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SOVIET ENERGY AND EASTERN EUROPE: THE ROLE OF JOINT VENTURES. (U)  
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⑥ SOVIET ENERGY AND EASTERN EUROPE:  
THE ROLE OF JOINT VENTURES •

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Masters Paper  
Department of Geography  
Syracuse University  
Syracuse, New York 13210

30 March 1979

⑨ Final rept.

⑪ 1 Jun 79

⑫ 52 p.

*Robert A. Jensen*


Principal Reader

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SOVIET ENERGY AND EASTERN EUROPE: THE ROLE OF JOINT VENTURES

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Final Report 1 June 1979

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A Master's Paper submitted to Syracuse University, Syracuse  
New York in partial fulfillment of the requirements for the  
degree of Master of Arts in Geography.



## UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle)  Soviet Energy and Eastern Europe: The Role of Joint Ventures		5. TYPE OF REPORT & PERIOD COVERED Final Report 1 June 1979
7. AUTHOR(s)  Frank W. Koleszar		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Student, HQDA, MILPERCEN (DAPC-OPP-E) 200 Stovall Street Alexandria Virginia 22332		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS HQDA, MILPERCEN ATTN: DAPC-OPP-E 200 Stovall Street Alexandria Va 22332		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE 1 June 1979
		13. NUMBER OF PAGES 44
		15. SECURITY CLASS. (of this report)  UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report)  Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES  Document is a Master's Paper (similar to a thesis), completed at Syracuse University.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)  Soviet Union      CMEA      Joint ventures Eastern Europe      Energy      Natural resources COMECON      Foreign Trade      Geopolitics Economic geography      Regional development		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  Rapidly growing energy demands among the nations of the Council for Mutual Economic Assistance (CMEA) is placing ever greater demands on the increasingly problematic Soviet energy supply. This situation together with the constantly rising world oil and gas prices, the Soviet desire to export oil and gas for hard currency,		

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1. TITLE	Soviet Energy and Eastern Europe: The Role of Joint Ventures
2. AUTHOR	Frank W. Kullander
3. INSTITUTION	Stanford University, HARRIS MILLERSON (DACS-007-2)
4. DATE	200 Stanford, CA 94305
5. SUBJECT	Stanford University, HARRIS MILLERSON (DACS-007-2)
6. ABSTRACT	Stanford University, HARRIS MILLERSON (DACS-007-2)
7. KEYWORDS	Stanford University, HARRIS MILLERSON (DACS-007-2)
8. CLASSIFICATION	UNCLASSIFIED

Approved for public release; distribution unlimited

Document is a Master's Paper (similar to a thesis) completed at Syracuse University.

Joint ventures  
Soviet Union  
CMEA  
Foreign Trade  
Economic Development  
Regional Development  
Energy  
Natural Resources  
Geopolitics  
The Soviet Union is a major energy supplier to the nations of the Council for Mutual Economic Assistance (CMEA) and is also an ever greater demand on the increasingly problematic Soviet energy supply. This situation together with the constant rising world oil and gas prices, the Soviet desire to export oil and gas for hard currency, and the growing energy demands among the nations of the Council for Mutual Economic Assistance (CMEA) is also an ever greater demand on the increasingly problematic Soviet energy supply. This situation together with the constant rising world oil and gas prices, the Soviet desire to export oil and gas for hard currency, and the growing energy demands among the nations of the Council for Mutual Economic Assistance (CMEA) is also an ever greater demand on the increasingly problematic Soviet energy supply.

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Unannounced	<input type="checkbox"/>
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Distribution/ _____	
Availability Codes	
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## SOVIET ENERGY AND EASTERN EUROPE: THE ROLE OF JOINT VENTURES

ABSTRACT. <sup>\*</sup>Rapidly growing energy demands among the nations of the Council for Mutual Economic Assistance (CMEA) is placing ever greater demands on the increasingly problematic Soviet energy supply. This situation together with the constantly rising world oil and gas prices, the Soviet desire to export oil and gas for hard currency, and the low prices paid by CMEA members may make East Europe, which is critically dependent on Soviet energy, an economic burden to the Soviet Union. The geopolitical and economic costs of reducing this burden poses a dilemma for the Soviet Union. This paper examines the role of joint ventures in Soviet relationships with Eastern Europe. Formed as a byproduct of the CMEA Comprehensive Plan, it appears that joint ventures may reduce the opportunity cost to the Soviet Union of maintaining energy flows to East Europe. At the same time joint ventures may facilitate Soviet regional development plans. <sup>\*</sup>

### EVOLUTION OF THE CMEA ENERGY SITUATION

The Soviet Union is sustaining large losses of potential hard currency earnings from oil and gas by continuing to sell low priced energy to Eastern Europe, where energy consumption far exceeds production. The problem had its beginnings in the late nineteen-forties when the East European nations were isolated from the West by the Iron Curtain and forced into a wrenching readjustment and reorientation of their political and economic systems toward the USSR. This isolation was made more complete by the formation of the Council for Mutual



Economic Assistance in 1949, which was formulated in an attempt to emulate the success of the Marshall Plan and at the same time to prevent its encroachment in areas of Soviet occupation. Until Stalin's death CMEA as an organization remained sterile and ineffectual, although intrabloc trade did expand somewhat. In 1954-1955 relaxation of harsh Soviet trade controls and restrictions, and formation of the European Economic Community gave impetus to CMEA's efforts to act together as a trading bloc.<sup>1</sup> CMEA trade in energy during this early period was largely in terms of coal (Table 1).

Economically the problem evolved as the nations of East Europe followed the Soviet model of economic development which stressed heavy industry and therefore pushed energy consumption to new heights. The nations of East Europe began to import substantial quantities of oil, almost all of which was from the Soviet Union (Table 1).

With the 1973 Oil Crisis, the subsequent rise of world oil prices and the relative inconvertibility of East European currencies, oil soon became the major earner of hard currency for the Soviet economy even though the demand for oil within CMEA continued to expand. Meeting this demand put a great strain on the Soviet Union, as it attempted to maximize hard currency earnings by selling oil on the world market. As a partial solution the Soviet Union raised the price for oil to the CMEA countries early in 1975, although not to world market levels.

Over the years the geographical dimensions of the CMEA energy supply problem became increasingly problematic. Up until the mid 1950s coal was still the primary energy source for both East Europe and the Soviet Union. At that time the Soviet leadership began to shift to oil and gas, thus increasing the demand for these fuels. East Europe

TABLE 1

## EAST EUROPEAN ENERGY IMPORTS

<u>Net Imports (Exports)</u>	<u>1965</u>	<u>1972</u>	<u>1975</u>	<u>1980</u>
Oil (mill. tons)	13.5	49.1	61.3	91.0
Natural Gas (Bill. cu. mtr)	.2	2.3	9.1	23.4
Coal (mill. tons)	2.3	(13.3)	(15.8)	(17.8)

Source: Scanlan, L. "The Energy Balance of the COMECON Countries." in Exploitation of Siberia's Natural Resources. NATO Directorate of Economic Affairs. M. Yves Laulan Ed. Brussels: 30 January-1 February 1974, p. 100.

Updated by United Nations Secretariat of the Economic Commission for Europe. Economic Survey of Europe in 1976 Part II: Five Year Plans for 1976-1980 in Eastern Europe and the Soviet Union. New York: 1977, p. 85.

followed the Soviet lead further increasing demand. This increased demand rapidly depleted the reserves in the traditional areas of gas and oil production and forced intensive searches for new oil and gas fields. For coal the centers of production were the Silesian fields in Poland and the Donbass and Kuzbass in the USSR. The oil bases were Ploesti in Romania and the Volga fields in the Soviet Union (Fig. 1). The search for new bases led to West Siberia and Kazakstan where substantial deposits of oil, gas and coal were discovered. This resulted in a locational shift in energy production (Fig. 2).

The pattern of imports within East Europe changed from coal to oil and gas as a result of the above factors, plus the lack of available additional energy supplies in East Europe.

Taken as a region East Europe has a substantial energy dependence on the USSR. For oil this dependence is of staggering proportions with over seventy-five percent of all oil used in East Europe being imported from the Soviet Union. In Czechoslovakia's case it is 100 percent. In terms of the total energy requirement considering all fuels, by 1990 it is projected that the nations of East Europe must import up to twenty-three percent from the USSR (Table 2). The oil deficit of 150 million tons per year is the greatest problem but the thirty-three million tons standard fuel deficit will almost certainly rise as the nation's continue to switch to this or that commodity. Coal will continue to be in surplus but will not offset the oil and gas deficit. From the USSR's point of view, this East European dependence together with other competing demands poses a major problem.



