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Jochen H. Mohnfeld\*

## Energy and Oil in Eastern Europe – Status and Prospects

*The energy economies of the states in Eastern Europe – East Germany, Poland, Hungary, Czechoslovakia, Bulgaria and Romania – are in a state of transition.<sup>1</sup> This is just one aspect of their overall transition from communism to more liberal political and economic systems. Future developments of the energy sectors in Eastern Europe and the Soviet Union will have important implications for world oil and energy market developments, since these countries comprise, as a group, the world's largest oil and gas producers, and they are the second largest energy consumers in the world.*

The East Bloc countries (Central European states plus the Soviet Union) were until recently as a group almost self-sufficient in energy. They were connected with the rest of the world only by their net exports of oil, gas and coal, while trade flows in the other direction were minimal. In the future, there will no longer be a homogeneous bloc, since a greater variety of relations between individual countries and the rest of the world is already evolving. Up to now, there was a complementary relationship between the Soviet Union and the six Eastern European countries. The Eastern European countries imported 1.6 mbd<sup>2</sup> of oil in 1988 (Table 1). The vast majority of this, about 1.5 mbd, came from the Soviet Union. The Soviet Union exported a total of 3.1 mbd of oil. The other half of these exports went to OECD countries, mainly in Western Europe. Most of the Soviet crude oil exported to the bloc countries is piped through export pipelines (built in the 1960s to East Germany and Poland, and in the 1970s to Hungary and Czechoslovakia). The contract terms permitted the Eastern European countries to buy Soviet crude at favourable conditions against roubles which were easier to earn than hard currency. Some years ago the Soviet Union refused to increase crude exports at these soft terms and in 1988 it reduced deliveries to Eastern Europe. In the future, the Soviet Union will request a larger share of hard currency payments. For East Germany, this change will already take effect as of end

1990 as the existing contract expires, and the progressing integration into the West German economic system will require world market pricing for imports and exports.

The Central European energy economies have some striking features in common (Table 2):

- Three out of these six countries – East Germany, Poland, and Czechoslovakia – are very heavily coal-based: between 60 and 70% of their total energy needs. A major part of this coal is lignite with low calorific value.
- They use very little oil in relation to total energy needs – between 13% (East Germany, Poland) and 20% (Czechoslovakia, Romania).

On average, these six countries satisfy only 21% of their total energy needs by oil, just half the ratio of West Germany (Table 2). The average share of coal is 58% and natural gas accounts for 17%.

The main reasons for this low oil use are twofold:

- Central Europe's proven oil reserves are minimal. Only Romania and Hungary fulfil a certain part of their oil requirements by domestic production: Romania 60%, Hungary 30%.

<sup>1</sup> Since these six states are geographically located between Western Europe and the Soviet Union, the term "Central European States" would be more appropriate; both terms will be used as synonyms in this article.

<sup>2</sup> mbd = million barrels per day.

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□ Since planned economies separate themselves from the world market, they cannot use it as a mainstream source of supply. The philosophy of self-sufficiency is part of central planning.

If Eastern European countries have to pay in dollars or other hard currency for Soviet oil, the incentive to rely almost exclusively on this source will diminish. It will, however, remain a preferred source of supply since

□ soft currency supplies will not be cut off immediately, but will rather be phased out over time;

□ the use of existing pipelines will assure low transportation costs.

More supply diversification is to be expected. But hard currency shortages in Eastern Europe will, at least in the near term, prevent large-scale purchases under commercial terms from the world market. Thus, barter deals will be sought with Middle Eastern and other producers. The shift away from Soviet oil will change world oil trading patterns. But it would be premature to expect dramatic shifts in the short term. The limiting factor continues to be financial constraints. But in the medium term economic growth in this area will pick up, provided economic reforms get under way. This opens up the perspective of a significantly larger oil use, in particular in the residential and the transport sector, and consequently more imports from the world market.

### Low Energy Efficiency

The system of central planning has led to an inefficient allocation of economic resources both in producing and consuming energy. This fact necessitates an examination of the issue of energy efficiency.

