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LIBERALIZATION AND PRIVATIZATION; IMPLICATIONS FOR ENERGY SECURITY IN ECE COUNTRIES

Abstract

1. Energy markets are increasingly being liberalized and opened up to competition. Given the importance attached to energy security, the potential impact that market liberalization could have on energy security is of particular interest at this time. This is why this paper examines the role of restructuring, liberalization and privatization in enhancing energy security in the ECE region. In addition, the objectives underlying energy policy and the concept of energy security are discussed. The liberalizing and restructuring trends in the energy sector are reviewed. Other issues, particularly future trends in energy demand and supply, of particular relevance for energy security are assessed.

2. The conclusion emanating from this assessment is that the restructuring, liberalization and privatization currently underway in the energy sector in ECE countries is conducive with, and contributes to, enhancing the energy security of countries in the region. Nevertheless, these trends by themselves are not sufficient to alleviate a range of concerns about energy security. Vigilance is still necessary. Government measures to promote energy security, that complement and facilitate the market transformation, continue to be needed.

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3. Past government measures and policies to foster energy security, such as the promotion of energy efficiency, the diversification of the kinds and sources of energy available to consumers, and the development of indigenous (domestic) supplies, have proven successful. Continuation of these policies is still needed and, where necessary, these should be adjusted and strengthened in the light of market developments. Governments cannot be too complacent about energy security. It has improved but security concerns have not been eliminated. The trends, while not alarming, do call for attention by governments.

4. A strengthening of international relations and economic cooperation would be helpful in improving energy security. In a number of ECE countries, the rule of law needs to be strengthened, commercial contracts protected and the business climate improved. Low standards of living, inadequate economic development and social, ethnic and political unrest in a number of subregions continue to trouble the region as a whole, and undermine energy security for all. Concerns about energy security cannot be fully separated from and resolved without addressing these broader issues and problems that besiege the region.

Introduction

5. Energy markets are in the process of being restructured and liberalized, and state-owned energy enterprises are being privatized. While these trends are most pronounced in the oil and petroleum products industries, they are not confined solely to these areas. Liberalization and privatization are also proceeding in the electric power and natural gas sectors, which up to recently had been viewed as natural monopolies.

6. This restructuring of markets and industries is not unique to the energy sector. It is part of a worldwide phenomenon or movement favouring less government intervention in the marketplace. It includes the liberalization of markets, the privatization of state-owned enterprises and the globalization of competition. No ECE country has been totally immune to these trends but obviously the transition countries of central and eastern Europe as well as central Asia have had to commence their restructuring from a significantly different starting point, having been centrally planned economies until 1989.

7. The two oil price shocks of the 1970s did much to focus attention on energy security. They mobilized governments to take a range of policy measures aimed at improving the situation. While concerns in this regard are not as prevalent today as they were in the 1970s and the early 1980s, this issue still continues to preoccupy governments. Hence, debate on the further liberalization and privatization of energy industries is invariably intertwined with considerations on their likely consequences for energy security.

8. The objective of this paper is to consider that issue: is the trend to the greater liberalization and privatization of the energy sector likely to enhance the energy security of ECE countries? Are additional complementary measures by governments still required?

9. To provide a context for this assessment, the paper begins with a brief review of the objectives of energy policy and what is meant by energy security. Then, the most recent trends in the restructuring, liberalization and privatization of energy markets in ECE countries are discussed. This is followed by an assessment of energy supply and demand trends and their significance for energy security. Lastly, there is a concluding section on the state of energy security in the light of evolving conditions.

Energy Policy Objectives

10. Three basic objectives currently underlie energy policy in most ECE countries. These are enhancement of energy security, the promotion of economic efficiency and protection of the environment.

(a) **Energy Security**

11. In many respects, energy security is the “raison d’être” for energy policy. Energy and energy industries are vital to all modern societies. They underpin economic growth and development. They contribute to the material well-being and comfort levels of populations and they touch every aspect of the daily life of individuals. Consequently, governments have historically felt the need to pay special attention to energy and energy security.

