial behaviour for crown corporations, was thus intended to

³⁸ Canada. House of Commons. *Debates*, 1944, p. 1900.

³⁹ *Ibid.*

institutionalize the Liberals' standards of accountability. It was the mechanism which would obtain when the Liberals were no longer there themselves. It was designed to ensure that Howe's corporations were kept in an "efficient state" once he was gone.⁴⁰ Henceforth, Polymer - a class "D" or proprietary corporation under the terms of the act - would be legally responsible to the bottom line.

With the ratification of the financial administration act and the restructuring of Polymer complete, C.D. Howe could now stand back and dedicate himself more fully to other mega-projects (e.g. the building of the Trans-Canada Pipeline and the St. Lawrence Seaway) knowing that Polymer was in good hands.⁴¹ With its structure now in line with its strategy, the company was primed to seize the opportunities of the 1950s. As the company would soon find out, there would be plenty of them, for this was the age of mass consumerism and the "great god - Car."

The 1950s was a time when Canadians earned more, spent more and owned more things; a time when people deployed their money to support leisure and other activities, to gratify the five senses and perhaps indulge in the seven sins, to define a lifestyle if not a persona itself. It was a time when people spent freely on big ticket consumer items, such as cars. It was a time of mass consumerism.⁴² To meet the unprecedented demand for consumer goods, giant shopping malls with everything under one roof were erected in the emerging suburbs of the nation. Another of Howe's dollar-a-year men, E.P. Taylor, used his Argus Corporation in these same years to give Canada its first designed suburb - Don Mills. Billboards materialized at the side of the nation's expanding highways, inviting Canadians to spend for their good and that of the nation. One of the main themes of the

⁴⁰ This interpretation is supported by the historian Robert Bothwell. See his *Eldorado*, p. 275.

⁴¹ For a discussion of Howe's role in developing the St. Lawrence Seaway and the Trans-Canada pipeline see R. Bothwell and W. Kilbourn, *C.D. Howe*, pp. 275-76, 283-298.

⁴² Owrain, *Born at the Right Time*, chapter 4.

1945 *White Paper* had been the need to maintain aggregate demand at home. If people and businesses could be kept spending, the Keynesian logic went, this would create jobs and profits and consumption would continue. Consumption was thus key to economic growth and stability. Of course, as the *White Paper* noted, in a small, open economy like Canada's any attempt to maintain aggregate demand at home would eventually fail if international markets were not found for Canada's products. Nevertheless, domestic consumption was viewed as critical to Canadian prosperity and after the war the Liberal government, in conjunction with the various provincial governments, did everything in its power to put more money into people's pockets so that they would continue to consume.

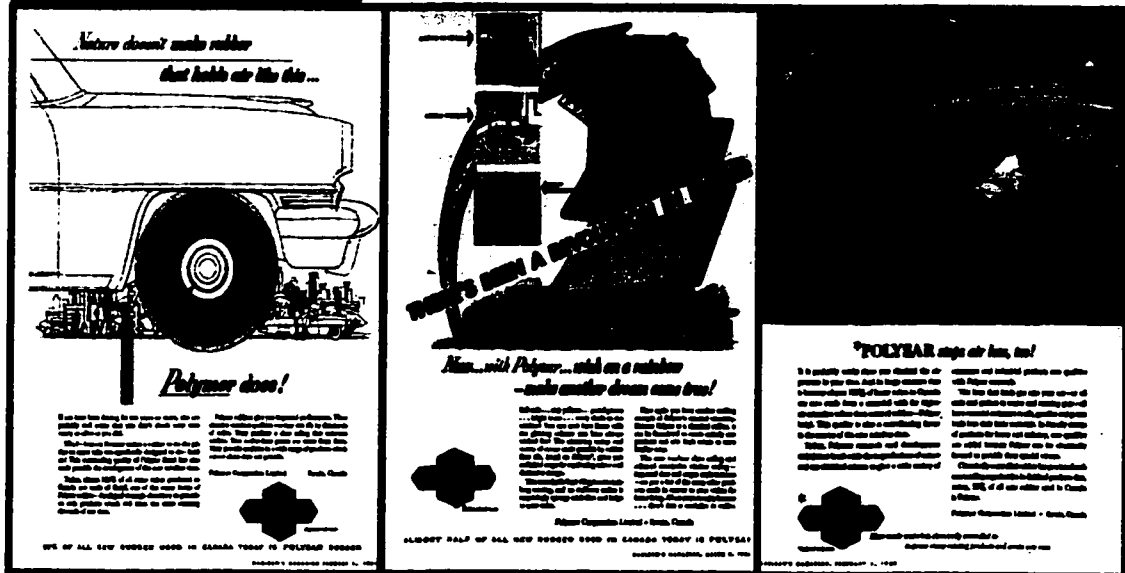
While the Liberal government provided Canadians with a fiscal incentive to go out and spend, business schemed to give them the psychological incentive to do so. The 1950s witnessed aggressive advertising campaigns as businesses tried to entice would-be consumers to buy their goods and services. "Ours is the first age," wrote the Canadian communication theorist Marshall McLuhan in his 1951 satirical examination of popular culture, "in which many thousands of the best-trained individual minds have made it a full-time business to get inside the collective public mind."⁴³ As advertisers, these "best-trained" minds urged the Canadian consumer to purchase everything from Leonard's "leisure line" appliances to Sunworthy "pre-pasted" wallpaper. "Nearly everybody wants a big, new Ford", one advertisement read.⁴⁴ "Come and get it!", read another.⁴⁵ The Admiral Television Company enticed shoppers to buy its products with promises of "whiter whites and deeper blacks, and the full range of in between shades." Mass advertising, such as this, extended the world of commerce and consumption ever more completely to all corners

⁴³ M. McLuhan, *The Mechanical Bride: Folklore of Industrial Man* (New York, Vanguard Press, 1951), p. v.

⁴⁴ *Maclean's* magazine (July 1, 1952), p. 26.

⁴⁵ *Maclean's* magazine (August 18, 1956), p. 48.

Figure 3.3
Polymer advertisements



Source: *Maclean's* magazine.

of society. It constituted an attempt by Canadian business to penetrate and open up the sphere of culture as a new territory of producing exchange value.

In 1953, Polymer embarked upon its own advertising campaign. That year, the company began running a series of advertisements in several Canadian editions of *Time*, the *Financial Post*, *Maclean's* and the French-Canadian magazine, *Le Samedi*, all with the objective of creating “interest and confidence in the company and its products.”⁴⁵ Barrington and the other executives at Polymer had become concerned by the lack of knowledge on the part of the general public as to the advantages and uses of synthetic rubber and even about the company itself. To bridge the knowledge gap, at a cost of just under \$70,000 a year, the company hired Harold F. Stanfield Limited to prepare an advertising program to “generate good will for the company and its products.”⁴⁶ The first advertisements began to appear shortly after the new year and stressed the role the company

⁴⁵ “Minutes of the Meeting of the Board of Directors of Polymer” (August 7, 1952), *DMS Papers*, vol. 12.

⁴⁶ “Minutes of the Meeting of the Board of Directors of Polymer” (May 1, 1952), *DMS Papers*, vol. 12.

had played in the postwar product revolution. "Today, Polymer's research and development technicians brush aside the imperfections of nature," proudly proclaimed one of the first advertisements, "and use chemical science to give a wide variety of consumer and industrial products new qualities with Polysar materials."⁴⁷ With the words "There's been a revolution in rubber" blazoned across the page, a series of subsequent advertisements informed the reader/consumer that they were likely to be one of the majority of Canadians who were "now riding on a comparatively new kind of tire - one built of chemical rubber."⁴⁸ How would one know if he/she were in the majority, the advertisement asked. By the performance of the tire, no less. Tires made with Polysar rubber, the company claimed, were the "toughest in tire history,"⁴⁹ able to "defy wear for tens of thousands of miles."⁵⁰

A tougher tire, however, was just one of the many innovations, the company assured Canadians, that had resulted from its scientific endeavours. It also enabled manufacturers to produce rubber tiles, creating floors that did not scuff; comfortable foam rubber cushioning for car seats, mattresses and upholstered furniture; and, for the army of do-it-yourselfers that emerged in Canada after the war, rubber-based paints that made just about anyone a professional painter.⁵¹

Advertisements such as these helped overcome the public's resistance to synthetic products. In Canada and the other industrialized nations where the company ran its ads, the wartime stigma of being *ersatz* was replaced by an image of synthetics as modern materials that could guarantee better living. No longer were synthetics taken as an unwelcome reminder of war-time sacrifices. Instead, during the 1950s people came to perceive

⁴⁷ *Maclean's* magazine (February 1, 1953), p. 31.

⁴⁸ *Maclean's* magazine (April 30, 1955).

⁴⁹ *Maclean's* magazine (May 28, 1955).

⁵⁰ See *Maclean's* magazine (March 2, 1957) and *Maclean's* magazine (April 30, 1955).

⁵¹ *Maclean's* magazine (May 28, 1955).

synthetics as “high-tech” commodities with superior qualities capable of democratizing consumption. Such chemically-engineered consumer goods as “Tupperware”, “Vinylite” and Polymer’s own “Polysar butyl rubber” were revered by manufacturers and many consumers for their versatility, convenience, sanitation, predictability and low cost.⁵² At one level, the change in perceptions was a consequence of an aggressive advertising campaign on the part of the chemical industry to promote its products as something superior to what nature had to offer. “Nature doesn’t make rubber that holds air like this,” read one Polymer advertisement, proffering a picture of a fully inflated inner tube.⁵³ “Nature doesn’t make the tough resilient rubber for today’s flooring,” proclaimed another.⁵⁴ The manufacturers of synthetic fibers, such as polyester, acrylic and nylon, seduced consumers with promises of wash-and-wear apparel. “Taking a ‘Terylene’ dress on your holidays,” assured one ad, “is the next best thing to taking a personal maid.”⁵⁵ Other advertisements of this *genre* pitched a sort of “damp-cloth utopianism” - to borrow a phrase from the cultural historian Jeffrey Meikle - of laminated walls, plastic dinette tops, upholstered furniture.⁵⁶

While advertisements that emphasized the extraordinary material superiority of chemically-engineered goods helped overcome the public resistance to synthetics, they could not have done so if they did not appeal to some underlying cultural logic, or what the neo-Marxist sociologist Robert Goldman terms “deep social assumptions.”⁵⁷ As the

⁵² See J. Meikle, *American Plastic: A Cultural History* (New Brunswick, Rutgers, 1995); S. Handley, *Nylon: The Story of a Fashion Revolution* (Baltimore, Johns Hopkins University Press, 1999); and A.J. Clarke, *Tupperware: The Promise of Plastic in 1950s America* (New York, Smithsonian Institution Press, 1999).

⁵³ *Maclean's* magazine (January 1, 1954), p. 49.

⁵⁴ *Maclean's* magazine (June 1, 1954), p. 98.

⁵⁵ *Maclean's* magazine (April 16, 1955)

⁵⁶ J. Meikle, *American Plastic*, p. 173.

⁵⁷ R. Goldman, *Reading Ads Socially* (New York, Routledge, 1992), p. 2.

historian David E. Nye points out, corporate advertisements such as Polymer's were not only a shaper of values, moulder of roles and effective promoter of needs, but were also mirrors of "otherwise unspoken assumptions about the social order..."⁵⁸ According to Roland Marchand, advertising leaders recognized the necessity of associating their selling messages with the values and attitudes already held by their audience.⁵⁹ They sought to strike only those notes that would evoke a positive resonance. In this way advertisements not only constituted but were constituted by the dominant social ethos. In Polymer's case the company's advertisements, perhaps intentionally, tapped into the postwar confidence in humankind's determining capacities.

For a majority of North Americans there seemed little that was beyond Man's control. Not only could humanity harness the nation's economy through the use of macro-economic policy, but it could control the material environment through chemical science. Only such a confidence in humanity's determining abilities could have led the Liberal government to commit itself in its 1945 *White Paper* to "a high and stable level of employment and income."⁶⁰ Only such a confidence could have led Polymer's Ralph Rowzee to predict that chemistry would soon render obsolete one of the world's longest lasting and most elastic commercial substances, natural rubber.⁶¹ On a broader plane, only such confidence could have prompted the majority of philosophers in Canada, the U.S. and Great Britain to reject as senseless the emphasis of traditional philosophy on such issues as metaphysics and theology and embrace the logical positivism of Ludwig Wittgenstein and the Vienna Circle. It was no coincidence that both Keynesianism and logical positivism were rooted in the

⁵⁸ D.E. Nye, *Image Worlds: Corporate Identities at General Electric, 1890-1930* (Cambridge, Mass, MIT Press, 1985), p. 155.

⁵⁹ R. Marchand, *Advertising the American Dream: Making Way for Modernity, 1920-1940* (Berkeley, University of California Press, 1985), pp. 52-87.

⁶⁰ Canada. Department of Reconstruction. *White Paper on Employment and Income*, (Ottawa, 1945), p. 23.

⁶¹ Rowzee, "Synthetic Rubber Industry in Germany," p. 316.

same mathematical-empiricism that led to the rise of modern chemical science. Thus, when Polymer claimed in its ads that its chemists could manipulate chemical elements “at will” to produce rubber better than that offered by nature, there was a cultural bias working in favour of Polymer’s message.⁶² The claim had a social validity or, if one prefers, truth.

During the 1950s, advertising campaigns such as Polymer’s played a consequential part in getting Canadians to go out and satisfy their pent-up yearning (a yearning formed by years of Depression and wartime deprivation) for the things that they longed for. The efforts of advertisers and those of the federal government resulted in unprecedented levels of real consumption expenditures in Canada.⁶³ Contributing to the spending frenzy, consumer credit became available in the 1950s; the 1954 Bank Act revision allowed banks to finance such purchases as cars through taking chattel mortgages. With the aid of this readily available consumer credit, Canadians were purchasing, and not only small items such as rubber-soled shoes, latex paints, nylon stockings, “Terylene” dresses and plastic hula-hoops but large-scale durable goods such as refrigerators, household furniture, televisions and cars. Of all these material goods, the automobile - with its more than 200 rubber parts - came to occupy a special place in Canadian society.

After the war, the dream of automobile-ownership was probably second only to that of home-ownership in the minds of Canadians. In an age that glorified technology, the automobile symbolized the good life. It symbolized security, status and freedom. To the lament of some, the car attained a god-like status. “For the god,” the historian Arthur Lower wrote in 1958, “no better name could be found than simply - CAR!”⁶⁴ During the decade, its places of worship - dealerships, drive-in theatres and drive-through restaurants - came to dominate the Canadian landscape. Increasingly, life was taking place in and

⁶² *Maclean’s* magazine (April 30, 1955).

⁶³ D. Slater “Consumption Expenditures in Canada” in Royal Commission on Canada’s Economic Prospects, *Final Report* (Ottawa, 1957), p.132.

⁶⁴ A. Lower, *Canadians in the Making* (Toronto, Longmans, 1958), p. 424

around the car. As a result, sales of new automobiles mounted as Canadians bought sleek American Fords and Chevies, traditional British Morris and Austins and, after 1953, the more utilitarian German Volkswagen Beetle. The car-selling slogan of 1950, "You auto buy now", encouraged Canadians to purchase a record 324,900 new passenger cars that year.⁶⁵ The auto industry kept the public buying by promising glamour and status in bigger and splashier models with gleaming chrome, two-tone colors, tail fins and white-wall rubber tires. "You'll be the leading man in *any* company in a beautiful new Chrysler," one 1954 advertisement proclaimed, appealing to the postwar cult of masculinity.⁶⁶ Between 1945 and 1952, car-ownership doubled in Canada.⁶⁷ By 1953, more than fifty percent of Canadian families owned a car. By 1960, two-thirds of households had a car, and 10 per cent had two or more. Like the gods of yesteryear, the "great god - Car" was seemingly everywhere.

This, of course, was not solely a Canadian phenomenon. In the United States and western Europe a similar occurrence was taking place. South of the border, Americans were also buying cars in record numbers. Between 1950 and 1960, 58 million new cars were sold. The number of automobile registrations increased by 21 million. The total of motor-vehicle miles traveled rose by 75 percent. And critics complained of "auto-sclerosis" - the clogging of urban arteries. Cars sporting such names as "Marauder" and "Barracuda" came in colors ranging from "passion pink" to "lilac mist" - with rubber moldings to match - and were powered by engines capable of propelling them at more than twice the existing speed limit. In his history of the decade, the historian David Halberstam notes that in the

⁶⁵ Sun Life Assurance Company of Canada, *Report to the Royal Commission on Canada's Economic Prospects. The Canadian Automotive Industry*, (Ottawa 1956), p. 115.

⁶⁶ *Maclean's* magazine (July 1954), p. 7

⁶⁷ *Ibid*, p. 114

fifties “bigger was better, and Americans, it seemed, wanted bigger cars every year.”⁶⁸ Advertisements, like the one for the 1952 Ford, invited people to step inside the new “coach-craft bodies” and feel the relaxing comfort of the “deep, wide seats cushioned in soft foam rubber.” Cars were also celebrated for their power - real and symbolic. The 1955 Ford, for instance, featured “Trigger-Torque ‘Go’ Power” and that year’s Pontiac boasted the “Sensational Strato-Streak V-8!” As McLuhan pointed out, car advertisements such as these made it plain that there was widespread acceptance of the car as a womb symbol and, paradoxically enough, as a phallic power symbol as well.⁶⁹ By 1960, 75 percent of all Americans owned at least one car. These were good years for the American auto industry, which had a strong corporate presence in Canadian industry, and as a consequence for the rubber industry as well.

In most western European nations, car registrations almost trebled during the decade and in some places they increased nearly tenfold. In Germany, for instance, the number of registrations jumped from 500,000 in 1950 to 4.5 million in 1960.⁷⁰ In 1953, there were close to 13 million cars in use in western Europe. A decade later the number had jumped to over 40 million cars in use.⁷¹ Most of these cars were European in origin. Foreign aid helped car manufacturers in Germany and Italy to rebuild their factories after the war. In Germany, external aid came in the form of a British army officer, Major Ivan Hirst, whose managerial talents kept alive Hitler’s dream of a small, cheap “People’s Car.” Having spent months scouring the devastated German economy for steel, rubber and other critical materials to keep the plant going, Hirst got Volkswagen back in business by 1946. The company produced 12,000 cars that year. Ten years later, the company, which was once

⁶⁸ D. Halberstam, *The Fifties* (New York, Villard Books, 1993), p. 127.

⁶⁹ McLuhan, *The Mechanical Bride*, p. 84.

⁷⁰ W. Laqueur, *Germany Today* (London, Weidenfeld and Nicolson, 1985) p. 32

⁷¹ G. Bloomfield, *The World Automotive Industry* (London, David and Charles, 1978), Appendix 1, p. 356.

again under German management, was turning out ten times that number of cars - a figure representing about 7% of the 2 million cars manufactured in Europe in 1973.⁷² Within another twenty years, the Beetle would surpass the Model T in sales and Volkswagen would emerge as the fourth largest car manufacturer in the world.⁷³ For Polymer, the success of Volkswagen and the automotive industry in general was very good news.

In the 1950s, people were buying cars, car makers were buying tires and tire manufactures were buying rubber. Corresponding to the growth in the automotive industry, world consumption of rubber more than doubled in the ten years following the end of the Second World War from 655,000 long tons in 1946 to over 1.3 million long tons in 1956.⁷⁴ In Canada, annual rubber consumption increased during the same period from 39,200 to over 91,000 long tons. Polymer's accomplishment lay in changing the *composition* of consumption. During the period, synthetic rubber came to represent a larger percentage of rubber consumed. In 1951, synthetic rubber accounted for 37% of all domestic rubber consumption; by 1957 that amount had increased to 54%.⁷⁵ "Almost half of all new rubber used in Canada today," proudly declared a 1956 Polymer advertisement, "is Polysar."⁷⁶

In part, the change had been brought about by the company's aggressive pricing strategy. During the decade, except for a brief recessionary period at the end of 1953 and early 1954, prices for Polymer's GR-S rubber were below natural rubber. Increased productivity, due to technological innovation, had allowed the company to lower costs to the point where natural rubber found it hard to compete on a price basis. The only task that remained, therefore, for the confident young crown company on the banks of the broad St.

⁷² *Ibid.*, Table 27, p. 183.

⁷³ *Ibid.*

⁷⁴ Phillips, *Competition in the Synthetic Rubber Industry*, table 25, p. 158.

⁷⁵ Dominion Bureau of Statistics, "Consumption Production and Inventories of Rubber" (Ottawa, April 1966) Table 4, p. 4.

Clair River, was to stretch natural rubber to the breaking point, by improving the quality of its products. To do this, the company turned to the rubber chemist.

One of the three elements of the company's postwar strategy for survival had been to produce rubbers which would equal or surpass natural rubber in terms of quality. The strategy was continued under Polymer's president J.D. Barrington, who emphasized the need for initiative and innovation in research and development. "At Polymer", Barrington stated shortly after his appointment as president, "we realize that we must step up our research efforts if we are to hold our position in the industry."⁷⁷ Barrington was a firm believer in the idea that nothing was as perishable as an established product and that without a resourceful R&D department the company would not continue to prosper.

Barrington was a man of science who had witnessed first hand its powerful effects on the nature of industry. After graduating from the University of Toronto in 1926 with a bachelor degree in science, he had gone to work in the mining industry as a field engineer. The mining industry was one of the first in Canada to recognize the role that science could play in achieving strategic objectives. At a time when most Canadian firms lagged behind the rest of the industrialized world in terms of research and development, Canadian mining companies, such as Shawinigan Company, the Consolidated Mining and Smelting Company and Barrington's own Moneta Porcupine Mines Limited, used science - such as magnetic anomaly detection - to locate, excavate and refine the earth's minerals. Barrington's years at the University of Toronto and Moneta Porcupine Mines had taught him that research, as a method of bold endeavour and good aim, was one of the best assurances of industrial success. When he came to Polymer, he brought this proactive philosophy with him.

Barrington arrived at Polymer at a unique time in the industry's history. In 1951, there were 29 commercial enterprises in North America engaged in synthetic rubber research and

⁷⁶ *Maclean's* magazine (March 3, 1956), p. 58.

development. Polymer continued to have the distinction of being the sole participant operating outside of the United States. While many of the U.S. government's synthetic rubber plants had been sold to private interests by this time, the government, through its agency the Reconstruction Finance Corporation (RFC), continued to regulate the industry south of the border. Not only did the RFC set prices and restrict exports, but, after 1948, it regulated and funded research and development as well. By mid-1949, the U.S. government had allocated just over \$13.5 million to industrial companies for synthetic rubber research.⁷⁸ In return for research funding, the recipients pledged to turn over all their discoveries and innovations to the U.S. government. The program thus removed the profit motive as a spur to technological innovation and, as a result, was a complete failure.⁷⁹

Since John Rae made his *Statement of Some New Principles on the Subject of Political Economy* (1834), economists have theorized about the connection between commercial self-interest, new knowledge, technological innovation and productivity/economic growth. Today, such theorizing takes the form of the "new endogenous growth theory" of Robert E. Lucas, among others.⁸⁰ In 1954, the American economist, Robert Solo, studied the effect of profit as a motive to technological innovation in the synthetic rubber industry. He concluded that there was little incentive to technological innovation without "commercial self-interest" and for this reason the U.S. government's

⁷⁷ J.D. Barrington quoted in *Financial Post* (April 9, 1955), p. 33.

⁷⁸ R. Solo, "Research and Development in the Synthetic Rubber Industry," *Quarterly Journal of Economics*, vol. lxxviii (1954), Table 1, p. 71.

⁷⁹ *Ibid.*, p. 79.

⁸⁰ See R. Lucas, "On the Mechanics of Economic Development," *Journal of Monetary Economics*, vol. 22 (1988), 3-42; P. Romer, "Idea Gaps and Object Gaps in Economic Development," *Journal of Monetary Economics*, vol. 32 (1993), 543-573; and P. Howitt

research program ended up being a near total disaster.⁸¹ Not one of the six major technological breakthroughs of the period, Solo pointed out, was accomplished by a participant in the government's program. Instead, the technological advances came from those companies - four in total - which remained outside of the government's subsidized program and, therefore, were free to exploit for profit the fruits of their own research.

Being a Canadian firm, Polymer had never been offered RFC funds and even if it had been, in all likelihood, would not have accepted them given C.D. Howe's devotion to the profit system as a measure of efficiency. At liberty to profit from its own research and development, Polymer participated in three of the period's major innovations. The company would have, perhaps, accomplished even more if it had not had to deal with the disadvantages of being a medium-sized firm. Without the capital resources of a large industrial enterprise like Du Pont or Dow Chemical, Polymer had to choose its research and development projects carefully, evaluating each in terms of cost and potential profit before proceeding. The crown corporation did not have the necessary resources to achieve a major advance in basic research, which was generally aimed at discovery of new knowledge. Polymer's emphasis, therefore, was on *applied* research, adapting known basic knowledge to practical and profitable ends. During this period, the crown company worked almost entirely in fields which had already been studied by investigators in Germany and the United States, bringing to the point of commercial production that which had been previously discovered in the laboratory.

It was the pensive and imaginative E.J. Buckler who spearheaded the drive for flexibility and selectivity in research and development. As director of the research department, he viewed it as his task to pursue the profitable goals which were attainable

et al, *The Implication of Knowledge-Based Growth for Micro-Economic Policies* (Calgary, University of Calgary Press, 1996), *passim*.

⁸¹ R. Solo, "Research and Development in the Synthetic Rubber Industry," p. 79.

given corporate resources.⁸² It was his responsibility to ensure the overall success of the department. In fact, as he stated with characteristic modesty in 1953, this function was the

Figure 3.4



Emphasizing its determination to provide the best possible technical service to its customers abroad, Polymer often sent Dr. E.J. Buckler (fourth from the left, around the table) to its technical conferences in Europe. This photograph is of the first technical conference which was held in Paris on November 6, 1954. Also present is Roger Hatch (centre, in the light suit). Source: *Polysphere* (February, 1967), p. 18.

“only excuse” for his existence as director of industrial research.⁸³ More specifically, Buckler took it upon himself to review all possible R&D problems at Polymer and select those solutions which were most likely to succeed. In addition, it was his role to judge whether a project should be abandoned or accelerated and expanded.

Like many of his generation, Buckler believed in the positive powers of chemistry; he was confident that through science man could overcome economic scarcity and improve his material lot in life. In a speech given in Sarnia in October 1955, Buckler outlined the recent accomplishments of his profession. “We are all well aware of the effect that research has had on our daily lives,” he confidently stated, “and can see very clearly the march of

⁸² E.J. Buckler, “Canadian Case History - Polymer Corporation Limited,” *Research Management*, vol. vi (1963), pp. 295-97.

progress within living memory - radio, television, radar, nuclear fission, high-octane gasoline, nylon, dacron, synthetic rubber and so forth."⁸⁴ According to Buckler, the driving force behind most of these innovations was free enterprise and the profit motive. Industrial research from which came technological innovation, he stated, grew out of the desire "to make more and compete effectively with other industries to the eventual benefit of the public."⁸⁵ In Buckler's opinion, there was no substitute for the discipline of the market. It fostered both efficiency and innovation with the ultimate effect of improving the standard of living. Innovation in and of itself meant little if it were not done in an economical manner. Indeed, if innovation were undertaken without observing the "hard facts of economics," he cautioned in November 1953, "then the standard of living would actually go down."⁸⁶ As head of research and development at a medium-size firm, Buckler was profoundly conscious of the need to economize. Only through the efficient allocation of resources could Polymer compete in the international marketplace with large, "multi-divisional" firms. The application of science alone would not yield a more prosperous future; only in combination with economics would it do that. "In their combination," Buckler stated, "lie the nature, problems and aims of research in industry."⁸⁷ Buckler had come to St. Clair Processing Ltd. in 1942 with a background in chemistry and engineering. While his doctoral work at Cambridge University in England had no direct bearing on his work at Sarnia, it did help define his vision of a modern industrial research department. Given the fact that the research was the most speculative of any industrial operation,

⁸³ E.J. Buckler, "Research - An Industrial Operation" (November 24, 1953), *Polysar Papers*, vol. 146, file: E.J. Buckler speeches, 1953, p. 6

⁸⁴ E.J. Buckler, "Industrial Research. An Address to School Teachers visiting Polymer" (October 6, 1955). *Polysar Papers*, vol. 146, file: E.J. Buckler speeches, 1955-1958.

⁸⁵ *Ibid.*, p. 3.

⁸⁶ E.J. Buckler, "Research - An Industrial Operation," p. 4.

⁸⁷ *Ibid.*, p. 4.

Buckler believed that the organization of the department had to be “very flexible.”⁸⁸ There was, for instance, really no hierarchical structure at Polymer as there was at Du Pont. Buckler gave his research chemists free rein to pursue the problems of industry. Often his time was spent outside of the department conferring with people in marketing and sales to ensure that theoretical advances would find a practical commercial purpose. To foster flexibility and interaction, Buckler created an academic-like setting, although the values of academia did not apply. This was research undertaken for economic ends, not to make a contribution to abstract knowledge. At Polymer, the research chemists would freely and critically exchange ideas in the pursuit of technological innovation *and* profit. Buckler felt strongly that industrial research could not be conducted in isolation. “It is vital that thoughts and the results are shared with others, so that everyone can make his contribution to solving the problem.”⁸⁹ This was necessary, Buckler believed, in any young industry like synthetic rubber.⁹⁰

The fact that this field was still so new meant that there was plenty to discover and many an opportunity for the eager and able rubber chemist. Yet despite these practical challenges, it was not always easy attracting new Ph.Ds. to join the company. Buckler had to persuade them to abandon their dreams of achieving academic immortality by the publication of original discoveries in a new field, and instead concentrate on innovation, that is on reducing fundamental research to the level of practice, sales and profits. When Buckler succeeded, he did so in large part by assuring his chemists that the intellectual challenge was just as great as doing basic research and the reward was, if not fame, at least continuing employment. By 1955, the department had grown to over 180 people, of whom 40 were university graduates. Among the graduates there were 12 who had administrative and non-technical training, 24 B.Sc.’s and M.Sc.’s from Canadian and European

⁸⁸ *Ibid.*, p. 10.

⁸⁹ Buckler, “Industrial Research,” *op. cit.*

⁹⁰ Interview with E.J. Buckler (Sarnia, November 1999).

universities, but only 4 who were Ph.D.'s with special training in research.⁹¹ In comparison Du Pont had roughly 1,600 Ph.D's on its payroll.⁹² There were occasions when Buckler's group undertook work of a basic nature, to close the gap between original discovery and reduction to practice.⁹³ But for the most part the department concentrated on innovation in pursuit of profit.

Following its recent success in solving the problem of "cold weather buckling" of butyl inner tubes, Buckler's department turned its attention to improving the properties of GR-S rubber - the principal type of synthetic rubber used in automobile tires. Given the global demand for automobiles, this was viewed as crucial to the success of the firm, indeed, to that of the whole industry. Rubber for use in tires still accounted for approximately seventy-five percent of rubber consumption. If the synthetic rubber industry was to continue to grow it would have to supplant natural rubber as the input of choice for tire manufacturers. While the properties of GR-S rubber had been substantially enhanced since the product was first developed in the late 1920s by I G Farben scientists Walter Bock and Edward Tschunkur, it was still inferior to natural rubber in terms of wear resistance, processibility and strength. Thus, after the war, there was a concerted effort on the part of all synthetic rubber research groups to produce a stronger and more malleable general purpose rubber for use in automobile tires.⁹⁴

For their part, the fraternity of rubber chemists felt that they were more than up to the task. Among this group, there was a confidence, a certitude, indeed, a cockiness, that

⁹¹ Buckler, "Industrial Research," p. 3.

⁹² Hounshell and Smith, *Science and Corporate Strategy*, p. 371.

⁹³ Examples include, the evolution of the catalyst system for the making of "cold" rubber, the study of the mechanism of bromination of butyl to make Bromobutyl polymer (the ultimate inner liner rubber), and the evolution of a rapid and reliable test for measuring the molecular weight of polymer during polymerization (in the production of Krynol).

⁹⁴ See Herbert and Bisio, *Synthetic Rubber*, pp. 151-156 and P.J Morris, *The American Synthetic Rubber Program*, pp. 32-39.

perhaps only accompanies those of a young age who are working with a new science. In so many ways, the rubber chemists of the 1950s resembled the computer scientists of the 1990s. They were bold and brash, seeing themselves as the keepers and practitioners of a whole new knowledge with seemingly limitless potential. In less than a decade, they had seen their science progress from its infancy into the full stature of young manhood. "The results of synthetic rubber research, on this continent, have proved so amazing," Ralph Rowzee stated immediately following the war, "that even the sober scientist cannot hide his enthusiasm."⁹⁵ It seemed as though each week brought news of another discovery and some sort of fresh knowledge. These were heady days, indeed, a time when the rubber chemist was potentate. Buckler's crew, which after 1953 had the luxury of working in a new "state-of-the-art" research laboratory, nick-named the "Buckler Hilton," were enthused, energized and ready for any challenge.⁹⁶

In their task of developing a better form of GR-S rubber, the postwar rubber chemist was assisted by developments which had taken place in Germany during the war. There, in the laboratory, chemists had succeeded in producing a GR-S rubber with improved tensile strength. This had been accomplished by lowering the temperature at which polymerization occurred; that is, by lowering the temperature of the emulsion in which the butadiene and styrene molecules joined together to form the long polymer chains which eventually constituted the synthetic rubber. Previously, chemists on both sides of the Atlantic had been unsuccessful in effecting polymerization at any temperature below 50°C. But the Germans had developed a polymerization recipe for a "cold rubber", using sugar, organic peroxide and iron as principal ingredients, which allowed the same mixing process to occur at between zero and 10°C. Polymerization at this lower temperature was desirable because

⁹⁵ E.R. Rowzee, "Address given by E.R. Rowzee at the Kinsmen's Club of London, Ontario" (March 25, 1946), *DMS Papers*, vol. 7.

⁹⁶ Interviews with E.J. Buckler and I.C. Rush (Sarnia, November 1999).

it suppressed secondary reactions between growing chains so as to make each of them more linear. The more linear the chain, the stronger the synthetic rubber. The stronger the synthetic rubber, the more wear-resistant the rubber tire. Not since Tschunkur and Bock's innovation of the butadiene-styrene copolymer had there been such a revolution in synthetic rubber technology. For commercial petrochemical companies, like Polymer, seeking to make inroads into the tire industry, the German discovery was a major breakthrough. "It gives promise," Ralph Rowzee stated shortly after his return from Germany in 1945, "of being better... than any product available to us."⁹⁷

The transfer of this fundamental research from Germany to North America was a result of the Allied victory in Europe. The second world war, unlike any war in history, was a war of science.⁹⁸ The brains and industrial techniques of Allied scientists and engineers were matched against those of the Germans to produce the most advanced and effective devices in pursuit of military supremacy. "The Second World War gave new meaning to the concept of total war," notes the Canadian historian Donald Avery in his recent study of the *Science of War*, "both in the mobilization of national resources and in the utilization of science."⁹⁹ The forces of science and industry were marshalled to invent and develop new devices, all of which were held under a tight cloak of military security. Each warring nation spent hundreds of millions of dollars on fundamental and applied research which, while

⁹⁷ E.R. Rowzee, "Synthetic Rubber Industry in Germany," *Canadian Chemistry and Process Industries* (December, 1945), p. 815

⁹⁸ See D.H. Avery, *The Science of War: Canadian Scientists and Allied Military Technology during the Second World War* (Toronto, University of Toronto Press, 1998); G. Hartcup, *The Challenge of War: Britain's Scientific and Engineering Contributions to World War Two* (New York, Taplinger, 1970); D.P. Mellor, *Australia in the War of 1939-45: The Role of Science and Industry* (Canberra, Australian War Memorial, 1958); and S. Zuckerman, *Scientists and War: The Impact of Science on Military and Civil Affairs* (New York, Hamilton, 1967), esp. pp. 103-115.

⁹⁹ Avery, *op. cit.*, p. 4.

primarily intended for the purpose of war, presented a unique form of war booty as the conflict came to a close. Project Paperclip, the American operation that brought Werner von Braun and the team of German rocket scientists to the U.S. after the war, was but one aspect of a much more comprehensive and systematic “intellectual reparations” program to exploit German scientific and technical know-how. Germany’s substantial advances in numerous industries - especially rocketry, optics, pharmaceuticals, plastics and synthetic rubber - were seen by the Allies as the industrial spoils of war and, given the outcome of the conflict, rightfully theirs to exploit.¹⁰⁰

In August 1944, the Allied combined chiefs of staff established the broad umbrella agency to plan for and administer the orderly exploitation of enemy secrets. Called the Combined Intelligence Objectives Sub-committee (CIOS), this new control centre was responsible for compiling lists of “target plants,” allocating the technical experts to investigate them, and processing and distributing the resulting reports. Its scope and co-operative purpose was reflected in the number and nationality of the agencies it represented. Canada was among the first of the Allied nations to establish formal and functional links with CIOS. The prospect of obtaining German science and technology titillated the Canadian government and private industry in Canada. According to Gordon Henderson, Polymer’s chief engineer, the acquisition of German industrial secrets was of “first-rate importance to Canadian industry.”¹⁰¹ As a result, between 1944 and June 1945, the Canadian government

¹⁰⁰ See, J. Farquharson, “Governed or Exploited? The British Acquisition of German Technology, 1945-1948,” *Journal of Contemporary History*, vol. 32, pp. 23-42; J. Gimbel, *Science, Technology, and Reparations: Exploitation and Plunder in Postwar Germany* (Stanford, Stanford University Press, 1990); T. Bower, *The Paperclip Conspiracy* (London, Paladin, 1987); and A. Krammer, “Technology Transfer as War Booty: The U.S. Technical Oil Mission to Europe, 1945,” *Technology and Culture*, vol. 22 no. 1 (January 1981), pp. 69-103.

¹⁰¹ G.R. Henderson, “Memoirs of a Canadian Engineer,” *G.R. Henderson Papers*, vol. 1, p. 205.

established two agencies - the Joint Committee on Enemy Science and Technology (JCEST), which was based in Ottawa, and the Canadian Advisory Targets Committee (CATC), which was based in London, England - to coordinate Canadian activities with CIOS and other related allied organizations.¹⁰² Early on, CIOS and its Canadian counterparts recognized that the success of its “technical missions” to Germany depended in large measure on the quality of the investigators.¹⁰³ Thus they recruited only the best scientists: men of broad interest, able to comprehend wisely and quickly; men of deep learning, capable of strong analysis and critical thinking; men with practical training, whom their German colleagues would respect for scientific attainment. In short, men like Polymer’s Ralph Rowzee.

In the spring of 1945, Rowzee, who was at that time Polymer’s director of research, was selected by Howe’s department of reconstruction to be part of the CIOS team being sent to Germany to investigate the synthetic rubber industry.¹⁰⁴ With his extensive knowledge of all aspects of synthetic rubber production, Rowzee was considered the most qualified Canadian to make the sortie. As J.R. Donald, the director-general of the chemical and explosives production branch, put it: Rowzee was without a doubt the “best qualified man in Canada to undertake this important technical mission.”¹⁰⁵ In mid-March 1945, Rowzee traveled to London, England by Liberator bomber to join up with other scientists from Great Britain and the United States. There, he was to be given an honorary commission in the Canadian Army and wait until he received the confidential details of his mission.

¹⁰² S. Koerner, “Canada and the Post-War Reparations Programme,” (Edmonton, unpublished, May 2000).

¹⁰³ J. Burchard, *Q.E.D. - M.I.T. in World War II* (New York, 1948), pp. 108-112.

¹⁰⁴ G.R. Henderson, “Memoirs of a Canadian Engineer,” p. 205; E.R. Rowzee, “Talk on Trip to England and Germany” (February 12, 1945), *Polysar Papers*, vol. 43, file: Addresses and Articles. 1940-1963.

¹⁰⁵ J.R. Donald to H.J. Carmichael (February 10, 1945), *Polysar Papers*, vol. 25, file: Research and Development, part 1.

By early March 1945, the Allied armies had reached the banks of the Rhine. On March 6 they took Cologne, and the next day, by remarkable luck, the Allies seized the bridge at Remagen before the Germans could blow it up. Troops poured across the Rhine. From then on, the war and the Allied investigational work speeded up greatly. Accompanying each of three main armed divisions on the Western Front was a so-called "T-force". It was the responsibility of the "T-force" to go into the "target" industrial plant with or immediately after the combat units in order to prevent looting, sabotage, removal of documents and the escape of key personnel. Once the plant was brought under control and put under "T-force" guard, a message was then sent to London informing CIOS that the plant was ready for investigation. Within a matter of hours, a group of investigators were dispatched to investigate the "target".

Rowzee's first trip to Germany came in the middle of April 1945. Along with six Americans, he was ordered to investigate the I G Farben synthetic rubber complex at Hüls and Leverkusen near Cologne. There, he spent almost two weeks poring over scientific and technical data, questioning key technical personnel and studying equipment and processes. He subsequently did the same at the Phoenix Rubber Company's plant at Hamburg and the Continental Rubber Company's plant at Nordhaven.¹⁰⁶ Rowzee was not, however, overly impressed with the German synthetic industry. Soon after his return to Canada in June 1945, he noted that Polymer's GR-S was "at least as good as the best German tire rubber and in one most important characteristic, processability, it was far superior."¹⁰⁷ Furthermore, Rowzee found "no indication" that the Germans had produced a rubber of the butyl type, leading him to conclude that: "our GR-I [i.e. butyl rubber] was far superior to any rubber used for inner tubes in Germany."¹⁰⁸ Despite Rowzee's general belief that the Polymer project was better than its German counterpart, he was nonetheless forced to admit

¹⁰⁶ Rowzee, "Trip to England and Germany," pp. 7-10.

¹⁰⁷ *Ibid.*, p. 12.

¹⁰⁸ *Ibid.*, p. 13.

that there were a few areas in which the Germans did excel. For instance, Rowzee found that the infrastructure setup for R&D at Leverkusen was on “a scale far exceeding any rubber research laboratories on this continent.”¹⁰⁹ He was also impressed with much of their equipment, equipment that he later found out was available through the “repatriation” initiative.