At this point it is necessary to make some remarks as to the precision and reliability of economic data from East Bloc countries. In sum, these data are not very up-to-date and in many cases not comparable to the quality of data used in OECD countries. Since East Bloc countries have no measurement for gross national product (GNP) in the way needed for comparison, an estimate on the basis of purchasing power parities (ppp)<sup>3</sup> has to be used. Figure 1 reveals striking differences in the energy efficiency between an industrialized country with a market economy like West Germany and East Bloc countries. In West Germany, 0.33 tons of coal equivalent of energy (tce)<sup>4</sup> were

<sup>3</sup> PPP's are, however, no exact scientific yardstick since they depend on – subjective – weighting procedures, and should therefore only be taken as tendency indicators.

<sup>4</sup> TCE is used as a measurement unit for primary energy; conversion to tons of oil equivalents (TOE) is made by multiplying it by 0.7.

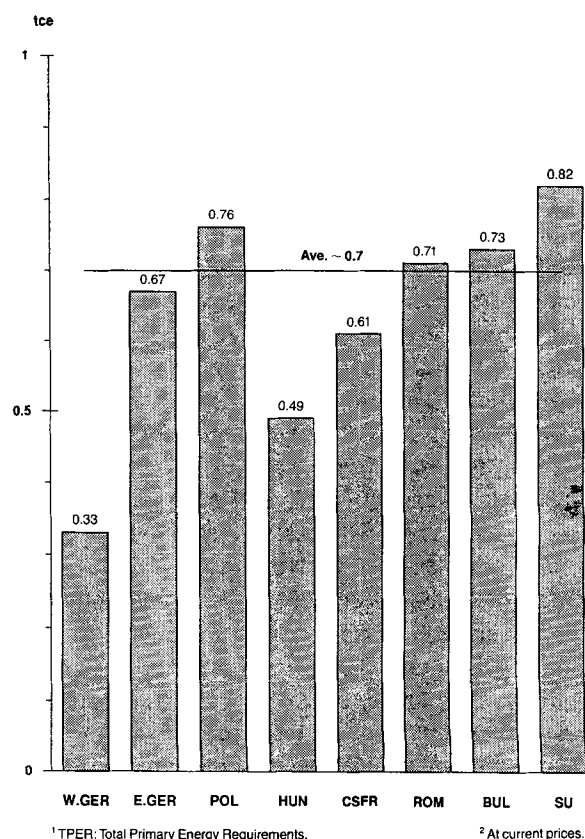
needed to produce a GNP worth US\$ 1000 (in 1989 prices). East Germany, which had at one time a similar industrial and commercial infrastructure and people with similar education and training, used 0.67 tons or twice as much energy to produce the same value of GNP. Energy intensities in the other countries vary between 0.6 and 0.8, with a maximum of 0.82 for the Soviet Union.

These data lead to the general finding that energy efficiencies in the planned economies are only about half as high as in Western Europe.

The high inefficiencies today imply, however, the chance for important energy conservation potentials in the future.

The oil use in these countries merits close attention. Figure 2 compares oil consumption per capita in West Germany, Eastern Europe and the Soviet Union. The highest use occurs in West Germany with 1.85 tons of oil per capita per year. East Germany uses only 0.7 tons or two and a half times less, for reasons which are typical for a centrally planned economy without a hydrocarbon resource base:

**Figure 1**  
**Energy Efficiency:**  
(TPER / 1000 US \$ GDP<sup>1</sup>)



□ the economy is heavily based on a domestic resource (lignite), which is produced regardless of its costs;

□ a rigid policy of oil substitution – as part of the policy of self-sufficiency – was pursued in order to avoid dependency on “capitalistic” world markets;

□ lower standards of living caused a low use of individual transportation, accompanied by a systematic preference for public transportation (mainly by rail).

Similar factors apply to Poland and Czechoslovakia.

In the Soviet Union, on the other hand, 1.5 tons of oil per capita were used even though income per capita is less than one half of that in West Germany. This comparison reflects the well-known fact that the Soviet Union uses oil very inefficiently in industry, in power generation, and also for heating purposes.

### Perspectives

A specific note of caution is appropriate when discussing the energy future of Eastern Europe and the Soviet Union which goes beyond the normal uncertainty connected with long-term forecasts or projections of energy development. One can hardly analyse the region's political, economic and energy future without having heard the latest news. Today's facts and assumptions may be obsolete tomorrow because the entire framework is in an accelerating process of change. Nobody can predict future events with any degree of reliability. The entire region is at a political and economic crossroads. Therefore one can at best try to develop some very general tendencies.

