

The World Energy Outlook: Implications for Economies in Transition

By John P. Ferriter*

The energy outlook for the European economies in transition is a timely topic. Many of these countries have reached a critical turning point in the transition process. In the past seven years, central and eastern European countries have passed through a difficult period of economic readjustment and hardship. Declining economic activity has led to a significant contraction of energy production and use in the region. For the last two years, however, many of these countries have begun to enjoy economic recovery. This means their need for energy is rising again. This will require a continued, sustained effort to adapt and restructure their energy sectors to lay the foundation for dynamic economic growth into the 21st century.

In examining the implications for central and eastern European economies of the IEA's recently released World Energy Outlook, I plan to emphasize four points:

- World energy patterns are changing, but energy demand is expected to grow steadily as it has over the last two decades. Fossil fuels will still account for nearly 90 percent of global energy consumption by the year 2010.
- Demand for fossil fuels will increase rapidly, with most of the growth coming from developing countries.
- Energy security is still a top priority. As their economies modernize, it will be increasingly important for economies in transition to protect themselves from potential supply disruptions.
- Since 1991, the IEA has worked closely with central and eastern European countries to help them establish competitive and open energy markets as a condition for successful economic reform and sustainable growth. Among these countries, the Czech Republic, Hungary, Poland, the Slovak Republic and Slovenia have applied to become IEA members; the Czech Republic and Hungary have recently become members of OECD, which is one of the preconditions for IEA membership.

IEA'S World Energy Outlook to 2010

The energy industry operates on a long-term basis. Because of the longevity of energy using equipment, the level of energy consumption today has to a large extent been determined by decisions taken many years or even decades ago. Similarly, today's energy supply is largely

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the result of investments undertaken in the 1970s and 1980s. Thus, in formulating energy policy and making investment decisions, it is important to have a view of possible future developments in the energy sector.

For this reason, the IEA produces its long-term *World Energy Outlook* which provides our assessment of the general direction and possible evolution of worldwide energy trends. Based on this analysis, policymakers are in turn in a better position to assess the consequences of changing, or not changing, the underlying policy parameters.

The 1996 edition of the *World Energy Outlook* was issued in April. The *Outlook* is based on two scenarios regarding the response to rising world energy demand. The cases differ with respect to the assumptions regarding prices and improvement in energy use. Assumptions on economic development have been kept unchanged between the two cases.

The two cases are:

- *Capacity Constraints*: Growth in world energy demand past 2000 will be such that oil prices will rise - to about \$25 per bbl. in 2005; and
- *Energy Savings*: Energy intensity is assumed to decline as a result of more efficient energy use. The price of oil is expected to remain flat at about \$17 per bbl.

The *Capacity Constraints* case assumes historic rates in energy efficiency improvements. Trends in past behavior will continue to shape future energy consumption patterns. The moderation of energy demand takes place through a rise in primary energy prices. At the same time growth in energy demand will be too fast for production to keep up without energy prices rising to stimulate additional supply. The growing capacity tightness cannot be satisfied by timely increases in non-OPEC production. Consequently, the balance of production shifts increasingly in favor of a number of low-cost producing countries.

The *Energy Savings* case implies changes in the way consumers make their choices in selecting and using their goods. The assumptions on additional efficiency in energy use do not involve new technologies or technologies that are not cost effective. Energy saving leads to a significant reduction in the rate of energy demand growth which reduces the need for additional production capacity. Energy markets are assumed to expand appropriately to meet demand growth. Therefore, upward price pressure does not arise.

Oil Price Assumptions

The *Outlook* assumes that there will be no increase in oil prices up to 2000. The assumption of flat prices through the remainder of this decade is primarily the result of significant upward revisions to non-OPEC oil production through the 1990s, mainly for North Sea production. The perception of continuing growth in non-OPEC supplies is a direct result of



John Ferriter at the podium.

the detailed analysis of short term supply trends routinely carried out in preparing the IEA's monthly *Oil Market Report*.

The upward revision to the projected increase in non-OPEC oil supplies suggests that there will not be any upward trend in oil prices before 2000. This is reflected in the oil price assumptions. The oil price in the *Capacity Constraints* case increases only after 2000, when it is assumed to rise steadily to reach \$25 (in 1993 dollars) per barrel in 2005 and remain flat thereafter, as the result of pressure on OPEC capacity. The oil price in the *Energy Savings* case is assumed to remain flat at \$17 per barrel throughout the projection period.