12. The concern about energy security was uppermost in the minds of energy policy makers during the 1970s and early 1980s when energy supply and demand were tightly balanced and energy markets were rocked by two sharp oil price rises. In response, governments introduced a range of policy measures designed to promote energy security. These measures plus the higher real energy prices prevailing at the time significantly reduced the rate of growth of energy demand relative to the growth rate of real Gross Domestic Product (GDP)

13. With the relatively “easier” energy market conditions since the mid-1980s, public concern about energy security, and the attention devoted to it by policy makers, has receded somewhat. However, it is an issue which continues to preoccupy governments. The underlying long-run fundamentals of energy markets, as discussed later on, have not changed sufficiently for governments to feel appreciably more secure about this issue.

(b) **Economic Efficiency**

14. The second objective of energy policy is to promote economic efficiency in the production and use of energy. As noted above, this is part of the worldwide drive to make economies more efficient. Today, governments, more than ever, are not only preoccupied with ensuring that energy is available to their populations but they also want this energy to be available to the economy at the lowest possible cost and to be used in the most efficient way possible.

15. It is commonly accepted that economic efficiency is best promoted through decentralized and liberalized energy markets, with freely determined market prices. In recent years technological, institutional and societal changes in many countries have tended to favour the implementation of measures in this regard.

(c) **Protection of the Environment**

16. The third leg of energy policy is protection of the environment. The 1980s could some day become known as the period which heralded the beginning of the environmental era. The energy sector has not been immune to this development. As environmental concerns have moved up the public and political agenda, so has the issue done likewise with policy makers in the energy field. This concern is not surprising since the production and use of energy can have significant consequences for the environment. Energy is a major contributor to air pollution. It can have an impact on both land and water resources in a variety of ways which at times can contribute to their environmental degradation. In addition, nuclear power is responsible for the generation of significant quantities of radioactive wastes that will remain hazardous to humans for thousands of years.

17. Energy policy today, to be credible, therefore has to have as one of its objectives the protection of the environment and, in the longer term, the promotion of the sustainable production and use of energy. Obviously, the importance of this objective will vary among countries depending on the severity of the local and regional environmental problems they confront, and their level of economic development and prosperity. But irrespective of their present situation, it is an issue that all countries will have to deal with individually and collectively for years to come.

(d) **Other Objectives and Tradeoffs**

18. In addition to these three objectives, there is a range of other considerations that governments have to take into account in formulating and implementing energy policies. The best way to illustrate this is to take the transition countries as an example; these countries are currently in the midst

of transforming and restructuring their economies and thus have to deal with a multitude of competing goals.

19. First of all, what should and can be done in any given sector, such as energy, is conditioned by the overall economic and social situation. For most transition countries, the road to reform since 1989 has been very difficult. The economic and social costs of transition have been high. Decline in economic output and unemployment has been severe. In other words, the process of transformation has severely taxed countries economically, socially and politically.

20. As an example, the economic dividends expected from transition in terms of an improvement in material well-being of populations has yet to materialize in most cases. Aggregate output levels in most countries, after seven years of reforms and transformation, are still well below their pre-transition levels and, in some cases, very much below. The only exceptions are the central European countries which have reached or are approaching their 1989 levels of economic activity.

21. The hyperinflation, economic turndown and disequilibria in state budgets that followed the collapse of the centralized planning system during the initial phases of the transition process - during the early 1990s - compelled governments to give priority to macro-stabilization policies. Consequently less attention, by necessity, could be given to reforming the energy sector in order to promote objectives such as energy security, economic efficiency and environmental protection.

22. In addition, progress in reforming the energy sector has lagged behind reforms in other sectors of the economy because of the very significant economic and social consequences of reforms in this sector. Energy costs represent a significant proportion of household expenditures. Governments have therefore had to weigh the economic and social implications of reforms, such as higher energy prices, notably on households but also on certain sectors of industry.

23. Household incomes, even in the most advanced transition economies, are low compared to those in western countries. Hence, the inability of households to afford higher prices (e.g. international or market-determined prices) has limited the ability of governments to raise energy prices to economic levels or to liberalize prices. Furthermore, governments have been concerned that too rapid a rise in energy prices would add to inflationary pressures and create macro-economic dislocations.

