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**CZECHOSLOVAK ENERGY POLICY IN THE PERIOD OF TRANSITION.
NEW OPTIONS AND OLD CONSTRAINTS**

**by
Susan Usher**

**A thesis submitted to Carleton University in fulfillment of the requirements for
the degree of Master of Arts in Political Economy**

**Institute of Political Economy
Carleton University
Ottawa, Canada
September 4th, 1995**

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**"CZECHOSLOVAK ENERGY POLICY IN THE PERIOD OF TRANSITION:
NEW OPTIONS AND OLD CONSTRAINTS"**

submitted by Susan Usher, B.A.
in partial fulfilment of the requirements for
the degree of Master of Arts

Thesis Supervisor

Director, Institute of Political Economy

Carleton University
11 September 1995

Abstract

The thesis traces Czechoslovakia's adaptation before and after the fall of Communism to a post-oil era in which no energy source appears trouble-free, inexpensive or easily operable. It looks first at energy development within the Soviet Bloc and Czechoslovak dependence on the USSR, next discussing the 1980s response to decreased Soviet oil supplies. The failure to accomplish these policy mandates is analyzed.

The effects of the post-Communist transition (1989) on Czechoslovakia's adaptation to the post-oil era are then detailed, focussing on the period before the 1993 breakup into the Czech Republic and Slovakia. Approaches to energy issues are examined in light of the policy mandates of the 1980s and for their ability to minimize the costs - societal, economic and environmental - of energy. Czechoslovak Energy Policy in the Period of Transition concludes by identifying new options and constraints in energy policy trends and discussing their implications for future energy development.

Dedicated to the two Roberts I love best

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FREQUENTLY-USED ACRONYMS

CCAЕ	Czechoslovak Commission for Atomic Energy
CEZ	Cesky energeticky podnik (Czech utility)
CMEA	Council for Mutual Economic Assistance
COCOM	The Western Co-ordinating Committee on Trade with Communist Nations
CPP	Cesky plynarensky podnik (Czech gas distributor)
EBRD	European Bank for Reconstruction and Development (see Appendix B, p.124)
EC	European Communities
Ecoservice	Economic News Service of CTK, the Czechoslovak News Agency
EIB	European Investment Bank
EIU	Economist Intelligence Unit
EU	European Union
GDP	Gross Domestic Product
G-7	Group of Seven industrialized countries
G-24	Group of 24 (see Appendix B, p. 124)
IAEA	International Atomic Energy Agency
IEA	International Energy Agency
IMF	International Monetary Fund
NMP	Net Material Product
OECD	Organization for Economic Cooperation and Development
OPEC	Organization of Petroleum Exporting Countries
PHARE	Pologne, Hongrie: Assistance à la reconstruction économique (see Appendix B, p.124)
SEP	Slovensky energeticky podnik (Slovak utility)
SPP	Slovensky plynarensky podnik (Slovak gas distributor)
UNECE	United Nations Economic Commission for Europe

INTRODUCTION

The countries of East-Central Europe emerged from the Soviet block into a world market very different from the one they had left soon after the Second World War. One of the most significant changes was in the way economies used resources to produce economic gain. Resources, and especially energy resources, had become increasingly scarce, and doing more with fewer inputs, rather than getting access to more inputs, was required for products to be competitive on world markets. This change was prompted by, or at least became apparent during, the oil crises of the 1970s, which delineated a prior period of cheap and plentiful energy resources from a "post-oil" era in which the costs of energy became much larger factors in all areas of production, and in which no energy source appeared trouble-free. Threats to the environment posed by energy production became global issues.

This paper will trace Czechoslovakia's adaptation to this post-oil era, first under Communism and then into the transition period. It will examine how the transition from a socialist economic system within an autarchic regional bloc to a capitalist economy open to the West affects the country's ability to produce, import and use energy in a way that is reliable, environmentally safe and economically competitive, in other words, that responds to the exigencies of the "post-oil" era.

The analysis will focus on Czechoslovakia over the three years beginning with the November 1989 popular revolution that saw a new government and economic policy direction adopted, and ending in January 1993 when the federation split into Czech and Slovak halves. Two elections were held; the first in June of 1990 expressed new priorities in foreign relations, and new definitions of property rights and institutions. The second, in June 1992, confirmed these mandates in the Czech Republic but also expressed the strength of the Slovak separatist movement. In these three years, initial steps were taken in a comprehensive programme of economic reform aimed at devolving power from central government agencies to independent economic actors, and at constructing the framework

within which these could function effectively. The aim was to fundamentally change the incentives of producers and consumers in order to achieve an economic vitality that proved impossible under central planning and rendered government unstable. These reforms have significant energy policy implications, both explicit and implicit.

Energy policy constitutes the attempt to satisfy many, often conflicting, interests and balance pressing short-term energy needs against a longer-term recognition of the scarcity of energy resources. Kemezis refers to the period following the first OPEC crisis as the Energy Policy Explosion. "Just as all the countries in the 1970s began the inevitable transition to a post-oil economy, so the initial policy consequence was a transition to an activist government role in energy." This role was taken on to fulfill a notion of "government responsibility in assuring national welfare, national security, and international competitiveness" (Kemezis and Wilson 1984, p.3). Though oil prices fell soon after 1978 and have fluctuated within more comfortable margins ever since, the priority accorded to energy did not diminish.

In consequence, energy planning became universal and efforts by government agencies to control the supply, pricing, and end use of fuels increased exponentially. Energy policies since 1973 have constituted attempts to cope in a post-oil era characterized by dwindling reserves of fossil fuels, especially premium fuels such as oil, and by the increasing threats energy production poses to the national and global environment, especially the dangers inherent in nuclear energy production. International environmental agreements have since ushered in a still broader level of control and, while not phrased specifically in terms of energy policy, are debated with full recognition of the effects they will have on the energy policies of each nation.

The management of energy resources formed, in Czechoslovakia and other Communist economies of the Soviet model, a cornerstone of central planning long before the oil crises occurred. However, in contrast to the central role efficient energy use assumed in Western energy policy after 1973, Czechoslovak policy was dedicated to ever

increasing production regardless of cost. In the West, energy conservation provided further impetus for developing more efficient technology and production processes in order to reduce the cost of all inputs and improve competitiveness. In the East, the policy goal of "intensive" development based on "more efficient use of resources and accelerated technical progress," (McMillan 1990, p.29) could never effectively be implemented under central planning. The discrepancy between the energy intensity and consequently the competitiveness of Eastern and Western economies produced ever-widening developmental gaps from the 1970s on.

When analyzing energy policy development in the communist and post-communist period, its results will be evaluated according to the exigencies of this "post-oil" era. Kemezis identifies five objectives common to all oil-importing countries since the 1970s: 1) secure supplies; 2) reasonable prices; 3) increased domestic production; 4) efficient use; 5) fair allocation (Kemezis and Wilson 1984, p.30). The priority accorded to each and the specific measures adopted to accomplish them depended on a particular country's social, economic and political options as well as on the natural resources available domestically. After 1973, countries with indigenous oil and natural gas reserves (think of Denmark, the U.K. or Canada) encouraged their exploitation. Coal-rich countries (Australia, Germany, the U.S., Belgium) developed sophisticated technologies to render coal a more efficiently mined and processed fuel while mitigating its effects on the environment. Some countries (notably France) developed extensive nuclear industries (for both power generation and weaponry). The variation in response was significant, but each served the overall objectives identified by Kemezis and Wilson.

As none of these objectives can be fulfilled completely and permanently, the notion, put forth by Evans, of energy policy as a set of guidelines rather than a fixed programme appears useful. Energy policy becomes, then, an attempt to minimize the "costs of energy", calculated according to the cost of long-term energy supplies; waste of primary energy; negative effects on the environment; rapid consumption of premium fuels; reliance on

unproven technology; dependence on 'insecure' energy supplies; capital expenditure; and dislocations of manpower (Evans 1978, p. 25).

Chapter One will examine Czechoslovakia's deviation from these guidelines evident in policy failures that were both protected and perpetuated by Czechoslovakia's former government within the framework of the Council for Mutual Economic Assistance (CMEA), despite harmful consequences to the country's and the region's economic vitality and environmental health. It follows energy development in Communist Czechoslovakia from the rapid infusion of Soviet oil into a previously coal-dominated economy to the oil-centred energy crisis of the 1980s as the Soviets became less willing to subsidize Eastern European imports. Carl McMillan and John Hannigan, in a number of reports for Carleton University's Institute for Soviet-East European Studies, examined CMEA energy relations and found that along with increased oil and gas supplies came a complex web of dependencies that provided the context for Eastern European efforts to adapt to the "delayed" oil crisis in the CMEA (McMillan and Hannigan 1981). Ivetta Pass, in a 1983 research essay for the Institute for Soviet-East European Studies at Carleton University, looked specifically at Czechoslovakia's efforts to adapt. Their research, as well as John Kramer's review of Eastern European energy problems published directly before transition began, provides the basis for this Chapter's look at efforts to institute adaptive policies under Communism.

Three mandates were pursued in Czechoslovakia during the 1980s: 1) diversifying sources of oil in order to make up for Soviet shortfalls and, when this proved impossible, 2) decreasing energy consumption and 3) developing domestic supplies, principally nuclear power, assumed priority. Finally, as delays plagued the introduction of nuclear capacity and conservation measures failed, traditional coal-generated power was relied on as a stop gap measure. The dependencies inherent in CMEA energy relations curbed Czechoslovakia's ability to fulfill these three mandates and sent the country into crisis once Soviet energy supplies were reduced. The consequences of the failure to diversify import

sources, decrease consumption and develop domestic energy sources included wasteful and unproductive investment in energy capacity, environmental devastation and outright cutbacks in public supply.

The transition to a market economy and democratic government would significantly alter the context in which energy consumption, production and trade occurred. Some of the reforms had an integral energy component. The restructuring and privatization of industrial production and energy production aimed to activate market incentives that would make these enterprises more efficient in their use of energy, as well as other resources. The creation of an environment ministry and independent regulatory bodies to monitor nuclear safety and pollution were democratic responses to public concerns.

Other reforms, such as trade liberalization, opening up to foreign investment and joining (or preparing to join) the establishments of Western nations, would change the rules of energy production and trade in sometimes unexpected ways, from the need to fall in with the United Nations embargo against Iraq, to the emergence of a coordinated Western assistance and advisory programme, to the collapse of trade in the CMEA. In the three years after the Revolution, enough headway had been made in reforms that Richard Portes called the "regime change" assured (Portes, 1993). But three years could not miraculously reverse communist structures, and new destabilizing elements, foremost the separation of the country into Czech and Slovak nations, made the revitalization of the energy economy, and the establishment of regulatory agencies appear as a 'one step forwards, two steps back' affair.

Chapter Two will look at these reforms and the environment in which they were accomplished for their significance to the conduct of energy activities, and examine the new approaches to energy management they permit. Many of the early studies of Czechoslovakia's transition were written by agencies involved in the assistance programme and served primarily to inventory energy assets that had formerly been held as state secrets. Their assessments had a prescriptive quality that was unhelpful in determining the extent of

change already in place, the effectiveness of new incentives and the reasons behind successes and failures. Political statements expressed new commitments, goals and projections, but were unhelpful in distinguishing intention from action in this optimistic period. To clarify the context in which decisions regarding energy were being made and gain the perspective of those newly charged with undertaking them, a series of interviews were conducted by the author in Czechoslovakia between November 10th and December 20th, 1992, the eve of the country's breakup.

Interviews with new managers of the Czech and Slovak utilities, and Czech gas and oil companies, helped distinguish ambition from accomplishment and present a clear view of the challenges these companies faced and the priorities they held. Further insight was offered by a consultancy called SEVEN, which was active in advising both government and energy companies. The Energy Efficiency Business Week Conference held in the first week of December 1992 under SEVEN's aegis gathered together policymakers, utility managers, Western assistance agencies and Czechoslovak industrial managers. The experiences described provided an invaluable perspective on how energy reforms were being implemented, what was holding up certain measures and what effect others were having. Interviews with executives at both Czech and Slovak utilities revealed differences in outlook between the Republics and underlined the importance of Slovak nationalism in energy decisions.

The early transition period also revealed imbalances between stated, and sometimes legislated, goals and the institutional and public backbone meant to support them. The reasoning that if one aspired to be an EC country and copied the laws of EC countries one would automatically become an EC country was rudely disrupted by the recognition of Czechoslovakia's own relative poverty and by EC reluctance to make the charade reality. Western interest in Czechoslovakia's energy sector would, nevertheless, become one of the most important determinants of activities undertaken, and thus demands a look at the priorities held by Western, and especially West European, governments and companies.

By examining activities underway both within Czechoslovakia and outside the country during the early transition period, by relying on sources expressive of goals held by the many parties involved in these activities and by infusing a historical perspective into the analysis, this study provides a means of assessing and understanding current energy developments in Czechoslovakia that is unavailable elsewhere in the literature. It also provides a foundation on which to assess future developments. The logic behind many current developments is impossible to grasp without consideration of domestic, foreign and historical factors, and when, in 10 or 20 years, someone questions why these two charming small Central European countries are so laden with power plants, electric grids, pipelines and mines, this study will be able to provide a few answers.

The diversify, develop, decrease mandates of the 1980s and the measures used to accomplish them reflected needs and means arising from Czechoslovakia's position as a centrally planned economy within an autarchic CMEA bloc dominated by the Soviet Union. Chapter Three looks at how the new context brought about by post-1989 reforms improved the ability to reduce the "costs of energy" and fulfill the mandates of the post-oil era. The priority accorded to each is telling: in Chapter One, tenuous and reduced Soviet supplies were the primary impetus to diversifying import sources, decreasing consumption and developing domestic energy resources. In the post-1989 period, decreasing consumption became a driving force behind the adoption of market structures, not as a way of coping with reduced imports but as part and parcel with the effort to increase the overall efficiency of production and the competitiveness of goods on world markets.

The decrease, diversify and develop mandates will be revisited in the three sections of Chapter Three, to see how the prospects for their accomplishment have been affected by the early stage of transition. Section A looks at the mandate of decreasing energy consumption which, with the abolition of central planning and the adoption of competitive (if not always liberated) pricing, was no longer the responsibility of the state but of individual enterprises and households. High hopes were held out for Czechoslovakia's

ability to decrease energy consumption by 10% to 30% through the use of measures developed in the West after the oil crisis, and privatization was expected to automatically make enterprises energy efficient.

Section B looks at new attempts to improve the security of supply by diversifying sources of imported fuels, a mandate which remained urgent in the post 1989 period. Reducing dependence on the Soviet Union remained the primary motive, but new problems emerged to further threaten the security of oil supplies: political instability in the Soviet Union and in Yugoslavia, the developing separation of the Czech and Slovak republics, the continued shortage of hard currency and the new participation of Western oil companies in the Soviet oil industry. The stakes involved also changed: a steady and secure oil supply was now also a prerequisite for restructuring and attracting foreign investment into industry, especially the country's large petrochemical industry.

Section C turns to Czechoslovakia's domestic energy resources. The urgency behind their development that was evident right through to 1989 seemed, at first, to abate. Demand fell somewhat, providing some flexibility within which policy makers and energy enterprises could have decided to close a number of the least efficient plants and abandon some of the monolithic expensive energy projects designed by the Communists. The fact that plants failed to close and large construction projects persisted cannot be attributed solely to a failure or slow pace of reforms, but rather points to new exigencies imposed by the reforms themselves.

From one dependency to another?

Following a Soviet model of development based on ever-increasing use of resources, and without the domestic energy base to support this type of development, Czechoslovakia was, under Communism, drawn into an ever tighter dependence on the rich oil and gas supplies of the Soviet Union. The insecurities attendant in this relationship maintained the need for energy-intensive industrial production and encouraged a domestic compensation

programme that saw the construction of massive hydro dams, costly nuclear plants of questionable Soviet design and an ever-increasing exploitation of coal that relied on insufficient technology and disregarded financial and environmental costs.

The transition to a democratic state based on market values was expected to remedy this situation by directing the economy towards efficient use of energy resources, by eliminating the political insecurities in energy trade and thus the need for 'white elephant' compensatory energy projects, and finally by infusing criteria of environmental safety and profitability into energy decisions.

Over the first three years of reforms, less changed than might have been expected: 'white elephants' begun by the Communists are on their way to completion, new political insecurities have created the need for further import routes, dependence on foreign nuclear technology has, if anything, increased, and only a couple of the very oldest coal-burning power plants have been shut down. National investment in the energy sector remains disproportionately large and has been supplemented by foreign investment and aid. These developments must be examined to find out whether, in the new context brought about by reforms, they can contribute to the country's adaptation to the post-oil era, help minimize the "costs of energy" and contribute to economic vitality, or whether they signal a new era of dependence in which national energy policy continues to be formed in reaction to the demands of other nations, sapping investment from other productive branches without allaying long-term insecurities.

Marie Lavigne and Jan Van Brabant, writing in the first two years of transition, expressed concern about the disintegration of trade and production systems built up on a regional level in the CMEA because of the ramifications this would have on small, relatively poor nations vying against each other for West European favour. Western participation in the reform process, through assistance, investment and provisions of modern technology, certainly had the potential to help overcome energy insecurities. But it is important to ask what interest the West has in doing so and to acknowledge the spectre of

new threats raised by Czechoslovakia's greater collaboration with the West under terms dictated by Western interest. Will Eastern Europe be "colonized" as producer of nuclear power for the West, or as a cheap and dirty source of energy-intensive goods? Will increased competition for Soviet energy supplies and Western control over supply networks from the Soviet Union inhibit Czechoslovakia's ability to secure the imports it needs on reasonable terms? Will Czechoslovakia find ways of improving energy efficiency and minimizing the costs of energy in this new context?

Just as Carl McMillan and John Hannigan looked at energy relations in order to better define the relationship between Eastern European countries and the Soviet Union, we can now examine the energy relations being forged with the West to understand the dynamic emerging between Czechoslovakia and its Western counterparts. Transition has overcome the constraints to sound energy policy inherent in the former relationship and opened up a new set of options; the next decade will reveal how many of these options can survive constraints imposed by the new relationship.

CHAPTER 1**ENERGY DEVELOPMENT IN COMMUNIST CZECHOSLOVAKIA**

The energy intensity of the Czechoslovak and other Eastern European economies in 1989 was, on average, double that of market economies in Western Europe, reflecting an energy-intensive industrial structure based on abundant and cheap energy and signalling tremendous problems in the ability to use energy efficiently and the quality of fuels relied upon. These problems can be attributed to a number of factors, some intrinsic to central planning, others resulting from the energy system developed within the Council for Mutual Economic Assistance (CMEA) and Czechoslovakia's position within it.

Communist development,¹ based on energy-intensive growth policies, shifted the course of the Czech Republic's long history as an advanced industrial nation to orient its economy disproportionately towards the expansion of energy-intensive heavy industry; Slovakia saw itself virtually transformed from an agricultural backwater into an industrial state.² Energy consumption increased six times between 1950 and 1989 and this energy-intensive development policy fuelled a period of strong economic growth, averaging 5.8% a year over 40 years. The strongest development occurred, however, before 1975.

The most important problem policymakers in the CMEA countries had to face was their inability to ensure steady economic progress without a concurrent increase in the supply of resources. The CMEA countries held fast to the policies and institutions favouring the traditional pattern of "extensive" growth and failed to institute measures that could foster a new "intensive" stage of development.

Central planners retained tight control over the allocation of resources through five-year plans with objectives that included retail price stability and full employment (Wolf

¹ Communism is used throughout as the equivalent of Socialism of the Soviet model or "real" socialism.

² Mechanical equipment, tools and industrial products represented 74% of Czechoslovak exports in 1987 (U.S. Senate 1991, p. 14)

1988, p.3). Fixed pricing, designed to facilitate planning and ensure universal access to basic necessities, meant that prices bore little relation to the costs of production. Structural barriers impeded cooperation between government ministries as well as between scientists and manufacturers, thus slowing the conversion of ideas into products; innovation was accorded much lower priority than the quantitative fulfillment of plan requirements (Amman 1986).

Some believe that the potential for growth in socialist economies of the East bloc was sharply limited from the start and that the extensive growth seen in the post war years was only possible through reliance upon repressive measures and external support mechanisms. Marer observed a pattern involving the rapid mobilization and deployment of inputs, integration with the USSR, and an influx of Western credits in the 1950s and 1960s that the Eastern European countries could no longer count on by the late 1970s and 1980s (Marer 1991, p. 52.).

Whether or not the socialist development strategy was, in the long run, suited to continued economic growth became, by the late 1970s, a moot point. The capitalist world,

TABLE 1.1
CZECHOSLOVAK VS. WEST EUROPEAN ENERGY INTENSITY (1988)

Petajoules of energy per billion U.S.dollars GDP

Source: *Power Plays*, 1992

under the impetus of the oil crises, evolved a new focus for development that involved, in the most basic terms, 'doing more with less' and this criterion was to become the gauge of economic competitiveness. While Western countries succeeded in improving energy efficiency through both the type of fuel they used and the way they used it, in Czechoslovakia and the rest of the East bloc, improvements in energy efficiency stagnated and even deteriorated after the oil-infusion stage.

Czechoslovakia's economy increased in energy intensity (the amount of energy needed to produce a unit of GDP or NMP) every year after 1975 so that, by 1989, it required 30 perajoules of energy to produce \$1 billion of GDP, which was twice to three times that of comparable countries in Western Europe (Table 1.1). The persistence of energy-intensive growth policies, delays in the application of energy efficient technology, and waste at all stages of transmission each contributed to keeping demand for energy high long after oil became expensive and scarce. Central planners in Czechoslovakia as in the rest of the East bloc were largely ineffectual at implementing policies that could secure energy imports, reduce dependence on Soviet sources, maintain acceptable energy balances and reduce the energy-intensity of the economy. Czechoslovakia presented something of a worst case, even among Eastern European economies, as its domestic resource base was centred almost exclusively on coal, predominantly brown coal of low calorific value. Thus, along with the balance-of-payments stress of heavy dependence on imported oil and gas, the continued reliance on coal produced environmental disaster in many parts of the country, exacting a hefty price in human health and natural resources.

DEPENDENCIES IN THE MAKING

The road to oil

The introduction of plentiful, cheap and reliable supplies of oil into Western and Eastern economies that had depended on coal for up to 80% of their energy needs until the 1950s receives due credit for allowing the terrific pace of economic growth in the post-war years.

Though oil entered East and West European energy economies at a similar pace, it did so in very different ways. The West imported almost all their oil in the 1960s and 1970s through Western European and American oil giants (the Seven Sisters) established mainly in the Middle East, and effectively reached an efficient fuels-energy balance in their economies (Table 1.2).

Table 1.2
East European (CMEA7), Czechoslovak and West European Energy Consumption Patterns 1955-1975. Energy source as percent of total energy consumption.

	1955		1965			1975			1990		
	EE	WE	EE	CZ	WE	EE	CZ	WE	EE	CZ	WE
coal	80	74	58	83	45	42	66	22	58	49	22
oil	16	19	23	12	45	32	24	54	22	23	43
gas	3	1	16	2	2	23	5.5	14	16	15	16
hydro	1	7	2	3.5	8	3	3.5	8	1	2	7
nuclear	—	—	—	—	1	0.3	—	2	3	9	12

Source: Calculated from United Nations Statistical Series, "World Energy Supplies" 1990 figures from Cambridge Energy Research Assoc. in U.S. Senate Energy Profiles, 1991 Czechoslovak figures for 1965 and 1975 from Houdek, cited in Pass, p67

In the East, the development of Soviet oil resources and the construction of the infrastructure needed to supply Eastern Europe was taken up as a joint regional project by CMEA members, operating in large part as an autarchic bloc. Beginning with the construction of the Druzhba oil pipeline in the 1960s,³ the development of Soviet resources brought a tremendous overall increase in the amount of oil available to the region and allowed for significant improvements in each country's energy balance. By 1970, Eastern Europe relied on the USSR for 18% of its energy consumption, mostly oil from the Druzhba pipelines (Wilczynski 1974). Czechoslovakia participated in the construction of

³ Each Eastern European country (save Romania, which had oil supplies of its own) built the section of the pipeline on its territory. The northern arm extended north from Byelorussia to Plock in Poland and on to Leuna in East Germany. The southern arm forked at the Czechoslovak border, with one line, Druzhba I, continuing through the country and the other, Druzhba II, crossing Bulgaria into Hungary.

the pipeline and also provided machinery to the Soviet oil industry in exchange for future deliveries of oil.

In Czechoslovakia, oil imports from the Druzhba were used in power generation, transportation and industry, and an expanding petrochemical sector came to depend heavily on these supplies. Between 1970 and 1980, crude oil consumption increased by 85% to reach almost 19 million tons a year (Table 1.3). The progress made in reducing the energy intensity of the economy was very directly linked to the proportion of oil in the country's energy balance: consumption of energy per unit of net material product decreased by about 2.5% a year from 1970-75 (Pass 1983, p.66).

Natural gas also permitted substantial improvements in energy efficiency. Again, cooperative development of Soviet resources in exchange for future imports replaced currency transactions as a means of accomplishing energy trade. The first pipeline, the Bratsvvo, linked gas fields in the Ukraine with consumers in Czechoslovakia and extended into Western Europe to permit Soviet exports to Austria, West Germany (1973), Italy (1974), and France (1980) (McMillan and Hannigan, 1981).

Table 1.3
CZECHOSLOVAK OIL AND GAS IMPORTS

Natural Gas (Billion Cubic Metres)
Crude petroleum (million metric tons)

	1976	78	80	82	84	85	86	87	88	89	90	91	92
Oil	17.1	18.6	18.9	17.3	17.2	16.9	17.7	17.7	17.1	17.6	13.6	11.4	9.6
Gas	4.6	6.2	8.3	9.0	10.5	10.8	11.6	12.2	12.0	13.6	15.1	13.2	12.

Sources:

FIU 85 supplement (80-83)

FIU and PlanEcon Dec 91 (1989-1991)

1976 - 1990, Pass p.45 from UN

1991 gas figures are PlanEcon estimates for 1st 3 quarters + second quarter doubled

1991 estimated from PlanEcon, confirmed by Financial Times 92/05/15: from Russia only

FIU 85 supp (1978-82), FIU from Fed Stats office CSFR (83-88), PlanEcon Dec 91 (1989-91)

1992 figures calculated from Energy in Europe Annual Review 1993, p.88

More intensive cooperation among CMEA participants was required to build up the Orenburg gas complex and Soyuz pipeline, with manpower, credits and machinery being provided by the Eastern Europeans in exchange for long-term deliveries of gas. Wide diameter pipe and compressor station generators contributed by the East Europeans (especially Romania) had to be purchased for hard currency from the West as East bloc technology was insufficient. Czechoslovakia also had to expand the capacity of its transit line to Western Europe to accomodate the increase in exports Soyuz would bring, entailing further investments in Western technology. The Americans tried to block East European purchases of pipeline equipment by applying COCOM restrictions;⁴ they were concerned about the Soviet Union drawing Western Europe into its sphere of influence with promises of natural gas. The incident harmed COCOM solidarity, but did not prevent the sale of the equipment. More than \$5 billion in wide-diameter pipe, compressor stations and turbines were imported from Japan and West Europe to complete the gas export line. Each East European nation (save Romania) assumed responsibility for building one section of the pipeline on Soviet territory and gas flowed through the Soyuz pipeline from Orenburg in 1979, with full capacity expected to be reached by 1981 (McMillan and Hannigan 1981, p.274).

Czechoslovakia received annual deliveries of 2.8 billion cubic metres of Orenburg natural gas for 20 years in exchange for work on the project. Through such time delayed barter deals, Czechoslovakia's gas use climbed from barely 2% of total energy in 1955 to 15% in 1990 (see Table 1.3),⁵ with its applications ranging from heating to industrial use to electricity generation. While Czechoslovakia and other East European nations undoubtedly benefitted through increased supplies of an efficient and clean source of

⁴ The Western Co-ordinating Committee on Trade with Communist Nations (COCOM) was established by the U.S. and 14 of its allies in 1949 and used to deny export licenses for certain types of technology to the Soviet bloc.

⁵ This was roughly equivalent to the increase from 1% to 16% in West European economies over the same time period

energy, the development of gas resources and the pipeline system heightened their dependence on the Soviet Union as the main supplier in an increasingly integrated regional energy system.

Oil and gas development formed only part of a massive effort, spearheaded by the Soviet Union, to integrate the region's energy system, a plan articulated in the 1971 Comecon Comprehensive Programme with the barter exchange mechanism institutionalized in the CMEA International Investment Bank to facilitate the financing of such cooperative projects. However, the COCOM dispute around the sale of pipeline equipment underlined the difficulty of operating as an autarchic bloc, given the growing technological gap between East and West as much as it confirmed Western European interest in gaining access to Soviet energy resources.

Soviet-led nuclear development

Czechoslovakia came to rely on the Soviets for nuclear technology and fuel as well, after more than a decade of vain attempts to develop a heavy-water reactor that could use the natural uranium available within the country. Czechoslovak aspirations for nuclear independence led them to approach several Western nations in 1964-65 to help complete the Bohunice A 1 plant, but the technology needed was blocked by American security concerns expressed in the COCOM list of products that could not be exported to East bloc countries. The Bohunice A-1 was finally deemed a failure. After 1968, Czechoslovakia, encouraged by the USSR in order to curb demand for oil, ended by accepting the Soviet invitation to share technology for an enriched uranium reactor for which the Soviets would be the sole provider of fuel. Kramer considered this the moment when Czechoslovakia "in effect lost its ability to develop an independent nuclear program" (Kramer 1990, p.46).

All Eastern European countries (save Romania, which obtained Canadian technology, and Poland, where nuclear energy was not developed) came to rely on Soviet nuclear technology, and formulated their nuclear power programmes on a cooperative,

regional basis. Two CMEA-level bodies were created to institutionalize the relationship. Interatominstrument⁶ (established in 1972) coordinated industrial production, scientific research, and technical collaboration among producers of components for nuclear engineering. Interatomenergo⁷ (founded in 1973) supervised the design, production, delivery, construction, and safe operation of nuclear power plants. In 1976 the CMEA Council approved a plan under which the Soviets would provide technical assistance and training for specialists in the construction, operation and design of nuclear stations.

Within the CMEA nuclear programme, Czechoslovakia became the most important regional supplier of nuclear equipment after the Soviet Union. A 1974-75 agreement between the Soviet Union and Czechoslovakia "permitted that state to manufacture, under Soviet license, Soviet-designed equipment and components, including reactors, for both domestic use and export."⁸ Czechoslovakia projected using nuclear power, considered a cheaper and cleaner alternative to coal-generated electricity, to fill 20% of its energy needs by the year 2000. Twelve units of the VVER 440 type were to be built at Bohunice, Dukovany and Mochovce, with a further set of VVER 1000 reactors at Temelin (Pass 1983, p.117).

Working from a strong base in heavy engineering, the Czechoslovak government directed huge capital investments into nuclear engineering firms,⁹ which first mastered the 440 MW Soviet design, then, in the 1980s, started to produce the newer VVER 1000 reactors. In 1980 the first Czechoslovak-made nuclear reactor was delivered to Hungary, and by 1987, 12 of the 30 VVER 440 MW pressurized water reactors (not the Chernobyl

⁶ International Economic Association for Nuclear Power Equipment

⁷ International Economic Association for Cooperation in the Equipping Construction and Installation of Nuclear Power Stations.

⁸ Czechoslovakia agreed to produce, between 1981-84, 18 light water reactors of the Soviet Voronezh type for use in the Soviet Union and Eastern Europe (Pass 1983, p 31 Kramer 1990, p 47,87)

⁹ The EIU estimates up to 15% of all investment in engineering (EIU 89/2)

RMBK model) in use in CMEA countries had been produced under license by the Skoda Engineering plant in Plzen; another ten were under production. The four reactors at Bohunice were brought into operation in Slovakia between 1979 and 1985, and Dukovany's four reactors came on line between 1985 and 1987. In the late 1980s, Czechoslovakia was exporting half of all the nuclear equipment and components it manufactured to other East bloc countries (Pass 1983, p.84, from: Foreign Trade USSR no 6 1980; Kramer 1990, p.48).

Hydroelectricity and coal-fired thermal plants remained largely untouched by CMEA regional energy development plans, but one notable hydro complex was conceived by the Hungarian and Czechoslovak governments as a joint development project (aimed at reducing dependence on the Soviet Union).¹⁰ The Gabčíkovo-Nagymaros power stations were meant to be fully operational by 1995 and would provide four times the electricity of Czechoslovakia's existing hydro projects (at Orly, Slapy and Liptovská Mara), or some 5% of the country's total electricity. The Czechoslovaks made a rapid start on the Gabčíkovo section their side of the Danube, relying on domestic designs and equipment, but Hungary wavered in its commitment continuously after 1980.¹¹

Coal-burning power plants remained the mainstay of domestic energy production all through the post-war period, with total thermal output rising quickly between 1970 and 1980 from 41.5 to 63 billion kilowatt-hours, a level that stayed more or less constant through the 1980s (see Table 1.7). The development of thermal plants was based almost

¹⁰ The Gabčíkovo-Nagymaros hydro complex involved three major components on a section of the Danube river directly below Bratislava: the Dunakiliti reservoir and bypass channel, the Gabčíkovo dam and six-turbine power station and, across the river, the Nagymaros power station. First discussed in 1977, the whole complex was originally scheduled for completion in 1995, with the Gabčíkovo section to be put into operation by 1990. (Appendix C details the post-1989 fate of the dam).

¹¹ Financial reasons ostensibly underlay the 1980 hesitation and, in 1986, the Hungarians agreed to continue work under pressure from Czechoslovakia, but only after reaching an agreement with Austria by which Austrian firms would finance and execute the bulk of construction work at Nagymaros in return for future electricity supplies from Hungary involving two-thirds of the dams' annual electricity (1.2 billion kwh) for a twenty-year period beginning in 1996 (Reisch 1990; Kramer 1990, p.87).

exclusively on the domestic manufacture of equipment and use of domestic fuels. From 55MW units in the 1950s, Czechoslovak industry switched to producing 110 MW and then 200 MW units in the 1970s; the first 500 MW block was constructed at Melnik in 1980. All turbines and boilers were produced by Czechoslovak companies and the vast majority of thermal power plants were geared to burn domestic supplies of brown coal and lignite.

Czechoslovakia relied primarily on domestic production of electricity, but was linked to other East European countries through the CMEA's Mir electric power grid, which helped to lower the unit cost of transferred electricity and enhance each country's capacity to meet peak demands for power. A jointly constructed power line linking the Mir grid to the Soviet power system was completed in 1980, part of a project to augment the capacity of the Eastern European transmission grid and connect it to Soviet nuclear power stations to permit imports of Soviet electricity beginning in 1990 (Pass 1983).