Based on Rowzee’s investigation, Polymer’s directors implemented “operation Leverkusen” to bring German equipment and technology back to Canada. Characteristically, it was Nicholson who spearheaded the drive.¹¹⁰ As he had so often done in the past, Nicholson first turned to C.D. Howe for assistance. Long a forceful arbiter of business-government relations, Howe believed that it was the role of government to assist Canadian business to locate and acquire German industrial science and technology. To that end, in January 1946 he appointed Roy Geddes as economic advisor to the newly opened Canadian Military Mission in Berlin. Under the command of General Maurice Pope, the Canadian Military Mission functioned as an emissary between the Canadian government and the Inter-Allied Reparations Agency (IARA), a body created in December of 1945 to oversee the allocation of German assets. In September 1949, Howe also solicited the support of L.B. Pearson, secretary of state at the department of external affairs, to help him bring German synthetic rubber knowledge and technology to Canada.¹¹¹ The process was long and drawn out given the number of competing nations interested in German

¹⁰⁹ Rowzee, “Synthetic Rubber Industry in Germany,” p. 815; see also his comments to the board of directors in “Minutes,” (June 13, 1945), *Polysar Papers*, vol.1.

¹¹⁰ J.R. Nicholson to C.D. Howe (September 6, 1949), *Polysar Papers*, vol. 13, file: Farbenfabriken Bayer Leverkusen Equipment; J.R. Nicholson to A.F.W. Plumptre (October 24, 1949), *ibid.*; Nicholson to J.H. Thurrott (January 14, 1950), *ibid.*; Nicholson to D. Wilgress (February 14, 1950), *ibid.*; Nicholson to Plumptre (March 11, 1950), *ibid.*; and Nicholson to Plumptre (March 21, 1950), *ibid.*

¹¹¹ C.D. Howe to L.B. Pearson (September 7, 1949), *Polysar Papers*, vol. 13, file: Farbenfabriken Bayer Leverkusen Equipment, 1949-1950

technology. But in the end the effort paid off. In 1950, Polymer's chief engineer, Gordon Henderson, went to Germany under the auspices of the IARA and brought back several thousand tons of the German research equipment to Sarnia.¹¹²

But research equipment was only a small part of the Allies' war booty. CIOS and its spin-off agencies also took tons of scientific and technological documentation out of Germany at the end of the war, information on everything from German pharmaceuticals and optics to synthetic fuel and leather tanning.¹¹³ It was from these technical missions that the Allies and, ultimately, the North American synthetic rubber industry, came to possess the fundamental theory and method for the production of "cold rubber."¹¹⁴

After the war, based on what CIOS had learned in Germany, a number of North American chemical concerns began manufacturing their own version of "cold" rubber. All used Polymer's polymerization recipe, which it had donated to the RFC free of royalties for the assistance it had received during the war. Polymer's version was introduced in 1950

¹¹² "Analysis of Equipment Released from Farbenfabriken Bayer Leverkusen," (February 14, 1950), *Polysar Papers*, vol 13, file: correspondence 1949-1951; Also see G. Henderson's personal account in his "Memoirs of a Canadian Engineer," pp. 205-226.

¹¹³ L. Ivanovszky, "BIOS Trip to Germany, 1946," *Petroleum*, vol. 10 (February 12, 1947), 37-48; W.F. Faragher, "Collecting German Industrial Information," *Chemical and Engineering News*, vol. 26 (December, 1948), 3817; E.C. Kleiderer, "The Pharmaceutical Industry of Germany," *Chemical and Engineering News*, vol. 27 (April 25, 1949), 1206-8; C.F. Enloe, "The War and the German Drug Industry," in *ibid.*, vol. 24 (November 25, 1946), 3046-48; H.A. Kuhn, "Development in the German Chemical Industry," in *ibid.*, vol. 23 (September 1, 1945), 1516-22; E.R. Weidlein, "Synthetic Rubber Research in Germany," in *ibid.*, (March 25, 1946) 771-774; W.C. Goggin, "Advances in Plastic in the United States and Germany," in *ibid.*, vol. 24, (February 10, 1946) 339-43; and "New Tanning Agents Based on German Technology," *ibid.*, vol. 26, (July 5, 1948) 1980-1, 2029.

¹¹⁴ Morris, *American Synthetic Rubber*, pp. 32-39. See also, J. Davis, "The Canadian Chemical Industry," Royal Commission of Canada's Economic Prospects, *Report*, p. 54.

and marketed under the trade name “Polysar Krylene.” It, like all other “cold rubbers” at the time, was an improvement over regular GR-S rubber and three times as good as natural rubber in terms of wear resistance in car tires. Unfortunately, however, tire manufacturers complained that the new “cold rubber” - whichever brand name it was marketed under - was difficult to process and no cheaper than the old, “hot” buna-s rubber to purchase.¹¹⁵ If “cold rubber” was to be a successful commercial product, it would have to be made more attractive in terms of processibility and price. The task that preoccupied Buckler and other rubber chemists, therefore, was to develop a longer-lasting, less expensive, and more processing-friendly form of “cold rubber”, a rubber which was cheaper than natural rubber but like natural rubber was malleable enough to be fabricated directly into tires. In short, the goal was to retain the positive properties of “cold rubber” while making it more affordable and more plastic. Here applied research took over from war-prize science.

By 1948, the task was already underway. At B.F. Goodrich, a young research scientist, Dr. Emmet Pfau, theorized that the relative strength of “cold rubber” and its lack of malleability derived from the same source: the long, intermingled chains of the butadiene molecules. Pfau theorized further that it might be possible to introduce oil directly into the polymerization process of an unmodified butadiene-styrene rubber so as to produce a sufficiently plastic material without compromising the strength derivable from the longer linear chains of “cold rubber.” Replacing some of the costlier styrene and butadiene with cheap oil would have the additional benefit of reducing the overall cost of production.¹¹⁶ In a strict sense, Pfau’s idea was not new. By this time, plasticizers, like oil, were common in rubber factories. What was novel about Pfau’s approach was that he suggested pushing oil extension to an unprecedented level (37-45 parts of oil per 100 of polymer) and to carry out the blending at the latex stage rather than in a mixing factory.

¹¹⁵ Interview with E.J. Buckler (Sarnia, November 1999).

¹¹⁶ Morris, *American Synthetic Rubber*, pp. 36-37

Pfau had marked success testing his innovation at the laboratory level but the research chiefs and upper management at B.F Goodrich were not interested in taking his work to the next step. Goodrich had joined the U.S. government's subsidized research program. Thus, there was no financial incentive for it to proceed any further with Pfau's ideas.¹¹⁷ With no prospect of commercial benefit, B.F. Goodrich pulled the plug on Pfau's research. The decision proved to be extremely short-sighted.

Unable to interest B.F. Goodrich in his work, Emmet Pfau left the company in 1949 and joined the General Rubber and Tire Company. General Tire, along with Phillips Petroleum, Dow Chemical and Polymer, was one of the four industrial companies engaged in synthetic rubber research and development which had opted-out of the U.S. government's subsidized program.¹¹⁸ It therefore could benefit commercially from Pfau's research, where Goodrich could not. Thus, when Pfau approached the company with his idea for an "oil-extended" cold rubber, company executives at General Tire welcomed him aboard with open arms. Still, before General Tire could fully exploit the fruits of Pfau's research, one more legal obstacle had to be overcome. While General Tire was legally free to develop Pfau's ideas, it could not do so in the facilities it operated for the U.S. government. Its operating agreement with the RFC prohibited this. In order to avoid any legal complication with the RFC, therefore, General Tire decided to develop Pfau's process outside the United States.¹¹⁹ To do this, it needed a firm already producing "cold rubber" in commercial quantities. This narrowed the field considerably. At the time, there was in fact only one firm in the world that fit the bill: Canada's Polymer Corporation.

Between 1950 and 1951, the two companies worked closely together to bring Pfau's process to the point of commercial production. Indeed, the co-operation between the two companies was so great that one technical journal, *Chemical and Engineering News*,

¹¹⁷ Solo, "Research and Development in the Synthetic Rubber Industry," p. 78.

¹¹⁸ *Ibid.*, p. 70.

mistakenly reported the Polymer Corporation had joined General Tire to form a “jointly owned company.”¹²⁰ While J.D. Barrington quickly set the record straight¹²¹, the oversight was perhaps understandable given the close relationship between the companies. Not since the war had there been such a level of co-operation between Canada and the United States on synthetic rubber science and technology. In terms of its development, Polymer’s contribution came in the form of an efficient polymerization recipe. Without it there would have been no way of controlling the molecular weight of the base polymer. Unlike the recipes developed in the United States (recipes which contained enough iron to severely limit the tolerance of polymer for oil in Pfau’s oil extended process), Polymer’s recipe included only a minute trace of iron bound to a sequestering agent, which enabled the company to make and dry a very high molecular weight polymer, like the one Pfau was suggesting. All without degradation. The recipe was essential to bring Pfau’s process to the point of commercial production.

The joint venture proved fruitful. In 1951, Polymer began the commercial production of a high-grade, oil-enriched, butadiene-styrene copolymer known as “Polysar Krynol.” As had been intended, the desirable properties of “cold rubber” were retained, but owing to the incorporation of a comparatively low-cost oil, the overall cost of the final product was reduced considerably. The new rubber also proved easier to mix, extrude and handle in rubber factory equipment than any other type of synthetic rubber produced. “The development,” the *Financial Post* noted in April 1951, “marks a new era in synthetic rubber manufacture....”¹²²

¹¹⁹ Solo, *Across the High Technology Threshold*, pp. 101–103.

¹²⁰ *Chemical and Engineering News*, (June 25, 1951).

¹²¹ J.D. Barrington to M.W. Mackenzie (June 26, 1951), *DMS Papers*, vol. 7, 296–1.

¹²² *Financial Post* (April 7, 1951) p. 1.

In terms of research and development, the twelve years that followed the Second World War were thus the most productive in Polymer's history.¹²³ The transfer of German science and technology gave an immediate stimulus to research on the North American continent. The ill-conceived policies of the American RFC had dramatically narrowed the number of companies positioned to reduce this research to commercial practice. As a result of Howe's post-war faith in Polymer, the crown corporation had built sufficient R&D to complete and cooperate on a continental basis - a remarkable lesson for "little" Canada. By 1957, however, the RFC was no longer regulating the synthetic rubber industry in the United States and new technology was emerging which would lead to types of rubber never made before. Buckler and the others sensed that success in the future would be more difficult to achieve and efficiency in production much more important. But for now they could have pride in all that they had accomplished and watch as those in charge of sales did their job. Here too Polymer found its opportunities.

When J.D. Barrington arrived in Western Europe in the autumn of 1952 to meet with customers, he found a region flourishing with economic activity. In seven short years, with the benefit of Marshall Plan aid, Western Europe had managed to rise from the ashes of war, reconstructing most of its major industries and establishing whole new ones. The despatch of Barrington to Europe symbolized the importance the corporation attached to the region. After the war, when the decision was made to "go global," it was to Europe that the company first turned. The going had initially been tough, but due largely to the efforts of Polymer's executive vice-president J.R. Nicholson the company had managed to persevere. Polymer's good reputation in Europe was primarily a product of Nicholson's way of doing things: the fact that he never promised anything he could not deliver; the way he lived up to the terms of his agreements; as well, the level of the personal service he gave to his clients. The company had worked hard to generate goodwill for itself and its

¹²³ E. J. Buckler, "Nostalgia," *E.J. Buckler Papers*, vol. 1.

products in Europe, and by 1951 had established a reputation as a reliable international supplier of rubber.

But just as the company was poised to reap the benefits that accompany such a reputation, the man largely responsible for establishing it announced his resignation. In June 1951, after a decade with the firm, J.R. Nicholson was stepping down as executive vice-president so as to assume a senior position with Brazilian Traction, a Toronto-based operator of Brazilian utilities.¹²⁴ The Canadian synthetic rubber program had never been without Nicholson. Indeed, the whole project was largely his idea. He was the first officer of the department of munitions and supply to be delegated to study the synthetic rubber situation and it was he who had almost single-handedly paved the way for the work of the first board of directors. In addition, Nicholson had arranged for the transfer of technological know-how and scientific knowledge from the United States - knowledge and know-how without which there would not have been a Canadian synthetic rubber industry. In the years that followed, he had overseen nearly every legal aspect of the firm and had personally developed Polymer's export markets in Europe.¹²⁵ "It was largely Nicholson's efforts, continued over the years," Howe stated on the eve of Nicholson's departure in 1951, "that has brought Polymer Corporation from an idea to the large and successful corporation that it is today."¹²⁶ Nicholson had proved himself a new kind of Canadian business executive: an aggressive international salesman with intellect, passion and determination, rarely matched. He was the quintessential "Howe boy." Now he had moved

¹²⁴ Nicholson would not experience the same success at Brazilian Traction. His business philosophy and approach were at odds with the South American way of doing things. See D. McDowall, *The Light: Brazilian Traction, Light and Power Company, 1899- 1945* (Toronto, Toronto University Press, 1988), esp. p. 391.

¹²⁵ E.R. Rowzee, "Report of Trip To Europe" (December 7, 1951) *DMS Papers*, vol. 3, p. 3.

¹²⁶ C.D. Howe, "Department of Defence Production, Press Release" (June 8, 1951), *DMS Papers*, vol. 7.

on, with Howe's blessing, to work with another of Howe's wartime acolytes, Henry Borden, who as president of Brazilian Traction, oversaw Canada's largest overseas investment. Nicholson would be missed.

In an attempt to mitigate the damages resulting from Nicholson's departure, Polymer immediately dispatched two of its most able personnel to Europe. Ralph Rowzee and Roger Hatch spent three months overseas reassuring agents and customers that the company would continue to do things "Nicholson's way." Meetings were held with the company's principal customers - Michelin and Kleber of France, Pirelli of Italy, Continental of Germany and Trelleborg of Sweden. The meetings went remarkably well. Rowzee and Hatch were successful in calming alarmed clients and in getting them to renew their existing contracts.¹²⁷

Rowzee's trip to Europe served as the basis for a report which would establish the corporation's sales policy for almost a decade. Rowzee believed that from the standpoint of both financial return and long-term growth possibilities, Europe was Polymer's most attractive export market. Rowzee anticipated that in the decades to come the demand for rubber would outstrip supply and that therefore Polymer should step up its sales efforts in Europe.¹²⁸ Given the attractiveness of the European market, Rowzee further recommended decreasing exposure in the United States. While the United States, with its unparalleled number of cars and consumers, appeared like the greenest of pastures, once there Polymer had found the grazing not so good. Due to the RFC's "no profit-no loss" pricing policy as well as its 10% duty on all synthetic rubber imports, Polymer had found it difficult, and at times impossible, to make money.¹²⁹ Nevertheless, Rowzee was not willing to go as far as to recommend withdrawing from the U.S. marketplace altogether. "Polymer must maintain

¹²⁷ Rowzee, "Trip," p. 3.

¹²⁸ Rowzee, "Report to the President" (December 7, 1951), *DMS Papers*, vol. 3, pp. 6-8

¹²⁹ "Minutes of the Board of Directors" (May 1, 1952), *DMS Papers*, vol. 12.

its U.S. market for the next five to ten years," he stated, "if only as an insurance policy."¹³⁰ Given the strong level of demand for rubber south of the border, Rowzee believed that it would be possible for Polymer to get rid of its product at short notice if currency difficulties, slumps in rubber consumption, drops in the price of natural rubber or increased competition should affect Polymer's sales elsewhere.¹³¹

Rowzee's report became corporate strategy and, as a result, the U.S. market became less important to the firm's success. In 1952, approximately 20,000 long tons were exported to the United States. This represented approximately 26% of total sales. In 1956, by contrast, less than 8,000 long tons were sold south of the border. Of total sales, this figure represented less than 7%. France and Great Britain were now both larger consumers of Polymer's rubber than the United States. In contrast, exports to Europe more than doubled during the period, from just under 25,000 long tons in 1951 to just over 60,000 long tons in 1956.¹³²

Polymer's success in Western Europe was largely a result of three factors. First, as in North America, the Western European economy was booming after 1950. In Germany, Italy, France and Great Britain, reconstruction was achieved quickly and with remarkably little political dispute. In each of these nations, real incomes continued to rise. As a result sales of durable goods such as cars increased. Secondly, Polymer faced little or no competition from other synthetic rubber producers during the period. While prospective competition was a serious threat and caused Polymer's executives no end of concern,¹³³ the threat did not become an industrial reality until the end of the decade. It was only then that the U.K., Germany, Italy and France followed through on their earlier plans to build their own synthetic rubber plants. Furthermore, it was only then that American synthetic rubber

¹³⁰ Rowzee, "Report to the President," p. 23.

¹³¹ *Ibid.*

¹³² Rowzee, "Report to the President," p. 24.

producers began aggressively selling their product in Europe.¹³⁴ Thus, for most of the decade, Polymer had an uncontested market for its product. The only real competition that the company did face was from the natural rubber cartel, and even on this front Polymer

Table 3.1
Selected statistics of operation, 1952-1957

Year	English		Metric		Profit as a % of	
	Production (thousands)	Number of Employees	Sales (\$000s)	Profit (\$000s)	Operating Investment	Dividends (\$000s)
1952	71,900	2,384	45,753	4,050	8.2	2,500
1953	80,400	2,343	50,614	5,097	11.2	3,000
1954	85,710	2,458	53,467	4,924	10.7	3,000
1955	103,100	2,556	61,836	7,531	16.4	5,000
1956	119,600	2,592	71,567	9,450	19.5	6,000
1957	130,800	2,723	74,615	6,823	13.2	4,000

Source: Annual Reports (1952-1957).

was winning the war. The third factor contributing to Polymer's success was innovation. In production, the company had been able to increase output rapidly, to meet demand in Europe, without new plant additions.

The period of Barrington's presidency, 1951-57, was by many indications the most prosperous in the company's history. The corporation's strategy, which had been formulated shortly after the war, positioned the company to take advantage of the international economic boom of the 1950s. Barrington had done his part, in a sense, by changing nothing at all, by staying the course. Early on he recognized the merits of continuing along the same path, of utilizing chemistry to create new and diverse products for both domestic and international consumers. Once the financial reorganization of the company had been completed and the company's structure brought into line with its strategy, the company was set to seize the opportunities that accompanied an age of mass consumerism and the great god - Car. Polymer was very fortunate in the combination of

¹³³ See "Minutes of the Board of Directors" (September 1951- August 1953), *DMS Papers*, vol. 12.

¹³⁴ Annual Report (March, 1950).

economic and political factors that operated during the period. But, at the same time, it had made the most of its opportunities.

While circumstances had benefited Polymer, after twenty-two years the times were no longer showing the same beneficent consideration to C.D. Howe and the Liberal government. By 1957, the political tide had turned against the “government party.” The Conservatives’ and CCF’s charges that the Liberals were arrogant, overbearing, undemocratic, indeed dictatorial, of course, had been made before; the difference was that now they were starting to resonate with the electorate. Howe himself was the target of much of the opposition’s criticism. His invoking of closure during the Trans-Canada pipeline debate of 1956 caused the Conservatives to cry foul. Howe, they charged, was a “dictator” who had a “contempt for parliament” and democratic practices.¹³⁵ Increasingly in the House of Commons, Howe looked like an old bear under attack by a pack of tenacious hounds. Occasionally, the opposition drew blood in the form of a politically unwise outburst - “What’s a million?”, “Who can stop us?”, “Nuts!”. Such infamous one-liners served to confirm the Conservatives’ characterization of him and his party. Looking old and tired, Howe was the visible symbol of the government’s ossification. Ironically, as Howe’s biographers point out, the least bureaucratic of men had come to embody the Ottawa attitude that the electorate so decisively rejected during the election of 1957.¹³⁶ Suffering from internal decay and discredited by the pipeline debate, the Liberals were defeated in June at the polls by John Diefenbaker’s Progressive Conservatives. That year, the Progressive Conservatives won more seats than any other party in Canadian history (208 of 265). Riding on Diefenbaker’s coattails, the party finally managed to appeal to voters in the west and Quebec without alienating their base in Ontario. As they had done in every election since 1945, the people of Sarnia voted for the Progressive Conservative

¹³⁵ For a concise and colourful discussion of the pipeline debate see Bothwell and Kilbourn’s *C.D. Howe*, chp. 18.

¹³⁶ *Ibid.*, p. 331.

candidate, re-electing Joseph Murphy. Ironically, Murphy had managed to get himself re-elected, in part, by identifying himself with one of Howe's most successful economic ventures - Polymer Corporation. In the years leading up to the election of 1957, Murphy celebrated Polymer at nearly every turn. "Polymer is a very successful corporation," he declared in the House of Commons in January 1956, "which is operated pretty much the same as any private corporation."¹³⁷ Murphy was no longer in favour of privatization, defending the *status quo* whenever the issue came up.¹³⁸ Perhaps just as ironic was the fact that the man responsible for Polymer's formation, C.D Howe, was not re-elected in 1957. His behind-the-scenes genius in plotting the strategies and structures of Canada's industrial success was largely hidden from the electorate. Like so many of the old Liberal guard - men like the minister of finance, Walter Harris, the minister of public works, Robert Winters, and the long-time Liberal power broker, Stuart Garson - Howe was unable or, more likely, unwilling to reinvent himself and was thus forcibly retired by the voters. After twenty-two years in office the Liberals had finally managed to offend more people than they had gratified. Never one to remain idle, Howe moved to Montreal and was soon finding new business challenges to match his enormous talents. From time to time, he spoke out on public policy issues, on one occasion defending the need for crown corporations like Polymer.¹³⁹ He had always taken great pride in Polymer's accomplishments. For Howe, Polymer was a shining example of everything that was good about the government being in business. It remained to be seen if Diefenbaker's Conservatives thought likewise.

¹³⁷ Canada. House of Commons. *Debates* (January, 1956), p. 136.

¹³⁸ *Ibid.*, pp. 135-137.

¹³⁹ "Why Crown Firm? C.D. Howe Speaks," *The Financial Post* (December 20, 1958), pp. 23-24.

Chapter Four

Worldly Wise: Growth and Multinationalization, 1958-1966

There are those who would like to convince us that further growth is inadvisable or impossible for Polymer. The arguments they use are that it is inappropriate for a Government-owned Company to grow to satisfy markets which private interests stand ready to serve; that the export market for synthetic rubber is finished; that those who do not have plants in the Common Market area are finished; and that it will be impossible for Polymer to establish an effective position in the solution polymer field. In answer to the arguments as to why Polymer should not grow, I submit that the export market is going to grow and that it may be in Polymer's best interest to establish manufacturing facilities in Europe. In regard to the solution polymer development, I believe that Polymer can and will establish a strong position in that field.¹

Ralph Rowzee (1960)

The 1950s and 1960s witnessed the perfection of the "multinational enterprise" as expansion abroad became the strategy of growth for an increasing number of leading industrial organisations.² In many ways, the "MNE" became the epitome of post-war economic dynamism - flexible, efficient and, as its critics would soon point out, imperialistic.³ The MNE was not new, of course. Since the second industrial revolution in

¹ E.R. Rowzee, "Objectives for 1960" (January 22, 1960), *G. Churchill Papers*, vol. 37, p. 2.

² Chandler, *Scale and Scope*, pp. 8, 18, 39, 408, 464, 606-8, 614; M. Wilkins, *The Maturing of Multinational Enterprise* (Cambridge, Mass, Harvard University Press, 1974), esp. chps. 13-15; J. Niosi, *Canadian Multinationals* (Toronto, Between the Lines, 1985), esp. pp. 98-101, 113, 116-120, 125-167 ; and R. Vernon, *Sovereignty at Bay: The Multinational Spread of U.S. Enterprises* (New York, Basic Books, 1971), esp. pp. 86-98.

³ During the 1960s, critics denounced the MNE as an instrument of neo-western imperialism. Academics like Andre Gunder Frank argued that the multinational corporation retarded the development of the underdeveloped world. Through it, Frank argued, the capitalist metropolis expropriated the economic surplus of satellite countries, "suck[ing]

the late nineteenth century, many firms - with competitive advantages derived from economies of scale and scope - had established production facilities in foreign markets. Even Canadian capitalism, long a recipient of foreign economic attention, had participated in this global reach; as early as 1899 Toronto capitalists had carried Canadian expertise in urban transit and power generation technology to Latin America.⁴ Geographical expansion into distant markets provided a way for the modern industrial enterprise to continue to exploit its competitive advantage. After the Second World War, an increasing number of

capital out of the periphery and dominat[ing] the periphery at all levels (A. Gunder Frank, *Latin America: Underdevelopment or Revolution*, pp. 227-8). Others argued that the MNE undermined national sovereignty and cultural autonomy (Ray Vernon, *Sovereignty at Bay*, esp. chps. 5, 6 and 7). In Canada, a similar sentiment was expressed. See, for example, R. Lexer, *Canada Ltd.* (Toronto, McClelland and Stewart, 1971); A Rotstein, *The Precarious Homestead* (Toronto, New Press, 1971); and J. Warnock, *Partner to Behemoth* (Toronto, New Press, 1970); and W. Gordon, *Storm Signals: New Economic Policies for Canada* (Toronto, McClelland and Stewart, 1975). Partly as a result of C.D. Howe's post-war reconstruction program, U.S. direct investment in Canada reached \$17 billion by 1960. The extent of American ownership prompted Walter Gordon - both as a royal commissioner in the 1950s and as a finance minister in the early 1960s - to call for new economic policies that would limit the level of direct foreign investment in Canada (W. Gordon, *A Choice for Canada: The Need for New Domestic Policies*). While the philosopher George Grant "lamented for the nation," the social scientist, Kari Levitt, told of the "silent surrender" of national sovereignty to the multinational corporation (G. Grant, *Lament for a Nation* and K. Levitt, *Silent Surrender: the multinational corporation in Canada*). According to Levitt, Canada's capitalist class had become the willing partners of the MNE, headquartered in the United States. Together, Levitt maintained, they had fashioned a system for holding the Canadian economy in thrall, narrowing its range of opportunities, and eliminating its power of choice. The multinational corporation, Levitt concluded, had reduced Canada to neo-colonial status. Despite these criticisms, the MNE proliferated in the post-war period.

⁴ McDowall, *Brazilian Traction*, chps. 2 and 3. See also C. Armstrong and H.V. Nelles, *Southern Exposure: Canadian Promoters in Latin America and the Caribbean, 1896-*

businesses embraced this strategy of direct foreign investment as a means to growth. Firms from around the world became successful challengers to Alfred Chandler's "first movers" - those Parsonian industrial organizations like Ford, RCA, Du Pont and Dow - which had established branch plants in distant lands early in the twentieth century.⁵ Having relentlessly expanded the output of their standard production line (i.e. increased their scale) and continually introduced new sorts of products (i.e. expanded their scope), post-war industrial enterprises invested in new products and new geographical markets in order to grow.⁶ As the economist Charles Kindleberger succinctly put it, "in going abroad, they grow abroad."⁷ The multinational enterprise thus evolved naturally out of the successful industrial corporation.⁸ Often by way of joint ventures, these corporations set up subsidiaries in places where both the markets and proprietary technologies of production offered the greatest potential for exploiting the economies of scale and scope.⁹ While this

1930, chp. 2.

⁵ Chandler, *Scale and Scope*, pp. 117, 122, 171-175, 213-217, 446-452.

⁶ *Ibid.*, pp. 36-45, 145, 230.

⁷ C. Kindleberger, *American Business Abroad: Six Lectures on Direct Investment* (New Haven, Yale University Press, 1969), p. 6.

⁸ Chandler, *Scale and Scope*, pp. 594-597.

⁹ Wilkins, *Multinational Enterprise*, pp. 379-381. Understanding when and why direct investment of this nature has taken place has preoccupied historians and economists for decades. According to the economist Peter Gray, firms sometimes expanded abroad for defensive reasons, either to forestall competition in a new market or to obtain assured sources of supply of some raw material vital to the domestic operation of the parent company. See H.P. Gray, *The Economics of Business Investment Abroad* (New York, Crane, Russak & Co., 1972), p. 8. At other times - as was the case with the American industrial expansion into Canada after 1870 - firms invested in distant production facilities to avoid tariffs and other discriminatory legislation which would raise the cost of finished goods shipped across national borders. In such cases, direct investment occurs because of the greater cost-effectiveness and profitability resulting from what economists term "country-specific advantages". The post-war boom in Canada brought a surge of such

was a quintessentially American phenomenon - *le défi américain*, as one European economist termed it - other industrial nations were not immune to its allure. These, then, became decades of "global reach."¹⁰

Between 1945-1970, Canadian corporations such as Inco, Brascan, Noranda, Cominco, Alcan, MacMillan-Bloedel and Massey-Ferguson made substantial investments abroad.¹¹ Alcan continued on its "global mission", investing in new fabricating facilities in Mexico and South Africa and expanding those already in operation in Switzerland, Norway, India and France.¹² Likewise, Massey-Ferguson expanded its existing plants in the U.K., Germany, France, Australia and South Africa and began manufacturing in

foreign direct investment. A third reason for investing in manufacturing abroad has been identified by Mira Wilkins, among others. According to Wilkins, during the 1950s and 1960s, American firms often found it impossible to obtain effective market penetration with exports from the home front and as a result they set up manufacturing facilities abroad. (M. Wilkins, *Multinational Enterprise*, p. 379). Thus while some market-oriented investments were made to defend existing foreign markets, most - according to Wilkins - were aggressive new stakes designed to penetrate new overseas markets. While accepting all of these reasons as valid interpretations of why direct investment takes place, Alfred Chandler argues that such investment cannot occur (successfully) until the firm itself has developed the organizational capabilities - the facilities and skills in production, marketing and management - to achieve economies of scale and scope at home. The expansionary urge, in Chandler's mind, is thus primordially one that is organizationally-driven, not market-driven. Once that has been done, the corporation can then expand into foreign markets, first through exports and then by direct foreign investment in manufacturing facilities abroad. According to Chandler, organizational capabilities provide the core dynamic for the continuing evolution of the modern industrial enterprise (Chandler, *Scale and Scope*, pp. 594-597).

¹⁰ R.J. Barnet and R.E. Müller, *Global Reach: The Power of the Multinational Corporation* (New York, Simon and Schuster, 1974).

¹¹ Taylor and Baskerville, *A Concise History of Business in Canada*, pp. 463-464.

¹² Campbell, *Global Mission*, pp. 404-5.

promising third world countries such as India, Brazil and Turkey.¹³ Having earlier developed its export market, Massey-Ferguson took the next logical step and established manufacturing facilities outside of its domestic market. In recent years, Massey-Ferguson's international expansion - master-minded by business-school trained executives like A.A. Thornborough - has been held up as a classic Canadian case of multinational growth.¹⁴ By establishing facilities abroad, both Alcan and Massey-Ferguson were able to reduce manufacturing costs through an increased scale of operation. Implicit in this new global outlook was a rejection of the old national policy mentality of Canadian manufacturing - a small, protected national market was no longer enough.

There was another Canadian corporation that became multinational during this period. In an effort to hold and expand its market in the face of increasing competition, Polymer embarked upon a program of growth through multinationalization. The golden era in petrochemicals had brought with it a rush of new entrants into the chemical field.¹⁵ The high profit margins of the immediate post-war period led many in business to consider the industry the "place to be".¹⁶ For over a decade Polymer had faced little competition in Europe from other petrochemical producers. But by the mid-1950s large American oil, gas and chemical companies, which were eager to emulate Polymer's earlier success, expanded into Europe. One of the main characteristics of the period therefore was the exploitation of economies of scale, which led to the construction of huge plants and to the realisation of the industry's global nature. Adding to the competitive environment was the fact that by the late 1950s, Germany, France, and some of the other European countries were well on the way to becoming petrochemical producers of some size, with strong assistance from the international oil companies operating refineries in these countries. Polymer's established

¹³ Neufeld, *A Global Corporation*, pp. 290-302.

¹⁴ See, for example, Bliss, *Northern Enterprise*, pp. 479-80.

¹⁵ Chapman, *The International Petrochemical Industry*, pp. 101-106.

¹⁶ Spitz, *Petrochemicals*, pp. 338-343.

markets were now under siege. If Polymer was to hold and expand these markets, it would have to join the small and elite collection of Canadian companies becoming multinational.

In January 1960, Ralph Rowzee put forward a new strategic vision for the crown company. "Polymer must grow," he stated, "to maintain its position as a major producer of synthetic rubber."¹⁷ To do otherwise, he believed, would lead to a loss of the company's "competitive position" and hence its "decline."¹⁸ In Rowzee's mind, the greatest danger to the company's status as a leading manufacturer of synthetic rubber was not any external phenomenon, like the emergence of new synthetic rubber producers in Europe, but rather internal decay and complacency. Rowzee had no doubt that competition, at home and abroad, could be met so long as the corporation remained attentive of mind and dynamic in action. That, after all, was how the corporation had met its challenges in the past. During the fateful post-war years of 1945-1951, when the corporation was faced with extinction if it did not find a market for two-thirds of its output, Polymer had devised and undertaken an aggressive new corporate strategy which emphasised exports, R&D and diversification. According to Rowzee, similar actions were now required if Polymer was to meet the challenges of the 1960s. "Fifteen years ago," Ralph Rowzee proudly reminded the board of directors, "we had the courage of our conviction and made bold moves that were contrary to so-called expert advice. In the same manner, bold moves are now required to insure the future of Polymer..."¹⁹ The corporation, he emphatically declared, had to grow or would wither away.

It was now or never as far as Rowzee was concerned. In 1957, the European post-war economic recovery was reaching maturity and the external environment was becoming more competitive. American firms like Firestone, Goodrich, Esso, and Du Pont were now

¹⁷ E.R. Rowzee, "Objectives for 1960," (January 22, 1960), *G. Churchill Papers*, vol. 37, p. 2.

¹⁸ *Ibid.*

¹⁹ *Ibid.*, p. 4.

in Europe.²⁰ In addition, European firms - including Royal Dutch Shell, ICI, Dunlop and BASF - had synthetic rubber plants in operation or under construction in England, Germany, France, Italy and Holland.²¹ As a result of this rapid building of synthetic rubber plants outside of North America, global synthetic rubber production doubled between 1956 and 1961 and Polymer's share of the market fell from 10% to 7.5%. Nevertheless, Rowzee was optimistic regarding Polymer's prospects. "I am convinced," he told the board of directors, "that Polymer has a tremendous potential for growth and that the synthetic rubber industry is on the threshold of another leap forward."²² As a result of fifteen years of intensive marketing, R&D and technical service, Polymer was in a position to hold a substantial share of world markets. All that was needed, Rowzee stated, was implementation of his aggressive strategy for growth.²³

What Rowzee had in mind was an enormous undertaking, a \$45 million expenditure to increase world-wide production by one-third, from 150,000 to 200,000 tons per year.²⁴ But that was not all that Rowzee was suggesting. In one of the most radical proposals to date, Rowzee recommended that the company abandon its reliance on exports and meet the competitive situation head-on by establishing actual production facilities in growth markets around the world. "There are real advantages from the standpoint of cost and of customer relations," Rowzee informed a parliamentary committee examining Polymer's operations "to locating production facilities close to the principal consuming areas."²⁵ If endorsed by the board of directors, Rowzee's idea to better serve existing and potential markets by

²⁰ Phillips, *Competition in the Synthetic Rubber Industry*, Table 10, pp. 63-64.

²¹ "Minutes of the Board of Directors" (September 17, 1959), *DMS Papers*, vol. 12.

²² Rowzee, "Objectives," p. 4.

²³ *Ibid.*

²⁴ "Minutes of the Board of Directors" (September 14, 1960), *DMS Papers*, vol. 12.

²⁵ Canada. House of Commons. Standing Committee on Public Accounts. *Minutes of Proceedings and Evidence No. 11* (May 9, 1961), p. 327.

locating facilities closer to them would mark a momentous change in corporate strategy from export sales to direct sales in the markets concerned.

A man of critical thought, Rowzee was profoundly aware of the risk involved in building plants overseas, especially given the global excess capacity existing in the industry.²⁶ Nevertheless, when weighed against the need to locate within these markets to prevent erosion of market share, he considered the risk worth taking.²⁷ Exports were becoming a more costly method of operation, open to the vagaries of foreign exchange differentials.²⁸ And while there was no tariff at this time on synthetic rubber entering the European common market, the cost of transportation alone was enough to compromise Polymer's competitive position overseas. "Transportation is an important factor," Ralph Rowzee informed the standing committee on public accounts. At almost 10% of Polymer's net return on sales, transportation costs were stretching Polymer's ability to compete overseas to the limit.²⁹ In an environment in which aggressive competition and excess industrial capacity were putting downward pressure on prices, such costs were deemed improvident.³⁰ To compete effectively in the European market, Polymer needed to eliminate these costs and, according to Ralph Rowzee, that meant establishing production facilities overseas.

Wise to the workings of a modern public enterprise, Rowzee fully appreciated the politico-economic ramifications of what he was suggesting. The crown corporation was initially conceived in a defensive mentality - i.e. to hold the home front - but Rowzee's strategy revealed a new aggressive mindset. If endorsed by the board of directors and

²⁶ Rowzee, "Objectives for 1960," pp. 3-5.

²⁷ *Ibid.*

²⁸ Canada. House of Commons. Standing Committee on Public Accounts. *Minutes of Proceedings and Evidence No. 11* (May 9, 1961), p. 336.

²⁹ *Ibid.*

³⁰ *Ibid.*

government, his program would see Polymer, a crown company, operating on foreign soil: no longer solely selling but *manufacturing* its product overseas. Never had a Canadian crown corporation produced its product outside of the national boundary. True, some crown corporations performed on the international stage. For example, Teleglobe Canada, which was established by Louis St. Laurent's government in 1949 to fulfil the terms of the Commonwealth Telegraph Agreement of the preceding year, functioned outside of Canada's borders. Nevertheless, it did so to fulfil a public policy purpose; that is, to coordinate Canada's external telecommunications services with the telecommunication services of other nations.³¹ While Teleglobe operated abroad, it did not manufacture overseas. No crown corporation did and for good reason. Prior to Polymer, the goal of public enterprise was to facilitate domestic industry. In so doing it served a public policy purpose. But to manufacture abroad, as Rowzee was suggesting, served no traditional public policy purpose whatsoever. It would not create jobs for Canadians; it would not further Canada's political or cultural cohesion; it would not help stabilize domestic prices or incomes, it would not secure the supply of critical materials; nor would it help develop an underdeveloped sector of the Canadian economy. No, as Rowzee readily admitted before the Standing Committee on Public Accounts in May 1961, the move could only be justified on commercial grounds. Polymer needed to manufacture abroad to maintain "an efficient and profitable operation."³² Given the rationale, Rowzee wondered whether the Diefenbaker government would have the political courage to endorse such a unique endeavour.³³ He also worried about the attitude of foreign governments to having a Canadian government-owned company establishing operations within their borders.³⁴ But

³¹ Canada, House of Commons. *Debates* (September, 30, 1949), pp. 387-402.

³² Canada. House of Commons. Standing Committee on Public Accounts. *Minutes*. (May 9, 1961), p 323.

³³ Rowzee, "Objectives for 1960," p. 5.

³⁴ *Ibid.*, p. 5.

these were just two of the obstacles associated with continued government-ownership that Rowzee identified as standing in the way of Polymer's future growth and prosperity.

There was also the problem of financing a major expansion programme. If Polymer was privately owned, it could have gone out and borrowed through the usual channels or sold additional shares. But as a crown corporation this was not possible. Any expansion would have to be financed out of retained earnings.³⁵ With a cash flow (after allowing for maintenance and improvement expenditures) of \$4-\$5 million per year, Polymer would have roughly \$20-\$25 million available over the next five years for new capital additions. But Rowzee's growth program called for an expenditure which was about twice that amount. It would therefore be necessary, Rowzee anticipated, to take on partners at certain junctures to obtain capital and market access.³⁶ But such linkages raised further questions. Would the government be willing to let one of its corporations go into partnership with what might well be a foreign, privately-owned company?³⁷ Conversely, would private industry be willing to take on a partner that was government-owned? Rowzee was uncharacteristically skeptical. "If, as seems possible, we build a plant in Europe and desire a partner, there are not too many companies who would consider partnership with a government-owned company."³⁸

These were serious problems of corporate status as far as Rowzee was concerned. Polymer needed to grow in order to continue to be prosperous and in order to grow it needed venture capital and a manufacturing presence overseas. Rowzee did not rule out the possibility of successful expansion as a crown corporation, but in his view the task would be much more difficult than if the corporation was privately owned. "Under conditions which continue to provide freedom of decision to the Board of Directors, a successful

³⁵ *Ibid.*

³⁶ "Minutes of the Board of Directors" (June 16, 1960), *DMS Papers*, vol. 12.

³⁷ Rowzee, "Objectives for 1960", p. 5.

³⁸ *Ibid.*, p. 5.

program of growth might be carried out," stated Rowzee cautiously, "but against considerably heavier odds than if the Company was privately owned."³⁹ Rowzee's preference for private ownership stemmed from his belief that under government ownership it was difficult to extend full authority to the board of directors and that it was almost impossible to prevent political considerations from coming into play - particularly in the event of conflict with private interests.⁴⁰ While C.D. Howe was in office, this was not as much of a consideration. For most of his tenure, there were no commercial synthetic rubber producers competing with Polymer in Europe and Howe was content to let Polymer do whatever it determined necessary to be prosperous. But Rowzee worried about the approach of future governments, especially given the rapidly changing macro-economic environment. He questioned the capacity of future federal administrations to remain quiescent when political pressure from private industry and foreign governments came to bear. Unable to reconcile his strategy for growth with continued government ownership, Rowzee opted for growth and the privatization of the firm. "On balance and with the full support of the management group at Sarnia," Rowzee stated in January of 1960, "I wish to go on record as believing that Polymer stands the best chance of future success as a private company."⁴¹

Unlike at the end of the Second World War, such talk was not academic. There were now a number of private firms interested in purchasing Polymer and here, Polymer executives sensed, was a means to their new-found global ends. No longer was the corporation viewed by business as a technological "white elephant." In the financial press, Polymer was heralded as a "technological wonder,"⁴² a "world leader in rubber

³⁹ *Ibid*, p. 6.

⁴⁰ Rowzee to O'Hurley (August 2, 1960), *DMS Papers*, vol. 15.

⁴¹ Rowzee, "Objectives for 1960," p. 6.