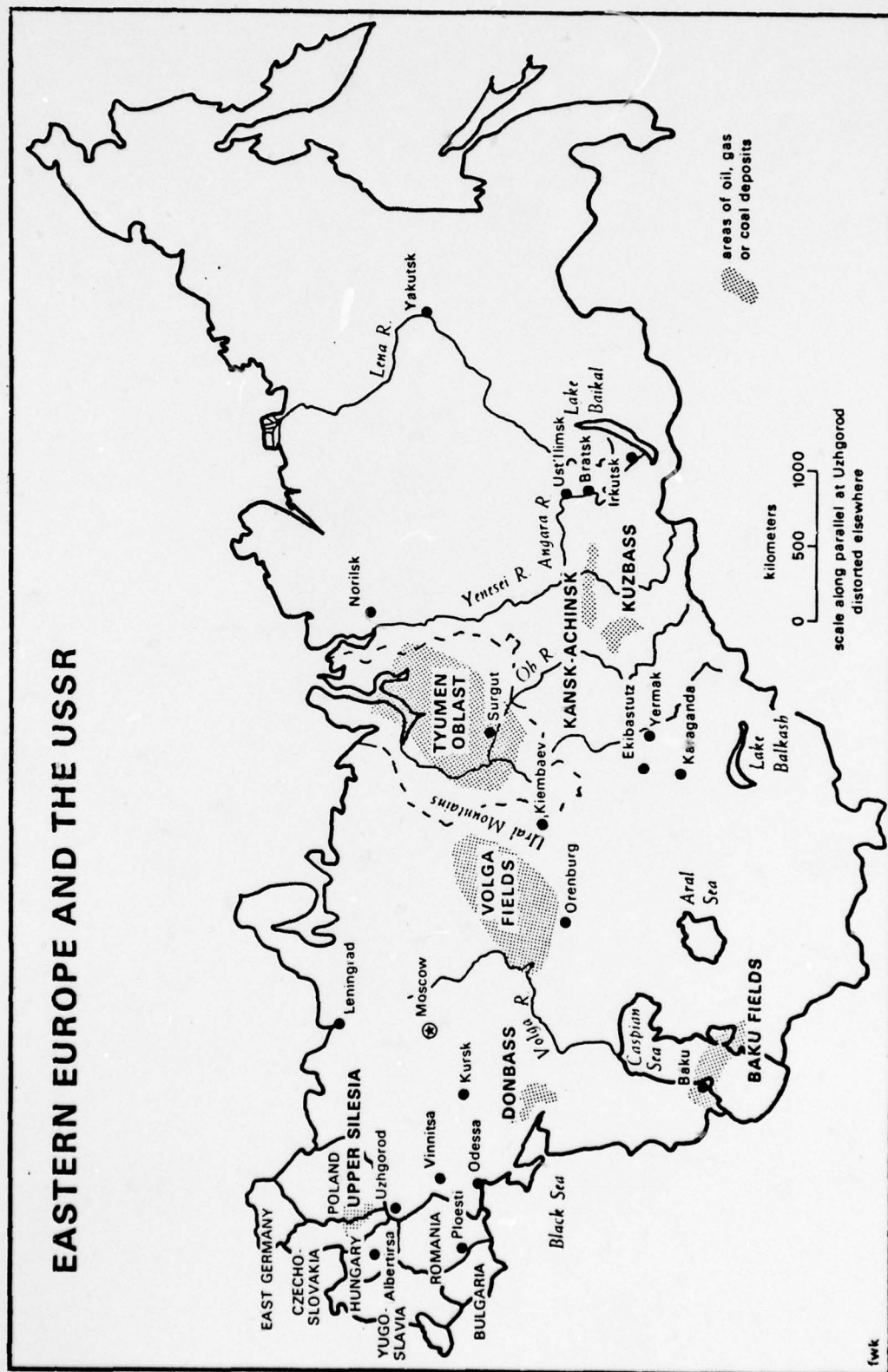


Figure 1 Reference Map

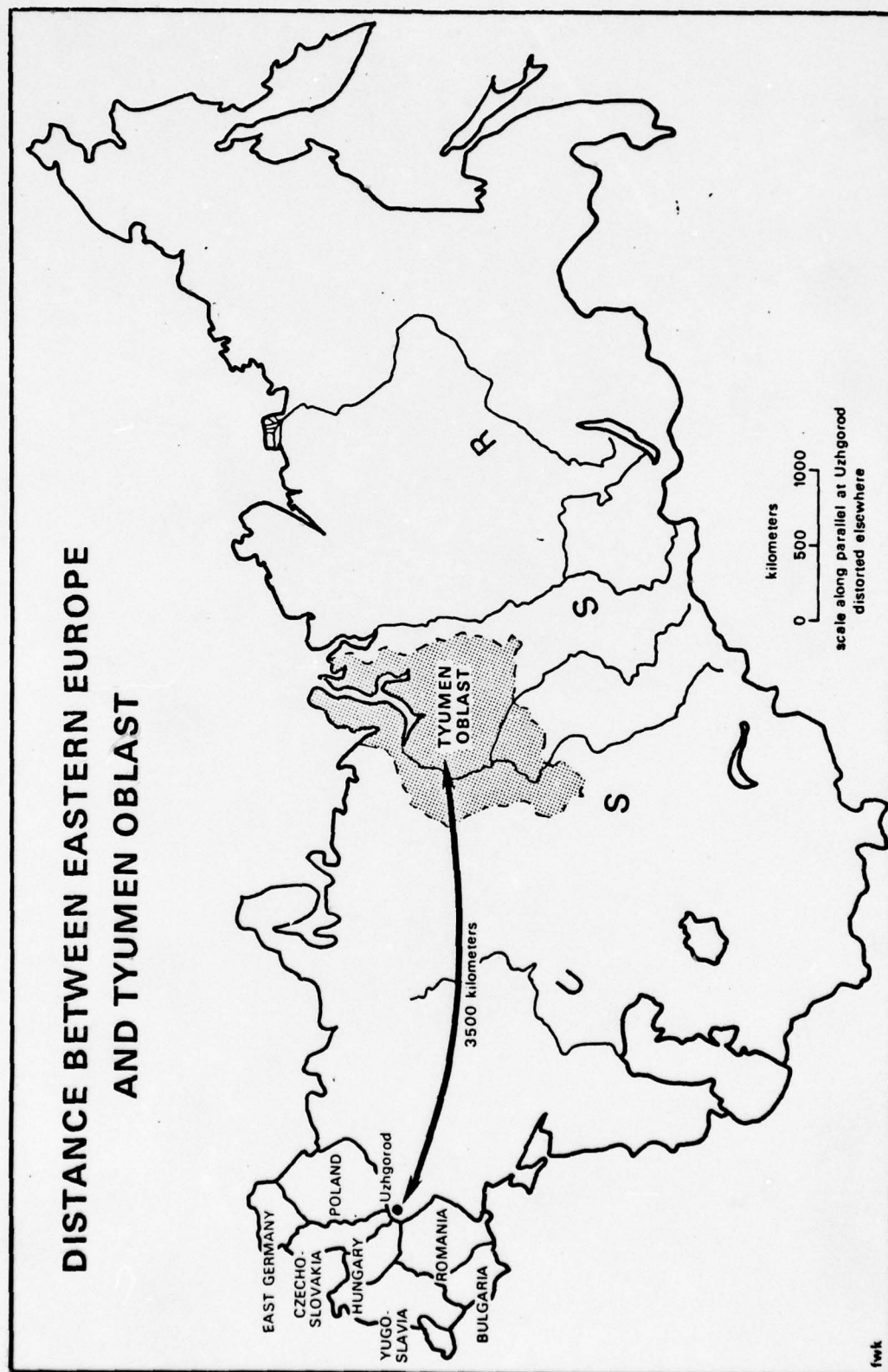


Figure 2 Locational Shift in Energy Production

TABLE 2

## PROJECTED EAST EUROPEAN ENERGY BALANCE 1980-1990

Countries represented are Poland, Czechoslovakia, German Democratic Republic, Romania, Hungary and Bulgaria.

MTSFE - Millions of Tons of Standard Fuel Equivalent

	<u>Oil</u>	
	$10^6$ tons	MTSFE
Demand	128.0	183.3
Production	19.1	27.3
Deficit	108.9	156.0

	<u>Natural Gas</u>	
	$10^9$ Bill. m <sup>3</sup>	MTSFE
Demand	92.0	110.6
Production	65.4	78.0
Deficit	26.4	32.6

	<u>Coal</u>	
	$10^6$ Tons	MTSFE
Demand	321.2	321.2
Production	371.0	371.0
Surplus	49.8	49.8

Summary Balance, All Fuels

	MTSFE
Demand	615.1
Production	476.3
Deficit	138.8

Source: Russell, Jeremy. Energy As A Factor in Soviet Foreign Policy.  
pp. 118-119.



## THE SOVIET ENERGY PROBLEM

The Soviet energy problem has interrelated supply and demand aspects. On the demand side, the USSR would like to meet East Europe's growing needs, rapidly growing Soviet domestic requirements, and West Europe's growing desire for Soviet energy (Fig. 3).

On the supply side there is some doubt that the USSR can meet the demands due to problems associated with the shift in location of resource base. The US Central Intelligence Agency prediction that the Soviet Union must soon become a net importer of oil is a reflection of this doubt.<sup>2</sup>

According to expert opinion, this problem will probably continue to exist for at least the next ten years.<sup>3</sup> The courses of action Soviet planners must rely on during this period to solve this problem are finding new domestic energy supplies, substituting less critical coal for oil and gas and modifying demand regionally.<sup>4</sup> To be fully understood, the dilemma this poses for the Soviet leadership must be seen in all its dimensions.