24. Governments in transition countries have also been confronted with the problem of how to handle domestic energy industries subject to intense competitive pressures and downsizing, such as the coal industry. The

challenges facing the coal industries in central and eastern Europe have been particularly daunting. More than one hundred mines have already been closed down, with the loss of hundreds of thousands of jobs. The human toll has been enormous. This problem, which is not unique to transition countries but is certainly more acute, has severely restricted what governments should and can do in implementing energy reforms (e.g. forcing the pace of restructuring in traditional energy industries)

Concept of Energy Security

25. Energy security is a multifaceted concept and therefore not easy to define. The dictionary defines security as protection against potential harmful incidents or detrimental developments. With this in mind, energy security can be defined as protection against internal and external factors that could potentially disrupt the continuous flow or availability of energy at reasonable costs, resulting in important negative consequences to the economy and peoples.

26. There are two time frames of relevance when discussing energy security issues, the short and long run. The first involves issues pertaining to the potential short-term disruption of energy supplies associated with breakdowns, acts of terrorism, natural disasters, social unrest or political action. The second pertains to the longer term development of energy supplies to meet expected demand at reasonable costs. In other words, it concerns the potential for the development of disequilibria between energy demand and supply in the long run associated with inadequate investment, financial constraints or political action.

27. There is another dimension of particular interest to analysts of energy security questions. This is whether the focus of attention should be on “physical” flows or “economic” flows. In other words, should one concentrate only on assessing the risks and vulnerabilities to the “physical” interruption of energy supplies or should energy security be assessed more broadly in economic terms.

28. Obviously, the two approaches are to some degree interdependent. The reason sometimes given for restricting oneself to the assessment of physical flows is the difficulty involved in defining what is meant by a reasonable price level and the difficulty in assessing and quantifying the economic consequences or costs associated with energy security issues. On the other hand, the broader economic approach permits a wider and richer assessment of energy security questions. For example, the study of energy security can be grounded in accepted economic theory and principles relating to public goods, externalities and the exercise of monopoly or oligopoly power.

29. A public good, broadly defined, is a good that is essential to the well-being of society but that the market fails to provide in sufficient quantity. Public goods are characterized by non-excludability (individuals not paying for the good cannot be excluded) and by non-rivalry in consumption (that is, it does not cost anything when, in addition, other persons consume the good). The classical example in this area is military preparedness in the form of petroleum product reserves. Without the willingness of government to pay for such strategic reserves, these would not be provided by the market; there is no incentive for individuals to incur the costs of providing for such reserves whereas, once provided, the benefits accrue to all.

30. Energy security can also be defined in terms of externalities where “private” and “social” costs and benefits diverge. Much has been written on whether energy imports can impose costs on an economy that might not be reflected in the market price of the commodity or in private decision making. Likewise, much has been written regarding the deleterious effects of energy price shocks on the macroeconomy. The more energy import dependant a country is, the more vulnerable it is to external price shocks. These price shocks can affect economic activity, capacity utilization, employment and inflation through their impact on aggregate demand and on the potential productive capacity of the economy.

31. Western economies were subjected to such oil price shocks in 1973-74 and in 1979-80 with important economic consequences. At that time, most of the transition countries were insulated from those shocks because of the economic and trading arrangements that existed under the former political and economic system in central and eastern Europe and central Asia. Due to the presence of vast energy resources, and for other reasons as well, not much attention was paid to the real resource costs of energy; the internal transfer price mechanism was insulated from price levels prevailing in other parts of the world and energy was systematically underpriced. Hence, the oil price shocks of the 1970s did not reverberate through that subregion.

32. However, the breakup of the former regime exposed many of the transition countries to the vagaries of the global energy market and to world energy prices. Prices for imported energy rose dramatically in real terms after the breakup of the former regime when prices for traded energy (imports and exports) were liberalized. With the price rise for imported energy, many transition countries experienced significantly higher energy import costs, resulting in terms-of-trade losses, a fall in real national income and accumulated nonpayment arrears. Broadly speaking, the impact on the economies of transition countries was similar to that experienced by western countries in the 1970s, the major difference being that transition countries had to absorb these price shocks at a time of dramatic structural transformation, making matters worse. Unfortunately, the required adjustments have not as yet been fully absorbed.

33. In principle, there is nothing wrong in a country being reliant on energy imports or imports generally. In fact, trade theory suggests otherwise. But this assumes a relatively competitive and unfettered world trading environment which does not necessarily always prevail. Some international energy markets are, rightly or wrongly, viewed to be monopolistic or oligopolistic in character. Consequently government intervention, particularly to protect consumers against the exercise of undue market power by producers, has frequently been advocated. Even in some cases the use of oligopsony power (that is, buyers acting in unison through government proxy) has been advocated to drive energy prices for imports down to levels judged more appropriate to true economic conditions.