⁴² *Financial Post* (June 11, 1960), p. 3.

developments,”⁴³ “one of Canada’s most successful corporations,”⁴⁴ and “a shining gem in the diadem of Canadian industry.”⁴⁵ The financial press had reason to eulogize. Over the last fifteen years of operation, Polymer had developed a world-wide reputation for leadership in rubber research and development. And if past success was any indication, Buckler’s R&D department would keep the company on the cutting-edge of technology. Whereas once Polymer had produced three distinct types of elastomers,^{*} now it produced ten.⁴⁶ It also produced fifty types of speciality products when once it had manufactured only eleven. These products, as J.D. Barrington noted before his departure from the corporation in 1957, “were well-known and fully accepted, both in Canada and abroad...”⁴⁷ Since 1946, when Polymer had begun organized R&D activities in response to the need for diversification and development, R&D expenses had been close to the level of 2.5% of cost of sales.⁴⁸ In 1960, the R&D department had an operating budget of roughly \$2 million, a figure representing about 20% of net income. The Gordon Royal Commission *Report* of 1957 had argued that one of the systematic problems of Canadian manufacturing was its chronic lack of R&D - an outcome of too high a level of foreign ownership.⁴⁹ But

⁴³ *Financial Post* (June 27, 1953), p. 35.

⁴⁴ *Executive* (September, 1960), p. 21.

⁴⁵ B. Henderson, “Canada’s Polymer,” *Monetary Times* (November 1956), 27-9.

^{*} *Elastomer* = a synthetic rubber or rubberoid material, which has the ability to undergo deformation under the influence of a force and regain its original shape once the force has been removed.

⁴⁶ *Annual Report* (1960), p. 5, 8-9.

⁴⁷ J.D. Barrington, (September, 1953) quoted in *Polysphere*, p. 25.

⁴⁸ E.J. Buckler, “Canadian Case History, Polymer Corporation Limited,” *Research Management*, vol. vi. (July 1963), pp. 295-301.

⁴⁹ Canada. Royal Commission on Canada’s Economic Prospects, *Final Report* (Ottawa, 1957), pp 445-458.

Polymer provided a countercase - a Canadian corporation that had prospered because it controlled its own R&D.

On the marketing side of the operation, by 1960 Polymer had a network of sales representatives that literally circled the globe. The company had agents in over 70 countries from Argentina to Singapore, Iceland to New Zealand.⁵⁰ Attempting to capitalize on this development, Polymer's advertisements that year read simply: "Polysar...everywhere." Roger Hatch, who was determined to see each one of the company's agents become a millionaire from their commissions, continued to have nationals in the different countries do the selling.⁵¹ This allowed the crown company to overcome the cultural and protectionistic barriers that stood in its way. While nationals did the selling, Polymer coordinated the sales efforts and provided technical service. Polymer also continued its earlier practices of sending its top executives on sales missions. On the basis of this world-wide sales organization, Polymer enjoyed a tremendous amount of "good will" within the industry. While Polymer was not the biggest synthetic rubber producer, it was one of the world's most adroit.

Polymer's research, production and marketing success was reflected in the company's financial performance. Between 1944 and 1961, net sales increased nine-fold from roughly \$10 million to over \$88 million. Net profits, on the other hand, increased from a loss of \$400,000 in 1944 to a net gain, in 1961, of just over \$10 million. In cumulative terms, between 1944 and 1961, Polymer had collected almost \$90 million in profits on net sales of over \$850 million. The number of employees increased from 1,810 in 1944 to 2,711 in 1961. At the expense of a total payroll increase of approximately 40% and an approximate doubling in the book value of facilities, the output of the plant had quadrupled.⁵²

⁵⁰ *Annual Report* (1960), pp. 4-5.

⁵¹ Interview with R. Hatch (Toronto, May 2000).

⁵² *Annual Reports* (1944-1961).

Since Polymer was a crown corporation, the Canadian government reaped most of the financial benefits of all of this. By the end of 1961, the government had received \$46.3 million in dividends and \$1 million in debenture interest. In addition, Polymer had repaid \$10.4 million of the total (\$48.4 million) government advance and retired \$8 million worth of debentures. With total assets of \$85 million and profits representing 17.1% of the government's investment, the *Financial Post* in 1960 could properly state that Polymer was "the most successful and profitable of all the crown corporations."⁵³ Not even Eldorado, Canada's national uranium producer, recorded such lucrative financial results.⁵⁴

The success and profitability of Polymer was not lost on the new Diefenbaker government, which in June of 1957 won a narrow victory at the polls, thus breaking twenty-two years of Grit dominance. Ten months later the Conservatives fortified their position by winning the most spectacular landslide yet seen in Canadian politics. In May 1958, after six weeks of indecision, Diefenbaker appointed Raymond O'Hurley as the minister of defence production and therefore the minister with oversight for Polymer. For the next five years, Polymer's future would be in his - and Diefenbaker's - hands. A full-blooded Irishman, O'Hurley was no stranger to business, although he was to federal politics. In 1956, at the age of forty-seven, he was enlisted by the Quebec premier Maurice Duplessis to run for the Conservatives in Lotbinière, Quebec. As a good soldier, he saluted smartly, ran, and was elected. In Ottawa, however, he was often out of his depth. His inexperience made him tentative and nervous. David Golden, who served as deputy minister of defence production between 1954 and 1962, later recalled that this added to the chaos of the Diefenbaker years.⁵⁵ Before entering politics for the first time in 1957, O'Hurley had worked for twenty-two years as a timber grader on the Ross Seigneurie in

⁵³ *Financial Post* (March 5, 1960), p. 4.

⁵⁴ H.J. Mullington, "The Federal Government as an Entrepreneur, The Canadian Experience," tables 4 & 5, pp. 47 and 57, respectively.

⁵⁵ D. Golden interview (Ottawa, October 2000).

Quebec. He was thus rooted in Canada's old, staple-oriented economy. This was a more bucolic business experience than the one that had taken place at Polymer. Nevertheless, even O'Hurley knew a successful modern enterprise when he saw one. In September he wrote to the prime minister praising Polymer's past performance.⁵⁶ "The actions of management," he reported, "have been in the public interest and in keeping with sound business practice.... The operation has been a success."⁵⁷ It was a message he later reiterated in the House of Commons.⁵⁸

To some, O'Hurley's statement must have come as a shock. Not because it was factually incorrect. It was not. But because, while in opposition, the Conservatives had been critical of the government trespassing into the realm of private enterprise.⁵⁹ The party was committed, at least in principle, to the idea that government should not tread where private industry could ably proceed. Given its preference for private ownership of industry, it was widely anticipated that the Conservative government would dispose of Polymer soon after coming to power.⁶⁰ During his years in office, C.D. Howe had been approached only twice by individuals interested in buying the crown corporation, once, in 1946, by the Liberal senator Peter Campbell, who was representing a less than fully committed group of anonymous investors and, more recently, in 1957, by J.D. Barrington.⁶¹ Perhaps private industry thought that raising the matter with Howe would be a waste of time given the minister's avowed attachment to the crown corporation. Publicly, Howe had not given any indication that he was prepared to hand over "his" enterprise to private industry. That is not

⁵⁶ R. O'Hurley to J.G. Diefenbaker (September 24, 1958), *DMS Papers*, vol. 7.

⁵⁷ *Ibid.*

⁵⁸ Canada. House of Commons, *Debates* (July 28, 1960), p. 7123.

⁵⁹ *Ibid.*, (June 3, 1946), pp 2128-29; *ibid* (June 4, 1946), pp. 2156-57.

⁶⁰ *Financial Post* (June 11, 1960), p. 3,5; *ibid.*, (March 5, 1960), p. 4; and *Canadian Chemical Processing* (October 1958), pp. 24-28.

⁶¹ See Howe to Campbell (December 1946), *C.D. Howe Papers*, folder 6 and Barrington's testimony in L. Bertin's "The Long Chain," p. 160.

to say that he was averse to the idea. According to J.D. Barrington, his offer to purchase Polymer was received favourably by the minister, but nothing had come of it because Howe did not want any disruptions in public policy before the 1957 election.⁶² It is quite likely that had the Liberals won that election, Polymer would have been sold; perhaps not to Barrington, and perhaps not until after 1960, when Rowzee had made his pragmatic appeal for growth and denationalization, but in all likelihood it would have been sold. Polymer had become profitable and capable of fending for itself as an instrument of national economic sovereignty and Howe had a tradition of picking good puppies, of raising them and then letting them out of the pound. But the Liberals lost the 1957 election and history took a different course.

Believing the Conservatives were ideologically committed to selling the firm, a number of private companies initiated behind-the-scenes approaches to the Diefenbaker government in an effort to obtain an interest in Polymer. Those who coveted the crown corporation were diverse in their backgrounds. Canadian Industries Limited, Canada's largest chemical manufacturer, was "extremely interested."⁶³ And quite understandably. Polymer had consistently outperformed CIL.⁶⁴ Shawinigan Chemical and the Dominion Tar and Chemical Company were also enticed by Polymer's strong financial performance.⁶⁵ Several American companies, including Allied Chemical Corporation of New York, Goodrich Rubber and Tire, Courtaulds of North America Limited, and Dow Chemical, added their

⁶² See Barrington's testimony in L. Bertin's "The Long Chain," p. 160. The argument that Howe was sympathetic to privatization is further strengthened by R. Bothwell's finding that Howe was going to privatize Eldorado if the Liberals had won the 1957 election. See R. Bothwell, *Eldorado*, p. 413.

⁶³ P.C. Allen to O'Hurley (November 27, 1959), *DMS Papers*, vol. 7.

⁶⁴ H. J. Mullington, "The Federal Government as an Entrepreneur: the Canadian Experience," (M. A. Carleton, 1969), p. 58.

⁶⁵ W.M. Hall to R. O'Hurley (January 14, 1963), *DMS Papers*, vol. 15; W.M. Hall to O'Hurley (December 12, 1962), *DMS Papers*, vol 15.

names to the list of companies in pursuit of the crown's industrial jewel.⁶⁶ In 1961, the Bay Street investment firm Wisener, Mackellar and Company Ltd. went into partnership with the Montreal engineering company, Mannis, for the purpose of acquiring Polymer. Two years later they were still pursuing their objective.⁶⁷ Likewise, J.D. Barrington was proving resilient. Having had nothing come of his initial bid, Barrington, in his capacity as president of Ventures Ltd., a subsidiary of the mining giant McIntyre-Porcupine, approached the Diefenbaker government in 1959 with a \$75 million offer to purchase Polymer.⁶⁸ The offer was discussed in cabinet but, at that time, it was decided that the enterprise was "too successful" to be disposed of.⁶⁹ As a consequence, the cabinet determined that there "should be no discussion now at all with Mr. Barrington."⁷⁰ Accordingly, when Barrington wrote to the prime minister asking for an appointment to discuss a deal, he never received a reply.⁷¹ Not to be discouraged, Barrington continued to lobby the government until the Conservatives' electoral defeat by the Pearson Liberals in 1963.⁷²

Many industry observers, including Polymer's former president R.C. Berkinshaw,

⁶⁶ G.H. Elliot to M.W. McCutcheon (December 20, 1962), *DMS Papers*, vol. 15; J.G. Davoud to G.W. Hunter (December 13, 1960) *DMS Papers*, vol. 15; B.G. Barrow to G.W. Hunter (September 16, 1960), *DMS Papers*, vol. 15; J.W. Murphy to R. O'Hurley (June 11, 1959), *DMS Papers*, vol. 15.

⁶⁷ R.A. Wisener to M.W. McCutcheon (January 25, 1963) *DMS Papers*, vol. 15; R.A. Wisener to O'Hurley (January 8, 1962).

⁶⁸ *Financial Post* (March 5, 1960), p. 4; J.D. Barrington to R. O'Hurley (June 15, 1961), *DMS Papers*, vol. 15.

⁶⁹ D. M. Fleming, *So Very Near: The Political Memoirs of the Honourable Donald M. Fleming, II: The Summit Years* (Toronto, McClelland and Stewart, 1985), p. 210.

⁷⁰ Canada. Privy Council Office. vol. 2745. *Cabinet Conclusions*, (July 22, 1959), p. 4.

⁷¹ See Barrington's testimony in L. Bertin's "The Long Chain," p. 160.

⁷² J.D. Barrington to R. O'Hurley (June 15, 1961), *DMS Papers*, vol. 15.

considered Barrington's offer reasonable.⁷³ While Polymer had assets of approximately \$125 million, critics noted that the plant was getting older and in the near future would need some expensive renovations. The depreciated value of the plant was already down to \$32 million. In addition, the company's raw materials position was not fully secure. In 1960, Polymer was supplementing its own production of butadiene with purchases from Imperial Oil across the road and imports from the United States. This would continue to be seen as a problem and would ultimately lead to a risky backward integration into feedstocks. Finally, it was generally anticipated that the buyer would have to invest another \$45 million over and above the cost of the existing plant to hold a competitive position in world markets. A corporation in the ethos of profitable private enterprise needed constant injections of capital to stay flexible, competitive and efficient. Howe seemed to realize this and thus was prepared by the mid-1950s to let the government-succoured infant industry go private. Given the anticipated capital expenditures, most of the offers to purchase Polymer were in the \$75-80 million range.⁷⁴ The one exception came from a group of investors represented by Julian H. Ferguson, a Progressive Conservative M.P. who was first elected to the House of Commons in 1945, which offered the government almost \$100 million for Polymer.⁷⁵

But the government was not selling, at any price. "The Government," the minister of finance, Donald Fleming wrote to Julian Ferguson in April 1959, "has at no time indicated any interest in the sale of the Polymer undertaking."⁷⁶ In what was fast becoming a pattern of ministerial behaviour, Fleming was reluctant to do anything that might undermine the

⁷³ For Berkinshaw's opinion of Barrington's offer see the *Financial Post* (June 11, 1960).

⁷⁴ "Department of Defence Production. Memorandum re. Polymer Corporation" (February 25, 1963), *DMS Papers*, vol. 15.

⁷⁵ Julian H. Ferguson to Donald Fleming (April 28, 1959), *DMS Papers*, vol. 7.

⁷⁶ Donald Fleming to Julian H. Ferguson (April 30, 1959), *DMS Papers*, vol. 7.

success of the firm. There is no indication that Fleming realized the ongoing implications of this stance - i.e. that Polymer would have to be fed capital. When asked in the House of Commons about the government's plans for Polymer, Raymond O'Hurley stated that he had "no views" as far as the future of Polymer was concerned but then went on to note that he saw no reason for disposing of Polymer so long as the "best interest" of Canada's only producer of synthetic rubber was being well served by the *status quo*.⁷⁷ In all likelihood that would have been the end of the matter except for developments that were taking place at Polymer itself.

Ralph Rowzee had always had a tremendous amount of influence on decisions by the board of directors and this instance proved no different. In June 1960, his suggestion that Polymer be transferred to private industry was endorsed by all but one member of the board of directors. The lone dissident was John Bruce, labour's representative on the board. Bruce, a union organiser who had been appointed to the board in 1947 by C.D. Howe, was of the opinion that the company could meet competition and carry out its growth program satisfactorily as a crown corporation.⁷⁸ It was no coincidence that this was also the position taken by the local unions. "There is no justification, in our opinion," stated Anne Blair, chairperson of the legislative committee of Local 535 of the United Electrical, Radio and Machine Workers of America, "in turning this valuable property over to those who reap large profits. Rather we suggest the government use the profit to expand this industry and other crown corporations."⁷⁹ The Oil, Chemical and Atomic Workers' Union, Polymer's largest union, also went on record as "opposing the surrendering of the Polymer Corporation into private hands."⁸⁰ It was a sentiment which had already been

⁷⁷ Canada. House of Commons. *Debates* (July 28, 1960), p. 7123.

⁷⁸ "Minutes of the Meeting of the Board of Directors" (June 16, 1960), *DMS Papers*, vol. 12.

⁷⁹ A. Blair to G. Hees (June 15, 1961), *DMS Papers*, vol. 16.

⁸⁰ "Resolution passed at the Ninth Conference of Canadian District Council O.C.A.W."

expressed by the Canadian Labour Congress. “[T]he Polymer corporation, which was created by the investment of public funds at a time of national emergency and made such an outstanding contribution to our successful war effort, should be retained by its owners, the people of Canada, and not sold for the private advantage of a small group within our nation.”⁸¹ But unfortunately for labour, this position was not endorsed by the majority of Polymer’s board of directors and as a result Rowzee was granted his wish. On June 16, 1960, he was authorized to advise minister O’Hurley that each of the directors, with the exception of John Bruce, was “strongly of the opinion that the Company can best meet competitive conditions and take full advantage of opportunities for growth, in Canada and abroad, as a private enterprise.”⁸² Raymond O’Hurley had once tentatively stated that if any new circumstances made the government’s ownership a liability, the government would sell Polymer.⁸³ Now Polymer’s high command was telling him exactly that.

Unfortunately for those advocating privatization, the matter was not solely O’Hurley’s to judge. A decision of this magnitude would first need the support of cabinet. To that end, in the spring of 1960, the Diefenbaker government formed a special cabinet committee to examine Polymer’s status.⁸⁴ Specifically, the committee was given the task of considering two issues: Rowzee’s three-pronged program for growth, and the merits of private ownership. The committee was composed of some of the most powerful men in Diefenbaker’s government. In addition to O’Hurley, who was appointed chairman of the committee, there was the minister of finance, Donald Fleming. The epitome of the right-wing Tory, Fleming often disagreed with Diefenbaker on matters of public policy. Yet

(September 15, 1962), *DMS Papers*, vol. 15.

⁸¹ C. Jodoin to R. O’Hurley (June 9 1961), *DMS Papers*, vol. 15.

⁸² “Minutes of the Meeting of the Board of Directors” (June 16, 1960), *DMS Papers*, vol. 12.

⁸³ Canada. House of Commons. *Debates* (July 28, 1960), p. 7123.

⁸⁴ “Minutes of the Board of Directors” (June 16, 1960), *DMS Papers*, vol. 12.

Fleming remained ferociously loyal to Diefenbaker while the party was in power. Gordon Churchill, a one-time school principal and wartime army officer, was house leader and minister of trade and commerce. Churchill, like David Walker, the final committee member, was part of Diefenbaker's inner circle. Walker was one of the first to support Diefenbaker's leadership bid and for that reason had the prime minister's ear on most issues. Walker occupied the public works portfolio. Together it was the responsibility of these men to determine the government's best course of action with regard to Polymer corporation.

In May and June, Ralph Rowzee, Stanley Wilk, Polymer's vice-president of finance, and Lee Dougan, Polymer's vice-president of operations, travelled to Ottawa to meet with the government's special cabinet committee. There, Rowzee reiterated the need for establishing plants overseas and the problems associated with government ownership. The bottom line, he told the committee, was that Polymer needed to expand to remain competitive and the best way this could be accomplished was for Polymer to be removed from the hands of government.⁸⁵ The committee was sympathetic to Rowzee's position. His arguments for privatization resonated well with those members of the committee, particularly Donald Fleming, who were opposed to government ownership of industry. Nevertheless, the committee expressed concern about the possibility of Polymer falling into foreign hands.⁸⁶ While the Diefenbaker government was not radically opposed to foreign ownership of Canadian industry, it was politically sensitive to the fact that the issue was of importance to a growing segment of society. Walter Gordon, the chairman of the 1955-57 royal commission on Canada's economic prospects, a commission which had put the issue of foreign investment on the public agenda, was gaining power within and outside of the Liberal Party. Gordon had warned that foreign direct investment had a "snowballing" effect in any national economy. During the election campaign of 1957, Diefenbaker had echoed

⁸⁵ *Ibid.*; and "Minutes of the Cabinet Committee on Possible Methods of Disposition of the Polymer Corporation" (June 15, 1960), *DMS Papers*, vol. 15.

⁸⁶ Cabinet Conclusions (September 7, 1960), p. 3. Privy Council Office, vol. 2747.

some of the views of Gordon's royal commission about the effects of too much American capital investment in Canada. It had been one of Diefenbaker's election promises to increase the proportion of domestic ownership of Canadian industry. Between 1958 and 1960 his government made various reforms to the state's regulatory power in order to protect Canadian ownership (e.g. limits on foreign direct investment, CALURA obligations on foreign corporations to report their activities, the Public Commission on Energy). In 1960, the prime minister and Alvin Hamilton, the minister of northern affairs and national resources, considered establishing a "national development corporation" to encourage Canadians to invest in, and ultimately, retain control of, Canadian industry.⁸⁷ Because of the firm opposition of Donald Fleming, however, the government dropped this idea.⁸⁸ Ironically, the proposal was later resurrected by Walter Gordon in the form of the Canada Development Corporation.⁸⁹ The Conservatives were all too aware of the fact that Gordon, a staunch economic nationalist, was determined to see their demise and they were therefore unwilling to provide grist for his mill by letting Polymer slip into foreign hands.⁹⁰

The committee further feared that if Polymer became foreign-owned, Canadian jobs would be lost. It had been another of Diefenbaker's election promises to end the agony of unemployment. Yet after three years in power, the Conservatives had been unable to turn their political rhetoric into an economic reality. In 1960, the unemployment rate was 7.5%, the same as it was in 1957 when the Conservatives took office and more than double its

⁸⁷ See W.A. Dimma, *The Canada Development Corporation: diffident experiment of a large scale* (Boston, Harvard Graduate School of Business Administration, 1976), vol. 2, pp. 290-292 and P. Stursberg, *Diefenbaker: Leadership Gained* (Toronto, University of Toronto Press, 1975), p. 112.

⁸⁸ D. Fleming, "Business and Government" (Toronto, April 1965), *Fleming Papers*, vol. 156, file 5.

⁸⁹ S. Azzi, *Walter Gordon and the Rise of Canadian Nationalism* (McGill-Queen's University Press, 1999), pp. 114-115.

⁹⁰ *Ibid.*, chp. 3, esp. pp. 71, 82-84.

1956 level. While much of this unemployment was due to structural weaknesses in the economy, the Conservatives did not help matters by being indecisive, and, at times, inconsistent when it came to formulating and implementing economic policy. At the department of finance, Donald Fleming appeared not to have heard the government's commitment to the unemployed. Abandoning Keynesian counter-cyclical fiscal stabilization principles, Fleming waged war on the budgetary deficit, attempting in vain to balance the books. To the further horror of Keynesians within and outside of the government, the governor of the Bank of Canada, a maverick by the name of James Coyne, refused to directly tackle the problem of unemployment.⁹¹ Contrary to the government's position, Coyne insisted that the principal economic problem afflicting society was not unemployment but inflation.⁹² Despite the relatively high rate of unemployment, inflationary pressures had persisted after 1957, as the inflow of external - primarily American - long-term capital continued to strengthen. Under these conditions, Coyne insisted that unemployment could not be vanquished without first obtaining domestic price stability, and he thus refused to increase the stock of money by any utilitarian extent.⁹³ Coyne's heretical stance caused the government untold political embarrassment.⁹⁴

Fortunately, the government had more control over public works and in 1959 it instituted a winter works program, under which Ottawa paid half of the labour costs of approved municipal work projects to combat the seasonal rise in the number of

⁹¹ For the response to Coyne's policy by Keynesians within the world of academe see H.S. Gordon, *Economists Versus the Bank of Canada* (Toronto, Ryerson Press, 1961).

⁹² J.E. Coyne, Testimony before the Senate Standing Committee on Manpower and Employment (April 1961) in Neufeld (ed.), *Money and Banking in Canada*, pp. 308-317.

⁹³ *Annual Report of the Governor to the Minister of Finance*, Bank of Canada (Ottawa, 1960), pp. 20-23.

⁹⁴ For a more extensive account of this episode see D. Smith, *Rogue Tory: The Life and Legend of John G. Diefenbaker* (Toronto, Macfarlane, Walter & Ross, 1998), pp. 393-414.

unemployed. In addition, the Conservatives oversaw the construction of a small number of roads and facilities as part of its grand “northern vision” - a largely oratorical scheme to open up the (alleged) vast economic potential of the Canadian north. While the “northern vision” did not live up to its billing, it did at least create some jobs, which was more than could be said about the government’s handling of the Avro Arrow development program.

When the government cancelled funding of the CF-105 in February 1959, after two years of indecision, A.V. Roe, the Malton, Ontario company which was slated to manufacture the supersonic jet, immediately let go of all of its 15,000 employees. While the company later recalled some 2,500 workers, the majority did not return. Thousands of Canada’s best trained scientific and technical personnel were thus lost to the United States forever - just the reverse of the effect that Polymer had had in drawing talent and ideas *into* Canada.⁹⁵ Whether or not the decision was correct from a military standpoint, it cost the government a good deal of political capital in the industrial heartland of Ontario.⁹⁶ Thus when it became time to rule on Polymer’s future, the government was not about to further alienate Ontario voters by doing anything that might cost jobs. Nor was it about to frustrate the national body politic by letting another of Canada’s technological possessions come under U.S. control. These considerations (i.e. the delicacy of returning a corporation to the private sector in peacetime) provided a contrast to the act of creation in an atmosphere of wartime expediency.

In August 1960, on the heels of the Avro affair and with the economy showing further signs of weakening, the special cabinet committee considering Polymer’s future tabled its final report.⁹⁷ Having weighed all the evidence, the committee came to the unanimous conclusion that the “corporation ought to be sold.”⁹⁸ Unwilling, however, to allow this

⁹⁵ Smith, *Rogue Tory*, p. 325.

⁹⁶ *Ibid.*, pp. 320-21.

⁹⁷ “Report of Committee of Cabinet,” *DMS Papers*, vol. 15.

⁹⁸ *Cabinet Conclusions* (August 24, 1960), p. 9.

technological asset to pass into the hands of U.S. interests, the cabinet committee made their recommendation subject to the condition that “satisfactory assurances” be given by the purchaser that “the company would be under Canadian control on a continuing basis.”⁹⁹ To prevent the further loss of technology-driven jobs in Ontario, the committee demanded that Polymer continue to be operated as an integrated unit, that the research and development program be maintained and that Rowzee’s strategy for growth be implemented by the purchaser.¹⁰⁰ Having committed itself to the privatization of Polymer, the committee wanted to do everything in its power to mitigate the possible negative effects arising from the sale of the firm.

Despite the safeguards stipulated in the committee’s final report, some in the cabinet were opposed to the recommendation that Polymer be sold. Several worried that no matter what safeguards were attempted, continued Canadian control could not be guaranteed and if Polymer did fall into foreign hands the government would be roundly criticized.¹⁰¹ Privatization, from their political perspective, was a risky business. Others in cabinet agreed with the conclusion but for different reasons. “It would be a serious political mistake, to sell one of the very few public enterprises that had paid regular dividends,” it was argued. The general public was unaware of the intrinsic problems of government ownership and, given Polymer’s profitable status, its disposal might be seen as the government selling out to its friends.¹⁰² Faced with these concerns, the cabinet was reluctant at this stage to endorse the committee’s findings and authorize Polymer’s disposal. Instead it was decided to postpone any concrete decision until a later date.¹⁰³

⁹⁹ *Ibid.*, p. 10.

¹⁰⁰ *Ibid.*

¹⁰¹ *Cabinet Conclusions* (September 7, 1960), p. 3.

¹⁰² *Ibid.*, (August 24, 1960), p. 11.

¹⁰³ *Ibid.*, p. 12.

When the cabinet next met on September 7, 1960 to consider Polymer's future, Raymond O'Hurley and the other cabinet committee members were determined to get the cabinet's approval for Rowzee's growth program. While a decision on privatization could wait, the judgement on growth could not. Early on, the committee had gone on record as stating that the approval for the plan for growth "should not depend upon, nor await a decision as to, the future status of the company."¹⁰⁴ For some months, work at Polymer had been underway and the company was now at the point where it had to either go ahead or turn back. A decision, O'Hurley informed the cabinet, was "required urgently."¹⁰⁵

Despite O'Hurley's appeal, the cabinet chose to first settle the matter of ownership. Again the discussion flowed endlessly and repetitively. The pros and cons of private ownership were discussed without resolution. To further complicate matters, a new proposal was tabled recommending that Polymer be sold on the basis that 50% of the equity be acquired by domestic industry, 25% by the Canadian public and 25% by the crown. It was argued that such a structure would allow the government to partially privatize the corporation without losing the ability "to exercise considerable influence over the policies of the company."¹⁰⁶ It was a remarkable notion given the hands-off approach successive governments had taken toward Polymer. There had been a precedent, however, for such an arrangement. In 1954, the Social Credit government in Alberta had established the Alberta Gas Trunk Line Ltd. (AGTL) as a "defensive" or "province building" response to C.D. Howe's plans to build the Trans-Canada pipeline. AGTL was a hybrid corporation, or "half-way house," as political economists John Richards and Larry Pratt put it, created to carry all the natural gas produced within the province for export.¹⁰⁷ Alberta's premier,

¹⁰⁴ "Report of Committee of Cabinet," *DMS Papers*, vol. 15, p. 6.

¹⁰⁵ *Cabinet Conclusions* (September 7, 1960), p. 2.

¹⁰⁶ *Cabinet Conclusions* (September 7, 1960), p. 3.

¹⁰⁷ J. Richards and L. Pratt, *Prairie Capitalism: Power and Influence in the New West* (Toronto, McClelland and Stewart, 1979), p. 67.

Ernest Manning, was opposed to public ownership both in principle and practice, but he needed a corporate vehicle to protect and promote Alberta's interests in the field. AGTL was the structural solution. It was owned by the province's gas producers, gas exporters, gas utilities and government. Despite this precedent, however, there was opposition to the proposal in the Diefenbaker cabinet. Those who were opposed argued that while they could conceive of no technical problems to such a structure, there would be "real" political problems associated with it. The government, critics argued, would be forced to "make decisions which other shareholders might not like or, to acquiesce on decisions which might not be in the best interest of the country."¹⁰⁸ The cabinet was again at an impasse.

Perpetually preoccupied with the political ramifications of its decisions, the cabinet was unable to reach a decision regarding the sale of Polymer. The neophyte minister O'Hurley, who was often out of his depth in Ottawa, was neither powerful nor persuasive enough to force a resolution. Instead the cabinet decided to first "test" the public's reaction to a possible sale by making public the recommendations of Polymer's directors and management.¹⁰⁹ Incessantly calculating and recalculating the possible impact of its political decisions, the cabinet could not bring itself to put to rest, once and for all, the matter of privatization. It was still under review two years later when the Glassco Royal Commission on Government Organization concluded that public ownership of Polymer was "unwarranted."¹¹⁰ "The corporation," the commission determined, "cannot be regarded as an instrument of public policy. Its ownership by the Crown is in no sense essential, on security or other grounds, to any of the programs of the federal government."¹¹¹ The commission did recognize, however, that the transfer of Polymer to private ownership

¹⁰⁸ *Cabinet Conclusions* (September 7, 1960), p. 3.

¹⁰⁹ *Ibid.*

¹¹⁰ Canada, Royal Commission on Government Organization, *Report* (Ottawa, Queen's Printer, 1962), vol. 2, p. 349.

¹¹¹ *Ibid.*

“presents certain practical problems which so far, have proved very obstinate.”¹¹² While the commission’s recommendation renewed private industry’s quest for Polymer, it did little to prompt action on the part of the government. As was so often the case (for example when considering the issue of whether to accept American nuclear warheads for Bomarc missiles) the government’s indecision ultimately resulted in paralysis. Remarkably, the government’s inaction did not hurt Polymer. The company was innovative enough to prosper in spite of continued government ownership.

While the Diefenbaker government was unable to settle the issue of privatization, it did have the foresight to authorize Rowzee’s plan for growth. In its report, the special cabinet committee considering Polymer’s future warned of “far-reaching consequences” if the government did not support the growth program.¹¹³ In September the cabinet took notice and “approved the growth program recommended by the Board of Directors of Polymer and endorsed in principle by the special cabinet committee...”¹¹⁴ Soon thereafter, Raymond O’Hurley explained the government’s decision to industry. “Polymer cannot stand still. Change and growth are for it, as for all organizations, the inescapable conditions of life.... A growth program now seems to be essential if Polymer’s position in international markets is to be maintained and enhanced.”¹¹⁵ “We are going ahead with the expansion now,”

¹¹² *Ibid.*, “By the very reason of its good management and commercial success in world markets, it has become established as a valuable and unique Canadian asset, possessing highly specialized scientific, production and marketing skills and experience, and providing careers and a livelihood for more than 2,500 men and women. Under these circumstances, general public approval can only be expected if its sale is made on terms which ensure that control of the undertaking will remain in Canadian hands. and that its integrity will be preserved by its new owners.” (pp. 349-350).

¹¹³ “Report of Committee of Cabinet,” p. 6.

¹¹⁴ *Cabinet Conclusions* (September 7, 1960), p. 3.

¹¹⁵ See R. O’Hurley’s speech in Canadian Industrial Preparedness Association’s *The Bulletin* (November 28, 1960), pp. 2-3.

O'Hurley stated elsewhere, "without thought as to whether the government will sell Polymer or not"¹¹⁶

For the second time in its history, Polymer's intellectual cabal had determined government policy on an issue of national importance. The first time had come at the end of the war when the board of directors - on the merits of Rowzee's argument - had won approval for the plant's continued operation under government ownership. That decision had proved remarkably provident. It remained to be seen if the government's latest decision would prove similarly sagacious.

It had always been Rowzee's contention that growth as a crown corporation was possible, albeit more difficult than if the corporation was privately owned.¹¹⁷ There were obstacles to growth as a crown corporation that would not have existed had Diefenbaker privatized the firm. But that had not happened and now these obstacles would have to be overcome. First and foremost was the problem of financing the expansion. Rowzee's plan called for an expenditure of approximately \$45 million but positive cash flow would provide only half of that amount.¹¹⁸ If the program was to succeed, therefore, Polymer would have to be very creative in developing the financial and organizational structure to implement its corporate strategy for growth.

In late 1960, the company aggressively moved into the European market, establishing Polymer Corporation SAF to build and operate a specialty rubber plant in France. Since the end of the war, the French had been Polymer's best single customer among the European nations. As Rowzee informed the standing committee on public accounts in 1961, Polymer was "well and favourably known in the Rubber industry in France which is very large and well organized...."¹¹⁹ Roger Hatch had developed close relationships with all of Polymer's

¹¹⁶ *Financial Post* (November 5, 1960).

¹¹⁷ Rowzee, "Objectives for 1960" (January 22, 1960), *G. Churchill Papers*, vol. 37, p. 6.

¹¹⁸ "Minutes of the Board of Directors" (June 16, 1960), *DMS Papers*, vol. 12.

¹¹⁹ Canada. Standing Committee on Public Accounts. *Minutes*. (May 9, 1961), p 336.

customers in France, but was particularly close to the Michelin family - Polymer's largest customer in Europe.¹²⁰ Due in large measure to Hatch's efforts, the French market in 1957

Figure 4.1
Plant at Strashourg, France



Source: *Polysphere Fifty*, p. 49.

represented 15% of Polymer's total sales volume.¹²¹ But sales dropped off thereafter as a result of import restrictions which favoured American firms.¹²² To circumvent these restrictions, Polymer decided to construct a \$12 million plant at Strashourg to produce roughly 10,000 tons of specialty rubber per year. To help finance the project, Polymer SAF took on the Banque de Paris et des Pays Bas as a minority shareholder. While the French bank's stake was only 5%, the bank provided valuable assistance in arranging the financing, in obtaining the necessary government approvals, and in counselling Polymer as to business practices in France.

Rowzee's growth plan also called for expanding production of butyl rubber - thus continuing Polymer's move away from general purpose rubbers for which the

¹²⁰ Interviews with R. Hatch (Toronto, May and July 2000); interview with T. Fitzgerald (Sarnia, July 2000).

¹²¹ G.W. Hunter to H.C. Green (April 14, 1958), *DMS Papers*, vol. 7.

¹²² "Minutes of the Board of Directors" (April 30, 1959), *DMS Papers*, vol. 12.

technological “know-how” was now readily available. After a period of relative decline - due to the introduction of the tubeless tire in 1954 - demand for butyl rubber was again on the rise. As a result of new applications (e.g. automobile weather stripping and seals, pharmaceutical stoppers, emulsion paint and roof coating) and the successful marketing of a butyl passenger tire, consumption of butyl rubber bounced back after 1957. Over the next five years, annual consumption increased at a rate of approximately 10%.¹²³ When Rowzee took over the presidency from Barrington in 1957, Polymer was supplying approximately 29% of the world demand for butyl. But by 1961, the company’s share of the market had dropped to just over 15%. Polymer’s principal competitor, Esso, a subsidiary of Standard Oil of New Jersey, was acting aggressively in the field, developing new uses for butyl rubber and expanding into foreign markets. Due to Esso’s initiatives, Polymer’s share of the market had been reduced considerably and executives at Polymer worried that if the company did not increase its output soon its market share would shrink even further.¹²⁴

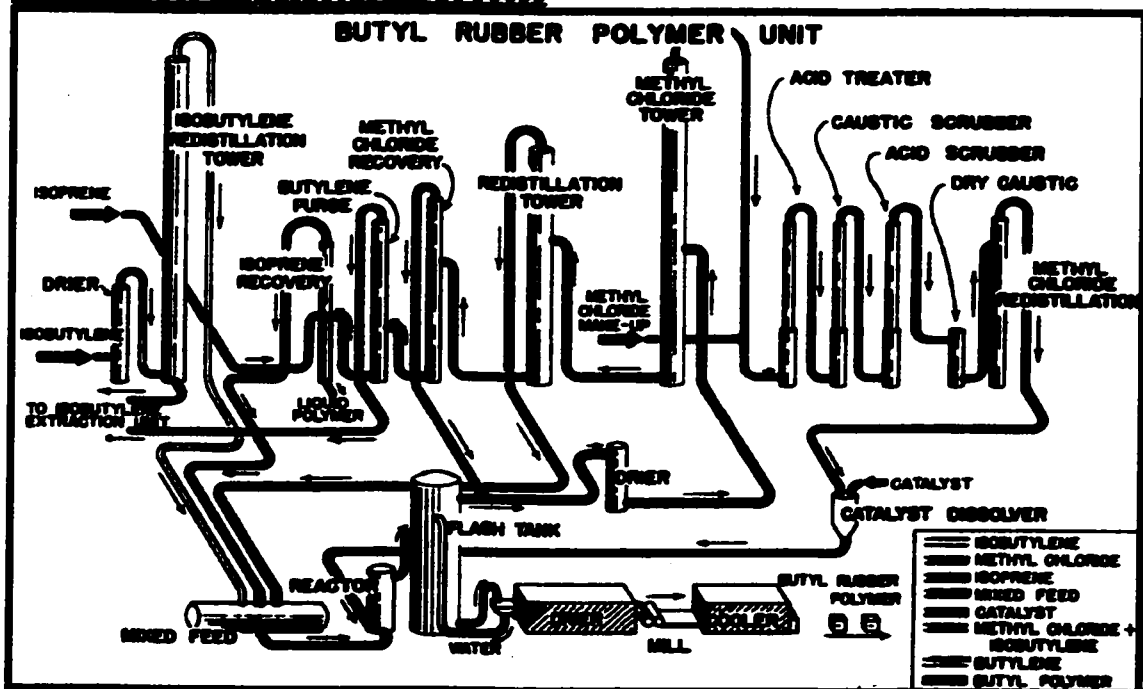
The butyl market was one that Polymer desperately wanted to retain. A good deal of the company’s net income was derived from sales of butyl rubber. Polymer was one of only two companies in the world - the other being Esso - that possessed the technology for its manufacture. At a time when burgeoning world production and increasing competition were gradually knocking down world prices and profit margins on general purpose rubber, the price of butyl rubber remained relatively high. As early as 1951, Rowzee had anticipated these developments. But at that time, due to the shifting requirements of Canadian industry, he had argued against increasing production of butyl rubber.¹²⁵ By 1962, however, circumstances had changed and Rowzee’s pragmatic mind had changed along with them. Now he and the rest of Polymer’s brain trust believed that with general purpose type rubber, it was better to sell “know-how” to new foreign manufacturers and/or

¹²³ Phillip, *Competition in the Synthetic Rubber Industry*, p. 80.

¹²⁴ “Minutes of the Board of Directors” (June 15, 1961), *DMS Papers*, 296-8-1, vol. 12.

¹²⁵ “Report of Trip to Europe” (December 1951), pp. 20-24.

Figure 4.2
Butyl rubber manufacturing process



To this day, the manufacture of butyl rubber is one of the most complicated commercial processes in the world. By reaction with itself (polymerization) and with a small amount of isoprene, isobutylene forms a butyl rubber polymer. The polymer forms instantly when the reactants, diluted in an inert solvent and at the extreme cold of -140°F , meets a catalyst. The isobutylene and isoprene are mixed with methyl chloride in exact proportions in the mixed feed tank. As shown in the diagram this mixed feed enters the reactor where it meets a solution of aluminium chloride in methyl chloride. On contact with this catalyst solid white particles of butyl rubber polymer are formed. The methyl chloride carries the suspended polymer particles into the flash tank where hot water evaporates the gaseous methyl chloride leaving the polymer suspended in the water. The butyl rubber polymer is separated from the water on a vibrating screen, passed through a drier and formed into a continuous sheet. The sheet is cut into slabs for shipment to the rubber factories. Source: St. Clair Processing Corporation, Ltd., *Synthetic Rubber: A Process Digest*, p. 16.

take a small participating interest, rather than to engage in production directly.¹²⁶ As a result, during the mid-1960s Polymer took a “know how” participation in styrene-butadiene rubber (SBR, formerly designated GR-S) plants in Mexico and South Africa. While the 1960s witnessed the proliferation of SBR producers around the world, the duopoly in butyl rubber remained.¹²⁷ The complex manufacturing process created a barrier to

¹²⁶ *Financial Post* (June 17, 1960), p. 64.

¹²⁷ By 1966, the number of countries with SBR technology rose to 22. In addition to Canada and the United States, France, West Germany, Italy, The Netherlands, Belgium, Australia, South Africa, India, Japan, Russia, East Germany, Rumania, Poland,

entry which could not be overcome even by the most innovative and industrious firms.

Having committed itself to expanding butyl production, the question that remained at Polymer was where to locate the new facility. Three locations were initially considered by the board of directors: Sarnia, the United Kingdom and Belgium. Sarnia was quickly ruled out, however. At a time when Polymer was exporting roughly 90% of its butyl rubber to Europe, expanding the facilities in Sarnia simply did not make business sense.¹²⁸ It was estimated that if the Sarnia facilities were expanded the company could hold a 15% share of the market. But if a plant was built in Belgium or the U.K., Polymer's share could be increased to 20-25% due to proximity to the major consuming areas.¹²⁹ The U.K. was considered desirable because it represented a large domestic market with a business climate and methods very similar to Polymer's own.¹³⁰ Belgium, on the other hand, had a relatively small domestic market and a somewhat different way of doing business. However, the patent situation in the U.K. was precarious. Esso claimed to have the sole right to license butyl production and it was not willing to extend the right to Polymer. The patent situation in Belgium was less problematic given that Esso held no Belgian patents in the field.¹³¹ What decided the matter, however, was the fact that it would be easier to finance a plant in Belgium than in the U.K. During the early 1960s, the Belgian government, eager to attract industry, was offering incentives in the form of construction

Czechoslovakia, Communist China, Brazil, Mexico, Spain, and Argentina had SBR plants in operation.