World Energy Demand

Regardless of which of the two cases are considered to be more realistic, a number of major elements emerge with which energy policymakers must contend in the medium- and long-term:

- World primary energy demand is expected to continue to grow steadily, and is projected to increase by one-third to one-half between 1993 and 2010 (to between 10,900 and 11,800 million tonnes of oil equivalent - Mtoe). This increase implies an annual average growth rate of from 1.7 to 2.2 percent
- One consequence of growing energy demand is that energy-derived CO₂ emissions could grow by 50 percent by 2010 over 1990 levels.
- Natural gas will account for 21-24 percent of total energy demand by 2010. Rising gas demand is primarily driven by electricity generation.
- With limited scope for increasing the use of nuclear and hydroelectric power in many regions, and the relatively low level of use of renewable sources of energy, primary energy demand will continue to be met overwhelmingly by fossil fuels - by almost 90 percent in 2010.

Oil Supply and Demand

Oil remains the dominant fuel. World oil consumption is expected to increase by about 40 percent by 2010, with most of the increase in consumption taking place in non-OECD countries. By 2010, the OECD will consume only about half of the world's oil, compared to around 60 percent now.

By 2010, the call on OPEC could be nearly 50 billion barrels per day - over half of the world's oil requirements, compared with 40 percent at present (or 28 million barrels per day.)

More than half of the world's energy will soon be used outside the OECD. In 1993, the OECD accounted for over 54 percent of world energy demand. By 2010 this share could be less than 47 percent. Countries outside the OECD, the former Soviet Union and central and eastern Europe, i.e., the Rest of the World (ROW), could account for over 38 percent of the world primary energy demand compared with 27 percent in 1993. Rapid energy demand growth in the ROW also increases substantially carbon dioxide emissions. As an example, we expect China and India alone to account for a larger increase in carbon dioxide emissions between 1990 and 2010 than all OECD countries combined.

The Outlook for Central and Eastern Europe

I would now like to turn specifically to the challenges facing the countries in central and eastern Europe as we look to the next century.

Primary energy demand in the central and eastern European countries - which was about 20 percent of that in western Europe in 1993 - could increase from about 270 Mtoe in 1993 to 360 Mtoe in 2010. After the steep contraction in energy demand between 1987 and 1993 - when aggregate GDP fell by 30 percent - and assuming modest growth until 2000, demand could increase between 1.0 and 1.7 percent per annum over the outlook period. Though this is almost twice the growth that we expect for Western Europe, the region's energy demand by 2010 will not yet reach its peak of the late 1980s.

Most of the increase will be for hydrocarbons. Demand for oil will increase between 1993 and 2010 by 48 to 67 percent. Natural gas will increasingly become a fuel used in newly constructed generating capacity. Consequently, natural gas demand could grow by 60 percent in the *Capacity Constraints* case, where incremental electricity demand will be met primarily by gas-fired power plants. In the *Energy Savings* case, we expect gas to grow only moderately, by 15 percent between 1993 and 2010.

We expect consumption of solid fuels to increase only slightly. Thus, the share of solid fuels in primary energy supply will decline from 52 percent to between 42 and 46 percent. By 2010, coal will still be the main source for electricity production. New capacity will largely be based on natural gas, but nuclear production will remain an important source for electricity generation.

Compared to 1990, carbon dioxide emissions are expected to increase by 2010 by about 7.3 percent in the *Capacity Constraints* case and decline by about 3.4 percent in the *Energy Savings* case.

What does this imply for energy policymakers in central and eastern Europe?

Oil

The significant growth in oil demand results from demand for space heating and transport fuels. Gasoline consumption is expected to rise to almost 11 percent of final consumption in 2010, compared to just over 6 percent in 1993. Consequently, there will be a move towards the lighter end of the barrel.

The majority of central and eastern Europe's oil supplies come from Russia via pipeline through Ukraine and Belarus, as indigenous production by central and eastern European countries is limited. Oil supply to the region will continue to be largely in the form of crude oil. There is likely to be a mismatch between the growing demand for transport fuels and the heavy-end products that can be delivered from Russian refineries. The choice will thus be whether to purchase products in Rotterdam or Mediterranean markets or to purchase crude oil on world markets and refine it domestically.