Czechoslovakia agreed to contribute four 1,000 megawatt nuclear reactors to the Khmelnytsky nuclear power plant in the Ukraine and be repaid in deliveries of electricity between 1984 and 2003.¹² Increased imports became a less attractive proposition after 1986, however, as key suppliers of electricity ran into trouble, with the Romanian energy sector in crisis and under military control, and a shortfall of electricity deliveries from Chernobyl after the accident there (Economist Intelligence Unit 1988).

While CMEA programmes improved Czechoslovakia's energy mix and allowed for high economic growth rates over several decades, a number of negative effects also ensued. Cooperative regional energy development left Czechoslovakia criss-crossed with an elaborate series of pipelines and electricity exchanges, linking it into a web of interdependencies and cutting it off from Western Europe. This hardware was only the most concrete manifestation of dependent energy development based on Soviet resources and under Soviet control. Investment was channelled into exploring Soviet natural

¹² Czechoslovakia was to contribute \$350 million of the estimated \$2.2 billion cost (Kramer 1990, p 33)

resources rather than being used to render the domestic industrial base more efficient, a need that was less urgently felt as long as fuels were cheap. This pattern also reflected a traditional tendency to focus adjustment policies on the supply rather than on the demand side.

Kramer estimated the cost of joint investment projects in the 1980s at \$100 - \$130 billion, of which the East Europeans contributed about half (Kramer 1990, p.31). Between 1976 and 1980, Czechoslovakia devoted 4% of its total national investments to joint projects.¹³ Joint projects were a bloc-scale manifestation of Communist disregard for ownership, implying that, as ownership didn't exist, the location of property was irrelevant. It was widely considered that all problems, from resource development to technological improvements to increased energy efficiency, could best be solved at a regional level. But regional projects demanded increasingly energy-intensive goods and even goods of Western manufacture, which contributed to keeping the energy intensity of Czechoslovakia's economy high while also consuming scarce supplies of hard currency, this in exchange for oil and gas supplies that would prove less than perfectly reliable.

Despite Czechoslovakia's advanced science and engineering fields, regional development under the Soviet Union also produced a technological dependence, something especially evident in the evolution of the country's nuclear programme: technology was acquired and mastered, but Soviet control over design specifications, delegation of tasks and inspection of finished products, as well as their insistence on models using Soviet fuel, prevented the Czechoslovak industry from adapting and improving on the technology. Moreover, the CMEA as a whole lacked the technological capability to fill all its energy equipment needs and had, many times, to turn to Western manufacturers to obtain components essential to an energy project.

¹³ Kramer quoting a Hungarian estimate (Kramer 1990).

After the oil

For Western countries, the 1973 OPEC oil crisis marked a real turning point in the strategies adopted to satisfy energy needs. It led to an immediate drive to reduce the use and diversify supplies of imported oil and to develop domestic oil, gas and other energy resources more rigorously (Table 1.4); more importantly, higher energy prices highlighted the benefits of energy efficiency and helped usher in an era in which a new intensive type of development was needed to assure economic success.

CMEA energy relations protected Eastern bloc countries from the immediate need to reduce their consumption of oil. The Soviet leadership took the opportunity to assure its East European neighbours that the 1973 "Western, capitalist" crisis would leave them untouched. The regional pricing formula (Bucharest formula) used to determine intra-CMEA prices did (although modified in 1975), in fact, cushion Eastern European customers from the first oil shock, as it took the average world market price over the preceeding five years and applied this price to intra-CMEA trade for a period of five years.

Table 1.4
Dependence on imported energy supplies in European Economic Community (EC), Poland (P), Hungary (H), and Czechoslovakia (C)

Oil and gas and imported oil and gas as percent of total energy consumption

	1955					1972					1980					1990				
	EC	EC	P	H	C	EC	P	H	C	EC	P	H	C	EC	P	H	C			
Oil and gas	23	69	13	37	19	19	66	34	63	21	58	33	20	17	40	32				
Imported oil and gas	22	65	6	12	18	16	26	33	20	17	40	32								

Sources: Compiled and calculated from Amoult, Energy in Europe; Oil and Gas Information (OECD), 1991; World Resources, 1988-89; Oil and Gas Journal, July 22 and August 19, 1991.

But continued use of this formula relied on Soviet willingness to forego tremendous potential earnings from the West after oil prices skyrocketed. This willingness lasted perhaps longer than seemed sensible in many Western economists' eyes, but soon after the Western oil crisis, the Soviets began pressuring to change the traditional payment arrangements for oil deliveries to CMEA members. In 1975, the Soviets revised the

Bucharest pricing system to allow a price increase for 1975 based on the average world market prices for 1972-74. Beginning in 1976, prices were adjusted annually according to average world prices over the past five years (Table 1.5). Over-plan deliveries had to be paid in hard currency.¹⁴ With the next upward turn in oil prices in 1979, the terms of trade began to work against Eastern Europe (McMillan 1990, p. 34).¹⁵

The Soviet Union nevertheless made long-term promises to maintain export volumes until at least 1985, gaining much propagandistic mileage from "insulating" East European brothers from the oil shocks. But East European plans based on these promises were rudely disrupted by reductions in Soviet oil deliveries from 1982 on.

Table 1.5			
PRICE OF EASTERN EUROPEAN OIL IMPORTS FROM THE SOVIET UNION			
	world market price	Comecon price (dollars per barrel)	*Real* Comecon price as % of world market price
Year			
1978	12.70	6.78	53
1979	17.26	8.23	48
1980	30.22	7.74	26
1981	32.50	8.79	27
1982	34.00	11.26	33
1983	29.00	11.52	40
1984	28.20	11.58	41

Source: Kramer, p. 27 from RFE Background Report #155 24 August, 1984

¹⁴ There has been much debate over the extent to which the USSR subsidized Eastern European oil supplies and what motives it had for doing so. Marie Lavigne saw the USSR as having "tolerated subsidies to Eastern Europe" so as to advance its own concept of socialist integration. Kramer also saw political reasons for continuing exports: "An Eastern Europe less dependent on the Soviet Union for vital raw materials — and commensurately less susceptible to political pressure — was probably unappealing to Soviet leaders after the turmoil in Czechoslovakia in 1968." Jan Vanous and Michael Marrese estimated a subsidy of over \$100 billion to Eastern Europe between 1972 and 1984. In dollar value, terms of trade changed over time and were subject to widely varied calculation, but these calculations become of only secondary importance to the fact that payment was effected in goods and that such trade and could not easily be diverted elsewhere.

¹⁵ When figuring how advantageous the pricing scheme has been to Eastern Europe, a few things must be taken into account: the exchange rate of the transferable rubles to the dollar was typically inflated (realistic exchange rates show a much greater subsidization to Eastern Europe). Planned deliveries of oil from the Soviet Union were calculated in transferable rubles, but over-plan deliveries were at world market prices, in hard currency. Amounts included in the plans were determined by the Soviet Union and depended on political factors as much as economic ones. Energy exports were tied to Eastern European participation in joint projects to develop Soviet energy resources, which increasingly meant a hardening of the terms of trade as Western equipment and technology had to be imported. Eastern European countries have a limited amount of hard goods or currency (Hannigan and McMillan 1983, p. 17).

The impact of the new terms for oil trade was delayed in Czechoslovakia until 1984, when the agreement under which Czechoslovakia received five million tons of oil per year at fixed 1967 prices for investment credits previously extended to the Soviet Union ended.¹⁶ Imports at this special price had represented 25% of total Czechoslovak imports of Soviet oil in 1981 (Hannigan and McMillan 1983, p.41). The result was that Czechoslovakia's oil import bill rose by 50% in 1984. After more than a decade in which overall energy consumption had rapidly increased, along with the economy's energy efficiency, tremendous pressure was felt to cut back on energy consumption and drastically alter the energy balance away from oil.

The impact of oil shortfalls was greater in Czechoslovakia than in neighbouring Poland which, with an ample supply of high quality black coal, relied on imported oil and gas for only 13% of its energy by 1985, or Hungary where, despite depending on imported fuels for 32% of its energy, had the same amount of these high quality fuels available domestically. Czechoslovakia, in contrast, relied on Soviet oil and gas for 30% of its total energy needs, with domestic sources of these premium fuels providing only 1% and the balance made up predominantly by coal of generally low grade (Table 1.6)

Table 1.6 Dependence on imported energy supplies in Poland (P), Hungary (H), and Czechoslovakia (C)						
Coal, oil, gas and imported oil and gas (O&G) as percent of total energy consumption						
	1985			1990		
	P	H	C	P	H	C
Coal	82	30	65	79	26	58
O&G	17	64	31	21	58	33
Imp O&G	13	32	30	17	40	32
<i>Sources: Compiled and calculated from Amouk, Energy in Europe; Oil and Gas Information OECD, 1991; World Resources, 1988-89; Oil and Gas Journal, July 22, Aug 19, 1991.</i>						

¹⁶ A 500 million transferable ruble credit for Czechoslovak machinery, materials and consumer goods

THE MANDATES OF ADAPTATION, DIVERSIFY, DECREASE, DEVELOP

Research undertaken by McMillan and Hannigan in the years following the OPEC oil crises traced the Eastern European countries' parallel adaptation to the "post-oil era". The adaptation was further complicated by the particularities of Soviet-East European oil and gas trade: long-term East European investment in Soviet resource development; bilateral and often barter trade; and unilateral East-European dependence on Soviet supplies.

Diversifying import sources

Diversifying imports of oil was, by the mid-1980s, not an option for Czechoslovakia, even as the Organization of Petroleum Exporting Countries (OPEC) prices stabilized.

Czechoslovakia had maintained up and down relations with Middle Eastern oil exporters. The Shah of Iran had been amenable to barter trade and cooperative development projects, and prospects for Iranian oil imports had led Czechoslovakia, Hungary and Yugoslavia to undertake the construction of the Adria pipeline, which was completed in 1979. It was intended to carry 30 million tons annually, of which five million tons would go to Czechoslovakia. But the agreement with Iran for deliveries of 20 million tons of crude over a ten-year period in return for industrial goods was annulled when, that same year, the Shah was overthrown by the Ayatollah Khomeini, who refused to honour barter agreements with the East Europeans (Kramer 1990, p.93).

While the CMEA became an increasingly autarchic bloc over the course of 40 post-war years, it would be dangerous to claim that this constituted an *ex ante* aim in energy provisions. Neither the Soviets nor the East Europeans foresaw relying strictly on Soviet sources of oil and gas. A number of ventures were planned to bring Middle Eastern fuels into the area, but Eastern European participation in the international energy market was limited by insufficient reserves of hard currency and tradeable commodities. Deals planned with Middle Eastern suppliers relied on barter and cooperative ventures rather than hard

cash, and thus called for political will from these partners. Without recourse to such alternative payment methods after the Shah, Czechoslovakia found it impossible to pursue Middle Eastern supplies further.¹⁷

Czechoslovakia was in a better position than other East European countries to obtain Soviet natural gas in the 1970s and 1980s, as on top of the amount received as repayment for investment, it received transit fees for transporting gas to the West. In 1985, Czechoslovakia earned 10 billion cubic metres of gas as repayment for investment in pipeline projects and as transit fees;¹⁸ by 1987, repayment involved 12 billion cubic metres of gas per year. The major problems with natural gas lay not in obtaining it, but in incorporating it into the economy. A number of projects were undertaken in the 1980s that aimed to convert large numbers of residential and industrial consumers to gas,¹⁹ construct underground gas storage facilities,²⁰ and build a gas liquefying station near Prague (Economist Intelligence Unit, 1988).

In contrast to gas, oil supplies decreased after 1981 (see Table 1.3), creating an immediate need to restrict the use of oil to those areas where it could not be substituted by some other fuel. However, Czechoslovakia had little if any excess capacity with which to

¹⁷ A plan (called the IGAT-II) elaborated in the mid 70s by Czechoslovakia, the Soviet Union and Iran would have seen the Soviet Union import natural gas from Iran through a pipeline to be built into its southern Republics, then export more of its own gas to Czechoslovakia and Western Europe. The project was also cancelled after the fall of the Shah. Policy changed again once the Iran-Iraq war got underway, and in 1982 Iran and Czechoslovakia again discussed long-term trade prospects, possibly with arms being promised from the Czechs. In 1984 and 1985, they concluded barter deals for 1 million tons of crude and Czechoslovakia expressed interest in reviving the IGAT-II project in 1989.

¹⁸ A project to increase the annual export capacity from 53 bn cu m to 68 bn cu m with the construction of a fourth pipeline on Czechoslovak territory began in 1983. Called the 'Progress' pipeline, it would carry gas through the Northern Ukraine to Czechoslovakia and into the West. Czechoslovakia's Transiti plynovod undertook the construction of 580 km and 8 compressor stations using designs of Plynoprojekt, a Prague-based enterprise. Large diameter steel pipes were imported, mainly from the West German firm Hoesch. Czechoslovakia was also to participate in building a gas-chemical complex in the USSR. In return for both projects, Czechoslovakia was to receive an additional 5 bn cu m/year of gas for 20 years beginning in 1989 (EIU 86/2).

¹⁹ 77,300 consumers were to be converted in 1985 alone, which proved unattainable.

²⁰ Construction began on the first, at Dolni Dunajovice, in 1985.

compensate for oil shortfalls and it soon became necessary to reduce overall energy consumption

Pass (1983) looked in detail at how the post-oil mandates of reducing dependence on imports and rationalizing energy consumption within the country were being implemented in Czechoslovakia in the early 1980s. She concluded not only that measures were ineffective, but that the failure displayed roadblocks to development that were inherent in the planned economic system: a switch to intensive development was required and could not be accomplished. Kramer, some years later, concluded the same. The severe consequences that this failure produced, in terms of flagging economic growth and gross environmental deterioration, reflected a terrible misadaptation to the realities of the post-oil era.

Decreasing energy consumption

The need for energy conservation and rationalization was felt at both regional and national levels from the early 1980s onward.²¹ Hannigan and McMillan described energy rationalization policies in Eastern Europe in the 1980s as a triad of conservation-substitution-restructuring measures. "Throughout Eastern Europe energy programmes were adopted, decrees on energy conservation were promulgated, and special energy commissions were established" (Hannigan and McMillan 1983, pp.24-26).

Industry was the main culprit in energy wastage and no industry was more culpable than the energy industry itself. Outmoded energy production equipment meant reduced performance, and inadequate infrastructure resulted in leakages of oil and gas during transportation and in high losses in electric transmission grids. In the mid-1980s it was estimated that the losses incurred in the course of producing, processing and refining fuels, in energy and heat production and in the distribution of electric power absorbed 30% of

²¹ Programmes such as the concentration of regional production of energy-intensive chemicals in the USSR as a conservation measure that were agreed at the 33rd CMEA Council Session in 1979.

total primary energy.²² Reliance on obsolete power plant equipment was only one part of the problem.

The 1981 Czechoslovak State Target Programme called the "Rationalization of Consumption and Exploitation of Fuels and Energy" introduced three types of energy conservation measures. These involved conservation through modernization and industrial restructuring; improvements in the technical efficiency of energy-using systems; and the encouragement of energy efficiency through incentives and administrative measures (Hannigan and McMillan 1983, p.24; Pass 1983, p.139). The need for investments in energy saving technology and equipment from the West was clearly identified in the programme (Pass 1983, p. 95).

The productive sector received the most attention in the State Target Programme. The use of fuels in metallurgy, machinery, the chemical industries and other energy intensive sectors was to be rationalized primarily by replacing obsolete technology. In 1983, 10,000 boilers using solid fuels were in operation, of which 15% were older than 55 years and 10% (about 700 boilers) were built before 1920 and were operating at less than 50% of their full capacity.²³ Boilers used in residential and industrial buildings had to be modernized, and a prototype was built by Slovenske Energetiske Strojarnje; the problem of incorporating the equipment into individual buildings, however, was not satisfactorily resolved. Selected plants were converted to combined heat and power generation or "co generating stations."²⁴

²² Czechoslovak Federal Statistical Office figures, see D. Park Oil and Gas in Comecon Countries 1979 quoted in Pass 1983, p.64.

²³ State Energy Inspection Commission findings, from East European Markets, vol3 issue 6, March 18, 1983 quoted in Pass 1983, p.65

²⁴ These are more widespread in Eastern Europe than in many other industrialized countries of the world "Although this is largely because of the ability to draw on Soviet technological advances, individual East European countries have also mastered the technology in this field and have even developed it for export Czechoslovakia exports mobile units for use while co-generating stations are under construction " (Hannigan and McMillan 1983, p.72) Co-generation requires advance planning and coordination, which may be easier to attain in a centrally planned economy.

Further measures aimed to use energy more economically and sought to eliminate wasteful consumption in enterprises caused by poor management. Inspections conducted by the State Energy Inspection and reported in *Rude Pravo* determined that "a slack attitude and lazy work habits" were causing high losses of energy resources (Pass 1983, p. 145), but in many cases this behaviour was reinforced by a lack of equipment such as meters with which to control energy consumption. Pass saw "a general atmosphere of stricter requirements, closer compliance with regulations and orders, and stricter discipline of every kind" being stressed as a way of dealing with "an irresponsible and unnecessary energy consumption" (Pass 1983, p. 105), which, unsurprisingly, produced a negative attitude towards energy conservation. Despite fines and supervisory controls, enterprises were adept at evading pressure from above. Managers were under pressure to meet both the production demands prescribed by the plan and the new limits on fuel consumption. Plan fulfillment always took precedence. Attitudes were difficult to change, and Pass cited government opinion that only "close and costly monitoring would reduce cheating on the part of managers" (Pass 1983, p. 155).

Unlike neighbouring Hungary where, in Hannigan and McMillan's view, gradual economic liberalization allowed pricing policies some success in changing practices, the price-responsiveness of enterprises in Czechoslovakia was doubtful at best, and reliance on administrative measures to make energy use more efficient remained strong. "In these (Eastern European countries other than Hungary) countries, moreover, enterprises are accustomed to directives lowering input norms, and have grown skilled in ignoring or circumventing them" (Hannigan and McMillan 1983, p. 96). Kramer also found managerial attitudes to be a critical obstacle to industrial conservation measures. "The imperatives of plan fulfillment make enterprise managers uninterested in assimilating modern energy-saving technologies that provide no immediate return on investment" (Kramer 1990, p. 113).

The non-productive sector was considered in need of especially urgent conservation measures as the fuels used here, primarily crude oil products and graded coal, were scarce, with very limited possibilities for increasing supplies (Pass 1983, p.96). The 1982 Plan started by setting targets to reduce the consumption of motor fuels by 10%, but more encompassing cutbacks soon proved necessary. Two types of measures were attempted in this consumer group: administrative decrees that were easy to implement but risked being unpopular, and measures that sought to use prices and consumer awareness to inculcate more appropriate consumer behaviour, which proved slow and largely ineffective.

To save motor fuel, public transport services were reduced by 10% 30%, speed limits were enforced, and rail and water transport were encouraged, as were trolleys in urban mass transit systems. Domestic consumers were asked to save at home, and the retail prices of gasoline and home heating were increased. Efforts were also geared towards substituting gas or electrical heating for coal-burning furnaces in residential units. By 1989, however, only ten, out of a projected 5,000 per year, had been converted (Economist Intelligence Unit 89/3). A combined heat and power project meant to provide centralized heating for buildings in Prague from the Melnik power station, 32 km north of the city, was held up by a lack of materials (Economist Intelligence Unit 90/3).

Hannigan and McMillan distinguished between conservation policies involving "those readier measures which (could) eliminate wasteful consumption without having to alter the technical parameters of the existing economic structure" and longer term "policies of technological modernization and industrial restructuring" (Hannigan and McMillan 1983, p.53). The latter type of policy was paid lip service, but little action resulted. Modernizing and restructuring the industrial base required considerable investment, and much of the available budget was taken up by the more immediate need to compensate falling imports of oil with increased coal and nuclear power output. Further investment resources were tied up in cooperative energy projects and payments for now expensive Soviet oil.

While the expenditure required to reduce the need for a given quantity of energy has been proven to be less than the amount to produce extra energy, conservation measures often appear less practicable. "That many demand-side policies will bring only long-term and dispersed gains but immediate and concentrated losses constitutes a key political problem in mobilizing support for them" (Kramer 1990, p. 129). Of the measures identified in Czechoslovakia's State Target Programme, only administrative means of reducing consumption remained plausible. Modernizing and improving the technical efficiency of systems could not be accomplished without significant investment, and incentives to encourage energy efficiency had little effect.

By 1984, the failure of conservation policies made it necessary to place enterprises on a rationing system and implement severe cuts in non-industrial uses of electricity, especially street lighting. In both 1986 and 1987, Czechoslovakia failed to meet its target for reducing energy consumption and compensated by mining yet more coal (Kramer 1990, p. 75). In 1987, organizational measures, such as shifting especially energy intensive production to off-peak consumption periods, were prepared in case of disrupted electricity supplies (Pass 1987, p. 149; EIU 85/1).

Developing domestic resources

The mandates of reducing consumption and increasing domestic energy production to replace imports competed for investment monies, and the continued failure of demand-side measures only made capacity expansion more urgent and more expensive. Throughout the 1980s, increasing domestic energy production clearly had the upper hand in the arm wrestle over state budgets: it is estimated that between 30 and 45% of all industrial investment went towards developing the domestic fuels and energy sector (Economist Intelligence Unit

1988; Kramer 1990, p.39), including the construction and expansion of mines and power stations and the production of power generating equipment.²⁵

The development of domestic coal and nuclear resources to replace oil assumed priority. Pass concluded that, as the East European countries entered the 1980s, "any increase in energy supplies (had to) come mainly from limited domestic resources" (Pass 1983, p. 36). Hannigan and McMillan ominously forecast that "delays in the interfuel substitution process would cause energy supply problems serious enough to warrant energy-saving programmes and outright austerity measures" (Hannigan and McMillan 1983, p.43).

Earlier plans had anticipated a gradual move away from coal burning power plants as nuclear stations were completed, but Czechoslovakia's domestic nuclear programme experienced serious delays throughout the 1980s due to shortages of skilled labour and building materials, to greater than anticipated cost and increased safety requirements after Chernobyl. Even in the early 1980s, Pass found it "hard to believe that Czechoslovakia could meet its investment demand in the nuclear power sector while devoting a great deal of investment in other sectors such as the extraction and production of coal" (Pass 1983, p.124). Soviet involvement in Czechoslovakia's nuclear programme also contributed to slowing progress on plants under construction as well as on reactors slated for export. Soviet supplies of necessary components proved unreliable and their inspections slow;²⁶

²⁵ The communist principle forbidding private sector activity was enforced with especial vigour in the energy sector because of its strategic importance to overall economic development. Laws enacted in the 1950s legalized the State's ownership of all mineral and energy resources, energy production and distribution networks and energy equipment. Specific laws governed mining, and the production, distribution and consumption of gas, electricity, oil and heat, they excluded private sector activity or outside interference in the State's management of the energy sector (Power Plays 1992, p 413). It is especially important to remember this when looking at the post-oil measures adopted by Czechoslovak leadership in the 1980s

²⁶ Before delivering the Czech-made reactor to Hungary in 1980, it had to be sent to the Soviet Union to pass inspection and receive a guarantee from Soviet specialists (Pass 1983, p 122). The Soviets were involved in the construction of Bohunice, where they supplied equipment, in Dukovany and Mochovce (Pass, p. 121). In 1983, work on the Bohunice V-2 power plant was proceeding 24 hours a day with workers transferred from the construction site of the Kralova nad Vahom thermal power station (Pass, p.118, from the Quarterly Economic Review of Czechoslovakia no 2 1983). The Skoda Works in Plzen

by 1989, nuclear capacity was being installed at half the rate anticipated at the beginning of the 1980s (EIU 89/2).

The Skoda engineering enterprise, in particular, appeared unable to maintain the pace of production (EIU 89/1). The company was plagued by unreliable contracts and a lack of skilled workers. "At one point (Skoda) had only six individuals qualified to perform highly exacting hand welding work on nuclear components" (Kramer 1990, p.53).

Uncertainties persisted among East bloc governments about the reliability of Soviet nuclear technology, making East Germany slow its programme and Poland hesitate to develop this energy form at all (EIU 88/3). Further doubts surrounded Czechoslovakia's ability to master Soviet technology. Chernobyl (1986) proved a major setback to the 1985 CMEA nuclear programme and the heightened concern for safety led to further delays in the nuclear construction schedule, and it was acknowledged at both national and CMEA levels that "the accident calls for a thorough review of existing safety measures."²⁷ The Czechoslovak government announced that the Temelin plant under construction would be protected by containment vessels and advanced Western nuclear safety equipment, which they proposed paying for by exporting electricity to the West.

Arguments against further nuclear development did not emerge in Czechoslovakia until the late 1980s, and had more to do with the economics of Soviet technology than safety concerns or a lack of commitment to nuclear power writ large.²⁸ Eastern technology was much less cost-effective than Western nuclear systems. Kramer cited that France needed 30% to 35% less cement and metal and 50% less labour than did Czechoslovakia to

experienced a shortage of skilled labour that constrained production. At the Mochovce nuclear power plant, labour instability and a shortage of building materials disrupted schedules (EIU 86/1).

²⁷ In 1987, the European Comecon countries adopted rules for safe carriage of nuclear waste and established (Bulgaria, Czechoslovakia and the Soviet Union) a common fund to finance research on decommissioning nuclear power plants, although action on these fronts was imperceptible (EIU 1988).

²⁸ It is difficult to gauge public response to Chernobyl: open protest by Czechoslovak people was hardly a threat given the repressive nature of the regime. The loudest anti-nuclear voices were still those of Western European neighbours.

construct nuclear facilities of similar capacity (Kramer 1990, p.66). The argument that nuclear construction used up scarce investment monies that could be used to modernize other sectors of the economy and thereby cut the need for energy was put forth, though not very loudly (EIU 89/1).

The completion of the Gabčíkovo-Nagymaros hydro complex was also threatened in the late 1980s, with Hungary's commitment to the project faltering more seriously. Environmentalist opposition mounted in Hungary (and, to a lesser degree, in Austria and Czechoslovakia), protesting the flooding and severe ecological disruption the dam would cause. The projected completion of the Czechoslovak plant was pushed back past 1990 and it began to seem unlikely that the complex would ever reach the dimensions originally planned.

Failed adaptation and compensation with coal

Each of the measures attempted during the 1980s to deal with lower deliveries of oil, be they conservation and improved efficiency or increased nuclear power output, fell short of expectations; and with each failure, the knee-jerk response was to produce more coal. The increase in nuclear power's contribution to total electricity production from 9% in 1984 to 21% in 1986 did not permit a proportionate decrease in thermal power generation as overall electricity consumption grew by six billion kilowatt hours over these two years from 78.4 to 84.8 billion KWh (Table 1.7). The production of thermal electricity actually increased each year between 1987 and 1989 as new nuclear plants were delayed.

In 1989, coal accounted for 58% of the fuel used in the country and thermal power plants produced 68% of electrical output. Czechoslovak coal production was concentrated in two main districts: the Ostrava-Karvina mining district produced 89% of the country's black coal and the Northern Bohemian mines, using open pit mining techniques, supplied up to 75% of brown coal. The thermal value of Czechoslovak coal fell dramatically as high quality reserves were exhausted. Hard coal production fell from a peak of 30 million tons

in 1978 to an average 25 million tons through the 1980s, and was compensated for by an increase in brown coal production from 89 to 103 million tons a year between 1976 and 1986 (Pass 1983, p.44; EIU 1984-85 supp). Kramer found that throughout East Europe (save Poland and Romania) coal production increased by 15.7% over this time period when measured in gross tonnage, but by only 6.1% when measured in oil equivalent (Kramer 1990, p.69).

Table 1.7
ELECTRICITY PRODUCTION BY ENERGY SOURCE (BILLION KWHRS)

	1970	1975	1980	1984	1986	1988	1989	1990	1991	1992
Total (prod)	45.2	72.7	73.5	78.4	84.8	87.4	89.2	86.6	83.3	59(C) 22(S)
Thermal	41.5	63.4	64.1	67.9	62.9	59.7	60.3	57.9	56.4	
Nuclear	0	4.5	5.1	7.3	17.9	23.33	24.6	24.6	23.8	
Hydro	3.7	4.8	4.2	3.2	4.0	4.4	4.3	4.0	3.0	

Sources: PlanEcon Dec 1991 (1970, 75); Pass p.45 from UN (1976-80); EIU 1984 supplement (1980-83); EIU 1985 supplement (1980-1983 imports and exports); EIU 1991-92 (1983-1989 production, imports, exports); Statistiska Rocenka 91 (1990); Energy in Europe, 1993 Annual Review, p.88 (1991); EIU 1995/1 (1992; Czech and Slovak production presented separately)

With nuclear-generated electricity delayed in the mid 1980s, there was an urgent demand for over-plan production of coal. The means of accomplishing this involved opening new mines and expanding existing ones in the North Bohemian brown coal region.²⁹ Despite steady increases in the complexity of mining the coal, the Communist attitude remained one of getting the coal out at any cost. This policy "subordinated optimal exploitation to the immediate task of plan fulfillment" (Kramer 1990, p. 83) and conflicted with considerations for profitability. The 1981-85 plan foresaw investments of Kcs 45-50 billion in coal mining alone, more than half of which would go to purchasing technology and machinery from the West to mine more difficult seams (Pass 1983, p.81).

²⁹ New mines were opened at Vrsany, Sverma and Chabarovice (Pass 1983, p. 88).

The deteriorating state of power plant equipment presented further impediments to increasing domestic production. Plants were inefficient, and not equipped with devices to reduce hazardous emissions. Maintenance work on many of them was postponed to make up for the delays in nuclear power plant construction in the early 1980s, and shortages of spare parts from equipment manufacturers delayed repair work even further. Thermal power stations (such as Melnik 3 and Detmarovice) due to be phased out were maintained (Ecoservice 91/07/24).

With the mining industry and power plant operations stressed way beyond capacity, coal could not provide the easy solution to nuclear delays and overall energy shortages that central planners were seeking. Total apparent energy consumption thus fell in both 1981 and 1982, which was "a major contributing factor in the decline in net material product in both years" (Hannigan and McMillan 1983, p. 93).

A coal-centred environmental disaster

The environmental problems caused by mining and thermal power generation did not appear overnight, but the desperate attempts through the 1980s to increase domestic energy output produced a sharp decline in the quality of the physical environment. In 1982, figures showed 26% of Czech and 14% of Slovak forests to be "destroyed or damaged". By 1989 these figures had reached 57% and 30% respectively, with a forecast for worsening conditions into the year 2000 (EIU 90/1). The harmful effects of coal burning heating systems and power stations were seen in the toxicity of the air in urban areas, in increased incidence of respiratory illnesses, especially in children, and in the catastrophic state of the forests in certain parts of the country. In Prague, with its thousands of coal burning home heating units, average concentrations of sulfur dioxide reached three to four times the standard set by the World Health Organization (Table 1.8) (Kabala 1991). In 1988 further data was released on "diseases of civilization", showing that 28,000 children in Prague

suffered from asthma, a figure that was rising by 13-15% each year, and that respiratory disease was the single most common reason for absence from work (EIU 88/4).

Table 1.8
Emissions of sulphur dioxide and
nitrous oxide in Czechoslovakia,
the U.K., France, Austria, Germany
in 1988, kilograms per capita.

	NO₂	SO₂
CSFR	60.8	179.3
U.K.	43.5	64.2
Germany	46.6	21.2
France	29.6	21.8
Austria	27.9	15.0

Source: Power Plays 1992 p. 140

Under the Czechoslovak Communist regime, official acknowledgement of environmental dangers was slow in coming.³⁰ The greater official openness in addressing environmental problems in the late 1980s came as "The political leadership of the Communist Party and the government seemed to realise that their authority is undermined by the persistent propagation of blatantly inaccurate, blandly optimistic information" (EIU 88/4).

North Bohemia was the main brown coal mining area of Czechoslovakia with no fewer than 10 major coal-fired power plant complexes generating electricity for transmission south. It formed part of the 'Black Triangle' that takes in North Bohemia, Eastern Germany and Western Poland, which attracted Eastern and Western attention to the effects, primarily sulphur dioxide emissions, of coal burning power plants (Table 1.9). The horrendous state of the environment damaged natural resources, the health of residents and

³⁰ Admission to the effects on human health proved too volatile a subject for the former Communist government to foray into (EIU 89/2). In 1988, the fact that Slovak prime minister Colotka acknowledged acid rain as a problem in the forestry industry was perceived as a landmark. (EIU 88/3) A fairly tame document entitled 'Bratislava Aloud', informing about environmental problems, was widely circulated in 1988 but condemned by the official press as anti-communist, with implicit charges of treason laid (EIU 88/3).

the social fabric of the area. The post-1989 Czechoslovak environment Minister, Vavrousek, described the pernicious effects of such grave pollution: "Northern Bohemia has high abortion rates, high rates of family violence, crime and drug use. Educated people flee, hoping to escape. The social system has eroded along with the environment." The region's workers were often paid extra because of health hazards (Montreal Gazette, 92/05/02).

Table 1.9
Sulphur emissions by sector in Czechoslovakia 1988

Source: Power Plays 1992, p.125

On average, adult lifespan in the black triangle was five to seven years shorter than that in Western Europe (Montreal Gazette, 92/05/02). Data released in the later 1980s pointed to the severe health problems caused by pollution in Northern Bohemia. Some sources claimed that infant mortality was 12% higher in North Bohemia than the average in the rest of the country, while life expectancy was up to four years lower. High incidences of bronchial disease were noted.³¹ Problems were also caused by the difficulty of

³¹ Statistics linking environmental damage directly to health problems and especially infant mortality have yet to become commonplace even in the West. In Hungary, statistics have now shown that air pollution (sulphur dioxide, nitrogen dioxide and carbon monoxide) contributed to a tenfold increase in chronic

recruiting medical personnel and other skilled workers to the area (EIU 4/87). Local authorities in North Bohemia, faced with damage to more than 50% of trees even in national parks, began monitoring sulphur dioxide levels and advising people to stay indoors on especially bad days.

A pretense of action

The 1986-90 plan foresaw considerable expenditures (Kcs 17.6 bn) on anti-pollution technology but huge problems arose in obtaining the technology, integrating it into existing plants and implementing industrial anti-pollution measures. The firms responsible for supplying the relevant technology were unable to cope with demand and imports from the West were restricted by COCOM regulations and hard currency shortages. Ministers and local authorities responsible for implementing projects were apathetic, and the various institutions responsible for enforcing environmental legislation were poorly coordinated. "The economy seemed unable to absorb funds for the environment and enterprises tended to direct funds allocated for environmental investment into other areas (EIU 88/4; EIU 87/4). Efforts to desulphurize thermal power plants were so plagued by delays³² that by 1987 it was clear that less than half of the projects in the "binding" State Ecology Investment Programme would even begin before 1989-90, with many being transferred to the next plan period.