As a result of the fundamental political changes in the whole region, the reforms of the economic systems are

already underway, though to a varying degree. Some Central European countries have already instituted market elements. Besides East Germany, where the transition to a market economy is becoming irreversible with progressing unification, these are Hungary, Poland and Czechoslovakia. For Bulgaria and Romania the future remains open.

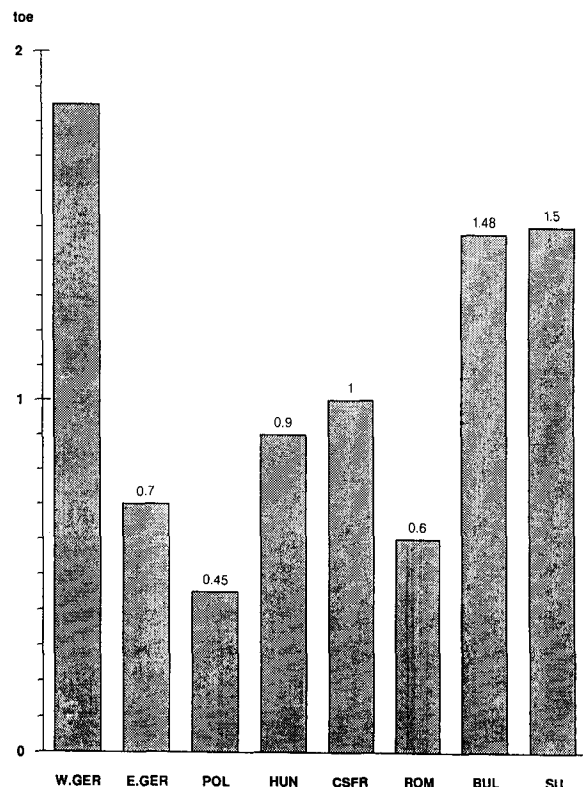
In the Soviet Union, on the other hand, “perestroika” has generated almost no economic benefits; the half-hearted introduction of a few “market elements” into a rigidly centralised system has caused more confusion than economic incentives.

The general issue for the latter three countries is: will there be a short shock or a long agony in displacing the planned economies?

A market system apparently entails a much more optimistic outlook for economic growth, personal income, energy production, increased energy consumption but also for improving energy efficiency.

This difficult issue is illustrated in the case of East Germany. Fairly recently some energy projections and forecasts were made for West Germany, but none of them already includes the effects of the unification of

**Figure 2**  
**Oil Consumption per Capita**



**Table 1**  
**Oil Production and Imports/Exports in**  
**Eastern Europe, 1988**  
(thousand b/d<sup>1</sup>)

Country	Domestic Production	Imports	Exports	Net Balance
East Germany	1	410	79	- 331
Poland	3	360	17	- 343
Czechoslovakia	3	344	25	- 319
Hungary	63	190	67	- 123
Bulgaria	6	290	.	- 290
Romania	186	355	193	- 162
Subtotal	282	1,949	381	- 1,568
Soviet Union	12,150	990	4,090	+ 3,100
Total	12,432	2,939	4,471	+ 1,532

<sup>1</sup> Barrels per day.

West and East Germany. Thus at present only a mechanical exercise is possible by adding up the projected numbers for West Germany with some bold assumptions on East Germany. In 1988, the status of total primary energy requirements (TPER) in East and West Germany was as follows:

- West Germany = 390 mtce, of which oil = 164 mtce (= 115 mtoe),
- East Germany = 139 mtce, of which oil = 24 mtce (= 17 mtoe).

An oil share of 42% in West Germany contrasts with just 13% in East Germany.

### Compensatory Effects in the Two Germanies

In an optimistic scenario (I) for a united Germany in the year 2010 – characterized by high economic growth, open markets, but also a high concern for the environment – an increase of the TPER over 1988 by a total of 5% could be foreseen. This is composed of an increase in the Western part by 9%, and a decrease in the Eastern part by 7%. At a first glance the decrease in East Germany looks astonishing, but is simply explained by the elimination of the tremendous waste in using lignite in inefficient power stations and other transformation plants.