## DIMENSIONS OF THE SOVIET ENERGY DILEMMA

To be sure the USSR would like to provide energy to all three major sources of demand. However the situation goes beyond mere desire. Indeed the USSR is in a position wherein all three demand options are necessary and must somehow be met. Failure to meet demands in any area could very well result in adverse geopolitical and economic consequences. This situation poses a real dilemma to the Soviet leadership. Complicating this relationship on the demand side are the supply constraints which must also be met and are largely operative in terms of

# ELEMENTS OF THE SOVIET ENERGY PROBLEM

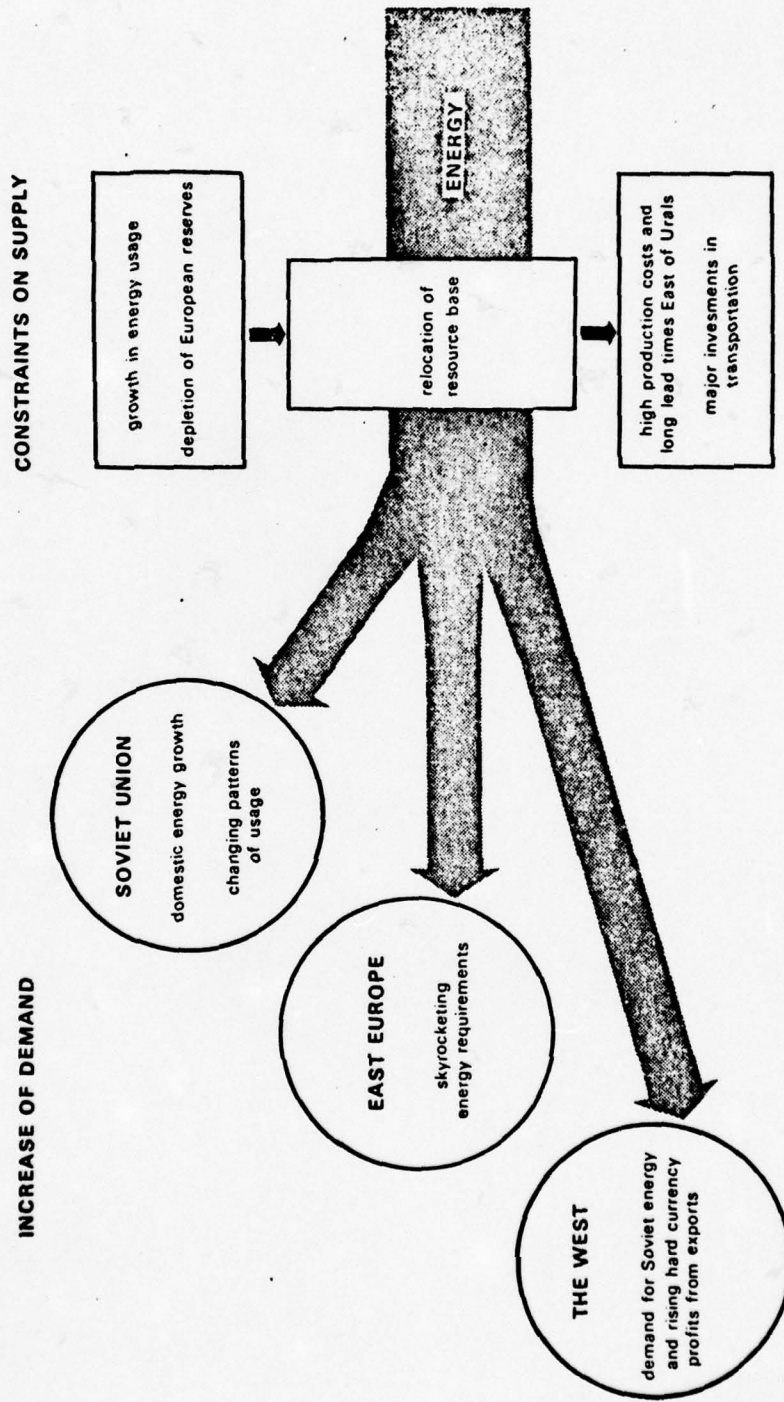


Figure 3

geography. Thus to fully understand the dilemma, it must be considered in terms of each of the three related dimensions; geopolitical, economic, and geographic.

#### Geopolitical Dimensions

Upon analyzing the Soviet energy problem one must keep in mind that the Soviet domination of Eastern Europe politically, militarily and economically can be regarded as the modern culmination of a movement with centuries old precedents: the acquisition of Western buffer states in the Russian sphere of influence. In part, this stems from the geography of the North European Plane and the relative lack of relief or natural features which could serve as defensible borders. The frequent, violent gains and losses of territory as the march-lands were crossed and recrossed, especially the most recent memory of Nazi Germany, has no doubt made a deep impression on the security conscious Soviet leadership. Thus the gain of eight buffer states as a result of the fortunes of war must have considerable strategic value from the Soviet point of view; it can be inferred that the present leadership will attempt to maintain this dominance, even at high political or economic cost. This strategic aspect of Eastern Europe will undoubtedly cause the Soviet leadership to be very reluctant to decrease flows of gas and oil to the region or even to cut off the yearly incremental increases.

Related to the strategic aspect is the potential for political destabilization of East Europe with decreased flows of oil and gas. To the extent that the Soviet Union declines to provide these commodities to East Europe in the increasing quantities required by their



growing industries, the nations must seek other sources or slow down their growth rates, both politically risky moves for the USSR.

To decrease supplies to Eastern Europe and essentially force them to purchase oil at Western prices on Western markets would place a burden of payment in scarce convertible currency on their shoulders.<sup>5</sup> Such actions might however be counterproductive, for by establishing oil purchases in the West, a momentum might be generated that is hard to stop and carries with it undesirable Western economic and social ethics.<sup>6</sup> Forcing East Europe to seek sources of energy outside CMEA therefore involves political risk.

#### Economic Dimensions

Soviet need and desire to export oil and gas to the West is a result of their need for hard currency. In turn the root cause of the Soviet need for hard currency seems to be the problem of chronic inconvertibility of the Ruble, which in turn appears to be caused by suppressed demand and uncertainties resulting from the fact that the USSR is not an open market. Thus no one wants to convert their holdings to purchase Rubles; such currency becomes inconvertible.<sup>7</sup>

Hard currency is needed to purchase technologically superior oil and gas exploration equipment from the West, and in lean years grain stocks. But selling oil and gas to East Europe (who also lack hard currency) does not alleviate the situation. Thus a gap develops between the amount of hard currency the USSR could earn in Western markets and the soft currency price paid by the nations of East Europe. This gap between actual and potential earnings from energy resources can be viewed as subsidizing the nations of East Europe and thus a burden on the Soviet Union.<sup>8</sup>

In the past the Soviet government has probably made a conscious decision to shoulder the burden, perhaps viewing such loss of potential currency as the political price or opportunity cost, that must be paid to keep control of the bloc.<sup>9</sup>

However, economic costs to the Soviet Union for preserving this dependence of Eastern Europe energywise will almost surely rise in the future and will require reassessment of the political benefits gained.<sup>10</sup> This rise in economic costs will most probably be due to the rapidly rising prices of oil, coal and natural gas and the continued growth in use of hydrocarbon fuels in East Europe as industrial expansion and the shift to oil and gas continue.

#### Geographic Dimensions

In contrast to the increasing demands on Soviet energy which were manifest in the geopolitical and economic spheres, the increasingly tight supply situation manifests itself largely in geographic dimensions.

First the move of the energy base to West Siberia means that oil, gas, and to some extent coal and hydroelectric power are not located where they are needed. About eighty-eight percent of the Soviet population can be considered to live in a "wedge" from Leningrad to Odessa to Irkutsk. The center of gravity of this wedge is somewhere in the Western USSR in the general vicinity of the Volga river, which was also the center of the petroleum and gas production in the 1960s. Within the wedge the industries and people consume about eighty percent of all energy that is produced in the USSR.<sup>11</sup> This shift in location of energy resource base to a center of gravity in West Siberia was necessitated by both Eastern Europe's and the Soviet Union's constant growth

in oil, natural gas and coal usage and the depletion of the energy reserves of the Western portion of the Soviet Union. The result has been to dramatically increase the distance between energy supplies and energy markets in the Soviet Union, East and West Europe. This has led to high development costs and long lead times in the Tyumen region and has necessitated major investments in transportation.

The production problem is finding new sources of oil and getting it out of the ground. This involves time consuming exploration and drilling in likely areas; often such drilling is fruitless. Although the shift in energy resource base is a direct result of preliminary finds of oil and gas in West Siberia, wells must be drilled in the correct areas to obtain the resources therein. Climate adversely affects production. With a January temperature of  $-43^{\circ}\text{C}$  the climate of this area is similar to Northern Alberta at the edge of the Canadian arctic. In US terms this shift would be similar to uprooting and rebuilding the Gulf Coast oil industry in this Canadian arctic region.

Supply constraints to petroleum and gas expansion are as much related to transportation problems as they are to production, and the shift in energy resource base has multiplied this problem tremendously. The flow of all types of fuel will soon be predominantly westward from Siberia and Soviet Central Asia to the industrial portions of the Central Economic Region and vicinity, and the Urals (Table 3). In terms of standard fuel by 1980 over four and one-half times the 1970 amount is projected to flow westward for oil, gas and coal.

The natural gas case is perhaps the most dramatic. In 1970 approximately forty-five billion cubic meters flowed westward or one-fourth of all Soviet gas produced (Fig. 4). By 1980 the westward flow must be



TABLE 3

## WESTWARD MOVEMENT OF FUEL FROM SOVIET ASIA

Fuel	Year		
	1970	1975	1980 (planned)
Oil (million tons)	15.0	113	242
Natural gas (bil. cu. meters)	44.8	104	224
Coal (million tons)	65.8	96	120
Total (million tons SF)	130.0	361	708

Source: Dienes, Leslie. "The Soviet Union: An Energy Crunch Ahead?"  
Problems of Communism Sep-Oct 1977, p. 47.