¹²⁸ "Minutes of the Board of Directors" (June 15, 1961), *DMS Papers*, vol. 12. According to Polymer's figures, a plant in Belgium would return 17% on the investment, after tax, as compared with about 10% for Sarnia facilities. Even if prices dropped 15%, the estimated return would still be 10% for the Belgium plant while the return on the Sarnia facilities would be no more than 5%.

¹²⁹ *Ibid.*

¹³⁰ *Ibid.*

¹³¹ *Ibid.*

loans to multinational companies like Polymer. Up to 60% of the capital requirements could be borrowed at a guaranteed rate of 2.5% for twenty years. This appealed to the crown company, which was looking for ways to finance its expansion program. The Belgian government's incentives meant that, unlike in France, Polymer could build without having any equity held by outside interests.¹³² At the board of directors meeting held in July, 1961 it was unanimously agreed that the company should proceed with the building of a butyl plant in Belgium.¹³³

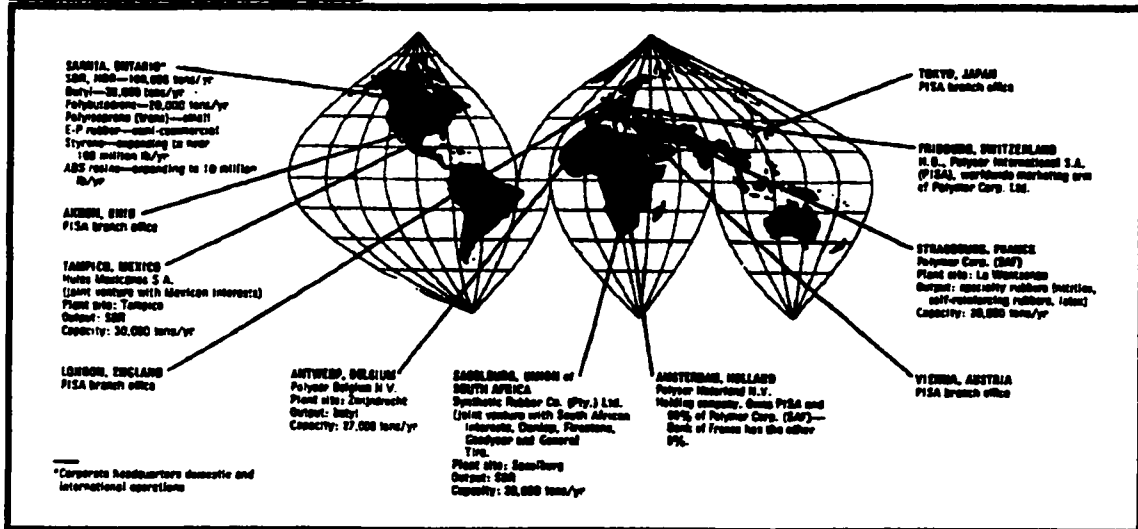
The aggressive international competition that drove Polymer into manufacturing operations in Europe was also the decisive force behind the establishment of an international marketing centre in Fribourg, Switzerland. Marketing efforts overseas had always received major emphasis in the corporate setting but the new competitive environment demanded stronger ties with distributors and customers. It was believed that by establishing a separate division responsible for sales outside of North America, Polymer could better co-ordinate production and marketing and this, in turn, would achieve cost savings as well as efficiency improvements in product distribution. Thus, in 1962, Polymer set up Polysar International SA (PISA) in Switzerland to market all of its products outside North America and provide technical services in all export marketing areas. To head the new international marketing organization the board appointed Roger Hatch. Hatch was the obvious choice given that Polymer's success in Europe was largely a result of his sales and marketing efforts over the past fifteen years.

The decision to locate in Fribourg, Switzerland was again primarily a financial one. Always working the numbers, Polymer's vice-president of finance, Stan Wilk, had determined that by establishing an international marketing centre in Switzerland, the company could avoid excessive taxation on repatriation of earnings from overseas

¹³² *Ibid.*

¹³³ "Minutes of the Board of Directors" (July 20, 1961), *DMS Papers*, vol. 12.

Figure 4.3
Global structure (1966)



Source: S. Otto, "Polymer of Canada," *Rubber World* (March 1966), p. 50.

operations. To do this, Wilk suggested a complex series of arrangements which would see Polymer's majority stake in Polymer SAF transferred to PISA whose equity, in turn, would be transferred to a holding company in Holland. The holding company, Polysar Nederland N.V., would thus serve as a vehicle by which profits from Polymer's European subsidiaries could be transmitted to Sarnia under the favourable tax conventions between Switzerland and the Netherlands and the Netherlands and Canada.

Wilk was a master of such savvy schemes. Indeed, it was his creative thinking on financial matters that had brought him to the attention of executives at Polymer in the first place. During the war, Wilk, an American-born chemical engineer by training, was a key member of the economic division of the U.S. Office of the Petroleum Administration for War (PAW). While at PAW, Wilk had helped Polymer negotiate a number of contracts with American petroleum companies. At the end of the war, Nicholson and Rowzee persuaded him to come and manage Polymer's petroleum economics in Sarnia.¹³⁴ When Rowzee

¹³⁴ Wilk interview (Sarnia, March 2001).

became president, Wilk was promoted to the position of vice-president of finance and when the Dutch company was formed he was given the top post.¹³⁵

While Wilk's creative proposal was viewed favourably by the board of directors, it was not by some in Diefenbaker's cabinet. Critics in cabinet argued that Wilk's proposal was tantamount to tax evasion, an action unbecoming a Canadian corporation, especially one that was government-owned.¹³⁶ But others in cabinet took a more sympathetic stance. Having studied the implications of Wilk's proposal, O'Hurley, Fleming and the secretary to the cabinet, R.B Bryce, concluded that the arrangement was "in line with normal business practice."¹³⁷ Polymer would simply be doing what other commercial firms seeking to maximize their profits were already doing in Europe. They therefore recommended that Polymer be authorized to go ahead with Wilk's proposal. The majority in cabinet agreed and in mid 1962 Polysar Nederland N.V. went into operation with Wilk as its head. By structuring its operations as Wilk suggested, Polymer managed to save roughly \$4 dollars a year in taxes. In the years that followed, the increased cash flow was used to finance the growth effort.¹³⁸ Through creative schemes like this, Polymer moved closer to realizing Rowzee's objective of "serving the world."¹³⁹

In the meantime, revolutionary technological developments were taking place. In 1952, Dr. Karl Ziegler, a German chemist with a strong eye for practical applications and the director of the Max Plank Institut für Kohlenforschung in Mülheim in Germany, announced a new class of catalysts that could bring about polymerization of ethylene, propylene and other olefins at low pressures. For some time, scientists had appreciated the importance of the catalyst in the production of straight-chained polymers. During the 1930s

¹³⁵ "Minutes of the Board of Directors" (April 18, 1962), *DMS Papers*, 296-8-1, vol. 12.

¹³⁶ *Cabinet Conclusions* (September 21, 1961), p. 3.

¹³⁷ *Ibid.*, p. 4.

¹³⁸ "Minutes of the Board of Directors" (April 28, 1961), *DMS Papers*, 296-8-1, vol. 12.

¹³⁹ *Polysphere* (October 1962), p. 8.

and 1940s, the subject had engaged many leading polymer chemists - Herman Mark, Maurice Huggins, Paul Flory and Calvin Schildknecht. But it was the work of Ziegler that demonstrated to the world just how fundamental catalyst technology was to achieving the requisite high degree of control and regularity in synthetic structures.¹⁴⁰ Ziegler, who was later awarded a Nobel prize in chemistry for his discovery, found that mixing aluminium alkyl in a hydrocarbon solution formed a black precipitate which initiated the polymerization of ethylene at low pressure. The important feature of Ziegler's catalyst was that it allowed the polymer chemist to control the spatial arrangements of the monomer molecules during polymerization. Ziegler's discovery excited the engineering community. "Using these [organo-metallic] catalysts," Ralph Rowzee stated in 1959, "the polymer chemist can [now] come closer to preparing a polymer having a specific molecular configuration than ever before."¹⁴¹ "I feel justified in suggesting to you," he continued, "that polymer chemistry and the synthetic rubber industry have entered a new phase in their development."¹⁴² Ziegler's discovery of a new way of putting the building blocks of polymers together promised a whole new class of polymeric materials. Sensing this, during the 1950s, American petrochemical companies flocked to Ziegler's laboratory in Mülheim, Germany, to procure the necessary licences to use his catalyst technology.

The technology did not come cheaply, however. The American chemical giant Hercules, for example, paid \$350,000 for a non-exclusive one-year option on Ziegler's "know-how" with respect to ethylene polymers, co-polymers and other olefin polymers.¹⁴³ Dupont, on the other hand, paid \$50,000 in advance just to get a look at Ziegler's

¹⁴⁰ F. McMillan, *The Chain Straighteners: The Discovery of Linear and Stereoregular Polymers* (London Macmillan Press, 1979), pp. 27-45.

¹⁴¹ *Financial Post* (June 20, 1959), p. 53.

¹⁴² *Ibid.*

¹⁴³ Dyer and Sicilia, *Labours of a Modern Hercules*, p. 288.

laboratory notes.¹⁴⁴ Goodrich-Gulf, a joint company established in 1954 to commercialize petroleum-based plastics, also paid Ziegler \$50,000, in this case for a one month option to examine samples of Ziegler's polyethylene and reach a decision about a permanent licence.¹⁴⁵

In 1954, Polymer joined those making the pilgrimage to Mülheim. That year, Buckler visited Dr. Ziegler to explore the possibility of using these new catalysts. Buckler found Ziegler to be most hospitable and engaging. The two men discovered they had a good deal in common. Each held a Ph.D. in chemistry, Buckler from Cambridge, Ziegler from Marburg University. Each had become too interested in practical applications of science to remain in the world of academe or take up a position elsewhere as a "pure" scientist. Each, instead, had entered industry and had created R&D departments which encouraged communication, co-operation and creative thinking. Each was passionate and philosophical about his work and enjoyed early success.¹⁴⁶

While appreciative of the long-term implications of Ziegler's work, Buckler decided that at this stage Ziegler's discoveries were not of direct interest to Polymer's synthetic rubber operation. In the following year, Buckler and Dougan made a second visit to Mülheim to follow up on further advances. They learned that Goodrich-Gulf and Phillips Petroleum had taken out restricted licences to investigate the use of these catalysts to polymerize butadiene and isoprene. In December 1955, Goodrich-Gulf announced that a catalyst composition had been found that would convert isoprene to a polymer (i.e. *cis* 1,4 polyisoprene) having substantially the same structure as natural rubber. Nearly a century after the Englishman Grenville Williams had succeeded in doing exactly the reverse, Goodrich-Gulf had achieved an almost exact synthesis of natural rubber from isoprene. Goodrich-Gulf quickly made the news public. "American scientists have finally succeeded

¹⁴⁴ Hounshell and Smith, *Science and Corporate Strategy*, p. 494.

¹⁴⁵ McMillan, *The Chain Straighteners*, p. 144.

¹⁴⁶ For more biographical information on Zeigler see *The Chain Straighteners*, pp. 27-45.

in reproducing the molecule of crude, or tree-grown rubber,” stated the president of Goodrich-Gulf. “It is a major scientific achievement,” he continued, “... a goal of world scientists for generations.”¹⁴⁷ Moreover, Phillips Petroleum had announced another variation of this type of catalysts that converted butadiene, which was much less expensive than isoprene, into polybutadiene - a substance which showed promise as a tire rubber. These announcements were stimulating widespread research in the field and Polymer decided that rather than taking out a licence at that point, it would be better to become knowledgeable in the field and await clarification of the overall patent position.

Polymer had learned that introducing a new tire rubber was a very risky business. Tire failures could lead to fatalities that could put a tire manufacture in jeopardy. Expensive, large-scale testing was thus felt necessary before adopting any major change in raw rubber, both in making the tires and in evaluating tire performance. Furthermore, no tire company wished to rely on a single source of tire rubber unless they made it themselves. Hence the correct strategy for Polymer to follow was to wait until the tire companies had decided what they wanted and then to use its commercial, geographic and technical position to negotiate licences.

In the late 1950s the general opinion in the industry was that polybutadiene was the preferred material. Small scale testing had shown that it had phenomenal wear resistance and resilience, far exceeding the properties of natural rubber or synthetic polyisoprene.¹⁴⁸ Polymer was urged therefore to undertake manufacture in Canada of polybutadiene in order to provide the tire companies with raw material for truck tires. Based on its own studies and pilot plant developments, Polymer decided finally to take a licence from Goodrich-Gulf for its catalyst to make polybutadiene, rather than know-how from Phillips Petroleum. Shortly before the Polymer polybutadiene plant came into operation, however, information

¹⁴⁷ Quoted in *The Chain Straighteners*, p. 145.

¹⁴⁸ E.J. Buckler, “Statement to Agents - Review of Polybutadiene Development” (June 25, 1962), *Polysar Papers*, vol. 146, file: Buckler speeches, folder 2.

came to light, first from a company in the U.K. and then confirmed in the U.S., that polybutadiene was extremely “nervy” and difficult to mix and extrude in the factory. Even worse, the treads of truck tires made from polybutadiene developed severe “chipping” and “chunking” and fell to pieces after only a few weeks of heavy service. Studies by several groups, and particularly by Polymer, suggested that the phenomenon was due to progressive cross-linking of the polybutadiene chains arising from free radicals generated by chain scission during deformation.¹⁴⁹ The problem did not arise in treads made from natural rubber because the free radicals produced from polyisoprene are much less reactive and are destroyed without causing damage.

No means could be found for preventing the chipping and chunking in treads made wholly or mainly of this type of polybutadiene. However, it was found that the effect was suppressed when the polybutadiene was blended with about equal parts of ordinary styrene-butadiene rubber. These blends were not sufficiently resilient for truck tires, but the superior wear resistance of polybutadiene carried through and produced a superior tread stock for passenger tires. (The blend is to this day the standard composition for all passenger tires). It was also found by Polymer that a few percent of this type of polybutadiene markedly reduced the brittleness of polystyrene plastic; the polybutadiene made with the Goodrich-Gulf catalyst was preferred over other types due to being almost colourless.

Despite these innovative efforts, narrowing profit margins within the industry led some in the company to question whether Polymer could survive in the future solely as a synthetic rubber producer.¹⁵⁰ As early as 1962, Buckler had predicted a stormy future for

¹⁴⁹ E.J. Buckler, “Canadian Contributions to Synthetic Rubber Technology,” *The Canadian Journal of Chemical Engineering*, p. 10.

¹⁵⁰ Interview with B. Pursell (Sarnia, July 2000); interview with E.J. Buckler (Sarnia, July 2000); and interview with F. Bentley (Sarnia, November 1999).

independent manufacturers of general purpose rubber (i.e. SBR).¹⁵¹ “The SBR plants under the greatest challenge will be the independent producers, particularly those depending to any degree on export business.”¹⁵² Only those heavy-integrated companies with captive and/or protected markets, he predicted, would survive in the field. Buckler was sanguine, however, that Polymer would continue to prosper as producer of specialty type rubbers so long as the research and development program was expanding.¹⁵³ In 1966, he pondered the future for Polymer Corporation as a manufacturer of synthetic polymeric materials. “To survive,” he stated, “it must supply the long-established materials in quality, price and quantity with such efficiency that the fabricators do not seek to manufacture their own materials.” In addition, Buckler maintained, the company must use its resources “to launch new materials and nurse them through their early uneconomic stages.”¹⁵⁴ Others, however, were less optimistic and argued that the company should diversify into unrelated areas of production. Lower net income in 1966 and 1967 served to further fuel the pessimism. The company had followed through on Rowzee’s strategy for growth and from a technical point of view it had done everything right. It had formulated a bold strategy and implemented an innovative structure which saw production double between 1960 and 1966. The crown company expanded geographically to gain a manufacturing presence in its most important markets. Polymer had created an international marketing company to better serve its customers. It had invested in state-of-the-art technology and R&D which had caused

¹⁵¹ E.J. Buckler, Review of Research and Development Program (May 1962), *Polysar Papers*, vol. 146, file: E.J. Buckler speeches, folder 2.

¹⁵² E.J. Buckler, “Future natural/synthetic prospects,” *Polysar Papers*, vol. 146, file: E.J. Buckler speeches, 1959-1965.

¹⁵³ *Ibid.*

¹⁵⁴ E.J. Buckler, “Polymer Corporation: The Future,” *Polysar Papers*, vol. 146, file: E.J. Buckler speeches, folder 3.

productivity to soar.¹⁵⁵ Unfortunately, however, net income did not experience the same favourable trend. In 1960, Rowzee had confidently stated that “a successful growth

Table 4.1
Selected statistics of operation, 1958-1966

Year	Rubber		Sales (£000s)	Profits (£000s)	Profits	
	Produced (thousands)	Number of Employees			as % of Ottawa's	Dividends
					Investment	(£000s)
1958	132,100	2,777	75,539	6,377	11.7	4,000
1959	98,200	2,669	60,253	3,690	6.5	3,000
1960	156,700	2,663	85,915	9,851	17.1	3,000
1961	161,200	2,711	88,514	10,220	15.8	3,000
1962	165,200	2,972	87,457	10,284	11.3	3,000
1963	194,600	3,310	97,806	9,138	8.8	3,250
1964	237,000	3,433	114,291	9,450	8.1	4,000
1965	247,800	3,605	117,503	10,303	8.5	4,500
1966	264,700	3,911	127,538	11,221	8.6	4,500

Source: Annual Reports (1958-1966)

program would mean... a possible doubling of the profit over the next ten years.”¹⁵⁶ But this did not happen for various reasons. Although sales were increasing, selling prices were not, as the price-cost squeeze throughout the industry continued. This was especially true with respect to salaries and wages, and feedstock prices. Rising costs, combined with surplus world capacity, offset the productivity increases of more efficient plants. This was - as one observer noted - a “strange boom, indeed.”¹⁵⁷ Investment in inventories also grew as the company sought to balance economies of scale and market demand. Another important factor was the increased cost of the debt financing. The capital expenditure programs required large amounts of long-term debt. The rising cost of doing business reduced Polymer’s 1967 net income to its lowest level in many years - \$5.8 million.

Nevertheless, from a long term perspective, Rowzee’s growth program was a success. During the period 1960-66 - a time of aggressive competition and narrowing profit margins

¹⁵⁵ While production increased 109% during the period, employment levels increased by only forty-two percent.

¹⁵⁶ Rowzee, “Objectives,” p. 4.

¹⁵⁷ W.L. Dack, “Chemicals and Plastics: a feature report,” *Financial Times* (June 11, 1966), pp. C1-C12.

- net income as a percentage of net sales and other income remained at roughly the same levels they had been during the period 1953-1959. Going global was risky business and quite different from serving a staid domestic market. To survive in the global economy, a corporation needed to be agile, strategic of vision, and ready to feed its hunches with capital and R&D. During the period under review, Polymer had done this and in the process had broken the historical pattern of Canadian manufacturing. By creatively structuring its expansion and developing its organization capabilities, Polymer had managed to maintain a favourable position throughout the world, despite U.S. competition and despite the fact that every industrialized nation was showing a determined intention to produce and market its own synthetic rubber. The crown company abandoned the old branch plant mentality which was satisfied with hand-me-down technology, and began stressing R&D and demonstrating a constant vigilance for new technology. This was a new world for Canadian manufacturing. Polymer had managed to overcome the obstacles to growth and despite continued government ownership had continued to prosper in the international market place.

Chapter Five

Decade of Discord: Diversification and Denationalization, 1967-1977

If Polymer were to continue on its old course the best we could expect would be a levelling-off and ultimate decline of profitability despite substantial new capital. Our answer to this is to follow an aggressive program of expansion and diversification to convert Polymer into a broader based aggressive business force.¹

Ralph Rowzee (1969)

The late 1960s and 1970s witnessed the rapid adoption of diversification as a strategy for corporate growth.² Mature firms around the industrialized world strategically expanded into related and unrelated industries in an attempt to sustain their growth and development.³

¹ R. Rowzee, "The Polymer Plan," (May 6, 1969), *Polysar Papers*, vol. 46, file: Minister of Supply and Services - Correspondence and Reports, 1969-70.

² Chandler, *Scale and Scope*, pp. 617-621; R.P. Rumelt, *Strategy, Structure, and Economic Performance* (Boston, Harvard University Press, 1974), esp. pp. 50-63; D.F. Channon, *The Strategy and Structure of British Enterprise* (Cambridge, Mass., Harvard University Press, 1973), pp. 52-68; G.P. Dyas and H.T. Thanheiser, *Emerging European Enterprise: Strategy and Structure in French and German Industry* (London, Macmillan, 1976), p. 72.; B.R. Scott "The Industrial State: Old Myths and New Realities," *Harvard Business Review* (March-April 1973), 133-145; and R. Sobel, *The Age of Giant Corporations: A Microeconomic History of American Business, 1914-1984* (Westport, Conn., Greenwood Press, 1984) chps. 8 and 9.

³ Diversification is related if there is some element in the diversifying strategy which entails activities and/or resources which are common to the existing activities and resources of the firm. Diversification is unrelated if investment projects have nothing in common with other activities of the firm or if the resources of the firm, and the experience gained using those resources, are not applied to new activities undertaken as a result of an investment strategy. Diversification into unrelated industries thus involves a departure from the firm's existing areas of specialization and according to the economist Edith Penrose may be one of three kinds: (1) the entry into new markets with new products using the same production base; (2) expansion in the same market with new products but in a different area of technology;

This became the age of the protean multi-national corporation, an enterprise dedicated to internationalization and the pursuit of synergies - a seemingly magical mixture of business activities that were stronger and more profitable together than they were apart. As Alfred Chandler has noted, in the 1960s and 1970s the drive for growth through diversification "had almost become a mania."⁴ In 1972, even the Liberal government in Ottawa got caught up in the exuberance when it created the Canada Development Corporation (CDC), a publicly-sponsored, diversified conglomerate with portfolio investments in mining, oil and gas, petrochemicals, life sciences and information processing. Without entirely abandoning old product lines, mature companies embarked upon the production of new and intermediate products, expanding their "basic areas" of manufacturing in the process. Increasingly, the "single business" or "specialized firm" became a rarity. In 1969, for example, over 90% of the *Fortune* "500" were diversified to some extent.⁵ The drive towards diversification was facilitated by the stock market which - at least in the 1960s and early 1970s - rewarded "high growth" companies with high stock prices. As a result, many companies that had once made a handful of products began making hundreds, if not thousands, and many companies which were once involved in one or a few businesses expanded into many.

Beyond the rewards of a higher stock price, there were several more fundamental reasons why industrialized firms chose to diversify. As a strategy for corporate growth and development, diversification - at least in theory - allowed a mature firm to utilize its management skills more fully, spread its risk across several business cycles and, concomitantly, seize opportunities for synergy. As early as 1955 business theorists like Peter Drucker began arguing that good managers needed to master certain general principles

and (3) entry into new markets with new products based in a different area of technology. See Penrose, *The Theory of the Growth of the Firm*, pp. 109-111.

⁴ Chandler, *Scale and Scope*, p. 622.

⁵ Rumelt, *Strategy, Structure, and Economic Performance*, pp. 53-55.

of management that were applicable in any business setting.⁶ Drucker's *The Practice of Management* became standard reading for a whole generation of corporate executives and led to a widespread belief in "general management skills." Given the currency of Drucker's ideas, it was not a great leap for many in the business community to conclude that "professional managers" - armed, as they were, with the latest portfolio techniques developed in consulting firms - might be able to use their skills in a variety of different business settings.⁷ At one extreme, conglomerates like Canadian Pacific and E.P. Taylor's Argus Corporation sought growth by entering a wide range of different businesses. Similarly, in the 1970s Bell Canada, under the leadership of a savvy young lawyer named Jean de Grandpré, abandoned its conservative approach to business and joined what the editors of *Fortune* magazine termed the "conglomerate commotion."⁸ The top managers of these conglomerates believed that they possessed distinctive general management techniques and that by applying them to a large number of different businesses they could grow profitably.

But diversification was not limited to those firms seeking to utilize corporate competencies more fully. During the 1960s and 1970s, many other industrial companies diversified to spread their risk across a variety of different business cycles. When a company's core business was maturing, as Polymer's was by the late 1960s, corporate managers looked for growth opportunities in new areas of production. In part this was a response to the rapidly changing macroeconomic environment. After the Second World War, many traditional industries and markets experienced slower rates of growth as

⁶ P. Drucker, *The Practice of Management* (London, William Heinemann, 1955); H. Knoontz, "The Management Theory Jungle," *Academy of Management Journal* (December, 1961), 174-188.

⁷ R. Katz, "Skills of an Affective Administrator," *Harvard Business Review* (Jan.-Feb. 1955), 33-42.

⁸ Editors of *Fortune*, *The Conglomerate Commotion* (New York, Viking Press, 1970).

demographic shifts and technological innovations affected product markets. At the same time, intensified R&D and rising consumer incomes generated new goods and services. Given the shifting socio-economic environment, many “old” industries faced with lagging demand chose to diversify into unrelated areas of production - those areas having nothing in common with the firm’s other activities or resources - rather than limiting themselves to the destinies of their existing markets. In so doing, they situated themselves in several business cycles, thereby spreading their risk across a variety of ventures and reducing the volatility of their performance. A large firm with many products in many markets, producing in many different places, was in theory less dependent on individual markets or technologies and therefore was less vulnerable to any single set of unfavourable circumstances. Such a strategy also opened up the possibility of cross-subsidization from mature to developing enterprises. In effect, these large diversifying firms rejected the classical doctrine of comparative advantage and embraced their own form of mercantilism. In place of specialization for higher returns they substituted diversification in hopes of greater security.

By the 1980s, however, many diversified, multi-business companies were encountering performance problems, and widespread scepticism about the ability of companies to manage and add value to multi-business portfolios gained ground. Diversification was thus no panacea but required careful balancing and synergy. According to historians David Hounshell and John Smith, Du Pont’s diversification program, which invested about \$100 million in a variety of generally unprofitable ventures, including a \$50 million building materials debacle, was a strategic and financial failure.⁹ Du Pont was one of a number of companies which had embraced diversification only to find that the synergies it had anticipated simply were not there. Du Pont’s Canadian subsidiary did not fare any better in its “digging for profits” by diversifying into mining.¹⁰ And Canadian

⁹ Hounshell and Smith, *Science and Corporate Strategy*, chp. 22, especially pp. 538-540.

¹⁰ H.H. Lank and E.L. Williams, *The Du Pont Canada History* (Toronto, Du Pont

Industries Limited's diversification into real estate did nothing to return the company to the profit level it had attained during the mid-1960s. The poor performance of firms like Du Pont, CIL and CP Enterprises prompted a rethinking both of the role of the corporate centre and the sagacity of diversification.¹¹ Moreover, consultants and academics such as Tom Peters, Robert Hayes and Michael Porter were increasingly hostile towards diversification, with several of their studies showing that diversification had generally performed poorly.¹² As a consequence, they and others advocated a renewed focus on selected "core" businesses. During the 1980s, corporate restructuring in Canada and the U.S. began to reverse the trend of the previous two decades, and the percentage of diversified firms declined among the *Fortune* "500."¹³ The period became one of "de-conglomeration" and "de-diversification", as corporations "shed assets" and got "back to basics." The trend was continued into the "lean and mean" 1990s.

During the 1960s and 1970s, however, the tendency in business was towards diversification. Polymer was not immune to this trend, further symbolizing that it was not a typical crown corporation perpetually cloistered in a discrete sector of the economy. Indeed, its experience was remarkably similar to that of other multinational companies, particularly those in the petrochemical industry. Like Du Pont, CIL, Hercules and Monsanto, Polymer's "core" business was maturing. In all its essential characteristics, synthetic rubber was now fully developed. The rapid technological innovations that

Canada Inc. 1980), chp. 21.

¹¹ S. Goldenburg, *Canadian Pacific: Portrait of a Conglomerate* (Toronto, John Deyell Company, 1983), chp. 10 & 13.

¹² M. Porter, "From Competitive Advantage to Corporate Strategy," *Harvard Business Review* (May-June, 1987), pp. 43-59; Peters and Waterman, *In Search of Excellence*; B. Hayes and B. Abernathy, "Managing Our Way to Economic Decline," *Harvard Business Review* (July-August, 1980), pp. 67-77.

¹³ C. Markides, "Back to Basics: Reversing Corporate Diversification," in *Multinational Business* (1991) pp. 12-25.

characterized the industry's infancy had thus tapered off. Polymer's product markets were established and there were seemingly few new frontiers. As is often the case in a mature industry, competition for existing markets became the order of the day. In 1967, there were 21 nations producing synthetic rubber, more than double the number that there had been a decade earlier. World capacity, as a result, was in excess of demand. And while the gap between supply and demand for synthetic rubber was narrowing in North America, it was widening disproportionately in the rest of the world. This global overcapacity, in turn, caused a sharp decline in prices. Early in the life of synthetic rubber, when there were few competitors, profit levels were high. But these high prices, along with technological changes in the form of major and minor process innovations, attracted additional competitors into the field. As the number of producers increased, price cuts caused profit levels to decline.¹⁴ Since ascending to the presidency in 1957, Ralph Rowzee had witnessed the price of SBR, the principal product of the synthetic rubber industry, decline by almost 23% in North America and somewhat more in Europe. The price of polybutadiene showed a similar trend, declining 33% since first being commercially produced in 1960. Despite the fact that butyl rubber continued to retain its value on world markets, the overall pattern in the rubber market was disturbing as far as Rowzee was concerned and led him to question if there was a place in the future for an independent, undiversified, synthetic rubber producer like Polymer.¹⁵ Adding further to Rowzee's anxiety was the fact that inflationary pressures were increasing the cost of materials and services. Salaries and wages, particularly in Canada, were rising faster than corresponding gains in productivity, leading to higher labour costs. Rising costs and declining prices

¹⁴ R.B. Stobaugh, *Innovation and Competition: The Global Management of Petrochemical Products* (Boston, Mass., Harvard Business School Press, 1988), pp. 67-78.

¹⁵ E.R. Rowzee, "Responsibility and Enterprise," *Rubber World* (August 1967), pp. 80-82.

reduced net income in 1967 to the lowest level since 1959, the year of the 90-day strike.¹⁶

Polymer's management was no less concerned about the 1967 results - which carried over, to some extent, into 1968 - than would private sector entrepreneurs have been in similar circumstances. Even the perennially upbeat Rowzee, who in 1967 was entering his tenth year as president of the corporation, was forced to concede that the company's financial performance was "disappointing."¹⁷ Rowzee had not anticipated the "profit squeeze" seven years earlier when he put forward his strategy for growth and multinationalization.¹⁸ No one at Polymer had. But in 1967, for the second year in a row, there was a marked rise in the cost of doing business and a corresponding decline in profitability. To be sure, Rowzee had experienced the cyclical nature of the rubber trade before. As a young research chemist working at Goodyear Tire and Rubber Company during the depression, he had seen the bottom drop out of the rubber market. And after coming to Polymer in 1942, he had witnessed several cyclical downturns, the most severe of which came during the period 1957-59, when net income fell in each succeeding year. But the downturn in 1967 was far more unsettling to Rowzee and others at the corporation, in that, unlike before, it occurred at a time of increasing sales. Indeed, Polymer had never sold as much as it did in 1967 - \$128.9 million worth of products and services. That was over \$1.3 million more than the preceding year, and yet net income was just over half of its 1966 level.¹⁹ This was a new and disconcerting phenomenon that led some industry analysts to conclude that Polymer was in a "declining business" from which it needed to escape.²⁰

¹⁶ *Annual Report* (1967), p. 4.

¹⁷ Rowzee to Drury (February 16, 1968), *Annual Report*, p. 4.

¹⁸ E.R. Rowzee, "Objectives for 1960" (January 22, 1960), *G. Churchill Papers*, vol. 37, pp. 1-6.

¹⁹ *Annual Report* (1967), p. 7.

²⁰ Wood Gundy, "Polymer Corporation Limited: A Valuation for the Department of Supply and Services, Government of Canada" (April 14, 1972) especially pp. 9, 32-50. *Polysar*

The “profit squeeze” and Polymer’s declining fortunes precipitated a crisis in managerial confidence. In 1967, for the first time in its history, Polymer’s management began to doubt its own entrepreneurial competence.²¹ There was a feeling among some senior managers, like Roger Hatch, that Polymer had stayed too long with a technology that had a disappearing premium and that the company had failed to anticipate changing conditions with timely action.²² Further down the corporate ladder, others began to question whether Polymer’s executives were capable of realizing the full potential of the rubber business.²³ Occasionally, fingers were pointed. The marketing department, for example, accused the department of research and development of being out of touch with the needs of consumers. The company’s renowned *esprit de corps*, which had been the hallmark of earlier years, seemed to vanish during what one observer termed “the traumatic experience of 1967-1968.”²⁴ The unity and harmony of the post-war years was increasingly hard to muster in this age of declining prices and increasing competition.

The tendency toward condemnatory introspection was reflected in the virtual suspension of executive action. For more than a year between 1967 and 1968, Polymer’s solution to the “profit squeeze” was to cut costs and take a more critical approach to existing methods of operation. In 1967, Rowzee was still sanguine that an increase in productivity would generate the profits necessary for the next leap forward in synthetic rubber development. Only such an advance, he informed the International Institute of Synthetic Rubber Producers in Montreal in April 1967, would save synthetic rubber from

Papers, vol. 46, file: Report for the Government of Canada.

²¹ Buckler, Bentley, Dudley and Rush interviews (Sarnia, November 1999); Bryne and Pursell interviews (Sarnia, July 2000).

²² Hatch interview (Toronto, May 2000).

²³ W. F. Ackerman, “General Survey: Polymer Corporation Limited” (February, 1969), p. 9. *Polysar Papers*, vol. 48. Cited hereafter as the *Ackerman Report*.

²⁴ *Ibid.*, p.iii.

becoming “a commodity article, with price alone being the basis for competition.”²⁵ But by 1969, Rowzee and other top executives at Polymer had decided that a more radical response was needed. Polymer would have to expand into new areas of production in order to survive and prosper in the future. “It is imperative that the Company diversify,” Roger Hatch stated, “so that it is less dependent on the vagaries of the rubber business.”²⁶ Rowzee agreed. In December 1969, he wrote to the minister of supply and services in Ottawa, James Richardson, stating that he was now convinced that “the risks of continuing as a one purpose company are far too great to be accepted.”²⁷ “In the future,” he continued, “we intend to be a broad-based business force.”²⁸ As in the past, Ottawa’s response was that the crown corporation knew best.²⁹

The strategic groundwork for Polymer’s diversification program was laid down in a lengthy 1969 report written by William F. Ackerman, a business consultant from New York. At a time when Rowzee was looking for an outsider to help him determine the future course of Polymer’s activities, Ackerman came highly recommended by Russell Baker, one of Polymer’s long-time advisers on international corporate structure. Ackerman’s final *Report* set the company’s strategic course for the next decade. According to Ackerman, in order to survive, Polymer would have to diversify into related and unrelated areas of production.³⁰ The world, he maintained, was becoming a more complex and competitive place. The trend in business was toward integration, diversification and conglomeration.

²⁵ Rowzee, “Address to the Institute of Synthetic Rubber Producers” (April 24-26, 1967), *Polysar Papers*, vol. 44, file: Addresses, speeches, articles, 1967-1968.

²⁶ R.E. Hatch, “Strategy for Growth” (September 22, 1969), *Polysar Papers*, vol. 134, file: Corporate planning and diversification, 1968-70.

²⁷ Rowzee to Richardson (December 9, 1969), *Polysar Papers*, vol. 46, file: Correspondences, 1969-70.

²⁸ *Ibid.*

²⁹ *Cabinet Conclusions* (December 19, 1969). p. 4.

³⁰ *Ackerman Report*, p. iv.

Within the petrochemical industry, integrating pressures on both feedstock suppliers (the oil companies) and their customers (the rubber fabricators) were great and growing. Polymer, as a relatively small and specialized firm, was out of step with these international business developments and, as a result, was vulnerable to a take-over bid by a larger firm. Ackerman warned that if Polymer was to survive as an independent entity, it would have to think anew and head in a different strategic direction.

Ackerman suggested a “drastic break” with the past.³¹ To date, Polymer’s strategy had been to develop and produce a variety of synthetic rubbers and to sell them aggressively in emerging markets around the globe. This strategy had been foreshadowed in 1944 when Polymer established its research and development department. In the early 1960s, an international marketing centre and manufacturing facilities were established overseas to augment the corporate structure in pursuit of its business strategy. But Ackerman wanted Polymer “to think [about] synthetic rubber less.”³² If it did not, he warned, the old “one purpose company” mentality would eventually lead to the extinction of the firm. Ackerman was sceptical that Buckler’s R&D department, which was relatively small and underfunded, could sustain its high level of innovation. This was not a criticism *per se* of Buckler or of the members of his department. It was simply that, in Ackerman’s mind, research could not do much to force the overall trend of technology now that the synthetic rubber industry had reached its maturity.³³ Without the dramatic technological breakthroughs of the past, Ackerman predicted that on its current course Polymer’s return on equity would approximate just 6.75% per annum within eight years.³⁴ That kind of return, he maintained, would not be enough to guarantee Polymer’s survival. “Another year like 1967, in which several harmful developments coincided, would produce heavy

³¹ *Ibid.*, p. vi.

³² *Ibid.*, p. x.

³³ *Ibid.*, p. 6.

³⁴ *Ibid.*, p. vi.

losses," Ackerman cautioned, "and would weaken Polymer irretrievably."³⁵ At that point, he continued, Polymer would be absorbed at a distress price by a larger foreign company.³⁶

The fear of losing control of Canadian companies to larger foreign - particularly American - firms was very much a part of the Canadian consciousness at the end of the 1960s and during the 1970s. The take-over of such venerable Canadian businesses as Ryerson Press, a leading Canadian publisher, by large American enterprises did much to invigorate nationalist sentiment. The passive concern over foreign direct investment witnessed at the time of Walter Gordon's 1958 royal commission on Canada's economic prospects was transmogrified over the ensuing decade into the more activist approach outlined in the *Gray Report*.³⁷ The *Gray Report* of 1972 set out a number of options for controlling direct foreign investment inflows, one of which was government intervention in the investment process. A 1972 Gallup Poll showed that 67 per cent of Canadians thought that Canada had enough capital from the United States.³⁸ It was the large, often dominant role played by foreign - and mainly American - capital that was widely perceived as being both a prime cause and chief consequence of Canada's alleged chronic inability to marshal adequate domestic savings to fund its economic and technological development.³⁹ During this period, associations such as Walter Gordon's Committee for an Independent Canada and Mel Watkin's Waffle Group gained considerable public support for their nationalist stance on economic issues. In the late 1960s, Gordon established a task force, under Watkins, to examine the problem of foreign control of domestic industry and to recommend

³⁵ *Ibid.*

³⁶ *Ibid.*

³⁷ Canada. Privy Council Office. *Report, Foreign Direct Investment in Canada*, (Ottawa, Queen's Printer, 1972).

³⁸ Anonymous, "US. Investment Not Needed," *Ottawa Citizen* (February 12, 1972).

³⁹ Guillet, J., "Nationalism and Canadian Science," in P. Russell (ed.), *Nationalism in Canada* (Toronto, McGraw-Hill, 1966), pp. 221-231.

ways to increase Canadian control.⁴⁰ The task force's subsequent conclusions reflected the growing anxiety in Canada about the foreign presence in the economy.

The rising concern over foreign take-overs of Canadian firms was also reflected in the literature of the period. A number of books, such as Richard Rohmer's best selling, albeit un-Canadianly dramatic, novel *Ultimatum* and Al Purdy's the *New Romans*, warned Canadians of the inherent dangers of American economic imperialism.⁴¹ In his novel *Takeover*, the esteemed Canadian historian Donald Creighton told the story of the annexation of an established Canadian distillery by an American syndication.⁴² Within the world of academe, a number of social scientists, particularly from the disciplines of sociology and political science - but certainly not limited to them - fashioned a new type of economic literature which supposedly embodied Canadian values.⁴³ Their goal was to undermine the hegemonic neo-classical paradigm which in their view rationalized what Ontario economist Ian Macdonald termed a "derivative economy" and justified "a neo-colonial situation."⁴⁴

For their part, Polymer's senior executives were not swept along by the rising nationalist tide. They profoundly understood that Polymer had benefitted from open access

⁴⁰ Canada. Privy Council Office. *Report, Task Force on the Structure of Canadian Industry*; especially pp. 273-275.

⁴¹ R. Rohmer, *Ultimatum* (Toronto, Clarke Irwin, 1973); and A. Purdy (ed.) *The New Romans: Candid Canadian Opinions of the U.S.* (Edmonton, Hurtig, 1968).

⁴² D. Creighton, *Takeover* (Toronto, McClelland and Stewart, 1978).

⁴³ See K. Levitt, *Silent Surrender: the multinational corporation in Canada* (Toronto, Macmillan, 1970); R. Lexer, *Canada Ltd* (Toronto, McClelland and Stewart, 1971); R.T. Naylor, *The History of Canadian Business 1867-1914*, vols. I and II (Toronto, Lorimer, 1975); and Clement, *Canadian Corporate Elite*.