The devastation resulting from coal mining and coal-generated power was the most immediately apparent result of the string of policy failures through the 1980s and fed the failure of international and public confidence in the Czechoslovak government's ability to deal with environmental problems. In the repressive atmosphere of Communist Czechoslovakia in the 1980s, the near total lack of public protest against environmental

respiratory diseases between 1975 and 1988, during which time the incidence of lung cancer rose from 35.9 to 68 cases per 100,000 people (Okolicsany 1992)

³² Such as the long drawn-out experiment at the Tisova plant with a dry limestone desulphurization system that was being developed with the East Germans in the 1980s.

conditions was hardly surprising: people were denied accurate information, were fed promises of state action that they had no means of verifying or enforcing, and were intimidated against openly opposing the Party. International pressure, however, mounted as the cross-border impact of sulphur dioxide emissions worsened, with West Europeans decrying the widespread damage from acid rain and seeking solutions with their Eastern neighbours to what was "necessarily a shared problem" (*Oil and Gas Journal* 91/06/03).

Under Communist rule Czechoslovakia participated in several European efforts to mitigate environmental pollution caused by coal-burning plants, but possibilities for truly effective cooperation were limited by the political system and by the absence of reliable and public data. Czechoslovakia committed itself, under the Helsinki accord, to reducing sulphur dioxide emissions by 30% by 1993 (Okolicsanyi 1992), signed an environmental cooperation agreement with West Germany in 1987 and even hosted a conference on environmental information and technology sharing attended by four Eastern neighbours, European Community representatives and ministers from Austria and West Germany in May of 1989. But these agreements produced more propaganda than concrete results: the Helsinki goal looked unattainable long before 1989, but the Communist government refused to acknowledge the fact, hoping to gain political mileage at home and abroad; promises of easier access to West German pollution control technology failed to speed desulphurization programmes; and the final communique of the Prague conference simply amounted to "a collective statement of intent to take (environmental issues) seriously" (EIU 89/3). Little more could be expected under conditions in which environmental data were unreliable and the operating data on power plants were treated as state secrets. As democratic governments assumed responsibility for fulfilling previously signed accords, these deadlines and commitments were reevaluated according to honestly collected public data and viable solutions.

The accident at Chernobyl in May 1986 can be credited with permitting a greater degree of openness about Czechoslovakia's nuclear programme. Western involvement in

Eastern European nuclear development had, since the 1960s, been curtailed by both Eastern and Western security concerns and Eastern European hard currency shortages.³³ Concern after Chernobyl played a role in lowering barriers to imports of advanced Western nuclear technology and made the West more amenable to long-term payments schemes for nuclear safety equipment. It also led East European and Soviet governments to accept an unprecedented degree of intrusion into their nuclear systems, in some cases at the express request of the citizenry.

In Poland, which was especially hard hit by fallout from Chernobyl, citizens demanded that the nuclear power plant under construction at Zarnowiec be placed under the supervision of the International Atomic Energy Agency (IAEA) (Kramer, p.62). In 1988, Czechoslovakia, Hungary and the Soviet Union each invited teams from the IAEA to inspect their nuclear facilities and East Germany joined the IAEA early warning convention. Kramer emphasized that although these invitations were extended largely out of political considerations, this "should not obscure the importance of these states assuming obligations in the international control of nuclear energy and permitting (albeit limited) international scrutiny of their national nuclear facilities" (Kramer 1990, p. 66).

The response to Chernobyl revealed that East European peoples and perhaps even East European governments had more faith in Western supervisory institutions and Western technology than in their own. News of panic in Western Europe and Western offers of assistance reached the people of Eastern Europe and contributed to undermining their faith in existing Eastern technology and in their governments' ability to regulate it safely, a reasonable concern as under central command, separate and objective regulatory bodies did not exist and issues such as nuclear safety simply fell into the portfolio of the same officials responsible for energy production (Power Plays 1992, p.413).

³³ After Czechoslovakia's aborted attempt at cooperation, Romania and Canada cooperated in 1977 (project not finished). Hungary has also negotiated with Canada and with France, on cooperation for the design and construction of nuclear equipment. Poland planned the manufacture of a turbogenerator under license from a Swiss firm.

Energy conservation formed the object of countless proclamations and policies through the 1980s, but these consistently failed to decrease overall energy demand in the economy. Administrative measures that relied on cuts to publicly provided transport and street lighting, on restricted energy supplies to enterprises and tighter supervision of wastage produced only marginal savings and risked costing the government dearly in public support. Measures which relied on incentives could hardly even be formulated in the centrally-planned system, and certainly had no success in changing energy consuming behaviour. The rational use of energy required the participation, and hence the information and motivation, of energy consumers, but the only real consumer in the centrally planned economy was the state itself. Though industrial managers were dealt two mandates in the State Target Programme— produce and conserve — they were only rewarded for the first. Fulfillment of the central plan remained the paramount goal of industrial enterprises.

By the late 1980s, it seemed unlikely that competitive levels of energy efficiency could be effectively achieved within the centrally planned system. "An effective market approach to energy conservation is unthinkable without an overall marketization of the national economy — with all the deleterious consequences for the dominance of the Communist Party that would entail" (Kramer 1990, p. 124). Kramer concluded his examination of efforts to close the "energy gap"³⁴ up to 1989 with the premonitory statement that a demand-side strategy would require a fundamental change in the economic and political system both to infuse the political will needed to support demand side initiatives which have gains that are necessarily long term and dispersed, and to "eliminate those features of the command economy that promote excessive consumption of energy" (Kramer 1990, p. 128-129).

³⁴ Kramer put forth the notion of an 'energy gap' in Eastern Europe between amounts these economies demanded and what they produced. The gap was necessarily an *ante factum* phenomenon as consumption could not exceed supply, but its importance lay in the desperate measures required to obtain sufficient supplies and control energy use.

Certainly, right up until transition began, demand-side measures remained at the bottom of the priority pile for Czechoslovak energy planners who saw increasing supplies as their Lenin-given duty, and kept pouring funds into the massive hydro-electric dam at Gabčíkovo, a hugely expensive nuclear programme, and a strained, inefficient and environmentally dangerous coal industry. Energy became an ever growing relative and absolute drain on national resources, using up to one fifth of total national investments (double that in most Western economies) by the late 1980s (UN ECE 1991, p.24). Despite such massive expenditures, supply disruptions, brown-outs and rationing became increasingly commonplace over the decade.

TECHNOLOGICAL INERTIA: AN IMPEDIMENT TO ENERGY PRODUCTION AND USE

In efforts to conserve energy and to increase domestic energy production, a lack of indigenous technological capability proved to be a tremendous impediment. Industrial processes that in the West had been streamlined and modernized in response to higher energy prices remained largely stagnant. Lacking ownership to provide incentive and the market to ensure competitiveness, the socialist economies did not come up with alternate ways of producing the human energy, inventiveness and commitment needed to intensify economic growth. Possibilities of quantitative change had been exhausted and, while the need for qualitatively better inputs was recognized, the means of obtaining them within the socialist system were not found. "The experience of the last decade has demonstrated that minor tinkering with the economic system has not been enough to induce the profound psychological change, which would pave the way for more rapid technical progress" (Amman 1986, p.24).

The phenomenon Amman referred to as "technological inertia" and called "the crucial constraint on future Soviet economic development" (Amman 1986, p.5) arose from

structural impediments deeply ingrained in the centrally planned system³⁵ there was little scope for initiative or commitment at implementation levels; the translation of scientific and technological progress into mature industrial processes was painfully slow; and monitoring and accounting systems provided no basis for international (or even intra CMEA) comparison. Input-intensive industrial processes not only kept demand for energy high, but also made potential exports uncompetitive on world markets, thus depriving the country of hard currency needed to import energy and technology from sources outside the East bloc

The lack of technological capability hampered many of the country's efforts to increase indigenous energy production as well, slowing progress in implementing the nuclear programme, hindering the effective desulphurization of coal fired plants and precluding measures to reduce wastage in production and transmission systems. Each new challenge brought by the 1980s, whether higher safety requirements for nuclear operations, tighter sulphur and carbon emission controls or deeper seams in coal mines relied on Western technology for solutions. Investment in Western equipment and technology was perceived as an essential part of each strategy to overcome the country's energy problems. Even in the coal industry, Czechoslovak technology did not evolve to meet these more demanding requirements. The country, valued by the Soviet Union for its advanced industrial and technological base after WWII, failed to maintain a level of technological capability commensurate with more sophisticated needs. A stage of Czechoslovak

³⁵ Amman points to three types of structural inadequacy recognized in the literature on industrial innovation under Soviet style systems:

- 1) The economic system is permeated with departmental barriers, which impede cooperation between different industrial ministries and tend to isolate scientific activity from manufacturing activity. Because of information overload the central planners cannot act as effective counterweights to this fragmentation
- 2) There is a systemic tendency on the part of industrial enterprises and their ministries to maximize output at the expense of the quality and novelty of products and thus attach a relatively low priority to industrial innovation.
- 3) The inadequacy of pilot plant and large-scale testing facilities creates an imbalance between resources devoted to research and development. This acts as a bottleneck, holding back the flow of ideas and their conversion into designs of new products and processes (Amman 1986, p. 16)

technological dependence on the Soviet Union gave way to bloc-scale technological dependence on the West.

Until 1989, the means of acquiring Western technology were limited. Foreign participation in the Czechoslovak economy was strictly regulated and virtually nonexistent, and licensing arrangements were scarce. Outright purchase of technology was the accepted means of acquisition, but was restricted by Western security concerns and, primarily, by hard currency shortages. The COCOM agreement managed to impede the Soviet bloc's ability to obtain the most advanced Western technology, even though tensions within the alliance, shifts in its basic philosophy and the impossibility of administering regulations in an air-tight manner rendered it a less formidable weapon than the Americans may have wished. But even the technology that was imported or otherwise obtained (e.g. through reverse engineering) from the West failed to produce expected benefits. "Technological inertia" wasn't limited to inventing new products and processes but extended to the ability to integrate imported technology.

Trade and cooperation among the centrally planned economies, while not subject to the restrictions of East-West trade, remained awkward and largely unproductive. Unlike Western capitalist nations, where foreign trade is encouraged to promote efficiency, competitiveness and employment, in the East bloc planners tended to consider "exports as a necessary evil in the production, through foreign trade, of the imports critical to plan fulfilment" (Wolf 1988, p. 12). The persistently bilateral nature of trade in the region was symptomatic of inherent rigidities in the Soviet socialist model that prevented trade from being used effectively and of the smaller East European countries' fear that a multilateral trade system within the bloc would erode what was left of their precarious independence from the Soviet Union.

McMillan reviewed the results of efforts to multilateralize trade within the CMEA through the International Bank for Economic Cooperation and the invention of the transferable ruble as a clearing unit, only to conclude that: "The quantitative evidence from

the initial years of operation further supported the *a priori* conclusion that no substantial change in the pattern of bilateralism is likely to result without more fundamental reforms of the planning systems of the individual member states" (McMillan 1990 p. 19). Persistent bilateralism was also evident in Czechoslovak trade with Western countries which were reluctant to hold a balance-of-payments surplus that did not translate into access to goods. Trade could not, therefore, be easily diverted outside of the CMEA and was subject, as in the case of oil negotiations with Iran and Iraq, to political will and an openness to barter arrangements. Neither could trade fulfill its mandate of encouraging efficiency gains as the Czechoslovak economy remained closed to foreign competition.

Under Gorbachev in the latter 1980s, the need for CMEA cooperation in upping the technological capacity of the region as a whole was recognized,³⁶ as was the need for enterprises, rather than governments, to pursue trade and cooperation, but as this could not happen without reducing central control over resources to the point that it compromised state planning altogether, the programme really went no further than paper. Where extensive development could be achieved by mobilizing existing equipment and manpower, socialist development and CMEA cooperation could promote development to a degree, but the CMEA could not help member countries intensify development to keep pace with technological advances in the West without weakening the central control of each national system. At a supranational level, the Soviet inability to continue to satisfy East European oil needs disrupted the practical, if not ideological, rationale behind the CMEA trading system. The organization thus became redundant even before the collapse of national communist governments.

The United Nations Economic Commission for Europe attributed the abolition of central planning to the inherent contradictions and limitations caused by an emphasis on central

³⁶ In the 1985 Comprehensive Program to promote Scientific and Technical Progress of Member Countries of the Council for Mutual Economic Assistance up to the Year 2000

resource allocation, quantitative growth and sub-regional integration, and by the top-heaviness and inertia of its systems (UN ECE 1991, p.5). While it would be too simplistic to posit these broad factors as the direct impetus behind the popular revolution that overthrew the Czechoslovak communist regime in November of 1989, they served to render the centrally planned economy less tenable by preventing the country from gearing up into the post-oil intensive production needed to be competitive in the world market after the 1970s. The repercussions of this failure produced a falling standard of living, chronic shortages of goods, including energy, and environmental devastation that put the health of citizens at risk: all of which are proper fodder for popular revolution.

CHAPTER 2

NEW APPROACHES

The Communist government of Czechoslovakia stepped down in November 1989 and new leaders, first appointed then elected as the Civic Forum Public Against Violence coalition, undertook to transform the country's political structure and institutions, its economy and its foreign relations away from Soviet bloc socialism. This national project, which came to be called "transition"¹ unfolded within a more widespread discreditation of communism, disintegration of the CMEA and dissolution of the 'iron curtain' between East and West Europe, a context which would fundamentally shape Czechoslovak possibilities in this period.

PRIVATIZING PRODUCTION AND ENERGY PRODUCTION

The overall goal of the economic transition project initiated by the new Civic Forum Public Against Violence government in 1990 was to change incentives and increase the efficiency of production by transferring the burden of achieving profitability to individual economic actors. Czechoslovakia's new leaders left no doubt as to their commitment to privatization. In his keynote address to the 1990 World Bank Annual Conference on Development Planning, Finance Minister Vaclav Klaus stated: "We don't want to repeat our mistakes of the 1960s to introduce a hybrid between central planning and a market economy. Rather, we want to achieve the transition from a state-dominated economy toward an economy based on the private sector, private initiative and private entrepreneurship" (World Bank 1990, p.13).

¹ The 'economies in transition' appellation (so institutionalized as to become the name of a World Bank publication that now includes news on China and Cuba) gained favour with international organizations who grouped these Economies in Transition together as distinct from less developed countries but also, as they warranted special treatment and assistance, separate from richer traditionally market oriented OECD countries. Transition also implied that these countries were Western economies in the making. Manser thought that the appellation masked the fact that Slovakia was 'a lower middle income' country comparable to Turkey or Iran', and that Czech was an upper middle income country 'on par with Greece, Portugal or Mexico' (Manser 1993, p. 71).

Private ownership was expected to revitalize and de-politicize economic activity, producing a competitive environment in which market prices reflected the costs of production and relative scarcities. Private owners, it was thought, could be counted on to "ensure that their costs of production are minimized and that their output mix is determined in response to market signals" (Borensztein, 1991 p.2).

Nuti saw the basic motivations behind Eastern European privatization drives as identical to those initiated in the West in the 1980s. "The strongest reason for this development is the expectation that privatization can raise efficiency through changed incentives" (Nuti 1990, p.2). Contrasting the pressures on managers in the Communist system to those in Western markets, Nuti noted that under Communism,² managers were "subordinated to political authority and not to economically motivated shareholders; they were not subject to take-overs; and their losses were absorbed by automatic grants from the state budget." 1988 figures showed that these "automatic grants" or subsidies amounted to 16% of Czechoslovakia's GDP (Tanzi, 1991). In the West, "company managers, as agents of owners, are subject to contractual discipline enforced by shareholders; to takeover discipline enforced by potential bidders, and to bankruptcy discipline enforced by creditors" (Nuti 1990, p.2).

A series of laws concretized Czechoslovakia's economic transformation project. The principle of private ownership of property was reincorporated into the constitution. A Bill on Small Businesses was passed, giving "physical persons the right to engage in all business activities," and amendments to the Bill on the Enterprise deleted reference to the Central Plan and extended the right to engage in foreign trade to all enterprises (ABCEES, Feb 9, 1990). State monopolies on foreign trade were largely abandoned in order to reintegrate the Czechoslovak economy into the international market, with the expectation that this would lead to a specialization according to comparative advantage and provide a

² Communism is used throughout as the equivalent of Socialism of the Soviet model or 'real' socialism

"check" on the monopoly power of domestic producers by introducing foreign competition, thus "importing international price structures" (Hanel 1992, p.35). The Joint Venture Law was amended to allow for the participation of Czechoslovak persons and to grant foreign subjects the right to found wholly owned firms (Business Eastern Europe, May 14, 1990).

Small privatization adopted the auction method and began in 1991. By June 1992, some 27,000 small businesses had been auctioned to Czechoslovak citizens and the same number again returned to former owners. The first wave of large privatization, begun halfway through 1992, sold off 2100 enterprises, 1500 (valued at 50% of GDP) through the voucher method, and a further 4,000 enterprises were to go in the second wave begun in late 1993. Shares were due to be formally transferred after each wave and a new bankruptcy law was anticipated for the Spring of 1993 (Svejnar, p.63).

Privatizing energy production

Enterprises in the energy sector (Table 2.1), though receiving somewhat different treatment under the privatization programme, were expected to be made responsive to market signals and efficiency mandates. A massive restructuring was undertaken to carve particular functions away from the massive conglomerates built up under Communism. The chain of command suited to central planning was abolished and state involvement in the operations of energy enterprises was reduced. The old Federal Ministry for Fuel and Energy was dissolved in 1990 and a smaller Fuels and Energy department was formed within the Federal Ministry of Economy to put issues forth for debate in Federal parliament, where the general principles of national energy policy were adopted. The regulation of the energy industry and responsibility for implementing and funding specific measures were assumed by the Czech and Slovak Ministries of Economy.

All non-regulatory functions were removed from the Energy Department and turned over to an operational level that could be restructured into enterprises responsive to a mandate of profitability rather than plan fulfillment, entailing the merger of production,

pricing, sales, research and trade functions which had been quite separate under central planning. The former State energy import, production and distribution monopolies were transformed into legally independent concerns, with full privatization foreseen for most and minority participation by non-state investors envisaged for some. From a strictly vertical chain of command in which each level worked to fulfill its part of a plan issued from the central government, an environment was to be created in which these enterprises would compete with each other and with foreign suppliers.

TABLE 2.1
STRUCTURE OF CZECHOSLOVAK ENERGY SECTORS

Oil

- Chemapol imports oil for the Czech Republic
- Petrimex imports oil for the Slovak Republic
- Transpetrol transports crude (Czechoslovak and West European use)
distributes to refineries
- Litvinov/Kralupy Czech refineries
- Slovnaft Slovak refineries
 - Benzina distribution and retail sale of product
in Czech Republic
 - Benzinol distribution and retail sale of product
in the Slovak Republic

Gas and electricity

- Metalimex trades in coal, gas and electricity
- Transgas (under CPP management) handles international gas transport
- Cesky plynarensky podnik (CPP) distributes gas in Czech Republic
- Slovensky plynarensky podnik (SPP) distributes gas in Slovak Republic
- Cesky energeticky podnik (CEZ) Czech electric utility
- Slovensky energeticky podnik (SEP) Slovak electric utility

The utilities

Two major electric utilities managed almost all power generation, transmission and sales of electricity and heat in Czechoslovakia, and under Communism were responsible for maintaining and operating power plants, fulfilling centrally mandated investment projects and overseeing the export, import and transit of electricity. Ceske Energetiske Zavody (CEZ) and Slovenske Energetiske Podnik (SEP) remained state-owned through to 1993, but were transformed into independent joint-stock companies with directors endorsed by

republic government. CEZ's Board of Directors included representatives from the Czech Ministries of Finance, Economic Development, Economy, Environment, as well as the Czechoslovak Commission for Atomic Energy and other non governmental members (Drab 1992, interview at CEZ). Different activities within the conglomerates were identified and separated into accountable enterprises.

Before preparing its privatization plan, CEZ was divested of regional distribution companies, which would manage the 110kv grid, buying power from the utility (which continued to operate all 440 and 220 kv lines) and selling it to consumers;³ energy equipment companies were removed from CEZ's structure and privatized independently. Individual power plants were rendered economically independent units under CEZ directorship, but profits from power generation went to the CEZ Board of Directors which made investment decisions and allocated resources among power plants (Drab 1992, interview).⁴ In Slovakia, SEP maintained ownership of both generating stations and the electricity grid and the Slovak Republic government preserved a controlling position at SEP (IEA 1992, p.57).

Coal companies whose production was largely geared to the two utilities were split up, with service-oriented and construction enterprises made independent and placed in the first wave of privatization. The North Bohemian Soft Coal Mines, which accounted for 74.1% of Czechoslovak soft coal and lignite, or 57.2% of all solid fuel consumed in the country, was divided into smaller mining enterprises that were set to be privatized

³ There are eight district companies representing the regions of Bohemia and Moravia, managing 100 kv lines. Zeman predicted that at some point CEZ's transmission and production functions would also be separated.

⁴ Some power plants, such as Opatovice, drew up privatization projects that separated them from CEZ and rendered them independent. Co-generation plants and five major energy equipment producers that used to be part of CEZ's portfolio were privatized independently. Co-generation plants sell power back to CEZ, mostly in the form of district heating. Zeman said that the managers of district heating plants lack the expertise with risk management to operate their business wisely, and thus preferred to deal with CEZ, which mitigated risk somewhat, this in contrast to small hydro plants which sold their power directly to consumers (Drab 1992, interview at CEZ). Individual power plants would eventually be able to negotiate joint ventures according to Zeman, and foreign interests were free to build new power plants.

independently.⁵ The hard coal companies, OKD in Northern Moravia, which controlled 15 mines and employed 99,000 workers, and KD Kladno which operated five mines with 13,000 workers, were transformed from state enterprises into joint stock companies in 1990.⁶ Coal from these mines was sold to the utilities on three-month contracts, providing a degree of stability during restructuring.

First ever annual reports were drawn up by the utilities in 1991, presenting a breakdown of income and the financial situation of each power plant and transmission grid separately as a first step to identifying profitable and non profitable sectors under utility management. Utility managers were not, however, at liberty to act on this information independently; government remained the principal decisionmaker on matters such as which energy sources would be privileged, which plants would be closed and how quickly prices could be raised. Some of the powers held by government were considered temporary, needed only to guide the transition, and others were expected to be transferred to more diffuse regulatory agencies, but the utilities expected government to preserve a significant role in safeguarding competition, securing supplies, ensuring safety and environmental protection and protecting consumers.⁷ Through the 1990-93 period, neither CEZ nor SEP was at liberty to raise capital through price increases without government approval; nor was foreign investment a possibility until a division of shares could be decided and a privatization project completed.

The question of how to distribute shares in the utilities between government and private investors — both domestic and foreign — brought different views on the role of electric utilities to the fore. A wide range of precedents existed in the West, ranging from

⁵ Komorany, Bilina, Lezaky, Nastup, Hlubina, Chabarovice, Vresdova and Brezova mines would be privatized independently in the second wave (Power Plays 1992, pp 94,95, 285-287).

⁶ In November 1990, the Stonava mine was separated from OKD to be privatized independently (Power Plays, p 284-286).

⁷ The UNECE predicted more of a role for government in these areas in Czechoslovakia than in Poland (UNECE 1991, p 19).

significant state ownership in energy production and restrictions on foreign participation, to private power production and transmission open to foreign competition, and these various arrangements were considered for their applicability to Czechoslovak conditions.

There were early signs that the Czech Republic and Slovakia would, after separation was completed, assign quite different roles to their national utilities. The Slovak government appeared generally less committed to market principles: stronger objections to social inequality and suspicions attached to the privatization process were manifest in the continued popularity of the Communists in Slovakia and dictated slower paced and possibly less pervasive reforms. At the Slovak utility, Hanzel viewed electricity supply as a natural monopoly that should be regulated by government and serve the public good, and considered privatization largely incompatible with these mandates. "British privatization," he said, "gave the companies great profits, but the burden has been transferred onto consumers. An official at the Slovak anti-monopoly bureau said that he wanted to buy electricity like he bought fruit or shoes, and this is not possible, to compare fruit and electricity" (Hanzel 1992, interview at SEP). The privatization project nevertheless foresaw making a significant number of shares available for foreign investors and SEP signed cooperation and technical assistance agreements as precursors to possible investment by West European utilities.

The Czech Republic, on the other hand, stated its intention to continue with the voucher privatization programme after 1993, considering that Klaus' election in June 1992 had "endorsed the plan to continue the radical transformation of the economy" (FBIS 14/07/92). This commitment to privatization did not necessarily extend to the electric utility, however, and plans for CEZ appeared to hang on the eventual strength of regulatory agencies.⁸

⁸ Officials at both utilities expressed interest in systems where electricity authorities were elected by the populace to form a regulatory board that would represent consumer interests in negotiations with the utilities, a point especially important to Hanzel, who had been sent to the U.S. in 1991 to examine a number of systems. Erik Schmidt at CEZ was impressed by the regulatory system in Maine that had achieved great success in incorporating mandates such as conservation into utility operations.

Imported fuels and distribution

The Czechoslovak gas network was the charge of two state companies, Cesky Plynarensky Podnik (CPP) in the Czech Republic and Slovensky plynarensky podnik (SPP) in the Slovak, which also managed a slew of equipment manufacturers and design companies. In 1991 the organizational structures of these two companies were clarified and their assets identified.⁹ CPP presented its privatization project to the Czech Ministry of Economy in June 1992 and activities other than handling and distributing gas, such as machinery plants, were prepared for independent privatization. The Ministry further proposed splitting CPP into a National Transmission Company, called Transgas, and Local Distribution Companies, but disputes between the Czech and Slovak Republics over Transgas (which will be examined in detail in Chapter Three) prevented CPP from removing international transport from its structure, and the company's privatization project could therefore not be implemented. At the end of 1992, CPP remained a state-owned company.

Transit fees and import prices for gas were negotiated yearly and set in dollars after 1991, with the trading company Metalimex acting as agent for both SPP and CPP in these transactions. The monopoly position of Metalimex was reduced through the introduction of a system of licenses but, in 1991, Metalimex was accorded the sole gas import license, issued only for the amount needed in the country.¹⁰

Insecurities about obtaining oil supplies kept government actively involved in negotiating imports and restricting exports. In May 1991, Finance Minister Dlouhy outlined

⁹ SPP consisted of 3 gas companies, two extraction companies and 2 engineering and research institutes as well as the gas distribution network. CPP's business had involved five main areas: a head office in Prague oversaw six regional divisions responsible for the distribution of gas, the pipeline for international gas transit, LPG filling plants and distribution, production of machinery at GMR Skuteč and VPS Rosice (regulators, meters, burners, boilers etc.) and Plynoprojekt Praha, an engineering and planning company (Plackova 1992, interview at CPP, BEE 92/03/02).

¹⁰ Metalimex, a former subsidiary of the Ministry of Foreign Trade which had held exclusive rights to trade in gas as well as coal and electricity, became a joint-stock company in 1991, owned primarily by its customers and 40% by a branch of the Ministry called FINOP that was due to be privatized in 1991 or 1992 (IEA 1991, pp 2-5).

legislative provisions for price regulation and taxing of crude oil and products, for government responsibility in maintaining strategic stores and regulating foreign trade through government issued licenses, as well as for powers to take further measures should "unmanageable deficits" threaten to destabilize the economy.¹¹ The refining, distribution and retail sectors were prepared for privatization. Oil refineries at Litvinov, Kralupy and Slovnaft, owned by the Czech and Slovak Republics, were to be privatized through the voucher method with provisions for infusing foreign capital, though both governments planned to retain some shares. At the distribution and retail level, the Czech company Benzina and Slovak Benzinol were transformed into joint stock companies (Prague Post 92/03/31) in which the state held majority shares. Benzina's privatization project,¹² approved by the Czech government in 1991, foresaw Benzina's continued involvement in strategic, government-commissioned projects (primarily the construction of storage depots), but decided that only a third of its 750 retail outlets would remain in its hands, with another third sold to in-country private investors through the small privatization auctions and the remaining third sold to foreign corporations. Both retail companies stated their commitment to continue buying product from the three national refineries at Litvinov, Kralupy and Slovnaft.

Impediments to decentralizing, restructuring and privatizing enterprises in the energy sector arose on a number of fronts. The fear of oil shortfalls led the government to maintain tight control over oil trade. Czech/Slovak disputes over energy assets, especially

¹¹ A certain amount of oil and product had been exported to Western Europe predominantly when prices within the CMEA made exporting imports from the Soviet Union profitable. Worries about maintaining supplies at levels sufficient for the domestic economy, however, put an end to this practice after 1989. In 1990, exports totalled 15,000 tons, which Dlouhy considered negligible. But as 'a large surplus' of petroleum products was accumulating in Czechoslovakia as crude oil supplies came in much more smoothly than anticipated, demand abated due to lowered production and money to complete the federal petroleum reserve had not yet been allocated, exports were allowed to increase to 340,000 tons in the second quarter of 1991. The firms Benzina, Petrimex and Chemapol were authorized to engage in these exports until July 1991. The virtual ban on exports was considered to have helped reduce Czechoslovakia's oil needs by 1992 (Ecoservice 91/05/24, 91/05/17, Petroleum Economist 92/01).

¹² Prepared with assistance from Trichem Consultant Ltd (London, U.K.)

the Transgas pipeline under CPP's management, hampered the privatization of gas companies. And the role and concordant structure of the electric utilities remained ill-defined. But perhaps most importantly, government was reluctant to relinquish control over the energy sector until regulatory bodies capable of assuring adequate and safe energy production and of protecting consumers could be developed and strengthened.

INCREASING CAPITAL RESOURCES: FOREIGN INVESTMENT AND ASSISTANCE

Foreign investment into all sectors of the economy was sought as a way of increasing the amount of investment capital available to modernize and restructure enterprises, of obtaining needed technology and, in some cases, of introducing competition. Energy enterprises, including the utilities, oil and gas distribution companies and refineries, foresaw making shares available to foreign investors, but could not actually accept investment until they were privatized, which in most cases didn't happen before the country separated in January 1993.

In anticipation of energy production and distribution companies opening up to investment, foreign companies signed cooperation agreements with many of these enterprises, involving consulting and technical assistance. These proved useful in helping utility managers get acquainted with Western products and Western ways of doing business but involved no financial dealings.¹³ Marta Ptackova at CPP headquarters in Prague commented in November 1992 that "CPP has had a lot of visitors over the past few years. However, no investments have been made to date because CPP cannot yet raise capital." Technical assistance studies became an important source of information for future

¹³ Otto Drab at CEZ stated a number of ways in which these advisors were useful: They can help decide on the best partner for a project after a tender has been issued, and determine where the purchase of Western equipment presents distinct advantages over using Czechoslovak manufactures. Foreign advisors also help in preparing audits and least-cost planning studies to help make the utilities' investments that much more cost effective.

investments and formed the basis for loans from international financial organizations such as the World Bank.¹⁴

Possibilities for foreign investment came much faster in the energy equipment industries, allowing Western engineering companies to seek partnership agreements with Czechoslovak companies and extend their own marketing and production activities into the country. Joint ventures, licensing agreements and the establishment of subsidiaries and new firms were all potential entries into the Czechoslovak market.

Western technology export restrictions were eased throughout 1991, with only products of the highest technological level, such as supercomputers, still being reviewed on a case-by-case basis. The move began in 1990 with a U.S. government initiative to exempt safety equipment suitable for Soviet VVER reactors from COCOM and U.S. export control rules in order to permit prompt imports of safety equipment to Czechoslovak nuclear power plants.¹⁵ Other countries followed the lead, eager to participate in the refurbishment of Eastern Europe's power base.

A Frost-Sullivan report predicted that expenditures on power plant construction in East European countries would rise dramatically in the 1990s (from \$3.3 billion in 1991 to \$5.3 billion in 1995) and that investment growth would be highest in Czechoslovakia. Western investment looked like an advantageous *quid pro quo* solution. With contracts being opened to international bidding, Czechoslovak engineering firms were under

¹⁴ Some of the technical assistance provided to the Czech and Slovak gas companies

— The U.S. provided \$55,000 in aid in 1991 to evaluate projects, including the reconstruction of the "Bratstvi" pipeline to increase capacity.

— Ruhrgas (Germany) signed a cooperation agreement in 1991 with SPP for scientific technological exchange in diversifying gas sources

— British Gas signed an agreement in 1992 with ČPP covering investments in the gas sector once it was privatized, on cooperation in expanding and modernizing the gas distribution network in the Czech republic and implementing programmes to convert coal burning equipment to natural gas (Ecoservice 91/05/24 91/07/26, 91/09/25, 91/09/27, BEE, 92/01/13, p.22)

¹⁵ Easing restrictions was conditional on the East European countries adopting export control systems based on COCOM norms and requirements. Their success in doing so led the U.S. House of Representatives to vote to remove Poland, Hungary and CSFR from the COCOM lists altogether possibly in the spring of 1992 (Ecoservice 91/03/25)

pressure to improve the quality of their production, often through partnership or licensing deals with Western firms. As development in the power industry was expected all over East Europe, Czechoslovakia's traditional role as supplier for other Eastern bloc countries encouraged Western firms to establish close cooperation with Czechoslovak companies ("Prognosis on East European market of equipment for the production and distribution of electrical energy" in Ecoservice 91/09/05).

Although in the major energy supply and distribution companies delays in privatization were the main factor slowing foreign investment, investors in energy equipment companies were deterred by uncertain property rights, given the imminent separation of the country, and by disputes over environmental obligations. Also, while foreign companies initially saw Czechoslovakia as a springboard into the huge Soviet market, this market came to look increasingly chaotic, and the adventuresome could invest directly there. Experience with foreign direct investment and joint ventures in the energy field so far suggests that without a visible commitment by governments (both donor and beneficiary), enterprises would not commit themselves significantly in the energy economies of central and eastern Europe" (UN ECE 1992, p. 15).