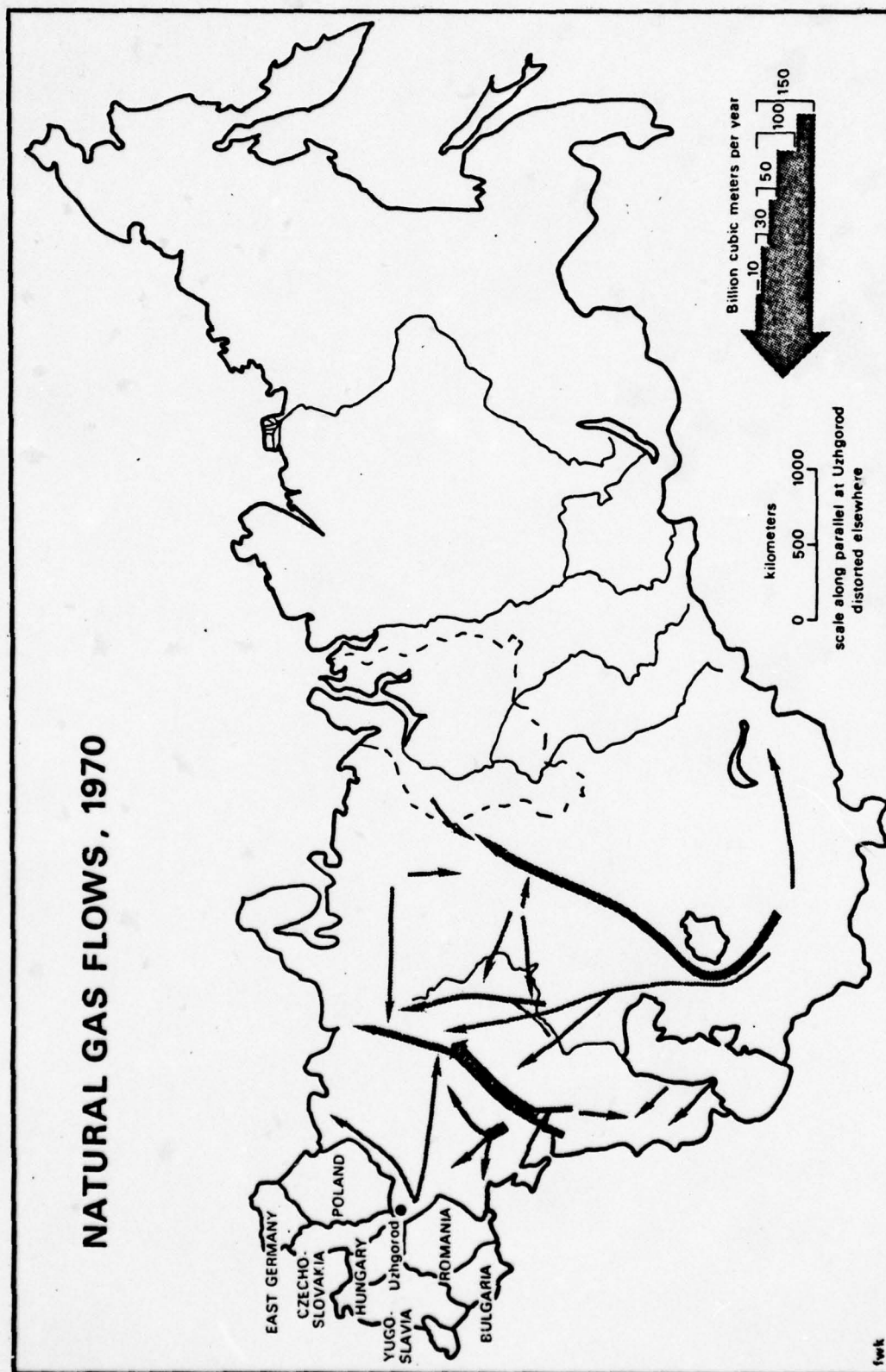


Figure 4

one-half of all Soviet gas production or 220 billion cubic meters, most of which must come from Tyumen Oblast (Fig. 5). Only superlatives can describe the magnitude of this task. Taking oil and gas pipelines together, the current plan requires an average of almost 7000 kilometers of pipeline to be laid each year. This is the equivalent of laying a Trans-Alaskan pipeline every six weeks, often in similar arctic conditions.

For oil the transportation problem is nearly as acute. The rapid shift to Tyumen Oblast has caused a lack of pipeline capacity to the refineries in the European USSR. However, even with this problem the westward flow was 113 million tons in 1975 or about twenty-three percent of national production.<sup>12</sup> During the period 1970-1975, oil pipeline transmission (in ton miles) increased 2.4 times as compared with only thirty-six percent increase in overall transportation network.<sup>13</sup> Growing reliance on long distance coal hauls from the Kuzbass, Karaganda, and Ekibastutz also increase the geographic separation of the western manufacturing region and the eastern resource region. The average coal haul in the USSR in 1970 was 692 kilometers (vs. 1204 kilometers for oil).<sup>14</sup> The westward movement will continue with a planned increase from 1970-1980 of almost fifty percent from sixty-six to 120 million tons, or fifteen percent of the national coal product.<sup>15</sup>

A third major reason why the energy supply is becoming increasingly tight is due to continuing change in sectoral and regional energy demand patterns. Continued Soviet shifts to oil and gas from coal for power plants and boilers fly in the face of official policy, which is now to increase coal use in these sectors. However, increasing energy demand and decreasing coal supplies west of the Volga, together with growing



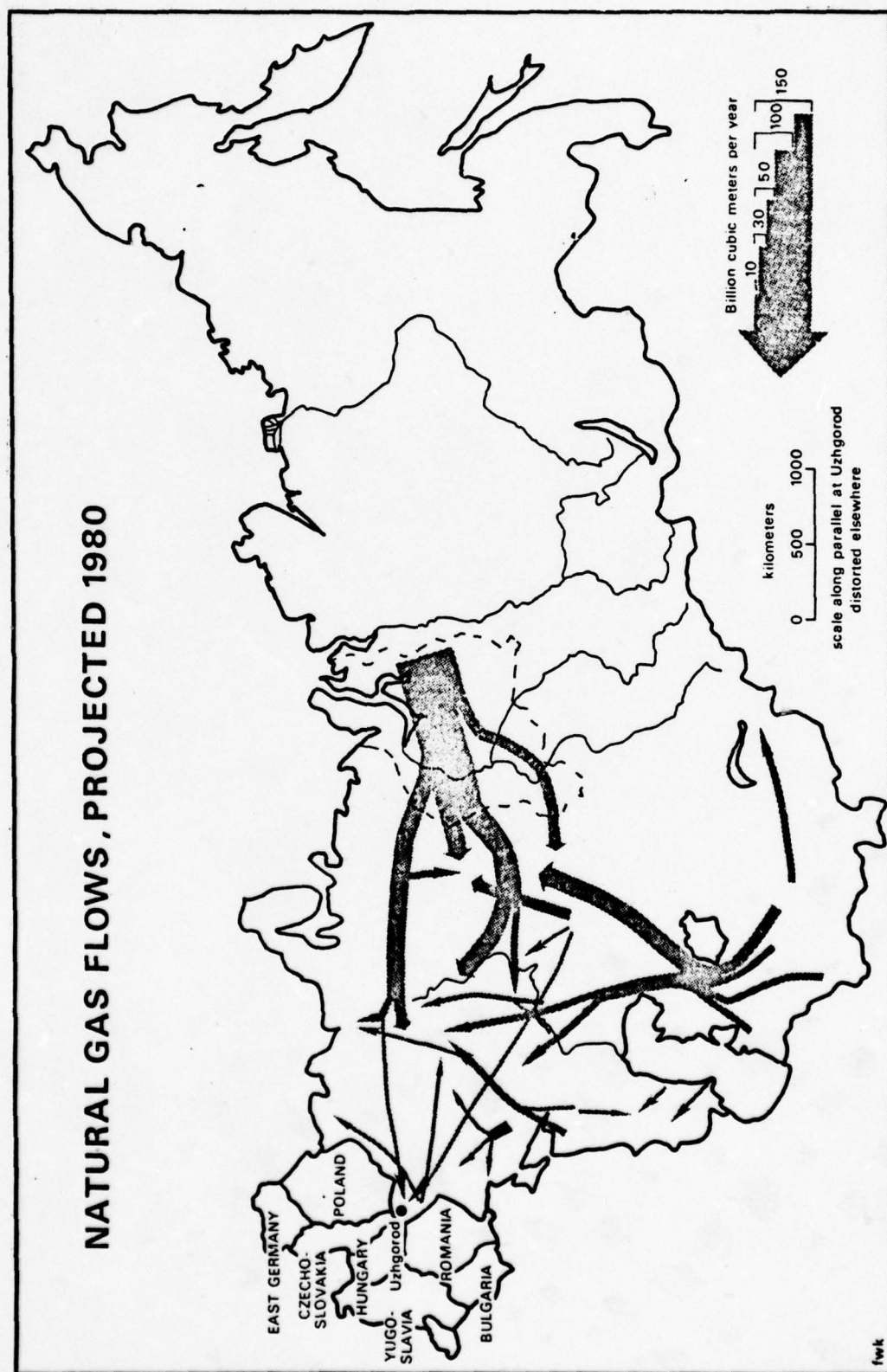


Figure 5

environmental concern over coal dictate that demand for oil and gas will continue to grow for the next four or five years.<sup>16</sup> A good example of this continued shift in the energy balance is in the area of thermal electric stations (Table 4). A reflection of the entire Soviet situation, this table shows a twenty-four percent decrease in the coal's share of the energy structure in the last fifteen years and a combined twenty-seven percent increase in the share of oil and natural gas over the same period. This shift, although reflected in terms of only one sector (power production) has had impact in other sectors as well.

What are the implications of the above information for the USSR's energy supply? Most probably oil and gas will become more expensive to produce and transport. In terms of production these higher costs are concentrated in the oil industry where extraction costs are highest, averaging fourteen to fifteen rubles per ton.<sup>17</sup>

Production costs of secondary importance lie in the area of infrastructure. Reliance on Tyumen Oblast for oil and gas means the presence of armies or workers, technicians, managers, and engineers. However the severe climate, few villages and virtually no roads combine to make life extremely uncomfortable for those engaged in extraction. Such inhospitable situations require intensive capital and labor resources to develop a system of transportation, communication, utilities and services in the new areas. It has been estimated that 25,000 rubles of new investment is needed for each new arrival in the Surgut region, while in the extreme northern part of West Siberia the figure is twice as high.<sup>18</sup>

Costs of transporting both oil and gas increase with distance from 2.3 rubles per ton per 1000 kilometers to 10.8 rubles per ton for 4000

TABLE 4  
CHANGE IN STRUCTURE OF SOVIET ENERGY CONSUMPTION  
IN THERMAL ELECTRIC STATIONS

	Percentage				
	<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1975</u>	<u>1980 (Forecast)</u>
Oil	7.5	12.8	22.5	28.8	28.0
Natural Gas	12.3	25.6	26.0	25.7	25.1
Coal	70.9	54.6	46.1	41.3	42.5
Other	9.3	7.0	5.4	4.2	4.4
	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

Source: Dienes, Leslie. "Soviet Energy Policy and the Hydrocarbons." Discussion Paper Association of American Geographers Project on the Soviet Natural Resources in the World Environment. April 1978, p. 23.



kilometers.<sup>19</sup> Gas transportation costs are about four times that of oil due to the problems of shipping in the gaseous state.