⁴⁴ See I. Macdonald, "Foreign Ownership: Villain or Scapegoat?" in Russell (ed.), *Nationalism in Canada*, pp. 187-190 and M. Watkins, "The Dismal State of Economics in Canada," in I. Lumsden (ed.) *Close the 49th Parallel: The Americanization of*

to foreign markets and from the free flow of capital and ideas across the national boundary. They instinctively sensed the cosmopolitan roots of their industry and their own careers in it. Canada's liberal immigration laws had brought many of them to Sarnia in the first place. Rowzee and Stanley Wilk, who were both American by birth, had come to Canada during the war to lend their expertise in synthetic rubber production. Buckler and Ian Rush had emigrated from Great Britain, and Roger Hatch had come from France. These men, all of whom later became naturalized Canadians, were present at the dawn of the Canadian synthetic rubber program and were acutely aware that it was German *cum* American technology and scientific "know-how" that had given the program its start.⁴⁵ After the war, Polymer's ability to think, and ultimately perform, in a global context determined the firm's success. Facing the limitations of a small domestic marketplace, the young, pioneering crown corporation had "gone global" in search of emerging markets. "To have become insular....," Rowzee later recalled, "would have been fatal."⁴⁶ From that time on, Polymer's global vision had remained strong. For his part, Rowzee felt that it was a vision that needed to be shared by more Canadians. "Our experience," he told the *Globe and Mail* in June 1971, "leads me to conclude that more Canadians need to look outward and not inward to achieve a perspective that will ensure policies which encourage and support dynamic enterprise."⁴⁷ Later, in an address to the Canadian Manufacturers' Association entitled "In Pursuit of Global Markets", he stated that Canadians had to avoid the obsession with national ownership of industry if Canada was to attract the productive capital necessary to

Canada (Toronto, University of Toronto Press, 1970), pp. 197-208.

⁴⁵ Interviews with I.C. Rush (Sarnia, November 1999), E.J. Buckler (Sarnia, July 2000) and R. Hatch (Toronto, July 2000).

⁴⁶ E.R. Rowzee, "In Pursuit of a Global Market," *Industry Canada* (July 1971), pp. 29-31.

⁴⁷ *Globe and Mail*, (June 8, 1971).

flourish in a challenging global economy.⁴⁸ “Canadian ownership itself,” he stated, “is not a panacea in the business world we face.”⁴⁹ Rather, securing a healthy and growing industry for Canada would, in Rowzee’s opinion, depend on whether the Canadian economy was competitive in a world sense. Only then would Canada attract capital for productive use.

While Polymer’s senior management was not given to thinking in nationalist terms, it was concerned about the possibility of the company being taken over by a larger, integrating company. Rowzee, Hatch, Buckler and Rush shared an unassailable feeling that Polymer was *their* corporation. “It was our baby,” Roger Hatch later recalled, “and we were determined to see it continue to grow under our direction.”⁵⁰ The feeling stemmed from a common history, a history that in 1969 stretched back over a quarter of a century and consisted of a number of defining moments. At the end of the war, for example, when most observers had consigned Polymer to oblivion, the board of directors, on the advice of Rowzee and upper management, decided to carry on and ultimately proved to Canadian nay-sayers that synthetic rubber was a commercially viable industry. In the years that followed, a number of American firms had in fact emulated Polymer’s move. The result, ironically, was stiff international competition and again the critics were quick to write off Polymer. But once more Polymer confounded its critics, this time by becoming a multinational operation with manufacturing plants and a marketing centre overseas. “The white elephant,” noted the *Financial Times* in 1964, “has [again] made good.”⁵¹ From its birth, the company had been immune to the protectionist mentality that had held sway in Canada since the 1870s. Despite being government-owned and -controlled, Polymer had prospered without subsidies or protective tariffs. Such prosperity had consequently given

⁴⁸ Rowzee, “In Pursuit of a Global Market,” p. 31.

⁴⁹ *Ibid.*

⁵⁰ Hatch interview (Toronto, March 2000).

⁵¹ *Financial Times* (June 1, 1964).

Polymer's informal executive cabal a strong attachment to the firm. Rowzee and the others did not want to see control pass from their hands. Diversification appealed as a natural antidote to such a possibility. Polymer was at "a critical point", Ackerman stated in his report, and as at the end of the war, upper management and the board of directors had a difficult strategic decision to make. In his opinion, Polymer could either conservatively continue down the same path, or, as before, boldly plot a new course to convert Polymer from "a take-over prospect to an increasing threat to take over a large fabricator, a large oil company, or both."⁵² Ackerman was convinced of the wisdom of the more daring course and claimed to have the roadmap necessary for heading in a new strategic direction.

In addition to continuing to cut costs to achieve maximum efficiency and developing effective systems in order to upgrade end products, Ackerman had argued that Polymer needed to diversify and expand into related and unrelated areas of production. "Diversification," he stated, "is essential to Polymer's long-term future."⁵³ In terms of related, or what Ackerman termed "congeneric" diversification, he felt that it would be necessary for Polymer to expand into those areas of manufacturing which would further utilize the firm's existing organizational capabilities.⁵⁴ This course of action had proved successful for Du Pont in the 1910s, Hercules in the 1920s and Union Carbide in the 1930s.⁵⁵ It had allowed these multidivisional chemical companies to exploit the economies of scope existing in their major functional units - production, distribution and research. The top and middle managers at these firms were able to draw on their experiences and skills in order to make the strategic decisions necessary to achieve and maintain first-mover

⁵² *Ackerman Report.*, p. iv.

⁵³ *Ibid.*, p. xi.

⁵⁴ *Ibid.*, pp. 23-25.

⁵⁵ A. Chandler, "Development, Diversification and Decentralization," in T. K. McCraw (ed.), *The Essential Alfred Chandler*, pp.107-109; Chandler, *Scale and Scope*, pp. 175-178.

advantages for their new products.⁵⁶ For Polymer, however, expansion into related areas of production alone would not be enough, according to Ackerman, to generate the rate of growth necessary for survival. Presumably, this was due to the fact that these related diversifications, by definition, would *still* be in the petrochemical field, a field that Ackerman felt was in relative economic decline. Thus, he maintained, diversification into unrelated fields would also be necessary. According to Ackerman, Polymer would have to “seek out and acquire basic positions in newer, faster-growing, and preferably technically oriented industries... that combine a high growth rate and acceptable profits.”⁵⁷ In these cases the investment projects would have nothing in common with Polymer’s other activities. They would be unrelated to existing facilities and capabilities.

Ackerman’s recommendations were received enthusiastically by Rowzee. Feeling that Ackerman’s report provided the focus, framework and direction which was urgently required, Rowzee sent a memorandum on May 6, 1969 to the company’s senior personnel. “I am happy to be able to present to you a plan for our future,” it stated. “It is one in which I have great confidence.”⁵⁸ Echoing Ackerman, Rowzee maintained that if Polymer was to continue on its “old” course, the best that could be expected was a “levelling-off and ultimately a decline of profitability.” The answer to this, he stated, was to follow an aggressive program of expansion and diversification which would “convert Polymer into a broader-based aggressive business force.”⁵⁹ By following this new strategy for growth, Ackerman confidently predicted a tripling of Polymer’s sales within the next eight years and a return on equity of 13.72% by 1977.⁶⁰ By that time, it was anticipated that about half

⁵⁶ Chandler, *Scale and Scope*, p. 188.

⁵⁷ *Ibid.*, p. xi.

⁵⁸ E.R. Rowzee, “Memorandum re. Polymer Plan” (May 6, 1969), *Polysar Papers*, vol. 46, file: Minister of Supply and Services - Correspondence and Reports, 1969-70.

⁵⁹ *Ibid.*

⁶⁰ *Ackerman Report*, p. xi.

of Polymer profits would be derived from new businesses. "The goal," Ralph Rowzee informed the *Chemical and Engineering News* in 1970, "is to reach a 50-50 mix of rubber-nonrubber sales within the next 10 years."⁶¹ The day after Rowzee's memorandum, the *Financial Post* reported "a strong new note of optimism at the top-management level at Polymer Corporation."⁶²

To implement the new strategy, management was split into two main divisions. One would seek to maximize profits in the old rubber and latex operations. The other would look for new investments in related and unrelated fields of production. To oversee Polymer's existing businesses, Rowzee appointed Ian Rush as executive vice-president. Rush was a no-nonsense chemical engineer who, after receiving a M.Sc. from the University of British Columbia in 1943, joined Canadian Synthetic Rubber Ltd. When CSR was absorbed by Polymer in 1950, he was appointed Polymer's assistant technical superintendent. Early on, Rush demonstrated his mettle at making difficult business decisions and in 1962 he was appointed director of corporate planning. Tough, competitive, contemplative and calculating, Rush did not suffer fools gladly and expected perfection both from himself and those around him. To many, Rush was aloof and stand-offish. Indeed, more than one former colleague described him as a "cool fish".⁶³

The man that Rowzee chose to oversee the development of new business activities, on the other hand, was in many ways the very antithesis of Rush. Outspoken, restless and gregarious, Hatch was first and foremost a salesman. He was always on the go, always marketing, always looking to the next big adventure. During the 1950s Hatch had pioneered sales to China, believing that if he could put just one pair of rubber soled shoes

⁶¹ Anonymous, "Canadian firm seeks expanded U.S. market," *Chemical and Engineering News*, vol. 48 (October 5, 1970), p. 15.

⁶² *Financial Post* (May 10, 1969), p. 45.

⁶³ B. Pursell interview (Sarnia, November 1999); F. Bentley interview (Sarnia, November 1999); R. Hatch interview (Toronto, July 2000); W. Petryschuk interview (Sarnia, July

on each “Chinaman,” he and Polymer would be set for life. Hatch was a ship in full sail. Thus, when he was offered the position of executive vice-president responsible for new enterprise development, he enthusiastically accepted. He was among the first to advocate diversification and was eager to see the rapid development of new businesses. Time, according to Hatch, was of the essence. The feedback he was receiving from his many friends within the industry was that Polymer’s competitors had already begun to diversify. So committed to diversification was Monsanto, for instance, that in 1964 it dropped the word “Chemical” from its name. Three years later, it created a new enterprise department to search out new business ideas inside and outside the company. The new fields in which it invested included electronics, graphic systems, educational toys, engineering composite systems, and protein foods.⁶⁴ In hopes of boosting its “inherent growth rate”, Hercules had also established a new enterprise department in the late 1960s and diversified into such unrelated areas as information systems, health care and prefabricated modular housing.⁶⁵ Du Pont’s adventures in unrelated diversification bore remarkable parallels to those of Hercules. In the 1950s, Du Pont executives determined that they too needed to diversify by acquiring “small, highly-technical companies” outside of the petrochemical field. Thus, when Polymer embarked upon its diversification program at the end of the 1960s, it found itself a relative late-comer to a movement that had already been underway for almost a decade. This did not discourage Hatch, however. It simply meant that Polymer would now have to be “fast on its feet.”⁶⁶ In a letter dated September 22, 1969, he warned Ralph Rowzee to expect a good deal of competition when it came to acquiring new businesses.⁶⁷

2000).

⁶⁴ D.J. Forrestal, *The Story of Monsanto: faith, hope and 5000 dollars. The trials and triumphs of the first 75 years* (New York, Schuster, 1975), pp. 187-191, 210.

⁶⁵ Dyer and Sicilia, *Labors of a Modern Hercules*, pp. 363-373.

⁶⁶ R.E. Hatch, “Philosophy for Growth” (September 22, 1969), *Polysar Papers*, vol. 134, file: Corporate planning and diversification, 1968-70.

⁶⁷ Hatch to Rowzee (September 22, 1969), *Polysar Papers*, vol. 134, file: Corporate

“A really good business opportunity,” he stated, “usually involves several potential buyers.”⁶⁸ To be competitive in such a situation, he continued, would require that his new department be given “the authority and financial backing” necessary for making a quick acquisition. In many instances, he predicted, time would not permit the “depth of study” that was normal during an expansion phase. Instead, the decision making would have to be “more intuitive and entrepreneurial or the business opportunity would likely be lost.”⁶⁹

In a memorandum prepared for the board of directors entitled “A Strategy for Growth,” Hatch identified business opportunities in five broad areas - plastics systems, housing systems, computers, environmental controls and pharmaceuticals - in which he felt Polymer should concentrate its development efforts.⁷⁰ Each he considered to be a “high-growth area”, with good or high profit potential, and with a high technological content.⁷¹ In the past, almost all of Polymer’s efforts began with discovering new materials that might be useful in some way. What Hatch wanted to do was to turn this process on its head by starting with a market need and then looking for technologies to fill it.

Hatch was most bullish when it came to what he termed the “profitability potential” of housing systems. He predicted that the need for housing would accelerate in the near future and that new industrialized systems for housing would capture a large share of the market. At Expo 67, Hatch and other Polymer executives had been awestruck by Moshe Safdie’s revolutionary Habitat.⁷² The modular-housing complex, which was only a short distance

planning and diversification, 1968-1970.

⁶⁸ *Ibid.*

⁶⁹ Hatch, “Philosophy for Growth” (September 22, 1969), *Polysar Papers*, vol. 134, file: Corporate planning and diversification, 1968-70.

⁷⁰ R.E. Hatch, “Strategy for Growth,” (September 22, 1969), *Polysar Papers*, vol. 134, file: Corporate planning and diversification, 1968-1970.

⁷¹ *Ibid.*

⁷² Hatch Interview (Toronto, July 2000).

from Polymer's own pavilion⁷³, was seemingly a graphic demonstration that by industrializing the building process there were better and cheaper ways to house people. "It is almost axiomatic," Hatch wrote to Ralph Rowzee in September 1969, "that the traditional methods of home building will give way to an industrialized or factory approach whereby the efficiencies of mass production can be achieved in a similar manner to... the automobile industry."⁷⁴ Just as Henry Ford recognised the importance of "bringing the work to the workers," Hatch calculated that the centralization of materials and workers would result in tremendous savings and thus allow Polymer to provide affordable housing to the maturing baby-boom generation. When he looked out at the highly decentralized nature of the housing industry in Canada, he saw thousands of disorganised, unsophisticated builders, needlessly duplicating their efforts. Hatch predicted the "industrialization of the housing process" would revolutionize the industry, leading to a few omnipotent nation-wide builders of which Polymer, with its experience in cutting-edge technologies, would be one.⁷⁵

In the late 1960s there were several American firms developing the technology for industrialized home building. Of them, Hatch singled out Stressed Structures Inc. (SSI) of Denver, Colorado as the "front runner" in the field.⁷⁶ SSI had developed a patented technology named the "uniment system" for volume production of lightweight, completely serviced, reinforced concrete housing modules. The technology used a special concrete that expanded as it dried, elongating the reinforced steel in the three-dimensional structure and simultaneously placing the concrete under compression. The benefit of this new technology

⁷³ Called "Curiosity: A Way of looking at Thing," Polymer's white concrete pavilion was constructed to represent a giant molecule. Inside there were nineteen unique exhibits, each designed to show the results of man's curiosity in the realm of rubber chemistry.

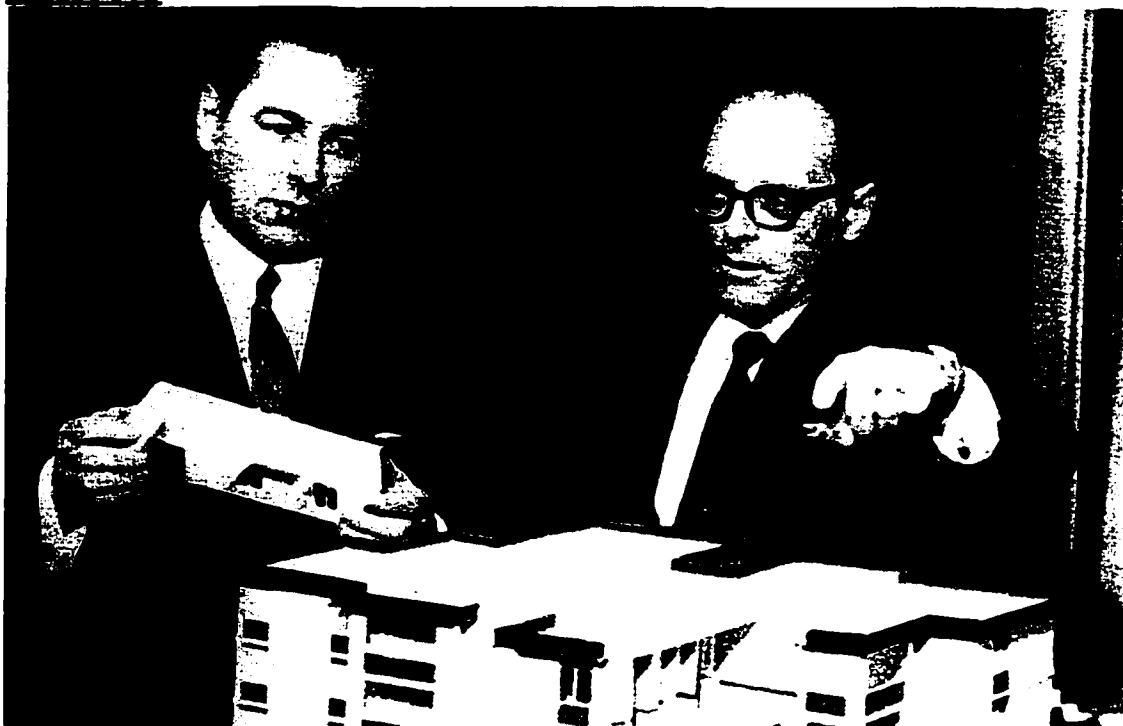
⁷⁴ Hatch to Rowzee (September 22, 1969), *Polysar Papers*, vol. 134, file: Corporate planning and diversification, 1968-1970.

⁷⁵ *Ibid.*

⁷⁶ Hatch, "Strategy for Growth," p. 3.

was that it allowed for very thin (2.5 inches thick), pre-stressed, load-bearing walls which made the finished prefabricated units remarkably light and therefore portable. The bulk of

Figure 5.1



Roger Hatch left, and George Bracewell examine the company's newest product line from Polymer's building systems division. Source: *Polysphere Fifty*, p. 79.

work could thus be done within a factory rather than on site, bringing about economies of scale. In a statement prepared for the financial press, Polymer stated that it was unable to find any existing system which combined the architectural versatility, the high degree of industrialization and the economic advantages of the uniment system.⁷⁷ "We believe that the technology for the building of chemically prestressed housing," Polymer's vice-president of corporate finance, George Bracewell stated, "is the best in the field and will prove itself superior to other modular systems."⁷⁸ In late September 1969, Polymer's board of directors endorsed Hatch's planned expenditure of \$3.25 million to acquire a 13% stake in Stressed Structures Inc. and to license its technology for exclusive use in Canada and in

⁷⁷ "News Release" (February 4, 1970), *DMS Papers*, vol. 16, file: ERD-4560-2.

⁷⁸ G. Bracewell, "The Future," *Polysphere* (April, 1972), p. 8.

Europe.⁷⁹ The board's approval was welcome news to Hatch, who had been pressing hard for an expansion into housing.⁸⁰

From the start, however, the housing program was plagued by problems. Late delivery of key equipment delayed the start-up of Polymer's plant at Milton, Ontario. And after the plant finally came into operation in the latter part of 1972, factory operating problems were encountered, interrupting the construction progress at key development sites. Such interruptions did not help Polymer's bid to industrialize the home building industry. It was proving difficult enough to get real estate developers interested in the new technology and the delays at the Milton plant were simply making matters worse. The principal reason for the lack of enthusiasm on the part of developers was that the new technology was turning out to be - to the shock and horror of Polymer's management - fundamentally flawed.⁸¹ The concept of stressing by using concrete that expanded during setting, and thereby applied tension to the embedded steel reinforcement, was demonstrated by SSI to have worked well on small blocks in the laboratory. But remarkably Polymer, in its haste to diversify away from rubber, had not demanded that there be scale-up pilot plant trials before purchasing the technology from SSI. When it came to fabricating building-sized sheets of concrete, the relative movement between the ends of the expanding concrete and the ends of the reinforcing elements was so large that slippage occurred. The concrete lost its grip on the reinforcing steel and thus pre-stressing could not be achieved. As a result the modules had to be of normal thickness and could not be stacked several stories high as had been anticipated.

In an effort to overcome some of these problems, H.W. Suters, the former managing director of the Ontario Housing Corporation (OHC), was brought in to oversee the building construction department. It was hoped that Suter could use his contacts within the industry,

⁷⁹ "Minutes," (September 25, 1969), *Polysar Papers*, vol. 4, book 11, p. 6.

⁸⁰ "News Release," (February 4, 1970), *DMS Papers*, vol. 16, file ERO.4560-2.

⁸¹ Buckler interview (Sarnia, March 2001).

particularly those at OHC, to stimulate demand for Polymer's prefabricated, modular housing. He could not. After only a year of operations, the department had incurred "substantial" losses. In an effort to reverse the trend, a new strategic plan was formulated for the division. Initially, the division's objective had been to build the prefabricated units and sell them to public and private contractors who would use them for the construction of condos, hospitals and hotels. But the new plan widened the department's scope from builder to "builder-developer." The division's new objective was outlined in the company's 1973 annual report: "We seek a position as a major builder-developer furnishing high quality housing based on the modular concept at a cost competitive with that of the conventional business."⁸²

The new plan required not only changes in design and production methods, but also investment in land on which to situate the houses. The move proved to be disastrous. Polymer had no experience in the field and soon found that it was unable to compete with traditional builder/developers who, ironically, were "faster on their feet" and more adaptable to the changing demands of the housing industry. To make matters worse, in 1974, the extended boom of the preceding ten years came to an end. That year, real GDP growth in Canada fell to 4.4% from 7.7% a year earlier. Despite the slowing of the economy, consumer prices did not fall, causing the inflation rate to jump to over 10%. The cost of consumer borrowing rose as a result, killing the Canadian consumers' appetite for housing. This in turn was a factor in the depressed state of the home building market. In 1974, the number of housing starts in Canada dropped to 169,437 from 211,543 in the previous year.⁸³ Unlike traditional builder/developers who had little in the way of fixed overhead and therefore could easily down-size in the face of declining demand, Polymer's cost were fixed. The plant at Milton was of fixed scale and scope, which froze Polymer's

⁸² *Annual Report (1973)*, p. 9.

⁸³ Statistics Canada. *Housing Starts and Completions*, vol. 28, no. 12 (December 1975), p. 15.

investment even when there was a slump in building. In practice therefore, conventional construction technology was relatively very flexible and cost effective and could be adapted to many different building styles, in many locations. Polymer's modular housing technology could not.

With losses mounting, the decision was made to withdraw from the housing business. Four years of experience in the industry had convinced Polymer that modular housing was a dead end. The revolution in housing construction, which Hatch had bet on, had not occurred. All of the division's assets were subsequently written down to net realizable value and placed on the market. In total, the diversification into housing systems had cost Polymer over \$20 million. This was hardly the start to diversification that the company had wanted or anticipated.

Polymer's diversification into the information processing field was only slightly more successful.⁸⁴ In his 1969 report, Hatch predicted that in the years ahead the use of computers would extend to an ever increasing spectrum of business activities. "The use of computers in business," he presciently wrote to Rowzee in September 1969, "is only now scratching the surface."⁸⁵ Hatch was particularly interested in computer time-sharing and in Com-Share Ltd., one of the industry's leading companies. Incorporated in 1968, Com-Share entered the Canadian market with a business strategy based on the use of hardware developed in the United States. It emphasized software and application packages in step with computer hardware improvements. According to Hatch, Com-Share had "excellent technology and marketing capabilities" that would enable it "to meet the needs and demands of a wide range of organizations."⁸⁶ As a high technology firm, Com-Share was considered

⁸⁴ *Annual Report* (1971), p. 10.

⁸⁵ Hatch to Rowzee (September 22, 1969), *Polysar Papers*, vol. 134, file: Corporate planning and diversification, 1968-70.

⁸⁶ R.E. Hatch quoted in *Polysphere* (May-June, 1970), p. 8.

a complement to Polymer's own emphasis on knowledge-based growth.⁸⁷ In December 1969, the board of directors authorized another expenditure of \$3.25 million, this time to acquire a 50% interest in Com-Share (Canada) and to expand its operations into Europe.⁸⁸ Under the terms of the sale agreement, Polymer would have six seats on Com-Share's eleven-man board of directors. In April 1970, Hatch, Bracewell, Dyke, Willoughby, Lewis and Hibberd were elected.

By acquiring an established business, Hatch felt that Polymer could avoid some of the out-of-pocket costs for equipment and facilities as well as overcome some of the managerial and technical difficulties which often bedevilled a firm entering a new area of production.⁸⁹ He also believed that diversification via acquisition was the quickest way of gaining access to new business areas. In her classic work *The Theory of the Growth of the Firm*, Edith Penrose argues there are basically two methods of expansion open to the individual enterprise: it can build new plants and create new markets for itself - what Hatch termed "grassroots expansion" -, or it can acquire the plants and markets of already existing firms.⁹⁰ For the expeditious Hatch, expansion via acquisition was the preferable method. "Grassroots entries," he wrote to Rowzee in 1969, "will take considerably more time, greater pre-investment in staff and research resources and greater risk."⁹¹ In Hatch's mind,

⁸⁷ *Ibid.*

⁸⁸ "Minutes of the Board of Directors" (December 4, 1969), *Polysar Papers*, vol. 4, book 11, p. 6.

⁸⁹ Hatch, "Strategy for Growth," p. 2.

⁹⁰ Penrose, *The Theory of the Growth of the Firm*, pp. 127-132 and 156-58. Penrose argued that there are benefits to acquisition. A valuable market position could often be obtained which might otherwise have taken years to build up. And immediate pressure from competition was often substantially reduced. Of especial importance was the fact that a firm could also acquire an experienced management "team" and an experienced technical and labour force. Hence acquisition could be used as a means of obtaining the productive services and knowledge that are necessary for a firm to establish itself in the new field.

⁹¹ Hatch to Rowzee (September 22, 1969), *Polysar Papers*, vol. 134, file: Corporate

therefore, the acquisition of Com-Share was the best and quickest way for Polymer to become “a major vendor offering on-line computer services.”⁹²

Unfortunately, in its haste to gain access to the computer field, Polymer overestimated Canadian demand for Com-Share’s services. It had been blithely assumed that the Canadian market was similar to the U.S. market. But what executives failed to recognize was that many Canadian plants were subsidiaries of U.S. companies, whose information processing was done in the U.S. Thus there was not the demand for Com-Share’s services that had been anticipated. This misassessment of the characteristics of the Canadian marketplace resulted in a loss of over \$700,000 in 1970. In the following year Com-Share did not fare any better. Technology and monitoring problems resulted in an operating loss of over \$1.2 million. In September 1972, Hatch wrote to the board of directors that the investment in computer systems had fallen short of expectations. “In summary,” he stated, “our investment in Com-Share Limited has to date failed to achieve the projected results.”⁹³ In two and a half years of operation, Com-Share’s Canadian and U.K. operations had lost over \$3.3 million.⁹⁴ It was not until 1977 that Com-Share finally generated a profit.⁹⁵

By nearly every measure, the diversification into information systems and modular housing was a failure. Impelled by new incentives, Polymer’s managers had moved away from the proven principles of earlier achievement toward a more frenetic, and ultimately self-defeating, search for profits. The synergies that Polymer had expected did not materialize primarily because top managers had little specific knowledge of the technical processes and markets of the divisions and subsidiaries they had acquired. Without the product-specific experience needed to evaluate proposals and to monitor the performance of

planning and diversification, 1968-70.

⁹² *Annual Report* (1973), p. 9.

⁹³ Hatch to the Board of Directors (September 19, 1972), *Polysar Papers*, vol. 135, file: Development/Diversification, 1963-1972.

⁹⁴ *Ibid.*

their operating managers, Polymer's senior management often found itself wandering in the dark. It had been assumed by nearly all those advocating diversification that because Polymer was a high-technology firm it was somehow innately capable of successfully acquiring and operating other "cutting-edge" businesses. The assumption was presumptuous and misguided. Perhaps even worse from a long-term perspective, the diversification effort jeopardized Polymer's core competency in synthetic rubber science and technology.

During the first twenty-five years of operation, synthetic rubber science and technology at Polymer was the driving force behind the growth of the firm. R&D was encouraged, emphasized and, indeed, enshrined. But during the decade 1967-1977, with the company experiencing economic stress, turmoil and change, research and development was de-emphasized. The research and development department underwent reorganisation and retrenchment and, apart from one important exception - the development of bromobutyl rubber, a revolutionary innovation that assured Polymer a permanent place in the synthetic rubber industry - concentrated on the progressive improvement of existing products and processes. Given the widespread belief at Polymer, especially among its corporate planners, that the synthetic rubber business was in decline, it was decided to postpone the commercial development of a number of innovations and instead to "concentrate efforts in the fields to which the corporation is now committed."⁹⁵ For instance, in 1968 work was suspended on the development of ethylene-propylene rubber - a stereo-specific rubber used in the production of wire and cable insulation. It was not until twelve years later, after the decision was made to get "back to basics," that the project was reinitiated. But by that time markets had been lost and Polymer found itself at a comparative disadvantage. Likewise, work had been halted on the development of thermoplastic block elastomers. These compositions could be moulded like plastics when hot and behaved like rubbers when at

⁹⁵ *Annual Report (1977)*, p. 9.

room temperature. Used primarily in the manufacturing of toys, insulation and mechanical goods, their main purpose was to avoid the expensive curing step needed for conventional rubber. This was a burgeoning field (during the 1980s thermoplastic rubbers were the fastest growing segment of the speciality rubber market) in which Polymer had enjoyed some early success.⁹⁷ Nevertheless, the marketing division came to the conclusion, in 1970, that the world demand for thermoplastic rubber of the block type would only be large enough to support one producer, namely Shell. Thus the program was shut down, along with associated work on living polymerization, lithium and block polymers. "The decision," Buckler later recalled, "broke my heart."⁹⁸ At the same time, the ABS resin program came under pressure and was also terminated. The operation in Canada was not large enough to support the research, development and technical service necessary to compete with the large U.S. producers who had established branch plants in Canada.

The progressive reduction of the research and development activities in Polymer's basic businesses created a surplus of technical and scientific personnel. In response, Ian Rush made the decision to lay off 300 research scientists. Rush had taken over the presidency from Rowzee in 1971, much to the consternation of Roger Hatch. Hatch had always believed that he was Rowzee's natural heir. He had, after all, done more than any other single individual, with perhaps the exception of J.R. Nicholson, to promote Polymer products abroad and his tenure with the company predated that of Rush. Nevertheless, the board of directors selected Rush to succeed Rowzee, who agreed to stay on with the company as chairman of the board. The reason for the board's preference is unclear. Perhaps it was Hatch's opposition to the Sarnia Olefins Aromatics Project (SOAP) - a mammoth program which would see Polymer and its partners invest three-quarters of a billion dollars in a plant to manufacture feedstocks for the regional petrochemical industry.

⁹⁶ *Annual Report* (1971), p. 11.

⁹⁷ E.J. Buckler, "Nostalgia," p. 7.

⁹⁸ Buckler to Bellamy (July 14, 2001).

Perhaps it was the disappointing start to the diversification effort over which Hatch had presided. Perhaps it was that, in this age of corporate planning, the board wanted a corporate planner like Rush at Polymer's helm. Or perhaps the board sensed that it was Rush who would be more effective implementing the tough cost-cutting measures that lay on the horizon.

Whatever the reason, Rush was appointed Polymer's seventh president in 1971 and he immediately got to work reorganizing and downsizing the existing operations so as to generate the money necessary for further diversification. In 1971, the corporation was decentralized along divisional lines to promote efficiency and cost-consciousness. The functional structure of the corporation was disbanded and each line of business was made into an autonomous centre responsible for its own financial performance. Polymer was among the first crown corporations to be reorganized along these lines. Several years later, when the profit-seeking Roger A. Bandeen took over as president of the Canadian National Railway, Canada's oldest and largest federal crown corporation, he followed Polymer's move, reorganizing the company into "profit centres." Bandeen argued that this gave management a more accurate yardstick for measuring the success of the firm.⁹⁹ At Polymer, Rush gave each line of business direct control over its research and development activities and authorized each one to select the development programs and personnel it favoured. The supporting R&D activities such as pilot plants, and analytical and compounding laboratories were centralized into one department to provide services to all product lines. Scientific and technical personnel from the research and marketing divisions were formed into a new group, the technical development division, and a small research group was established to explore the remaining interesting ideas not included in the divisional programs. While the reorganization had the desired effect of reducing overall costs, it weakened communication

⁹⁹ See J. Gratwick, "Canadian National: Diversification and Public Responsibilities in Canada's Largest Crown Corporation," in W.T. Stanbury and F. Thompson, *Managing Public Enterprises* (New York, New York, Praeger, 1982), pp. 244-245.

links and compromised Polymer's core competency.

Despite Rush's cost-cutting measures, in 1971-72 Polymer was still having trouble generating the funds necessary for further diversification. In his report, Ackerman had maintained that Polymer would have to generate roughly \$8 million in equity each year to finance the diversification program.¹⁰⁰ But in 1971 the crown corporation recorded an after-tax profit of just \$500,000 on sales of \$174.7 million.¹⁰¹ This was the lowest level of net earnings since the financial reorganization in 1952 and well short of the amount that was required to feed further diversification. With the "profit squeeze" affecting the petrochemical industry getting tighter, management struggled with ways to come up with additional capital. The solution which it formulated was to tap the international capital market by transforming the crown company into a publicly traded enterprise.¹⁰²

But the federal government had different plans for Polymer. In January 1971, after almost a decade of political deliberation and procrastination, the Liberal government, in response to the rising nationalist tide, introduced legislation to create the Canada Development Corporation - a government sponsored, venture capital and holding company. The logic behind the CDC had a decidedly nationalist bent: to develop and maintain strong Canadian controlled and managed companies in the private sector. By channelling funding into Canadian industrial development, the CDC would close the gap in Canadian capital markets that inhibited equity holding by Canadians and facilitated it by foreigners. In one sense, the CDC would act like any other large diversified holding company, picking businesses which were thought to be the "winners" in their respective fields in order to generate a profit for its shareholders. In another sense, however, it would be very different from other conglomerates in that "its shares would be owned only by Canadian citizens and

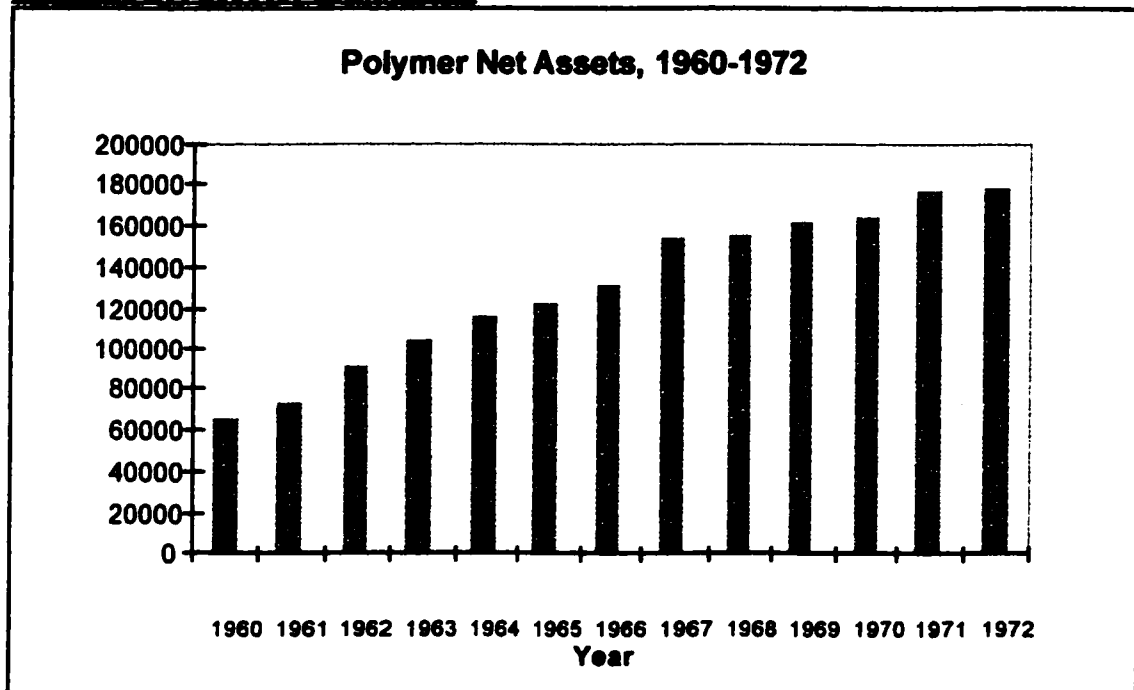
¹⁰⁰ *Ackerman Report*, p. xi.

¹⁰¹ *Annual Report* (1971), p. 2.

¹⁰² "Notes - Board of Directors' Dinner in Montreal" (February 26, 1969), *Polysar Papers*, vol. 44. file: Directors' correspondence, 1968-1970.

residents and the national interest was supposed to be very much a part of its objectives and

Figure 5.2
Polymer net assets, 1960-1972



Source: *Annual Reports* (1960-1972).

operating policies.”¹⁰³ The CDC would thus have both a commercial and public policy purpose. It was widely anticipated that once the CDC became an institutional reality, Polymer and two other “profit-oriented” crown corporations, Eldorado and Northern Transportation Company Limited, would come under its control.¹⁰⁴ With net assets of roughly \$180 million, Polymer would be the largest of the CDC’s holdings. In terms of net assets, Polymer had tripled in size since 1960 (see figure 5.2 above). Polymer would thus give the CDC the scale, cash flow and respectability that it would need to achieve its commercial and public policy objectives. The CDC had first been proposed by Walter Gordon during the election campaign of 1962-63 as an instrument to curb foreign take-

¹⁰³ M.R. Graham, “Canada Development Corporation: A Corporate Background Report,” *Royal Commission on Corporate Concentration*, study 4 (Ottawa, January 1976), p. 1.

¹⁰⁴ *Globe and Mail* (April 25, 1969); and *Canadian Dimension* (May-June) pp. 7, 22.

overs of Canadian industries and to encourage Canadians to invest more in domestic enterprises. Gordon's plan, however, ran into heavy criticism, both from political opponents and representatives of the financial and business communities. Those on the right, like the former Tory finance minister Donald Fleming and his friends on Bay Street and in the financial press, viewed the CDC as a "socialistic monster".¹⁰⁵ Neil McKinnon, the chairman of the CIBC, for instance, argued that the CDC was incompatible with the principles of the free enterprise system and marketplace economics.¹⁰⁶ Ironically, it was another of the CIBC's senior personnel, Marshall Crowe, who became the first president of the CDC when it was finally established in mid-1971. In an address delivered to the Canadian Club of Toronto on January 17, 1966, McKinnon took issue with Gordon's position that foreign investment in Canada was detrimental to the nation. Gordon had long maintained that there was a debilitating gap in Canadian capital markets and that this, in turn, was compromising Canadian economic sovereignty. The CDC was conceived by Gordon as a partial remedy to this "worrisome situation"; it would provide equity finance to Canadian ventures that might otherwise be compelled to turn to foreign sources for funds. McKinnon agreed with Gordon that there was a shortage of investment funds in Canada, but argued that this was not a distinctly Canadian phenomenon and therefore did not warrant Gordon's radical remedy.¹⁰⁷ Gordon, of course, disagreed.

While those on Bay Street and on the political right opposed Gordon's CDC because they felt it would lead to too much government intervention in the economy, those on the political left objected to it because, in their opinion, it would not extend the principle of government intervention far enough. United behind the basic tenet of functional socialism -

¹⁰⁵ Fleming, *So Very Near*, p. 653; J. Meyer, "Will the CDC lead to the total socialization of the economy", *Executive* (March, 1971), p. 13.

¹⁰⁶ N.J. McKinnon, "An Address delivered to the Canadian Club of Toronto" (January 17, 1966), p. 8. *Walter Gordon Papers*, vol. 4.

¹⁰⁷ *Ibid.*, p. 11.

that a greatly increased level of government intervention was the most appropriate response to the problems created by and in a capitalist society - the NDP and others on the left played an active and aggressive role in the debate over the CDC. They opposed Gordon's suggestion that the government should retain only a ten percent ownership of the CDC's shares, arguing instead for total government ownership and control. If economic power was to be concentrated, the left argued, then the best place for that to occur was in the hands of government. This would assure that the collective national need transcended that of the individual investor.¹⁰⁸ In the end, they almost got their wish. Faced with investor apathy, scepticism, and conservatism, the Canadian government was forced to retain a 47% ownership in the CDC well into the 1970s. The CDC was thus not the privately-owned development corporation that Gordon had envisioned but a mixed-enterprise - a firm owned jointly by the government and private investors.¹⁰⁹

The left's objections to Gordon's plan did not end there, however. Soon after his appointment as finance minister in 1963, Gordon began hinting that Polymer would be among the CDC's first acquisitions.¹¹⁰ Gordon was a great admirer of Polymer. He viewed the corporation as a symbol of Canada's managerial and technological competence.¹¹¹ In an address to the Canadian Club in Sarnia in October 1965, he celebrated the achievements of the firm. "The Corporation's success amidst highly competitive business conditions," he stated, "has been the result of efficient businesslike operations free from interference from

¹⁰⁸ *Canadian Dimension* (May-June) pp. 7, 22.

¹⁰⁹ For a more through analysis of the nature of mixed-enterprises see, L. Musolf, *Mixed-Enterprise: A Developmental Perspective* (Lexington, Mass., Heath and Co., 1972), especially pp. 3-7.

¹¹⁰ W.L. Gordon, "Discussion regarding the Canada Development Corporation (March 23, 1964), *Walter Gordon Papers*, vol. 4, file: CDC.

¹¹¹ W. Gordon, "Address to the Canadian Club, Sarnia: Polymer and the Canada Development Corporation" (October 7, 1965), *Walter Gordon Papers*, vol. 37, file: Speeches, 1965.

the outside.”¹¹² Gordon was profoundly aware of the earlier efforts to take over the crown corporation and had strenuously objected to the Diefenbaker government’s plans to privatize the firm. But at that time, he was unable to conceive of a solution that would free Polymer from government ownership without control passing into foreign hands. It was only later that he came up with the idea of selling Polymer to the CDC. The benefits of doing so, he told his Sarnia audience, would be multiple. Polymer would get not only the access to capital and markets it needed, but also the freedom it deserved. In return, the CDC would get “a large and immediate income and some diversification.”¹¹³ Without such a start, Gordon maintained, the commercial future of the CDC would be subject to a number of uncertainties, thus making the sale of its shares to the public more difficult. But perhaps most importantly, as far as Gordon was concerned, by selling Polymer to the CDC Canada would retain ownership and control of one of its most innovative companies, thereby ensuring the health and stability of the Canadian petrochemical industry.¹¹⁴

Nevertheless, many on the left considered Gordon’s plans for Polymer a “regressive step.” As things stood, all Canadians shared in the profits of Polymer, noted the editors of *Canadian Dimension* - a left-leaning, neo-nationalist periodical - but if Gordon’s legislation was enacted and Polymer sold to the CDC, the major portion of the profits would go to only a handful of citizens - i.e. the shareholder of the CDC.¹¹⁵ That would be an unacceptable development, declared Stanley Knowles, the NDP’s elder statesman.¹¹⁶ To

¹¹² *Ibid.*

¹¹³ W.L. Gordon, “Discussion” (March 23, 1964), *Walter Gordon Papers*, vol. 4, file: CDC.

