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*The political events that have transformed Eastern Europe and the nature of economic reform undertaken in these countries have reopened the energy question and have made the development of new energy policies imperative. Faced with worsening energy production problems, the Soviet Union can no longer guarantee oil and gas supplies to COMECON countries, at least not under previous arrangements. Moreover, considering the urgent need to modernize its industry and the size of the investments required to do so, the USSR must develop new energy strategies that are fundamentally different from the old approaches based on state control of resources. The sweeping economic reforms undertaken in most of the former "East Bloc" may impart genuine substance to a new "made-in-Eastern-Europe" energy policy. However, it is futile to try to draw immediate conclusions about the changing energy patterns of Eastern Europe. At best, some general hypotheses may be ventured.*

*Les événements politiques qui ont bouleversé l'Europe de l'Est et les réformes économiques que ces pays tendent à mettre en place reposent la question de l'énergie et la nécessité de redéfinir de nouvelles politiques énergétiques. L'Union Soviétique, confrontée à des problèmes de production énergétique de plus en plus aigus, ne peut plus assurer l'approvisionnement en hydrocarbures des pays de CAEM, au moins aux conditions passées. Qui plus est, les impératifs de modernisation industrielle et les investissements nécessaires supposent de nouvelles stratégies énergétiques qui s'éloignent de l'ancienne logique de développement basée sur une gestion extensive des ressources. Les réformes économiques qui tentent d'impulser la plupart des économies de l'ancien "bloc de l'Est" sont susceptibles de donner un véritable contenu à une nouvelle politique énergétique à l'Est. Mais il est illusoire de vouloir tirer dès maintenant des constats quant aux changements des schémas énergétiques. Tout au plus peut-on émettre des hypothèses générales.*

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## Energy and the Restructuring of the Economies of Eastern Europe and the USSR

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From Warsaw to Bucharest, 1989 has witnessed the stunningly rapid emergence of a still hazy but unmistakable image of a new Europe. While the far-reaching changes have been so far primarily political, the winds of democratic reform now sweeping Eastern Europe have also called into question an entire economic system based on the central planning model and generated an urgent desire for a market economy.

Unfortunately a market economy cannot be legislated into existence. The new economic paradigms that are emerging in the "East Bloc" will be shaped and constrained by the logic that has governed past economic development in these countries. This is a crucial stage in the transition from an old to a new system, the final form of which is still being worked out.

The energy sector provides a representative illustration of this process of change, having been a central element of the internal integration of the COMECON market (though in the view of many it hardly merits being called a market). The purpose of this paper is to examine the changes that are in progress and to attempt to understand their implications for the Eastern European energy system.

To set the stage for this examination, recall that

the autonomy of Eastern Europe with respect to energy was made possible by the Soviet Union's exports of fossil fuels and the intra-COMECON trade arrangements associated with them. In these circumstances, the energy situation and the policy climate in the Soviet Union are decisive for the East Bloc countries as a whole. The USSR's political abandonment of its Eastern European allies inevitably raises the question of whether COMECON can survive at a time when all the countries concerned are striving for greater integration in world markets. Will the Soviet Union, wrestling with its own serious internal problems, phase out its oil supply deliveries under COMECON? What would be the domestic economic consequences of such a move? It should be borne in mind that growth in these "economies of shortages" was already constrained by limited energy resources during the 1980s.

The energy sector also illustrates some of the inherent contradictions of the Soviet economic model. For example, the energy development strategy followed by the USSR appears more and more to be untenable from the point of view of investment requirements and, even more importantly, at odds with the objective of modernizing the economy. Under the impetus of *perestroika*, will the USSR succeed in devising a new energy strategy more compatible with the reforms already implemented? What consequences will this have for the other East Bloc countries? How much time will it take before a new approach to resource management takes hold in the COMECON countries as a whole, as domestic and external constraints make choices more difficult and uncertain?