In sum the geographical remoteness of the new producing region will undoubtedly raise the costs of supplying gas and oil to the separate domestic and export demand regions. This in turn will exacerbate the dilemma the USSR finds itself in terms of meeting the three areas of demand simultaneously. As an end result the USSR is finding it increasingly difficult to continue to provide gas and oil to Eastern Europe in the same manner as before.

#### JOINT VENTURES, THEIR DEFINITION AND CHARACTER

The term "joint venture" variously referred to as "joint construction," "joint projects," "joint developments," and "joint investments" has a wide variety of meanings in economic, political and geographic literature. In Western usage a joint venture is most often defined as a "temporary partnership formed to carry out a single business enterprise for usually a relatively short period of time."<sup>20</sup> As such the joint venture involves investment or equity and implies ownership. In Soviet usage there can be no foreign control of the means of production as all such means must be controlled by the State for the common good. As such there can be no joint ventures on Soviet soil in the Western sense. The Soviets view a joint venture as "an investment without ownership title," and formulated on a multilateral basis between nations.<sup>21</sup> An investment can be considered the construction of a production facility or development of a raw material resource, but does not automatically imply ownership.<sup>22</sup> This Soviet definition is the one that will be used throughout this paper.

In this context it is illustrative to examine the role of roles of joint ventures in reducing the common Soviet and CMEA energy problem. It is at once apparent that any joint venture will have geopolitical, economic and geographic aspects, just as the dimensions of the energy dilemma are framed in those terms.

Joint ventures arise from the CMEA planning process, specifically the "Comprehensive Program" adopted in 1971 and the "Coordinated Plan" (the CMEA Five Year Plan) adopted in 1975. These programs emphasize integration of CMEA economies and have as one of their main objectives the expansion and intensification of the fuel and raw material base of the CMEA countries.<sup>23</sup> Such integration could reduce the scale of the Soviet energy dilemma by reducing energy demand through coordination of production schedules, product specialization within industry, and industry specialization between nations: in short, spatial integration.

The specific planning process by which joint ventures and other forms of international economic cooperation are formulated is known as joint planning and differs from previously used plan coordination primarily in scale and timing.<sup>24</sup> Joint planning is long term (five years or more), and focuses on planning at the enterprise rather than the governmental level.

An early result of the joint planning process, the CMEA Five Year Plan represents a qualitative step forward toward CMEA integration (and reduction of the energy dilemma) as a result of its coordination of CMEA-wide goals prior to approval of each country's own Five Year Plan. To insure commitment of the necessary financial and material resources, the CMEA plan requires that each country devote a separate section of its own Five Year Plan to an inumeration of its role in joint ventures

and other CMEA-wide projects.<sup>25</sup> The 1975 plan committed CMEA members to a series of joint ventures on Soviet soil to develop fuel, power, and raw material resources which require large capital investments.

The joint ventures are ostensibly developed by the CMEA Committee for Cooperation and Planning and presented at annual CMEA council meetings and approved by those who wish to participate. The Executive Council has also approved joint ventures prior to submission before the Committee. Multilateral protocols are then signed followed by bilateral agreements with all other countries.<sup>26</sup>

The initial plan included ten projects, eight of which were funded, of which five are in a fairly advanced stage.<sup>27</sup> These five are the Orenburg gas pipeline project known as the Soyuz Pipeline, the Ust-Ilimsk cellulose combine, the Kiembraevskii asbestos combine, the Peace electric power transmission line, and the Kursk iron and steel production facility (Fig. 6).<sup>28</sup> In addition to the initial five joint ventures, some fifteen to twenty have been planned or are under active consideration.

By far the most publicity among the planned joint ventures has been given the Soyuz natural gas pipeline which runs from the gas fields in Orenburg Oblast to Uzhgorod on the Czechoslovakian border. The CMEA members minus Romania each agreed to build a section of the large diameter pipeline in return for guaranteed gas deliveries from the Soviet Union, each country except Romania receiving 2.8 billion cubic meters of gas per year for twenty years. Romania has agreed to supply materials and will receive 1.5 billion cubic meters per year as compensation. Each country also agreed to provide both labor and infrastructure to build their own section while purchasing pipe and necessary



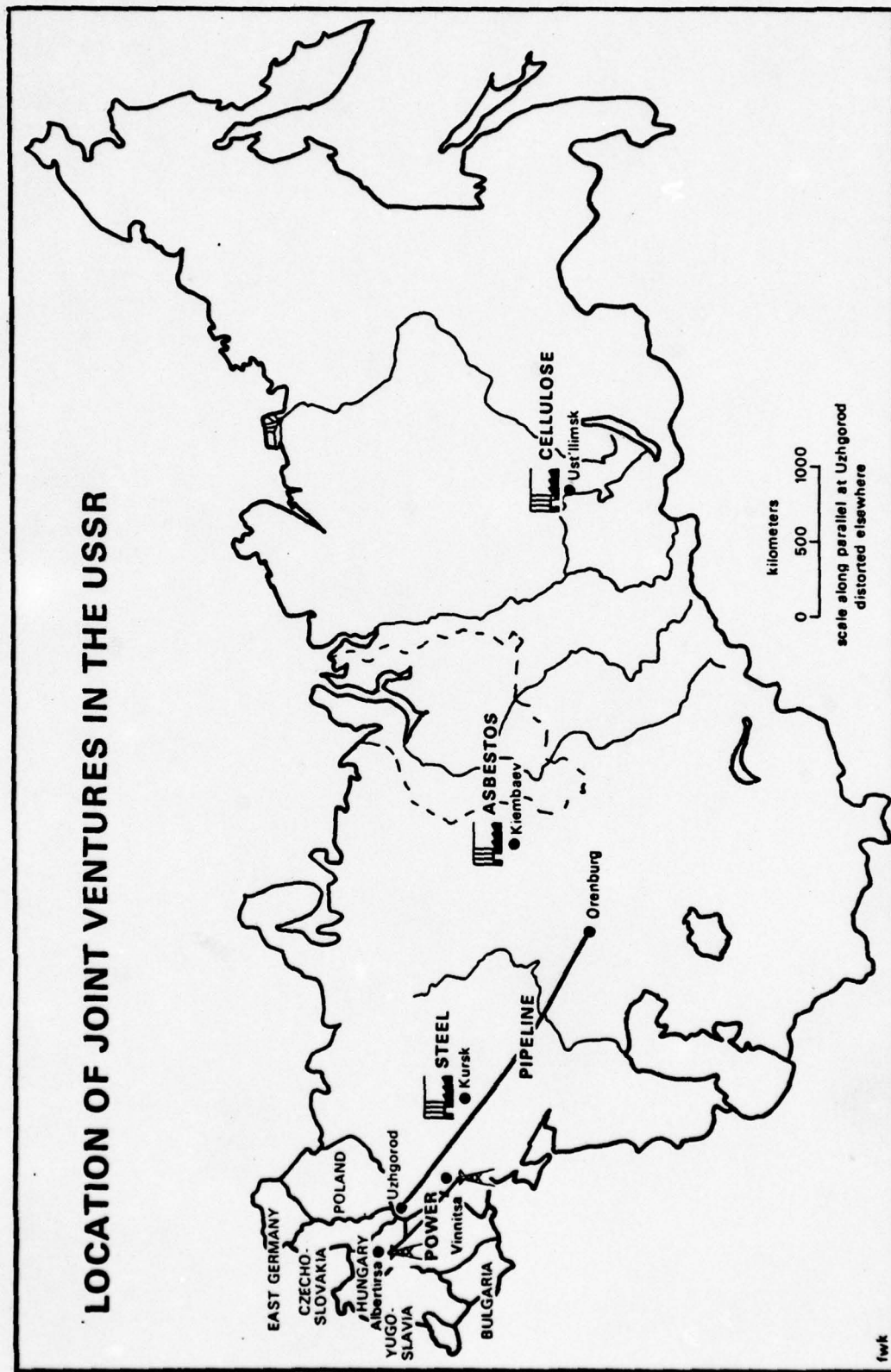


Figure 6

materials from GOSPLAN.<sup>29</sup> The pipeline, when complete in 1980, will have an initial throughput of 15.5 billion cubic meters yearly and ultimately twenty-eight billion cubic meters yearly. Since its inception, major changes in building responsibility have occurred.

The effect the Soyuz pipeline will have on the economies of the regions it passes through could be substantial. The housing of some 30,000 foreign workers, managers, engineers and technicians for up to four years on Soviet soil, a veritable army, together with the vast array of health centers, furnishings, workshops, machines, equipment, restaurants, shops, recreational and other service facilities cannot but have a beneficial effect.<sup>30</sup>

The second joint venture in a fairly advanced state is the "Mir" Peace electric power transmission line. The 860 kilometer 750 kilovolt line is to integrate the national energy systems of Europe with that of the western USSR and will run from Vinnitsa in the Ukraine to Albertirsa (immediately southeast of Budapest) in Hungary. The agreement, signed by the CMEA countries in 1974, actually predates the Coordinated Plan, although it is considered part of it.<sup>31</sup> This line will enable the 100,000 kilovolt CMEA transmission grid to run in parallel with the 60,000 kilovolt grid in the western Ukraine, complete the existing grid, and will enable shunting and rerouting operations to move the electricity through time zones to where it is needed, thus saving considerable amounts of energy.

The 500,000 ton Ust'Ilimsk cellulose combine on the Angara river north of Bratsk is a third joint venture. When put into operation in 1979 it will be a major power user in the region. All European CMEA members are its signators.