34. For example, there has been a continuing debate since the beginning of the 1970s regarding the market power of oil producers, and most notably Middle East and OPEC producers, and their potential influence on world oil prices. This is of particular importance because oil satisfies about 40% of the world's energy demand and is the de facto price barometer for other energy sources. Hence, the exercise of undue market power to influence world oil and energy prices upwards would be detrimental to the interest of energy consumers and energy importing countries, thus justifying the implementation of mitigating and countervailing measures.

Liberalization

35. Common wisdom has long been that some energy industries, or significant components of these industries, such as the electric power and natural gas industries, are characterized by significant economies of scale. In other words, unit costs fall with size. Therefore an enterprise in such an activity or branch can acquire an unsurmountable competitive advantage, precluding further entry. With the existence of monopoly power, governments are then obliged to intervene either through regulation or direct state ownership.

36. This paradigm has long permeated policy making in the energy sector. But in recent years, it has increasingly been questioned. A host of factors have contributed to this, such as more liberal thinking on the part of policy makers, the drive to promote greater efficiency, the advent of new technologies, the development of financial markets and transactions, intermediaries and exchanges, the capacity to handle vast amounts of information and commercial transactions electronically, and the increase in interfuel competition. All these factors contribute to convince governments to open up many energy markets to competition, or at least to liberalize access to those markets, where once it was thought not possible.

37. This market liberalization has reached different stages in the different areas of the ECE. It is most pronounced in North America, the Nordic countries and the United Kingdom. It is emerging on the continent of western Europe. It

is under serious consideration in transition countries where the main efforts up to now, and rightfully so, have been focussed on restructuring the energy industries before considering ways of opening up markets to more competition.

38. This liberalization has recently been most pronounced in the electric power sector. The markets for the generation and purchase of electricity, including access to transmission and distribution networks, have been opened up in a number of countries. Britain and the Nordic countries are close to full liberalization. The European Union, the United States and Canada are in the process of opening up and liberalizing their markets. In the case of the European Union, up to 32% of the electricity market will be opened up by the end of 2003. This will allow for more competition in the wholesale power market as well as more trade among European Union countries. Still others, like Poland and Hungary, are setting up the institutional structures and frameworks that will permit this to take place.

39. The same process of liberalization is taking place in the natural gas sector. In some instances, such as in the United States and Canada, the liberalization of the gas sector even preceded that of the electric power sector. In Europe, the European Union is in the process of opening up access to transmission facilities while in the United Kingdom this is already a reality. Even in transition countries, such as Romania, some steps have already been taken to give third parties access to pipeline transmission networks.

40. As discussed earlier, the main goal of liberalizing energy markets is to promote increased efficiency in the marketplace. From a public policy point of view, it is important that resources be effectively allocated in the economy, that consumers have as much choice as possible in terms of different fuels and sources of supply, and that consumer prices are stable and “fair” (i.e. free from undue market power). From the perspective of a participant, such as a private enterprise, it is important that energy prices are sufficient to attract investment for the continued development of new supplies, and that the market penetration of different fuels and supply sources is not hampered by artificial hindrances and obstacles. To the extent that liberalization fosters or facilitates achievement of these objectives, then liberalization will also help to promote energy security.

Restructuring in Transition Countries

41. Significant progress has been achieved by most transition countries in reforming and transforming their economies. This has been particularly the case at the macroeconomic level with respect to macroeconomic policies, such as fiscal and monetary policy. At the sectoral level, including the energy sector, progress has been somewhat less pronounced. Furthermore, countries are at different stages in their reforms, both in terms of macroeconomic and

sectoral reforms, including energy reforms. The reform process is most advanced in countries of central Europe.

42. To varying degrees, many reforms have been implemented to improve the economic performance of the energy industries: property rights have been instituted; commercial law has been strengthened; the legal, regulatory and energy policy frameworks have been strengthened; operating units in the energy sector have been corporatized into semi-autonomous legal entities and joint stock companies; some energy assets, though still limited, have been privatized; domestic energy prices are being raised closer to market levels; selective competition in the energy sector is being promoted; and measures to attract foreign direct investment are being implemented.