Assistance

Western governments recognized the need to provide incentives to encourage their companies to invest in the East European economies and support the East European transition. Established institutions such as the OECD and IEA, the World Bank, IMF, EC, EIB and G-7 and expressly created bodies such as the G-24, EBRD and PHARE programmes (see Appendix A for descriptions of these and other organizations involved in Eastern European transition) set up programmes aimed at helping the new democracies introduce market economy structures and policies, overcome short-term financing gaps and enhance the transfer of technology, capital and management know-how (UNECE 1991,

p.33). There was, at first, the assumption that the Czechoslovak and other Eastern European economies needed only a kickstart to get working

In October 1990, the G-24 agreed on energy as a priority sector in the assistance programme, and compiled an inventory of prioritized requirements in conjunction with international organizations, including the IEA, which proceeded to draw up comprehensive studies of the energy sector of each country in 1991-92 (Petroleum Economist 91/03). Assistance to the energy sectors of East European countries provoked a need for the different agencies involved to consolidate their efforts. The expertise of energy and environmental agencies was used to determine priorities and suggest means through which more liquid lending and aid agencies could participate, ranging from macroeconomic support to technical assistance on policy reform to specific project aid.

The evolution of American assistance to the Economies in Transition illustrates the kind of interagency coordination that evolved in individual donor countries as well as at an international level. The U.S. assistance effort was first implemented through the SEED (Support for East European Democracy) Act brought in by Congress in November 1989, which provided funds to help Poland and Hungary (and later Czechoslovakia) develop democratic institutions through viable free market economies. As energy and environmental needs in these countries appeared urgent, the Department of Energy was allotted SEED monies for projects such as retrofitting Polish coal burning power plants. An Energy and Environment Working Group, under State Department coordination, came to involve the Environmental Protection Agency, the Agency for International Development (USAID), the Office of Environmental Safety and the Department of Commerce. These various groups worked together on an emergency energy programme, a regional energy efficiency project and a more localized clean and efficient coal project in Poland (U.S. Senate 1991, p.61). On an international scale, increasing inter-agency cohesion lent the assistance programme a monolithic character. Czechoslovak officials would often seek financing from each of the

WB, EIB and EBRD, who in turn adopted an ad-hoc strategy of co-financing larger projects and cooperating on sectoral studies.

Assistance programmes provided avenues for attracting capital and expertise that were not previously available, but also imposed conditions on the activities of recipients and their energy policies. Conditionality was a prominent feature in assistance packages from the outset; all multinational and bilateral programmes were conditional on the pursuit of democratic and market-oriented reforms. However, the initial emphasis on financing only private enterprises diminished as aid and lending agencies gained a better understanding of the problems facing East European privatizers. Mandates such as the EBRD's became more flexible in their definition of private enterprise, loosening it to include "state-owned companies undergoing restructuring on their way to privatization."¹⁶

Flexibility on the state ownership issue was even more important in the energy sector as it became obvious that privatization would be neither speedy nor complete. The World Bank considered that even if East European utilities remained in State hands, they could be made to function competitively if they were sufficiently separated from the state budget and if enterprise managers were accorded "the authority to make the necessary decisions to adapt to the new circumstances and incentives" and were held accountable for profits and losses (World Bank 1990).

But more specific conditions regarding environmental protection, energy pricing and trade also appeared in the mandates of these agencies and, to avoid duplicating or undermining each other's efforts, the conditions imposed by one agency were often adopted by others. This could be seen in the European Commission (EC) and European Investment Bank's (EIB) adoption of IMF conditions regarding energy pricing, and the World Bank's adoption of stricter environmental standards in line with the EBRD. The

¹⁶ The Bank's Board of Directors noted that "a more gradualist approach will be needed to ensure that the productive sector does not completely break down" (EBRD, Operational Challenges and Priorities: initial orientation, April 1991)

coordinated nature of the assistance programme heightened the pressure on Czechoslovak officials to implement recommended policies, especially in the establishment of a regulatory framework for the energy sector.

Negotiating a regulatory framework

A regulatory framework had to be established in which both private (domestic and foreign) and state-owned energy companies could operate in line with national goals. Domestic energy producers were, in a 1992 draft law on energy, given the global mandate of "seeking a secure and reliable energy supply for the public good" (Lower Plays 1992, p.416). Following from this, enterprises engaged in energy production, procurement and transmission would be subject to certain supervisory and price regulations, and the state, as owner of all mineral, energy and water resources, would participate through stock ownership in different companies. The state would also be responsible for strategic reserves of imported fuels and for supporting research into energy technology and energy efficiency. Apolitical regulatory bodies at Republic level would be established to ensure that the rights and obligations of various parties were enforced and that conditions for a safe, reliable, efficient and environmentally benign energy supply were maintained.

In the preparation of energy policy and programmes in the Czech and Slovak Republics, the VUPEK energy institutes in Prague and Bratislava provided the major domestic pool of technical expertise. However, old habits and a limited knowledge of alternatives made them less useful in advising on much-needed human and organizational problems. A handful of former VUPEK engineers moved to the SEVEN Energy Efficiency Consultancy and, through American assistance monies, were provided with opportunities to visit foreign facilities and work with foreign staff, which helped develop new ideas about practices that could work well in the Czechoslovak context. This group became instrumental policy and technical advisors to the Federal government as well as the Czech government and electric utility. Offices in Bratislava were not opened before January

'993 ¹⁷ Foreign experts contributed advice on every facet and at every level of energy management, helping to prepare privatization projects, evaluating assets and recommending policy measures.

Pricing and taxation

A system of incentives through pricing and taxation was expected to influence both producer and consumer behaviour in energy. Under the old regime, prices were set by the state and bore no relation to the actual costs of production. Energy suppliers had been compensated directly out of the state budget, either through a negative turnover tax or a direct subsidy. In 1991 the negative turnover tax was eliminated (Power Plays 1992, p.62) and direct subsidies, except on heat supplied to households, were abolished. Consumption taxes replaced negative turnover taxes, and like the Value Added Tax (VAT) that would eventually replace them, expressed preference for a particular type of energy, for example by directing price advantages to less harmful, lighter and leadless fuels (Loula 1992, interview at Benzina Praha; FBIS 31/01/92).¹⁸

By January 1991, as the economy was opened up to imports, only 16% of prices were still regulated, a figure that dropped to 6% by January 1992, but energy prices remained among those still controlled by the Ministry of Finance. The government raised prices for oil and petroleum products by 50% in 1990. Wholesale gas prices were raised in

¹⁷ SEVEN, the Energy Efficiency Centre, began as a non-profit, independent institution in December 1990, with start up funding provided by the US Environmental Protection Agency to Battelle, Pacific Northwest Laboratories, with some additional funds provided by the World Wildlife Fund. Core funding was assured by a three year funding commitment from USAID through the Department of Energy. This relationship with Battelle and USAID did not prevent SEVEN from taking on other contracts, and after a three year period, SEVEN should, in fact, be weaned from Battelle support.

While VUPEK itself was privatized in the first wave, it, like so many other firms, would have a long restructuring ahead in order to shake old habits of working in isolation from the rest of the economy and the rest of the world.

¹⁸ Leadless petrol, though more expensive to produce, was not subject to the tax instituted on product distributors. Gas stations thus sold it for 20 haller less than regular petrol. This measure in itself contributed to a 4% increase in leadless fuel's market share between 1991 and 1992 (Loula 1992, interview at Benzina Praha).

January 1991, and retail prices, which had been heavily subsidized by the state, were more than doubled in May 1991, though this still didn't match the increase in import costs (Ecoservice 91/04/10). Prices for electricity and heat also remained under government control, maintained at the same level across Czechoslovakia for different users (classified as either industrial, commercial or residential) and were gradually increased by the Ministry of Finance each year between 1991 and 1993. CEZ and SEP could propose more significant increases in electricity prices (to counter, for example, higher coal prices or the need for pollution controls), but the government proved itself quite capable of refusing these requests. Citizens accustomed to obtaining electricity and heat at negligible cost exerted enough pressure to keep residential energy prices low that the first price increases in 1991 were compensated by increases in transfer payments to vulnerable groups such as pensioners in order to assure the acceptance of the measure.

A federal energy programme presented by Vladimir Dlouhy in January 1992 foresaw energy prices being liberated by 1995 (FBIS, 31/01/92), but most anticipated the government "having the last word on such matters for a long time to come" (Drab 1992, interview at CEZ). Ivo Slavotinek at SEVEN recognized that despite the beneficial conservation effect higher prices might have, residential prices couldn't be increased quickly. The potential social and political consequences of sudden residential energy price increases were considered too damaging to the general acceptance of economic reforms. "Price inflexibility is something that foreign investors (as well as company managers) in the energy sector must therefore accept," said Otto Drab at CEZ. Foreign investors in industrial sectors were also, in isolated instances, able to influence energy pricing policies. At least a few foreign investment deals involved government guarantees that electricity prices would remain low over a specified period (Manser 1993, p.99).

Countering these pressures were the IMF and World Bank, which considered higher energy prices essential to discouraging the wasteful and harmful use of energy. The conditions attached to loans reflected World Bank/IMF thinking on how efficiency and

environmental improvements were achieved and a central component involved removing energy price subsidies and other price and market distortions. "Once resources are more realistically allocated, policies to improve environmental quality are likely to be more effective" (Petroleum Economist 91/11). When government raised prices for oil in 1990, it was partly in anticipation of the Gulf War causing higher world market prices for oil (which the Soviets were charging), but also partly to comply with conditions the IMF attached to its first loan.¹⁹ It called for the adoption of measures to improve the country's energy situation, foremost that prices of oil products approach world levels (Ecoservice 91/06/24).

Giving the environment a voice

Environmental concerns, including the serious threat of nuclear accidents after Chernobyl, played a crucial role in undermining Communist leadership and even, it could be said, in instigating the revolution in Czechoslovakia. The United Nations Economic Commission for Europe considered that, in the first years of democracy, the "procedures of involving the population in energy policy choices such as the siting of energy facilities, the safety of nuclear installations and pollution resulting from energy activities has become an issue of high political relevance" (UNECE 1991, p. 14). Environmental mandates were vocalized and organized by extra-governmental groups grown out of pre-1989 movements like Brontosaurus, as well as by chapters of international, high profile groups newly active in Czechoslovakia, with Greenpeace the most visible.

A Federal Commission on the Environment was instituted in 1990, and was given the status of a ministry.²⁰ It was charged with formulating legal and regulatory policy,

¹⁹ The IMF loan accorded to Czechoslovakia in 1991 was augmented to help Czechoslovakia cope with the transition to world market prices with the Soviets and the Gulf Crisis

²⁰ Environmental protection fell, until 1990, under the jurisdiction of the State Commission for Science, Technology and Investment (Kabala 1991)

ensuring that parliamentary debates, especially on energy issues, addressed environmental concerns, as well as with directing investment capital toward repairing environmental damage, both through domestic allocations and by inviting and channelling foreign assistance (Ecoservice 91/04/22). The Czechoslovak Commission for Atomic Energy (CCAEE) was established as a regulatory body in 1990 to incorporate and enforce international safety norms in the nuclear power sector.

In April 1991, the federal government approved a first comprehensive programme for environmental protection²¹ that detailed activities requiring environmental assessment, including virtually all activities in the energy sector, and drew up a Clean Air Act setting national binding limits on harmful emissions (mainly sulphur, carbon and nitrogen) that would be brought into effect gradually. In December 1991, a federal law empowered State Funds for the Environment at Republic level to collect fines and manage other income dedicated to environmental projects.²²

The shaping of Czechoslovak environmental policy was guided not solely by the concerns of citizens, but also by the desire to "rejoin" Europe. "Efforts to institute effective environmental regulations have been significantly influenced by international standards, practices, and conventions, in particular those of the EC" (Kabala 1991, p. 12). The Clean Air Act was based on EC environmental standards, and Czechoslovakia re negotiated its commitment under the Helsinki accord on trans-boundary air pollution, extending the

²¹ The programme was elaborated jointly by republic and federal officials. Some projects required federal implementation, while others responded to the priorities of each Republic and would be managed by Czech or Slovak bodies. An initial breakdown of spending involved 180 project proposals for which 300 million Kcs were earmarked, 20% for projects aimed at repairing past damage, 50% for technological means of improving the environment, and 30% to support environmental protection measures taken at the Republic level (Environment Minister Vavrousek cited in Ecoservice 91/09/19, 91/04/22).

²² A five year grace period was allotted to existing facilities during which time gradually stricter pollution controls would be imposed, the Republics were each free to set more stringent pollution limits. A Federal Environmental law passed in December 1991 empowered the environmental agencies of the Czech and Slovak Republics to levy fines of up to 1 million Kcs for violations of environmental regulations, and assigned them responsibility for monitoring compliance. Provisions for arbitration in case of disputes between the Czech and Slovak Republics were included in the law (JPRS EER 92 029 p 27).

deadline for reaching a 30% reduction in emissions by five years until 1998 (Ecoservice 91/05/21). While the Communists had used the accord mainly to gain propagandistic mileage, the new government undertook concrete measures aimed at meeting the new deadline. A tax was imposed on coal used to generate power, with deductions made for plants that undertook desulphurization and reduction of nitrates and solid emissions, and a programme was elaborated to bring thermal power plants up to new standards.

The 1989 Basel Convention of the Control of the Transboundary Movement of Hazardous Wastes was incorporated into a new Czechoslovak statute on waste management. Like Western European laws on waste, the statute included requirements for nuclear power plants to establish funds, beginning in 1993, for the storage of spent fuel as well as for the eventual disassembly of the plant. As assistance monies were made available for environmental projects, conditions were again imposed, reflecting ideas on the preconditions for environmental improvement. A sectoral adjustment loan to Czechoslovakia from the World Bank included provisions for the introduction of pollution charges and specified environmental assessment criteria for new projects. As well, a specific energy sector loan granted in part to help reduce air pollution from thermal power stations called for a strengthening of government institutions in charge of environmental management and higher prices for gas and electricity.²³

WEAKENED RESOLVE

Environmental regulations based on European standards began to look less tenable as economic pressures on enterprises increased. Even so, alternatives drawing on models elaborated elsewhere in the West were never seriously contemplated. Hanzel at the Slovak utility considered the federal government's practice of "taking environmental standards

²³ World Bank loans to Hungary and Poland to desulphurize coal-burning power stations and improve the efficiency of district heating systems also imposed energy sector conditions. Hungary had to cut back sharply on subsidies to coal production and make the coal-mining industry self-supporting as a condition for a sectoral adjustment loan granted in 1990.

from Germany and enforcing them in Czechoslovakia" unrealistic. He thought that a system akin to the American "bubble" system, which imposes emission limits over an area within which pollution permits can be traded, would be more economic and effective than requiring every power plant to meet the highest standards (Hanzel 1992, interview at SIIP). A system of tradeable permits was developed in parts of Poland but Czechoslovakia maintained the goal of enforcing the highest standards at each power plant and industrial enterprise.

Tension surfaced between the Environment and Economy ministries around how quickly environmental concerns should be incorporated into economic decisions. In 1991, Finance Minister Klaus insisted that measures such as taxes and credits for environmental projects could only be effective once the market system as a whole had been created (Ecoservice 91/04/17). Environment Minister Vavrousek stated that he could not "agree with Klaus that a solution to environmental problems can be postponed. A narrow view of the economy that neglects the environment slows down overall economic growth." However, for new federal efficiency and environmental standards to be enforced without placing an unbearable strain on federal resources, enterprises had to be largely independent of financial subsidies and have enough capital available to either meet standards or pay fines. "The transition period creates special problems because it is unclear how effective financial penalties will be" (Economist Intelligence Unit 91/3).

The other consideration behind Klaus' objection to stringent environmental regulations was the fear of scaring off foreign investors. While foreign buyers were being counted on to infuse the capital and technology needed to bring enterprises up to higher efficiency and environmental standards, he felt that government could not risk making them overly unattractive by enforcing past fines or imposing high penalties on polluters. Environmental legislation was named a dissuading factor by potential foreign investors, who were "unwilling to pay high prices for assets which are... burdened with severe ecological problems" (Financial Times 19/10/92).

The Benzina corporation attempted to use foreign investment to defray some of the costs of bringing old Czech petrol stations up to new environmental standards. Eighty percent of stations did not meet European environmental standards (Ian Vrba, Czech Ministry of Industry, quoted in Ecoservice 91/05/21) that were being brought into force. In distributing stations, Benzina directed foreign investment to the sites most in need of refurbishing by placing foreign companies third in line to acquire properties, after Benzina itself and the Small Privatization programme which was restricted to domestic buyers (Ecoservice 91/06/17). Sixty stations were actually leased by November 1992, but foreign leaseholders generally didn't begin to upgrade the stations until the purchase was final; other companies waited for firmer privatization plans to come into effect or decided it was cheaper to construct entirely new stations that met environmental standards (Loula 1992, interview at Benzina Praha; Ecoservice 91/05/28).

Reluctance on the part of foreign investors prodded the Czechoslovak government to rule in June 1992 that foreign buyers of Czechoslovak enterprises would no longer be liable for paying environmental cleanup costs and that the state would also bear the burden of paying fines levied against the enterprise in the past (Prague Post 92/06/30).²⁴ These backward steps went largely unopposed as the Czechoslovak populace grew increasingly apathetic over environmental issues. Concern over environmental issues in Czechoslovakia fell, between 1989 and 1992, from second to fourth rank in public opinion polls, after economic problems (Montreal Gazette, 92/05/02). The massive layoffs involved in restructuring the energy sector and hardship imposed through higher prices threatened to erode public support for environmental measures. Many in the Czech Republic accepted Klaus' faith in the market. Simply put: "a need to make money will now force businesses to conserve raw materials" (Eva Tisovska, Czechoslovak Biological Society, quoted in

²⁴ In some cases, negotiations over liability went on for years. Questions over liability for environmental damage kept reappearing in the Skoda/VW joint venture, with Skoda insisting that the government assume responsibility. In 1995, the Czech government finally agreed to pay for damages caused before 1991 (Economist Intelligence Unit 95/1)

Prague Post 01/09/92). Jaroslav Marousek, Director of SEVEN, commented in a personal interview in late 1992 that: "Right after the revolution, it was quite easy to get any motion to do with the environment pushed through, but now if you mention the environment, or add a paragraph to federal legislation, the response is "no, no, you environmentalists have gone too far."

After the June 1992 elections, the Federal Committee for the environment was closed down and its duties, such as setting national environmental policy, proposing legislation and coordinating ecological foreign assistance, officially fell to the Federal Ministries of Foreign Affairs and Economy, a sort of non functional limbo on their way to Republic governments (Prague Post 01/09/92).

Manser, looking at progress on the environmental front up to 1993, concluded that the new emission limits were not well enough monitored in the first years of transition to induce changes in enterprise behaviour. "To force enterprises to install new technology, emission charges have to be maintained for a long periods. If there are any signs of weakness... most firms will postpone investing until they are sure that the rules are permanent" (Manser 1993, p.93). He considered monitoring and inspections the weakest link of the chain from policy formulation to implementation in Czechoslovakia and the other countries of East Europe. Under-staffed and under-equipped local enforcement offices recognized the threat that companies from countries with very stringent environmental controls such as Germany would abuse lax controls, but nothing more than a code of conduct that the Western enterprises themselves were expected to uphold was brought in to curb the temptation (Manser 1993, p.114).

It is possible that international assistance in the regulatory field contributed to the weakness of new Czechoslovak regulatory agencies, a phenomenon that became evident in the area of nuclear safety. Dependence on the International Atomic Energy Agency's (IAEA) safety services, such as missions to review past incidents and evaluate the siting, construction and operation of nuclear plants, increased dramatically with political changes

in Eastern Europe,²⁵ perpetuating a pre 1989 pattern in which the Soviets had played the role of inspector (Petroleum Economist 91/03). In its first two years of existence, the Czechoslovak Commission for Atomic Energy (CCAEC) appeared to play little more than a coordinating role, inviting foreign inspections, primarily by the IAEA, and coming up with recommendations based on these.

East European openness to foreign inspection was at first perceived by the West as an important step toward assuring nuclear safety in Europe. The Financial Times wrote in July 1991 that "the willingness of the governments of the formerly centrally planned economies to open an intensive dialogue and engage in active cooperation in the field of nuclear safety emerges as a new and major feature of the reform process" (Financial Times 91/07/03). Although the 1986 Chernobyl disaster had hinted at the shortcomings of Soviet-designed nuclear plants, the awesome scale of the problem only became apparent as the Soviet bloc unravelled during 1990, enabling western experts to examine the reactors in detail. While none of the Eastern European plants used the graphite-moderated technology of Chernobyl, concern over a lack of safety features and unmotivated and underskilled operators persisted. None of the Eastern European reactors was encased in a containment vessel as a control against meltdowns. Nuclear safety came to be viewed alongside widespread civil wars as a major threat to European security and the assistance programme sought to address the problem.

However, the increasing reliance, over the course of two years, on inspections and recommendations by the IAEA and independent Western companies may have compromised the development of national regulatory bodies and damaged their credibility with local populations, encouraging a psychological carryover from Communist times. The CCAEC proved powerless to establish nationally agreed standards for nuclear safety and,

²⁵ Over the 15 months beginning in 1990, teams of specialists from 21 countries and the IAEA performed safety evaluations of 10 Soviet-designed VVER 440-230 plants in East Europe and the former Soviet Union (IAEA Bulletin)

even prior to separation, differences of opinion over the possibility of keeping the Bohunice nuclear power plant running led the Slovak government to call for the CCAE to divide into Republic level organizations (FBIS 20/04/92). Imminent separation further weakened the CCAE which actually became dysfunctional towards the end of 1992 as Czech and Slovak replacements for it were being worked out.²⁶ Disregard for the CCAE was soon compounded by mistrust for the IAEA

While there is no guarantee that a strong national regulatory agency would have remained above suspicion, dependence on foreign and international bodies that were immune from electoral pressure and closely linked with an aggressive Western nuclear industry contributed to increasing mistrust of their inspections and recommendations. Early on in reforms, Czechoslovaks had put their faith in Western institutions as technically superior, impartial and, most importantly, anti-Soviet bodies, but many came to feel that these institutions had a vested interest in supporting Czechoslovakia's nuclear industry. The chairman of Slovakia's Green Party accused the Western nuclear industry of "pushing atomic energy on Czechoslovakia in order to unload its outmoded equipment" (CSTK 91/07/17). The IAEA was targeted with some of the most severe suspicion, with critics challenging the agency's objectivity and "contending that it maintains an incestuous relationship with the Western nuclear industry, whose interests it promotes" (Kramer 1992, p.62).

The West looks to its own

In their elaboration of programmes to be funded by international institutions, especially in the profitable nuclear field, Western donors had to draw the fine line between true emergency measures and international assistance programmes that risked usurping opportunities for their own energy companies. Bilateral aid favouring a country's own

²⁶ When wanting to arrange an interview with CCAE officials in 1992 I found that the offices they had occupied just down the hall from SEVEN had been vacated

companies was more acceptable to donor countries than multilateral aid in which projects were open to bidders in international competition. The American assistance programme, for example, clearly stated its priority of facilitating the entry of U.S. companies to Eastern Europe. "Underlying the U.S. Government's efforts is the belief that small and medium sized (American) firms would be more inclined to pursue opportunities in Eastern Europe with active U.S. technical assistance, grant, and capital support" (U.S. Senate 1991, p.62). The kinds of support made available ranged from direct loans and loan guarantees, to insurance against a broad range of political risks, to investment advisory services.

As the organizations involved in assisting East Europe confronted the infinitely huger task of providing assistance to the Republics of the former Soviet Union, organizations responsible for the programmes questioned their ability to really transfer expertise to individuals and enhance the capacity of institutions (Financial Times 19/10/92).²⁷ Laux identified two phases of Western assistance to the transition countries: "The extraordinary first phase (1989-91) was characterized by euphoria and assumptions that the transition could be rapid and thus assistance temporary." After the coup that set off the collapse of the Soviet Union came a second phase (1992-94) shaped by "a sobering re-evaluation of the costs and complexity of transition" which resulted in the institutionalization of assistance for the long term (Laux 1994, p.173). Long-term assistance was more difficult to justify to recession-struck electorates in the West and donor governments came under increasing pressure to make funding serve the needs of opportunity starved domestic companies.

Long on negotiations, replete with self-serving motives and slow in arranging for actual transfers of funds and/or technology, the assistance programme left many

²⁷ Dissatisfaction was expressed by both donor and recipient countries at conferences in Washington and Lisbon in 1992.

Czechoslovak energy managers more confused than thankful.²⁸ "I am not sure what the real motivation behind this foreign assistance programme is," said Hanzel at SEP. "I think it is mainly to gain information."

In a 1992 evaluation of the assistance programme to East Europe, the United Nations Economic Commission for Europe Energy Working Group critiqued the absence of triangular aid schemes that would encourage the continued presence of Eastern European companies in the development of Soviet resources and to the conspicuous lack of programmes involving only Economies in Transition in the energy field (UNECE 1992, p.8). "In the first year of transition, the East Europeans themselves had little desire to perpetuate CMEA links, but as the Soviet Union collapsed and began its own reform process, and energy supplies were threatened by the breakdown of trade, Western sponsored triangular aid could have provided them some much needed clout in their dealings with Soviet Republics. A project to institutionalize a triangular aid plan was put forth by Czechoslovak Foreign Minister Jiri Dienstbier and supported by other East European leaders in 1991 (Financial Times 30/10/91).²⁹ But when the European Community eventually ruled in 1992 that 25% of the 500 million ECU credit guaranteed to Russia would have to be used to purchase goods from former satellites, Czechoslovak officials claimed they were only able to participate in the assistance programme by allying themselves with German enterprises (L'Echo 92/04/06).

²⁸ As an example of the complications involved in assistance projects from the recipient's point of view Hanzel pointed to World Bank assistance for reconstructing the Vojany power plant. Townsend Electric, a U.S. company, drew up the feasibility study for Vojany with funding from the Trade and Development branch of USAID. But "American technical conditions for the building, management and operation of power plants are different than European conditions." American recommendations were therefore not compatible with bids from European companies. "This could prejudice the eventual choice (Hanzel 1992, interview at SEP).

²⁹ When President Mitterrand first suggested institutionalizing triangular aid into a subsidiary of the EBRD, he did so not in response to the Eastern European need, but as an expedient solution to demonstrations in Paris protesting against the influx of Eastern European agricultural exports.

AFFILIATIONS REALIGN

The Western assistance programme was instituted to encourage the East European countries in their democratic resolve as they shook off the Soviet mantle and adopted the values of the West. It was coupled with assurances that they would not be left stranded between Western Europe and a still Communist Soviet Union. As country after country deposed Communist Parties and prepared for democratic elections, ties with the Soviet Union, and with each other, were considered impediments to their new aspirations.

Czechoslovak Finance Minister Vaclav Klaus was the first to suggest officially withdrawing from the CMEA (Financial Times, Jan 5, 1990) but other members soon echoed his view and none of the new East European leaders suggested another form of trade cooperation. After the dissolution of the CMEA, trade between former members was accomplished in hard currency, which had the immediate effect of sending intra-CMEA trade plunging and making oil and gas imports much more expensive. Svejnar determined that trade in non convertible currency "virtually disappeared in 1991," though 40% of Czechoslovak trade was with CMEA countries. That year, Germany replaced the Soviet Union as Czechoslovakia's main trading partner (Svejnar 1993, p.42).

From the outset of the transition, Czechoslovaks encapsulated their new aspirations in the words "EC membership". Some analysts even credited the momentum built up in the European Communities' project through the 1980s with sweeping up the East Europeans in its wake. Promise of EC membership was an essential factor in the Czechoslovak drive to adopt Western standards in areas such as environmental protection. However, abandoning the CMEA club did not grant them automatic entry into the EC. European Commission President Jacques Delors treated the idea of according immediate membership to Czechoslovakia, Poland and Hungary as "preposterous". "As if they were ready,

economically and politically, to embrace pluralist democracy and operate a market economy; as if this scenario raised no financial or institutional problems.³⁰

The early 1990s leading up to the Maastricht summit were a crucial period for the EC, and not one they wished to jeopardize by admitting a set of new, poorer and problematic countries. But the fear that failure of the economic and political transition in Eastern Europe could spill over and jeopardize Western prosperity and stability demanded something more solid than possible future membership. Havel warned:

...the 12 should prevent a void of despair from being created in Czechoslovakia, because instability exerts its influence and spreads from its original source. You have supported our efforts to establish a democracy, today you cannot be indifferent to what's happening in our country, if only for a question of your own survival (Havel addressing the European Commission, quoted in Agence Europe, March 1991).

The concept of Association, contained in the Treaty of Rome, was selected as a compromise solution,³¹ but association agreements soon came under fire for the restrictions they placed on Eastern European exports of chemicals, textiles, coal, steel and agricultural produce and did not prevent further quota restrictions being placed on Czechoslovak steel exports in November 1992.³²

In 1993, the EC outlined the conditions for membership eligibility, all of which the Czechs and, on most counts, the Slovaks were well on their way to fulfilling.³³ But clearer

³⁰ Fellow Commissioner Jean Dandelier echoed this view. Reaffirming the desire to help Czechoslovakia, he reminded them that Spain and Portugal spent seven years preparing for membership. Speaking at Charles University, Prague, May 1991 (EC Bull 1/90 p 7).

³¹ Association agreements involved four essential elements: 1) free trade between the country concerned and the European Community brought in gradually, 2) industrial, technical and scientific cooperation, 3) a pluriannual program of financial assistance, 4) the creation of a mechanism for political dialogue. "These agreements would constitute an end in themselves. They are not a transitional phase on the road to membership of the Community, neither do they exclude the possibility of an associated country applying subsequently to join the EC." The Agreement signed with Czechoslovakia was replaced by separate Czech and Slovak agreements in October, 1993 (EC: The European Community and its Eastern Neighbours, Brussels, 1990, p 13. EC No58, 1994, p 64).

³² An increase in the steel quota was announced in 1994, but only after (and because) the European Union had decided to abandon plans to restructure its steel production, a plan that involved import restrictions (Economist Intelligence Unit 95/1).

³³ Stable institutions, democracy and the rule of law, respect for human rights and protection of minorities and a functioning market economy that can survive the rigours of the single market.

targets for economic performance and dates on which negotiations could begin were not forthcoming. Instead, the Czechs, Slovaks and other Eastern aspirants were offered "hundreds of pages on the administrative and legal procedures by which EC (now European Union or EU) legislation must be adopted and implemented by applicants." It looked unlikely that the first new member from the East would be admitted before the year 2000. Southern EU countries worried about competition from Polish farmers, and "even in the North grumbling from steel producers has been louder than exporters welcoming new market opportunities" (The Economist, May 13, 1995, p.14).

The EU grew increasingly interested, however, in pursuing closer energy relations with the former CMEA countries, motivated principally by the desire to assure supplies of Soviet oil and gas in order to heighten security against supply breakdowns on a Community-wide scale. EC initiatives in 1990-91 occurred in the context of preparing and negotiating Economic and Political Union, including the creation of an Internal Energy Market through which the European Commission sought to bring about a transition "from national (energy) control to security on a Community scale" (EC Working Paper, 4 July, 1990, Energy in Europe, p.53). Environmental concerns also encouraged cooperation; most EC countries had reached the point where further reductions in CO₂ and SO₂ emissions would be quite expensive to accomplish and, amid international enthusiasm for combatting the greenhouse effect preceeding the Rio Conference,³⁴ suggested that it might be "more effective to finance CO₂ reductions outside the Community, especially in Central and Eastern Europe" (EC Energy in Europe 1990, p.28).

The Pan European Energy Charter was developed as a means of institutionalizing the principles of the new energy relationship desired. The Charter was signed in December 1991 by 35 countries (including all the East Europeans) and nine Soviet Republics,

³⁴ The United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil in May of 1992 was expected to arrive at a binding plan for global reductions in greenhouse gases, but the Agenda 21 plan has not progressed significantly since

establishing committees responsible for fleshing out binding protocols covering aspects of energy production and trade. These aimed to provide a framework in which to harmonize and consolidate the European energy map, "from the Atlantic to the Urals", and elaborate mechanisms through which Western European investment and technology could be drawn into accomplishing the unification. The Charter also held provisions for the behaviour of Western companies in their energy dealings with the East and sought to achieve standardized environmental regulations throughout Europe. The Charter remained in the realm of ideas until December 1994, when the European Charter Treaty was signed to bring into existence a Charter Conference. Investment protection and infrastructural interconnections were placed at the top of the Conference agenda; mechanisms to standardize environmental behaviour appeared outside the scope of the loose Conference structure.

By providing a distinct forum in which energy trade, investment and cooperation could be deliberated, the Charter effectively separated these issues from negotiations around EC membership and provided a less committed alternative to the prospect of extending the EC's REGEN³⁵ energy development and integration programme eastward. The net result was that energy integration projects were undertaken outside of the EC structures capable of coordinating programmes and upholding standards. Though energy projects in Czechoslovakia were undertaken for the most part with Western European countries and though Western European countries became the largest investors in the country's energy sector, this was accomplished on a bilateral level and not through the mechanisms or under the regulations of the EC. Seventy percent of all foreign investment in the first three years of transition came from Germany which also accounted for almost 30% of all Czechoslovak trade, or more than half the country's trade with the West (Business Eastern Europe 92/03/16, p.123; Economist Intelligence Unit 95/1). Austria

³⁵ REGEN, or Regional Energy, was an initiative launched by the European Commission in May 1990 to develop the energy transmission networks of less developed regions of the Community

became the Slovak Republic's most important trade and investment partner, accounting for 25% of all investment by 1994. The Czechs and Slovaks became, in this context, much more susceptible to the demands of these countries.

A Czech step forward and a Slovak step back

In developing new approaches with which to accomplish the mandates of the post-oil era, the Czechoslovak government appropriated the systems and standards that had brought success on many fronts to Western nations. It was motivated by the desire to repair damage incurred under Communism and revitalize an economy and national morale badly in need of fresh air. The adoption of high standards and strict regulations was bolstered by the expectation of EC membership, and supported by financial assistance for projects that met with the approval of particular donor institutions and countries. However, the authorities and institutions meant to enforce these standards were only just beginning to develop the skills and acquire the tools needed to be effective. Without the EC as a supranational framework to support regulations based on high EC standards, these authorities were challenged by a population burdened with economic difficulties and the demands of much-needed investors, many of them EC members. The risk of aiming too high in environmental law and conservation incentives was not only that these would become unenforceable but that respect for the agencies responsible for and the goals underlying them would be lost, a pattern that likely contributed to the waning of environmental concerns in Czechoslovakia after 1991.