The last two joint ventures in advanced stages of development are the asbestos mine in Kimbayev in the south Urals with an annual capacity of 500,000 tons, and the steel mill complex at Kursk, with an annual capacity of twelve million tons of rolled steel products. The Kursk project has been postponed until after 1980.<sup>32</sup> The Kimbayev combine facility will see the first section in operation in 1979 and will contain a highly mechanized quarry, a partial refining or "benefication" mill and a large power plant.<sup>33</sup> The CMEA signators are providing some equipment, cable, building materials and consumer goods for the projects.

Future joint ventures which were suggested in the Comprehensive Program in 1971 include expansion of production of fuels, ferrous and nonferrous metallurgy, oil and natural gas, iron and steel mills, and expansion of nickel and titanium products.<sup>34</sup> Although information on such additional joint ventures is scarce it appears as if negotiations are underway for a ferroalloys plant at Yermak, and other plants for fodder yeasts and isoprene rubber, as well as projects for oil prospecting and extension of oil extraction.<sup>35</sup>

Total investment for the eight projects for which funds have been allocated is between eight and nine billion transferrable rubles over the 1976-1980 Five Year Plan period. This is about 1.5-2.0 percent of the total investments of the CMEA countries for that period of time, which although relatively small is significant in terms of productivity.<sup>36</sup> The Soviet Union will pay for about one-half the cost with the Eastern European nations providing capital, equipment and labor necessary for the construction projects themselves. Payback will be in the form of the goods produced by the projects themselves, usually after a twelve year period.<sup>37</sup> If current plans are fulfilled the projects will raise



productivity in the areas involved from close to ten percent in the cellulose case to almost fifty percent in the natural gas case, both of which are substantial in their respective fields.<sup>38</sup>

#### THE ECONOMIC ROLE OF JOINT VENTURES IN CMEA ENERGY PROBLEMS

Although joint ventures have been coordinated for the asbestos, timber, ferrous metal, electric, and natural gas industries, we are concerned with them only as they affect the Soviet Union in its relationship with East Europe vis-a-vis energy. The question to be asked is exactly what role do joint ventures play in reducing the magnitude of the Soviet energy dilemma in its geopolitical, economic and geographic framework?

Viewing their role from an economic perspective, it has been suggested that several advantages accrue to the Soviet Union in the energy field for such agreements for developments on Soviet soil. First, heavy investment in the Soviet energy industry such as the already described Soyuz project, can be considered compensation to the Soviet Union for receiving \$3 or \$4 less per barrel of oil than the world rates.<sup>39</sup> The end result is not so much a decrease in the amount of hydrocarbon fuels that the USSR must supply East Europe as a decreased amount of investment required in their own resources. Additionally Campbell indicates that due to the magnitude of these projects, East European involvement was demanded by the Soviet Union to reduce its own investment requirements in labor, capital and equipment.<sup>40</sup> Indeed, one Soviet authority indicates that from the Soviet point of view the effectiveness of joint ventures and other joint construction projects depends on how much they "help" the USSR by lowering the investment

load, increasing the rate and concentration of production, and raising the technological level and labor productivity.<sup>41</sup> Further, in striving to increase production by seven percent annually by 1980, East Europe participation in Soviet raw material development projects will clearly assist these efforts.<sup>42</sup> This participation is in the amount of about \$4.6 billion dollars (3.4 billion Rubles in 1975 prices including investment in labor and hard currency).<sup>43</sup>

This benefit to the Soviet government will be somewhat reduced however by commodity paybacks at the other end of the agreement plus Soviet participation in some joint ventures in East European countries. The net balance of payments effect of the present joint projects is probably less than \$3 billion dollars.<sup>44</sup> It is anticipated, however, that an increase in the flow of Western technology can be anticipated as a direct result of the reduced capital investment requirements will result in increased export of oil to Western markets. In short, joint ventures may have important short run implications for the Soviet energy problem and at the same time related long run implications for East Europe.<sup>45</sup>

Joint ventures may overcome CMEA capital and labor immobility to some extent. Capital for joint ventures granted through Industrial Investment Bank credits has introduced some mobility. Labor mobility has been introduced through the introduction of workers, technicians and managers from East European nations in the projects on Soviet soil. Until the start of the Soyuz pipeline with its 30,000 foreign workers, the only large foreign presence was the 12,000 man Bulgarian workforce in the timber cutting operation in Komi ASSR. It has been estimated

that next year and in the coming years 40,000-50,000 foreign workers will be employed in the USSR.<sup>46</sup>

By prevailing on East Europe in such a manner to make substantial contributions to joint CMEA investment, the Soviets have closed the gap between their actual and potential terms of trade with East Europe.<sup>47</sup> That is to say, joint ventures have narrowed the gap between CMEA Transferrable Ruble prices and Western prices, once applied to the commodities involved. It can be seen that this gap in prices results in a net "loss" for the USSR. The joint investments would alleviate this to some extent.<sup>48</sup> As a good example of the magnitude of these investments in relation to the economies of the nations of East Europe, it can be noted that from 1971-1975 nearly forty percent of the total investment in Poland went to enterprises involved in CMEA joint ventures.<sup>49</sup>

In contrast to these positive economic aspects are two problems which reduce the overall economic effectiveness of joint ventures to the Soviet Union. The first is the problem of currency inconvertability. Much of the equipment required by the East European nations for their portions of the joint venture agreements must be obtained from the West with hard currency or must be borrowed from the CMEA Industrial Investment Bank and ultimately payed back in the same hard currency. A good example of this is the purchase of U.S. made Caterpillar tractors by Hungary for construction of the Soyuz pipeline. In turn it is the USSR which provides the hard currency for the IIB to lend, and then still must occasionally ease East European payback requirements by renegotiating terms, or else providing assistance in the form of hard currency loans. For example on the Soyuz pipeline project each country



has already reduced its commitment for equipment purchased for hard currency.<sup>50</sup> The net result to the Soviet Union, although not a net loss, is a reduced effectiveness of joint ventures when viewed as part of the overall terms of trade context.<sup>51</sup>

A second issue which clouds the joint venture situation is the problem of East European trade deficits with the West. The USSR is generally regarded as the "ultimate guarantor" of loans of debts incurred by East European enterprises with Western financial institutions.<sup>52</sup> East European credit worthiness is based, to some extent at least, on this acknowledged relationship. Growing East European trade debts do in fact seem to be backed by the Soviet Union: in 1976 Poland received a substantial aid package including a one billion ruble loan, and substantial hikes in commodity shipment (above Plan) including crude oil, from the Soviet government to assist it in its economic woes.<sup>53</sup> This payout then, results in an overall average terms of trade for the USSR less effective than it could have been.

In summarizing the economic role of joint ventures in the CMEA energy dilemma it can be said that joint ventures will probably enable the Soviet Union to export more oil for hard currency, reduce the requirement to invest in her own resources, and allow for increased inputs of Western technology. Yet the overall effectiveness of joint ventures on the reduction of the economic burden to the Soviet Union (and the resultant oil and gas exports) is somewhat reduced by the problem of currency inconvertibility and the requirement to guarantee East European trade deficits with the West. In light of the fact that one of the avowed reasons for joint ventures is to increase mutual energy supplies and to provide infrastructure, this economic role is quite equivocal

and would seem to suggest that although the role played by joint ventures is quite encouraging, it is less than what was hoped for.<sup>54</sup>

#### THE GEOPOLITICAL ROLE OF JOINT VENTURES IN CMEA ENERGY PROBLEMS

Let us now turn our attention to the second aspect of the political-economic-geographic situation and address the role that the joint ventures play in the political context. It has been suggested that joint ventures will increase political ties by fostering market and resource dependence on the Soviet Union, that East Europe will become more dependent and "locked in" over the long term with the USSR as a source of raw material and energy supply and as a market for European equipment.<sup>55</sup> It is easy to see that the East European countries may be required to divert a significant portion of their industrial production to the USSR, that they must produce what is dictated by the projects and not items of their own choosing, that many managers, administrators and skilled laborers are involved, and that the situation may extend over a period of several years; certainly these are all conditions that foster dependence.<sup>56</sup>

Additionally, in terms of dependence, the Soyuz pipeline is much more significant than meets the eye. Due to the difficulties of transportation of natural gas in comparison to the relative ease with which crude oil is transported, gas exports carry a sense of dependency in excess of the quantities transported.<sup>57</sup> This is due to the lack of alternative liquid state supply sources that are commercially available. Whereas it is relatively easy to switch from pipeline oil to tanker-truck delivered oil if the situation warrants (assuming sulfur and other impurities are about the same), the present limited state of the art of

liquid natural gas technology would make it very difficult if not impossible to acquire alternate natural gas supplies in the event of a stoppage of oil deliveries. Such information tends to indicate that East Europe would be in a catastrophic position if it were dependent upon Soviet natural gas and cut off from the supply.

A second political consequence of joint ventures is the probable increase in Soviet control over East Europe. This control can be exercised in many ways aside from the obvious military presence, as in Hungary in 1956 or in Czechoslovakia in 1968. First there is control through the price mechanism. The 1975 price hike strengthened the Soviet hand in requiring increased investment in Soviet Union to offset increased costs. As a result the states of East Europe must now reevaluate any plans they had for independence from Soviet oil.<sup>58</sup> In addition, price increases without substantive oil imports may force the East Europeans to slow down their growth rate and modernization of industry drive, and adversely effect the standard of living of their peoples.<sup>59</sup>

At a conceptually higher level of control, the East Europeans are aware that large amounts of their capital tied up in the USSR could conceivably be used to exert pressure on them at some future time.<sup>60</sup>

Third, there is a definite element of control in the implied threat (as in Hungary) that economic reforms will not be reversed as long as they do not spill over into politics.<sup>61</sup> Finally, at the power end of the spectrum, there is a direct threat in the warnings the Soviets have given East Europe that increases in future deliveries to Eastern Europe are contingent on investments in Soviet oil production.<sup>62</sup>



Beyond all that has been said thus far, the most far reaching and fundamental effects that the joint ventures have in either the economic or political realm seem to be the qualitative increase in CMEA economic integration and its concomittant implications for future political integration. At the very least, the joint plan coordination of the Five Year Plans limits the CMEA countries' flexibility to trade outside the bloc.<sup>63</sup> Most importantly there is a world of difference between coordination of individual country Five Year Plans prior to, and not after the joint CMEA planning sessions. Such prior coordination forces discussion of shortages before they arise. This directly or indirectly could cause planners to modify their plans to include the information coming out of the joint plan coordination meetings. In other words the act of coordinating joint venture plans could be a vehicle for forcing recognition of CMEA-wide problems and for adopting CMEA-wide solutions.<sup>64</sup> In the words of one author, East Europe will be expected to make "major changes and sacrifices" in return for continued shipments of oil and gas.<sup>65</sup> This will involve changes in the production structure to conform to the type of energy available, especially for nuclear energy. It is clear that joint ventures and their accompanying coordinated planning are the political price for such shipments.