Oil use in East and West Germany together in 1988 adds up to 188 mtce (= 132 mtoe), and will increase to just 196 mtce (= 137 mtoe), corresponding to an increase of 4%.

This relatively small growth is made up by a gradual decline in the Western share (from 115 mtoe to 108 mtoe, or –6%), and an increase in East Germany from 17 mtoe to 29 mtoe (+ 75%). In West Germany, the gradual decrease comes about by further conservation in the home heating sector, a partial substitution of oil by gas in the residential and industrial sectors and an increased efficiency of the – still slowly growing – automobile fleet. These developments do not present a dramatic change, but are rather a continuation of the existing trends.

In an alternative scenario (II), which is not discussed here in detail, the positive economic growth perspectives are sometimes interrupted by cyclical downturns and hampered by a less positive development of world trade.

In the more optimistic case I, oil demand in the eastern provinces of Germany will almost double because private consumers will use the new personal freedom they were lacking for a long time, e.g. to travel more in their private cars, or to substitute the inconvenient lignite heating in their homes by more convenient sources such as oil or gas.

Car ownership in West Germany at present is at 475 per 1,000 inhabitants, in East Germany it stands at 216. East Germany could reach the same density that West Germany has today in about 10 years. Instead of using public transportation (bus, railway), people will prefer to use their own cars. This is a more oil intensive and also less energy efficient consumption structure than before.

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**Von der polnischen Teilung bis zur Gegenwart**

The beginnings of peasant self-help organisations in Poland were characterised by the political situation in which Poland found itself in the 19th century. A Polish state had not existed since 1795. Different legal, economic and social conditions therefore prevailed in the areas annexed by Austria, Prussia and Russia. This study describes the development of peasant self-help in Poland. The various types of self-help are first examined historically and then in the form they take today. (Only available in German.)

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Commercial transport will also change drastically. In West Germany, lorries are at present the dominant means of moving goods (56%), while in East Germany their share is only 20%. In East Germany railways are the dominating commercial transport system (72%), while they account for only 22% in West Germany. We can expect these structures to become more similar until 2010, thereby contributing to the described increase in oil use.

As already pointed out, large increases in oil use in East Germany will to a considerable extent be compensated for by a slow decrease in West Germany. Thus, the resulting increase for both regions together will be surprisingly small.

### Energy Future at a Crossroads

A compensatory effect curbing the expected increase in oil use can, however, not generally be expected in other Eastern European countries which turn to a market economy, namely Poland, Hungary and Czechoslovakia. For these and the other Eastern European countries it is impossible to quantify future developments with any degree of certainty. An attempt therefore is made to come to a qualitative assessment, as summarised in Table 3.

It is generally expected that Soviet oil production and exports will decrease over the next 10 to 20 years. The rate of decline will depend mainly on two factors:

- ☐ geology: maturity of fields;
- ☐ success in improving energy efficiency. Out of sheer necessity energy conservation will take place, but the degree will largely depend on market-oriented pricing.

To facilitate the discussion, Table 3 shows the crossroads on which the energy future will decisively depend:

- ☐ market economies or continuation of planned economies?

- ☐ Short-term or long-term effects?

In the Soviet Union, domestic oil demand will increase in the case of a more market-oriented system in the short and medium term, while in the long term, the effects will be just the reverse because more progress will be made in energy conservation.

In the case of the continuation of the planned system, internal oil demand is likely to increase in both the short and the long term, with negative consequences for the exportable surplus of oil.

For Poland, Hungary and Czechoslovakia, the road to market economies seems to be irreversible. This implies a steep increase in oil demand and imports in the short and medium term for the same reasons already explained in the case of East Germany. In the long term, however, the increase will come to a halt and eventually make room for a gradual decline.

For Bulgaria and Romania, similar considerations apply as to the Soviet Union in the case of more market orientation, with a steep increase of oil demand in the short and medium term. In the case of continued economic planning, we may expect a smaller increase initially, but little progress in improving energy efficiency in the long term.

### Conclusions

- ☐ At present, the data base for a thorough evaluation of the current energy situation in Eastern (or: "Central") Europe and the Soviet Union is not sufficient.
- ☐ Future energy developments will decisively be determined by the shift away from centrally planned systems to market economies. This step seems to be irreversible in East Germany, Czechoslovakia, Hungary, and Poland; it remains open for Romania, Bulgaria and the Soviet Union itself. Because of these open questions, the considerations presented are only of a very preliminary nature.