The Czech/Slovak separation infused an important destabilizing factor into Czechoslovakia's institutional reform efforts as ministries were established then dropped from the roster, and proved especially detrimental to the creation of regulatory bodies. After separation, the Czech Republic benefited from stable, continuous government and commitment to joining the EU, and to completing the privatization programme has never been in doubt. In contrast, Slovakia saw three shaky coalition governments between 1993

and 1995, with Vladimir Meciar raising frequent questions as to which direction, both geographic and economic, would be favoured. Directly upon regaining power in December 1994, Meciar temporarily suspended the second wave of privatization due to begin that month, then declared a total moratorium on privatization, including all direct sale privatizations initiated by the outgoing Moravcik government (Economist Intelligence Unit 95/1). In the two years following separation, Slovakia signed some 40 intergovernmental cooperation agreements with Russia and, by 1995, had 60 diplomats in its Moscow embassy compared to six in Brussels. In February 1995, the Slovaks became the only East Europeans to be allowed to visit Russia without a visa (The Economist, May 6/95, p 51).

The effectiveness of new approaches

Commitment to the new approaches designed in the early transition period appeared much stronger in the Czech Republic than in Slovakia by the time the country separated in January 1993. While we can assume Czech support for the projects initiated and laws adopted by the Federation — based on the election of the author of reforms to the Prime Minister's office and the continued presence of the most influential Federal politicians in Czech government — Slovak support is a more precarious assumption. The possibility that Slovak resistance to privatization or nuclear regulation was only resistance to *Czech* programmes must be acknowledged, but accumulating post separation evidence would suggest otherwise.

Nevertheless, the delays in privatization and the weakening of regulatory measures examined in the preceding pages cannot be pinned solely on Slovak nationalism. Uncertainty about the role electric utilities should fulfill and the degree of government involvement desirable played the more important role in delays. A deeper legacy of public hostility and mistrust towards national regulatory agencies bred under Communism was evident in the failure of the CCAE and in diminishing support for environmental protection laws, a trend exacerbated by the "broken promise" of EC membership to uphold the high

standards recommended. New means of infusing capital into the energy economy were opened up, but the Western donors and investors attracted were often responding to ambitions quite separate from those of Czechoslovak recipients, providing little assurance that the capital would contribute to allaying supply insecurities or minimizing the "costs" of energy.

The first three years of transition undoubtedly untied the knots of the centrally planned system that had precluded approaches to encouraging efficient energy production and use, but the simple adoption of new approaches would not guarantee better results. As we now turn to look at how the post-oil mandates are being accomplished in the transition period, it is important to consider these new approaches not according to the success they may have enjoyed in the Western world but according to their potential effectiveness in the Czechoslovak context. Higher prices can be charged but remain unpaid; high standards of environmental protection can be legislated but remain unenforceable; nuclear regulators can be established but disobeyed; and enterprises can be privatized but remain inefficient.

CHAPTER 3

MANDATES RETRIED AND REDEFINED

A) DECREASING ENERGY CONSUMPTION

Many within and outside Czechoslovakia expected that the creation of a market environment through privatization would automatically solve the problem of energy overconsumption that had formerly plagued productive enterprises. "The transformation to a market economy will mean a rationalization of the energy picture, the net effect of which is certain to be a significant reduction in the energy intensity of economic output," reported the Oil and Gas Journal in 1991 (Oil and Gas Journal 91/06/03). Analysts with a little retrospect to their advantage saw nothing certain or automatic at all in the ability of the market to improve energy efficiency: a new playing field was not enough when the players themselves required major surgery.

Manser, assessing the first three years of transition, found the belief "that capitalism would intrinsically succeed where communism failed" held by the first democratic politicians, was now allowing that more active industrial restructuring may be necessary (Manser 1993, p. 147). Portes concurred that "the growth of small scale new private firms cannot substitute for restructuring the large state firms in industry, and it is now evident that the market cannot do the job without guidance" (Portes 1993, p. 6). Svejnar further found it uncertain that "citizen-shareholders and investment funds would generate a structure of corporate governance that will alter enterprise behaviour toward greater efficiency" (Svejnar 1993, p. 46). In the Czech Republic, where a second wave of privatization involving 860 enterprises ended in December 1994, more than 80% of the economy would be in private hands by 1996. However, as late as 1995, the Economist Intelligence Unit noted that there was "no evidence of a dramatic change in the management of previously state-owned firms" (EIU 95/1).

It also remained uncertain that bankruptcy laws would be strong enough to actually close down uncompetitive plants. In the Czech Republic, the bankruptcy law came into

effect in April 1993 with an amendment giving creditors three months to reach an agreement before a bankruptcy was processed by the courts. Only a small number of bankruptcy procedures have since been completed¹ (EC No.58, 1994, p.67) "Neither banks nor suppliers generally took action against defaulting clients, even if there was a valid legal basis .. (primarily because) many firms could hardly find any non-defaulting clients " At the end of September 1991, 43% of firms were in arrears on debt repayment to other firms (Hrncir, p.65). The pervasiveness of inter-enterprise indebtedness prevented viable firms from recapitalizing their production and provided a disincentive to see uncompetitive firms closed down.

Consequently, while overall energy consumption fell each year after 1989,² the reduction occurred at a much slower rate than did economic output (Planecon data in Manser 1993, p.131), pointing to continued inefficiencies within enterprises and a continued need to restructure the economy away from energy-gobbling heavy industry. A 1991 study by the CSFR Statistical Office found that the proportion of heavy engineering in Czechoslovak industry was twice that of the average of five small economically developed countries. As well, industrial production in all CMEA countries was 50% to 250% less energy-efficient than in OECD countries (JPRS 1991, 36).

Achieving productive efficiency

Reducing energy use out of concern for productive efficiency was a qualitatively different enterprise than implementing emergency cutbacks to deal with energy shortages. The term 'demand management' referred to rationalization measures that reduce energy consumption without diminishing output. As Pass found in looking at the "State Target Programme" of the 1980s, demand management could not be instituted through administrative decrees; it

¹ The same clause appeared in the Slovak bankruptcy law which came into effect in June 1993

² Consumption fell by 3.7% between 1989 and 1990, and by 8.7% between 1990 and 1991 (Marousek 1992)

required the participation, education and motivation of energy consumers who had to be equipped with the information to assess energy use, the incentive to conserve and the capacity to implement measures leading to greater energy efficiency.

Ivo Slavotinek, in an interview at SEVEN offices in Prague, called the Communist efforts at energy savings a dismal failure.³ "They didn't distinguish between energy intensive and other industries, they provided no financial incentives and did nothing to make people act more responsibly. As well, there was no way to ensure that measures were adopted." After 1989, attempts were made to create an environment in which energy saving programmes could be more effective at reducing consumption in all areas of the economy. Many of the ideas, projects and policies of this period were modeled on post oil crisis policies adopted in the West (Table 3A.1), and were encouraged by Western success at decreasing the energy intensity of their economies significantly since the 1970s. Starting in 1989 from the position of using twice as much energy per capita than the average West European country, Czechoslovakia had much to gain from encouraging efficiency. Energy efficiency in industry held especially important potential: while industry used 51% of all energy consumed in Czechoslovakia (Table 3A.2), industry represented only 31% of American and 35% of European Community energy consumption.⁴

How is efficiency achieved

The question of how energy efficiency is achieved has attracted much theoretical attention, first with the oil crisis and more recently through environmental concerns. The process of

³ SEVEN worked with policymakers, business leaders and researchers in many fields to identify the economic benefits possible from energy savings. Similar centres were set up in Poland, Russia and Bulgaria. Members of the Prague office were unsure that an office would be established in Slovakia after the January 1993 breakup.

⁴ Even Poland and Hungary, with industry using 42% and 36% of energy respectively for industry had more even distribution (IEA, 1991, U.S. Senate 1991, Dietz 1992). Czech industry also used the higher quality fuels: 47% of the hard coal consumed in the Republic, 52% of the oil and 42% of the gas, but only 19% of the brown coal available in the Republic go to serve industry (Power Plays, p. 249).

increasing efficiency involves all levels of the economy, from specific industrial processes and management structures to technology transfer mechanisms and trade environments, to government legislation and government funded programmes. While higher prices and direct government involvement have been important in supporting energy improvements in the West, a number of writers consider improvements in energy efficiency to be inseparable from more general technological and industrial progress.

TABLE 3A.1
CONSERVATION MEASURES ADOPTED BY IEA COUNTRIES AFTER THE OIL CRISES

Energy conservation measures in industry:

Financial/ fiscal incentives grant/subsidy, loan, tax incentive

Reporting/Auditing: targetting, reporting, auditing

Information, advice/assistance information/publication, meeting/seminar, advice for small and medium sized firms

Other measures CHP, waste/waste heat

Energy conservation measures in the residential and commercial sector:

Fiscal financial incentives discount on taxable income, subsidy/grant, loan

Prohibition of bulk metering

Switch to individual metering for energy use in apartment blocks

Temperature control especially in public buildings

Efficiency labelling of appliances mandatory or voluntary

Information/advice

Programmes to accomplish energy audits in individual homes and buildings

Improved house construction codes

Energy conservation measures in transportation:

Fuel taxation

Rules to force the production of more fuel-efficient autos

Penalty taxes on large cars and motors

Speed limits

Pooling and public transport subsidies

Source: Kemezis and Wilson 1984, pp 191-192

Martin Bell questioned the impact of legislation and government programmes specifically aimed at increasing energy efficiency, pointing to studies undertaken by the U.S. Office of Technology Assessment in 1983 which found the influence of such legislation to be negligible and which predicted that "Given a healthy economy and reasonable access to capital... industry will make investments... that will increase productivity and profitability and will have a positive effect on energy efficiency. This

improvement can take place without additional Federal incentives." He further cited a study of OECD countries by Schipper (1987) which concluded that post 1973 energy conservation policies accounted for only a small part of the overall increase in energy efficiency (Bell 1990, p. 18). Bell also cautioned against overemphasizing the role of energy prices in long-term efficiency gains. "The post-1973 reductions in intra industry energy intensity should be seen as continuations of longer term trends that have characterized the evolution of industries through the whole of the post war period" (Bell 1990, p.6).

TABLE 3A.2
FINAL ENERGY CONSUMPTION IN CSFR 1990

From: SEVEN

In Czechoslovakia, the input-input model of enterprise behaviour described by Tanzi (Tanzi 1991) had to be radically transformed. Chapter One outlined some of the reasons behind the weakness in the capacity to implement change which impeded efficiency gains under Communism. In the post-1989 period, sectors that still had market potential faced much greater pressure to make their production energy efficient in order to compete

2 of/de 2

PM-1 3½"x4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

PRECISIONSM RESOLUTION TARGETS

globally, sectors without much hope for profitability would have to find other production lines, and higher domestic energy prices were widely regarded as essential to guiding this restructuring process.

Vratislav Ludvik, of the Czech Ministry of Industry and Trade, acknowledged towards the end of 1992 that set energy prices were a main limitation to effective demand management and believed that prices should be liberated as soon as possible (Table 3A.3). Robert Archer, from USAID supported this view, one also propounded by the World Bank/IMF, that unless the proper incentives were in place, demand side management and instruments to increase efficiency would suffer. However, the pervasiveness of inter enterprise debt and the near-absence of bankruptcies between 1990 and 1994 indicated that even privatized industry was not well-equipped to respond to new signals and that this inadequacy was widespread enough to make policies (be they pricing, pollution charges or bankruptcy laws) practically unworkable.

TABLE 3A.3
1990 ENERGY PRICES FOR CSFR AND OECD EUROPE

From IEA 1992, p 71

Hrncir attributed some of the disappointing results of the first few years of transition in Czechoslovakia to the 'questionable capacity of economic agents to adjust to exposure to foreign competition' (Hrncir p 63). He concluded that a fundamental change in the 'experience, interests and expectations of economic agents is needed...' (Hrncir p 72). Bell held a similar inability to respond to signals responsible for the lack of incremental efficiency gains in the industries of less developed countries. The inability was rooted, he thought, in the weakness of technological and managerial capacities in these industrial enterprises. Competitive pressure and appropriate price regimes could help stimulate enterprises to exploit the full potential of technologies, but the technological, managerial and financial capacities able to respond creatively to those conditions formed an equally important component.⁵

Financing measures to improve efficiency

Insufficient access to capital proved an important early impediment to energy efficiency improvements in newly privatized as well as restructured state enterprises. Cash-strapped new managers would have difficulty financing such changes even when the pay-back period in terms of energy savings was relatively short. The banking sector was needed as a financial instrument to implement energy efficiency projects but took time to become capable of identifying projects worth financing and becoming supportive lenders or on lenders to industry.

⁵ Improving the technological and managerial capacities in Czech and Slovak enterprises is bound to be a long process, and its success will depend not only on overcoming the structural barriers identified by Amman and cited in Chapter One, but also on the pervasiveness of technology transfer involved in joint venture and licensing deals negotiated after 1990, on the ability to develop technological capability through technical assistance programmes, and on the trade environment new enterprises would be working in. While these issues have profound implications for energy efficiency, it is both outside the scope of this paper, and likely too early in the transition process, to assess their potential contribution. However, Martin Bell's interesting examination of the different types of technology flow and their potential for increasing technological capability is presented in Appendix B as food for thought.

Mr. Koubal, of the Ceskomoravska Investment and Development Bank, saw the need to improve banking services especially in channelling funds to small and medium enterprises, but he also stated that the quality of projects presented for financing was generally weak. Zdenek Polnicky of the Komerční Banka agreed. At the moment there don't seem to be many projects that would be eligible for financing.⁶

In the first years of transition, Western export banks, international financing agencies and assistance programmes provided readier sources of funding than Czechoslovak banks. However, these agencies were much more adept at providing large sums for a single project than the relatively small amounts needed for many energy conservation measures.⁷ As well, a number of them required loan guarantees from either a domestic bank or government.

The International Finance Corporation (IFC) which was the largest early private investor in Eastern Europe, investing \$400 million and mobilizing a total of \$2 billion, was geared exclusively toward large scale financing. The normal IFC project size was \$20 million. "It would not be cost-effective for us to direct projects of less than this amount," said IFC representative Ellen Lederman.⁸ The World Bank, said SEVEN's Slavotinek, "has no interest in energy efficiency. I wasn't able to propose a single large project to them, so

⁶ The Bank was privatized in March 1992, it restructured its management and has 100 branches around the country. Its mandate was to help enterprises prepare project proposals that could be financed by a loan from the bank's commercial division, a loan from a foreign bank or out of a credit line from the U.S. Export-Import Bank that it managed (Energy Efficiency Business Week Conference).

⁷ One representative of an American energy efficiency technology company said that his company had been experimenting with creative financing programmes, as companies in CSR couldn't seem to liberate enough funds to cover purchases of even inexpensive equipment. One strategy involved providing companies with equipment, and being paid out of fuel savings monies (Energy Efficiency Business Week Conference, 1992).

⁸ The IFC could, however, set up lines of financing in the host country, a system that allowed for good contact with small and medium enterprises. One such line has been established with the Bank of Austria serving Poland, Hungary and Czechoslovakia (Energy Efficiency Business Week Conference).

they considered it too difficult to manage. The World Bank Energy I loan provided \$1 390 000 for supply side measures, zero for efficiency measures.

Smaller bilateral assistance programmes were better bets for helping enterprises finance energy saving measures. The Czech and Slovak American Enterprise Fund, created with \$60 million in 1990 under the SEED act, provided capital to smaller entrepreneurs (\$100,000 to \$200,000) to get started, to medium sized projects (\$250,000 to \$1 million) to recapitalize former state assets, and to larger projects such as joint ventures with Western partners that could go up to \$2 million, but these programmes were not well-known to many Czechoslovak enterprise managers.

The inability to finance the stream of minor investment projects, or even maintenance expenditures, that could generate important contributions to efficiency early on in the process of restructuring and privatizing enterprises impeded progress in reducing industrial energy demand. Discussions at the Energy Efficiency Business Week conference revealed that, though foreign assistance monies were available, obtaining small amounts of aid or loan money appeared impossible to many Czech firms. The IFC or EBRD, through their mandates to provide loans to local banks for on-lending, could only help if Czechoslovak banks were better equipped.

GOVERNMENT'S ROLE IN DEMAND MANAGEMENT

After the oil crises, all Western governments established agencies to promote energy conservation, which served to secure budgets for conservation programmes and educate citizens in ways they could contribute to energy savings. Energy consultant Theo van Rossum, describing energy savings policies in the Netherlands, drew a clear link between government expenditure and efficiency gains. "Until the late 1970s, the Netherlands had no energy policy. It took the oil crisis to begin programmes that, between 1973 and 1985, produced efficiency gains of 2% a year. The lower energy prices of the mid-1980s saw concern wane and government programmes cut. Efficiency gains correspondingly fell

behind. In the late 1980s, environmental concerns entered the picture as the government set out to cut SO₂ emissions by 30%, and the Ministry of Economy accorded a larger budget to energy conservation programmes" (van Rossum 1992, Energy Efficiency Business Week conference).

In Czechoslovakia, the Federal Energy Agency was formed in 1991 with the mandate of reducing energy demand in the Czechoslovak economy. It was modelled on Western agencies created in response to the oil shocks of the 1970s and initiated a number of projects with Federal funding to improve industrial and residential energy efficiency. Some Agency projects received further support from Western assistance programmes such as PHARE.

Residential energy efficiency: getting people involved

The Federal Energy Agency undertook an energy savings in buildings project in 1991, with 500 million CSK from the federal budget allocated to install meters in 100,000 Prague apartments, something that had been legislated in 1987 by the Communists but never accomplished. The government allocated 118 out of the 500 million crowns devoted to the project to encourage the manufacture of metering technology in Czechoslovakia⁹ (Ecoservice 91/09/19), and the PHARE programme provided ECU 1.1 million to purchase metering equipment. "We all realize that the best thermostat you've got now is the window" (Jean Trestour from PHARE, 1992). A demonstration project to insulate and install meters in Prague Castle helped publicize the programme.

The Economist Intelligence Unit foresaw greater success for the programme as residential heat prices increased. "Up to now the price of domestic heating has been so low that (...) there had been no incentive for the final user to conserve or for landlords to ensure adequate insulation (EIU 91/3). But while prices had, by 1991, increased enough to

⁹ This was part of an employment creation programme associated with job losses at the Oslavany power station (EIU 91/1).

provide an incentive to conserve.¹⁰ there remained the difficulty of identifying who would undertake the insulation of buildings or the upgrading of heating systems as the ownership of buildings was in flux. 'No one knows who is responsible for maintaining them,' said Jiri Zeman of SEVEIn.

Such programmes were meant to demonstrate the energy savings possible with minimal investment, but Slavotinek criticized the Federal Energy Agency's programme for its lack of continuity and visibility. 'It goes in swells and nobody cares much about what this money accomplishes.' In Czechoslovakia, the funds and possibly the experience to implement such programmes were limited, and international assistance efforts attempted to provide some support from the outside. Conservation mandates that evolved gradually in the West were imposed as ready made regulatory systems and programmes on Czechoslovak citizens who had not contributed to their evolution. Without concerted public awareness campaigns, it seemed unlikely that Czechoslovak citizens would enthusiastically commit their tax dollars to such programmes. There was little concern expressed over the fact that the Federal Energy Agency would likely not survive the country's split.

In both industrial and residential sectors, the negative attitude toward energy saving left over from the Communist era would be a very difficult obstacle to overcome in garnering support for and participation in efficiency measures. "There is a very big need for public awareness campaigns," said PHARE delegate Trestour, to make people conscious of the connections between environmental health, economic growth and energy efficiency, but also to encourage the belief that individual actions could make a difference:

"The unsuccessful energy saving programs that were announced in conjunction with every five year plan since 1975 have left a negative impression in people's minds. Under those programs, pressure was exacted from the center, evoking the feeling that centralized dictates on energy were only a further means of strengthening control mechanisms and curtailing personal freedoms under the communist regime. People

¹⁰ To the degree that an estimated 30%-50% of all households in the CSFR would not be able to pay their heating bill for the 1991-92 winter (IEA 1991, p 7)

quickly learned to meet the demand for demonstrated savings by changing accounting books rather than factories (Marousek 1992, p.5)

Encouraging a more efficient fuels-energy balance

Government also sought to raise the energy efficiency of the economy by outlining a target fuels-energy balance that could be worked towards through legislative and budgetary support for more specific projects. In 1991, the Ministry of Economy's "Czechoslovak Energy Policy" draft outlined which energy sources would be privileged. It described a general trend towards increasing the proportion of electricity, using less coal, less oil, more nuclear and more natural gas (ORBIS 108, Czechoslovak Energy Policy). Electrification assumed high priority in order to gain flexibility in the use of fuels and make control more precise. With oil, expressed aims were to restructure the industrial sector away from oil eating industries that were destined to become less competitive on world markets and to substitute oil where possible, thereby alleviating balance of payments stress in the long term. The comparative shortage of private automobiles and extensive public transport network in place (primarily electric trolleys and metros) in urban areas would likely keep demand for oil among individual consumers relatively low.

In policy statements, gas was being encouraged as a clean and accessible fuel in both district and residential heating, and gas boilers produced both domestically and abroad figured prominently at exhibitions of energy technology (such as *Racoenergie* in Bratislava 1991, and *Pragotherm* in Prague in November 1992). However, financial support for boiler conversion (from coal to gas) was not forthcoming. Marta Ptackova at CPP looked dubiously upon the government's projections for increased gas consumption over the next five years given the absence of such incentives. "We can't convince customers to convert their boilers at their own expense because it isn't economical," said Ptackova. Even tax deductions for conversion programmes remained unavailable. CPP began subsidizing some boiler conversion, but hadn't determined that such programmes were profitable. "Until the cost of coal rises, gas will remain unattractive," Ptackova concluded.

It is not a matter of supporting gas, but of eliminating coal," said Zeman. "Now gas is more expensive as coal mining is still subsidized. He suggested that city councils might also play a role in the future in pushing out coal for home heating, either through emission control regulation, or direct regulation, as worked in London in the 1950s. The extensive use of coal in all sectors of the economy (Table 3A.4) was a crucial impediment to improving energy efficiency, but the societal disruptions attendant in decreasing coal use quickly were too severe to be contemplated during the fragile early transition period.

TABLE 3A.4
TOTAL FINAL ENERGY CONSUMPTION IN CSFR BY SECTOR AND FUEL TYPE

From IEA 1992, p.14

The utility's role in demand management

In many Western countries, electric utilities came to assume a prime role in encouraging energy efficiency among both industrial and residential customers. The idea was to disrupt the cycle in which utilities stand to profit from greater energy consumption. Least-cost planning was evolved in the 1980s as a mechanism blind, in many respects, to whether a

measure taken by a utility (or gas company) made a demand side or supply side contribution (Marc Ledbetter, of ACEEE (U.S.))

In the Czech Republic, these concepts attracted interest from government and CEZ managers, largely through the encouragement of the SEVEEn consultancy. In Slovakia, demand-side management remained a much lower priority than increasing generating capacity. Many thought that the transition project of erecting legislative and administrative structures from scratch would allow Czechoslovakia to 'leapfrog' into demand side management.

The energy consultants involved in advising the government and utilities considered that the first step in encouraging energy efficiency was to change the perception of the utility's role. One of the examples most influential in CEZ's planning was an American utility, Central Maine Power. "The Maine Energy Policy Act, which mandates integrated, least-cost planning, also instructs planners, when considerations like cost and reliability are otherwise equal, to treat conservation as the resource of choice" (CMP Annual Report 1991). But a particular legislative framework must be in place for the utility to assume a role in conservation. A 1991 Maine Public Utilities Commission ruling introduced a system of incentive payments based on anticipated savings through demand side management and allowed the utility to recover lost revenues through an Electric Rate Adjustment Mechanism (McCulloch, CMP 1992).

The Czech government intended to incorporate demand side management tools such as least-cost planning and perhaps a form of rate adjustment mechanism into its energy policy. These methods were to be adopted by the utility and supported by guarantees on investments in energy savings as well as price reforms that encouraged efficiency in a system overseen by an independent regulatory body that would be formed after January 1993¹¹ (Power Plays 1992, p.109).

¹¹ However, even before 1993, CEZ had adopted demand-side managements for environmental reasons in such projects as a labelling project launched with SEVEEn cooperation in 1992, which

A new era for demand management?

The structural measures described above, which could be implemented within the context of redefining the utility's relationship with electricity consumers, provided a degree of optimism for promoting energy efficiency. As Czechoslovak policymakers were looking for Western examples of how to structure these relationships, demand side management and least cost planning appeared no more difficult to implement than other less beneficial models, despite the fact that in the West they were brought in under pressure from consumers and emerged as sophisticated solutions in a long term conservation effort. However, it remained to be seen whether such solutions could be implemented from the utility downward.

The political will to uphold energy efficiency programmes remained weak, and environmental concerns, which in the West became crucial to supporting programmes as the price of oil fell, waned in Czechoslovakia after an initial bout of enthusiasm in 1990. The Federal Energy Agency did not succeed in according energy efficiency an important and permanent position in national debate, a failure that can be attributed in part to the confusion surrounding all Federal programmes as the country prepared to separate, but also to the lack of reinforcement it received from the Federal government's Energy Policy Principles, which focussed primarily on cleaner energy generation with very little mention of energy savings (Marousek 1992, pp.5-8). Western assistance programmes encouraged this focus on supply side measures, through the scale of project aid provided and the type of studies carried out.¹²

concentrated on refrigerators, heaters etc. whose results were published in the mass media, financial support for technologies such as lights and heat pumps, and an energy audit service (with possible Power Smart (Canada) cooperation) and information and consulting centre (Erik Schmidt, CEZ representative)

¹² Though an early USAID Energy Emergency Program for Czechoslovakia offered support for conservation, this programme was not followed up after 1990 and subsequent USAID activities targeted energy production. The World Bank Energy I and II loans focussed on installing scrubbers and reconstructing coal-fired power plants, and only in 1992 did the PHARE programme stray from studies of the power generation sector to allocate one third of its aid budget to energy efficiency studies (Marousek 1992, pp.5,8)

Investment was a precondition to energy efficiency gains without which prices, utility support for conservation and government demonstration programmes could not be responded to. The 1981 State Target Programme recognized the need to upgrade productive processes but failed to allocate investment to this end. After 1989, enterprises themselves became responsible for directing investment towards improving efficiency, but even relatively inexpensive and highly beneficial measures such as converting boilers from coal to gas remained out of reach for many consumers.

CHAPTER 3B

THE DIVERSIFICATION MANDATE AFTER 1989

The evolution of oil trade with the Soviet Union: from barter and bilateralism to dependence on Western intermediaries.

As seen in Chapter One, all of Czechoslovakia's oil supplies came from the Soviet Union in amounts that had been steadily declining throughout the 1980s. This trend accelerated dramatically after 1989 to cause major disruptions. From a high of 19 million tons in the mid eighties, Soviet deliveries of crude fell to 17 million tons in 1989, to less than 13 in 1990 then 10 in 1991 (EIU 1990/91, Financial Times 92/05/15)

Unhonoured contracts

The increasing unreliability of deliveries as the Soviets began negotiating supply commitments to Eastern Europe on a quarterly rather than annual basis and unilaterally cut deliveries to Czechoslovakia in July 1990 compounded problems further; by the third quarter of 1990, only two thirds of contracted amounts were arriving into the country. Petrol rationing was instituted in October 1990 and a lack of heating oil was anticipated for winter (CTK, October 1990 (various); Petroleum Economist 90/06). There also appeared to be serious risks that restructuring industry, especially petrochemical and other energy intensive enterprises, would be held up by the unstable supply situation.

Evolving new trade mechanisms

As the immediate possibilities of obtaining oil from other sources were limited, assuring Soviet supplies remained Czechoslovakia's short-term priority. Prior to November 1989, all oil contracts had been negotiated as government to government deals, often in barter agreements, and both government involvement and barter mechanisms in oil trade persisted in the first two years of transition. In 1990, more than eight million tons of the oil Czechoslovakia received (from both Moscow and independent producers) were exchanged for goods, most of which consisted of heavy and passenger vehicles (including 10,000

Skoda Favorit cars) and industrial equipment in deals negotiated between Czechoslovak Premier Calfa and Soviet Premier Ryzhkov (Table 3B.1).

But the erosion of centralized control in the Soviet Union and that country's own reform difficulties rendered responsibility for contracts vague. Unable to fulfill its agreement with Czechoslovakia the Soviets, in the fall of 1990, officially sanctioned more direct dealings between Czechoslovakia and Soviet Republics and firms (EIU 91/1). The Czechoslovak government obtained a further 0.5 million tons directly from the Siberian producer Tyumenneftegaz to make up for shortfalls in contracted amounts (BBC, October 13, 1990, *Petroleum Economist* 90/12).

As of January 1st 1991, oil deals between Czechoslovakia and the Soviets were conducted in hard currency, though this requirement was tempered by the Soviets allowing Czechoslovakia to apply its trade surplus to oil credits and did not totally eliminate barter trade for oil. Agreements for 1991 deliveries were negotiated with both the central government in Moscow and with individual Republics, focussing predominantly on Russia as the most important oil producer (*Petroleum Economist* 92/02, *PlanEcon*, December 1991). Oil equipment, health care for Megion oil workers at Karlovy Vary, and foodstuffs, footwear, clothing and industrial goods were exchanged for oil in 1991 in deals with both the Russian government and directly with the Megionnyeftegaz extraction company (*Ecoservice* 91/04/25). The Vienna Institute for Comparative Economic Studies estimated that 2.5 of the ten million tons Czechoslovakia imported from the Russian Republic in 1991 were through barter deals (Dietz 1992, p. 13).

The cost of imports from the Soviet Union effectively tripled between 1990 and 1991, partly because of the move to world market prices in trade with the Soviet Union, but also because of the sharp devaluation of the crown.¹ Barter exchange in 1991 helped

¹ Both *PlanEcon* and *UNECE* analysts thought too sharp. *PlanEcon* advocated a revaluation on the grounds that data on terms of trade was less than perfectly reliable, that the currencies of Poland and Hungary remained much stronger by comparison, and that the terms of trade with the West were elastic to moderate revaluation (*PlanEcon* Oct 24/91).

Table 3B1
Czechoslovak oil contracts 1990-92

1990	USSR trade protocol negotiated supply commitments to Eastern Europe on a quarterly rather than annual basis for the first time. 16.6 mmt contracted (522,200 b/d) (EIE 90/4)
July 1990	Soviets unilaterally cut deliveries in July. 12.8 mmt delivered (210,435 b/d by 3rd quarter) (PE 90/12/90/06)
Oct 1990	Soviet premier Ryzhkov 7.5 mmt tons of oil in exchange for goods (including 10,000 Laverin cars) allow negotiations with regions and republics (EIE 91/1)
Jan 1991	Dissolution of CMEA. Switch to payment in hard currency
1991	Soviet Union negotiated 13 mmt of oil hard currency/barter deal (PE 90/12)
1991	Tyumen region, Russia 0.5 mmt of oil in exchange for trucks, buses, loaders and consumer goods (BBC Summary of World Broadcasts, Oct 13, 1990, PE 90/12)
1991	Megionneftegaz provides additional 15,000 tons in exchange for 900 oil workers from Megion in the Tyumen region receiving health care in Karlovy Vary sanatorium (Ecoservice 91/04/25)
May 1991	Russian Federation agrees to deliver 100,000 tons to Slovnaft in 1991 in exchange for Slovak deliveries of foodstuffs and industrial goods. Deliveries to begin end of September 91 (Ecoservice 91/09/24, PlanEcon Dec 1991)
July 1991	Deliveries from Iran begin. 2 million tons contracted for 1991 (Ecoservice 91/06/21)
Aug 91	Czechoslovakia has been importing 60% of its oil from the east and 40%, 14,000 tons arriving daily through the Adria (Ecoservice 91/08/21)
1991	Soviet Union guarantees delivery of 7.5 mmt instead of the negotiated 13 mmt (O&G 91/08/19)
1991	Russia, the Ukraine, and Uzbekistan signed new accords allowing Czechoslovakia to obtain additional supplies from individual Republics (O&G 91/08/19)
8 mths 1991	The Soviet Union delivered 5.3 mmt instead of the 7.5 million planned (Herald Tribune 91/11/05)
Sept 1991	Serb forces take over Adria pumping stations
1992	Russian trade protocol called for imports of 150,000 b/d. Further volumes may be obtained through direct deals with producers (PE 92/02)
1992	Slovnaft (20%) will participate in a joint venture with C. Itoh of Japan (25%), a Swiss bank (5%) and Megionneftegas of Russia (50%) to produce and transport oil from the Tyumen region. Production from the venture should cover 50% of Slovnaft's needs (IEA 1992, p 42)

alleviate the need for hard currency that remained in short supply in Czechoslovakia and guaranteed a market for manufacturers who could not easily turn their trade elsewhere

Bilateralism and barter also figured in negotiations with alternative potential suppliers of oil in the Middle East (Iran, Iraq and Qatar) and Africa (Nigeria) that were energetically pursued throughout 1990-91 by high level Czechoslovak delegations.² Though the IMF expressed its disapproval for bilateral and barter trade, stating that "only global and multilateral commercial integration can bring the necessary profits and productivity" (Hospodarske Noviny 06/09/90), it imposed no specific limitations on these exchanges as a condition for the \$1.8 billion loan accorded on January 8, 1991, that was partly intended to help Czechoslovakia pay for Soviet oil. In fact, the West also became involved in a number of barter deals, with the first, signed between France and the Soviets in 1991, involving a \$405 million food-for-oil exchange between Sucres et Denrees/Integra and Soviet energy exporters, with the French government guaranteeing 90% of the contract.³

For 1992, trade protocols signed with the new Russian government assured Czechoslovakia supplies totalling 7.7 million tons of oil. Further volumes would be obtained through direct deals with producers (Petroleum Economist 92/02). Czechoslovak import agencies were confident they could obtain all of Czechoslovakia's oil needs from Russia in 1992 and the first important Czechoslovak Russian joint venture in the oil industry was signed between the Slovnaft refinery and Megionneftegaz in November 1991

² Havel told the Iranian delegation that Czechoslovakia would like to pay for crude oil and gas with supplies of complete plant equipment. Calfa visited Nigeria in April 1991 to discuss economic cooperation, including the possibility of Nigerian oil supplies to Czechoslovakia and possible Czechoslovak participation in oil, gas, coal and ore extraction and processing in Nigeria. Nigeria would supply Czechoslovakia with 120,000 tons of oil in the latter half of 1991. Talks with Iran resulted in the promise of 10 million tons a year, to be transported through the Adria pipeline. Possible imports from Qatar were explored, with discussion of a deal whereby Czechoslovak enterprises would participate in the construction of oil and gas pipelines and supply Czechoslovak technology in exchange for oil (CIK, Oct 18, 1990; Ecoservice 91/06/11, 91/06/14, 91/06/21).

³ "Commodity analysts expect barter trade will become increasingly common with the Soviet Republics given their shortage of cash and need for food and raw materials" (Financial Times 91/11/20).