### **1. Energy Issues in Eastern Europe: the Need for New Policies**

Under the impetus of *perestroika* and in the aftermath of the Chernobyl accident, there has been something of a shift in Soviet energy policy. In the 1980s a three-pronged strategy was pursued — oil, gas and nuclear energy. Judging from the allocation of investment alone, the coal sector cannot be considered a high priority of the Soviet

strategy, even though the Soviets anticipate annual production of 780-800 million tonnes. The objective of the long-term energy program formulated in 1983 is to substitute natural gas for oil in domestic consumption. After the year 2000, plans call for heavy reliance on nuclear and coal energy as a substitute for fossil fuels. Thus the guiding objective appears to be to free up large quantities of oil for export. The development strategy appears to have shifted from a focus on satisfying consumer requirements to a focus on the need to earn hard currency.

The Chernobyl disaster has forced the Soviets to drastically revise their nuclear production objectives. In 1983, the long-term energy plan called for generating capacity in the 150-200 GW range by the year 2000. However, even 100 GW of installed capacity now appears to be an optimistic estimate. Growing public opposition to the nuclear option is simply heightening the uncertainty surrounding the program. In 1989, for instance, the press reported several stoppages or freezes of nuclear power plant construction in Odessa, Minsk and Azerbaijan. In the short term, problems in the nuclear program, of which Chernobyl is but one indication, are forcing the authorities to keep power plants operating (particularly oil-fired plants) that should have already been decommissioned. In the longer run, Chernobyl will have a significant impact on the Soviet energy scene. For instance, since nuclear objectives have been revised downward, the authorities will have to rely on natural gas for a substantial portion of the increase in electric power generation, and environmental concerns are likely to reinforce this trend. This is one of the major shifts apparent from the sketchy information available about the new Soviet long-term energy plan (2005-2010). A production target of 1 trillion m<sup>3</sup> is set for 1995 (a level scheduled for the year 2000 in the 1983 plan), with 1.18 trillion m<sup>3</sup> anticipated by 2000 and 1.25 trillion by 2005 (*Bulletin Analytique Pétrolier*, 1989).

Nevertheless, relying on outdated approaches and strategies is difficult today. The fact that the energy plan has not been published reflects the controversy raging in the energy sector and the emergence of new decision-making centres in

the USSR to displace the all-powerful Gosplan. The three components that once formed the core of the Soviet strategy have, one by one, been called into question: state management of resources with all its attendant contradictions, the policy of massive exports of fossil fuels, and the question of how these exports are divided between East and West. The last issue assumes particular importance in light of the cuts in oil deliveries to most of the former East Bloc countries during the summer of 1990.

### 1.1 A New Energy Strategy for the Soviet Union?

The central issue in the Soviet energy debate is whether to continue the strategy of maximizing fossil-fuel production and exporting large volumes of oil. In keeping with the precepts of *perestroika*, the "reformers" are, unsurprisingly, strongly in favour of limiting further expansion in production; some feel restrictions should focus on oil, others on fossil fuels in general, judging from statements by L. Albalkin and D. Aksenov (*Pétrostratégies*, 1989b, p.2). Aksenov believes that the Soviet Union should abandon the goal of raising its oil production to 630-640 Mt and its natural gas production to 1.25 trillion m<sup>3</sup> by 2005. The on-going and as yet unsettled controversy surrounding long-run targets for natural gas production testifies to the current debate. Researchers at the Soviet Academy of Sciences (including A. Makarov) advocate a production target of 1.3 trillion m<sup>3</sup> of natural gas by 2030. Officials at the new "Concern Gasprom," which has replaced the former ministry of gas, take a much more pessimistic view. They favour stabilizing long-term production at around 1 trillion m<sup>3</sup>.<sup>1</sup>

