

## **ASEM-EMM 6: Special Session on Energy**

### **Background Document**

## **Security of Supply: Invest in Energy Efficiency!**

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### ***1. How important is energy for the economy?***

Energy is a crucial input for the economy of any country. Energy allows an economy to grow and increase its output. Countries that do not produce sufficient energy themselves must import energy from elsewhere. The availability and cost of energy has a large impact on the competitiveness of a country or economy, but also on the cost of living. Access to energy is therefore a precondition for economic growth and economic stability. A net importing country must balance its energy imports with exports of other goods and services (and/or capital imports) in order not to suffer from balance of payments deficits and potential economic instability.

An efficiently organised energy economy is therefore important. The market for energy is an international market. Net consumer countries depend on energy imports to fulfil their demand for energy. They rely on investment in energy producing countries to be timely and avoid supply constraints. Governments have a large influence on energy supply and demand through their trade-, industrial-, tax-, price-, investment- and environmental policies. Also, governments can influence the energy mix and stimulate efficient energy demand. In short, the fabric of the energy system, as well as the functioning of the market for energy, depends to high degree on national and international policies and regulation.

**Message 1: Energy is a crucial input in the economy and governments can facilitate economic growth by organising their energy sector effectively and efficiently.**

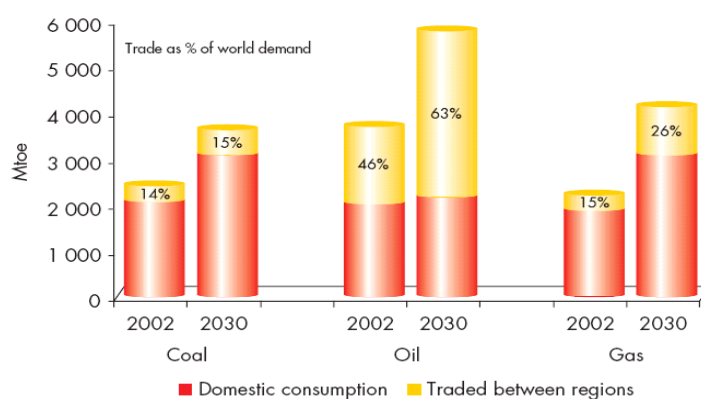
### ***2. How do governments influence the energy economy?***

Countries that are highly dependent on energy imports want to reduce the risk of disruptions in the supply of energy and shield their economy from large price fluctuations. The ability to do this successfully depends on the concentration of reserves, the willingness to invest in the energy sector, the possibility of foreign direct investments, the proper functioning of (international) capital markets, and the effectiveness of the international energy market mechanism in general. In the domestic market they can opt for market-based, public utility-based or mixed organisation structures, and influence the national energy mix by allowing certain energy sources to be used for certain purposes. Governments can promote new energy technologies and alternative energy resources, such as wind, solar and nuclear energy, through the Research & Development (R&D)

policies that aim for a more diversified and sustainable energy system in the future. On the demand side governments can stimulate efficient energy consumption. For instance, electricity is often produced in coal plants. With the growing environmental awareness and the increased availability of gas<sup>1</sup>, electricity is increasingly produced in gas-powered plants. Since the concentration of coal reserves is less high than the concentration of oil and gas reserves, countries could opt to retain some coal-fired electricity generation capacity. Clean coal technologies, when they become competitive with gas-fired generation plants, can address both the security of supply and environmental issues. Governments can stimulate companies to explore the technologies that allow for a more diversified, low-carbon and perhaps less import dependent energy mix. In the transportation sector the dependence on oil is substantial, but also here cleaner fuels are increasingly introduced in the market. Governments can stimulate the use of cleaner fuels and help to upgrade the car fleet with fiscal policies and setting stricter standards. The choice to switch to oil- or gas-based economies implies a larger import dependency. International trade and investment policy subsequently play a larger role in developing the domestic energy systems (see figure 1).