Slovnaft assumed a 20% stake along with C. Itoh of Japan (25%), a Swiss bank (5%) and Megionneftegaz of Russia (50%) in a venture to produce and transport oil from the Tuymen region that would cover half of Slovnaft's crude requirements (IEA 1992, p.42).

The costs of CMEA dissolution

The Petroleum Economist considered that East Europe's ability to weather the breakdown of CMEA trading systems would depend on such factors as 1) their ability to secure financing from western banks for oil imports; 2) their access to multilateral and government aid; 3) their foreign debt burden; and 4) the competitiveness of their exports on western and Soviet markets (Petroleum Economist 91/03). According to these criteria, Czechoslovakia wasn't so badly off. Its foreign debt burden was insignificant: it was able along with Hungary, to obtain letters of credit from western banks for oil purchases; \$US 690 million of the \$US 1.8 billion standby credit the IMF accorded to Czechoslovakia in January 1991 took the form of a cover note to pay the increased prices of oil imports (Ecoservice 91/04/02; UNECE 1991, p.33). On the export competitiveness criteria, Czechoslovakia undoubtedly faced problems that would last into the indefinite future. The difficulties Czechoslovak firms faced even in participating in the EC's triangular aid scheme (see Chapter Two) demonstrated that the Soviets had little interest in passing up German goods for Czechoslovak ones.

"Weathering" the breakdown would, however, have its own consequences. The letters of credit obtained from the IMF were used to purchase oil (at significantly inflated prices) through western traders and on the spot market. Major oil companies such as British Petroleum (BP), Shell and Phibro and oil traders such as Sitco became actively engaged in selling oil to Czechoslovakia and Hungary, with western banks acting as intermediaries. In the turmoil of Russian reform and supply insecurities, these companies were the least likely to be affected by shortfalls. The Financial Times further reported, in 1991, that these major oil companies would remain fairly exempt from Yeltsin's decree

limiting oil exports (Financial Times 91/11/19; Petroleum Economist 92/01). The combination of these companies' growing experience in trading on former COMECON territory and the dearth of independent import companies to emerge from Czechoslovakia between 1990 and 1993 as government retained tight control over oil imports hinted that the commercialization of oil trade with the Soviet Union would also mean its Westernization. Many of these companies were also investing in retail gasoline outlets in Czechoslovakia and had an expressed interest in investing in the Slovnaft, Kralupy and Litvinov refineries once this became possible.

A considerable price in terms of lost opportunities to diversify was also attendant in the terms of the IMF loan. The IMF's willingness to expand the loan to cover increased oil costs hinged not only on a desire to protect the policy package agreed with Czechoslovakia from higher oil prices, but also to ensure its cooperation with the United Nations embargo against Iraq after the invasion of Kuwait. Membership in established Western institutions cost Czechoslovakia dearly on this count, as an agreement between Czechoslovakia and Iraq on provisions of oil to repay that country's \$300 million debt to Czechoslovakia was being negotiated when Kuwait was invaded (EIU 90/4, 91/1; Petroleum Economist 91/03).

The costs of war in Yugoslavia

Iraqi oil was not the only casualty in the first few years of transition. Other supplies, negotiated through 1990 by Czechoslovak delegations in the Middle East and Africa, were secured for delivery through the only other pipeline that could be called into action immediately, the ill-fated Adria. After 1989, putting the Adria pipeline into service assumed high priority, with Hungarian and Czechoslovak officials quickly settling their accounts in order to get the line into operation.⁴ An accord, signed July 31, 1991 replaced the 1974 agreement between Hungary and Czechoslovakia with one based on commercial terms.

⁴ Czechoslovakia agreed to write off the 21.5 million convertible rubles Hungary owed for the construction of the pipeline in exchange for Hungary waiving the balance of payments deficit incurred by

Deliveries of 100,000 tons per month from the Middle East started along the Adria pipeline through Yugoslavia in January 1991 according to an agreement concluded between Czechoslovakia and Hungary for the delivery of 2.5 million tons in 1991 (EIU 91-92; Dietz 1992, p. 13). Czechoslovakia's long-range aim was to sign a three-year agreement for the transport of about 4.5 million tons of oil a year (Ecoservice 91/06/26), representing the Adria pipeline's maximum capacity in its present state (Ecoservice 91/08/02). Discussion began within the framework of the Central European Initiative (see Appendix A) around means of expanding the pipeline's capacity. The chance to diversify away from exclusive dependence on the Soviet Union made the use of the Adria attractive despite the fact that transit charges were about \$30/ton higher than through the Druzhba pipeline (EIU 91/2; Dietz 1992, p. 12). On September 16, 1991, however, Serb forces took over five pumping stations along the pipeline and its operation was interrupted, leaving Czechoslovakia unable to recover the 30,000 tons of Nigerian and Iranian oil that were in the pipeline at the time (PlanEcon December 91; Ecoservice 91/09/18).

Two countries seeking secure supplies

The Yugoslav conflict re-emphasized the need for new infrastructure that would link Czechoslovakia into the Western European pipeline system. With payment in hard currency at world prices adopted for trade with the Soviet Union and barter trade waning after 1991, the infrastructure in place was the only reason not to look for supplies elsewhere. Though the separation of the country would only become a real concern after June 1992, the exploration of links into the Western European Trans-Alpine (TAL) and Central European (CEL) networks was accomplished from the outset by Republic governments (Figure 1).

The Czech government initiated plans for a 315 km oil pipeline with a 10-15 million ton capacity from Ingolstadt in Germany to Kralupy nad Vlatou in Central Bohemia very

Czechoslovakia It was also agreed that, despite past Czechoslovak investment, the portion of the pipeline running through Hungary would remain Hungarian property (Ecoservice 91/07/31, 91/08/02).

map scale in kilometers - releases published include Berlin, Bratislava, Budapest, Prague, Vienna, Zagreb, Belgrade, Trieste, and Belgrade spur

East - West Energy Connections

soon after reforms began. The Ingolstadt link was seen as crucial to attracting foreign investment into the Czech refineries, as any further breakdown of Druzhba supplies would have forced the Litvinov and Kralupy refineries to suspend operations (Ecoservice 91/05/21). The Ingolstadt-Kralupy pipeline would have the potential to displace nearly 80% of Soviet imports to Czechoslovakia with African and Middle Eastern crude arriving at Trieste and travelling through the TAL pipeline. By September 1991, the Czech government had prepared preliminary studies, was conducting talks with German authorities on ownership questions and seeking contractors (Oil and Gas Journal 91/08/19; Ecoservice 91/05/20, 91/08/05). Only 70% of the refining capacity of the Czech Republic was being used after 1989, and greater utilization depended on the Ingolstadt-Kralupy link; foreign investment in the refineries was further made conditional on diversified supplies (Ecoservice 91/05/21).⁵

Slovakia, early in 1990, initiated plans for a 37 mile pipeline from the Slovnaft refineries near Bratislava to the Austrian Schwechat refineries which linked into the TAL system via the Adria-Vienna spur. The link would be able to deliver four million tons of oil a year to the Slovnaft refinery (Ecoservice 91/05/06).

The Czech government undertook the financing of the Ingolstadt link, initially estimated at DM 350 million (Ecoservice 91/05/21). But as estimates rose over 1991 to DM 540 million, additional funds were sought from the World Bank and the EBRD, as well as from foreign investors interested in the Czech refineries (Prague Post 92/04/21; Oil and Gas Journal 91/08/19; Ecoservice 91/09/03).⁶ The German company Transalpine Olleitung

⁵ Other proposals that received assessment included a 60 mile pipeline from Litvinov to Zeitz in East Germany, which would join an existing pipeline leading to the Leuna to the Schwedt refineries and be able to provide Czechoslovakia with Norwegian oil. It would then link into the northern leg of the Druzhba through Poland to the Baltic port of Gdansk, where Kuwait's Sanbar Development Corporation had extensive development plans. However Czechoslovakia, perhaps hesitant about the security of routing oil through Poland, preferred the German option (Oil & Gas Journal 91/11/04).

⁶ Agip Petrol (Italy), British Petroleum (UK), and Petrol Hunt Oil (US) expressed interest in capital participation on the pipeline construction. Agip also submitted a bid, in cooperation with Total and Conoco (US) to participate in the Kralupy and Litvinov refineries. Petrol Hunt Oil (US) planned to invest \$150-200

solidified a deal with the Litvinov refinery in April 1992 that included investment in the link and, in July 1992, the EBRD agreed to provide additional financing to the venture (Prague Post 92/04/21; BEE 92/01/20).⁷

Financing for the Slovak extension became part of a much larger venture under negotiation between Slovnaft and the Austrian OMV refineries. Progress was slowed, however, by disputes over the degree of control OMV would have over supplies provided through the new pipeline. OMV, which owned both the Schwechat refinery and 55% of the Adria-Vienna spur, was interested in obtaining a 25-35% share of the Slovnaft refinery to increase production at both refineries and possibly build a plant to produce lead free petrol in cooperation with Slovnaft. OMV offered Slovnaft the opportunity to buy stock and a seat on the OMV board of directors but was not willing to grant the Slovak refinery a stake in the Adria-Vienna spur as it wanted to maintain control over how the oil supplied by the new pipeline would be processed (Oil and Gas Journal 91/08/19; Ecoservice 91/05/15).⁸

The Western companies that bid on the Czech pipeline (as well as OMV in Slovakia) were not only prospective investors in the Czechoslovak refineries but had, by 1992, already entered the Czechoslovak oil sector by leasing or constructing petrol stations, and had extensive plans for vertically integrated participation in the country.⁹

million in the Czech oil processing industry (Prague Post 92/04/21-27, 92/07/28; BEE, 92/01/20 p. 34, 92/02/24, p. 95)

⁷ Dlouhy negotiated the loan on a visit to London (Prague Post 92/07/28). Loula from Benzina Praha stated in an interview, however, that by December 1992, the Ingolstadt-Kralupy pipeline was still at the financing stage and construction had not yet begun.

⁸ In early 1995, negotiations were broken off and OMV abandoned plans to purchase a stake in Slovnaft (EIU 95/1).

⁹ By November 1992, OMV had leased 35 stations, Kuwait Petroleum, Agip (Italy) and Total had leased 25 stations each, Conoco had 13, MG (Swiss) 17, Aral (Germany) 10, and other companies such as Shell, BP and Esso held smaller numbers. OMV had begun constructing stations, planning to open 40 throughout the country; Total foresaw eventually constructing 2,000 and DEA 1,500. Agip and Aral planned to build 60 and 80 respectively. Benzina also planned to expand its gas station network from 750 stations to 1,800 but was hindered by a shortage of funds (Interview with Loula at Benzina Praha, Prague Post 92/06/23, 92/07/21, 92/07/28, 92/08/04, 15/09/92, Ecoservice 91/09/24, Oil and Gas Journal 91/11/04).

Slovak nationalism: another push for the Czechs

The rise of Slovak nationalism that led to Meciar's election in June 1992 and preparations to dissolve the Federation added further insecurity to the Czech Republic's oil situation and encouraged speedy measures to link into Germany's system. The Druzhba pipeline ran across Slovak territory from Russia to the Slovnaft refinery, after which a smaller pipeline carried crude to the two refineries in the Czech lands. Directly after the June election, the *Financial Times* reported Slovak statements that "An independent Slovakia will seek higher transit fees from the Czech lands" (*Financial Times*, 92/06/22). Czech officials expressed the fear that their position at the tail end of both the Druzhba 1 and the Adria pipeline systems could allow the Slovaks (as well as other Eastern neighbours) to exact hefty transit fees from them or even disrupt transmission (*Power Plays* 1992, p. 104).

These worries were grounded in disputes that had begun early on in the transition over the ownership of oil transport infrastructure. Transpetrol was created as a state-owned joint stock company on June 14, 1991, responsible for the transport of Soviet oil through Czechoslovakia. The Ministries of Industry of the Czech and Slovak Republics became the largest shareholders and its administrative board was to have six Slovak, three Czech and two Federal representatives, reflecting that 73% of the pipeline was located in Slovakia. In March 1992, however, the Federal government took over the pipeline, charging that the creation of Transpetrol was unconstitutional because it resulted in jurisdictional powers passing to the two republics without the constitutionally required approval of the Federal Assembly.¹⁰ The decision to revert jurisdiction over the pipeline back into the hands of the

¹⁰ A decision on power sharing over oil and gas pipelines and power lines was to be made the subject of a special law. The Federal government proposed that Transpetrol be stripped of its property holdings. A state controlled organization would then be created, which would be privatized. The Federal government would have the power to appoint the new organization's director and to claim all revenues from the operation and administration of the pipeline. Federal Finance Minister Dlouhy asserted that it should be done because "keeping decisionmaking on such a profitable enterprise with the Republic governments would lead to conflicts between the two, mainly on revenue sharing" (*Ecoservice* 91/06/17, *Prague Post* 92/03/31, FBIS 05/03/92).

Federal government met with strong opposition from Slovak government and only with separation was the dispute resolved.

The potential for overcapacity

From an insecure position in assuring oil supplies during the last years of the CMEA, Czechoslovakia's supplies grew even more tenuous as political affiliations strayed from the infrastructure designed to join the countries of the Soviet bloc. War in the former Yugoslavia precluded one set of options, and Slovak separatism presaged the potential for further difficulties on the Eastern front. Though oil needs fell quite dramatically between 1989 and 1992, the threat of interrupted deliveries maintained the drive to diversify as an urgent priority. There was a marked risk that new pipeline spurs would be built to alleviate real and perceived dependencies rather than to meet actual needs in an economically sound manner. In 1991, the Oil and Gas Journal judged it difficult to predict which new pipeline project "would contribute to improving the crude supply economics of the region as opposed merely to developing out of political rivalries" (Oil and Gas Journal 91/08/19)

Of all the East European Countries, Czechoslovakia faced the highest potential for overcapacity through anticipated links as it sat at the crossroads of the existing CMEA network. The Oil and Gas Journal calculated that even with just the Schwechat Slovnaft and Ingolstadt-Kralupy links, as well as the Adria upgrade, Czechoslovakia's capacity utilization would be only 45%. Both the availability of imports from Russia and the stability of relations among transit countries (including Czech/Slovak relations) would affect how much Czechoslovakia was willing to pay to achieve supply diversification given the sunk costs and the relative underutilization of the existing Soviet oil transport system. Continued strife in the Russian oil industry and the Ukraine's move in June 1992 to cut the flow of Russian oil through pipelines on its territory by 25% (in an attempt to force payment of \$5.5 million in transit dues from Hungary and Czechoslovakia) highlighted the

impossibility of the new Czechoslovakia relying solely on supplies from the Soviet Republics (Herald Tribune, 92/06/22; Ecoservice 91/09/25).

Gas: CMEA infrastructure now an asset

Czechoslovakia's important role in ongoing Soviet gas projects and as a transit country for Soviet gas destined for Western Europe ensured steady supplies despite the breakup of the CMEA and instability in the Soviet Union. This was in sharp contrast to other East European countries, such as Poland, which was abruptly cut off from supplies on January 23, 1992 despite a 1991 agreement with Russia. Though Moscow maintained that the cut was the result of bureaucratic errors and deliveries resumed in the first days of February, the event displayed the general disregard with which agreements with former CMEA partners were treated (New York Times 92/01/30).

Pre 1990 Czechoslovak-Soviet agreements, which had seen a good proportion of gas supplies exchanged for participation in Soviet natural gas projects and transit services, were translated into commercial terms and set in dollar values when the CMEA was dissolved. As these terms came into effect in January 1991, gas prices agreed in old contracts rose considerably, but the value of goods and transport services provided by Czechoslovakia were raised accordingly and also paid in hard currency (Ecoservice 91/03/25; Oil and Gas Journal 91/03/11; EIU 91/2).

As well as securing supplies, Czechoslovakia's important transit role helped attract Western investment and assistance monies for upgrading existing lines and constructing new links into the West European network. The main focus of attention was the Transgas pipeline, which crossed from the gas fields in the Soviet Union, through Slovakia, the Czech Republic and into Western Europe, and handled all Soviet gas exports to Germany, France, Austria, Italy and Yugoslavia. Fifty percent of the gas it transported went to West European countries (Ecoservice 91/09/10, 07/26). The network, with a capacity of 70

billion cubic metres per year, involved 4,239 km of pipeline and 10 compressor stations. It was being used at 90% capacity.

Polishing the family jewels

Plans for renovating and expanding the Transgas pipeline to incorporate further compressor stations and increase transport capacity were drawn up in 1990-91. That year, Transgas purchased 13 compressor units, valued at \$50 million, from Italian and American companies, that would increase the pipeline's capacity by 25% and improve its efficiency. The purchase of as many as 35 such units was expected before 2005 (Power Plays 1992, p.295). These units comprised General Electric generators which had previously been subject to COCOM restrictions. The influx of gasline technology needed to fill Transgas repair and expansion needs presented opportunities for Czech engineering enterprises. General Electric was cooperating with the Czech aviation engine company Motorlet to build components of the generators, and was working with Czech turbine manufacturer První brněnská strojírna of Brno on a turbine compressor unit incorporating the General Electric generator (Prague Post 92/08/04).

Financing for the Transgas pipeline was being covered in part by the tremendous profits the gas company took in,¹¹ partly by direct government support¹² and partly through the World Bank Energy II loan disbursed in 1991.¹³ Many Western European gas companies (foremost Germany's Ruhrgas) expressed an interest in investing in a privatized Transgas and linking it into the West European network through which Czechoslovakia

¹¹ Profits from the transit service amounted to 12,000 million crowns in 1990 (approximately \$430 million US at 1990 pseudo-formal exchange rates)

¹² The government provided direct support for the realization of the 'unification' projects (in oil, gas and electricity networks) until December 1993 (Power Plays 1992, p. 104)

¹³ The Branstvi pipeline also received World Bank funding under ENERGY II to effect badly needed repairs and increase capacity significantly (Power Plays 1992, p. 295)

could eventually import gas from the North Sea and Algeria (EIU 91/2: Oil and Gas Journal 91/03/11)

An asset worth fighting over

The profitability of the Transgas pipeline¹⁴ and its essential role in obtaining supplies, facilitating diversifications and attracting investment made it the centre of jurisdictional disputes within the country. Though most of the Transgas pipeline was laid across Slovakia, under the Communist government the pipeline was under Czech management, by the Czech gas company CPP. The section of CPP responsible for managing the transit pipeline was transformed into an technically independent enterprise called Transgas (Tranzitni plynovod) in 1991. A proposal to transfer its management to Bratislava and eventually privatize the company with 48% of shares for the Czech and 52% for the Slovak republic was debated but the Federal government decided in 1991 that Transgas should remain united, "an independent gas company specialized in the international transport of Russian natural gas" (Ptackova 1992, interview at CPP; Ecoservice 91/07/19).¹⁵

Negotiations about the company's structure and ownership continued as the future of the country grew less certain. As of November 1992, just one month before the country separated, Transgas remained 100% owned by CPP, a (Czech)-state-owned company. Imminent separation added worries that the Slovaks would not only retrieve the lion's share of gas transit fees, but also exact their own share from the Czech Republic.

Ptackova emphasized the irrelevance of ownership questions under central planning with universal state ownership. "The fact that the Transgas pipeline was officially managed by CPP remained irrelevant so long as the republics formed one nation in which

¹⁴ At least until 1990 Transgas earned 15% of the CSFR's total hard currency (IEA 1991).

¹⁵ Possibly acting on the advice of Rothchild and Sons who had accomplished a study in 1991 called "Restructuring Transgas" for the Federal government. One of their conclusions was that Transgas would be even more profitable if it restricted activities strictly to transport, without involvement in purchasing gas (IEA 1991).

all was state-owned. Now things are much more complicated. Transgas revenue proved highly beneficial to CPP in the 1990-93 period. Hard currency payments for transit services were the major reason behind the 488% increase in CPP's net profits between 1990 to 1991 (reaching 44,557 million kcs), despite a concurrent switch to hard currency payments for gas, and allowed CPP to add 84,000 users to its domestic network in 1991 (CPP Annual Report, 1991).

But the Transgas dispute delayed the implementation of privatization projects put forth by CPP and SPP, held up possibilities for foreign investment, and kept the government tightly involved in the gas business which impeded the emergence of independent import companies and prevented CPP and SPP from expanding into the trade arena. "CPP should be a company, buying and selling gas to customers, but the government is still the main negotiator for gas supplies," said Ptackova.

DIVERSIFICATION DESPITE REDUCED DEMAND

Internal disputes notwithstanding, the confidence in Soviet gas supplies resulting from the successful translation of CMEA relations into market terms encouraged official Czechoslovak projections for expanding the use of gas as "a clean and accessible fuel" in district and residential heating and, in Slovakia, of introducing new gas burning thermal power plants (US Senate 1991; Petroleum Economist 92/02). However, these projections were not supported by the concrete action on the consumer side required to attain them. The decrease noted in gas consumption after 1989 (Table 3B-2) resulted from lower industrial demand rather than precarious Soviet supplies. Ptackova believed that in the Czech Republic the gas industry suffered from a lack of lobbying power, while nuclear and coal industries had very strong lobbies.

Nevertheless, the integration of Czechoslovakia's gas pipelines into those of Western Europe was made a priority under the Official Energy Policy of 1991.

Table 3B.2
Natural Gas consumption in the Czech Republic CPP system

Natural gas sales (mm³)					
	1987	1988	1989	1990	1991
industrial	4245	4572	5167	5404	5065
commere	270	284	312	331	380
resid	965	972	1066	1145	1332
total	5480	5828	6545	6880	6777
thous uses	1220.5	1315.5	1416.6	1490.4	1574.5

International Transport

Mil m ³	53044	55950	61462	67953	67861
from this					
for CSFR	5891	7027	8450	8661	9371

From CPP Annual Report 1991

Interconnections began modestly that year with a 3.5 km pipeline connecting the Western Bohemian district line to that of that of the German company Ruhrgas, and the construction of a link from Northern Bohemia into the Midal-Stegal system under construction in East Germany, with a further link planned to connect Southern Bohemia into Austria's OMV gas line (Power Plays 1992, p.294). Larger projects under consideration included a new north south gas pipeline that would carry Norwegian gas across the former GDR, Poland, intersect the Transit pipeline in Moravia and continue down through to Austria, Hungary and Yugoslavia; a project that "would make it possible to link together all the basic sources of natural gas in Europe" (FBIS, October 3, 1990). The expansion of Transit and Bratislava pipeline capacity was geared not so much to increasing domestic supplies, but to supplying these new interconnections ¹⁶

¹⁶ The European Community's attempt to create an Internal Energy Market warrants more than a footnote in the discussion of East-West gas interconnections, but unfortunately won't get it in this paper. The idea is almost as old as the EC itself, but has met with enough opposition every time talk gets serious to prevent its completion. When, in the early 1990s, EC Energy Minister Cardoso e Cunha achieved tentative support for 'unbundling integrated energy companies', concrete proposals for third party access (TPA) met with resistance from powerful monopolies. The TPA directive, published in January 1992, aimed to allow large energy users to buy from suppliers anywhere in the European Community as of January 1, 1993, with the principle extended to smaller users in 1996. TPA requires a certain amount of open access to gas networks,

In oil infrastructure development a similar trend became apparent and new links were pursued despite a drastic reduction in consumption. A combination of economic slowdown and a (temporary) government ban on oil exports shrank Czechoslovakia's crude oil import requirements after 1991. The Economist Intelligence Unit found that "the collapse in industrial output and in consumer demand confounded expectations of an energy crisis in early 1991." Petrol consumption dropped by 20 to 25% in the first quarter of 1991 against the same period in 1990 (Petroleum Economist 92/01, EIU 91/3). Domestically, concerns for revitalizing the petrochemical industry, attracting foreign investment and reducing supply insecurities provided the rationale for diversification policies, but Western support, through studies, joint ventures to build pipelines, and aid and loan monies made available through international financial institutions encouraged the construction of more links than would ever be needed.

Western interest in boosting Czechoslovak diversification attempts can be found in the pipeline networks of Western Europe itself. The Western European crude and product pipeline network was a rather poorly integrated system, with only limited interconnections between northern and southern routes. "Beyond providing supply diversification options away from the USSR for Central European countries, the many pipeline projects considered by these countries are likely to have an important secondary effect: the creation of an integrated network for the whole of Europe and increased competition for crude and product supplies throughout (Oil and Gas Journal 19/08/91). The mutually supporting mandates being pursued under the European Energy Charter, of creating a secure

though an end to monopoly gas line construction was as much as was achieved before 1993 (Financial Times, November 3 1992, Survey of the Oil and Gas Industry)

East-West interconnections were being pursued with the success of the Single Energy Market in mind. "An interconnected gas and electricity system between Member States is a *conditio sine qua non* for the proper functioning of the single energy market," said Director General for Energy, C. Maniopoulos at a conference in Budapest in October 1994. He welcomed the start of construction on a pipeline linking of Hungary's gas pipeline with (future member) Austria's, as it would "strengthen links between Russia, as main gas supplier and the European Union" (Energy in Europe, No 24, Dec 1994, Energy in Europe 1993 Annual Review p 10)

environment for Western investment into Russian oil and gas resources, and under the Single Energy Market, of achieving supply security and a liberated market on a Community wide scale, relied on gaining access to the infrastructure of the CMEA (a plentiful resource in Czechoslovakia) to transport Russian oil and gas. "In our relations with Central and Eastern Europe and CIS countries, interconnection of networks aims particularly at securing energy supplies," said European Commission Director General for Energy, C. Maniatopoulos (Energy in Europe, No.24, December 1994).

The picture to come

The vertical integration (from retail to refining and transport) desired by many of the companies seeking investments in Czechoslovakia would equip them to compete in the environment outlined by the Single Energy Market and European Energy Charter. OMV's negotiations with Slovnaft were part of a greater plan to cooperate with the Hungarian petrochemical concern OKGT, and with INA refineries in Croatia, a complex that would process about 10 million tons of crude a year and enable OMV to compete with the major European petrochemical centres (Ecoservice 91/05/15). Conoco (US), which was already operating 13 service stations throughout the Czech Republic by mid-1991 and had expressed an interest in the construction of new refineries (Ecoservice 91/05/28; BEE 92/01/20) stated its long term objective to have "an integrated refining and marketing operation throughout the area" (David Kem, Conoco vice president in the Oil and Gas Journal 92/02/17). As Slovnaft's dispute with OMV revealed, Czechoslovak companies would have a hard time forging deals that would give them access to the Western European network and allow them to compete in this new environment. Any degree of third-party access achieved in the European Communities (EC)'s Internal Energy Market would, of course, not extend to non-EC members.

Domestic retail companies Benzina and Benzinol lacked the capital to invest in refineries and construct new gas stations, and thus risked losing their foothold in the

market. Vertical integration in Czechoslovak companies was more likely to occur from the refineries down as the Kralupy and Litvinov refineries acquired 25 gas stations each when Benzina was privatized. In 1995, the FBRD awarded the Slovnaft refinery a \$30 million loan to help it build a chain of new gas stations that would supplement the 80 odd stations it acquired from Benzinol in 1992 (Loula 1992, interview at Benzina Praha; EIU 95/1). But the perceived need (especially in the Czech Republic) for extensive diversification away from the former CMEA encouraged refineries, in their privatization projects, to relinquish significant shares to foreign investors in exchange for the capital to build pipeline connections.¹⁷

In the period before oil pipeline interconnections were actually built, foreign participation benefitted the Czech and Slovak petrochemical industries as most foreign product distributors bought their supplies from Czechoslovak refineries.¹⁸ In the Czech Republic, oil refining increased 18% between 1994 and 1995 (EIU 95/1). The completion of interconnections between the crude and product pipelines of Czechoslovakia and Western Europe would give Western companies the option of bringing in their own supplies from refineries elsewhere in Europe, or of operating through Czech and Slovak refineries, where lower wages (and possibly environmental standards) could keep costs down, to supply the (liberated) Western European market.

The diversification mandate after 1989 was supported by Western investment and aid, not as a way of helping Czechoslovakia compensate for reduced Soviet deliveries of oil and gas, but as a way of connecting European supply routes and equipping companies to participate in a Pan-European competitive environment. Though Czechoslovak government invested in the interconnections, the primary benefits would fall to private and mostly

¹⁷ The abandonment of the Slovnaft-OMV venture after five years of negotiations was undoubtedly made easier for Slovnaft through the closer relations pursued between Slovakia and Russia after separation, which, along with the Slovnaft-Megionneftegaz joint venture, eased fears of disrupted oil supplies

¹⁸ Shell's representative stressed that Czechoslovak products mostly conformed to European quality standards (Ecoservice 91/04/19)

Western oil and gas companies. It became especially difficult in this context to consider the World Bank Energy loans as well as other support these interconnections received, as assistance to Czechoslovakia. Rather, they were serving the ambition stated in the European Energy Charter, of creating "an integrated network from the Atlantic to the Urals", with only uncertain benefit for Czech and Slovak companies and economic strength.

Electric connections move West

This third component was added to the diversification mandate after 1989, having not received serious consideration in the previous period when Czechoslovakia's immediate diversification goal was to compensate shortfalls in Soviet fuel supplies and only small electric interconnections with the West were technically feasible anyway. The drive behind creating links with the Western European electricity grid (UCPTE) after 1989 arose from the increasingly unstable situations in electrical output from Bulgarian and Romanian plants, as well as those in the former Soviet Union, that raised fears of important currency fluctuations. Diversifying electricity linkages presented more technical complications than with oil or gas, however, as fluctuations anywhere in the electric grid affected the entire system. Redirecting electric linkages therefore required a greater degree of cooperation between the more Westward oriented East European countries than was evident in any other area of energy procurement.

Hungary, Poland and Czechoslovakia began to work on the possibility of changing to the Western European UCPTE system, which entailed first smoothing out fluctuations in their current frequency (at an estimated cost to the three countries of \$500 million). In November 1992, the three agreed to separate themselves from the rest of the eastern grid, forming an island temporarily so that fluctuations could more easily be identified and resolved (Financial Times, 26/11/92). Western electric utilities provided technical assistance and some financing for the project, which involved detailed attention to each

power plant as well as to transmission lines. Czechoslovak plants, many of which were more than forty years old, did not meet UCPTE standards (Hanzel 1992, interview at SEP). Electricite de France, with Ffr 1.3 million provided by the French government, signed cooperation agreements with CEZ and SEP to develop plans to synchronize Czechoslovak power grids with those of Western Europe (BEE, 92/01/20).

Full connection with UCPTE was not expected before 1998. In the interim, special converter stations were built to allow for exchanges without risking fluctuations in the Western system. Austria had two such stations already in operation, linking it to Hungary and Czechoslovakia, and a line between Etzenricht in Germany and Hradec Kralove in North Bohemia, financed by CEZ and the German Bayernwerck utility, was in trial operation at the end of 1992.¹⁹

The possibility of importing electricity from the West was perceived as a way of overcoming insecurities about the Mir system, of providing Slovakia, which imported almost 20% of its electricity, some leverage in price negotiations for Ukrainian (and possibly Czech) electricity, and, for the electricity self sufficient Czech Republic, of assuring supplies when thermal and nuclear power plants were taken out of commission for repairs and safety inspections. The Etzenricht link, and a larger one under construction, permitted CEZ to conclude an accord with the German Bayernwerk utility covering emergency mutual supplies of electricity which CEZ intended to use when the smog in North Bohemia worsened over the winter months.

¹⁹ Over the long term, this conversion equipment could be moved eastward, allowing Eastern European countries to retain links with the CIS (Financial Times 26/11/92, Ecoservice 91/07/29, 91/04/03, Prague Post 92/03/31)

CHAPTER 3

C) DEVELOPING DOMESTIC ENERGY RESOURCES

The development of domestic energy resources after 1989 was accomplished within the new framework described in Chapter Two. Utilities were restructured into accountable profit driven enterprises responsible for assuring adequate electricity supplies at the least possible expense, and for implementing the changes needed to make power supply conform to new environmental and safety regulations. Their decision-making powers were curtailed, however, by the strong government presence on the utilities' board of directors. This presence was generally thought to be necessary as regulatory agencies were not yet strong enough to protect consumers, but had the further effect of drawing concerns for particular sectors of the economy and particular social groups into the utility's decisions.

Two other factors would influence the perceived cost of different energy sources. The first was the availability of assistance monies from Western donors for selected projects; the second was the cost in terms of foreign relations capital involved in pursuing particular sources of electric power, a cost calculated on the basis of the broader international affiliations desired. Each of these considerations would influence to what extent domestic energy production was developed after 1989 and which sources were preferred, decisions that, while made in a difficult period of transition, would have profound and long-lasting effects on the country(ies).

A Green backlash against Red projects

The urgency behind the development of domestic energy resources evident right through to 1989 seemed to abate in the initial phase of transition. Demand for electricity fell after 1989, providing some flexibility within which the utilities could have decided to close a number of the least efficient plants and abandon some of the expensive energy projects under construction. In the Czech Republic, a complex of four VVER 1000 reactors was under construction at Temelin to supplement the operational Dukovany nuclear power

plant. In Slovakia, work was underway on the Gabčíkovo hydro complex on the Danube and the Mochovce nuclear plant that would more than double existing nuclear capacity at Bohunice. The initial impulse of the Civic Forum-Public Against Violence government was, in fact, to distance itself from these energy producing monoliths of Communist design. The environmental and safety concerns that had been denied expression under Communism came to the fore of the popular revolution. Optimistic proclamations were broadcast from the President's office: Gabčíkovo and Temelín would be torn down, and the expansion of mining in Northern Bohemia would be stopped.

Immediate neighbours jumped at what appeared the perfect chance to terminate Czechoslovak projects that had long been objectionable to their own people. The Hungarians proposed abandoning the Gabčíkovo Nagymaros hydro dam altogether and creating an international conservation area in its place, a proposal that received enthusiastic support from the Havel government who said "this scheme would serve as a good example of cooperation among small European nations" (Reisch 1990, p.27) (Appendix C details the fate of the dam after 1989). Austrian protest against the construction of the Temelín nuclear power plant, referred to as CSSRnoby1, heightened after 1989,¹ hoping to develop the initial Czechoslovak mistrust of the Communist nuclear programme into a decision to join Austria in abandoning the nuclear option completely. Austria welcomed the initial moratorium on construction at the plant imposed by the new government, some of whom had been active in Charter 77's opposition to Temelín.² But the backlash against Communist energy construction soon moderated as the government settled into the enormous task of running the country and managing its transition to a democratic, market driven state.