Paradoxically, the reformers have taken a much less categorical stand on the question of future oil exports. While they are clearly in favour of limiting exports, they also feel that significant export volumes to the West should be maintained. The drop in exports in 1990 relative to previous years probably reflects the Soviet Union's current production problems. The events in Azerbaijan, where a significant portion of oil industry equipment is manufactured, have

revealed the fragility of the Soviet oil system. As a result of a drop in oil production of 14 Mt in 1989, Soviet exports apparently fell to 185 Mt in 1989, compared with 203 Mt in 1988 (*Bulletin de l'Industrie Pétrolière*, 1990a). The outlook for 1990 is even bleaker: according to *Izvestia* (reported in *Bulletin de l'Industrie Pétrolière*, 1990c), production may fall below 600 Mt. The strategy of the reformers centres around a strict energy conservation policy that is intended to reconcile the two aspects of this policy. Indeed, the need to curb wasteful energy practices is no longer disputed in the USSR, even by conservatives. For the reformers, however, energy conservation is a key element of their strategy, although the exact details remain to be worked out.

According to the model of state-controlled development followed in the Soviet Union, increases in production can only be achieved through massive and steadily increasing investments in labour and capital. Outlays on this scale inevitably come into direct conflict with the main goals of *perestroika* — modernization and development of the consumer goods sector. In 1986, energy's share of capital investment reportedly reached 24.3%, when, according to the plan, it should have stabilized at 20-22%. By the late 1980s, energy accounted for 40% of industrial investment (Korchemkin, 1989, p.40). Under these circumstances, a slowdown in production growth is essential. Yet such a move is feasible only if coupled with an energy conservation policy; otherwise, economic growth will founder on resource constraints.

Much more radical views are also being expressed, particularly with regard to oil exports. Quite apart from the issue of resurging nationalistic pressures, the advisability of continued exports is being questioned, in light of partially unsatisfied domestic demand, low international prices, and the enormous investments required to develop Siberian reserves. One of the most significant aspects of *perestroika* is undoubtedly the emerging debate over the economic costs and benefits of exports and production. This debate

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1/ Information obtained from Gasprom officials during a fact-finding mission to the USSR in April 1990.

is clearly complicated in the present context by the question of whether the Soviet republics should control their own mineral resources, and hence production and exports. It should not be forgotten that Russia (which includes the very rich province of Western Siberia) accounts for almost 90% of the USSR's oil production and that Russia's President, Boris Yeltsin, is determined to assert sovereignty over resources.

What conclusion can we draw from this proliferation of analyses and policy positions? On the basis of the meagre information currently available, the philosophy of state-controlled development continues to hold sway in the energy sector, at least for the moment. How else can we interpret the staggeringly high forecasts for natural gas production? There seems to be a basic contradiction here, since such a development strategy would entail large investments that would have to be steadily increased if the old model prevails. (It is also mistaken to think that modernizing the oil industry will not require investment; while the investment needed will obviously be of different kind, the scale will inevitably be massive.) Yet, in the face of severe financial and budgetary constraints, the first estimates for 1990 indicate a significant reduction in energy investment, of perhaps as much as 30%. This reduction may have a serious impact on oil production that will likely persist until new, more efficient management methods are introduced in the industry. The continual delays plaguing the Tenghiz project are, unfortunately, all too typical (*Petroleum Intelligence Weekly*, 1990a, p.1).

These contradictions may simply reflect a convergence of constraints from which the reformers are finding it difficult to escape. They urgently need hard currency at a time when the effects of *perestroika* remain limited in terms of both export diversification and new-style economic management. Soviet oil export policy seems to be consistently subordinated to balance of payments considerations. Indeed, the Soviet Union's options appear limited in the short run, with one notable exception: trade with Eastern Europe. Changes to trade arrangements within COMECON would enable the USSR to increase

its foreign currency earnings to some extent and to redirect a portion of its imports to western-made equipment (of much better quality, in some cases, than that available within COMECON) and to the consumer goods so desperately needed at present. While a new energy policy is likely to be one outcome of the economic reforms now under way in most of the East Bloc countries, such a policy will need to be revamped before too long, given the implicit or explicit challenges to the continued existence of COMECON and its operating arrangements.