At the highest level of political heirarchy there arises the possibility that joint ventures could serve as an incipient low level supranationality in the fullest sense of the term, with all that portends. If plans for the integrated industries materialize on a large scale there will be little or no need for supranational planning authorities as all essential decisions are coordinated prior and incorporated into the Plan. In effect the Soviet GOSPLAN would become

the supranational authority.<sup>66</sup> Such an argument can be likened to the branches of American owned multinational corporations in third world countries, which often wield great political power, even though such power is not highly visible.

It can be asked what effect the above measures and influences will have on the psyche and psychology of East Europe. Certainly there have been historic precedents for a broad spectrum of relationships, from international animosity, to cooperation and political integration, with each extreme at one time or another in the strife-torn history of East Europe having the upper hand. The present political balance in East Europe has smoothed over old differences and created new ones, yet the long term effect of CMEA integration measures and economic situation cannot be denied. The joint venture will certainly encourage this eastward orientation for the states of East Europe; psychological ties may well become a natural by-product of the political and economic ties. The reaction of East Europe in alarm to the economic problems and recession of the West in the last few years cannot but also help. There is a certain psychological benefit knowing one has a relatively secure supply of oil and gas at prices comparable with the West, at a time when that same Western market is in a state of chaos.<sup>67</sup> Indeed some East European authors have expressed great interest in joint ventures since their inception.<sup>68</sup> The psychological effect with the most potential impact however is the tacit or explicit endorsement of the status quo, and the resulting tendency of such psychological ties to become inelastic and permanent.<sup>69</sup> The East European nations have

realized, however reluctantly, that at least for the time being investment in the development of intra-COMECON energy resource distribution networks, and production based upon the Soviet Union provides the most rational course of action likely to guarantee them stable supplies of energy over the long term.<sup>70</sup>

#### THE GEOGRAPHIC ROLE OF JOINT VENTURES IN CMEA ENERGY PROBLEMS

What role, or roles, if any, do joint ventures play in overcoming the many problems with energy arising from the recent locational shift in resource base? To answer this question the joint ventures must be seen in the context of the CMEA integration measures. It must be remembered that expansion and intensification of the fuel and raw material base was one of the main objectives of CMEA economic integration as implemented by the Comprehensive Program. Within this overall framework joint construction programs are considered to be effective forms for resolution of resulting problems of integration; therefore in some way we should be able to relate joint ventures' role from economic integration ultimately to the energy problem.<sup>71</sup> Indeed, Avdeichev has suggested that economic integration influences development of regions in four functional ways: by construction of territorial production complexes, improving interregional flows, developing industrial branches, and development of infrastructure.<sup>72</sup> The influence of joint ventures on these regional functions varies widely depending on their character, location and purpose. However the influence is real; one writer considers that in some ways joint ventures can be considered a force for integration, rather than the product of it.<sup>73</sup>

The role played by joint ventures in regional development is not a simple one. Some ventures certainly act as growth poles in the same



sense as Perroux: as a propulsive or leading industry, which results in polarized growth because of its great size, high interaction with other firms, and high degree of dominance and concentration of decision-making power. This description would fit the Ust'Ilimsk cellulose complex for example. Indeed the GOSPLAN chairman Baibakov indicated as much in an address to the Supreme Soviet in which he indicated that the cellulose complex, together with the hydroelectric station will result in accelerated development of the Bratsk-Ust'Ilimsk region.<sup>74</sup>

Reinforcing the view of joint ventures as growth poles are Territorial Production Complexes (TPC). Frequently mentioned in recent Soviet literature, they can be considered synonymous with growth poles for our purposes. The Soviet definition is that of an interlinked combination of industries within a particular area which achieves an enhanced economic effect as result of its planned composition, and becomes the basis for large and small economic regions.<sup>75</sup> The Soviet Union has been developing TPCs since the eighth Five Year Plan, especially in areas that border the edge of the more densely populated core of population concentration. During the current Five Year Plan TPCs for which development is emphasized include the power and wood processing facilities at Bratsk-Ust'Ilimsk, the Tyumen oil and gas TPC, Sayan power, aluminum and engineering complex, South Yakutia coal and power complex, Norilsk nickel, copper and platinum, and the South Tadzhikistan power, aluminum and engineering complex.<sup>76</sup>

The joint ventures among these TPCs indirectly assist in overcoming the CMEA energy dilemma by freeing Soviet capital, labor, and material resources for investment in other areas. The Kiembayev

asbestos combine and the Ust'Ilimsk power and timber processing complex, as well as other TPCs can be placed in this category.

In the area of infrastructure, joint ventures assist in solving the CMEA energy problem by constructing facilities which will be the basis for energy and other resource exploitation. These transportation, utility, and service facilities are essential for development of energy or other resources and can be called "international infrastructure" due to their evident association with raw material export. Included in the category of international infrastructure are railroads, highways, and airports. Judged from this point of view, the Orenburg pipeline definitely is international infrastructure as it transports gas over 2700 kilometers from the central Soviet Union to the Czechoslovakian border.

In some cases secondary infrastructure is so large that it may have independent economic effects on the region. Consider the Orenburg case again: the crews of 30,000 working on the pipeline must bring or construct a whole host of support facilities. These include

. . . workshops, admin. facilities, machines and equipment, means of transport, cranes and jack equipment . . . all necessary services for their own workers, living cultural and social facilities and restaurants, canteens, shops, laundry and cleaning facilities, cinemas and infirmaries with doctors and medical personnel.<sup>77</sup>

Clearly such massive amounts of economic activity will have spinoff into the local region, as all equipment and buildings will not be imported from the parent country: some will be manufactured or fabricated on site and left after the project is completed.

Specific information on the actual effects of joint ventures on economic development of the specific region in which each joint venture

is being constructed is almost nonexistent, at least in English sources. An analysis of the role of joint ventures on specific regions is therefore somewhat of a speculative exercise.

The joint ventures presently under construction, and others under consideration will most probably have an effect on export of energy and other resources as a result of their very character: they were conceived to be export oriented. In addition as stated earlier the very presence of joint ventures in a region has been declared a prerequisite to the flow of oil, and other resources.<sup>78</sup> In a number of cases a large jointly built CMEA venture, combine or production association can be considered an export base.<sup>79</sup> As currently accepted export base literature has as its premise that the ability to export is the determinant of growth of a region, the regions in which joint ventures are located should see growth. This in turn will feed exports and the cycle will build on itself.

With respect to the targeting of joint ventures in specific areas for the development of natural resources for export, little information is available which suggests this to be the case. On the contrary, some authorities indicate that in a majority of instances the locations of joint ventures are chosen based simply upon geography, or in other words, where the fuel and raw material resources are located.<sup>80</sup> This strong regional dependence would seem to preclude "targeting" as a conscious plan.

Such practices cannot simply be discounted out of hand, however. Decisions on development locations are made with a finite amount of information available and can be interpreted in different ways depending on the background and government position of the decisionmakers. Thus



in my estimation it is probably that targeting is in fact used even if only implicitly. Given a choice between two new raw material sources approximately equal in development costs, the one that will get developed will probably reflect the goals of the planners and decision-makers, assuming they are rational.

#### CONCLUSIONS

This paper has reviewed the growing and competing demands for Soviet energy by Eastern Europe, the West and domestic Soviet economy on a supply situation which is increasingly unable to meet these demands. Within this context the role of joint ventures in reducing the geopolitical, economic and geographic costs of this dilemma for Soviet leadership were examined. In a geopolitical sense, joint ventures seem to facilitate the Soviet Union's economic and political control over East Europe and foster the economic integration of CMEA. Economically joint ventures appear as an investment offset in development of Siberian energy transport and distribution networks and by releasing scarce capital and labor for other projects. Geographically the joint venture appears to be an agent of spatial integration of CMEA economies and a definite aid in Soviet regional development.

The role played by joint ventures in the overall CMEA energy situation varies with the countries involved. In the Soviet case the influence of joint ventures will probably be a maximum in the short term, or at least until the switch to the East Siberian resource base is complete.

For Eastern Europe, however, joint ventures may very well have continuing impact over a long term for integration with CMEA means

integration with the decisive size of the market, planning apparatus, and resource base of the Soviet Union.

It is too early to tell what the implications of these joint ventures will be to Soviet energy exports through the 1990 time frame. Joint planning as such is only about five years old, and consequently joint ventures as we have defined them less than that. Expert opinion itself is divided whether there will be net oil exports from the Soviet Union by 1990. Nevertheless it appears to be safe to say that if all joint ventures are substantially completed as planned, and if there are more such joint ventures in the future comparable in scope and investment to those now in progress (as indeed there appears to be), then the opportunity cost to the Soviet Union of maintaining energy flows to Eastern Europe may be lowered enough that continued flows could be rationally justified.