Both the purchase of products and of crude oil will move central and eastern Europe closer to OECD markets. The establishment of these trade links will require, in some countries, substantial investment in pipeline capac-

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Globalization of the World Economy *(continued from page 7)*

in the European Union results from an insupportably large social welfare system, and rigid labor markets, and penalties on sacking which also penalize hiring. Much is not understood. The German underwriting of *Ossi* prices and wages at five times their real values is in a class by itself.

But whatever the causes, the prolonged stagnation is dangerous. A strongly rising economic tide lifts some segments much faster than others, but so long as nearly all advance, and the few losing out can move over to a rising segment, there is acceptance or at least toleration. But when the lift is weak, there is great uncertainty, fear of the unknown, clinging to what one has, excluding as many as possible. To "save jobs" one puts up barriers to imports, which makes the stagnation worse, which makes the protectionist mood worse. The mild and beneficial North American Free Trade Agreement (NAFTA) is under loud venomous attack. The European Union finds reasons to limit imports from Poland, Hungary, and the Czech Republic despite a natural bias toward free trade with neighbors who may soon be treaty partners.

So as the world economy grows ever more global, the pressures to limit and fracture it also grow. I hope and expect that "aggregate output" - an abstraction poorly defined and nowhere loved - will keep rising. But I will not try to predict the road.

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Report of the 1996 Annual General Membership Meeting and the Year 1995

President Tony Finizza called the meeting to order at 1:30 pm, May 29, 1996 at the Hotel Atrium Hyatt in Budapest, Hungary and introduced Council and past Council members present. He then outlined his broad objectives for the year which included:

- Improving services to members.
- Increasing membership in three areas:
 1. By broadening membership to include more members in the financial, academic and policy areas.
 2. By extending membership coverage in the emerging energy markets.
 3. By widening membership among current country participants.
- Developing and implementing a long-range plan for the Association.

Finizza noted that three-quarters of our members are from industrialized countries and that outside of Japan, only 5 percent of our members are in Asia, the fastest energy growth area. Further, he pointed out that while IAEE has members in nearly 70 countries, only half of those have membership large enough to qualify for affiliate status and only 10 countries have more than 100 members.

Secretary Len Coburn reported that membership was growing at a rate of approximately 4 percent a year and currently totaled a little over 3250.

Treasurer Mitchell Rothman reported that 1995 had been an unusually good year for the Association as a result of the very successful International Conference held in July in Washington, DC. Subsequent to the meeting he provided the following income and expense report for the year and balance sheet for the end of the year:

<u>Income</u>		<u>Expenses</u>	
Dues	\$143,000	Admin. & Office Oprs.	\$88,000
Meetings	62,000	Publications	102,000
Publications	89,000	Other	11,000
Interest	19,000	Total	\$201,000
Other	<u>16,000</u>		
Total	\$329,000	Net Income	\$128,000

December 31, 1995 Balance Sheet

<u>Assets</u>		<u>Liabilities & Fund Balance</u>	
Cash & Equivalents	\$462,000	Accounts Payable	\$12,000
Accounts Receivable	6,000	Deferred Dues & Subscriptions	<u>73,000</u>
Total	\$468,000	Total	\$85,000
		Fund Balance	<u>383,000</u>
		Total	\$468,000

Rothman further commented that he had recommended to Council the establishment of a foundation through which the Association could promote energy economics in developing countries and the development of resources for energy economists. He also noted that a committee to develop a definitive proposal had been established by Council.

Finizza noted that coming International Conferences were scheduled for New Delhi, India in January, 1997, Quebec City, Canada in May 1998 and Rome, Italy in June 1999. Proposals were now being entertained for the year 2000 and later.

The meeting was adjourned at approximately 2:00 pm.

World Energy Interdependence and OPEC's Policy

by *Rilwanu Lukman**

As we approach the end of the 20th century, there is a distinct upward trend in the globalization of the world's economic interests. The phrase "global village" is creeping into our language, inexorably with the advance of the hi-tech information revolution! The term "village" traditionally refers to the smallest, self-contained community of mankind. As the requirements of communities become more diverse and complex, they resort to broader-based administrative structures. Progressively, their economic affairs operate at the level of the town or city, the local region, the nation and, particularly in the past two decades, the international region. Now we are operating increasingly at a global level.