### 1.2 New Energy Issues in Eastern Europe

At the January 1990 COMECON meeting in Sofia a consensus emerged that the organization was in need of a major structural overhaul, although some fundamental disagreement was evident among the participating countries over the reform process itself. The East Bloc countries, all engaged in their own versions of *perestroika*, are eager to abolish the old trading system, which they consider a major obstacle to their integration into the world trading system. Political considerations involved in ensuring the stability of COMECON, which in the 1970s provided the rationale for guaranteeing energy supplies to Eastern Europe on advantageous terms (e.g., payment in transferable roubles and prices based on a moving average of the international oil price over the previous five years) are clearly no longer considered valid.

The result was Soviet Prime Minister Nikolai Ryzhkov's announcement (*Le Monde*, 1989) that by 1991 intra-COMECON trade would be carried out in convertible currency (i.e. dollars) at world prices. Early evidence of the application of this strategy can now be seen in Hungary. Contracts for oil deliveries will no longer be annual, but semi-annual, with accounts paid in hard currency by 1991 (*Pétrostratégies*, 1989a, p.9).

This means that trade in oil within COMECON is being integrated into the world hydrocarbon market. These changes are unlikely to have a major impact on the international oil market. Considering the rigidities that now charac-

terize energy consumption patterns (and hence energy imports by East European countries), along with offsetting movements in Soviet oil supply and in the demand for oil in the COMECON countries, the existing equilibrium on the world market will not be greatly affected. The domestic economic implications, however, may be far-reaching indeed.

Whether Eastern Europe will be able to pay for its oil imports in hard currency is open to question. This raises the issue of how well their exports can compete on western markets. The situation is complicated by the fact that some of their industrial specialties (not only chemicals and petrochemicals, but also exports of refined products) may be jeopardized in the future. Under these circumstances, any increase in the world oil price would be disastrous.

In the past, East European countries were able to base their economic growth on Soviet supplies of fossil fuels and heavy reliance on domestic energy production, primarily of coal, but also of nuclear power. The first of these resources has clearly reached its limits; the restructuring of trade is but one indication of that. Reliance on coal is becoming increasingly difficult in a context of industrial restructuring and modernization. A coal-based strategy relies on massive investment. Over the 1981-1985 period, energy investment accounted for at least one-third of industrial investment in most of these countries (EEC/UN, 1987, p.198). As production conditions deteriorate and rich deposits are depleted, production costs are mounting, requiring ever-higher inputs of capital with no guarantee of higher production.

The countries of the former East Bloc now find themselves facing the task of redefining their energy policies in an extremely difficult context marked by rising oil prices. For most of these countries, therefore, energy conservation is clearly a major priority. This issue is not a new one in Eastern Europe; it was a feature of the energy strategies of most of these countries in the mid-1970s. However, with rare exceptions, the results were unimpressive. It appears that the transition from stated intentions to the implementation of a genuine policy of rationalizing

energy consumption is hampered by the inherent characteristics of planned economies.

In the economic systems of Eastern Europe, energy conservation is seen primarily as a macroeconomic issue in the context of a deteriorating trade balance, strong external pressures and limited oil supplies from the Soviet Union. In this regard, there is a contrast between the Soviet Union and the small countries of Eastern Europe, which have been feeling these pressures since the late 1970s. At least until 1986, when world oil prices began to fall, there was little incentive for the USSR to implement a genuine energy conservation policy, even though the inherent contradictions of state-controlled resource management had already become obvious by the 1970s.