¹¹⁴ W. Gordon, “Address” (October 7, 1965), *Walter Gordon Papers*, vol. 37, file: Speeches, 1965.

¹¹⁵ “The Canadian Development Corporation,” *Canadian Dimension*, (May-June, 1965), pp. 7, 22.

¹¹⁶ Canada. House of Commons. *Debates* (June 7, 1971), p. 6431.

take Polymer, a government-owned corporation being run by the “people” for the benefit of the “people”, and turn it over to a few capitalists, was in his opinion a bankrupt idea. Knowles maintained that despite Gordon’s statements to the contrary, there was no way to guarantee the nationality of the shareholders of the CDC and therefore no way to guarantee that Polymer would continue to be operated by Canadians for the benefit of Canadians. As the pace of globalization accelerated, Knowles and others on the left came to view the nation’s crown corporations as the last bastions of Canadian capitalism. In 1974 Herschel Hardin, echoing the sentiments expressed sometime earlier by the historian Frank Underhill¹¹⁷, argued that public enterprise was central to Canadian economic culture and hence the national identity. In his treatise *A Nation Unaware*, he singled out Polymer for special praise:

Created by public enterprise, Polymer also endured and excelled in public enterprise. Over and above that it manifested, in its operations, a recognizably Canadian public enterprise style.... The best single adjective for it is “civilized” - a civilized style which in Polymer’s case, stemmed from the ambiguous character of Canadian nationalism itself.¹¹⁸

In this time of increasing global reach, Hardin and others on the left implied that the nation needed more crown corporations, not fewer. Indeed, Mel Watkins and his disciples within the Waffle Group of the NDP argued for the nationalization of all industry as a defence against American “corporate imperialism.”¹¹⁹ For the Waffle Group, the nationalist left wing of the NDP, the major threat to Canadian survival was “American control of the Canadian economy.” The group’s solution was to replace capitalism with socialism, including “national planning of investment” and “public ownership of the means of

¹¹⁷ F. Underhill, “Oh Canada, Our Land of Crown Corporations”, in H.D. Forbes (ed.), *Canadian Political Thought* (Toronto, Oxford University Press, 1985), pp. 227-229.

¹¹⁸ Hardin, *A Nation Unaware*, pp. 133-134.

¹¹⁹ M. Watkins, “Will We Have to Nationalize?” *Canadian Dimension* (July 1969), pp. 4-5; D. Godfrey and M. Watkins, *Gordon to Watkins to You. A Documentary: the Battle for Control of Our Economy*, (Toronto, Free Press, 1970), pp. 104-105.

production.”¹²⁰ While not everyone on the left supported Watkin’s socialism, most agreed that the denationalization of Polymer was a strange way to go about re-patriating the Canadian economy. Thus, they strenuously objected to the idea of selling Polymer to the CDC.¹²¹ “Polymer corporation is 100 percent Canadian owned and controlled,” stated Randolph Harding of the NDP in the House of Commons. “Let us keep it that way.”¹²²

When news of Gordon’s plans reached Polymer, the reaction was mixed. On the one hand, a sale to the CDC would, as Gordon maintained, remove Polymer from the hands of the government and so it was viewed in a positive light. Since 1960, Polymer’s brain trust had been advocating the denationalization of the firm and while a sale to the CDC would not eliminate the government’s involvement altogether, it was seen as a step in the right direction.¹²³ It had long been felt at Polymer that with government ownership there was always the possibility of political interference in its affairs. To be sure, to date, Polymer had operated virtually free of political intervention. Nevertheless, management and the board of directors continually worried that this situation would not last. “It is a fact that in the past the Canadian government has accepted [our] ‘decisions of change’ when they were required,” Ralph Rowzee stated in 1969. “However, changes in Governments and Government policies bring with them the likelihood of changed attitudes toward a Crown Corporation and what it should be doing.”¹²⁴ Rowzee was convinced that as a commercial

¹²⁰ *Ibid.*

¹²¹ Hardin, *A Nation Unaware*, pp. 242-244; The editors, “The Canadian Development Corporation,” *Canadian Dimension*, p. 22.

¹²² Canada. House of Commons. *Debates* (June 7, 1971), p. 6433.

¹²³ Rowzee, “Objectives for 1960” (January 22, 1960), *Churchill Papers*, vol. 37, file: Polymer Corp. Ltd; “Minutes of the Board of Directors” (June 16, 1960), *Polymer Papers*, vol. 12; “Minutes of the Broad of Directors” (February 1, 1963), *Polysar Papers*, vol. 4; and “Minutes of the Board of Directors” (October 16, 1969), *Polysar Papers*, vol. 4.

¹²⁴ Rowzee, “Memorandum on Growth and Diversification,” (December 9, 1969), *Polysar*

enterprise with no directive from Ottawa other than to turn a profit, Polymer needed the freedom of choice and action that was enjoyed by other profit-oriented firms. "Continuance of our long-established principles of operation and continued independence of decision," he stated shortly after meeting with Walter Gordon in February of 1965, "are, in my opinion, essential to the future well-being of the Company."¹²⁵ It was a position he later voiced to other ministers of the crown. If incorporation in the CDC could guarantee Polymer's independence, Rowzee maintained, then the proposal would have the full support of management and the board of directors.¹²⁶ The problem was that Gordon's proposal was so vague in terms of the details that no one at Polymer seemed to be sure whether incorporation into the CDC would give the firm more or less independence.

Gordon - as Stephen Azzi notes in *Walter Gordon and the Rise of Canadian Nationalism* - was concerned with broad political and economic issues, seldom discussing or even thinking about the finer points of his proposal.¹²⁷ This was certainly the case in regard to the plan to sell Polymer to the CDC. Despite addressing himself to the topic in October 1965, many of the details of his proposal remained unspecified.¹²⁸ Was the purpose of the CDC to "buy back" Canadian industry or maximize profits for its shareholders? If the former, would Polymer be mixed in with what Rowzee termed "a nondescript group of companies which were not money makers?"¹²⁹ Would Polymer be

Papers, vol. 134, file: Corporate Planning, diversification 1968-70.

¹²⁵ Rowzee to the Board of Directors (May 21, 1965), *Polysar Papers*, vol. 4.

¹²⁶ "Minutes of the Board of Directors" ((March 25, 1965), *Polysar Papers*, vol. 4.

¹²⁷ Azzi, *Walter Gordon*, especially pp. 114-17, 139-40 and 148-49. Also see, S. Azzi, "Intuitive Nationalist, Walter Gordon as Thinker," *Journal of Canadian Studies*, vol. 34 (Winter, 2000), pp. 121-135.

¹²⁸ W. Gordon, "Polymer and the Canada Development Corporation" speech to the Canadian Club of Sarnia (October 7, 1965); *Walter Gordon Papers*, vol. 37, file: Speeches (part 6).

¹²⁹ Rowzee to the Board of Directors (May 21, 1965), *Polysar Papers*, vol. 46, file:

“milked” - as was suggested by the Canadian Trade Committee, the blue ribbon industrial lobby group¹³⁰ - to shore up the less prosperous companies owned by the CDC?¹³¹ Would Polymer’s operations still be based on sound business principles and the profit motive? Would Polymer continue to develop and expand within the CDC or would incorporation in the CDC retard Polymer’s growth? Would the CDC take a hands-off approach to Polymer or demand a say in the way the firm was run? To these questions, Gordon had no satisfactory answers and as a result those at Polymer withheld their support from Gordon’s proposal. “Until we know what form [the] CDC will take and how it will operate,” Rowzee wrote to the board of directors, “we cannot properly evaluate this facet of a change of ownership.... For this reason, I believe we should withhold our support.”¹³²

But by 1972 Rowzee had changed his mind. In need of capital to finance the ailing diversification effort, Rowzee threw his full support behind the measure. Despite strong political opposition and the declining political fortunes of Walter Gordon, the idea of creating a corporation to promote Canadian ownership and control of domestic industry had not gone away and in June 1971 the Trudeau government brought the CDC into being. In addition to its primary task of counteracting the multinational challenge, the CDC,

Correspondence, 1965.

¹³⁰ Canadian Trade Committee, *The Canada Development Corporation - An Assessment of the Proposal* (Toronto, 1966), especially, p. 7. The Canadian Trade Committee, which was made up of such industrial dignitaries as J.D. Barrington, Earle McLaughlin, the president of the Royal Bank of Canada and W.O. Twaits, the president of Imperial Oil Limited, condemned Gordon’s proposal to sell Polymer to the CDC, calling the idea “indefensible.” According to the committee’s report, which was prepared by the economist E.P Neufeld, the sale to the CDC would do little if anything to benefit Polymer. If it was to benefit anyone, the committee maintained, it would be the CDC, bolstering its earnings and assisting in the marketing of its shares.

¹³¹ “Memorandum” (May 21, 1965), *Polysar Papers*, vol. 46, file: Department of Defense Production (part 2).

¹³² Rowzee to the Board of Directors (May 21, 1965) vol. 46, file: Correspondence, 1965.

somewhat paradoxically, became the instrument through which the government denationalized a number of its “profit-seeking” crown corporations. The Trudeau government could see no logic in retaining a crown corporation which served no public policy purpose other than to generate a profit.¹³³ Successive federal governments had been uneasy about the socialist implications of public ownership of institutions like Polymer, which functioned by every practical test as a member of the private sector. Yet they had struggled with how to go about denationalizing these firms without compromising Canadian ownership and control. A sale to the CDC offered a practical way out of the philosophical mire. But Ottawa was reluctant to act without Polymer’s approval. That came in March 1972: “Given a free choice,” Rowzee wrote to James Richardson, “I would like to see [the] CDC acquire Polymer.”¹³⁴ It was a position also shared by Polymer’s board of directors.¹³⁵ Two things had prompted Polymer to shift its position. The first came in the form of assurances from the government and CDC officials that there would be strong and on-going support for Polymer’s diversification program and that there would be little interference in the affairs of the firm.¹³⁶ The second was that Polymer’s market value had dropped to a level where it was questionable if the sale of its shares to the public would generate the capital necessary for further diversification and expansion.

With all sides agreeing to the sale, Polymer was sold to the CDC for \$62 million in July 1972. “A new era is ahead,” predicted Anthony Hampson, the chairman of the CDC.¹³⁷ According to Hampson, who became part of Polymer’s executive committee in August of 1972, the sale would make Polymer “more aggressive, more private enterprise-oriented and

¹³³ *Ibid.*, p. 6.

¹³⁴ Rowzee to Richardson (March 8, 1972), *Polysar Papers*, vol. 46, file: Correspondence, 1971-1972.

¹³⁵ “Minutes of the Board of Directors’ Meeting” (January 27, 1972), *Polysar Papers*, vol. 4, book 12.

¹³⁶ Rush interview (Sarnia, November 1999).

more entrepreneurial.”¹³⁸ The multi-million dollar sale included an additional payment of up to \$10 million depending on Polymer’s earnings over the next two years.¹³⁹ The payment was in the form of 6,142,000 common CDC shares with a book value of roughly \$10 a share. At first glance, a \$72 million selling price might have seemed low for a company with total assets exceeding \$180 million and shareholders’ equity of \$123.5 million at the time of the sale. On the CDC’s balance sheet there was \$51.6 million of negative goodwill by which the net assets purchased exceeded the price paid. However, the three independent estimates obtained by the government prior to the sale, two by separate government departments and one by a leading investment dealer, all clustered around the \$62-72 million range of the CDC’s purchase price.¹⁴⁰

In the years following the sale, Polymer took advantage of the CDC’s financial backing, both in terms of share issues and loans advanced to provide the corporation with lower cost equity financing. In February 1977, for instance, the CDC advanced \$50 million to the company on an interest-free basis. In addition, Polymer used the CDC’s backing to diversify backwards into feedstocks. In his report, William Ackerman had suggested the need to integrate/diversify backwards to remain competitive in the synthetic rubber field. He predicted that by the end of the decade only a handful of heavily-integrated companies would be producing synthetic rubber. “Polymer’s management,” he declared, “should act as though one-profit integration into oil-rubber-fabrication will be a reality by 1980... [and

¹³⁷ *Polysar Progress* (September-October, 1972), p. 1.

¹³⁸ *Ibid.*

¹³⁹ Privy Council Office, *Cabinet Minutes* (July 13, 1972), p. 11.

¹⁴⁰ Wood Gundy, “Polymer Corporation Limited: A Valuation for the Department of Supply and Services, Government of Canada,” (April 14, 1972), *Polysar Papers*, vol. 46; “Inter Department memo re: valuation of Polymer Corp. Ltd. and its subsidiaries.” (January 17, 1972), *Polysar Papers*, vol. 44; Rowzee’s “preferred number” - as he put it - was \$60 million. See, Rowzee to Richardson (January 18, 1972), *Polysar Papers*, vol. 44.

seek] to take over a large fabricator, a large oil company, or both.”¹⁴¹ Increasingly after 1970, the high cost of feedstocks for petrochemical derivative manufacturing plants was a problem to the entire Canadian petrochemical industry. Small-scale, widely scattered and, in some cases, technologically antiquated production facilities, combined with the high cost of feedstocks, therefore placed the Canadian petrochemical industry at a competitive disadvantage. During the 1970s, foreign producers with modern, large-scale plants began penetrating the Canadian marketplace. As a result, Canada’s trade deficit in chemicals and plastics grew at an alarming rate. Without revitalization of the industry in Canada, the future of domestic producers of petrochemicals looked bleak.

In Polymer’s case, Sarnia-produced butadiene was becoming too high-priced *vis-à-vis* butadiene available to its U.S. competitors. It was believed that the vagaries and uncertainties of the operating environment, including government policy, required a means of ensuring reliability of raw materials at reasonable costs. If the declining profitability of the synthetic rubber operation was to be reversed, Polymer felt that it had to secure cheaper feedstocks.¹⁴² At the time, there were seemingly two alternatives: Polymer could either purchase by-product butadiene from European or Japanese sources, or expand its operations so as to once again become self-sufficient in butadiene production. The purchase of offshore butadiene would provide some temporary relief from cost pressures, but it could hardly offer a permanent long-term solution. This left the second alternative to be pursued further.

In the early 1970s, a proposal called the Sarnia Olefins Aromatics Project (SOAP) began being developed at Polymer. In its final report, the committee set up to study the feedstocks problem advised that a world-scale complex, utilizing the most modern technology and crude oil from Western Canada, be built at Sarnia. Not everyone saw the wisdom in

¹⁴¹ *Ackerman Report*, p. iv.

¹⁴² “Minutes of the Board of Directors” (October 26, 1972), *Polysar Papers*, vol. 4., book 12.

integrating backwards into feedstocks, however. Some, like Roger Hatch, argued that SOAP would commit Polymer even more deeply to the “declining rubber industry” and thereby reduce its capital-raising capacity and limit its diversification prospects. What was the point, Hatch asked, in spending millions of dollars to produce the feedstocks for a product that was becoming increasingly unprofitable to manufacture? But Hatch’s was a dissenting opinion and after 1972 he was no longer with the company to make his objections heard. Disappointed at having been passed over for the presidency and unable to work under Ian Rush, a man whom he disliked, Hatch left Polymer to pursue other ventures.¹⁴³ He was not the only one of Polymer’s informal executive cabal to do so. Stanley Wilk and Lee Dougan also decided to leave the firm. Polymer was certainly becoming a different company - strategically, structurally and organizationally - and in March 1973, less than a year after its sale to the CDC, the company changed its name to Polysar Ltd. to reflect the transformation.¹⁴⁴

The SOAP project would dwarf all others of the decade. Once constructed, the plant would process approximately 170,000 barrels of Western Canadian crude oil a day into one billion pounds of ethylene and two billion pounds of other primary petrochemicals such as benzene, propylene, isobutylene and butadiene. Petrosar would thus be the largest single consumer of Canada’s oil production. It was initially estimated that the complex would cost \$170 million to construct; in the end, however, the cost was roughly four times that amount. Given its enormous scale, the project needed broad-based private and public financial support. In 1974, Petrosar Limited was established as a partnership between Du Pont Canada, Union Carbide Canada, Koch Canada, and Polymer Ltd. Polymer originally held 51 percent, thus giving it majority control, and Rush was named Petrosar president. Rush was the driving force behind the project. Under his leadership it became bigger and

¹⁴³ Hatch interview (Toronto, July 2000).

¹⁴⁴ To avoid confusion, I will continue to refer to the company by its original name, Polymer.

more expensive than anyone had anticipated. Once operations at Petrosar began, Polymer's contribution included \$20.1 million in equity and \$74 million in subordinated debentures. Polymer, along with the project's other participants, promised to provide the necessary funds to complete the project and to meet Petrosar's bank loans and customer payments.

Mirroring most other developments of the decade, the Petrosar project got off to a shaky start. Hampered by delays due to strikes and the lack of skilled trades people, it was not until 1978 that the plant finally came on stream. The delays, combined with the cost overruns and the high cost of financing, made Petrosar a costly investment . By the end of 1977, Polymer had invested over \$165 million in the Petrosar project and the plant was yet to produce a single petrochemical feedstock. To make matters worse, when the plant finally did come on line, it did so in an unfavourable operating environment. In 1978, Petrosar's operations resulted in a loss to Polysar of \$10.2 million, followed by a loss in 1979 of \$6.2 million. In the years that followed, Polymer's investment in Petrosar continued to mount. So did the losses. Polymer put the best face on things, stating that the project was a success since it strengthened its "long-term international merchant market position" by ensuring a continued source of feedstocks.¹⁴⁵ This came at a heavy cost, however. A cost that, in the years that followed, would become even greater due to the effects of the National Energy Program and world market conditions.

If there was any doubt that this was not shaping up to be worst decade on record, that doubt was laid to rest in 1973 when it was discovered that Polymer's European marketing subsidiary (PISA) had been involved in "questionable" business practices extending back to 1970. In February 1973, Polymer's "audit" committee, which included Ian Rush, Tony Hampson and two outside directors, Ronald Todgham and William McGregor, met in Toronto with Maxwell Henderson, the Auditor General of Canada and Gordon Cowperthwaite, a senior accountant with Peat, Marwick to discuss Polymer's 1972

¹⁴⁵ *Annual Report* (1978), p. 7.

financial results. Henderson discovered that PISA was helping its customers minimize taxes and avoid foreign exchange regulations by diverting certain “under-the-table rebates or kickbacks” either to another country or into a numbered Swiss bank account.¹⁴⁶

A principled and uncompromising man, Henderson told the committee that he had “reservations” about the way PISA was conducting its business and wanted the “questionable practices” stopped or, at least, disclosed to the company’s shareholders. According to Henderson, the outside directors were stunned to learn of PISA’s transactions and how they were being handled on the books. “It was clear,” Henderson later recalled of Todgham’s and McGregor’s reaction, “they had no knowledge of what was going on.”¹⁴⁷ Rush was immediately asked for an explanation, which he gave according to Henderson, stating that these were “customary marketing practices in the highly competitive European market.”¹⁴⁸ Henderson, however, did not share Rush’s moral relativism and he thus refused to endorse Polymer’s financial statement. He also felt it was his duty to inform Prime Minister Trudeau about PISA’s dealings in Europe. When Hampson heard this he erupted, questioning Henderson’s findings and his proposed handling of the matter.

But Henderson was resolute and on March 22, 1973 he wrote to Prime Minister Trudeau of the “existence of a serious contingent liability of indeterminable proportions arising out of certain transactions of [Polymer’s] Swiss subsidiary, Polysar International S.A.”¹⁴⁹ As Henderson later noted, he thought the situation raised “the very serious contingency that the government of one or more of the customers involved might simply

¹⁴⁶ M. Henderson, *Plain Talk! Memoirs of an Auditor General* (Toronto, McClelland and Stewart, 1984), p. 323.

¹⁴⁷ Henderson, *Plain Talk*, p. 329.

¹⁴⁸ *Ibid.*

¹⁴⁹ M. Henderson to P.E. Trudeau, (March 22, 1973). A copy of the letter in its entirety can be found in *Minutes of Proceedings and Evidence of the Standing Committee on Public Accounts*. Issue 19 (March 1, 1977), Appendix “PA-88”.

decide to sue the multinational corporation owned by the government of Canada.”¹⁵⁰ Henderson’s revelations concerned Trudeau, who thought the matter required “immediate attention.”¹⁵¹ In a letter to C.M. Drury, president of the treasury board, Trudeau wrote that “while the government may not have complete control or direct responsibility because of the status of Polymer and the CDC, there are obvious possibilities for embarrassment.”¹⁵² The government was still the CDC’s largest shareholder, having a 68% interest, and if shown that one of the CDC’s subsidiaries was involved in illegal or immoral practices, it would reflect badly on the Canadian government. Trudeau suggested that Drury discuss the problem with finance minister John Turner, supply and services minister Jean Pierre Goyer, and secretary of state for external affairs Mitchell Sharp. Not knowing of Henderson’s previous efforts, he also proposed bringing the issue to the attention of Polymer’s executive in the hope that it would give “serious consideration” to modifying its practices.¹⁵³ Drury, however, did little about the matter except to make a telephone call or two before dropping it altogether.¹⁵⁴

Four years passed during which time it was business as usual at PISA. The company continued to artificially inflate prices and deposit the so-called “rebates” into numbered Swiss accounts for a small number of its clients.¹⁵⁵ Henderson had retired in March 1973

¹⁵⁰ Henderson, *Plain Talk*, p. 323.

¹⁵¹ P.E. Trudeau to C.M. Drury (March 27, 1973). A copy of the letter can be found in *Minutes of Proceedings and Evidence of the Standing Committee on Public Accounts*. Issue 19 (March 1, 1977), Appendix “PA-90”.

¹⁵² *Ibid.*

¹⁵³ *Ibid.*

¹⁵⁴ Henderson, *Plain Talk*, p. 334.

¹⁵⁵ Polymer’s internal investigation, which was undertaken by David Stanley and John B. Ayleworth, concluded that the “great bulk” (i.e. 80%-95%) of PISA’s business was neither illegal or immoral. In total, there were sales to some 13 direct customers and to 14 of PISA’s distributors that involved “objectionable or questionable practices.” See J.B. Aylesworth and D.A. Stanley, *Report to the Board of Directors of Polysar Limited on*

and his successor, James Macdonell, was denied access to Polymer's records on the grounds that the company ceased being a crown corporation as of July 1972, when it was purchased by the CDC. The matter as a result remained hidden from the shareholders and the public until November 1976. That month, Macdonell presented a report to parliament which contained startling disclosures about bribes paid by another crown corporation, Atomic Energy of Canada Limited, in South America and elsewhere to secure purchases of its CANDU reactors. A member of the press called Henderson to ask his views on this matter and to inquire whether it was true that he had written the prime minister in 1973 about similar "bribes" made by Polymer. Henderson later recalled that he was "astounded by the question" and felt he had no choice "except to confirm" that he had written to Trudeau.¹⁵⁶ The reporter immediately asked Henderson for a copy of the letter, which he received and subsequently made public.

On the morning of Saturday November 27, 1977, executives at Polymer woke to the news that their company had been involved in "questionable business practices" for more than five years. A large headline on the front page of the *Globe and Mail* read: "Polysar says paybacks normal, still makes them."¹⁵⁷ Bill Dimma, a cerebral business executive who joined Polymer's board of directors in 1974, remembered being "blindsided by the news."¹⁵⁸ Having solicited legal opinion and concluded the practices did not violate Swiss law¹⁵⁹, Rush and Hampson decided not to order the transactions stopped nor to disclose them to shareholders. When the story broke in the press, Rush dismissed it as a tempest in

certain invoicing and payment practices of Polysar International S.A. (January 31, 1977), pp. 3-4

¹⁵⁶ Henderson, *Plain Talk*, p. 334.

¹⁵⁷ *Globe and Mail* (November 27, 1976), pp. 1, 10-11.

¹⁵⁸ W. Dimma interview (Toronto, March 2001).

¹⁵⁹ E. Homburger to W.J Dyke (February 14, 1973), *Polysar Papers*, vol. 54, file: public accounts committee, 1973-1977; Russell Baker to W.J Dyke (March 1, 1973), *Polysar Papers*, vol. 54, file: public accounts committee, 1973-1977.

a teacup.¹⁶⁰ “The controversy which has arisen over Polysar International in Europe, following the common commercial practice of allowing rebates, and the unpleasant and inapplicable language used to describe it [by the press], are a great disappointment to me as a Canadian,” he stated. “The customers were fully entitled to the rebates, which were therefore their property, and Polysar International was obligated to act in accordance with the customer’s instruction on the handling of those rebates.”¹⁶¹ Rush’s comments, however, did little to reassure investors and parliamentarians. Indeed, they seemed only to fan the flames of the controversy.

In the House of Commons there was an uproar. The NDP called on the Liberal government to put an end to these “transactions of a nefarious nature” - as the leader of the NDP, Ed Broadbent, termed them.¹⁶² “Does the government of Canada,” Broadbent asked, “think that we as a country should be setting the lowest possible standards for international trade?”¹⁶³ At the public hearing that followed, members of parliament heard from Polymer’s own executives about how PISA had assisted its customers in concealing \$15 million worth of sales.¹⁶⁴ David Stanley, a member of Polymer’s board of directors, who had been assigned to undertake an internal investigation of the PISA affair along with Justice J.B. Aylesworth, told of how PISA had invoiced one of its customers at an artificially inflated price and then rebated a foreign affiliate of the customer 8.6% of the inflated figure, thereby helping the customer shift profits from one taxing jurisdiction to another and potentially defrauding shareholders or the host government.¹⁶⁵

¹⁶⁰ I.C. Rush, “Press Release: Information from Polysar Ltd.” (November 28, 1976), *Polysar Papers*, vol. 54, file: public accounts committee 1973-1977.

¹⁶¹ *Ibid.*

¹⁶² Canada. House of Commons. *Debates* (November 30, 1976), p. 1499.

¹⁶³ *Ibid.*, p. 1500.

¹⁶⁴ Canada. House of Commons. *Minutes of Proceedings and Evidence of the Standing Committee on Public Accounts*. Issue 20 (March 3, 1977), p. 35.

¹⁶⁵ See J.B. Aylesworth and D.A. Stanley, *Report to the Board of Directors of Polysar*

When the parliamentary committee reported to the House on July 5, 1977 it criticized all the principal actors: PISA for engaging in improper business practices; Drury for not adequately investigating the practices and not reporting back to the prime minister when requested to do so; and the auditors, Henderson and Cowperthwaite, for not immediately bring the practices to the attention of parliament.¹⁶⁶ In response, to the overwhelming criticism Polymer put a stop to the questionable transactions at PISA. One can only speculate what would have happened if Polymer had decided not to stop the “objectionable” business dealings when it did. Polymer was no longer a crown corporation, although its parent company was partially owned by the government. But as later events demonstrated the government had little, if any, ability to direct the affairs of the CDC. In 1981, for example, the Trudeau government attempted to persuade the CDC to bail out one of Canada’s leading multinational corporations, Massey Ferguson. The CDC refused as it had done earlier when the government had wanted the company’s headquarters moved to Vancouver.

The PISA affair (1970-1977) or “Polygate” as it was later referred to by company executives¹⁶⁷, demonstrated that the corporation - even before it was sold to the CDC - was behaving in every way like a private corporation, seeking to maximize profits and retain market share, in this case by giving “under-the-table” rebates to its customers. The practice, as Rush had all along strenuously maintained, was not illegal under Swiss law, and was common among commercial corporations in Europe. Nevertheless, it raised two fundamental questions. First, should Canadian corporations operating abroad, be they

Limited on certain invoicing and payment practices of Polysar International S.A. (January 31, 1977), pp. 6-7.

¹⁶⁶ Canada. House of Commons. Standing Committee on Public Accounts. *Minutes of Proceedings and Evidence* 39 (July 5, 1977), pp. 3-18.

¹⁶⁷ B. Pursell interview (Sarnia, July 200); B. Dimma interview (Toronto, March 2001); and D. Stanley interview (Toronto, March 2001).

public or private, act in such a way that violated Canadian legal and moral standards? Secondly, should public corporations, especially those operating for profit like Polymer, be held to a different standard than private corporations? In 1976, shortly after PISA's practices became public, Trudeau challenged the Canadian people to consider these questions. "If it is legal and acceptable business practice, then we have to make up our minds whether we want crown corporations to exist which have corporate and commercial enterprise as their object."¹⁶⁸ Trudeau had already formulated his answer. "If we want to depart from what are acceptable business, accounting and legal practices in the name of some ethical standard which we may well want to apply, I suggest that we should get out of the business of having crown corporations."¹⁶⁹ Trudeau's comments stimulated a good deal of debate and ultimately led to a 1977 government report on crown corporation direction, control and accountability.¹⁷⁰

From a strategic and financial point of view, the diversification program of the 1970s was a failure. It did not move the company in a new direction and did not generate an adequate return. It was Rowzee's hope to reach a "50-50" mix of rubber-nonrubber sales

¹⁶⁸ Canada. House of Commons. *Debates* (November 30, 1976), p. 1500.

¹⁶⁹ *Ibid.*

¹⁷⁰ Canada. Privy Council Office, *Crown Corporations: Direction, Control, Accountability* (Ottawa, Minister of Supply and Service, 1977). The issue of what standards of propriety should apply to corporations active abroad was not limited to Canada. American executives and politicians tackled the same issue throughout the 1970s. Late in that decade, the U.S. Congress attempted to establish standards for ethical corporate behaviour abroad by passing the Foreign Corrupt Practices Act. Such attempts at imposing corporate social responsibility on American corporations prompted a backlash among many observers of American enterprise. The business of business, Chicago economist Milton Friedman insisted, was profits and nothing but profits. One practical outcome of this controversy was the proliferation of audit committees on board of directors as an attempt to bring independent outside evaluation to corporate accounts.

by 1979.¹⁷¹ This did not happen. By the end of the decade, Polymer had withdrawn from both housing systems and information processing. Lacking the requisite technical expertise, Polymer was unable to “pick the winners” in unrelated areas of production. Thus, Polymer did not become the diversified industrial giant that Rowzee and others had envisioned. Nor did it become a darling of the financial community. In 1969, Ackerman had confidently predicted that by following his strategy of diversification, Polymer would make a return on investment to its shareholders of 13.72% per annum by 1977.¹⁷² In fact, the company returned less than half that amount - 6.2% - that year, and this was one of the company’s better years of operation during the decade.¹⁷³ In 1972, the company’s rate of return on equity was 5.7%; in 1976, it was 3.7%. And in both 1971 and 1975, it was less than 1%. To even the most conservative investor, this could hardly have been a satisfying return on his or her investment.¹⁷⁴

The company had, however, become bigger. During the period 1969-1977, sales had more than tripled, as Rowzee had hoped, from \$160 million to \$577 million. The number of employees had also grown to over six thousand world-wide. Nevertheless, the profitability of the company had not increased. In 1969, Polymer recorded a net income of \$12.6 million. Eight years later, after investing roughly \$300 million in various diversification projects, Polymer’s net income was not much more at \$14.4 million.¹⁷⁵ The CDC’s acquisition of Polymer did not improve the firm’s profitability. Perhaps even worse, from a long-term perspective, the diversification program had reduced Polymer’s ability to seize a number of opportunities that might have contributed to its core competency if diversification had not consumed its cash reserves and increased its long-term debt. For

¹⁷¹ Anonymous, “Canadian firm seeks expanded U.S. market,” *Chemical and Engineering News*, vol. 48 (October 5, 1970), p. 15.

¹⁷² *Ibid.*, p. xi.

¹⁷³ *Annual Report (1977)*, p. 20.

¹⁷⁴ *Ibid.*

Table 5.1
Selected Statistics of Operation, 1967-1977

Year	Butyl Rubber Produced (long tons)	Number of Employees	Sales (\$000s)	Profit (\$000s)	Return on Shareholder Equity	Dividends (\$000s)
1967	275,400	3,976	128,900	5,810	3.8	3,300
1968	305,800	3,722	143,900	7,500	7.1	3,000
1969	326,800	3,779	159,900	12,600	12.6	6,000
1970	357,600	4,273	156,700	7,600	6.4	3,000
1971	382,140	4,414	174,600	800	0.7	500
1972	427,700	4,856	205,400	7,050	5.6	750
1973	506,700	6,317	261,400	11,100	8.2	1,200
1974	461,600	6,104	392,400	22,820	12.0	2,500
1975	383,500	5,973	392,100	1,600	0.8	1,200
1976	464,700	6,189	457,600	7,500	3.5	n/a
1977	n/a	6,405	577,000	14,400	5.6	n/a

Source: Annual Reports (1967-1977).

instance, the diversification effort cost Polymer an opportunity to gain a larger share of the profitable butyl rubber market. While butyl contributed only 35% to Polymer's sales revenues in 1971, it provided 90% of the operating profit of the rubber division.¹⁷⁶ At a time when Polymer's executives were "thinking synthetic rubber less", Cities Services - one of three producers of butyl rubber - became available for purchase. Polymer made no effort to acquire the company. There was also talk that Esso was interested in getting out of the butyl rubber business. But again Polymer's priorities lay elsewhere. Top managers were unable to conceive of the diversification program as anything other than an expansion into new "faster growing" businesses. There was no discussion of how the new businesses would contribute to Polymer's "core competence" - something that C.K. Prahalad and Gary Hamel, in their prize-winning 1990 article from the *Harvard Business Review*, claim is critical to a successful corporate strategy.¹⁷⁷ Nor was there any discussion of how Polymer would achieve synergy through these acquisitions. As a result, there was little

¹⁷⁵ *Ibid.*

¹⁷⁶ Wood Gundy Report, p. 35.

¹⁷⁷ Prahalad and Hamel, "The core competence of the corporation," *Harvard Business Review* vol. 68 (May-June 1990), 79-91.

sharing of activities or skills which might have enabled Com-Share and SSI to perform better than they did. The corporate restructuring of 1971 only added to the problem. For over a quarter of a century Polymer had been a pioneer in knowledge-based growth. And, despite the obstacles associated with innovation in the Canadian climate, they had made a number of important contributions to synthetic rubber technology¹⁷⁸ But the diversification effort compromised the source of its growth and profitability. It jeopardised Polymer's core products - i.e. its polymeric materials - and its core competency, the technological "know-how" and scientific knowledge to make those products. Realizing this, in the years that followed, Polymer got "back to basics."

¹⁷⁸ In "Innovation in a Cold Climate: The Dilemma of Canadian Manufacturing", *Report 15* (October, 1971), The Science Council of Canada identified eight impediments to innovation in Canada: (1) an inadequate technology base (2) limited market size and market access (3) poor climate for investment (4) inadequate management skills (5) improper location of industry (6) tariff and non-tariff barriers (7) the lack of size and stability in Canadian industrial laboratories and (8) the multinational corporation.

Chapter Six

"Back to Basics." 1978-1990

[A]re we, their inheritors, capable of such efforts should the need arise again?¹

Robert Dudley, president of Polymer, 1981-1988

After the diversification mania of the 1960s and 1970s came a wave of divesting in the late 1970s and 1980s as firms got "back to basics." Polymer was among these firms. During the diversification drive, many companies diversified beyond what was optimal for them. Some firms, like Polymer, expanded into unrelated areas of production without the requisite capital and organizational capabilities and, as a result, their profitability and market value suffered. Worse still, from a long-term perspective, these firms lost sight of what they did best. In Polymer's case, the company moved away from developing new and improved polymeric materials. In its zeal to diversify, Polymer siphoned off money from its R&D and in so doing compromised its core competency. Diversification was much more difficult to realize in practice than in theory. "It is not an activity," wrote the business theorist Ralph Biggadike in 1979, "for the impatient or for the faint-hearted."² When successful, diversification took substantial resources and continual commitment. Polymer seemingly lacked both.

In light of its negative impact on profits and stock prices, diversification as a strategy for growth began to be questioned in the late 1970s by business theorists and corporate managers alike. In 1980, Robert Hayes and William Abernathy wrote a scathing article in the *Harvard Business Review* entitled "Managing our way to economic decline" criticizing the myopic management principles which had led to diversification and corporate-

¹ R. Dudley, quoted in *Polysphere Fifty*, p. 93.

² R. Biggadike, "The Risky Business of Diversification," *Harvard Business Review* (May-June 1979), p. 111.

America's competitive inertia. "Responsibility for this competitive listlessness," they wrote, "belongs not just to a set of external conditions but also to the attitudes, preoccupations and practices of American managers."³ In their opinion, management had focused too much on short-term profits at the expense of developing the facilities and skills needed for long-term growth and competitiveness. The indictment was reminiscent of Adam Smith's scorn for the feudal lords who traded their leadership in return for a pair of silver buckles.

One area that had particularly suffered during the diversification drive was research and development - the cornerstone of technological innovation. Companies fell into the habit of thinking that they could acquire others' technology rather than generating their own. By 1979, Canadian investment in R&D had declined to 0.9% of GNP from a high of 1.4% in 1967. What was even more disturbing to some business observers was the fact that most R&D in Canada was not being undertaken by industry but by government laboratories and universities.⁴ Unlike in most other industrial countries, where about two-thirds of R&D was carried out by private enterprise, in Canada in 1979, industry undertook only 40% of research and development. Critics complained that due to the low priority it had placed on R&D, Canadian business had fallen behind its major competitors, particularly the Japanese, whose investment in R&D had continued unabated since the end of the Second World War. This situation would continue, warned the economist Charles McMillan, who would serve for a time as an adviser to Brian Mulroney, if Canadian firms did not learn from the Japanese and invest more in the development of technologies which would improve production processes and enable them to shift product lines more rapidly in response to

³ R.H. Hayes and W.J. Abernathy, "Managing our way to economic decline," *Harvard Business Review* (July-August 1980), pp. 69-77.

⁴ "It's high noon for high technology," *Financial Post* (October 25, 1990), p. S1.

changing market conditions.⁵ The business press agreed. “It’s high noon for high technology” read a *Financial Post* supplement on innovation in 1980.⁶ Canadian firms needed to invest more in applied research and rely less on borrowed technology if they were to remain competitive in an increasing global environment.

The dismal state of Canadian industrial research precipitated calls for government action.⁷ But while there was a theoretical and intellectual awareness in Ottawa of the need to stimulate innovation, the federal government was hesitant to offer any substantial incentive. While not unsympathetic to the needs of science-based industry, the Mulroney government, which came to power in 1984, was primarily concerned with dismantling existing government programs, like the National Energy Program (NEP), as well as privatizing those crown corporations which did not serve a public policy purpose. During the election, which had given the Progressive Conservatives 211 of 282 seats in the House of Commons - a majority larger even than Diefenbaker’s in 1958 - Mulroney was able to capitalize on the declining fervour for government “induced” megaprojects (e.g. Alberta tar sands) and the penchant of the government for “picking winners.” Viewing the state as the fundamental cause of social and economic malaise, he called for the strengthening of the market at the expense of the state. Gone was the “Red Tory” urge. Mulroney was, in belief, if not always in action⁸, a neo-liberal and therefore committed in principle to privatization.⁹

⁵ C. McMillan, “From Quality Control to Quality Management: Lessons from Japan,” *Business Quarterly* 47 (May 1982), pp. 31-40; *idem*, “How Japan Uses Technology for Competitive Success: Lessons for Canadian Management,” *Business Quarterly*, vol. 54 (Summer 1988), pp. 34-38.

⁶ Anonymous, “It’s high noon for high technology,” p. S1.

⁷ Anonymous, “Financing R&D: Tax breaks would help,” *Financial Post* (October 25, 1980), p. S6.

⁸ See, for example, M. Bliss, *Right Honourable Men: The Descent of Canadian Politics from Macdonald to Mulroney* (Toronto, Harper Collins, 1994), chp. 10; G.B. Doern and

Not all of the crown corporations had performed as profitably as Polymer. During the 1970s the government made a number of “investments in failure” - to borrow a phrase from public policy analysts Borins and Brown.¹⁰ Canadair, a producer of advanced aircraft, was a prominent example. In 1976, the Liberal government had bought Canadair from General Dynamics for \$38 million, with the aim of preserving jobs and stimulating high-technology manufacturing. Faced with declining demand for military aircraft and the firm’s flagging water bomber sales, Canadair decided to make a major entry into the commercial aviation market by producing a new executive jet, the Challenger. Ottawa and Quebec City provided most of the start-up capital for the project. The money was not well spent, however. In 1982, managerial and oversight problems led to a loss of \$1.4 billion, the largest corporate loss in Canadian history.¹¹ More than \$1 billion of the loss was the result of the Challenger program. The taxpayers’ money was never fully recovered. As *Maclean’s* magazine noted in 1983, “for the Canadian taxpayers, the Challenger has proven to be a very, very, expensive way to fly.”¹²

The Canadair debacle seemed to confirm the Mulroney government’s presumption that the state had no place in the boardroom of the nation. Like other neo-conservative

J. Atherton, “The Tories and the Crowns: Restraining and Privatizing in a Political Minefield,” in *How Ottawa Spends*, chp. 3.

⁹ The term privatization is used here in its narrowest sense to refer to the whole or partial sale of state-owned enterprise. In a broader sense it has been used to describe those measures (e.g. deregulation, trade liberalization, and increased contracting out of services) which aim at reducing the role of government and enhancing market forces to produce a more competitive economy. See C. Veljanovski, *Selling the State: Privatization in Britain* (London, Wedenfeld and Nicolson, 1987).

¹⁰ S. Borins and L. Brown, *Investments in Failure: Five Government Corporations that Cost the Canadian Taxpayers Billions* (Toronto, Methuen, 1986), introduction.

¹¹ Borins and Brown, *Investments in Failure*, especially pp. 58-67, 143-145.