At the same time, however, as the macro units of operation expand, there is the contrasting tendency towards a sentiment best encapsulated in the whimsical expression of two decades ago, "small is beautiful." This phenomenon is not merely inspired by a wave of nostalgia. It also springs from the realization that many day-to-day affairs function better at the smaller, more personal level.

The energy industry is very much entrenched in this dichotomy. On the one hand, there is the recognition that to realize the true potential for energy efficiency, one must adopt a global perspective. On the other hand, there are the individual, locally induced energy needs of mankind, to prepare food, to keep warm, to travel from A to B and to generate wealth. The ideal global energy equation consists of an incalculable number of smaller, interdependent energy functions.

If, in the following, I concentrate excessively on the international oil market, I make no apology; this is, after all, the principal area of interest to the organization I represent, OPEC. However, the challenges facing the oil market are closely related to those affecting the energy industry at large. Further, I shall focus on the remaining five years of this century - although one cannot, of course, divorce oneself entirely from the longer term.

This five-year period equates roughly to the average lead time for investment in the oil sector. Hence, we already have a pretty good idea about how the oil sector - and, indeed, the energy industry as a whole - will be structured throughout this period. This suggests two dimensions to activities within the industry during this time. First, there is the day-to-day running of an industry whose overall shape and style is expected to evolve only slowly from what we have today. And secondly, there is the planning for the future that must take place during these five years; it is here that we may begin to detect the potential for radical change in the complexion of the industry. There are strong linkages between the actions that satisfy each dimension's requirements. There are

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also - naturally - conflicts of interest, trading off the present for the future. Throughout, however, the concept of energy interdependence manifests itself.

Keeping the two-dimensional aspect at the back of our minds, let us seek to identify the major influences on the energy industry in the twilight years of the 20th century.

We can begin with the global village, since we referred to this earlier. What will be the extent of the global village and how will it affect the energy industry? As the logical conclusion of the centuries-long process of rationalization and technological advance, one might at first envisage a single, massive global economy, with a concomitant, centralized system of energy supply. However, such are the political, social and cultural allegiances of mankind, as well as the sheer impracticalities of such a monolithic structure, that a rather less grand process of evolution appears likely. This is indeed already taking shape, with the regionalization of the world's principal economic areas into several large, increasingly self-contained groups. Part and parcel of this process is energy supply, and we can, similarly, detect a regional trend manifesting itself here. However, this is a trend, rather than an absolute phenomenon. Clearly, energy supply will continue across regions, since other, basic economic factors will be at work.

The concept of large, regional groupings, with their indigenous energy systems, is not new. The former Soviet Union was one such grouping which lasted more than 70 years; its integrated energy supply system stretched well beyond its vast borders, to embrace neighboring states in Eastern Europe. Up to the end of the 1980s, the FSU was the world's leading oil producer. Its dissolution, however, revealed an oil industry in a state of disarray, characterized by obsolete technology, high inefficiency and poor investment. Oil production and export levels swiftly declined; only now are there signs of a bottoming out. Other branches of the energy industry also suffered rapid, substantial setbacks in the post-Soviet period. Natural gas output fell heavily, although the region remains comfortably the world's leading exporter of this hydrocarbon. Coal suffered a precipitous decline, with present production levels a fraction of those of the Soviet era. The nuclear industry, still rocking from the Chernobyl accident of 1986, was seen to be replete with serious safety problems. Newly independent republics each set about rebuilding their indigenous energy systems; much of this has involved looking outwards from the former Soviet area, into the wider world. The European Energy Charter was set up to assist this process and to attract much-needed investment to the region. The future pattern of energy supply in the former Soviet Union - and its impact on the world at large - is extremely difficult to predict beyond the immediate term, due to the complex of politics, nationalism and other pressures weighing heavily upon the region at the present time.

Much of the former Soviet area's problems stem from its use of obsolete technology. This brings us neatly onto the third major influence, technological change. This is an on-going matter affecting all branches of the energy industry. The pace and extent vary, however. At



Dr. Lukman and other panelists at the opening session.

the present time, the spotlight is very much upon the rapid rate of technological advance in the upstream oil industry, which has had the effect of greatly extending the lives of existing reserves, as well as lending commercial viability to exploration and production in more remote areas. Nowhere is this more true than in the North Sea, where pioneering recovery techniques have given a new lease on life to reserves which, previously, had been expected to be on a downward trend by now.