In most cases, incentives for economic agents (firms and households) to conserve energy do not work well. Incentives cannot be financial, given a system of production volume targets, assigned a high priority whatever the cost, and administered prices with no real connection to production costs — the effective budget constraint is soft. Energy conservation policy in Eastern Europe is shaped by this framework. The primary thrust of this policy is thus to ration available supplies through administrative measures (standards, quotas, and so on). It is aimed mainly at the industrial sector (with the exception of the extreme case of Romania, with its measures designed to severely curtail home heating temperatures). Such a standards-based policy focusses on the sectors most easily identified and controlled by a central agency (the planner): iron and steel, metallurgy, and the electric power industry. For the latter industry, it is difficult to make maximization of production a top priority of the plan, and so another objective — fuel conservation — is used as a key indicator of success.

In the German Democratic Republic (GDR), Czechoslovakia and Romania, as in the Soviet Union, consumption standards are being introduced in the industrial sector. In both the GDR and Czechoslovakia, compliance with these standards is considered a top priority of the plan. In the USSR, according to information supplied by Gosplan (the central planning body), energy

deliveries to industry are forecast to be 2 to 3% lower than in the previous five-year period. Gosplan takes these reductions into account when calculating its resource consumption balances.<sup>2</sup>

Under these conditions, with the exception of the definition of standards, in which several research institutes take part, the implementation of energy conservation policy often amounts to no more than monitoring and enforcing compliance with the standards. In most cases, these functions have been and continue to be performed by existing organizations with close links to the producing sectors. In the Soviet Union, this monitoring function is performed by Gosstab (the supply committee) and energy-producing departments.<sup>3</sup>

A standards-driven energy conservation policy of this kind involves a number of drawbacks. We will not delve here into the myriad of regulations required by the widespread application of such a system, nor the frequent adjustments needed to keep abreast of technological progress. But the problems are very real. Above all, such a policy is implicitly founded on the basic premise that the planners have accurate information on the energy consumption of enterprises. This has, however, turned out to be largely illusory. According to Bethkenhagen (1987, p.59), in certain cases in the German Democratic Republic, actual consumption is 50% below the standards that are supposed to be encouraging energy conservation. Even worse, such regulations may ultimately "backfire" and encourage exactly the opposite behaviour from what was intended. Some Soviet officials have pointed out that firms have every interest in inflating their energy consumption in order to more easily meet the energy consumption reduction targets specified in the plan. Moreover, this takes place in an environment where the true determinants of producer behaviour are resource constraints, not profits.

In addition to problems connected with incentives and behaviour, there is also the vital question of the whole organization of the economic system. The sector-based structure of the economy and the compartmentalization of govern-

ment departments (often as a result of a supply-driven approach) represent major obstacles to any energy conservation measure that, in contrast, relies on the assumption of a decentralized system in which numerous agents make economic decisions.

Only sweeping economic change can hope to impart genuine substance to a new "made-in-Eastern-Europe" energy policy. Thus economic reform must be based on a two-pronged approach. First, a new supply management strategy capable of achieving significant reductions in energy investment must be implemented. Second, a new approach to demand management must be developed that is more compatible with limited production growth. Ultimately, the objective is to reduce significantly the burden of the energy sector on the economy as a whole, while ensuring that energy availability does not become a major constraint on economic development.

## 2. Energy and *Perestroika*

As is the case for assessing economic change, it is futile to try to draw immediate conclusions about the changing energy patterns of Eastern Europe. At best, some general hypotheses may be ventured. Patterns of energy use, it must be remembered, reflect essentially economic factors (e.g., type of technology, age of equipment and production structure). Still, just as it is possible to point out the inadequacies and inconsistencies of efforts at general economic reform, the same can be attempted for energy.

### *2.1 Economic Reform and a New Approach to Energy Management*

Radical economic reform holds out the prospect of imparting real substance to energy conservation efforts and of engineering a successful transition from the discussion stage to reality. The

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2/ Information obtained from Gosplan officials during a fact-finding mission to the USSR in April 1990.