*Figure 1*

### Share of Interregional Trade in World Primary Energy Demand by Fossil Fuels



Source: IEA WEO 2004

**Message 2: International trade and investment policies play an increasingly crucial role in the development of the domestic energy market of importing countries.**

### 3. Why is it important to focus on energy trade and investments?

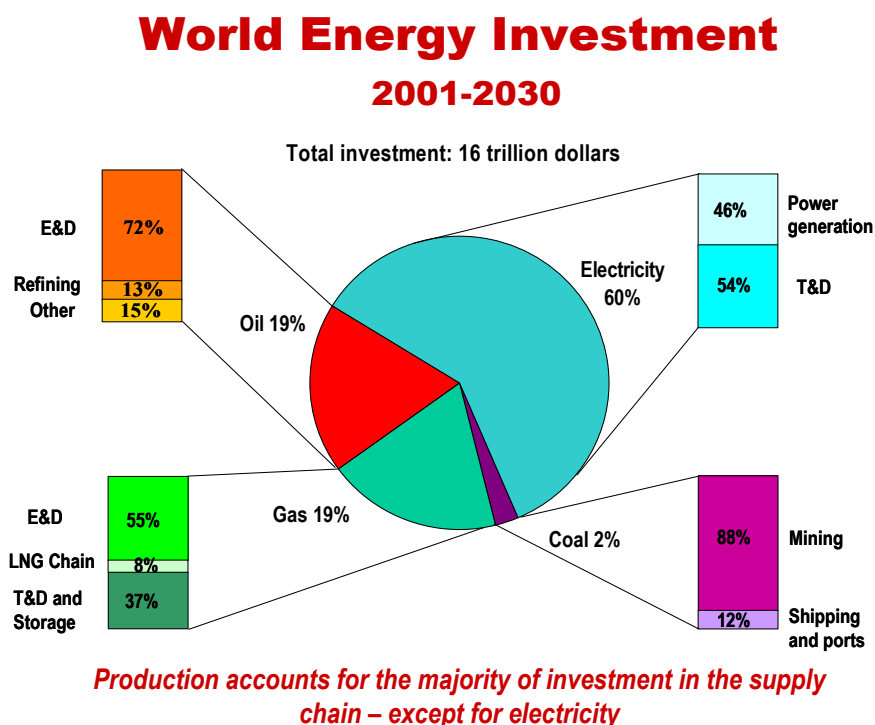
The challenges for the next 20 years will predominantly be in the area of energy investments. The International Energy Agency (IEA) expects<sup>2</sup> that in the period to 2030

<sup>1</sup> The future of gas: will reality meet expectation? Coby van der Linde and Jonathan Stern, at [www.iefs.sa](http://www.iefs.sa); previous IEF meeting, 9<sup>th</sup> meeting Amsterdam go to papers

<sup>2</sup> IEA World Energy Investment Outlook, 2004.

the global energy investments in the entire energy value chain will be about \$16 trillion (see figure 2). A large part of these investments (60%) are foreseen in the electricity generation sector, while the oil and gas sectors each will require 19% of total world investments.

*Figure 2*



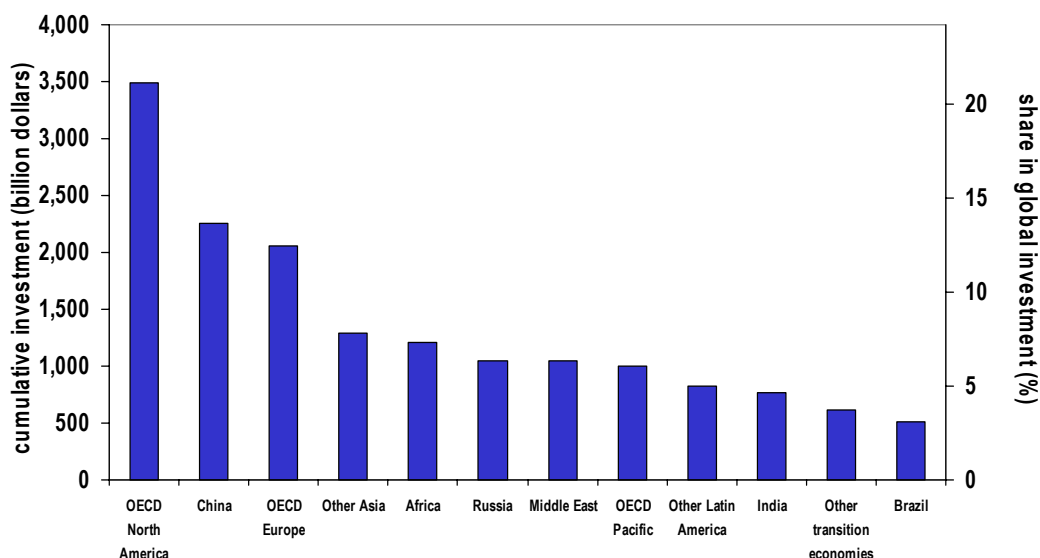
Source: IEA WEIO 2003

Developing countries require the largest part of investments. This applies not only to the expansion of their electricity generation and distribution capacities, but also to the 'upstream' (exploration and production) sector in fossil fuel producing countries. The investment requirements of countries in Asia and Europe are substantial (see figure 3). At the same time, despite their efforts to develop alternative energy sources, both Asia and Europe will see their energy import dependency increase from 54% in 2002 for Europe and 43% in Asia to 86% in 2030 for Europe and 78% for Asia.<sup>3</sup> This import dependency implies that they will have to rely on investments in producing countries in order to satisfy their growing demand. International (private) energy companies play an important role in realising these investments. They can provide both capital and knowledge. Moreover, energy trade will further develop into a major economic activity.