# FOOTNOTES

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<sup>3</sup>Leslie Dienes, Soviet Energy Policy and the Hydrocarbons, Discussion Paper, Association of American Geographer's Project on Soviet Natural Resources in the World Economy (Washington, D.C.: Association of American Geographers, 1978), p. 17.

<sup>4</sup>Dienes, op. cit., footnote 3.

<sup>5</sup>Jeremy Russell, Energy As a Factor in Soviet Foreign Policy (London: Saxon House, 1976), p. 187.

<sup>6</sup>Robert W. Campbell, Trends in the Soviet Oil and Gas Industry, (Baltimore: John Hopkins University Press, 1976), pp. 80-81.

<sup>7</sup>Franklyn D. Holzman, International Trade Under Communism: Politics and Economics, (New York: Basic Books, 1976), p. 43.

<sup>8</sup>Wolfgang Berner et. al., The Soviet Union 1974-75: Domestic Policy, Economics, Foreign Policy, (New York: Holmes and Meier, 1976), p. 121.

<sup>9</sup>Arthur Jay Klinghoffer, The Soviet Union and International Oil Politics, (New York: Columbia University Press, 1977), pp. 61-62.

<sup>10</sup>Holzman, op. cit., footnote 7, p. 206.

<sup>11</sup>Leslie Dienes, "The Soviet Union: An Energy Crunch Ahead?" Problems of Communism, Vol. 26 (1977), p. 46.

<sup>12</sup>Theodore Shabad, "News Notes," Soviet Geography: Review and Translation, Vol. 19 (1978), p. 275.

<sup>13</sup>Shabad, op. cit., footnote 12.

<sup>14</sup>Werner Gumpel, "Alternatives to Oil Imported From OPEC Countries: Oil and Gas Imported From the USSR?" Energy in the European Communities, edited by Frans A. M. Alting von Gesau, (Leyden The Netherlands: A. W. Sijthoff, 1975), p. 139.

<sup>15</sup>Shabad, op. cit., footnote 12, p. 285.

<sup>16</sup>Dienes, op. cit., footnote 3, p. 23.

<sup>17</sup>Jan F. Elliot, The Soviet Energy Balance, (New York: Praeger Publishers, 1974), p. 269.



<sup>18</sup> Sectretariat of the Economic Commission for Europe, Economic Survey of Europe in 1976 Part II: The Five Year Plans For 1976-1980 in Eastern Europe and the Soviet Union, (New York: United Nations, 1977), p. 96.

<sup>19</sup> Elliot, op. cit., footnote 17, p. 271.

<sup>20</sup> Joseph T. Kosnik, Natural Gas Imports from the Soviet Union: Financing the North Star Joint Venture Project, (New York: Praeger Publishers, 1975), p. 12.

<sup>21</sup> Kosnik, op. cit., footnote 20, p. 15.

<sup>22</sup> Kosnik, op. cit., footnote 20, p. 15.

<sup>23</sup> P. Alampiev, O. Bogomolov, Y. Shiryaev, A New Approach to Economic Integration, (Moscow: Progress Publishers, 1974), p. 51.

Zbigniew Fallenbuchl, "COMECON Integration," Problems of Communism, Vol. 22 (1973), p. 27.

<sup>24</sup> Other forms of International cooperation under the Comprehension Program are International Scientific Research Coordination Centers and International Economic Organizations.

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<sup>25</sup> Edward A. Hewett, "Recent Developments in East-West European Economic Relations and Their Implications for U.S.-East European Economic Relations," East European Economies Post-Helsinki, (Washington, D.C.: U.S. Government Printing Office, 1977), pp. 188-189.

<sup>26</sup> Arthur J. Smith, "The Council of Mutual Economic Assistance in 1977: New Economic Power, New Political Power, and Some Old and New Problems," East European Economies Post-Helsinki, (Washington, D.C.: U.S. Government Printing Office, 1977), p. 156.

<sup>27</sup> Hewett, op. cit., footnote 25, p. 189.

<sup>28</sup> Hewett, op. cit., footnote 25, p. 189.

<sup>29</sup> Russell, op. cit., footnote 5, pp. 229-230.

<sup>30</sup> Friederich Levciik, "Migration and Employment of Foreign Workers in the CMEA Countries and Their Problems," East European Economies Post-Helsinki, (Washington, D.C.: U.S. Government Printing Office, 1977), p. 469.

<sup>31</sup> B. Gorizontov and S. Petrikhova, "The Development of the International Infrastructure of the COMECON Countries," Problems of Economics, Vol. 22 (1977), p. 51.

<sup>32</sup>Zbigniew M. Fallenbuchl, "East European Economic Integration: COMECON," Reorientation and Commercial Relations of Economies of East Europe, (Washington, D.C.: U.S. Government Printing Office, 1973), p. 127.

<sup>33</sup>V. Morozov, "Prospective Forms of Collaboration of COMECON Member Nations." Problems of Economics, Vol. 18 (1975), p. 60.

<sup>34</sup>Fallenbuchl, op. cit., footnote 32.

<sup>35</sup>M. Poltoranin and V. Sevastyanov "On the Banks of the Irtysh," Current Digest of the Soviet Press, Vol. 24 (1977), p. 7.

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<sup>36</sup>Hewett, op. cit., footnote 25, p. 190.

<sup>37</sup>Hewett, op. cit., footnote 36.

<sup>38</sup>Hewett, op. cit., footnote 36.

<sup>39</sup>Klinghoffer, op. cit., footnote 9, p. 93.  
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<sup>40</sup>Campbell, op. cit., footnote 6, p. 40.

<sup>41</sup>L. Avdeichev, I. Zaitsev, and S. Moskalov, "The Regional Development of the Economy of the USSR under the Influence of Socialist Economic Integration," Problems of Economics, Vol. 20 (1977), p. 29.

<sup>42</sup>Klinghoffer, op. cit., footnote 9, p. 171.

<sup>43</sup>Edwin M. Snell, "East European Economies Between the Soviets and the Capitalists," East European Economies Post-Helsinki, (Washington, D.C.: U.S. Government Printing Office, 1977), p. 34.

<sup>44</sup>Snell, op. cit., footnote 43.

<sup>45</sup>Arthur W. Wright and Allen L. Kretz, The World Market For Iron Ore and Scrap: A Background Study, Discussion Paper Association of American Geographer's Project on Soviet Natural Resources in the World Economy, (Washington, D.C.: 1978), p. 20.

<sup>46</sup>Levcik, cp. cit., footnote 30, p. 464.

<sup>47</sup>Martin J. Kohn, "Developments in Soviet-Eastern European Terms of Trade 1971-75," Soviet Economy in A New Perspective, (Washington, D.C.: U.S. Government Printing Office, 1976), p. 69.

<sup>48</sup>Berner, op. cit., footnote 8.

<sup>49</sup> Secretariat of the Economic Commission for Europe, op. cit., footnote 18, p. 105.

<sup>50</sup> John R. Haberstroh, "Eastern Europe: Growing Energy Problems," East European Economies Post-Helsinki, (Washington, D.C.: U.S. Government Printing Office, 1977), p. 392.

<sup>51</sup> Haberstroh, op. cit., footnote 50.

<sup>52</sup> Smith, op. cit., footnote 26, p. 163.

<sup>53</sup> Central Intelligence Agency, The Scope of Poland's Economic Dilemma, (Washington, D.C.: U.S. Government Printing Office, 1978) p. 8.

<sup>54</sup> Secretariat of the Economic Commission for Europe, op. cit., footnote 18, p. 126.

<sup>55</sup> Smith, op. cit., footnote 26, p. 156.

<sup>56</sup> Smith, op. cit., footnote 26, p. 157.

<sup>57</sup> Dienes, op. cit., footnote 3, pp. 29-30.

<sup>58</sup> Russell, op. cit., footnote 5, p. 136.

<sup>59</sup> George W. Hoffman, A Geography of Europe, fourth edition (New York: John Wiley and Sons, 1977), p. 445.

<sup>60</sup> John M. Kramer, "The Energy Gap in Eastern Europe," Survey, (1975), p. 72.

<sup>61</sup> Holzman, op. cit., footnote 7, p. 206.

<sup>62</sup> Klinghoffer, op. cit., footnote 9, pp. 193-194.

<sup>63</sup> Smith, op. cit., footnote 26, p. 159.

<sup>64</sup> Hewett, op. cit., footnote 25, p. 192.

<sup>65</sup> Hoffman, op. cit., footnote 59, p. 449.

<sup>66</sup> Fallenbuchl, op. cit., footnote 23, p. 39.

<sup>67</sup> Kohn, op. cit., footnote 47, p. 77.

<sup>68</sup> Sylva Sinanian et. al, Eastern Europe in the 1970's, (New York: Praeger Publishers, 1972), p. 204.

<sup>69</sup> Smith, op. cit., footnote 26, p. 157.

<sup>70</sup> Russell, op. cit., footnote 5, p. 138.



<sup>71</sup> Morozov, op. cit., footnote 33.

<sup>72</sup> Avdeichev, op. cit., footnote 41, p. 31.

<sup>73</sup> Sinanian, op. cit., footnote 68, p. 204.

<sup>74</sup> N. K. Baibakov, "On the State Plan for the Economic and Social Development of the USSR in 1978," Current Digest of the Soviet Press, Vol. 24 (1978), p. 10.

<sup>75</sup> I.V. Nikolsky, "Economic Regions, Administrative Regions and Territorial Production Complexes," Soviet Geography, Vol. 16 (1975) p. 377.

<sup>76</sup> Secretariat of the Economic Commission for Europe, op. cit., footnote 18, p. 96.

<sup>77</sup> Levchik, op. cit., footnote 30.

<sup>78</sup> Hoffman, op. cit., footnote 59.

<sup>79</sup> Avdeichev, op. cit., footnote 41, p. 33.

<sup>80</sup> Avdeichev, op. cit., footnote 41.  
Secretariat of the Economic Commission for Europe, op. cit., footnote 18, p. 94.