43. While significant progress in reforming and restructuring the energy industries of transition countries has been made, more tough decisions lie ahead in order to improve further the economic performance, productivity and competitiveness of energy enterprises and industries. For example, most energy entities, despite being corporatized and converted into joint stock companies, continue to be state owned or controlled. This in itself is not a problem because it is important to distinguish between restructuring and privatization, which are not synonymous. Even in western countries many energy markets are dominated by large state-owned enterprises or monopolies. There is no unique prototype or model that ought to be followed or that is intrinsically superior.

44. However, where monopolies exist and where large state-owned enterprises dominate the marketplace, it is imperative that the role of government be clearly defined; that appropriate regulatory regimes be implemented; that the relationships between government, regulatory agencies and state enterprises be defined; and that the role that competition can and should play in the marketplace be clearly understood and agreed to by governments. In many transition countries, this framework is still in its infancy and in a state of flux.

45. Nonetheless, the foundations for the future viability and competitiveness of the energy industries of transition countries are being put into place. The economic, financial and policy barriers to investment and the further integration of east-west energy systems are being removed and are continuing to recede.

Supply and Demand Trends

46. The energy marketplace is in a state of constant change and evolution. In addition to the liberalization of energy markets, there are numerous other trends in the global marketplace that could affect the energy security of countries in the ECE region. These include the future evolution of energy

demand, the sources of future supplies to satisfy this demand, the variety and diversity of fuels and energies that might be available to consumers in the years ahead, the geographical distribution and concentration of fossil fuel production and reserves, the potential use of market power, the diversity and reliability of energy transportation infrastructure, and the level of social unrest and ethnic strife in producing and transit countries.

(a) **Primary Energy**

47. The energy import dependence of many ECE countries will likely continue to rise for the foreseeable future. In most countries, the growth in energy demand, buoyed by growth in transport and electricity demand, is expected to outpace the growth in domestic energy production. Hence, in the absence of mitigating measures, countries' vulnerability to external shocks (caused by either supply interruptions or price increases) will continue. The major exceptions are the fossil fuel rich countries of the region, such as the Russian Federation, Norway and a number of countries in the Caspian Sea area, which will remain major producers and exporters of fossil fuels. A second group of countries, such as the United Kingdom, may also not appreciably experience an increase in overall vulnerability because of their considerable reserves of fossil fuels. However, the majority of countries in the region will experience increased reliance on energy imports.

48. The energy security of countries can best be preserved by enhancing the diversity and variety of the energy mix available to consumers. Over-reliance on one type or form of energy, particularly imported energy, can increase a country's vulnerability to unforeseen mishaps. A well-balanced fuel mix is the safest way for countries to ensure energy peace of mind. Today, however, there are many forces at work, such as new technology, environmental concerns and financial constraints, which are tending to limit and even decrease, albeit very slowly, the diversity and variety of types of energy available in the marketplace. This process is not likely to alter significantly the energy mix in the short to medium term, but it will do so over the longer term if present trends continue. This is explored more fully below for individual fuels.

(b) **Oil**

49. Oil import dependence of countries in North America, western Europe and central and eastern Europe (with the exception of the Russian Federation) will invariably rise with time. The dependence on oil imports of the countries of the Organization for Economic Cooperation and Development (OECD), which today stands at approximately 50%, is likely to rise to about 60 percent by 2010. For central and eastern Europe oil import dependence, which is currently more than 80%, could rise up to around 90% by 2010. Hence, in the absence of measures to offset increased oil import dependence, ECE countries could become more susceptible to world oil supply disruptions or other shocks.

50. Today, about 30% of all oil consumed in the world comes from the Middle East. By 2010, this could be around 40%. Surplus production capacity exists in the Middle East. Producers can expand this low cost capacity relatively quickly. Moreover, two-thirds of the world's established reserves of crude oil are in the Middle East. In fact, the oil market is a perverse market; high cost reserves continue to be developed while low cost Middle East reserves are not as extensively developed. Hence, given time, reliance on the Middle East for oil is bound to rise. The Middle East has been prone to instability. It has been afflicted by war and political upheavals, a fact of international life that energy policy makers cannot ignore.