3/ Information from Gosplan officials.

changes in the structure of industry that are now being contemplated, along with a shift in focus towards the consumer-good industries, will undoubtedly help spur reductions in energy consumption. But the crux of the question is still how to modify the behaviour of economic agents in terms of both energy consumption and the choice of technologies.

The key factors involved in achieving significant reductions in energy consumption will be price reform, changes at the level of the individual firm (independence, financial independence and self-management) and the development of markets for consumer goods and capital goods.

In an "economy of shortage," where the primary objective of firms is to fulfil the objectives of the plan, where firms cannot retain their profits and where energy prices are low, there is scarcely any incentive to save energy. Wasteful practices are the rule rather than the exception. This is apparent in all the countries of Eastern Europe. The challenge of reform is to instill in firms a greater awareness of the costs of production. Higher costs for energy inputs — the inevitable result of price reform — are likely to lead to new attitudes towards energy conservation and new forms of energy consumption management.

Low energy prices, which only partially reflect the costs of production, are an essential characteristic of planned economies. Examples are legion. At the time of the 1982 price revision, the USSR coal industry was deliberately kept in a deficit position by prices pegged at a very low level. Even raising the price of Soviet coal by 50% would leave it far below the world price (*Revue de Presse CDF*, 1989, p.5). In 1984, 5.4 billion roubles in subsidies were allocated to this sector for mining operations alone (*International Coal Report*, 1989a, p.7). According to Aganbeguian (1990, p.38), it would be necessary to at least double the wholesale price of fossil fuels and raw materials.

The "new regulations for enterprise," particularly the possibility for firms to retain some or all of their profits, leave significant leeway for investment and capital renewal. Faced with mounting production costs, firms should be en-

couraged to alter their criteria for choosing equipment and to shift to more energy-efficient technologies. Studies have shown that planned economies have an inertia relative to technological change; those applying to energy technology, although incomplete, confirm this. This factor has been cited as an important variable explaining observed energy consumption levels.

For the moment, only certain energy prices are expected to rise in the Soviet Union in 1990 and 1991. There are some preliminary indications of the scale of these increases, although it is still unclear whether they will in fact be carried out.

According to Korchemkin (1989, p.42), the price of oil will rise by a factor of 2.3, natural gas by 2, electricity by 1.45, and heating fuel by 1.45. Miners should receive a 90% increase in the wholesale price of coal, retroactive to January 1, 1990 (*International Coal Report*, 1989b, pp.11-12), reflecting an increase of 50% in the mine-mouth price of coal. For the time being, this measure does not seem to be having much of an impact. In Poland, on the other hand, the price hikes are very real. The price of coal increased sevenfold for end consumers and fivefold for industry in early 1990. By the spring, coal prices are to be set at auction and will therefore reflect the interaction of supply and demand. But the price hikes have not stopped there: in January the price of gasoline tripled and the price of a kWh of electricity to households quadrupled, although it must be borne in mind that these increases took place in a context of hyperinflation, which mitigated their impact (*Enerpresse*, 1990). From this point of view, Hungary is not far behind, with gasoline price hikes, for example, of between 10 and 14% (*Le Monde*, 1990).

Nevertheless, the possibility of an increase in energy consumption, particularly of oil, in certain sectors (transportation and the residential sector) cannot be ruled out. Higher living standards and expansion of the consumer goods sector as a result of reform may lead to an increase in the number of households purchasing major durables — not only passenger cars and household appliances, but also larger living areas. It is reasonable to anticipate profound changes in energy consumption patterns in East European

countries that will bring them more into line with western countries — with industry accounting for a declining share of energy consumption, and transportation and the residential and services sector for an increasing share.