<sup>3</sup> IEA World Energy Outlook 2004, table 3.7, p. 117

Figure 3

### Energy Investment by Region: 2001-2030



***Almost half global energy investment will be needed in developing countries***

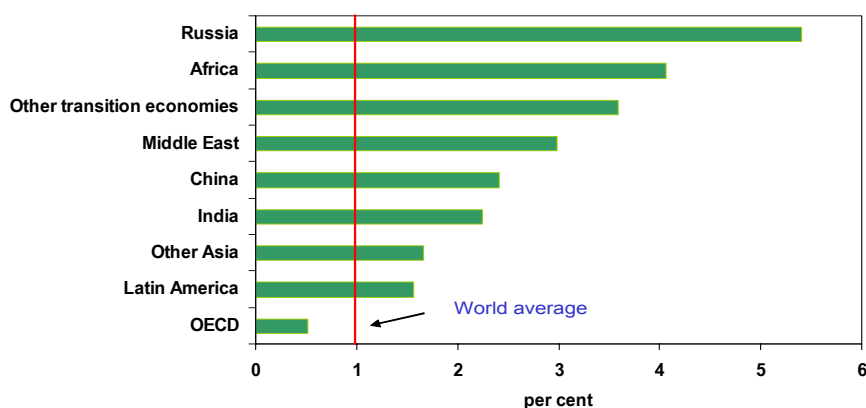
Source: IEA WEIO 2003

Investment is still largely subject to domestic rules and regulations, although the European Energy Charter is an example of an investment agreement among multiple states. The EU thus has attempted to promote inter-regional co-operation to create a stable trade and investment climate for energy in Russia and Central Asia.

Energy is important to Asia and Europe, two regions that are structural importers of predominantly oil and gas. For both regions energy co-operation can vitally contribute to the creation of a stable trade and investment climate in producing and consuming countries. Yet the share of energy investments in GDP is higher in emerging economies than in developed economies (see figure 4).

*Figure 4*

## Energy Investment Share in GDP 2001-2030



***The share of energy investment in the economy is much higher in developing countries and the transition economies than in the OECD***

Source: IEA WEIO 2003

The challenges to trade and investment growth in the energy sector, particularly oil and gas, are large: enough capital must be mobilised to realise the required investments in the domestic and international markets, infrastructural needs must be met and trading routes must remain economically and politically secure.

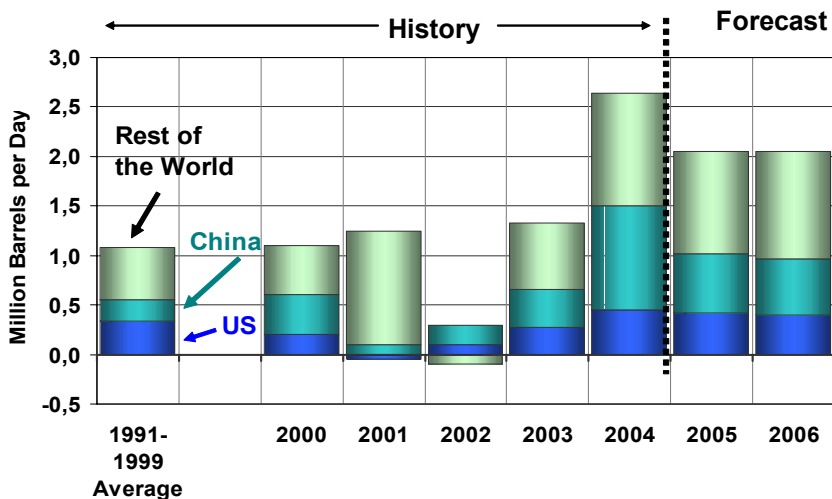
**Message 3: Capital needs to be mobilised in international capital markets and through foreign direct investment to realise the large projected investments in the entire value chain of energy in the next 25 years. A stable international investment climate is a pre-condition.**

#### ***4. Are current oil markets developments a reason for concern about future demand and supply balancing?***

The year 2004 was a memorable year for oil prices both in terms of the nominal level of oil prices (over \$50 a barrel) and the speed at which prices increased. Both developments indicated that demand and supply were very tight and continue to be tight given the fact that oil price increased to a little over \$60 a barrel in July 2005. This tight market can be explained by the unexpected surge in demand compared to the world supply capacity (see figure 5).