51. Today, OPEC's share of world oil production is about 40%. This is much less than its share of 54% in 1973 or even its share of 44% in 1980. However, it is considerably more than the share of 29% in 1985. The mid 1980s was a watershed for oil and energy generally; it is when oil and energy demand started to rise once again in response to lower real oil and energy prices. Therefore, unless there is another watershed, dependency on oil from OPEC is likely to continue to rise; it has risen from 29% to 40% in just over a decade. The world's dependency on oil from OPEC is currently projected to rise to about 50% by 2010, close to the levels that existed in 1973.

52. Much has been written on whether or not OPEC can influence oil prices. The mere fact that so much has been written and said about this topic would suggest that OPEC can indeed have some influence on oil prices. Obviously, this does not mean that OPEC will always be successful in moving prices or that the sky is the limit. Indeed, there are many factors that can influence prices as OPEC has learned in the past. Moreover, not all members of OPEC have the same interests because their production capacity, level of reserves, ability to absorb revenues and their time preference for revenues are different.

53. Furthermore, consuming countries can blunt the ability of producers to raise prices. For example, consuming countries can tax oil and oil products and thereby drive a wedge between consumer and producer prices. In so doing, producer prices will be depressed downwards. In the process, consuming countries may even be able to appropriate some of the rents, assuming that there are rents in the industry. In essence, there can result a transfer of rents from producing to consuming countries. And last but not least, market forces can and do impose discipline on producers, such as OPEC.

54. Yet despite all this, OPEC has in the past been able to influence prices, if only temporarily, and has been the cause of price volatility. With its market share steadily increasing, these problems have the potential to resurface in the years to come.

55. Caspian Sea countries, such as Kazakhstan and Azerbaijan, and to a lesser extent Uzbekistan and Turkmenistan, are producers of oil. One or more of these countries are likely to become leading exporters of oil in the future. Their vast oil resource potential is attracting considerable interest not only from domestic but also foreign companies. Their major disadvantage is that they are landlocked. Hence, transit rights crossing through third countries, which are sometimes difficult to negotiate on commercially acceptable terms, are of vital interest. Moreover, some of the existing transport links as well as new export capacity is likely to be routed through areas which have in the past been subject to instability and unrest.

56. The oil price shocks of the 1970s encouraged governments as well as private oil companies to carry more oil stocks. Today, member countries of the International Energy Agency (IEA) that are oil importers are obliged to carry oil stocks equivalent to 90 days of forward consumption. Moreover, the IEA as well as the European Union have oil sharing arrangements in place in case of a significant disruption in oil supplies. These emergency response procedures are constantly being updated and adapted to reflect changing oil market conditions. However, with the easier oil market situation, there are signs today of complacency in this respect.

(c) **Natural Gas**

57. The perception about natural gas today is radically different from that 10 or 20 years ago. A few years ago, natural gas was perceived as a noble fuel, reserved for premium uses and to be sold at premium prices. Today, it is used in a variety of sectors and applications, and it is experiencing significant growth as a fuel for electricity generation. This change was brought about by more competitive and less regulated gas markets, technological and cost improvements in the design, efficiency and operation of gas turbines and increasing public concern about the environment.

58. Today, gas is the fuel of choice. It is flexible to use, environmentally friendly compared to other fossil fuels, relatively abundant, with supplies perceived to be relatively secure and reliable. The Kyoto Climate Change Protocol can but enhance this image of natural gas. Therein lies the problem. Gas will, albeit slowly, displace coal and nuclear, and in time oil, in the marketplace. Gas may even make inroads in the transportation sector where so far its presence has been very limited. This could contribute to an ever increasing reliance on gas as a source of energy and, thereby, contribute to reducing energy diversity in the marketplace.

59. The rapid growth in natural gas consumption will boost import dependency, particularly in many countries of Europe. Total imports by OECD countries in Europe (from outside the OECD region) are likely to increase from about 35% of natural gas consumption to about 45% by 2010, even assuming a significant

expansion in Norwegian production. The import dependence of central and east European countries, excluding the Russian Federation, is likely to rise from about 65% to 85% by 2010. On the other hand, the situation in North America is more encouraging. The North American market is relatively self sufficient, well balanced and diversified in terms of supplies and transportation infrastructure, and is likely to remain so for the foreseeable future.