The factors likely to affect consumption patterns will also influence supply. The challenge in the energy sector is to increase efficiency while reducing the sector's share of industrial investment. Financial and managerial autonomy in energy utilities, price reform and the modernization of the energy sector — notably through foreign capital participation in the much-talked-about joint ventures — are likely to lead to new approaches of supply management that are more rational than the traditional state control of resources. The legal and institutional arrangements for joint ventures have evolved rapidly in the Soviet Union, particularly with respect to the share of foreign capital allowable in mixed enterprises. Initially restricted to a maximum of 49%, foreign investors may now be majority shareholders. Once again, measures range from simple reorganization of the energy sector to far-reaching changes in the economic system. These measures are aimed at making profitability the benchmark of sound energy management.

The Soviets have been forced to reconsider how overall production costs are determined. Many who are involved in exploration have argued that financial criteria should replace the traditional quantitative criteria as the means of assessing the results of exploration. A specified "explored reserves price" would allow them to bill for their services, instead of their results being simply "forwarded" to the Oil Ministry for development without compensation (Agoshkov, 1988, p.3). These are just some of the many indications of a growing willingness to take the true cost of exploration into account. Experiments based on the same cost and profitability approach are also starting to appear in Poland's coal industry.

The goal of greater efficiency in the energy sector is also behind efforts to introduce western technology through joint ventures. Such projects circumvent the need to import massive amounts of equipment that must be paid for in hard cur-

rency. The contribution of joint ventures may prove vital in at least two areas, offshore exploration and enhanced recovery technologies, where East European countries are encountering persistent difficulties.

## 2.2 *The Contradictions of Partial Reform*

It is still too early to assess the impact of economic change (particularly price increases) on consumption (except for the hoarding that often precedes increases, aggravating existing shortages) (*Le Monde*, 1990; *Enerpresse*, 1990). Past experience shows, however, that price adjustments are a necessary, but not always sufficient, condition for altering energy consumption patterns in the absence of genuine financial and managerial independence of firms. Hungary during the 1980s is a case in point. According to Dobozi (1988), energy price increases have not greatly affected the pattern of industrial energy consumption in these countries. In fact, their impact on the decisions of enterprises seems to have been offset by the persistence of a tax and subsidy system in certain sectors. These systems have helped to perpetuate the weak budget constraints already referred to above.

More efficient energy consumption requires change that goes beyond energy price increases. The whole question of establishing a rational set of relative prices now faces Eastern Europe. While energy prices are low, prices for regulating equipment and insulating materials are very high. Moreover, simplistic solutions, such as partial increases in energy prices, may engender new sets of problems by threatening the economic viability of certain sub-industries. In the USSR, for example, vehement opposition to coal price hikes is starting to manifest itself. According to Korchemkin (1989, p.42), even with a 45% increase in the price of electricity, more than 50% of thermal power stations would only break even or operate at a loss under current production conditions. This indicates that the economic viability of the electric power industry is precarious. The situation in Poland is similar.

However, it may well be that the energy sector, because of its status as an earner of hard cur-

rency, will escape reform for some time to come. In the Soviet Union, financial and managerial autonomy was granted to the petroleum sector in 1988, and to the gas sector, refining and part of the prospecting sector in 1989. But how genuine is this autonomy when production and export objectives are always fixed and state orders account for almost 100% of production (Korchemkin, 1989, p.38)? In fact, firms cannot dispose of a portion of their production as they wish, as is the case in other sectors. The legislation aimed at decentralizing foreign trade in the energy sector has thus remained unenforced. Similarly, the hydrocarbon industries are not allowed to retain a portion of the hard currency generated by exports, as other industries are legally entitled to do. However, changes appear to be in the offing. A recent article in *Petroleum Intelligence Weekly* (1990b) reports that, in Siberia, hard currency payments are made for production in excess of government-fixed quotas. This is combined with the possibility of negotiating arrangements directly with certain major consumers. In the same vein, accounting autonomy is reported to exist at the regional level.