¹ Protests against the plant had been staged in Austria as early as 1986 (E.U. 86/3, 87/3)

² A 1983 study of Temelín, published by Charter 77, found that there was insufficient water available to cool reactors, and held that the site was a seismological zone

Distinct Czech and Slovak challenges

After the June 1992 elections which presaged the breakup of Czechoslovakia,³ it became senseless to look at electricity generation on a national level. Chapter Two outlined some of the differences in political and economic priorities that were likely to emerge between the Republics but, in the development of domestic energy resources, these became only second in importance to the tremendous differences between Czech and Slovak natural resources (Table 3C.1). The two Republics faced very different challenges in assuring adequate and socially acceptable electricity supplies, with the Czechs under pressure to make its use of indigenous coal less damaging and the Slovaks, reliant on imported coal, oil, gas, nuclear fuel and electricity for almost 70% of their energy, guided by the need to reduce dependence on energy supplies from the Czech Republic as well as the Former Soviet Republics.

TABLE 3C.1
SOME DIFFERENCES BETWEEN CZECHS AND SLOVAKS

	Czech	Slovak
Black coal 1990 (thous tons)	22,406	—
Brown coal 1990 (thous tons)	78,588	3,450
oil refining (thous tons)	7,297	6,503
Elec output (1990,bil KWh)	620	24.1
of which		
Thermal plants	48.5 (78%)	9.5 (40%)
Nuclear plants	12.0 (20%)	12.0 (50%)
Hydro plants	1.5 (2%)	2.5 (10%)
Population (millions)	10,364	5,310
GNP 1990(Kcs million)	438,135	185,657
GDPgrowth 1993	+0.1%	- 5.7%
Unemployment 1993	3.5%	14.4%
Foreign investment 1993	\$450 mil	\$100 mil
Foreign investment 90-94*	\$2,698mil	\$135mil
Main investors	Germany	Austria (25%)

* to September 1994

From Prague Post 92/07/14, Statistika Rocenka 1991

³ And even before to a degree, as the commercialization of domestic energy suppliers in itself would change the formerly interdependent relations between Czech and Slovak utilities.

Coal-fired power plants: a Czech problem

In 1989, Czechoslovakia had 89 blocks of fossil fuel burning power stations with a total output of almost 11,000 megawatt hours, representing more than half of the country's total power production (Ecoservice 91/05/21). Filters to trap solid emissions had been installed in all power plants, but their efficiency decreased with use just as the quality of brown coal deteriorated through the 1970s and 1980s. Filters were gradually upgraded during general repairs of the older units, but never achieved the efficiency of Western European or American designs; the only flue gas desulphurization equipment manufactured in Czechoslovakia used a magnesite regenerative method of Soviet design.⁴

New Clean Air legislation adopted in 1990 aimed to enforce much stricter pollution controls in the thermal electricity generating sector.⁵ The limits it set were incorporated into the Czech utility's (CEZ) power plant reconstruction programme and were to be reached at individual power plants by using a higher quality of fuel, by pre-treating fuel, by incorporating new coal burning technologies or flue gas measures or, of course, by closing down older blocks (Table 3C.2). All power plants with a lifetime beyond the year 2000 were required to install desulphurization and denitrification units and filters (Power Plays 1992, pp.160-6). CEZ expected to decommission 880 MW of thermal capacity by 1996, focussing on blocks more than 30 years old at the Prunerov, Tusimice and Ledvice brown coal burning plants in North Bohemia. 4,700 MW of CEZ's thermal capacity would be retrofitted with desulphurization equipment of Western design from some of the leading manufacturers of this type of equipment, including Westinghouse (US), Bischoff and Frichtner (Germany), and Wagner-Biro and SGP-VA (Austria).

⁴ A long drawn out experiment with this technology at the Tusimice II power plant began in 1983 and was finally deemed a failure in 1990. German dry limestone addition technology was imported by CEZ and SGP for other power plants in the latter 1980s

⁵ According to environmental legislation, as of April 1 1993, Power plants will have to pay about 150,000 kcs fine for each ton of SO₂ and ash they produce (Drab 1992, interview at CEZ). Storage for ash and waste generated by desulphurization also had to be created (Power Plays 1992, p 111)

Table 3C.2

THERMAL POWER PLANTS AND THEIR PROSPECTS

Melnik I	C. Bohemia	1960	6x55 MW	brown coal	reduction of output
Melnik II	C. Bohemia	1970	4x110 MW	brown coal	switch to black coal
Melnik III	C. Bohemia	1980	1x500 MW	brown coal	switch to black coal

- desulphurization projects being prepared for all three units
- suspension of a heat line project in 1991 as CEZ is not interested in financing it
- Rigips (UK) will install desulphurization units
- cost about five billion Kcs with Japanese assistance covering part
(*Prague Post* 92/05/19, *Exoservice* 91/05/23)

Tisova I	N Bohemia	1958	2x50 2x55	brown coal (Sokolov)	block 1 shut down 1990 block 2 shut down 1992
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- Bayernwerke AG (German) plans to build a 300 or 600 MW

brown coal burning plant equipped with modern technology in a 50% joint venture with CEZ

Tisova II	N Bohemia	1961	3x100	brown coal	one block shut down 1991 flue gas desulphurization in other blocks
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(*Exoservice* 91/08/13, 91/06/24)

Prunerov I	N Bohemia	1967	6x110	brown coal	block 2 shut down Jan 1991
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- CEZ awarded a 2.8 billion Kcs contract to Bischoff (German) to build four desulphurization units.

Bischoff is working with Skoda Plzen on building the units.

- supported by German government assistance
(*Prague Post* 92/07/21)

Prunerov II	N Bohemia	1981	5x210	brown coal	desulphurization units for all blocks
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- have reserves of coal with lower sulphur content for use in unfavourable atmospheric conditions.
- ECU 4 million awarded from PHARE. WB, the EIB and EBRD monies also available
(*Exoservice* 91/05/21)

Tusimice I	N Bohemia	1963	6x110	brown coal	block 6 shut down 1991 5 blocks to be shut down 1992-97
Tusimice II	N Bohemia	1974	4x200	brown coal	Western FGD units

- biggest energy complex in the country, supplies heat to nearby industrial plants
- pilot project for Soviet NIIOGAS desulphurization technology which failed
(*EU* 89/1)

Pocerady I	N Bohemia	1970	4x200	brown coal	
Pocerady II	N Bohemia	1977	2x200	brown coal	

- 1989 contract signed for the first stage of FGD using a German wet limestone method on one block
- desulphurization equipment for other blocks to come from a Czech-German joint venture
- Federal government subsidy of Kcs 504 million will cover a third of the cost.
(*BEE* 1989p.223, *BEE* 92/03/9, p.118)

Table 3C.2

THERMAL POWER PLANTS AND THEIR PROSPECTS (cont'd)

Ledvice I	N Bohemia	1967	200	brown coal	
Ledvice II	N Bohemia	1966	2x110	brown coal	2 blocks to be shut down in 94-95

- supplies heat to Bilina and Teplice (supply up 3x between 1989 and 1990)
- Westinghouse control system to be installed to optimize efficiency and minimize emissions
- desulphurization methods under consideration and electrofilters under reconstruction

Chvaletice	N Bohemia	1977	4x220	brown coal	change to black coal
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- in 1989, zoned burners (Deutsche Babcock) to reduce NOx emissions were installed
- other blocks to be fitted with same technology
- supplier and financing for FGD now being considered
- electrofilters need reconstruction

Detmarovice	Moravia	1975	4x200	black coal (OKD and Poland)	
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- needs desulphurization equipment and reconstruction of electrofilters
- supplies heat to Orlova, with extension being considered

Opatovice	Near Pardubice	1959	6x55	brown coal	change fuel reduce output install FGD and electrofilters
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Porici	NE Bohemia	1956	3x55	black coal (Kladno & Poland)	needs FGD
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Hodonin	S Moravia	1954	2x50, 2x55	to be fitted with FGD unit	
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- SGP-VA Energie und Umwelttechnik (Austria) won contract from CEZ
- Austrian Ekofund will partially finance desulphurization
- Czech government will provide additional support
(BEE, 92/01/20 p.34, Otto Drab at CEZ)

Novaky A	C Slovakia	1954	2x22, 2x32	brown coal	1988 32MW reconstructed 1990 25MW shut down
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Novaky B	C Slovakia	1976	1x110	brown coal	1991 reconstruction blocks 1, 2
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- installation of FGD on 2 blocks will be financed by the Austrian Ekofund (\$7.1 million)
- electrofilters are being reconstructed
- Skoda Plzen and Wagner Biro (Austria) will supply sulphur removal equipment
- foreign equipment will cost Kes 725 million
- One third will be financed by the Austrian Ekofund
(Euraservice 91/05/28, 91/06/04)

Vojany I	E Slovakia	1967	6x110	gas or oil	reconstruction blocks 4,5,6
Vojany II	E Slovakia	1970	6x110	gas or oil	reconstruction of block 2 in 91 black coal (Polish and Ukrainian)

(Prague Post 08/09/92)

Sources:

Energy sector programme of the Czech Republic; Ministry of Industry, 1992

Government report on possible emission reduction of coal power plants, Federal Ministry of Environment and Federal Ministry of Industry

Structural changes in the energy sector, Ministry of Industry of the Slovak Republic in Power Plays, p.164-165

The Electrical Power Infrastructure Market Intelligence Report, June 1992

Cleaning the thermal power park assumed top priority in official "Czechoslovak Energy Policy" and a concerted programme was developed at CEZ to desulphurize all coal-burning power plants in the Czech Republic by 1998, the date by which, according to the Helsinki accord revision and domestic Clean Air legislation, CEZ plants had to reach European air quality standards (Prague Post, 92/07/21).

The first blocks shut down, in 1990, were at the Tisova plant, dating from 1958, which the German Bayernwerk utility planned to replace (through a joint-venture foreseen with CEZ) with a new 300-600 MW brown coal-burning plant equipped with modern desulphurization equipment. The installation of desulphurization units at plants in Southern Moravia (as well as Central Slovakia), of immediate concern to Austria, was undertaken with financing (about \$15 million) from the Austrian Ekofund, that was conditional on Austrian engineering companies winning the contracts to accomplish the work. Japanese assistance (through the G-24 programme) financed units for the Melnik plant in central Bohemia, and a portion of the (\$246 million) World Bank Energy I loan, as well as PHARE monies, went to equipping the Prunerov plants with electrofilters and desulphurization units, a contract CEZ awarded to the German Bischoff company that was supported by assistance monies from the German government. Bischoff was working with Czech companies to produce the equipment, which added to Czech government support for the contract. Government grants from the Ecological Fund were accorded to the Pocerady plant, which was committed to purchasing a wet limestone desulphurization unit manufactured by a new Czech-German joint venture.

These plants all burned brown coal and lignite from the North Bohemian and South Moravian mines. Plants burning high quality black coal from OKD (and Polish imports) produced fewer emissions and, importantly, were located in North-East Bohemia and North Moravia, bordering on Poland from whom assistance monies to reduce trans-boundary air pollution were not forthcoming. Plans for desulphurizing these plants

(Detmarovice and Porici) were drawn up but their financing and implementation schedule remained vague.

Commitment to the Helsinki accord, the adoption of strict Clean Air legislation, access to Western technology (some of which had previously been restricted by "security" concerns), and the influx of assistance monies were mutually supporting interdependent factors in generating activities aimed at wiping the blot of the Black Triangle off the European map. The World Bank loan came with the stipulation that regulations to achieve the goal of European air pollution standards by 1998 be implemented (especially fines and higher energy prices); Czechoslovakia's desire to connect with the UCPTE grid afforded West Europeans additional clout. Despite CEZ being "the most profitable company in Czechoslovakia" (Zeman 1992, interview at SEVEN), it is unlikely that the utility could or would have taken on the massive project of refurbishing coal fired power plants from its own budget without additional support, and also unlikely that the Czech or Federal governments could or would have come up with adequate environmental funds to underwrite the programme.

The European Commission stated that assistance from Western European governments came from their "acknowledging the need for continental efforts to diminish carbon and sulphur emissions, and assume a degree of responsibility in facilitating the transfer of environmental protection technology" (UNEP/E 1991, p 26).⁶ The synergistic effect of international and Czechoslovak financial and legislative commitment to the problem helped bring about a reduction of CO₂ emissions per capita from 14.6 tons in 1986 to 11.1 in 1991 (EC Energy in Europe Annual Review 1993, p.88), supporting the

⁶ Estimates of the total cost of cleaning up the North Bohemian, however, dwarf the sums of assistance provided. One study (quoted in Frankfurter Allgemeine Zeitung 7.12/90) estimated that a third of the sulphur dioxide emissions in Czechoslovakia (totalling 3.3 million tons) could be retained at a cost of about DM 1 000/ton, suggesting a total cost of over DM1 billion. The reduction of sulphur dioxide emissions by 80% and the modernization of the entire Czechoslovak electric power park was estimated at DM 45 billion (UNEP/E 1991 p 26)

International Energy Agency's assessment that "coal-fired plants can be run in an environmentally acceptable and economic manner" (IEA 1991, pp.7-14).

Only six of the 89 blocks under its management were shut down before 1993 and CEZ planned to take less than 8% of the total thermal capacity out of operation by 1996, indicating that though coal production would be reduced significantly, coal would continue to be the primary source of electricity in the Republic. CEZ was encouraged to reconstruct rather than close down plants by the availability of assistance to finance their upgrading and by continued government subsidization of the coal that supplied them. In the Czech Republic, deliberations over whether to desulphurize or close down coal-fired power plants had to consider the impact each measure would have on mining operations and the tremendous number of Czech men these employed.

The miners

In 1989, 2% of the Czechoslovak labour force was employed in the mining industry (IEA, 1991). Their number and the important role they played in fulfilling the country's energy needs through the 1980s had made them an influential group, one whose support was actively recruited during the November 1989 demonstrations and considered essential to the success of the economic reform package.⁷ In 1990, as new governments initiated a comprehensive restructuring of the coal industry to prepare for its privatization, the concerns of strong mining unions figured prominently in decisions. Many miners were retired under new Federal regulations fixing the maximum number of hours a miner could spend underground and setting new health stipulations for early retirement.⁸ This law was meant to bring the less stringent Communist health and safety standards in coal mining up

⁷ In November 1989 student activists from Prague travelled to the North Bohemia and other mining areas to recruit support for the demonstration underway in Prague. One of the memorable moments of the Velvet Revolution came when Stepan proclaimed to an assembly of miners and farmers that they could not let the country be run by little children, and one burly miner responded 'We are not little children'.

⁸ 700 million crowns from the federal budget surplus for 1990-91 were released to provide health benefits to miners (Ecoservice 91/06/17).

to the level of developed market economies. The amnesty for prisoners declared in 1990 meant further losses of mine workers. While these measures served both to repair Communist wrongs and drain some of the surplus miners, further reductions were sure to be less popular.

No concerted strike movement among miners affected by restructuring emerged in the 1990-93 period, but strike alerts and demonstrations (as well as reports from the Soviet Union and Romania where the situation became more volatile) kept miners at the forefront of government decisions. Short-term strikes at individual mines were called to ensure that government health compensation packages and retraining programmes were implemented.⁹ After the June 1992 elections, Vaclav Klaus expressed his commitment to "ensuring a smooth and effective process of privatization and restructuring (in the coal industry) without traumatic social upheavals" (FBIS 14/07/92), and a massive demonstration by North Bohemian coal miners was staged in Prague in November 1992 to ensure that his commitment survived the breakup of the country.

Half of all brown coal produced in the Czech Republic was purchased by CEZ. Brown coal production dropped by 10.3% between January 1990 and January 1991 as eight coal mines were partially or entirely closed (Czech Statistical Office in: Ecoservice 91/04/05; IEA 1992, p.35)¹⁰ as the utility got started on upgrading its thermal power plants (Table 3C.3). A further 15% drop between 1991 and 1992 created serious regional disparities in Czech unemployment rates, with only 0.3% unemployment emerging in Prague by 1994, but 4.7% in North Bohemia and 5.8% in North Moravia (EIU 95/1).

⁹ In the Ostrava area, for example, plans for closures that would lead to 13 000 redundancies by the end of March 1991 were announced on November 22 91. "Miners (in Ostrava) declared a strike alert over demands for compensation for miners with ruined health" (EIU 91/1). The planned redundancies were further contested by trade unions on the grounds that the announced training programmes had not yet been implemented (UNECE 1991, p 22).

¹⁰ Reductions had been started by Communist governments to reduce output as nuclear power production increased in the late 1980s.

TABLE 3C.3
CZECH COAL PRODUCTION BY DISTRICT (thousand tons)

	1989	1990	1992
Hard coal (all Czech)	25,070	22,400	18,486
OKD (Ostrava, Cz)	22,310	20,059	
KD (Kladno, Cz)	1,606	1,322	
Brown Coal	90,915	82,044	68,084
SUD (Most, Cz)	69,249	62,122	
(Sokolov, Cz)	17,773	16,466	

OKD=Ostravsko-Karvinske doly
 KD=Kamenouhelne doly
 SUD=Severoceske hnedomhelne doly
 HD=Hnedouhelne doly a briketarny

From Statisticky Rocenik 1991
EU '95/1, 1992 figures

The employment problem in coal mining was compounded by the gross inefficiency of Czech mining operations. Productivity per miner was much lower than in OECD Europe, the U.S. or Australia, with the average Czech miner producing 375 metric tons of hard coal per year (vs. 800 in OECD Europe and 5000 in Australia) and 2000 metric tons of soft coal (vs. 3,500 in OECD Europe). As mines acquired new technology, restructured their operations and sought to become profitable enterprises, significant lay-offs would occur even without a decrease in coal output (IEA 1992, p.39).

The Czech utility could no longer be mandated outright to use Czech coal and steps therefore had to be taken by both the mining companies and the government to both render it an attractive fuel option and assure the competitiveness of Czech coal against imports. CEZ imports of Polish black coal doubled between 1989 and 1991 (Table 3C.4). "If the government wants to protect mining jobs," said Otto Drab of CEZ, "it will subsidize the cost of the coal to make it a competitive option for CEZ." Czech parliament voted in 1991 to maintain subsidies at several mining operations through 1992 at least (Power Plays 1992, p.114). The government commitment to mining evidenced in the first two year of transition encouraged the utility to persist with thermal power plants and enter into long-

term arrangements that provided a degree of stability in which mines would be restructured and privatized without destroying the North Bohemian economy (EIU 91/4).

Table 3C.4
Fuel Consumption for electricity and heat generation in CEZ and SEP plants (thousand tons)
and % of total mining production bought by utilities

	1989		1990		1991	
	CEZ	SEP	CEZ	SEP	CEZ	SEP
hard coal	4,085	1,937	3,923	1,745	3,527	1,670
Ostrava	2,407	8	2,082	5	1,279	0
Kladno	982	0	1,009	0	767	0
Polish	695	0	832	0	1,481	0
Soviet	0	1,930	0	1,740	0	1,470
soft coal	45,890	4,241	42,670	3,001	30,380	2,633
Most	36,891	795	34,277	304	30,160	1
Sokolov	7,382	1	6,615	75	4,941	0
Slovak	1,623	3,445	1,783	3,239	1,272	2,632

From Newsletter of the Czechoslovak Energy Dispatching Centre, 1989/90/91 in Power Plays, p.281 and % calculated with Statistická Ročenka 1991

Higher quality black coal, less than 20% of which was used in power generation, benefitted less from government/utility protection and had to find other means of attenuating the hardships of restructuring. As production decreased in many industrial sectors, demand for black coal dropped sharply. Ostrava Karvina Mines (OKD) in Northern Moravia, which supplied most of the Czech Republic's black coal, instituted a massive slow-down programme, retiring almost 10,000 miners in the first half of 1991 (Eco-service 91/07/11; 91/07/18). New black coal mine managers campaigned with some success against imports of coal, particularly from Poland which was accused of subsidizing its mines (EIU 91/4), and focussed on exports to solve overproduction woes. OKD had established customers in Austria and found new ones elsewhere in Western Europe. Voest Alpine Stahl (Austria) contracted to buy over four million tons of coal a year from OKD in the four years beginning in 1992; in 1991, coal from OKD covered 35% of the Austrian firm's needs; in 1992, it would cover more than half (Prague Post 92/05/19 25). Exports were rendered a viable solution through exchange rates that remained favourable to

importing countries, and wages that remained at only 10% the German level more than compensated for productive inefficiencies

Exports appeared as a solution not only to immediate overproduction woes, but also as a means of acquiring western technology to improve the efficiency of mining operations, leading OKD to conclude a deal with Charbonnages de France exchanging future exports for technology to improve the mine's productivity (Prague Post 92/07/7; BEE 92/02/17, p.83).¹¹ As the European Community's duty on Czechoslovak coal was due to be removed within a year of Association Agreements being ratified, and as coal sales after 1992 would be permitted without the mediation of the Metalimex foreign trade company, many expected exports to become more significant (Ecoservice 91/04/24; JPRS 35). Federal legislation requiring export licenses was put in place to control this trend,¹² but with the choice of even more massive mining layoffs or looser restrictions on exports, the former would be a hard sell.

Slovak nationalism builds its power base

For Slovakia, which lacked the abundance of coal available in the Czech Republic, converting coal fired stations to ones using Soviet natural gas presented a feasible solution to environmental problems; the mining question was a less important consideration. Brown coal production in Slovakia represented only 5% of the Czechoslovak total and largely went to feed the Novaky power plant in Central Slovakia and to CEZ for its Moravian plants (Ecoservice 91/03/29 and 91/07/09). Between 1989 and 1991, SEP eliminated purchases

¹¹ Coal bed methane may also prolong the life of some mines. Though degasification technology is already used at several sites, foreign (especially American) hydraulic fission technology can increase the amount of recoverable methane significantly (Power Plays p.114). Coal seams in Ostrava-Karvina have too much methane, which complicates coal extraction. American and Canadian companies (Fracmaster and Cengas) are providing technology and financing for methane extraction projects at OKD (Ecoservice 91/10/17, Prague Post 92/08/04). Additional funding may come from the World Bank, as the project promotes the use of alternative fuel.

¹² Coal was included, as a non-renewable resource, on the list of goods, drawn up with the advice of international organizations, mainly the IMF, for which export licenses would still be needed (Ecoservice 91/03/25, EIU 91/1).

of brown coal from the Czech mines and reduced its imports of hard coal (from the Soviet Union) by 25% (see Table 3C.4). A project to convert the Vojany power plant to gas using integrated gas-coal combustion (IGCC) was prepared, with Westinghouse accomplishing a feasibility study through funds from the U.S. government.

Lacking the mining concerns of the Czech Republic, holding some natural gas reserves as Gbely and, especially after separation, enjoying a more secure position for gas imports, SEP did not foresee coal-fired plants remaining an important source of electricity. Hydroelectric and nuclear power became the primary focus in SEP's plans as energy sources that could reduce Slovak reliance on both the Soviet Union and the Czechs. From the very beginning of transition, Slovak domestic energy development was geared to becoming self-sufficient in electricity, a commitment which saw SEP put the Gabčíkovo hydroelectric plant into operation by the end of 1992 despite vehement Hungarian opposition (see Appendix C), keep the Bohunice nuclear power plant running despite IAEA recommendations and CCAE rulings, and persist with construction at the Mochovce nuclear power plant despite financing difficulties that often appeared insurmountable.

Disregarding nuclear danger

Bohunice, located 60km from the Austrian border in West Slovakia, had been in operation since 1978, and concerns about its safety escalated as information about past accidents became public after 1989. Worries were strong enough to induce public health authorities along the Czechoslovak-Austrian border to distribute potassium iodide tablets to prevent of thyroid cancer in the event of an accidental release of nuclear radiation (Petroleum Economist 91/03). Siemens, Westinghouse, the IAEA and a group of Austrian experts contributed to a report on the plant, which concluded that 80 safety related measures would have to be implemented for Bohunice to continue to operate until 1995 (Ecoservice 91/04/08; FBIS 06/05/92). In January 1991, the Czechoslovak Commission for Atomic

Energy (CCAE) licensed Bohunice's operation for a restricted period of time and stipulated measures to be taken at the plant in 1991 and 1992 (Ecoservice 91/06/24).

Progress in Bohunice's safety regimen was found by the CCAE to be unsatisfactory in 1992¹³ and further concerns arose when SEP stated its intention to effect a major reconstruction of the plant (something never attempted on a VVER reactor) that would enable it to run until 2005.¹⁴ This blatantly ignored the CCAE's ruling that Bohunice should be permanently closed down after 1995 (FBIS 20/04/92). Prior to June, 1992, the CCAE was too weak an organization to enforce the stipulated safety measures or prevent SEP's reconstruction plans. After that time, Federal authority over SEP evaporated. SEP also determined to complete the Mochovce nuclear power plant, despite the limited capital available,¹⁵ in order to further reduce dependence on electricity imports.

The continuation of Czechoslovakia's nuclear power programme became a much more expensive proposition after 1989 as Western safety standards were adopted and cooperative relations with the Soviet Union were abandoned, but in both the Czech and Slovak Republics, commitment to nuclear power endured the change in government and appeared to strengthen through the first years of transition (Table 3C.5).

The Temelin nuclear power plant under construction in the Czech Republic had attracted the most vehement criticism, both domestic and Austrian, and the Austrians tried to preserve the post revolutionary Czechoslovak resolve to abandon construction. Offers of financial aid for tearing it down (Prague Post 92/06/2) were followed by offers of financial

¹³ While the record for shutdowns remained within international norms, 'incompetent handling' was ascribed as the cause of one serious (INES level 3) accident involving spilled radioactive fuel, and 6 minor (INES level 1) accidents at the plant (FBIS, 17/04/92)

¹⁴ Closing down Bohunice was made less thinkable when the aluminium plant Slovalco, in Slovakia for which a good part of Bohunice's output was dedicated, saw its government subsidies extended in 1991 and wrested a commitment from the Slovak government to import electricity to keep the plant running if Bohunice was closed (IEA 1991, pp 5-7). This same plant received a \$110 million loan from the EBRD in 1994 to modernize production (EIU 95/1).

¹⁵ At one point during 1991, the principle technical contractors for Mochovce had threatened to cancel deliveries because of SEP's insolvency (FBIS 29/01/92)

and technical cooperation on energy saving measures and the reconstruction of coal fired stations (EIU 91/2). But these had little effect. Foreign Minister Dienstbier pointed out that "the Austrian offer of attractive credits amounting to billions to stop our nuclear program would have to be repaid" (FBIS June 13, 1990).

Following an IAEA study of the plant at the beginning of 1990, the government decided that Temelin, scaled down to two reactors, could be completed if it were equipped with Western safety features (FBIS 15/05/92). CEZ requested a second report from the IAEA on the first and second blocks in 1991 and American and West European experts worked with the Temelin staff to elaborate further measures that would increase the plant's safety (Ecoservice 91/08/29).

A final decision on Temelin's fate was delayed time and again by the Federal government, with options ranging from full completion to tearing down the parts of the plant that were already completed receiving consideration. Through the first half of May 1992, the government was still toying with the possibility of abandoning Temelin, primarily because Czechoslovakia was not expected to reach 1989 levels of electricity consumption until 2005 (Prague Post, 92/05/19; Power Plays 1992, p.204). The other Czech nuclear station at Dukovany had been found by the IAEA to meet international norms and could continue to operate without disruption, needing only to improve its personnel training and repairs schedule (Ecoservice 91/06/3). Furthermore, the economics of nuclear power had to be reconsidered as Czechoslovakia was forced to assume responsibility for nuclear waste.

Until 1988, the Soviet Union had included services such as reprocessing and disposing of nuclear waste free of charge and on its territory as part of the cooperative nuclear programme, primarily because the plutonium recovered from spent fuel was used in nuclear weapons (Pass 1983, p.127). After 1989, the Soviets refused to accept

TABLE 3C.5
CZECHOSLOVAKIA'S NUCLEAR POWER STATIONS

Location	Plant name	Reactor type	Capacity (MW)	Commissioning Date
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Jaslovské Bohunice (West Slovakia, 50 km NW of Bratislava)	A-1	—	150	1972
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First atomic plant in CSFR, was closed down in 1978 following an accident, decommissioning is problematic as radioactive waste must be removed

V-1	PWR-VVER 440	440	1979
V-1	PWR-VVER 440	440	1980
V-2	PWR-VVER 440	440	1984
V-2	PWR-VVER 440	440	1985

— V-1 does not comply with new safety standards. The plant was assessed in 1990 by Czechoslovak and foreign experts, including the IAEA. After 1995, it will either be decommissioned or undergo substantial reconstruction to bring it up to new standards. Cost of reconstruction = \$200 million
 — Bohunice provides 25% of Slovakia's electricity (ECO 91/04/08)

Dukovany (Moravia)	V-3	PWR-VVER 440	440	1985
	V-3	PWR-VVER 440	440	1986
	V-4	PWR-VVER 440	440	1986
	V-4	PWR-VVER 440	440	1987

Faces problem with storage of spent fuel. Otherwise largely meets new safety standards

Mochovce (West Slovakia)	PWR-VVER 440	440	(1993)
	PWR-VVER 440	440	(1994)
	PWR-VVER 440	440	(1995)
	PWR-VVER 440	440	(1996)

— Because of the increased technical demands and higher nuclear safety standards, the supply of monitoring and control systems from a Czech manufacturer was cancelled. After competition among leading western firms, Siemens was chosen as supplier, valued at 100 million DEM.
 — The EBRD was to contribute \$840 million to a joint venture between SEP and Electricite de France to complete Mochovce. Conditions of the EBRD loan included closing Bohunice and raising electricity prices by 20%. EBRD support came under attack, especially from Austria which threatened to pull out of the bank if it went ahead with the venture. In 1995, Skoda Praha offered to finish two reactors at a cost one third lower than that quoted by Electricite de France and the Slovak government asked the EBRD to delay its decision. In Spring 1995, Russian Prime Minister Viktor Cherbomyrdin offered Slovakia a \$150 million loan to finance Russian equipment, expertise and nuclear fuel to get Mochovce going, arguing that Slovakia could not afford to comply with the conditions involved with the EBRD loan (Transitions, 1995, The Economist, May 6, 1995, p 51)

Temelin (South Bohemia)	1000	(1994)
	1000	(1995)

4 reactors were under construction, but blocks 3 and 4 (1000 MW each) were cancelled in 1990. In 1991 a competition for a new supplier for instrumentation and control systems was held, with Westinghouse and Framatome leading. Westinghouse and ABB have bid to supply fuel.

Sources: Pass, p 116; Kramer, official stats

Bracketed dates represent targets for completion held until 1989

Czechoslovakia's waste, and spent fuel was being stored near the Bohunice plant¹⁶ under insecure conditions. SEP was charging CEZ four to six times more than world prices to store waste from Dukovany at the Bohunice plant. CEZ pursued alternate solutions with French and British nuclear companies, but the new European Basel Convention on the Transboundary Movement of Waste foreclosed possibilities of exporting spent fuel to Western Europe. Czechoslovakia's adoption of European waste laws required each nuclear plant to construct its own waste storage facilities and establish a decommissioning fund, requirements that increased the costs of nuclear power generation considerably.

Czech nuclear aspirations: take III

Given the results of the June 1992 election, the outgoing Federal cabinet deferred from ruling on Temelin, stating that it had "lost its mandate to decide the issue" (FBIS 11/06/92, Prague Post 92/06/16-22). It also announced, however, that until a decision could be reached, construction at Temelin would continue. The new government of the Czech Republic lent its support to Temelin and the mandate of bringing two reactors on line before 1996 was adopted (Economics Minister, Karel Dyba quoted in the Prague Post 92/07 28; Prague Post 92/05/2; Power Plays 1992, p.111). A Greenpeace leader accused the outgoing government "backed by strong nuclear lobby" of delaying the decision until so much of the plant was built that stopping construction makes no sense (Petr Hlobil quoted in the Prague Post 92/06/23).

Kramer identified three variables as salient in determining the future of nuclear power in Eastern Europe: 1) public opinion, 2) western aid (either for refurbishing plants or assuring alternative energy supplies) and 3) the overall trend in demand for energy

¹⁶ A temporary storage depot had been built at Bohunice, owned by SEP. Spent fuel from Dukovany had also been stored there, but SEP demanded that CEZ not only remove the spent fuel in storage but also build a storage facility in the Czech Republic in which SEP would, in future, be able to store its waste as the one at Bohunice would be full by 1994. Radioactive waste at the A1 plant at Bohunice, closed down in the early 1980s, had never been removed (Power Plays, p. 103, Lidove Noviny 16/04/92, FBIS 20/04/92, Ecoservice 91/05/10; Petroleum Economist 92/01, Financial Times, 30/08/91, Washington Post 15/05/90, Kramer 1992).

(RFE, Kramer, p.42). However, in the Czech Republic, a fourth variable, in the shape of the "strong nuclear lobby" referred to above, proved equally influential in determining the future of the nuclear programme.

Public acceptance of Western safety standards

Public opinion in Czechoslovakia, rather than holding the black and white positions of Westerners, focussed its critique of nuclear energy on Soviet technology, perceiving Western standards and technology to be an entirely different, more acceptable matter. For the most part, the nuclear watchdog movement that grew in the new Czechoslovakia appeared far more concerned with assuring higher safety standards than in abandoning nuclear plants altogether. President Havel spoke for a majority of both Czechs and Slovaks when he said: "The only alternative to the traditional way of producing power from brown coal is the use of nuclear energy" (RFE, Kramer, quoted in "Profil" November 1990). That this resignation did not translate into a passive public acceptance was evident in Slovakia, where 93 towns around the half-finished Mochovce nuclear power plant formed a group to demand "guaranteed and unbiased information about the plant's safety and effective systems for protecting the population." They accepted the plant and nuclear waste disposal site, however, as "a fact of life" (JPRS 12/02/92).

The Czechoslovak sang-froid with regard to the need for nuclear power contrasted more radical stances adopted by other East European countries after 1989. In Poland, which had no nuclear capacity in place and which was badly hit with fallout from the Chernobyl accident, passionate public protest forced the cancellation of plans to construct a nuclear power plant and nuclear waste dump (Petroleum Economist 91/03). Neither were old East German plants tolerated; soon after unification, the German government closed

down two nuclear power stations in East Germany, wanting "nothing to do with the old and unsafe reactors of the former Communists" (Financial Times 30/08/91) ¹⁷

Czechoslovakia had neither suffered a serious nuclear accident, nor had a Western half able to compensate the shortfalls of electricity that would result from closing down plants in permanence. The visible dangers of coal-fired plants proved more convincing than the theoretical dangers of nuclear power, dangers that the public felt would be reduced to insignificance with the application of Western technology and the enforcement of Western standards. Public opinion polls conducted in 1991 found that while only 4% of Poles and 8% of Hungarians supported nuclear energy, more than 60% of both Czechs and Slovaks supported nuclear development if Western safety standards were adopted (Kramer 1992).