¹² I. Austen, “Canadair enters a swift, steep nosedive,” *Maclean’s* magazine, vol. 96, no. 25 (June 20, 1983), p. 37.

governments around the world, particularly Margaret Thatcher's in the U.K. and Ronald Reagan's south of the border, the Mulroney government viewed public enterprise as symptomatic of an intrusive state and accepted as axiomatic the benefits to be derived from privatization. Only the iron discipline of the market, they maintained, could ensure a firm's efficiency.¹³ In May 1985, the Progressive Conservative finance minister, Michael Wilson, stated that any crown corporation that did not fulfil a policy purpose would be sold.¹⁴ Over the next two years the government moved in a "deliberate" manner to down-size the state by selling a number of crown companies.¹⁵ By early 1987, the government had privatized nine federally-owned and -operated corporations, including Canadair. The government's actions would have a profound effect on Polymer's operations. It is one of history's ironies that during the period that Polymer was the least tied to the government, government policy determined the destiny of the firm.

While government was getting "leaner and meaner", so was industry. Among corporate managers, the realization set in during the 1980s that they could not manage anything and everything as they had formally been assured by Peter Drucker and others and they thus returned to what they knew and did best. At Canadian Pacific Enterprises, for example, management re-focused on the company's basic business, shedding its steel and airline units.¹⁶ Canadian Pacific was not the only conglomerate to "unbundle" itself so as to concentrate on its "core" concerns. According to Constantinos Markides, as many as half of the *Fortune 500* firms de-diversified in the period 1981-1987.¹⁷ In most industrialized

¹³ *Annual Report to Parliament on Crown Corporations and Other Corporate Interests of Canada, 1983-1984* (Ottawa, Ministry of Supply and Services Canada, 1985), p. iv.

¹⁴ Department of Finance, *Budget Papers* (Ottawa, Minister of Finance, May 23, 1985), pp. 26-28.

¹⁵ A. Tupper and G.B. Doern, *Privatization, Public Policy and Public Corporations in Canada* (Montreal, The Institute for Research on Public Policy, 1981), esp., chp. 1.

¹⁶ Goldenburg, *Canadian Pacific*, esp. chp 11 and 14.

¹⁷ Markides, "Back to Basics," p. 12.

countries the average size of firms became smaller, not bigger, as divisions were “spun off” and “out-sourcing” was initiated. Perhaps the most obvious example of this occurred at International Telephone and Telegraph, which in 1980 was the world’s largest conglomerate with revenues of \$23.8 billion per year. Under the direction of Rand V. Araskog, a West Pointer who made his reputation running ITT’s defence and avionics subsidiary before being appointed president in mid-1979, the company sold off over forty of its subsidiaries. The selling was so heavy that in 1982 *Fortune* magazine declared that “the most famous conglomerate around has plainly made a U-turn.”¹⁸ Whereas the dictum of big business in the 1960s and 1970s was “diversify, diversify, diversify” in the 1980s it was - in Peters and Waterman’s famous phrase - “stick to the knitting.”¹⁹

The de-diversifying was made more pressing by the emergence of takeover artists who - armed with junk bonds - threatened to acquire or break-up any company with a depressed stock price. During the 1980s, the buying and selling of corporations became a business in its own right, abetted by the huge blocks of shares that pension funds and collective investors could trade. Corporate raiders such as Carl Icahn, T. Boone Pickens and the “radical sheik” of the Canadian oil patch, Bob Blair, demonstrated that they could acquire even the largest companies, break them up and realize huge profits. The threat of a takeover prompted firms to refocus on their core products and competencies and return to a more optimal level of diversification.

The de-diversification movement was heralded in the business and academic press as a managerial revolution which was producing more efficient companies for creating and distributing shareholder wealth. “Through refocusing,” Constantinos Markides noted in 1991, “many firms have been able to stream line their operations and improve their

¹⁸ G. Colvin, “The De-Genering of ITT: The most famous conglomerate around has made a U-turn,” *Fortune* (January 11, 1982), p. 36.

¹⁹ T.J. Waterman and R.H. Peters, *In Search of Excellence: Lessons from America’s Best-Run Companies*, (New York, Harper and Row, 1982), chp. 10.

competitiveness so that they are now more efficient global competitors.”²⁰ Likewise, the historian Michael Bliss, whose 1987 book *Northern Enterprise* upheld the discipline of the market and disparaged the state, argued that “the best business practice in response to the tough going of the 1980s was to return to fundamental values: market sensitivity, entrepreneurship, emphasis on leanness, motivation and the maximum use of human resources.”²¹ *Fortune* magazine’s “companies to watch” were no longer the large multifaceted businesses it had once singled out in the 1960s and 1970s. Its eye was now on those smaller companies which were focused, lean, and had a well-defined market niche; companies like Easton Aluminum, a manufacturer of aluminum sporting equipment, and Tyco Toys, a maker of “tried-and-true” playthings.²² The trend in the 1980s, as the *Economist* noted in 1989, was towards firms “drawing in their horns, not pushing them out.”²³

Polymer had always been sensitive to trends in the business environment and this time was no different. Sometimes it had to anticipate these trends - as was the case at the end of the Second World War when it decided to “go global” - and sometimes it had lagged behind. When Polymer joined the diversification drive in 1969, for example, the movement had already been underway for more than a decade. To make up for the lost time, it streamlined the decision-making process and rushed into areas of production that in hindsight it should have avoided. Until that time, however, Polymer was a model of success. “Its record to date,” noted one keen observer of public enterprise in 1969, “clearly demonstrates that it has been an outstanding example of entrepreneurial success on the part of the Canadian government and establishes it as a model against which other proprietary crown

²⁰ Markides, “Back to Basics,” pp. 12-24.

²¹ Bliss, *Northern Enterprise*, p. 551.

²² “Companies to Watch: Easton Aluminum Inc.,” *Fortune* (October 12, 1987), p. 97; “Companies to Watch: Tyco Toys,” *ibid.* (March 14, 1988), p. 96.

²³ Anonymous, “Management Brief,” *The Economist*, vol. 313 (October 28, 1989), p. 78.

Table 6.1
Polymer Corporation: comparison of return on investment with average long-term federal government bond yields, 1952-1971.

<i>Year</i>	<i>Polymer's rate of return on investment</i>	<i>Average federal government bond yield 10 years and over</i>	<i>Difference (1)-(2)</i>
1952	8.2	3.59	4.61
1953	11.2	3.68	7.52
1954	10.7	3.55	7.15
1955	16.4	3.36	13.04
1956	19.5	4.10	15.40
1957	13.2	4.14	9.06
1958	11.7	4.48	7.22
1959	6.5	5.07	1.43
1960	17.1	5.18	11.92
1961	15.8	5.04	10.76
1962	11.3	5.11	6.19
1963	8.8	5.08	3.72
1964	8.1	5.18	2.92
1965	8.5	5.22	3.28
1966	8.6	5.44	3.16
1967	3.8	5.94	-2.14
1968	7.1	6.73	0.37
1969	12.6	8.30	4.30
1970	7.6	6.99	0.61
1971	0.7	7.15	-7.08

Source: Polymer Annual Reports (1952-1971) and Bank of Canada Statistical Summary (1952-1971).

corporations might wish to measure their performance.”²⁴ Only during the “traumatic experience” of 1967 did Polymer fail to return a higher profit than the government could have realized by transferring its investment in the company into government bonds or, more logically, by reducing its own borrowing requirements by an equivalent amount.

To be sure, the crown corporation had habitually benefited from good timing. It had entered the synthetic rubber field at the dawn of the chemical age, when polymer science was in its infancy and there was therefore plenty to discover and plenty to improve upon. In the years that followed, few other synthetic rubber companies had the position or know-how to compete and Polymer prospered accordingly. That said, Polymer had made the most of its opportunities. After the war, the future of the nascent synthetic rubber industry

²⁴ Mullington, “The Federal Government as an Entrepreneur,” especially pp. 54-63.

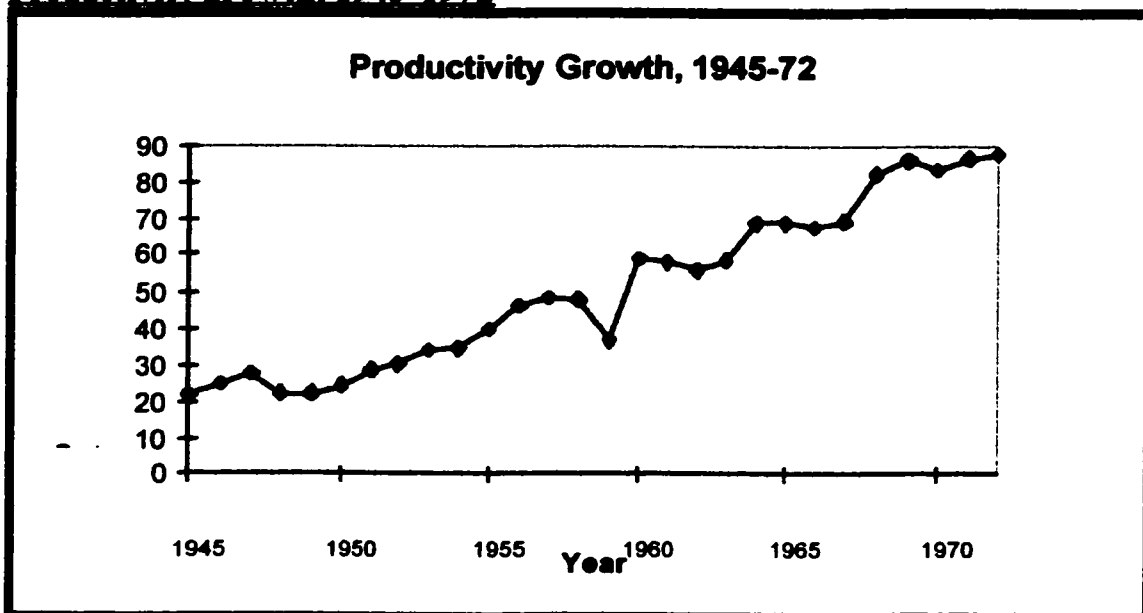
was far from certain. Natural rubber was superior in terms of quality and price and its cartel had a well established international network of marketers and distributors. In the United States these obstacles were considered too great to overcome and most of the synthetic rubber plants which had been established during the war were shut down. Polymer faced its own additional problems and thus was perhaps an unlikely candidate for industrial success. At the end of the Second World War, its capacity was twice that of domestic demand and it was a long way from the rubber-hungry markets of Europe. In addition, C.D. Howe, Canada's post-war economic czar and the man who had overseen the birth of the enterprise, showed little interest in perpetuating a Canadian tradition by extending government protection to the infant industry. If Polymer was to survive, Howe maintained, it would have to do so as a free enterprise without the benefit of protective tariffs and direct government succour.

Despite all these obstacles, Polymer endured and prospered. By pioneering synthetic rubber sales in Europe, it demonstrated to the world that synthetic rubber was a commercially viable industry. In the process it had developed certain revolutionary sales techniques which were subsequently adopted by others in the industry. As a result of being the first North American synthetic rubber producer in Europe, Polymer captured a substantial share of the market.²⁵ Thereafter, it restlessly expanded the output of its standard product line through technological innovation. Between 1945 and 1972, productivity increased more than fourfold (see figure 6.1, below). By applying science, it continually brought new sorts of products into commercial use. During the 1960s, its growth entailed strategic investment in manufacturing facilities and organizational talent abroad.²⁶ As a consequence, Polymer became one of Canada's first multinational manufacturing corporations, taking its place alongside Alcan and Massey Ferguson. For the first twenty-five years of its evolution, Polymer was a model of corporate growth and

²⁵ Chandler, *Scale and Scope*, pp. 227-229.

²⁶ *Ibid.*, pp. 36-45, 145, 230.

Figure 6.1
Productivity growth, 1945-1972



As the graph shows, the amount of rubber produced per employee (productivity) increased more than four fold during the period 1945-72, from 21 to 88 long tons. Source: *Annual Reports (1945-1972)*.

development and, remarkably, it outperformed many of the private companies operating in the field.²⁷ Hardin was right: Polymer had “endured and excelled in public enterprise.”²⁸ It had, as another observer noted in 1971, “confounded its critics for 29 years.”²⁹

During the next decade, however, its performance had not been so spectacular. Like most other petrochemical firms, Polymer was negatively affected by lower growth rates for most of its existing products, higher energy and feedstock costs and a slowdown in the introduction of new technology. As early as 1960 there were signs that the industry was suffering from over-capacity and cost-cutting. Yet numerous manufacturers continued to bring new capacity on stream well ahead of anticipated demand. During the 1970s companies joined in the petrochemical gold rush only to find many others working the same veins. Faced with declining profit margins, Polymer embarked upon a program of diversification. Unfortunately, the company lacked the requisite technical expertise to be

²⁷ *Ibid.*, p. 58.

²⁸ Hardin, *A Nation Unaware*, pp. 242-244.

²⁹ Anonymous, “Polymer ponders its future,” *Executive* (March, 1971), p. 52.

able to pick and manage the “winners” in those fields unrelated to its basic areas of production. As a result, its financial performance continued to suffer. Ian Rush had the distinction of presiding over these turbulent years. Years after the fact, he still maintained that diversification was the correct course of action given the discontinuities and uncertainties of the 1970s.³⁰ Others were not so sure.³¹ Either way, at the end of the decade the decision was made to get back to basics.

The new corporate mission was outlined in the company’s 1979 annual report. The firm, it stated, aimed to be “a profitable international company of significant standing in the petrochemical industry, through the development of influential positions in selected geographic and product segments....”³² The world petrochemical industry was quickly becoming restructured. Ackerman had been wrong about a good number of things, but he was not mistaken about the changing nature of the industry. By 1980, most of the oil giants had integrated their processes downstream, as he had anticipated ten years earlier, and had become major competitors in the petrochemical field. These giants invested heavily in new facilities and new products, forcing others in the industry to rationalize their operations.³³ In addition, new producers from oil- and gas-rich regions of the world entered the field, further adding to the competition. In the mid-1970s such oil-rich countries as Iran, Saudi Arabia, and Libya, plunged headlong into petrochemical projects when the world oil crisis appeared to give them a spring board. In these countries there was a great deal of resentment over the past “imperialistic” policies of the Western petrochemical producers. While some countries, such as Kuwait, had managed to establish their own refining industries, most had left the processing of crude oil largely in the hands of the multinational

³⁰ Rush interview (Sarnia, November 1999).

³¹ Pursell interview (Sarnia, November 1999) and Bentley interview (Sarnia, November 1999).

³² *Annual Report* (1980), p. 1.

³³ Quintella, *The Strategic Management of Technology*, pp 78-79.

oil companies. But after the first “oil shock” of 1973 and OPEC’s subsequent success in wresting control of the world’s crude oil supply from the major oil companies, Middle Eastern countries used their new wealth and leverage to build locally-owned and -controlled refineries and petrochemical plants.³⁴

It was a similar sort of resentment that led the Alberta government to support and promote the development of a petrochemical industry in the province. Since the First World War, Alberta had felt left out of Canada’s industrialization. The province’s attempts during the Second World War to get Ottawa’s economic overlord, C.D. Howe, to establish factories in the west for the production of alcohol from grain into synthetic rubber had, for instance, been unsuccessful. This, along with Howe’s attempt to take control of the province’s natural gas exports after the war, infuriated Albertans and seemed to confirm that the federal government was not interested in the province’s economic development. In response, the Alberta government became increasingly activist on economic matters.³⁵ The idea of establishing petrochemical facilities in Alberta as part of a provincial strategy of encouraging oil- and gas-based industrialisation can be traced back to the 1950s.³⁶ But it was not until the mid 1970s, after the energy crisis gave the province the leverage and opportunity to realize its ambition, that the idea came to fruition. In 1977 the Lougheed government announced its intention to sponsor and promote a major program to build plants for the production of ammonia, methanol and various ethylene derivatives. This could be done through the use of Alberta’s recently established “Heritage Fund,” into which the provincial government paid much of the “windfall” profits received as a result of the frantic escalation of crude oil prices. The friendly and stable political environment, combined with the perceptions of a raw material cost advantage, brought corporations

³⁴ Spitz, *Petrochemicals: The Rise of an Industry*, pp. 486-491.

³⁵ Richards and Pratt, *Prairie Capitalism*, esp. chp. 9.

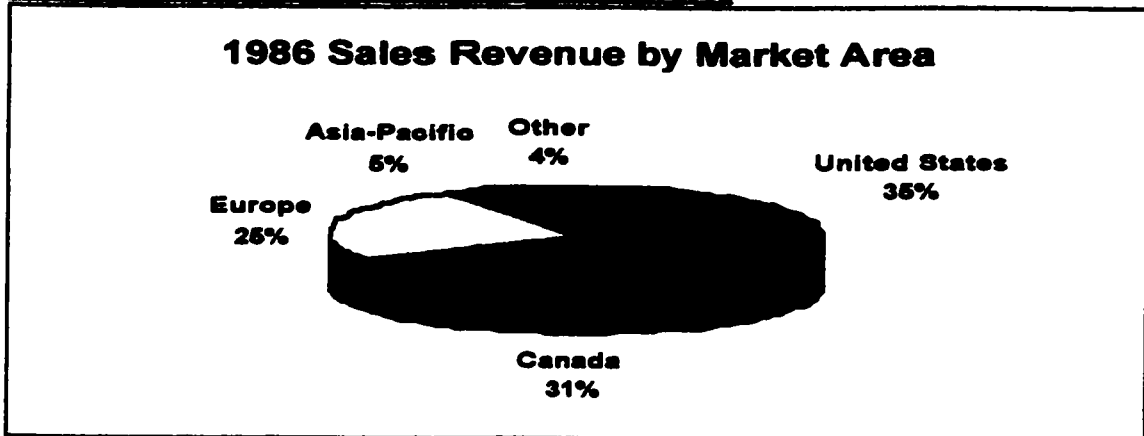
³⁶ Alberta Research Council. *Papers Presented at Symposium on the Occurrence and Chemical Utilization of Light Hydrocarbons*. Circular 23 (1957).

rushing into the province. New petrochemical plants were constructed. The fact that Central Canada already had ample petrochemical capacity did not faze the Albertans, long known for their independent thinking and actions. In fact, as a result of Alberta's relatively tough bargaining stance with Ottawa, as well as with foreign firms, their oil men soon became known as the "blue eyed sheiks" of the North.³⁷

Polymer believed that to be a major player in this new environment it needed to reinforce its strengths, while reducing the drain caused by less productive activities. With that goal in mind, a new class of senior managers - made up of men like Firm Bentley, Dr. Mark Abbott, Pierre Choquette and Charles Ambridge - sent out directives to the various divisions emphasizing the need for growth in high value-added areas which offered attractive profit margins. During the 1970s, Ralph Rowzee, Bill Buckler, Stanley Wilk and Roger Hatch all took their leave of the firm. For thirty years these men had provided the company's intellectual leadership. It was their direction in the areas of research and development, marketing, distribution and finance that had established Polymer as a world-class producer of synthetic rubber. It was their actions and those reporting to them that had established Polymer's core competencies. Perhaps the greatest compliment that could be paid to these men was that in 1979 their successors decided to get back to basics, refocusing on the fields that they had so ably cultivated. By 1983 Polymer's rubber operations were again the largest in the free world, with major production facilities in six different countries. That year rubber sales accounted for more than 60% of total revenues. Under the direction of Robert Dudley, who replaced Ian Rush as president in 1981, renewed attention was given to technical and customer service - a hallmark of the early years. Where growth was deemed not to be the primary means of obtaining market leadership, increased importance was placed on productivity improvements and rationalization of existing operations to increase capacity utilization. The new strategy

³⁷ P. Foster, *The Blue-Eyed Sheiks: The Canadian Oil Establishment* (Toronto, Collins, 1979), p. 301.

Figure 6.2
Percentage of 1986 sales revenue by market area



Source: *Annual Report* (1986)

brought a re-alignment of corporate responsibilities. The new organizational structure comprised three divisions: basic petrochemicals, rubber and diversified products. Later, in 1986, a fourth division - the Asia-Pacific Group - was added. The formation of the Asia-Pacific Group was the first concrete step in the corporate objective to establish a physical presence in the Asia-Pacific region, which Polymer viewed as “the fastest growing [market] in the world.”³⁸ In 1986, roughly five per cent of Polymer’s sales revenue came from the region. After engaging in business there for more than thirty years, the corporation sought to further broaden its sales base with the addition of manufacturing and warehousing facilities in the region. Polymer became the first Canadian manufacturing company to form a joint venture in the People’s Republic of China. Located in Shanghai, Shanghai Gao Qiao-Polysar Company Limited oversaw the production of 3,000 tons of latex rubber per year. These key elements gave Polymer the competitive advantage it needed to retain its market share, and to grow as an industry leader.

One of the areas that had suffered during the diversification drive of the 1970s was research and development. For the first twenty-five years of Polymer existence, R&D played a leading role in the firm’s success. Although it had never been undertaken solely

³⁸ *Annual Report*, p.15.

for its own sake, research was the program that gave Polymer its competitive edge. Without the resources necessary to make a major breakthrough in basic science, Polymer focused on applying science to bring needed products into regular and profitable use. Often this involved scouring the world for customers' needs and for technology from universities and research institutes in other industries. These two ends of the innovation chain were brought together in the R&D division. Under Buckler's guidance, the firm proved remarkably adroit at harnessing science to bring new goods and services into everyday use.³⁹

But during the period 1967-1977, R&D was de-emphasized and the division entered its "dark ages." With profit margins eroding rapidly because of increasing competition and rising energy and raw material costs, Polymer had little incentive to undertake what were often high-risk, capital-intensive ventures. Under these circumstances, Polymer felt that it had no choice but to cut back on its R&D expenditures. While not given to confrontation, E.J. Buckler subtly questioned the long-term wisdom of this move.⁴⁰ That said, he fully understood the short-term pressures of running a business. "Innovation, like gambling and prospecting," he wrote in 1984, "initially costs money: money is rarely made until the innovative phase is over. The total orchestra of activities, including capital investment," he continued, "can only be practiced when profits are being made and must, regrettably, be curtailed when business is poor."⁴¹ By 1970, the synthetic rubber industry had reached maturity and the pace of innovation slowed. At the best of times, investment in R&D took years before it returned some sort of financial reward. During the diversification drive, Polymer lost its faith in the ability of R&D to produce a profitable and timely return. It wanted a higher and more immediate yield from its investment and to get this it thought it

³⁹ E.J. Buckler, "Canadian Contributions to synthetic rubber technology," pp. 3-12.

⁴⁰ E.J. Buckler to R.E. Hatch (March 19, 1969), *Polysar Papers*, vol. 133, file: Canada General.

⁴¹ *Ibid.*, p. 11

Figure 6.3



Robert Dudley, lower left, with his Polymer colleagues in 1951. Source: *Polysphere Fifty*, p. 93.

best to siphon off money from R&D and invest it in new, “faster-growing” areas of unrelated production.

With the decision to return to basics came a renewed emphasis on R&D. Robert Dudley was an ideas man who was committed to research and development and understood the relationship between R&D and technological innovation. Born in Shanghai, China, Dudley obtained a masters degree in engineering from the University of British Columbia in 1951, and shortly thereafter joined Polymer as a process engineer. Before becoming president in 1981, he had played a critical role in bringing bromobutyl (the rubber industry’s premier inner liner material) into commercial production. Dudley’s commitment to R&D was supported by budgetary increases. While other areas experienced decreased spending and downsizing, R&D expenditures increased year after year, by more than 23% in 1980, and by more than 17% in both 1981 and 1982 - despite flat earnings and an actual loss in 1982. By 1986, spending had increased to \$48 million, ranking Polymer among the top twenty firms in Canada in terms of R&D expenditures. More than half of the R&D was undertaken

in Sarnia and represented significant added value. To further foster the spirit and the climate necessary for innovation an “innovation fund” was created. Dudley was of the view that success was dependent on encouraging people to come forward with their ideas.⁴² A defining characteristic of Polymer’s early years was the tight internal communications loops which fostered idea-sharing and, ultimately, innovation. But during the 1970s, as the corporation became bigger, many channels of communication were lost. The innovation fund was designed to restore them by reducing bureaucratic barriers so that “creative idea generation and problem solving could take place.” In many ways the fund was a reincarnation of the “coin-your-ideas” program that Polymer initiated after the war. Employees were rewarded for coming up with new and more efficient ways of doing things. These measures helped Polymer regain its reputation as one of the most innovative companies in the synthetic rubber industry.

Initially these measures brought the desired results, as the decade commenced with stronger sales. But by 1981 the economy had entered a recession which dampened market demand and weakened prices. As the recession continued, so did high inflation, high interest rates, and high raw material prices. In 1982, Polymer experienced the worst results in its history, registering a \$30.5 million loss on sales of \$1.33 billion.⁴³ Polymer’s Canadian operations were most deeply affected. While the corporation sought to maintain its momentum in terms of meeting its strategic goals, it was faced with the realities of plant shutdowns and lowered production. As it had done in the past when faced with declining revenues, Polymer curtailed its expenditures and focused on careful cash management. Unlike during the 1970s, however, this time it maintained its commitment to R&D. The commitment paid off in 1987, with the introduction of Tornac rubber - a heat and oil resistant rubber that would maintain its properties at 150°C for more than 1000 hours. The development won the company the Canadian Award for Business Excellence - inventions

⁴² Dudley interview (Sarnia, November, 1999).

⁴³ *Annual Report* (1982), p. 1.

Table 6.2
Selected statistics of operation, 1978-1986

Year	Number of Employees	Sales (\$000s)	Profit or loss (\$000s)	Share holder equity	Total assets (\$000s)	Return on shareholder equity
1978	6,264	747,800	18,500	262,300	766,100	7.0
1979	5,437	1,066,900	74,000	317,900	909,900	23.0
1980	6,144	1,180,600	73,400	380,700	1,044,100	19.3
1981	7,081	1,347,400	22,000	391,300	1,402,500	5.6
1982	6,561	1,328,700	(30,500)	392,300	1,438,300	(7.7)
1983	5,985	1,336,900	8,700	387,300	1,453,000	2.2
1984	5,947	1,416,200	35,900	398,000	1,468,700	9.0
1985	6,652	1,865,400	100	775,900	2,431,200	0.01
1986	6,462	2,049,500	27,800	749,100	2,386,300	3.7

Source: Annual Reports (1978-1986).

category. Instead of cutting R&D, the completion of large projects, such as the new, state-of-the-art butyl rubber plant at Sarnia, were put on hold and downsizing of existing operations was initiated. In this hostile climate, efforts to improve internal communications and innovation met with weakened morale, especially among employees caught in the uncertainty of the economic situation. The loss in 1982, from positive earnings of \$22 million in the previous year, did not, however, divert the corporation from its strategic mission. Polymer was an agile corporate player. It continued to move into high technology and speciality products, and into new geographic and product markets.

As the global economic situation changed in 1983 and 1984, Polymer's own situation improved. The efforts at cost reduction and rationalization of services brought positive results in 1983 with a net income of \$8.7 million, followed by a substantial increase to \$36 million in 1984. By the end of 1983, Polymer had completed its major capital projects, including the Butyl II project, at a final cost of \$360 million - this was more than \$100 million over the original estimate. Incorporating the latest technology, this plant represented the largest single investment Polymer had ever made.

Polymer's corporate mission would have been more easily achieved if the Petrosar situation had not impacted so negatively upon its operations. At the beginning of 1980, Polymer held a 40.2% stake in Petrosar, while its parent company, the CDC, held an

additional 19.8% interest. From a financial standpoint, Petrosar was a complete failure. At the close of 1984, Petrosar had losses totalling \$159 million. No dividends had been received from the investment, while Polymer was committed to furnishing 48% of the additional funds necessary to meet Petrosar's debt obligations. At the time the project was undertaken, it was justified on the prospect that Petrosar would provide Polymer and the other petrochemical producers in the region with competitively-priced feedstocks. For petrochemical producers, feedstocks constituted between 60% and 70% of manufacturing costs. Thus any reduction in their cost would enhance Polymer's competitive position relative to that of petrochemical producers elsewhere. Naphtha - a product similar to the gasoline component of crude oil - was chosen as the proper feedstock for the Sarnia cracker, because it came closest to producing the range of primary petrochemicals required by the partner companies and because in the Sarnia environment it was considered the most economic feedstock for chemical industry's use. However, when it became evident that naphtha could not be processed locally in a volume sufficient to sustain capacity operations, the decision was made to base the operation on Western Canadian crude oil. This meant an additional processing step to separate the naphtha from the crude oil and in turn meant an expansion of SOAP into something much larger and costlier than initially imagined.

The financial success of the project was dependent in part upon Western Canadian oil prices never getting excessively out of line with prices elsewhere and particularly in the United States. While that was the case during the 1970s, it was not so during the early 1980s. As a result of the NEP, by 1980 oil prices in Canada were in excess of those in the United States. The NEP had created a pricing regime for domestic oil and gas which involved incremental rate increases every six months. The architects of the NEP believed that this would protect Canadian consumers from further "shocks" to the international energy market. The schedule of price increases anticipated a substantial rise in the price of oil to Canadian consumers, but the architects of the NEP were confident that international prices would rise further and more suddenly than oil prices under their regime. They were

wrong. Almost as soon as the pricing mechanism was put into place, the price of oil on international markets began to fall. This gave petrochemical companies operating in more market-responsive systems, as prevailed in the U.S., a tremendous competitive advantage since Petrosar was committed to purchasing higher-priced Western Canadian crude oil. This disadvantage was compounded by Petrosar's inability to use natural gas as well as crude oil, reducing its sourcing flexibility to take advantage of price and market conditions. The NEP's schedule of price increases involved a more gradual rise in the price of gas than the corresponding program for oil. This difference related to the government's strategic objective of encouraging a shift away from oil to natural gas in patterns of energy consumption to take account of the relative domestic reserve positions of the two hydrocarbons. An incidental effect of this policy was to further improve the economics of the gas-based petrochemical industry in Alberta, since the regulated domestic price for natural gas was the principal variable determining the price of ethane feedstocks.⁴⁴ It was not surprising, therefore, that many of Alberta's petrochemical firms, such as Bob Blair's Nova corporation, were on balance supporters of the NEP.⁴⁵

Before any additional strategic steps could be taken at Polymer, Dudley felt that Petrosar - which he later described as a "hideous monster" - had to be turned around.⁴⁶ Although he had never been a strong supporter of the project, Dudley was sanguine that if domestic oil prices were brought into line with world prices, a turnaround in Petrosar's fortunes was possible. Existing profit margins within Petrosar were low, but changes in terms of the price of raw materials would increase the profitability and viability of the operation. The first thing that had to go, therefore, was the NEP. In 1984, Polymer joined with others in the Canadian petrochemical industry calling on the government "to obtain

⁴⁴ Chapman, *The International Petrochemical Industry*, pp. 194-199.

⁴⁵ B. Doern and G. Toner, *The Politics of Energy: The Development and Implementation of the NEP* (Toronto, Methuen, 1985), pp. 222-226.

⁴⁶ Dudley interview (Sarnia, November 1999).

market related prices for feedstock.”⁴⁷ The industry found the newly-elected Mulroney government receptive to their position and in 1985 the NEP was terminated and oil prices were deregulated.

In April of that same year, Polymer took over complete ownership of Petrosar. The complex restructuring included the issue of non-voting redeemable preferred shares (\$188 million) to the previous partners, Union Carbide and Du Pont of Canada, and the purchase of the CDC’s interest for a nominal consideration. Union Carbide and Du Pont Canada subscribed as well to shares in the CDC, the proceeds of which were to provide Polymer with funds necessary to reduce Petrosar’s debt, and to begin to convert some of Petrosar’s operations to utilize cheaper-priced natural gas. The integration of Petrosar brought an improvement in Polymer’s debt-to-equity ratio, lowering it from roughly 2:1 to 1.5:1. It also impinged upon corporate results, since Petrosar’s operating results were now fully consolidated. In 1985 Polymer recorded a net loss of \$520,000 on sales of \$1.86 billion.⁴⁸

The losses in Polymer were only a small part of the CDC’s problem. An unwieldy collection of incompatible assets, the CDC suffered from lackadaisical direction, an insurmountable debt load and contradictory corporate objectives. Tony Hampson, who had been at the helm of the CDC since its inception was not an inspired day-to-day manager, but until it was too late, the board of directors was unwilling to demand his resignation. In 1982, every division of the CDC except for tiny Life Sciences Inc. was showing an operating loss, and millions of dollars in bad investments had to be written off.⁴⁹ The commercial performance of the CDC was poor by virtually any standard. In terms of return

⁴⁷ *Report of the Petrochemical Industry Task Force*. Report to Minister of Energy Mines and Resources and to the Minister of Regional Industrial Expansion (Ottawa, Supply and Services Canada, February, 1984).

⁴⁸ *Annual Report* (1985), p. 1.

⁴⁹ A. Tarasofsky, “Something Ventured: The Canada Development Corporation, 1972-1985” (June, 1987), p. 40.

on shareholders' equity, for example, the CDC averaged just 5.1% during the period 1977-1982. During the same period, the TSE 300 management companies' composite averaged 10.5%.⁵⁰ In terms of price to earnings ratios, the CDC's recorded a 3:1 ratio in 1980 and 2:1 ratio in 1981 compared with 7.6:1 and 6.0:1 respectively for the TSE 300 management companies composite. In 1984 and 1985 several academic studies concluded that the CDC was being inefficiently run.⁵¹ Summing up these studies, economist D.F. McFetridge stated that the "judgments regarding the contribution of the CDC to Canadian growth and development are as close to unanimity as occurs in the social sciences - namely it has not made a contribution."⁵² The failure of the CDC led McFetridge to conclude in his comparison of government, mixed and private enterprise, that the mixed enterprise "is more likely to constitute the worst than the best of all possible worlds."⁵³

In May 1987, the tall, aristocratic Tony Hampson was finally forced to step down as chairman of the board. He was invited to remain as the CDC's deputy chairman - a corporate title the equivalent of the kiss of a mafia don. But Hampson refused. When asked why he was not remaining on the board, Hampson stated that he was not the kind of

⁵⁰ D.G. McFetridge, "Commercial and Political Efficiency: A Comparison of Government, Mixed and Private Enterprises," in D.G. McFetridge (ed.) *Canadian Industrial Policy in Action* (Toronto, University of Toronto Press and the Royal Commission on the Economic Union and Development Prospects for Canada, 1985), Table 6-1, p. 223.

⁵¹ A. Boardman "An Evaluation of Canada Development Corporation." Paper presented to the Royal Commission Symposium on Crown Corporations (Ottawa, June 1984); A. Boardman and A. Vining, "An Evaluation of Canada Development Corporation," University of British Columbia, Faculty of Commerce and Business Administration, (Mimeo 1984); A. Tarasofsky "The Canada Development Corporation 1973-1983," Paper Presented to the Economic Council of Canada's Conference on Government Enterprise (Toronto, November 1984).

⁵² D.G. McFetridge, "Commercial and Political Efficiency: A Comparison of Government, Mixed and Private Enterprises," p. 226.

⁵³ *Ibid.*

person to hang around and fade away. "I'm not the shrinking violet type," he stated. "I am too strong willed and too energetic..."⁵⁴ Hampson was replaced by French-born Bernard Isautier, the one-time president of Aquitaine Company of Canada Ltd. - an energy producer that was absorbed by the CDC in 1981. Dubbed by the *Financial Post* as "the most bankable senior executive in Canada," Isautier rapidly pared the CDC down to its "core business units."⁵⁵ He disposed of the CDC's assorted investments in office and industrial equipment, venture capital, fishery products, pharmaceuticals and mining. The CDC's payroll was consequently shrunk to 7,000 from 17,000. The downsizing helped reduce the CDC's debt from \$4.6 billion to about \$2 billion. In 1987, the CDC changed its name to Polysar Energy & Chemical Corporation reflecting the emphasis on its core businesses - oil and gas production and petrochemicals. Polysar Energy consisted of two main parts: Polymer Ltd., which remained the world's biggest synthetic rubber maker and North America's number three polystyrene producer, and Canterra Energy Ltd., its oil and gas subsidiary.⁵⁶

Shortly after Isautier's appointment, Mulroney's privatization minister, Barbara McDougall, announced the sale of the federal government's last 7,486,344 shares in the CDC. The government had been slowly selling off its shares since 1982. "Crown ownership in the CDC," McDougall stated at the time of the sale, "is no longer needed to meet government policy objectives."⁵⁷ Six million of these shares were bought up by Bob Blair's voracious Nova Corporation. The purchase began a fight for Polysar that was one of the most vicious in Canadian corporate history.

Nova Corporation was the successor of Alberta Gas Trunk Line Ltd. (AGTL), which had been established by the Alberta government in 1954 to prevent Ottawa (i.e. C.D.

⁵⁴ P. Foster, "CDC's Hampson bids Farewell," *Financial Post* (May 18, 1987), p. 14

⁵⁵ *Financial Post* (April 18, 1988), p. 4.

⁵⁶ *Financial Post* (February 6, 1988), p. 1.

⁵⁷ Quoted in the *Financial Times of Canada* (October 12, 1987), p. 9.

Howe) from exercising legislative and regulatory control over the production, marketing and pricing of Alberta gas.⁵⁸ During the 1950s and 1960s AGTL had restricted its activities to the operation of a natural gas pipeline grid within Alberta.⁵⁹ But when Bob Blair took over as president of the corporation in 1970, AGTL spread its wings far and wide. Blair, who was later described by Peter C. Newman as “the thinking man’s energy Baron,”⁶⁰ pursued two parallel strategies, revitalizing AGTL’s transmission function and diversifying into other corporate areas. Blair’s method of diversification was in at least one way similar to Polymer’s in that he expanded into diverse fields through the acquisition of on-going concerns. Blair, however, proved much more savvy in making his acquisitions than Hatch and the diversification team at Polymer had been. In the 1978, he brilliantly outmanoeuvred both Petro-Canada and Dr. Armand Hammer’s Occidental Petroleum Corp. in the battle for the control of Husky Oil - a large oil producer and refiner with activities split between the United States and Canada.⁶¹ Earlier, he had proved similarly artful in acquiring a share of the Alaska Highway Pipeline.⁶²

As a result of Blair’s acquisitions, AGTL was, by 1980, a major player in the western petrochemical scene. To reflect its growth and increasing diversity, that year AGTL changed its name to Nova, An Alberta Corporation. Under Blair’s direction, Nova continued to expand during the 1980s.⁶³ In 1987, Nova purchased the Moore Township polyethylene plant from Union Carbide. About 40% of the plant’s total ethylene feedstocks - a natural gas derivative used in the manufacture of textiles and plastics - were provided by the

⁵⁸ Richards and Pratt, *Prairie Capitalism*, p. 66.

⁵⁹ Foster, *The Blue-Eyed Sheiks*, pp. 107-109.

⁶⁰ Blair quoted in P.C. Newman, “The thinking man’s energy baron,” *Maclean’s* magazine (February 26, 1990), p. 36.

⁶¹ Foster, *The Blue-Eyed Sheiks*, chp. 9.

⁶² *Ibid.*, chp. 8.

⁶³ E. Gray, *Wildcatters: The Story of Pacific Petroleum and Westcoast Transmission* (Toronto, McClelland and Stewart, 1982), pp. 282-289.

Polysar's plant at Sarnia. With supplies tight and prices skyrocketing, Blair felt Nova had to do something with respect to its long-term supply of ethylene and he thus began acquiring large amounts of Polysar stock with the ultimate goal of taking over the corporation.

In January 1988, Nova tried to raise its holding in Polysar Energy to 30.9% through a \$14-per-share offering. The bid was viewed unfavourably by those at Polysar. Its analysts placed the value of the company at somewhere around \$25 a share, if its \$5.4 billion of assets were sold off. In March, in an effort to discourage the western corporate raider (and keep its own investors loyal during its takeover struggle), Polysar restructured itself in a way which would allow its existing shareholders to collect \$900 million in cash and extra securities by 1993. A defensive tactic, recapitalization had been employed successfully in the United States to discourage similarly hostile takeover bids. But Blair was a tenacious suitor, and despite repeated professions of fading interest, he was not willing to walk away from his target.

In mid February 1988, Blair raised his offer to \$16 a share. But again the offer was rejected by Polysar's board, which included such leading business luminaries as Bernard Lamarre, Bill Dimma, Kendal Cork, Pat Keenan, John Burk, Pierre Côté, Don Campbell, Don Lougheed, Bud McCuaig and Bill Mongo. Also on the Polysar board was Bill Wilder, a veteran corporate director who had tangled with Bob Blair once before when trying to build a pipeline down the Mackenzie River Valley. Polysar's president Bernard Isautier, who himself owned 40,000 shares plus stock options, charged that Nova was "nickel and diming" Polysar. "Our objective," Isautier stated in the spring of 1988, "is to maximize the value of our shares, and Nova has always been too cheap in its offers."⁶⁴ The unusually emotional tenor of what Peter C. Newman termed "the bitter Nova-Polysar slugfest" spilled over into the street with observers and financial analysts taking sides.⁶⁵ In early June,

⁶⁴ Isautier quote in *Macleans* (May 9, 1988), p. 46.

⁶⁵ P. C. Newman, "The bitter Nova-Polysar Slugfest," *Macleans* (May 9, 1988), p. 46.

officials from Polysar Energy & Chemical and Nova attempted to reach an agreement on a merger, but negotiations broke off on June 11 amid renewed recriminations. With Isautier threatening to sell off more of Polysar's assets including the all-important Sarnia plant, a deal was finally reached on June 15, bringing an end to one of the most acrimonious takeover feuds in Canadian business history.

During the final stage of the negotiations, which took place in the stylish offices of Gordon Capital Corporation atop Bay Street's Toronto-Dominion Bank Tower, Blair and Isautier stayed in separate rooms. The powerful but publicity-shy James Conacher, chairman of Gordon Capital, who had set up their meeting, shuttled between them with offers and counteroffers. Blair, who was concerned about losing the biggest prize - the Sarnia plant - finally agreed to raise his offer to \$20.31 a share. Isautier accepted. Isautier had shown his mettle. Despite considerable pressure to do otherwise, he had turned down four Nova offers, in the process adding \$1.4 billion to the value of Polysar's shares between January, when the bidding began, and when the deal was reached in June.

Despite the emphasis placed on money during the five month struggle, there was more to the deal than short-term financial gain. Polysar Energy's major asset was its petrochemical plant at Sarnia. Queen's Park officials had already expressed their displeasure at Calgary-based Nova gaining a major share of one of Ontario's most prized industries. The sale also gave Nova control of 80% of Canadian production of ethylene. In a telegram to the Bureau of Competition Policy, the federal agency that policed corporate concentration in Canada, Ontario Premier David Peterson expressed reservations about the transaction. "Future plants to produce ethylene derivatives," he wrote, "will not be built in Ontario, despite clear commercial advantage." He was right. They were not.