Compounding the issue – and, notably, the expense – of technological change is the wave of new rules and regulations being discussed or imposed across the energy world. Many of these have a direct connection with environmental concern. They can be divided into two areas – visible and invisible. The visible relate to the tangible state of the environment and the fostering of healthy, clean and safe life-styles for ourselves and future generations. We in OPEC welcome any sensible, balanced measures taken to achieve these noble objectives. The invisible side is far more tenuous and controversial, as well as being highly politicized. Here we are talking about the phenomenon of climate change and global warming, and the ensuing, purported remedial measures. The most notable of these is the imposition of prejudicial energy taxes. What alarms us is that many countries seem prepared to impose drastic fiscal measures to remedy a supposed malaise, whose very validity is being questioned increasingly by reputable scientists and other experts across the world. If implemented on a wide scale, such taxes would have highly disruptive, hugely expensive repercussions for the world energy mix, as well as the global economy at large. For OPEC's member countries, they would have a devastating impact on our export revenues and, among other things, on our ability to invest in a future, secure oil supply.

The four aspects we have covered so far – regionalization, the FSU, technological change and the environment – all have a part to play in bringing about an economically viable, environmentally harmonious world energy industry for the coming years and into the 21st century. However, they all have one thing in common, and that is the need for investment. This is the fifth of our major influences. It raises so many questions, questions which require answers, and action, as the years unfold. Where does the money come from? How much is

needed? Where should it go within the energy industry? What should we concentrate on? Will political considerations continue to outweigh economic considerations? The competition for funds will both be within the energy industry and between it and other industries. Within the energy industry, it will be between different sources of energy. Among the sources of energy, it will be between the different areas of supply. The most blatant case in the oil industry is between investment in the easily accessible reserves, which lie principally in the OPEC area, and the more difficult ones, which lie in the hazardous, remote areas.

Closely related to investment is the issue of pricing – our final major influence. When prices are low, fewer funds will be available for investment. But demand, at the same time, will become higher, increasing the need for investment. In such situations, funds will inevitably be attracted to the areas where you get more for less. If prices are high, then you are liable to get the opposite effect. Furthermore – and this applies particularly to the oil industry – the issue of pricing itself is complicated by the fact that, in the short-to-medium-term, it depends upon more than just economic fundamentals. In today's highly computerized, information age, spot and futures markets play a disproportionate role in determining the price of oil on world markets. This has been a feature of the past decade, and there is little to suggest that it will change, certainly over the remaining years of this century. Everything now happens at such a rapid pace and with greater magnitudes than is either natural or healthy for the market. A mild run on demand in an unexpectedly severe winter, when stocks are already low, will obviously raise prices; but it need not lead to wild overshoots in price, to be soon followed by exaggerated swings in the opposite direction.

So far, I have identified six major influences on behavior in the world energy industry over the remaining years of this century. As I said earlier, we must consider these in the context of keeping the ball rolling in this five-year period, as well as planning for the future. Each of these major influences can be hived off as separate discussion subjects in their own right, but time prevents us from doing this. What we can do, however, is to convey to you how these and other factors have molded our perceptions of world energy market performance in the period up to the year 2000. Here, we use projections from OPEC's *World Energy Model*, reference case scenario.

With the world economy projected to grow at an average annual real rate of 3.4 percent between now and the year 2000, we expect world commercial energy demand to continue to rise, at an average annual rate of 2.0 percent. The most rapid energy growth is expected to occur in the developing countries, at 3.3 percent, and the slowest in the OECD, at 1.5 percent. For the former centrally planned economies, which, for the sake of neatness in our projections, include China, the projected figure is marginally below the world average, at 1.9 percent; effectively, protracted weakness in the former Soviet Union is balanced out by continued rapid growth in China.

Looking at individual energy sources, at a global level, oil is expected to experience the slowest growth rate between now and the year 2000, at 1.8 percent; coal and gas will be neck-and-neck, at 2.0 and 2.1 percent respectively; while

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The World Energy Outlook (continued from page 9)

ity, refinery upgrading and environmental protection measures, which exceed the financial capabilities of the domestic industry. The restructuring of the domestic petroleum industry and regulatory changes are essential for attracting foreign partners that can provide capital and know-how.