60. The problem of import dependence is compounded when countries not only have to import large quantities of gas but also have to rely on a single source for gas. Most countries in western Europe are now supplied from a number of sources, including indigenous sources of supply. But this is not generally the case for central and eastern Europe for historical and geographical reasons. Almost all the gas imported, to supplement domestically produced gas, comes from the Russian Federation. So far, the Russian Federation has been a secure and reliable supplier of natural gas to both central and east as well as west European countries. Since deliveries began thirty years ago there has been no major interruption of gas supplies. While in recent years Gazprom, the major Russian supplier, has curtailed deliveries to some foreign markets, this has been solely motivated by the nonpayment of debt arrears. In some cases, these arrears have amounted to hundreds of millions of dollars.

61. Nonetheless, despite the reliability of Russian gas supplies, the desire for central and east European countries as well as other countries to diversify their sources of supplies is understandable. It is an attempt to minimize risks through diversification. Unintended accidental disruptions can occur. This desire for diversification is no different from the desire of an investment manager to minimize investment risks through a wide and diversified investment portfolio.

62. Natural gas production in most west, central and east European countries is stable or on the decline. The major exception is the North Sea, particularly the Norwegian shelf where production is rising, and the Russian Federation. Traditional suppliers, such as the Russian Federation, Algeria, the Netherlands and Norway, are likely to be able to meet Europe’s growing demand for natural gas over the medium term. But meeting demand over the longer term will be a major challenge for the industry. Significant investments in production and transportation infrastructure will be required. This is one of the reasons why many companies continue to advocate the need for long-term “take-or-pay” contracts; without this type of contract they argue that the required investment might be difficult to finance.

63. Long term natural gas supplies will have to be transported over longer distances as new production centres are developed in the Russian Federation, North Africa and the Caspian Sea area, such as Turkmenistan, and perhaps ultimately Iran, that are further and further from existing consumption

centres. Even supplies from Norway will have to come from more remote areas. This trend will not only put upward pressure on prices but also add to the vulnerability of gas deliveries; the risk of accidental or weather-related supply disruption, even if it is of short term duration, will rise.

64. World gas reserves are relatively abundant and for the time being are relatively diversified. However in the longer term, increased supplies might have to come from fewer sources. The Russian Federation has about 40% of total known reserves of gas. The Russian Federation and Iran together account for more than 50% of world reserves. Perhaps of more significance is that supplies will increasingly have to come from, as well as transit, areas such as the Caspian Sea area and the Caucasus, which have in the past experienced social unrest and instability. Consequently, the risks of supply disruptions could rise with time.

65. Even today the transit of natural gas through third countries is an issue of controversy and potential tension between countries. Some countries (such as Ukraine) are major transit countries for gas from the Russian Federation and Turkmenistan to central and western Europe. At the same time, some of these transit countries, according to reports, have significant outstanding energy debts to the gas-exporting countries. These are reputed to be hundreds of millions of dollars. The potential for disputes and misunderstandings under these circumstances are ever present.

66. In addition, transit rights in general are of concern to both gas-exporting and gas-importing countries. Gas from the Russian Federation, Turkmenistan and Uzbekistan for example has to transit a number of countries before reaching markets in central and western Europe. These transit rights are sometimes the subject of intense commercial and political negotiations.

67. Unlike oil and coal, gas is more difficult to store. Nevertheless, gas companies have increasingly expanded their underground storage capacity not only to take care of daily and seasonal peaking of demand but also for strategic reasons. Moreover the practice, quite prevalent in western Europe, of interruptible supply contracts for large customers, particularly those with dual-firing capacity, is gradually catching on in central and eastern Europe. Both underground storage and interruptible contracts can mitigate to some extent the consequences of short term interruptions in gas deliveries.

(d) **Coal**

68. From the point of view of energy security, coal has advantages compared with other fuels. World coal reserves are large, sources are diversified, ample supplies are available from politically stable regions, world infrastructure is well developed, new supplies can be easily brought on stream, and coal can be stored. Also it can be a low cost source of energy.

69. On the other hand, coal is besieged by an array of problems which in the longer run could have implications for energy security. Coal's share of energy markets is slowly being eroded. Environmental concerns trouble the industry. Competition from other energy sources is intense. The required restructuring to meet this competition and the environmental regulations is costly, and therefore difficult and painful in many countries. In the long run, coal could be increasingly displaced from the marketplace especially in countries where other options are available. The declining share of coal could result in a less diversified energy mix.