Financing options

The adoption of Western safety standards raised the costs involved in completing nuclear power plants considerably, and the very possibility of financing Temelin and Mochovce was in doubt through the early phase of studies and recommendations. Though nuclear energy was identified as an area where foreign assistance was needed, established international organizations could not easily venture into it. The World Bank had an explicit policy not to fund nuclear power projects, and only technical assistance with nuclear waste and safety problems became available through the PHARE I nuclear programme (Hanzel 1992, interview at SEP; Zeman 1992, interview at SEVEN). The primary international role in financing the construction and repair of nuclear plants would eventually fall to the EBRD which, in 1992, began a regional project to estimate the costs of bringing East European and Soviet reactors up to European safety standards and, after 1993, to finance the upgrading of nuclear power plants (FBIS 29/06/92).

¹⁷ The East German Greifswald plant had suffered a near meltdown in 1975, caused by what was considered a basic design fault in the WWER 440-230. This was successfully suppressed by the state authorities until the collapse of the regime (Petroleum Economist 91/03).

Bilateral donors became the most likely source of assistance for Temelin's completion. The U.S. Export Import Bank provided CEZ with \$400 million in export credits, thereby guaranteeing Westinghouse the contract to provide control systems for Temelin. Other bilateral assistance took the form of Western European countries exchanging financial support to complete the plant for exports of electricity following its completion (Prague Post 92/06/23). In 1992 CEZ signed a deal with Italy's ENL utility for financial assistance to complete Temelin in exchange for electricity supplies after 1995. Further commitments were made to export electricity from Temelin to the German Bayernwerk utility through the new Etzenricht power link in exchange for emergency supplies that were compensating for Northern Bohemian coal stations temporarily taken out of service (Drab 1992, interview at CEZ; Ecoservice 91/04/03; BEE, 92/01/20 p.34). SEP invoked similar financing schemes, negotiating with Westinghouse for control systems in a deal that would allow SEP to pay 15% of the cost in goods and services, including uranium, and with a Bavarian utility for further instrumentation and control systems in exchange for future deliveries of electricity (ABSCEES; The Times 92/03/21).¹⁸

Exports were not an entirely new phenomenon,¹⁹ but had previously been limited by technical factors and by an absence of surplus electric capacity in Czechoslovakia. The special conversion stations quickly brought into use after 1990 and the move towards full UCPTE connection being undertaken by Poland, Hungary and Czechoslovakia with the support of Western utilities promised to overcome the technical problems; by 1994, the

¹⁸ In April 1992, the Slovak government began discussion with the EBRD for a 1.1 billion DM loan to help complete construction at Mochovce (CSTK 27/05/92 in RFE Kramer; FBIS 27/04/92). The EBRD loan was requested for a planned SEP-Electricite de France joint venture to complete the plant, but by the Spring of 1995, it had not yet been confirmed and a bid from Skoda to finish the two reactors for one third less than the French, as well as a Russian bid that included \$150 million to help finance the work, were being considered by SEP. Further Austrian protests against the plant were taken more seriously as the country became Slovakia's most important source of trade and investment and as Austria was threatening to pull out of the EBRD should the bank proceed with funding (World Bank, Transitions, 1995).

¹⁹ Czechoslovakia began exporting electricity abroad after 1986. A deal with Austria and Switzerland provided exports to them in the winter for badly needed hard currency, and imports from them in summer when Czechoslovak coal fired stations were being serviced.

European Directorate General for Energy judged that full compliance with UCPTE requirements would be reached by 1997 (Energy in Europe, No 24, Dec 1994, p.89). Surplus capacity was being assured by the export deals themselves.

The West European market welcomed these new sources of electricity: 'West European utilities foresee a need for electricity imports from their eastern counterparts because public environmental concerns are restricting their ability to expand capacity to keep up with demand' (Financial Times, 26/11/92).²⁰ Coal fired thermal generation had been steadily decreasing in the EU and nuclear growth appeared close to stabilization in 1990 (Energy in Europe, 1993 Annual Review, p.11)

Opposition to exports came from Czechoslovak citizens unwilling to assume the risks inherent in nuclear production destined for consumers outside the country. "The people of southern Bohemia will not agree with the idea of building a plant from which they will receive the danger of nuclear catastrophe while someone else gets the energy" (Prague Post 92/06/23). This sentiment extended even to inter Republic relations and lay behind statements from Czech officials that no nuclear station whose output is geared largely for consumers in Slovakia would be built on Czech territory. In April 1991, Finance Minister Vladimír Dlouhý stated that "Given the current tense situation in the field of energy production, the repaying of foreign credit through immediate exports of electricity is impossible" (Ecoservice 91/04/22). However, these objections were heard less often from government officials after 1991.

The use of exports and future exports as a financing option skewed projections of demand for electricity and made them less relevant to decisions. While domestic demand contracted steadily after 1989, this, contrary to Kramer's expectation, did not affect Czechoslovakia's pursuit of the nuclear option.

²⁰ Even nuclear free Austria will draw power from Ukraine - some of it almost certainly from nuclear generators (The Times, 92/03/21)

Revitalized aspirations for an independent nuclear capability

To understand the continued expansion of nuclear capacity, even when this would be devoted to fulfilling export contracts, a fourth variable must be added to Kramer's list. Czechoslovakia had tried since the 1960s to develop an indigenous nuclear capacity: the Bohunice A 1 attempt failed because of inadequate technology. Soviet technology was adopted but regarded as second-rate, and Soviet interference an impediment; with transition came a third chance to fulfill the potential of an already important industrial sector. Czechoslovakia was the only country outside the Soviet Union to build and export Soviet-designed nuclear power stations, and had developed an extensive engineering sector around the production of nuclear equipment. To continue in its role as supplier of nuclear equipment to other East European countries, and possibly expand into Western and Southern markets, Czech engineering companies needed to recruit capital and technology from more advanced Western firms.

The Skoda enterprise was transformed into a joint stock company called Skoda Energo and began seeking Western participation that would permit it to broaden its range of products and meet more stringent safety standards (Ecoservice 91/10/10 and 91/07/03). The company's expertise was appreciated by Western nuclear officials, and Czechoslovakia's role as a 'nuclear power' was acknowledged in the West with an invitation to join the European Convention for Nuclear Research (Ecoservice 91/08/16). Lord Marshall of Goring, Chairman of the Association for Nuclear Reactor Operators, deemed production of nuclear equipment at the Skoda plant to be of high quality, "better than some American or British production" (Ecoservice 91/06/10).

Czechoslovakia's plans to expand its own nuclear power base and its traditional role as supplier for other East bloc countries were crucial to attracting Western interest (Ecoservice 91/09/05). Worldwatch reported a revival of optimism among Western nuclear companies, which had witnessed the demise of their own markets but perceived enormous opportunities for expansion in Eastern Europe. "Reactor repair is a lucrative business"

(Petroleum Economist 91/03). Partnership with Skoda was recognized by major Western engineering companies, such as Siemens, Westinghouse and Asea Brown, as the key to penetrating Eastern European and Soviet markets for power plants, and especially nuclear power plants (JPRS 30/01/92). A few years down the line, these opportunities were recognized as essential to the survival of the European Union's nuclear industries. "The market for nuclear construction is increasingly outside the Community and the future of the European industry will depend on its capacity to hold a significant part of the external markets," stated the European Commission Green Paper "For a European Union Energy Policy" (EC Jan 1995, Annex A, p.54).

Throughout the debate around Temelin's future, the fate of the country's nuclear equipment producers was also being determined as an offer from Siemens to form a joint venture with Skoda Energo solidified. After the deal received approval from the Czech Ministry of Industry in January 1992,²¹ the venture began manufacturing nuclear power plants and decommissioning equipment.²² The Vitkovice engineering plant in North Moravia also acquired Siemens technology that would allow it to switch from production of Soviet designed steam generators to models used in Western nuclear power plants after fulfilling its contract for Temelin (Ecoservice 91/09/24).

Assuring the privatization and recapitalization of domestic nuclear equipment producers put tremendous pressure on the government to continue work at the Temelin plant: Western interest depended on the continuation of the Czechoslovak nuclear programme as well as those elsewhere in the former CMEA.²³ Siemens made this quite

²¹ Siemens took a 67% stake, 10% of which it offered to Framatome (France). Skoda kept 33% of shares and provided most of the management.

²² As well as fossil fuel plants, hydro-electrical generators, modern environmental protection equipment and waste disposal facilities (BEF 92/01/20 p.34 East West Project, March 1992 Report JPRS 30/01/92).

²³ For equipment companies which remained in Czech hands as well, contracts with nuclear plants eased privatization. Stavoizolace, for example, was denationalized and bought out by the company's employees. Contracts to supply Temelin provided the company a secure market to ease the transition (Ecoservice 91/08/13).

clear when it insisted on reassessing the terms of the Skoda agreement as a shortfall in orders from the Soviet Union occurred in 1992 (Prague Post 92/07/14).²⁴

The possibility of using Western investment and technology to develop the technologically-dependent, second rate nuclear industry built up under Soviet supervision into a long-coveted indigenous nuclear capacity required the expansion of domestic nuclear power use.²⁵ Whether or not the joint-venture and licensing deals entered into by Czech nuclear equipment manufacturers will lead to their possession and mastery of Western-quality nuclear technology cannot be determined at this stage.

A DECOUPLING OF SUPPLY AND DEMAND IMPERATIVES

Prior to 1989, the rationale behind developing domestic energy resources lay in compensating shortfalls of imported energy on which the economy had come to depend. Only upon failing to expand energy production were attempts made to decrease energy consumption. The situation was inverted after 1989 as decreasing energy consumption through greater efficiency became a central goal of reforms, aimed at improving the competitiveness of Czechoslovak production on world markets. However, despite a drop in the demand for electricity, expanding the power base remained a priority in both Czech and Slovak energy policies. Assistance monies directed almost exclusively to upgrading supply capacity encouraged this focus, as did government concern for economic branches servicing the power industry.

²⁴ 50% of Skoda Engineering production used to be absorbed by the Soviet market, a relationship Siemens wished to see continue.

²⁵ Eleven countries in the world get more than 30% of their electric energy from nuclear power, most of these in part to support domestic nuclear industry. France in fact exports \$1 billion of nuclear-generated electricity a year.

The Russians, however, have expressed their misgivings about East Europeans abandoning Russian technology and believe aid benefits will accrue especially to Western nuclear companies (Financial Times 92/07/03). Czechoslovak officials, however, do not seem to share Russian concerns and, given adequate support from and beneficial partnerships with Western nuclear companies, appear unlikely to continue nuclear relations with Russia.

The export (and future export) deals used to finance the upgrading and expansion of power-generating capacity served to decouple the need to decrease energy consumption from the need to decrease energy production. Excess capacity was easily marketable to Western European countries whose populations objected to further nuclear development and enforced stringent environmental standards.

Dr K. Topfer, German Minister for the Environment, saw Czechoslovakia and the other Eastern European countries under "tremendous pressure to export electricity in order to acquire urgently needed foreign currency" (IAEA Bulletin, June 1992). However, the hard currency earned from exports of electricity was already invested in producing electricity, eliminating the flexibility to put these monies towards improving the efficiency of non power-generating industry. More importantly, with exports maintaining the need for capacity expansion and an assistance programme narrowly focussed on improving capacity, efficiency improvements were not accorded priority and were deprived of investment. In developing energy for the export market it remained to be seen whether high value-added production resulting from joint ventures engineering would eventually compensate low value-added production of electricity based on the comparative advantage of low wages and a more complacent public.

CONCLUSION

By opening up a box of tools previously unavailable, post-1989 governments changed the course of Czechoslovakia's development once again, and provided hope of achieving a vital economy and healthy environment — of becoming a "Western" nation. The Western approaches that were adopted reflected Czechoslovaks' aspirations rather than their realities, however, and could therefore not hope to replicate the energy management success achieved in the West. Lacking a strong backbone of public and institutional support, laws and programmes also remained open to redefinition as challenges arose.

The fundamental change in the economic and political system that Kramer saw as a precondition to closing the energy gap in Czechoslovakia was initiated in the first years of transition. Features of the command economy that "promoted excessive consumption of energy" (Kramer) were abolished, and an environment was created to induce the "profound psychological change" (Amman) which would pave the way for more rapid technical progress. The roadblocks to accomplishing the mandates of adaptation to the post-oil era that had plagued Czechoslovakia throughout the 1980s were overcome as central planning was abandoned, as CMEA energy trade was commercialized, and as Western technology and capital became available.

Through new Western partners, pipelines linkages were undertaken, desulphurization equipment was obtained, technology and capital were brought into joint ventures which promised to bring the production of energy equipment up to Western standards, and a significant sum of grants and loans was directed to financing interconnections and renovating the power park.

Activities in the first three years continued the efforts of the 1980s, bringing new tools to bear on the problem of diversifying import supplies and expanding domestic capacity. Only, the mandates themselves became somewhat less relevant in the transition context and their pursuit stood to bring results quite different from those foreseen in the

pre-1989 period. While Czech and Slovak energy policies remained less than solid by the end of this study's time frame, a number of important trends and developments can be discerned in the activities of the first three years of transition:

Security of import supplies

— From an insecure position in assuring oil supplies during the last years of the CMEA, Czechoslovakia's supplies grew even more tenuous as political affiliations strayed from the infrastructure designed to join the countries of the Soviet bloc. War in the former Yugoslavia precluded one set of options and, for the Czechs, Slovak separatism presaged the potential for further difficulties on the Eastern front. The urgency to pursue solutions with the West was therefore increased.

— The influx of Western oil companies into former CMEA territory and the dearth of independent importing companies to emerge from Czechoslovakia between 1990 and 1993 as government retained tight control over oil imports hinted that the commercialization of oil trade with the Soviet Union would also lead to its Westernization. Slovnaft's dispute with OMV revealed that Czechoslovak companies would have a hard time forging deals that would give them access to the Western European network and allow them to compete in the new liberated Pan-European environment. Slovakia did, in 1992, gain a commercial foothold in Russia through the Slovnaft-Megionneftegaz joint venture.

— The construction of gas infrastructure and participation in Soviet resource development in the Communist period had secured sufficient imports before 1989 and remained assets afterwards. Czechoslovakia's important transit role helped attract Western investment and assistance monies for upgrading existing lines and constructing new links into the West European network. Transition achieved little success in further encouraging gas use.

The expansion of Transit and Bratstvi gas pipeline capacity was geared not primarily to increase domestic supplies, but to supply new interconnections with the West.

From a West European perspective, investments and assistance for expanding Czechoslovak capacity and infrastructure served the goals of bringing Soviet supplies into the West European market, obtaining electricity from sources considered contentious by West Europeans and creating a new market for Western energy equipment, some of which (i.e. nuclear plant) was having trouble finding markets elsewhere.

The near absence of ventures between East European countries appeared to be caused more by a lack of viable projects than a lack of will. Where mutually beneficial projects arose, reflective of true interdependencies under Communism, they were worked on effectively. When, after 1989, putting the Adria pipeline into service assumed high priority, Hungarian and Czechoslovak officials quickly settled their accounts in order to get the pipeline operating by the end of 1990. Hungary, Poland and Czechoslovakia further worked together to prepare for connection to the Western European UCPTE system.

Increasing (improving) domestic supply

– Dramatic improvements in nuclear safety and environmental protection came with transition, mostly thanks to better access to Western technology. However, Czechoslovakia's hard currency supply did not miraculously expand after 1989 and many of these improvements were financed by exports and future exports of energy, restricting the option of closing mines and power plants and shortchanging the environmental improvements accomplished at each plant by the combined impact of too many plants. The disproportionate investment in energy supply that had been evident in the 1980s continued, again at the expense of investments to improve industrial energy efficiency.

— The expansion of supply capacity also suited government priorities as it alleviated pressure to cut back sharply on coal production and permitted renewed aspirations for building up a first-rate nuclear industry.

— In the Slovak Republic, nationalist aspirations to reduce dependence on the Czechs guided the expansion of capacity; and future export deals were agreed in the absence of alternative financing strategies.

Efficient and safe use of energy

Where Communist attempts provided no financial incentives to efficiency, did nothing to make people act more responsibly, and established no way of ensuring that measures were adopted (Marousek), the market provided both incentives and controls through competitive pricing that reflected the costs of production. Building up the technological, managerial and financial capacities that would allow enterprises to respond creatively to incentives was a longer-term proposition.

— The inability to undertake even minor investment projects that would contribute to efficiency early on in the process of restructuring and privatizing enterprises indicated that the market alone would not produce the results anticipated. The need, recognized by the Communists in their 1981 State Target Programme, for investment into industrial processes and plant continued to go unanswered as the supply side sapped government funds. Western assistance programmes encouraged the focus on supply through the scale of project aid provided and the type of studies carried out.

— The political will to uphold energy-efficiency programmes remained weak and environmental concerns that, in the West, became crucial to supporting programmes as the price of oil fell, waned in Czechoslovakia after an initial bout of enthusiasm in 1990.

The implementation of structural measures to improve efficiency within the context of redefining the utility's relationship with consumers provided some hope of leapfrogging into a more beneficial style of energy management. But the experiment of imposing Western systems ready-made on a population that would not necessarily uphold the concerns behind it had no guarantee of success.

-- Extensive use of coal in all sectors of the economy was a crucial impediment to improving energy efficiency, but decreasing coal use too quickly risked, as policymakers recognized, jeopardizing reforms altogether. Coal use may not have appeared as sound energy policy, but as a regional development policy, it was essential. Further, if supporting coal for power generation helped to eliminate it from industrial and residential use, palpable environmental improvements would follow. The rapid influx of technology and capital into Czech coal-fired power plants permitted Czechs to benefit from 25 years of Western research into improving the thermal efficiency and reducing the environmental hazards of coal.

In the energy policies that helped Western nations adapt to the post oil era, the links between energy conservation, environmental protection and economic dynamism, mandates that had originally been considered at odds, were gradually acknowledged. Pressure to conserve energy and reduce environmental damage would improve the efficiency of production and thereby increase profitability and competitiveness. But this equation only became apparent as the pressure was sustained enough to recruit investment and prompt the development of new processes. The difficulties in enforcing environmental regulations and the focus on increasing energy supply evident in Czechoslovakia during transition provided little hope that this equation would be allowed to work. The other effect of sustained pressure from strong environmental lobbies and high energy prices in the West was to

encourage high-end production that required less energy and entailed fewer environmental hazards, and relocate low-end production elsewhere. A Communist legacy of energy intensive industry, production capacity and infrastructure, coupled with a technological dependence on the West and a population burdened by the hardships of reform, made the Czech and Slovak Republics look like promising host countries.

APPENDIX A

ORGANIZATIONS INVOLVED WITH ENERGY IN THE ECONOMIES IN TRANSITION

INTERNATIONAL ORGANIZATIONS

IAEA

- founded 1957, with global membership
- exclusively involved with energy issues, specifically nuclear
- offers technical assistance in standard setting, safety, safeguards, the international Chernobyl project
- works through field missions and plant inspections (OSART teams)

IEA

- founded 1974, involves OECD countries except Iceland
- exclusive concern with energy issues, EEC issues since 1990
- offers technical assistance for oil and gas industry development; interconnection of gas/electricity networks; energy technologies; trade, statistics
- established the Centre for the Analysis and Dissemination of Demonstrated Energy Technologies (CADDET)
- works through country reviews, seminars; clearing-house services
- Expenditure on P,H,C amounts to 1.5 million FFR in 1990, and 4.5 in 1991 [US Senate Energy Profile]

OECD

- founded 1961, involves 24 advanced market economies
- has been significantly involved in EEC energy issues since 1990, Partners in Transition programme for CSFR, Poland, Hungary
- offers technical assistance for assessing environmental risks, promoting requisite policies/institutions
- works through studies, seminars, clearing-house services

IBRD

- founded 1945, involves 164 nations worldwide and most of the EECs
- involved in CEE energy issues since 1989
- offers project (co) financing, pre-investment and policy advisory services, infrastructure; project financing
- works through loans and country/project studies and seminars
- 3-year regional energy plan for Eastern Europe
 - \$600-800 million to Poland to support investment projects in Poland, including energy projects
 - \$500 million loan to CSFR for energy production and environmental protection projects [ECO 91/04/02] to be used for desulphurizing thermal plants [Dlouhy, ECO 91/04/18]
 - 15-year \$246 million loan to CEZ to purchase desulphurization equipment for Prunerov II [Prague Post 92/07/28]
- loans are conditional on taking measures to reduce air pollution, on legislating pollution charges and environmental assessments

IMF

- founded 1945
- same membership as IBRD
- macroeconomic stabilization, bridging balance-of-payments difficulties; policy advice
- concern with macroeconomic stability in Eastern Europe led to compensation for dollar pricing of USSR energy exports and oil price increases during the Gulf War
- works through negotiation of formal agreements on credits and policies
 - \$1.783 billion to CSFR as standby credit, of which \$690 million to overcome short-term problems financing oil imports, conditional on increasing the price of oil, gas and coal
 - 1992, IMF approves \$322 million loan to CSFR [Prague Post 92/04/07]

\$318 million to Hungary to compensate increased oil prices [ENERGY/7, p.33]

UNECE

- founded 1947, involves 43 European nations, North America, and Israel
- significant involvement in energy issues
- offers technical assistance in forming sustainable policies; market adaptation of energy industries; advises on tariffs and provides training
- main concerns with Eastern Europe are the interconnection of electricity networks, interconnection and expansion of gas networks, and the impact of economic reforms in eastern and central Europe on institutions and practices in international coal trade, new Energy Efficiency 2000 programme aims to create a vast information exchange at the industry and enterprise level
- conducts workshops and studies through its working parties on gas, coal, electric power

G-24

- founded 1990, involving 24 market economies
- significant involvement in energy issues
- coordinates assistance efforts through its "Scoreboard", provides guidelines for emergency assistance
- works through meetings of donors

EBRD

- founded in 1991, involves 55 European and North American nations, including all central and eastern European countries except Georgia
- increasing involvement with energy issues since 1991
- offers developmental and project financing in areas of infrastructure, technical assistance on least-cost planning; efficiency, conservation; interconnections, retrofitting of plants
- works through grants; loans; developmental finance
- agreed to provide financing for the Ingolstadt-Kralupy oil pipeline (PP 92/07/28)
- negotiations with Slovakia about providing financing to complete Mochovce
- agreement for loan signed in 1995 with Slovnaft for \$30 million to build gas stations (EIU 95/1)
- \$110 million loan accorded in 1995 to Slovalco (a major aluminum company in Slovakia) to modernize production (EIU 95/1)

G-7

- G-7 short-term action plan which would involve spending several hundred million dollars on the 25 most hazardous reactors in the East bloc. Could lead to a more extensive long-term programme, with cost estimates running between \$5 and 20 billion, to bring all reactors in Eastern Europe and the Soviet Union up to western safety standards. The programme will concentrate on the 10 VVER 220 reactors (in Bulgaria, Czechoslovakia and Russia) and 15 RBMKs, which have the most serious design defects. The remaining 32 Soviet-designed PWRs are more modern and come closer to meeting western standards. Programme could be multilateral or bilateral with some form of central coordination. Decision on the programme will be made at the Munich G-7 summit in July 1992. In discussions leading up to the summit, the UK govt has been particularly keen to divorce the emergency assistance, which it sees as a non-commercial safety precaution, from the commercial issue of upgrading more modern Soviet-designed reactors to international standards and building new ones. [FT 92/07/03]
- at their July 1994 meeting, the G-7 adopted an action plan to close Chernobyl, rapidly complete 3 new reactors and reform the Ukrainian energy sector (Euro Commission Green Paper, Jan 95)

Washington Conference on Assistance to New Independent States

- founded 1992, with 63 members worldwide
- involved in energy issues in its energy working group
- offers assessment of priorities, assistance in legislative reforms; pricing; demonopolization/privatization; management; supply of spare parts
- works through missions; implementation through existing programmes and the commercial sector

EUROPEAN DOMINATED INITIATIVES

EC or EU

- founded 1957, involves 12 European nations (in 1995, Austria, Finland and possible Norway and Sweden will become members) and EECs as "associates"
- significant involvement in energy issues through the Directorate General on Energy (DG XVII)
- DG XVII launched the Synergy programme to intensify energy cooperation with the central and east European countries with a focus on electric and gas connections
- PHARE offers technical assistance, expert advice on drafting energy legislation, pays foreign advisors, provides courses abroad for Czechoslovaks
- initiated the European Energy Charter; provides emergency assistance; concern with nuclear safety and energy efficiency; coordination of assistance (G-24)
- works through advisory missions, feasibility studies, grants
 - EC loan of \$500 million to CSFR finalized May 30/91. Repayable in 7 years. Aims to stabilize the crown's exchange rate. Conditional on Czechoslovakia reaching an agreement with the IMF
 - PHARE provided grants for projects to be implemented by CSFR federal committee for the environment, non-investment assistance, for financing studies and, at most, purchasing monitoring equipment [ECO 91/03/25]
 - PHARE aid of 5 million ECU to Czechoslovak energy sector announced in Aug 91 [ECO 91/08/05]

EIB

- founded 1957, involves all members of the EC or EU (12 nations up to 1995)
- has had some involvement with EEC energy issues since 1989
- offers selective project (co) financing (with the World Bank and EBRD) for infrastructure
- works through loans (8.5 interest rate, 12-15 year payback)
 - EIB opened a 700 million ECU credit to CSFR, Romania, Bulgaria for projects aimed at integration into Europe. CSFR intends to use its share to connect with West European oil pipelines [ECO 91/07/24]

Pan-European Energy Charter

- 47 European and North American nations, plus Japan and Australia
- in 1991, the European Council of Ministers organized an international conference to pursue a proposal made by Netherlands Prime Minister Ruud Lubbers an all-European energy charter. The Charter was signed on December 17, 1991 by 35 countries and 9 Soviet Republics
- exclusive concern with energy issues
- the Charter sets out principles that will be fleshed out as binding protocols covering various aspects of energy are agreed sector by sector.
- Aims to support the political developments in Eastern Europe by means of concrete cooperation and greater integration in the energy field, in particular to secure stable energy supplies, obtain a better balance between energy sources, and limit external (especially OPEC) dependence. Strengthening European gas, oil and electricity grids is a priority. Further aims are to support a more efficient use of energy and reduce energy-related pollution.
- Aims to encourage the exchange of Western capital and know-how for enormous natural gas and oil reserves held by the USSR. The West would invest in Eastern supplies in exchange for long-term supply contracts that would reduce its dependence on OPEC. [Le Monde 91/12/18] Protocol 4, covering hydrocarbons, aims to set out conditions under which western operators would be able to take part in developing Soviet oil and gas reserves, and a key provision would ensure that non-Soviet companies can repatriate profits and be protected from expropriation.
- In December 1994 the European Energy Charter Treaty was signed by 41 countries. The Czech Republic and Hungary stated their intentions to sign the Treaty in early 1995 and continued their work on the Charter Secretariat in the meantime. It is the first multilateral treaty between East and West Europe since the Cold War ended. The Treaty brings into existence the European Energy Charter Conference that will monitor implementation. Clive Jones from the UK was appointed Secretary General.

- Aims to promote economic recovery in the East by encouraging energy investments and energy trade and formally launches negotiations on investment rights and a future regime for import and export tariffs on energy materials. (Energy in Europe, No 24, December 1994, p 50)

John Wakenin, the British energy secretary: the charter's provisions "for investment protection and competitive energy markets will encourage investment in the SE and EEC's. Peter Hadfield of Royal Dutch/Shell Group: "We believe in a free market, and if the charter opens trade with EE that would be fine. But we want no bureaucracy and centralized planning." (O&G 91.12.24)

Central European Initiative

- founded in 1990, involves Austria, Croatia, CSFR, Italy, Hungary, Poland, Slovenia, Yugoslavia (suspended 30.11.90)
- aims to contribute to security and stability during the Eastern European countries' conversion from central planning to market economies with democratic rule
- formed nine working groups to focus on various cooperative undertakings
- significant involvement in energy issues
- working group on energy has been headed by Czechoslovakia to study the possibilities of connecting electricity grids and oil and gas pipelines
- offers project-oriented technical assistance for infrastructure through feasibility studies (e.g. study of expanding the Adria pipeline's capacity)

Source: ENERGY/R78 92/08/28, unless otherwise referenced

APPENDIX B

TECHNOLOGY TRANSFER AND TECHNOLOGICAL CAPABILITY.

Flow A: Capital goods, services and design specifications

The machinery and equipments which is acquired and brought into operational use during investment projects; technological and managerial services, including feasibility studies and project management. For establishing local production of machinery and equipment, a project might include transfers of capital goods, but the main component would be design specifications

Flow B: Skills and know-how for production

Paper-embodied technology such as manuals and flow-charts

People-embodied knowledge through various types of training that produces a deeper understanding of the product; system to increase capacities for problem-solving

Flows A and B increase 'production capacity' in the technology-importing enterprise, but adds little or nothing to the importer's capacity for 'producing technical change, "unless the activities are managed in particular ways to achieve that objective." Distinguishes between production capacity and technological capacity: the ability to manage and generate technical change

Flow C is what Bell considers the necessary addition to the process, knowledge and expertise for generating and managing technical change

Concerned with changing technical systems and developing or introducing new systems rather than only using them as given

1) System-specific knowledge is deeper and more elaborate than the basic elements of understanding needed to deal with routine operation and maintenance: know-why as opposed to know-how

2) The design, engineering, planning and managerial expertise required to use the know-why and transform it into "concrete realities of new or changed processes or products" - assess and draw upon potentially relevant technology that may be available elsewhere, evaluate the techno-economics of alternatives, managing the process of incorporating technology into new or improved production systems

Flow C will frequently require organizational arrangements that are novel for both parties involved. But can also occur quite naturally given a certain relationship between researchers, suppliers, consumers

From Bell, 1990, pp 77-78

APPENDIX C

GABCIKOVO-LOSES-NAGYMAROS

The "good example of cooperation between small European countries" that a Gabčíkovo-Nagymaros nature reserve would have provided turned instead into one of the most heated disputes to affect the 'Visegrad Three'

When the Civic Forum-Public Against Violence government came to power in November, the Hungarians, who had halted all work on the project in August 1989 in response to public pressure (the same public who assured the non-communists election), immediately proposed modifying the bilateral treaty of 1977 that had initiated the Danube project. That their second communication with the new government in Prague was a proposal to modify the treaty gives some indication of the importance the new Hungarian government attached to the outcome of Gabčíkovo-Nagymaros. They expected a positive response from the new government, and, at first, were not disappointed. Havel initially supported abandoning the project, and in April, 1990, the Slovaks announced that work on the project was to be suspended for two years until further impact studies could be completed. (Rude Pravo, FBIS, April 26, 1990)

But by the summer of 1990, Czechoslovak officials at both federal and republic level had solidified their position: they were open to compromise, but wanted to go ahead with at least part of the project. "Billions have been poured into Gabčíkovo, so let them produce energy for us at least." (Foreign Minister Dienstbier quoted in Narodna Obroda, FBIS June 13, 1990) Czechoslovak Environment Minister, Vavrousek, had come out quite strongly against the dam directly before the revolution, but sounded less assured of the wisdom of abandoning the project once in office. He declared that he personally "is convinced that the project was erroneous from the very start," but that 90% of it was on Czechoslovak territory, was complete and that "the correctness of a unilateral abrogation of the contract was questionable." (Lidova Democracie, FBIS, July 11, 1990)

As with Temelin and Mochovce, mistrust of Communist methods and data led to an initial assessment phase in which the plant was studied by Czechoslovak and Western agencies, however, no single institution such as the IAEA could be turned to for a decisive opinion and no book of "Western standards" existed for hydroelectric power. The technical recommendations and assessments provided by external bodies were diverse enough that they could be used to bolster both Czechoslovak and Hungarian positions in a debate that thus remained essentially political.

Compromises were attempted through 1990. According to first post-revolution proposals, Hungary would agree to the completion of the Gabčíkovo dam on the Czechoslovak section of the project "provided that certain ecological requirements were met" (Reisch, RFE, p.27). The Dunakiliti dam and reservoir would be completed but the Nagymaros part of the project would be abandoned. This suggestion produced an outcry from the Hungarian public, who demanded that the government make any future proposals public and take no further steps until parliamentary elections had taken place. The government conceded.

In March 1991, the Slovak government contracted with Hydro Quebec to work out an environmental impact study of the project. Mr Simard, responsible for the project at Hydro Quebec, stated in a personal interview that their study led to 19 recommendations on minimizing damage to the environment. In effecting the evaluation, he said Hydro Quebec had taken into account that the project was complete, with turbines already installed, and admitted that their recommendations may have been different had they been evaluating a proposal rather than a finished complex. The Hungarians engaged the international WWS environmental group to accomplish an impact study to counter the Czechoslovak results.

Slovak Prime Minister, Meciar, adopted the confrontation with the Hungarians over Gabčíkovo-Nagymaros as part of his separatist platform. In April, 1991, Meciar rejected Hungary's ecological opposition to the project and said that the 1977 agreement remained valid. (RFE, April 22, 1991) The federal government, still responsible for ultimately deciding the issue, needed to retain good relations with the Hungarian government, but could not afford to be perceived as working against the interests of the Slovaks in this critical time before the separation of the country appeared inevitable. The Federal government thus approved the Slovak decision in July 1991 to complete the Slovak part of the dam on the Danube in spite of Hungary's withdrawal from the project. (ECO 91/07/29)

In September 1992, Meciar and Antall agreed to have a joint commission consider the economic aspects of the dispute and accepted an offer from the EC to have international experts

help resolve the conflict (Interview with Hanzel at SEP, ECO 91/04/03, IPRS TEN 92-005, Prague Post 92/05/19, Prague Post 15/09/92)

While the federal government remained the official party involved in negotiations, it wanted the Slovak government to assume responsibility "as soon as possible" (Montreal Gazette, 26/10/92, CSTK 11/11/92) Meg Ryan, an intern at SEVEN, stated in a personal interview that the federal government was "kind of embarrassed" about giving the okay for Gabčíkovo, and would have preferred to extricate itself from the whole thing "The Ministry of Finance's line has been 'it's 95% done, let's just finish it,'" she said

On October 22, 1992, Slovak engineers began to divert the Danube into a 20km concrete canal. Talks in Brussels had just broken off, but the EC had made no definitive statement on the project and was keeping their study of the dam confidential, according to Hanzel from SEP. While an immediate call for economic sanctions against Czechoslovakia was put out by European environmentalists, no concrete action was taken against the Slovak Republic. Two years later, in 1995, the dispute was still waiting to be heard by the European Court of Justice as Hungary started to dismantle Nagymaros (EIU Country Report, Q1 1995, p.39)

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