Gas

We expect natural gas demand to grow substantially, due principally to the progressive replacement of coal-fired power plants. The region's own gas production accounts for only about 45 percent of its needs. The majority of the region's gas requirements is met by imports from Russia. The region's own production will likely decline beyond 2000. Consequently, there will be an increased need for gas imports.

Supplies from the former Soviet Union will continue to be the main source of imports. Increased gas demand in central and eastern Europe combined with rising demand in OECD Europe will require new gas transport infrastructure. These will likely make more imports available from the former Soviet Union. Thus, over the longer term, the growth in gas demand will increase the region's dependence upon the former Soviet Union.

Given the growing dependence on imported oil and gas, energy security considerations need to be firmly embedded in the countries' energy policy objectives. Some countries, including Hungary, have already made promising progress in enhancing their emergency preparedness. The majority of these countries, however, will have to substantially increase their efforts. Storage capacity for both oil and gas is generally not sufficient to be prepared for a supply disruption.

Coal

In 1993, over half of the total energy demand in central and eastern Europe was met by solid fuels. Coal is the region's most significant energy source, which explains the dominant role it has achieved over time. However, much of the consumption of solid fuels in the region is accounted for by brown coal.

The reliance on low-quality coal, coupled with a significant presence of energy intensive industry and often inadequate pollution control, has led to severe environmental problems. Governments are required to reduce sulphur dioxide emissions as part of international commitments they are partner to, such as the Convention on Long-Range Transboundary Air Pollution. Finding solutions for cleaner and more efficient energy supply will take time and demand substantial investment in new technology and environmental protection measures. Consequently, the role of coal in the region's energy supply mix will diminish gradually but remain significant.

Restructuring of the coal industry is a necessary condition for modifying the fuel pattern and providing energy more cost effectively. Governments are becoming increasingly concerned with the social costs of scaling down the mining industry. For some countries, the costs of closing unprofitable mines are substantial. Decisions related to the restructuring of coal mines in most cases expand beyond those of simple economics

of production. Experience in IEA member countries shows that social welfare support, if required, should be provided directly through the welfare system, not by prolonging high-cost production.

Electricity Production and Nuclear Energy

We expect electricity demand in central and eastern Europe to grow between 1.0 and 1.8 percent annually over the outlook period. Some countries will soon have to make decisions on how to provide new capacity and to replace power plants for which continued operation is uneconomic. Security supply considerations, economics of fuel supply, environmental constraints and social policy objectives will influence the fuel and technological choice.

A particularly sensitive issue is the role of nuclear power. In 1993 nuclear power plants supplied 13 percent of the region's electricity production, but its share in electricity generation is considerably more important in some countries. In Hungary and the Slovak Republic, for example, nuclear power plants produce about 40 percent of total electricity production.

For some countries, nuclear power is an essential strategic energy source. As a result of reduced priority of power generation from fossil-fuel burning plants, the share of nuclear generation has increased in some countries in the early 1990s. We expect that nuclear energy will continue to provide a significant portion of electricity generation, but its average share could decrease to between 10 to 12 percent in 2010.

It is commonly accepted that the nuclear industry in some countries in the region suffers serious design and operational safety weaknesses, faces substantial decommissioning and clean-up costs, and lacks adequate storage facilities for radioactive waste. It is in the industry's interest that any continuation of investment in nuclear energy is fully in line with fundamental safety principles set out by competent international authorities, and that reactors are made acceptable under internationally recognized licensing practices.

The IEA's Role: From Assistance to Partnership to Membership

Intensive IEA cooperation with economies in transition began soon after the collapse of the communist regimes. Initial activities focused on energy policy reviews, drawing on the 20 years experience of the Agency in examining the policies of its member countries. The aim of these first reviews was to provide immediate assistance and advice on the most pressing energy policy issues, and to lay the foundation for the development of sound market-oriented energy strategies.

Follow-up to energy surveys has focused on issues such as emergency preparedness, market liberalization and reduction of trade barriers.

At present, Hungary, Poland, the Czech Republic, Slovakia, and Slovenia have applied for IEA membership. On May 20 Russia also expressed its intention to join the OECD and the IEA. We look forward to developing closer relations with these countries and to welcoming a number of them into the IEA as soon as they have fulfilled the criteria for membership.