**Table 2**  
**Structure of Total Primary Energy Requirements in Individual Countries in Eastern Europe, 1987**  
(in %)

Primary Energy	GDR (1)	Poland (2)	CSFR (3)	Hungary (4)	Bulgaria (5)	Romania (6)	Average 1-6	Soviet Union <sup>2</sup>	Average <sup>1</sup> E. Bloc	FRG
Coal <sup>2</sup>	74	78	57	25	31	25	58	23	32	28
Oil	13	13	21	29	38	20	21	32	29	42
Gas	9	8	12	28	15	50	17	38	32	17
Nuclear	3	—	8	10	10	—	3	3	3	11
Hydro	1	—	—	—	—	—	1	4	4	2
Other	—	1	1	—	—	4	—	—	—	1
Total <sup>3</sup> (mtoe)	95	134	78	30	41	75	453	1,366	1,819	272

<sup>1</sup> (1-6) + Soviet Union. <sup>2</sup> Incl. Lignite. <sup>3</sup> Inconsistencies in totals of percentage shares due to rounding and/or insufficient data.

**Table 3**  
**Energy / Oil Consumption and Import Tendencies**

Country	Type of energy demand/supply	Market economy		Planned economy	
		short term	long term	short term	long term
USSR	Oil demand	+	-	+	+
	production	0	-	0	--
	exports	0-	-	0-	--
	Gas demand	++	+	++	++
	production	++	++	++	+
	exports	++	++	++	+
	Energy efficiency	-	+	0-	0-
Poland	Oil demand	++	0-		
CSFR	Oil imports	++	0-		
Hungary	Gas demand	++	+	n. a.	n. a.
	Gas imports	++	+		
Bulgaria	Oil demand	++	0-	+	+
Romania	Oil imports	++	0-	+	+
	Gas demand	++	+	+	+
	Gas imports	++	+	+	+
E. Germany	Oil demand / imports	++	0-		
	Gas demand / imports	++	++		
W. Germany	Oil demand / imports	0	-	n. a.	n. a.
	Gas demand / imports	+	+		
E. + W. Germany	Oil demand / imports	+	0		
	Gas demand / imports	++	++	n. a.	n. a.

+: increase; -: decrease; 0: no change; n. a.: not applicable.

□ The Soviet Union's relationship to the Central European countries was up to now of a "complementary" nature: the Soviet Union was the almost exclusive supplier of oil and gas. These ties have loosened already and will loosen further. The Soviet Union will try to earn more hard currency instead of accepting roubles.

□ For the Central European countries the incentive to buy exclusively from a single source will consequently decrease. As a result of the partial dissolution of the COMECON as a trading bloc and of the basing of trade in this group of countries more on world market prices, a more diversified oil supply structure and new trading patterns will evolve.

□ This will create chances for other suppliers, e.g. from the Middle East. In the short and medium term, however, shortages of hard currency in almost all Central European countries may delay or impede their world oil market integration; barter deals could partially ease this restriction.

□ Up to now, the Central European countries' energy systems were characterised by a high share of coal and a low share of oil in total energy use. This was the result of a very small hydrocarbon resource base and a separation from world (oil) markets typical for planned systems.

□ The Soviet Union's exportable oil surplus will probably decline slightly in the short term and more steeply in the long term, but considerable scope for improvement exists if market mechanisms are applied.

□ The East German energy economy will rapidly change and be steered by market mechanisms as the unification of the two parts of Germany progresses. A marked increase in oil use for transportation and home heating is likely, but also a strong increase in gas use for heating purposes. The increased oil consumption in the Eastern part will partially be compensated for by a gradual decrease in the Western part. It will occur despite bright economic growth prospects as a continuation of currently existing trends in conservation.

□ In the Soviet Union and the Central European countries, large potentials for energy efficiency improvements exist. They would be greater if market systems were adopted than if central economic planning continued.

□ The higher oil demand in the transportation and residential sectors in these countries may be compensated for partially by a reduction of energy waste in industry and power generation. A further success is, however, uncertain in some of these countries since a fundamental change in their economic systems remains open.