Blair was in fact never committed to Polysar's rubber operation. He never viewed it as a strategic fit with Nova's other divisions. The technical focus of Nova was engineering - drilling gas wells, building and installing pipelines and compressor stations, the separation of ethane and propane by distillation and cracking to make ethylene. The commercial side

of Nova's business was all domestic, or at most North American. Customer service was minimal, except for polyethylene and that was a fairly simple process. The technical basis for Polymer, on the other hand, was advanced chemistry at the polymerization level and at the compounding level. Unlike Nova, Polymer was involved with a complex patent structure. It required feedstocks (e.g. butadiene, acrylonite, isobutylene and isoprene) that were not related to Nova's line of business. In addition, Polymer's business, unlike Nova's, involved intense technical service with rubber users in many industries: tires, hose, mechanical goods, flooring, soling, etc. And finally Polymer exported all over the world whereas Nova did not. It had overseas plants. It required staff with many capabilities, in chemistry, languages, marketing, as well as unusual branches of engineering. About the only characteristic that Nova and Polymer shared was that their basic businesses were both based on hydrocarbons. For Blair, that was not enough. Soon after the acquisition of Polysar, Blair moved the rubber group's (i.e. Polymer's) headquarters from Sarnia to Toronto and began considering selling the division.

The takeover of Polysar had left Nova strapped for cash. Prior to the acquisition, Nova had had \$700 million in non-utility debt. But as a result of the hostile takeover that figure had jumped to \$2.9 billion. Adding to the strain on cash flow, almost immediately after the Polysar purchase, world prices of nearly every commodity Nova made took an unprecedented tumble with polyethylene, methanol and styrene all dropping at least 40% in value. As a consequence, Nova's cash flow collapsed. During the second-half of 1989, the corporation had earnings of close to zero. This prompted the Dominion Bond Rating Service to downgrade Nova's debentures from A to BBB, and analysts and financial observers expressed serious doubts about whether Nova's surviving cash flow would cover the carrying costs of its accumulated debt, let alone dividends.⁶⁶ These adverse

⁶⁶ T. Phillips, "Aspirin for Bob Blair: Nova slashes debt with the Bayer deal," *Alberta Report* (June 4, 90), pp. 15,17; L. Grogan, "Nova's numbers slide but investor optimistic," *Financial Post* (July 23, 1990), p. 10; B. Wickens, "Postponing Nova's

conditions, combined with the increasing pressure from investors to clean up Nova's balance sheet, caused Blair to rethink his corporate strategy. In late 1989 Nova too joined the companies getting back to basics by spinning off some of its non-core subsidiaries and thereby reducing its debt load. "Our priority is to get return on equity back to a healthy level of at least 17% a year and create some long-term share-growth. We also want to get our long term debt on our nonpipeline assets down to 30% again; it's now up to 40% because of the Polysar purchase."⁶⁷ Blair thus had financial and strategic reasons for selling off Polysar's rubber division.

When it came to finding a purchaser, Blair had little problem. There were several interested suitors with both the capital and technical capabilities to takeover the business. The giant German chemicals and health care company Bayer AG - best known as the manufacture of Aspirin - had been eyeing Polymer for years. But it did not jump in to make a bid when the rubber business was a rumored sale candidate during the hostile Nova-Polysar fight. Bayer had a strict rule against getting in the middle of anyone else's hostilities. Its major competition, Italy's Enimont and the Dutch firm DSM, did make several offers, however. And these two companies also made bids when the brokerage house Morgan Stanley promoted the sale of the rubber division for Nova in the spring of 1990. But their offers did not compare well to Bayer's eventual \$1.22 billion offering.

The purchase of Polysar's rubber division was the largest acquisition in Bayer's 129-year history and made the company the world's leading manufacture of synthetic rubber and synthetic latex with an annual capacity of around one million metric tons. Together

dream: a crushing debt has forced Nova Corp. to join the oil-and-gas industry's great asset sell off," *Maclean's* magazine (June 4, 1990), pp. 52-53; B. Dargie, "Preparing to peddle Husky: Nova plummeting income fuels rumours that it will sell Husky to cut debt," *Alberta Report* (February 12, 1990), p. 17; and D. Hogarth, "Debt, streamlining send assets sales up," *Financial Post* (May 28, 1990), p. 17.

⁶⁷ Blair quoted in P.C. Newman, "The thinking man's energy baron," *Maclean's* magazine (February 26, 1990), p. 36.

with its rubber chemicals, Bayer now offered the widest range of products for the rubber sector of any company in the world. The acquisition also extended Bayer's portfolio to include three important classes of rubber: emulsion styrene-butadiene, ethylene-propylene and butyl. At the time of the sale, Bayer promised to center its entire North American rubber business in Canada, to increase R&D and to invest \$120 million in the Canadian operations over the next three years. Polymer had truly become a global company.

It was fitting that Polymer should have ended up in Bayer's hands. After all, it was German technology, imported from the U.S. by C.D. Howe's department of munitions and supply during the war, that had given Polymer its start. Bayer was a world-class company, with 170,000 employees world-wide and \$30.5 billion in sales in 1988. Having been engaged in the production of synthetic rubber since 1909 Bayer understood the polymer game. Like Polymer, it had been built on a powerful research and development tradition. But unlike Polymer, it was big and foresighted enough to have expanded into new polymers as well as other chemicals. It thus had a broad technological base and its various fields of expertise interacted and reinforced each other in a way that Polymer in 1990 could not hope to match. Perhaps history would have been different if Polymer had not diversified in the 1970s. But it had, and as a result it was time for a final strategic move if Polymer was to survive. Otherwise, its products and processes would gradually become obsolete. Somewhat ironically, the main benefit of Petrosar proved to be that when it was bundled with Polymer it formed a package that appealed to a Canadian purchaser, Nova. Polymer alone would have been impossible to sell to a Canadian company because no one had the expertise, market position and business connections to make a success of it, and for political reasons it could not be sold to a foreign owner. As soon as the combined package was sold, the Polymer component was offered for sale again, but now it could be offered to an international corporation.

There were many in Sarnia who objected to the sale of Polymer to Bayer. Bill Buckler was not one of them. On the eve of the sale, Buckler addressed the employees of the

company that he had helped to establish almost fifty years before. “Polysar employees and their families,” he stated in June 1990, “should be gratified that their performance in the innovation, manufacture and sale of synthetic rubber was so outstanding that they attracted a company like Bayer. Now is the time to wake up, not to forget our dreams of the past for sure, but rather to smell the coffee and realize how extraordinarily lucky we are that events beyond our control led Nova first to buy and then to decide to sell and that Bayer was the company finally able to buy. Now there is good reason to expect that the polymer operations that Polymer created will survive and prosper....”⁶⁸

⁶⁸ E.J. Buckler, *The Observer* (June 6, 1990).

Conclusion

Poor by Nature, Rich by Policy: State Intervention and Polymer Corporation Ltd.

Twenty years ago, in an article entitled “‘Rich by Nature, Poor by Policy’: The State and Economic Life in Canada,” business historian Michael Bliss argued that government action made Canadians poorer than nature had originally intended.¹ Through the use of protective tariffs, direct financial succour and the creation of public corporations, the state had retarded the development of an otherwise well-endowed nation. State activism, Bliss vigorously maintained, had thus compromised Canada’s productivity, efficiency and standard of living. If Canada could just give up its “addiction to the positivist state” - an addiction which Bliss equated to the dangerous effects of smoking - it would be the healthier for it. But there is at least one prominent example that contradicts the assumed universal validity of Bliss’s conclusions. Polymer Corporation was a dynamic state-owned and -controlled enterprise, which played a useful, agile and profitable role in the economy. Through it the state “forced the pace” - to employ a Bliss phrase - of the development of a new, synthetic rubber industry and in so doing helped the nation overcome its innate deficiency in natural rubber. In this remarkable case, therefore, government action in fact made Canada richer than nature had intended.

There is little debate that the state has played a major role in Canadian economic development. Canada’s expansive geography, sparse population, relative lack of technology, capital and markets, as well as the ongoing threat of American economic expansion, have led successive governments to take an active role in the development of the Canadian economy. “The role of the state in the economic life of Canada,” notes the

¹ M. Bliss, “‘Rich by Nature, Poor By Policy’: The State and Economic Life in Canada,” in K.R. Carty and P.W. Ward (eds.) *Entering the Eighties: Canada in Crisis* (Toronto, Oxford University Press, 1980), pp. 78- 90.

political scientist Alexander Brady, “is really the modern history of Canada.”² The economic historian Hugh Aitken reached a similar conclusion. In his classic 1959 article “Defensive Expansionism: The State and Economic Growth in Canada,” Aitken argues that the government’s activity has been prolific. Indeed, so much so, that he concludes that “the creation of a national economy in Canada and, even more clearly, of a transcontinental economy, was as much a political as an economic achievement.”³ This truism will be evident to any reader of Harold Adams Innis.⁴ According to Aitken, who studied under Innis, the political urgency of protecting the westward-moving Canadian frontier against the threat of American encroachment, as well as the economic necessity of mobilizing resources to promote investment, prompted government intervention. Other economic historians have detected this role since the canal and railway eras of the nineteenth century.⁵

That is not to say that the state has sought to supersede the free enterprise system. On the contrary, the state’s role has been to accommodate private capital and foster private initiative by building the infrastructure and producing the goods and services necessary for private industry to develop.⁶ When the state has used public enterprise to accomplish the task, it has primarily been “facilitative” - to use Marsha Chandler’s terminology - fostering

² *Ibid.*

³ H.G.J. Aitken, “Defensive Expansionism: The State and Economic Growth in Canada,” in W.T. Easterbrook (ed.), *Approaches to Canadian Economic History* (Toronto, McClelland, 1967), p. 184.

⁴ H.A. Innis, *A History of Canadian Pacific Railway* (London, McClelland, 1923); *The Fur Trade in Canada: An Introduction to Canadian Economic History* (New Haven, Yale University Press 1930); *Problems of Staple Production in Canada* (Toronto, Ryerson Press, 1933); *The Cod Fisheries: The History of an International Economy* (New Haven, Yale University Press, 1940).

⁵ See, for example, D.C. Creighton, *The Commercial Empire of the St. Lawrence* (Toronto, Ryerson, 1937).

⁶ T. Traves, *The State and Enterprise: Canadian Manufacturers and the Federal Government, 1917-1931* (Toronto, University of Toronto Press, 1979), esp. chp. 8.

the conditions necessary for the profitable expansion of the private sector, rather than “redistributive,” seeking to alter the balance of economic power.⁷ For this reason Marxist writers have been critical of state intervention, viewing it as a tool to augment the economic power of the hegemonic class and serve the interests of private property.⁸ As political economist Wallace Clement writes: “The state in Canada is predisposed to ensure the general interest of capitalists and assure capitalists that the conditions necessary for the orderly extraction of economic surplus into their hands are provided....”⁹

For his part, Bliss does not question the extent of state intervention in Canada. Indeed, he somewhat fancifully traces it back to the age of European exploration when monarchs lent their imprimatur to merchant adventurers. The state’s involvement has been more or less constant since it financed and built the canal system upon which the empire of the St. Lawrence was constructed. Since that time, the state has made generous land grants and loans to privately-owned companies like the CPR, established and operated such “nation-building” institutions as the Canadian National Railway and Trans-Canada Airlines and endorsed the construction of the Trans-Canada pipeline - to cite but a few examples. “The one non-contentious statement that can be made about government involvement in Canadian economic life,” Bliss states, “is that we have had a lot of it.”¹⁰ What is in dispute as far as

⁷ M. Chandler, “State Enterprise and Partisanship in Provincial Politics,” *Canadian Journal of Political Science*, vol. 15 (1982), 711-742.

⁸ See, for example, J. Hutcheson, “The Capitalist State in Canada,” in K.J. Rea and J.T. McLeod (eds.), *Business and Government in Canada: Selected Readings* (Toronto, Methuen, 1969), pp. 43-61; Clement, *The Canadian Corporate Elite*; and L. Panitch, “The Role and Nature of the Canadian State,” in L. Panitch (ed.), *The Canadian State: Political Economy and Political Power* (Toronto, University of Toronto Press, 1977), pp. 3-27.

⁹ W. Clement, “The Corporate Elite,” in L. Panitch (ed.), *The Canadian State*, p. 244.

¹⁰ M. Bliss, “Rich by Nature”, p. 79.

he is concerned, therefore, is not the extent but the purportedly beneficial effect of that intervention.

According to Bliss, since the construction of the Lachine and Welland Canals in the 1820s, government activity has been compromising Canada's standard of living. He points to the development of the national railways as an example of this. Between 1850 and 1950, the state financed the railways in order to quicken the development of primary and secondary industry and to create a more integrated and diversified economy that was able to stand on its own feet alongside the young, powerful economy of the neighbouring republic. But in a new country, lines had to be pushed ahead of available traffic, involving the hazards of heavy capital investment from which private enterprise shrank without the state's support. The artificial environment that the state's activism created resulted in periods of what Harold Adams Innis has termed "cyclonic" growth - a whirlwind of state-initiated activity and consequent economic desolation. According to Innis, whose focus was always on long-term economic development, government intervention has left Canadians "with a legacy of large government debts and heavy fixed costs which bear down with great pressure...."¹¹ Echoing Innis, Bliss argues that by forcing the short-term pace of growth, the state has undermined the long-term prosperity of the economy. According to Bliss, the state's participation in transportation development did not create sound enterprise, combining the strengths of government stability and private entrepreneurship. "Instead the partnership fed on the weaknesses inherent in a relationship in which each side saw the other as the principal risk-absorber."¹²

There are abundant examples to substantiate Bliss's case. The Intercolonial Railway, completed in 1876 and built directly by the government to connect Halifax with Quebec and

¹¹ H.A. Innis, "Government Ownership and the Canadian Scene," in Mary Q. Innis (ed.), *Essays in Canadian Economic History* (Toronto, University of Toronto Press, 1956), p. 81.

¹² M. Bliss, *Northern Enterprise: Five Centuries of Canadian Business*, p. 188.

Montreal, exemplifies the combination of political and economic design which, according to Bliss, was implicit in all state-sponsored railways. Like the other government-endorsed ventures, the Intercolonial was such an “uneconomic proposition” - as Bliss put it - that no private company was interested in building and operating the line. “Government construction of both roads was a ‘mare’s nest’ of politicking, patronage, cost over runs, and pigging at the public trough.”¹³ Likewise, the Laurier government’s politically-planned and semi state-owned Grand Trunk Pacific-National Transcontinental system “involved a near-criminal misuse of public funds.”¹⁴ As a result, the Grand Trunk Pacific and Canadian Northern were “hopelessly” unable to earn enough to cover their operating costs, let alone service their mountain of debt. In 1919, the two lines were nationalized by the Borden government into a publicly-owned company, the Canadian National Railway.¹⁵

These examples are evidence, according to Bliss, that whenever the state has intervened in the economy, and especially when it has acted for nationalistic or “defensive” reasons, it has done so to the economic detriment of the nation. That is to say, by forcing the pace of growth ahead of market dictates, the state violated the timeless laws of supply and demand, reduced per-capita incomes, killed initiative, introduced inefficiencies and removed the discipline of the market. Canada would have been far better off, Bliss concludes, if the state had allowed the CPR to run south to Superior; if it had not got involved in the development of the Avro Arrow; if it had not attempted to establish the National Energy Program; and, if it had shunned developing its own high-tech research and development.

¹³ *Ibid.*, p. 213.

¹⁴ Bliss, “Rich by Nature”, p. 82.

¹⁵ Contrary to Bliss’s conclusions, the economists D.W. Caves, L.R. Christensen, J.A. Swanson and M.W. Tretheway maintain that there was “no substantial differences” in productivity growth rates between the government-owned Canadian National and the privately held Canadian Pacific. See , D.W. Caves, L.R. Christensen, J.A. Swanson and M.W. Tretheway, “Economic Performance of U.S. and Canadian Railroads: The

Of course, Bliss is judging these state initiatives based on the criteria of a neo-conservative business historian. For him, if the state is in business, then it should be judged by conventional commercial yardsticks. But is this fair? Should crown corporations be regarded as profit-seeking institutions whose performances should be measured solely in hard corporate terms? Or conversely, should they best be seen as “policy instruments” whose behaviour and performance should differ radically from private enterprise? Opinion is mixed. Marsha Gordon, for example, maintains that crown corporations should seek to maximize profits and therefore should be judged based on normal commercial criteria.¹⁶ On the other hand, Alexander Brady argues that public enterprise and state initiative need to be judged by something more meaningful than profit or loss. “Judged by the yard-stick of private business,” he maintains, “the government-sponsored Intercolonial Railway was never a commercial success.”¹⁷ But it is almost irrelevant to assess it by the criterion of deficits and surpluses, Brady maintains, since it was primarily a political achievement that served well the ends of a national government seeking an integrated community.¹⁸ Brady’s position has its supporters in Canada and abroad.¹⁹ Political economists Jeanne Kirk Laux and Maureen Appel Molot, for example, argue that crown corporations are only justified when the objective of profit-maximization is *subordinate* to the pursuit of broader socio-

Significance of Ownership and the Regulatory Environment,” in Stanbury and Thompson (eds.), *Managing Public Enterprises*, pp. 123-160.

¹⁶ M. Gordon, *Government in Business* (Montreal and Calgary, C.D. Howe Institute, 1981), especially, chp. 8.

¹⁷ A. Brady, “The State and Economic Life In Canada,” in K.J. Rea and J.T. McLeod (eds.), *Business and Government in Canada*, p. 30.

¹⁸ *Ibid.*

¹⁹ A. Tupper and G.B. Doern, “Understanding Public Corporations,” *Canadian Business Review*, vol. 9 (Autumn, 1982), p. 38; Canada. Privy Council Office, *Crown Corporations: Direction, Control, Accountability* (Ottawa, Minister of Supply and

political purposes. "If maximization of profits or government revenues are the goals served by the substitution of state for private producers," they argue, "there is no evident reason to tie up public monies in productive assets if private-sector agents could assume the risks."²⁰ In short, Laux and Molot maintain there has to be something beyond profits to justify the use of public enterprise.

At Pacific Western Airlines - a provincially-owned and -controlled airline service - that something was the preservation of domestic enterprise. Rather than let PWA slip into the hands of interests who were perceived as being indifferent or even hostile to Alberta's economic aspirations, the Lougheed government purchased the airline in 1974 from private interests. At Eldorado, Canada's national uranium company, that something took the form of strategic control of Cold War material. Not only was Eldorado a successful commercial enterprise, but through it the government was able to regulate uranium's application. However, as the historian Robert Bothwell demonstrates in his study of the crown corporation, this "bifurcated" policy became increasingly difficult to maintain over time.²¹ At Atomic Energy of Canada Limited (AECL) the objective was to promote nuclear autonomy and regional economic development while attempting to earn a profit. While AECL was a success in terms of its "public purpose", the success came at the cost of a huge public investment.²² Likewise, at Telesat Canada - a partially government-owned corporation which was established in 1969 to influence the development of a domestic satellite communication system on a "commercial basis in competition with existing technologies" - management was successful at realizing its public policy objective but not at

Service, 1977), pp. 21-22; H.B. Feigenbaum, *The Politics of Public Enterprise: Oil and the French State*, esp. pp. 145-174.

²⁰ J. Laux and M. Molot, "Potash Corporation of Saskatchewan," in A. Tupper and G.B. Doern (eds.), *Public Corporations and Public Policy*, (Montreal, The Institute for Research on Public Policy, 1981), p. 208.

²¹ Bothwell, *Eldorado*, esp. pp. 430-435.

²² Bothwell, *Nucleus*, p. 451.

a financial gain.²³ "Satellites were built and operated," state G.B. Doern and J. Brothers, "but not by any reasonable measure at a profit."²⁴ Bricklin, Canadair, Churchill Forest Industries, Deuterium and Consolidated Computer Limited each had as their public policy goals regional economic development or "province building" and job creation. Each was also to be run in a "business-like" manner in pursuit of a profit. For various reasons, which included managerial incompetence, oversight problems, political interference and changes in the economic environment, these government corporations lost the Canadian taxpayers billions of dollars. Each, according to Sandford Borins and Lee Brown, represented an "investment in failure."²⁵ Failures such as these have led Marxist commentators, like Reg Whitaker, to conclude that "the state exists to mobilize financial support for.... unprofitable enterprises."²⁶ That public enterprise has generally been unsuccessful at generating a profit is not surprising, according to journalist Walter Stewart. In his opinion, state enterprise has always been a "gross, ugly, wrong-headed brute of a thing...."²⁷ Crown corporations, Stewart states, are arrogant beasts that vie for power but not responsibility.²⁸ They are, in his opinion, as much political as economic animals.

The charge that the crown corporations have served political purposes as much as, and perhaps more than, economic ends has of course been made before. Political economist Wallace Clement, for example, has argued that crown corporations are political instruments of the Canadian state, designed to look after the general interests of Canadian capitalists,

²³ G. B. Doern and J. Brothers, "Telesat Canada," in Tupper and Doern (eds.) *Public Corporations and Public Policy*, pp. 221-250.

²⁴ *Ibid.*, p. 244.

²⁵ Borins and Brown, *Investments in Failure*, esp. pp. 1-3, 108-109.

²⁶ R. Whitaker, "Images of the State," in L. Panitch (ed.) *The Canadian State: Political Economy and Political Power*, 64-65.

²⁷ W. Stewart, *Uneasy Lies the Head: The Truth About Canada's Crown Corporations*, (Toronto, Shrup, 1987), p. 165.

²⁸ *Ibid.*, pp. 166-167.

not Canadians in general.”²⁹ Likewise, in his analysis of the “politics of development”, historian H.V. Nelles argues that the state and big business were so intertwined between 1849 and 1941 in the development of Ontario’s “new staples” that it compromised the principle of responsible government and reduced the state to a “client of the business community.”³⁰ Politicians like Premier George Ross (1899-1905) were enormously important to the economic process itself. At the national level, Sir John A. Macdonald could not keep his politics out of the development of the Canadian Pacific Railway, resulting ultimately in the Pacific Scandal of 1873. It was not the first time, however, that politics were involved in railway development. “The railways in Canada,” notes Garth Stevenson, “have always been associated with politics.”³¹ While the CPR was closely tied to the Conservative party of Macdonald, the Grand Trunk was linked to the Liberals, and the Intercolonial invariably tended to be subject to the political influence of the incumbent party and became famous for the role that patronage played in its operations. According to the journalist Jeffrey Simpson, such government involvement has polluted our politics by creating endless opportunity for “jobbing” since the 1850s - from Hinck’s “ten thousand pound job” to Air Canada’s aircraft procurement in the 1980s.³²

It is an open question, therefore, whether the state can reconcile public policy objectives and the pursuit of economic interest. The case of Polymer suggests that it can. Here was a crown corporation that not only generated a financial windfall for the government but introduced science-based industry to Canada and helped Canada become globally

²⁹ Clement, “The Corporate Elite,” p. 245.

³⁰ H.V. Nelles, *The Politics of Development: Forest, Mines and Hydro-Electric Power in Ontario, 1849- 1941* (Toronto, Macmillan, 1974), introduction.

³¹ G. Stevenson, “Canadian National Railways and Via Rail” in Tupper and Doern (eds.), *Privatization, Public Policy and Public Corporation in Canada*, p. 47.

³² J. Simpson, *The Spoils of Power: The Politics of Patronage* (Toronto, Collins, 1988).

competitive. By nearly every measure, Polymer was an efficient economic animal.³³ Contrary to the assertions of some economists about public enterprise in general, Polymer was not inferior to private firms in terms of allocative efficiency.³⁴ Nor did it perform notably more poorly than private industry in times of economic distress.³⁵ During the recession of 1967, for instance, Polymer outperformed Canadian Industries Limited. That year Polymer produced a profit as it had every year since its inception in 1942. It was thus both a successful commercial enterprise - selling its goods and services to the public, confronting competition, covering its costs and earning a profit - and an effective public policy instrument - stimulating R&D and promoting industrial development in the Sarnia region. Canada never produced an indigenous supply of natural rubber in any significant amount. The Canadian climate was ill-suited to the cultivation of the rubber tree *Hevea Brasiliensis*. The nation was therefore poor, not rich, as Bliss insists, by nature. But Canada overcame this deficiency as a result of government action. Through its agent Polymer Corporation, the state embarked upon a program to produce synthetic rubber - rubber that was in no way related to botanical endowment yet crucial to modern industrial development. By applying science, Polymer made this rubber so well that it found markets all over the world. By 1960, it was supplying 10% of world requirements and was pouring money into the public coffers. In the case of synthetic rubber, it was government policy, not nature, that made Canada rich.

³³ D.G. McFetridge, "Commercial and Political Efficiency: A Comparison of Government, Mixed and Private Enterprises," in D.G. McFetridge, *Canadian Industrial Policy in Action* (Toronto, University of Toronto Press and the Royal Commission on the Economic Union and Development Prospects for Canada, 1985), pp. 122-123.

³⁴ *Ibid.*

³⁵ The economist Richard Pryke argues that public enterprise performs "particularly badly" when the economy is in difficulty. See R. Pryke, *The Nationalised Industries: Policies and Performance Since 1968* (Oxford, Martin Robertson, 1981), chp. 13, esp., p. 266.

So what had caused Polymer to get it right? There were several reasons. First, the crown corporation did not receive mixed messages from Ottawa. Its post-war mandate was to act like a commercial enterprise for the purpose of generating a profit. If that could be done, Polymer's political godfather C.D. Howe maintained, all the other public policy objectives would take care of themselves. Howe was tremendously insistent on this point. It was "profit or perish," he told Polymer's board of directors shortly after the war. Like other commercial enterprises, Polymer would have to "toe the bottom line." This ultimatum, along with Howe's refusal to extend protection to the infant synthetic rubber industry, provided tremendous motivation to the young men and women working at the plant. "His directive," Polymer's reflective director of research and development E.J. Buckler later recalled, "certainly put the staff's feet to the fire."³⁶ It also fostered in them a self-interest and concern for Polymer's survival and created a sense of collective *esprit de corps*. Eldorado had operated in a completely artificial market with only one customer, the U.S. Atomic Energy Commission, whose demand was determined almost entirely by the political and military pressures of the military arms race. Polymer's situation was profoundly different. It sold its products to numerous customers all over the world, without subsidies, financial support or protection of any kind. It faced competition at home and abroad. Working without a safety net, Polymer was forced to develop its own production, marketing, research and managerial capabilities.

Secondly, Ottawa was entirely willing to maintain an arm's length relationship with Polymer. There were no political hacks, for example, appointed to Polymer's board of directors. In addition, the responsible minister never got involved in the day-to-day operations of the corporation. Having clearly defined Polymer's task, Ottawa was willing to stand back and let the crown corporation determine how to get the job done. "It will be the job of Polymer to sell sufficient rubber to keep its operations at an economic level,"

³⁶ E.J. Buckler to M.J. Bellamy (May 30, 2001).

Howe wrote to a senior Polymer executive at the end of the war, "and I am quite willing to leave the method to you and your Board of Governors."³⁷ Howe was thus not insulating the activities of his state enterprise managers from the discipline of the market. On the contrary, he was tacitly encouraging them to seek out joint ventures and to co-invest, even with foreign firms, to enhance their research and development capability and thereby achieve flexible specialization - characteristics Laux and Molot argue are essential to a successful state-run enterprise.³⁸ As long as the corporation was making money, Howe could conceive of no reason to intervene in the affairs of the firm. After C.D. Howe was voted out of office in 1957, his successors took a similar approach to Polymer. There was a sense in Ottawa that Howe had developed a winning formula, and public policy makers were therefore loth to do anything that might jeopardize the *status quo*. At a fundamental level, profits were the politics of Polymer.

Critics might ask where the political accountability is in all of this. Does not the goal of profitability and the accordance of managerial autonomy to pursue that goal reduce the accountability of public enterprise? Certainly, as H.V. Nelles illustrates in his insightful history *The Politics of Development*, that was the case at Ontario Hydro - North America's first publicly-owned electrical company. Under the autocratic direction of Adam Beck, the corporation worked its way free of both the discipline of the marketplace *and* the legislature. "In the name of the people," Nelles states of Ontario Hydro's operation in 1919, "[it] was literally running away with the provincial treasury and no one had the courage to ask for what purpose."³⁹ According to the journalist Walter Stewart, this type of irresponsible behaviour is not limited to Ontario Hydro; it is a characteristic of all crown corporations: "... Crowns can get away with fiscal murder. They can take enormous powers unto themselves to expropriate land and to hold themselves beyond the reach of the

³⁷ *Ibid.*

³⁸ Laux and Molot, *State Capitalism*, p. 202.

³⁹ Nelles, *Politics of Development*, p. 413.

people they displace. Crowns hold power without responsibility, spend money without sufficient accountability, and set policy without consultation - all anathemas to the democratic process, besides costing a hell of a lot of money."⁴⁰ According to political scientist H.B. Feigenbaum, public enterprise in France took on many of these same characteristics.⁴¹ Both *Essences et Lubrifiants de France* (Elf) and *Compagnie Française de Pétrolés* (CFP), France's state owned oil companies, ignored their public policy objectives (i.e. to secure and supply reasonably priced petroleum to the French people and assist the state in the balance of payments) in order to maximize profits. During the oil crisis of 1973-74, for example, CFP and Elf refused to divert oil deliveries from foreign to French customers.⁴² On the surface, the event seems strikingly similar to Polymer's decision not to divert deliveries of rubber from foreign to domestic consumers during the Korean war. The difference is that Polymer did not operate in an oligopolistic marketplace and it was not large enough to influence prices and production. Furthermore, unlike Elf and CFP, its mandate was to function foremost as a profitable commercial enterprise.

It is true that Polymer was given a tremendous amount of managerial autonomy, but it did submit yearly capital budgets to Ottawa and did consult with Ottawa on major policy decisions. That said, it would be a stretch to say that Polymer was directly accountable to parliament. It was not. Polymer was first accountable to the bottom line. This was state capitalism in its purest form. Perhaps, if Polymer had operated in an artificial economic environment, like Mexico's PEMEX or Indonesia's Pertamina, then managerial autonomy and profit maximization would not have guaranteed efficiency. But Polymer had not functioned in such an environment. C.D. Howe had insisted on this. For a man who has rarely, if ever, been celebrated for his critical thinking, C.D. Howe profoundly understood the logic of business and applied it consistently and effectively in government.

⁴⁰ Stewart, *Uneasy Lies the Head*, p. 7.

⁴¹ Feigenbaum, *The Politics of Public Enterprise*, esp. chp. 3.

⁴² *Ibid.*, pp. 76-80.

Having been made accountable to the bottom line, Polymer adopted the norms of corporate capitalism, developing strategies and structures similar to that of other dynamic corporations operating on the free market. Early in its existence, it embraced research and development as a means of achieving corporate ends. Polymer was one of the first Canadian firms to recognize that modern economic growth could be knowledge-based and science-driven. The war had taught Polymer the power of science and innovation. Under the pressure of war, Polymer had excelled technologically. In the immediate post-war period, Polymer continued to apply science to develop products that appealed to peacetime consumers and in the process the corporation made numerous contributions to synthetic rubber technology. Recently, there has been much written about Canadian business's historic inability to compete with uniqueness and innovation. To this day, according to Martin and Porter, Canadian firms rely on relatively low-cost labour and raw materials to survive in the global marketplace. But this was not how Polymer competed and grew.⁴³ Polymer's growth was based on ideas, not solely on objects (i.e. capital and labour), supporting the thesis of Howitt *et al.* that "innovation resulting from the accumulation of knowledge plays a fundamental role in determining economic growth."⁴⁴ By allowing Polymer to exploit for profit the fruits of its own research and development, the Canadian government stimulated post-war technological innovation in the synthetic rubber industry. The U.S. government was nowhere near as successful in its attempts to do the same.⁴⁵ Polymer's dedication to science attracted scientists from all over the world. Polymer was thus responsible for a kind of reverse brain-drain, drawing men and their ideas to Canada.

⁴³ R. Martin and M. Porter, "The road not taken," *Globe and Mail*, (April 26, 2001).

⁴⁴ P. Howitt (ed.), *The Implications of Knowledge-Based Growth for Micro-Economic Policies* (Calgary, University of Calgary Press, 1996), p. xiii.

⁴⁵ See P. Morris, *The American Synthetic Rubber Research Program* (Philadelphia, University of Pennsylvania Press, 1989), esp. chp. 2; and R. Solo, "Research and Development in the Synthetic Rubber Industry," esp. pp. 78-81.

Of course, Polymer's industrial laboratories could not have succeeded without the resources and culture sufficient to attract some of the best minds working in science and technology, nor could they have succeeded without top management advocacy or skillful research directors.

Science gave Polymer tremendous power to control the quality of the rubber being produced. What the young crown corporation did not have immediate control over was the quantity of rubber to be manufactured. That had been determined by the demands of war. To meet its wartime requirements, it was decided that Polymer would have to produce 50,000 tons of rubber annually. That was what the plant had been designed to produce. The fact that this level of output was more than twice Canada's peacetime requirements meant that after the war Polymer would have to export to survive. And export it did. In the post-war period, Polymer aggressively developed markets in America, Europe, Africa and Asia. When, in 1960, Polymer established manufacturing plants overseas to meet the surging foreign demand for its product, it joined an exclusive club of Canadian companies - including Inco, Brascan, Noranda, Cominco, Alcan, MacMillan-Bloedel and Massey-Ferguson - that were multinational in operation. In many ways, Polymer was the epitome of post-war economic dynamism - flexible, efficient and imperialistic. In going abroad - to borrow a phrase from the economist Charles Kindleberger - Polymer grew abroad.⁴⁶

In their study of state enterprise, Laux and Molot lament the "trend to commercialization" which Polymer had helped to initiate. For them, the commercialization of the crown corporations had compromised the kinder and gentler nature of public enterprise. "Once state enterprises are required to compete or to produce for profit," they argue, "their managers tend to seek greater autonomy and government tends to give priority to financial performance, thereby neglecting the wider social and economic implications of

⁴⁶ Kindleberger, *American Business Abroad*, p. 6.

corporate activities.”⁴⁷ There is no indication that Polymer’s executives were anymore concerned with the “wider social and economic implications” of their actions than their private industry counterparts. In nearly every way they acted like aggressive and deliberate free-market managers. They laid off workers when it was necessary; they bought supplies wherever they were the cheapest; they set up manufacturing facilities overseas; and they did not discriminate against foreign purchasers. There is thus little evidence here to support Thomas J. Courchene’s claim that public managers will minimize profit so as to maximize political support.⁴⁸ At Polymer the reverse seemed closer to the truth.

The actions of management transformed Polymer into a powerful and autonomous institution capable of molding its environment and pursuing independent strategies for growth. The corporate strategies that they formulated reflected trends in the international business environment. To be sure they had not always worked in the firm’s favour. In the 1970s, for example, Polymer joined the diversification movement with disastrous results. Its ventures into housing and information processing were both strategic and financial failures and compromised the corporation’s core competency. While diversification, which began in 1969 when Polymer was still fully government-owned and -controlled, proved to be a costly cul-de-sac, it nonetheless illustrated that the firm was conceiving of itself as, and operating like, a real corporation.

While Polymer was not beyond making mistakes, most of the time it got things right. Polymer was a successful enterprise. A child of wartime expediency, Polymer Corporation Ltd. oversaw the construction of a state-of-the-art synthetic rubber plant at Sarnia. Like most C.D. Howe-inspired private and public ventures, the plant was constructed on cost and on time. Private industry could not have accomplished the task. Only the state could

⁴⁷ Laux and Molot, *State Capitalism*, p. 65.

⁴⁸ T.J. Courchene, “Privatization: Palliative or Panacea,” in T. Kierans and W.T. Stanbury (eds.), *Papers on Privatization* (Montreal, Institute for Research on Public Policy), pp. 1-36.

have co-ordinated the necessary exchange of technical and scientific information between governments, industries and universities. Without the state's timely initiative there would have been no synthetic rubber industry in Canada and in all likelihood no "chemical valley" at Sarnia.

Having fulfilled its wartime mission, Polymer turned its attentions to the post-war world with the objective of turning a profit. By "going global" and utilizing science, Polymer successfully fulfilled its primary function of generating a revenue for the government which was then put to strategic use in other areas of national development and social betterment. In the process of becoming a profitable commercial enterprise, Polymer attracted new industry, scientists and ideas to Sarnia, turning the region into a hothouse of economic activity. During the 1960s, Sarnia had more Ph.D.s per capita than anywhere else in Canada. By the 1970s, the corporation - which was by then multinational in scope - had become a symbol of Canada's post-war industrial prowess, finding its image on the back of the \$10 bill. This was no lazy crown corporation. On the contrary, it was a harbinger of progress, a dynamic, agile and flexible corporation that well served the nation's needs.

Note on Sources

The *Polysar Papers* at the National Archives of Canada were the main source of information for this dissertation. The close to two hundred volumes of material cover various aspects of corporate activity from the wartime formation of Polymer in 1942 to the purchase of Polysar by Nova Corporation in 1988. The documentation for the period 1942 to 1970 is particularly extensive and, when examined in conjunction with the *Department of Munitions and Supply Papers*, provides a detailed portrait of the company's operations and performance. Emerging from the documentation is the important role that management played in the development and growth of the firm. Each of the principals - Rowzee, Buckler, Wilk, Hatch, Dougan and Rush - generated a great deal of documentation. These were thoughtful and deliberate individuals. While there is very little of a personal nature, the student interested in business history can easily trace the evolution of the firm's financing, marketing, new business development, operations, research and development, corporate planning and production and distribution from their correspondence. One is also given a glimpse into the early diversification effort and the rapid expansion of its core petrochemical operations in the early 1970s. Fortunately, Polymer's managers did not limit their discussions to the day-to-day operations of the firm. They were often reflecting on the role of science and technology in the growth of their firm and the industry in general. Buckler and Rowzee were particularly contemplative. Their respective papers contain a number of speeches and articles addressing questions of a broader or more philosophical nature.

The importance of the *Polysar Papers*, however, lies in what they tell us not only about the growth of the firm but also about the birth and development of the Canadian synthetic rubber industry. As the documentation relating to patent sharing arrangements clearly demonstrates, the Polymer project would not have been possible without the assistance of private industry and the U.S. government. The Canadian government, and

specifically C.D. Howe, was instrumental in obtaining this support. The *C.D. Howe Papers* at the National Archives in Ottawa are an important additional source of information for anyone interested in government-industry relations. The *Papers* contain five volumes that deal directly with Polymer Corporation and provide a window into the activities of one of Canada's most successful economic planners. While much of the information located here can be found in the *Polysar Papers*, there is fresh information on Howe's relationship with officials at the U.S. government's Rubber Reserve Cooperation and his postwar plans for the crown corporation. For those interested in the politics of development, there is a large file relating to the 1942-1944 feedstock debate. Howe's continentalist perspective is colourfully countered by the regional/nationalist view of such people as T.C. Douglas.

On some important matters, however, the Howe papers are silent. There are perhaps several reasons for this. We know from his biographers that Howe often delegated responsibility. The extant documentation depicts a man who surrounded himself with the best and the brightest people. It was their task to "get the job done." Thus the correspondence, proposals and reports that crossed Howe's desk were often of a final or complete nature. Ideas were often fully developed. Positions were established. All that the proposals needed were Howe's ultimate approval and support. Howe rarely got involved in the developmental stage of these proposals and thus it is difficult at times to trace the evolution in his thought. Adding to these difficulties is the fact that Howe was a man of few words - written or spoken. He accomplished so much yet said so little. He disliked drawn-out discussions and never talked around an issue. He was always direct and to the point. He was clear and concise. Often he would respond to a written correspondence over the telephone or in person. This was Howe's way. When he did respond in writing, his messages were most often less than a page in length and sometimes only a sentence or two long. The war and Howe's management-on-the-run style demanded this. That said, Howe's managerial style does not always make it easy to discern the rationale for some of his public policy decisions. We do not know, or cannot state for sure, for example, what

Howe's precise rationale was for embarking upon the synthetic rubber program in the first place. There is a good deal of circumstantial evidence to suggest that Howe seized the opportunity of war to modernize the Canadian economy and bring new (American) science and technology to Canada. But there is no documentation in the Howe Papers directly stating this. We do have the confirmation of some of Howe's "boys", but no words from Howe himself. In addition, the Howe Papers go silent after 1951. While Howe remained in office and responsible for Polymer until 1957, he had next to nothing to say - at least in an archival sense - about the corporation after 1951. The five volumes relating to Polymer Corporation in the Howe Papers cover the period 1942-1951. There is no documentation relating to the period 1951-1957. Perhaps this was a result of the success of the firm. Once Polymer was up and running and generating a profit, Howe was willing to fade into the background. His job was done and he had faith in the capabilities of Polymer's managers.

Howe's hands-off approach to Polymer was emulated by successive ministers of the Crown and thus there is not a lot of information generated in bureaucratic circles in Ottawa. Indeed, the only time that a good deal of government discussion was generated about the affairs of the firm came during the Diefenbaker years (1957-1962) over the issue of privatization. By far the best source of information relating to the government's limited position on this matter is found in the *Cabinet Conclusions*. The documentation makes it clear that there was nothing close to unanimity within the cabinet. Opposing positions are clearly outlined, although the advocates of each position are rarely identified. On the issue of privatization, the *Polysar Papers* provide insights into the views of management and the board of directors as well as the attitudes and ambitions of Polymer's suitors.

From a broader perspective still, the *Polysar Papers* are important for what they reveal about the growth of the petrochemical industry in general. The Board of Director's minute books 1942-1987 contain insightful descriptions of the domestic and international developments in the petrochemical industry. There is information on the nature and sources of growth, the diffusion of technology, the proliferation of producers, patterns of

development, corporate strategies and international locations. The minute books also contain shareholders' minutes and bylaws. The documentation generated by Polymer's managers reflects the extent to which the firm was integrated into the larger international community of petrochemical producers.

Unfortunately, the post-1972 records are not complete. There is very little relating to government-business relations during this period and a limited amount on the diversification effort of the 1970s. For example, the Comshare file is limited to less than twenty pages of documentation. It was during this later period that Polymer/Polysar became a subsidiary of the Canada Development Corporation. The CDC papers, if they still exist, could not be found and are not in the public domain. It was my intention therefore to fill in some of the historiographical gaps by way of oral interview. A list of these interviews as well as the other sources used are contained below.

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