Another important question then arises: What is the use of financial autonomy without prior price reform? Given the distortions caused by administered prices, which in many cases bear absolutely no relation to actual production costs, many plants will lose money and be forced to close. They may also find themselves unable to finance the investment needed to modernize the energy sector and to bring down production costs. The case of Soviet coal is a good example. Even with large increases in coal prices, V. Medvedev, the secretary of the Central Committee of the Mine Workers' Union, estimates that many mines will not be profitable (*Enerpresse*, 1989). It will be recalled that, following their strike in July, miners secured managerial and financial autonomy for their enterprises, as well as the right to sell freely any surplus in excess of production quotas. As of January 1, 1990, these mines can be considered government enterprises independent of the unions under the purview of the Ministry of Coal (*International Coal Report*, 1989a, p.7).

Poland is facing a similar set of problems. Legally, 23 of the country's 72 mines became independent profit-oriented operations on January 1, 1990. The fate of the remaining mines will be decided on a case-by-case basis in accordance with their economic viability (*International Coal Report*, 1989b, p.11). Nevertheless, the coal industry continues to operate in the red despite the recent price increases, since these increases apparently fall far short of what is necessary, forcing the government to continue subsidies. Although provisions for bankruptcy now exist, so far they have not been implemented. The fact that the government retains control over pricing and export objectives significantly reduces the scope of the new legislation. And, for the time being, privatization of this sector is not on the agenda (*International Coal Report*, 1989b, p.12).

Joint ventures in the energy sector remain the exception. In the Soviet Union they appear to be concentrated in the petrochemical industry. A major exception is the exploration and production agreement signed with Elf on May 23, 1990. According to several observers, this project breaks new ground in many respects for the Soviet Union, although the details remain sketchy; all that is known is that the company is granted direct access to the fossil fuels involved. The classic exploration agreement covers 37,500 km<sup>2</sup> in the Volga region around Volgograd (*Bulletin de l'Industrie Pétrolière*, 1990b). Given the non-convertibility of the rouble, a major stumbling block will undoubtedly be the crucial question of the repatriation of profits (*Petroleum Intelligence Weekly*, 1989, p.4). A point of interest is that because the output of future joint ventures will not be officially included in the plan or in the Soviet energy balance, it may be freely exported (Korchemkin, 1989, p.41), eliminating another previous stumbling block.

The contract signed with Elf may indeed open up new possibilities. But, for Eastern Europe as a whole, as long as detailed legislation governing the petroleum industry is not in place, joint ventures are likely to remain of limited interest to international oil companies. In the USSR, however, the major impediment remains the attitude of the Soviets. While recognizing the need for

foreign investment, particularly to improve the energy efficiency of their industrial equipment, they are at the moment more cautious and reserved when it comes to investment in the area of supply (Korchemkin, 1989, p.42).

Thus economic reform in the energy sector is essential. Reforms will likely foster new strategies for managing supply and demand, although it is still too early to speculate about their eventual effects. Yet the contradictions inherent in halfway measures are already apparent, as are their potential consequences for the energy futures of these countries. The Soviet Union is but one example. The dismal oil production figures for 1989 raise serious questions. One of the causes appears to have been inadequate equipment supply. This situation stems from the reforms already implemented and the partial deregulation of various subsectors of the energy industry. In the machine-building industry, for instance, state orders now account for only about 30% of production.<sup>4</sup> The remainder is freely determined by the firms themselves. Under this arrangement, a significant number of equipment purchase orders placed by the oil industry have apparently been cancelled. This has led to the current paradoxical situation: whereas the oil industry remains subject to production objectives set by the state, with its output sold at fixed prices, its equipment needs are at the same time no longer guaranteed or must be paid for at higher prices. In late 1988, Soviet officials announced that 30% of the equipment needed in this sector for 1989 was not guaranteed (*Soviet Oil Review*, 1988, p.53).

In sum, only radical reform can bring about a fundamental restructuring of the energy patterns of the countries of Eastern Europe. Only then will it be possible to reduce investment in the energy sector, maintain a significant level of exports and meet domestic needs.

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