70. The problems are particularly daunting in central and east European and CIS countries where liberalization, the severe economic downturn, low labour and overall mining productivity and the lack of capital for the sizeable investments needed for coal restructuring, have created enormous economic and social dislocations.

(e) **Nuclear Power**

71. Since 1973, nuclear power has significantly contributed to meeting rising electricity demand in the region and in reducing dependence on oil for power generation. However, since the early 1980s, far fewer orders for nuclear power plants have been placed, stemming in part from public concern and political debate on the possibility and consequences of accidents, on the lack of adequate methods for disposal of nuclear wastes, and over the costs of nuclear power plants themselves, including their decommissioning costs.

72. If there continue to be constraints on the development of nuclear power plants, and these are compounded by constraints on the use of coal and hydropower, difficulties could be encountered in the future in meeting rising electricity demand. The future role of nuclear power in electricity generation is in a state of limbo. The longer this state lasts the more constrained will be the options, and the less flexible and less diverse will be the power generating sector of the future. This is bound to have implications for energy security as well as for environmental security (particularly as regards global climate change). While nuclear power may not necessarily be a desirable option for each and every country, removal of that option for all countries as a group would remove an important element of flexibility and diversity in energy supply.

(f) **Renewable Energies**

73. Other than hydroelectric power and biomass, renewables, such as solar, wind and geothermal, are not likely to contribute substantially to meeting energy needs over the foreseeable future. They can be usefully deployed in specific areas under special conditions but their widespread use will be

limited for economic, and to some extent environmental, reasons for some time to come.

74. Even the potential of hydroelectric power to contribute to increasing electricity demand is limited. The region as a whole is characterized by a state of maturing (or limits) when it comes to the development of hydroelectric power. Suitable sites are increasingly difficult to locate for hydrological reasons, competition with alternative land and water uses, and public resistance to the impact of hydro schemes on the natural environment. The Russian Federation still possesses substantial untapped resources but these are in eastern Siberia and are unlikely to be developed very quickly because of their remoteness and low population density. Likewise, there is still considerable potential in a number of countries in central Asia but their development is hampered by the same constraints as those that apply to the development of oil and gas projects.

Conclusion

75. Are the restructuring, liberalization and privatization that are taking place in the energy sector enhancing energy security? The answer is clearly yes. They are promoting a more efficient allocation of resources, greater consumer choice and the continued development of new sources of energy to meet demand. However, energy industries are far from textbook models of competition. There is no real atomistic competition, nor full integration of markets.

76. Furthermore, many governments continue to view energy as a strategic sector that has to be closely nurtured and monitored by the state. Fossil fuel production and reserves, notably of oil and natural gas, are not equally distributed among countries. Some areas of the world, which are major producers and exporters of energy, and still others which have the potential of becoming major energy suppliers to the world, are prone to instability. Many markets are dominated by a few large firms, not only in the area of production but also in transportation, distribution and retailing. Entry barriers both in production and transportation, notably in the electric power and natural gas industries, are relatively high because of the high cost of infrastructure. Interlocking ownership among energy companies is prevalent, thus contributing to the concentration of decision making. Two important features, price transparency and flexibility, for the efficient and proper functioning of markets are frequently lacking. Some markets are not mature in the sense of not being fully interconnected and integrated, or consumers lack the flexibility to switch between suppliers or between fuels.

77. For these and many other reasons, government intervention in the energy sector continues to be extensive. It manifests itself in two ways: directly, through ownership of large state-owned companies, and indirectly, through a

host of legal, legislative and policy measures. One of the driving forces for this intervention, and rightfully so, continues to be concerns over energy security. The current climate of liberalization and opening up of energy markets is helpful in this respect but it is not sufficient.

78. Governments have to continue to strive to strengthen energy security by championing energy conservation and efficiency, expanding the fuel mix, diversifying sources of supply, including development of indigenous supplies, building up and maintaining strategic stocks, encouraging the private sector to carry commercial stocks, and promoting research and development of new and renewable sources of energy.

79. In addition, the energy security of the region could be improved by a greater integration of the energy economies of countries in the region (i.e. fuller interconnection of natural gas pipeline and electric power grid systems), by strengthening economic cooperation, links and interdependences, and by harmonizing norms, standards, practices and policies to facilitate commercial relationships, trade and investment which would be of mutual benefit to producers and consumers alike.