Figure 5

### Annual World Oil Demand Growth Was Unexpectedly Strong in 2004

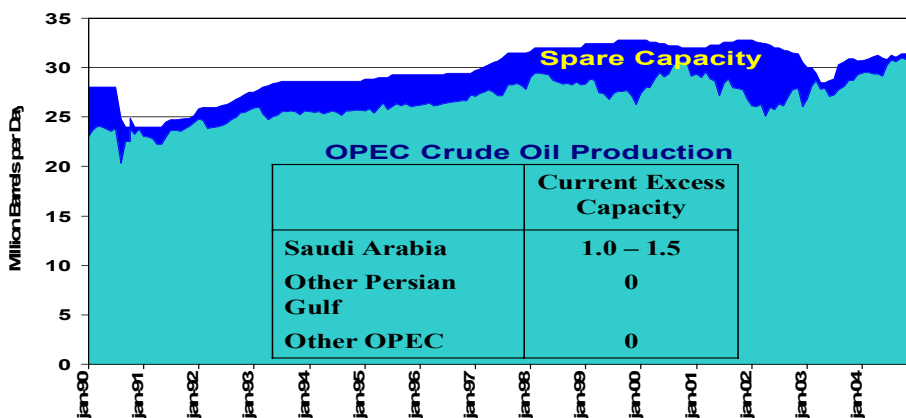


Source: Energy Information Agency US Department of Energy; www.eia.doe.gov

The surge in demand very quickly pressured OPEC countries to abandon the production restrictions and use their buffer capacity to satisfy increasing demand. As a result, world production was after June 2004 approaching its current peak capacity. Also OPEC countries had only very limited spare production capacity left at their disposal. It was clear that increasing demand had not been followed by a steady increase in supply capacity, at least not in the OPEC countries (see figure 6).

Figure 6

### OPEC Spare Capacity is Tight



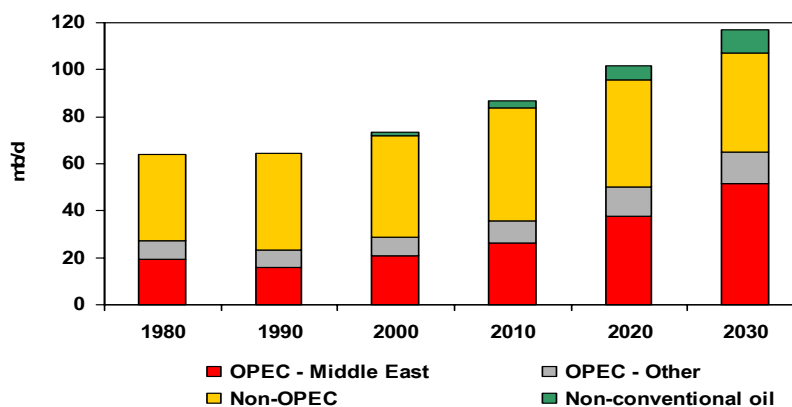
Source: Energy Information Agency US Department of Energy; www.eia.doe.gov

Non-OPEC supply has increased substantially in the past 25 years but growth will level off after 2010 because important oil regions are maturing and the current new Non-OPEC

oil regions, such as Central Asia and Sub-Sahara Africa can only just about replace the declining production of traditional Non-OPEC producers (see figure 7).<sup>4</sup>

Figure 7

## World Oil Production



**OPEC countries – mainly in Middle East – will account for almost all the increase in world oil production to 2030**

Source: IEA WEIO 2003

Given the distribution of reserves, the 2004 oil market made it very clear that future increases in production have to come from OPEC countries, in particular those in the Middle East, where a little over 60% of today's proven oil reserves are located.<sup>5</sup> OPEC's role as the world residual or swing supplier to the world market has been important in the past to stabilise prices. However, OPEC's role of future swing supplier and manager of oil prices depends on its ability to invest in sufficient spare capacity.<sup>6</sup>

**Message 4: The tight oil market of 2004/2005 has created great concerns about the ability of traditional producer countries to match future demand.**

### 5. What are the prospects of increasing future supply?

Increasing capacity to match growing oil demand is going to be enough of a challenge for most OPEC countries. After months of mollifying messages from Saudi Arabia that they could easily match increasing demand and that they were actively investing in new

<sup>4</sup> IEA World Energy Outlook 2004, table 3.5, p. 106.

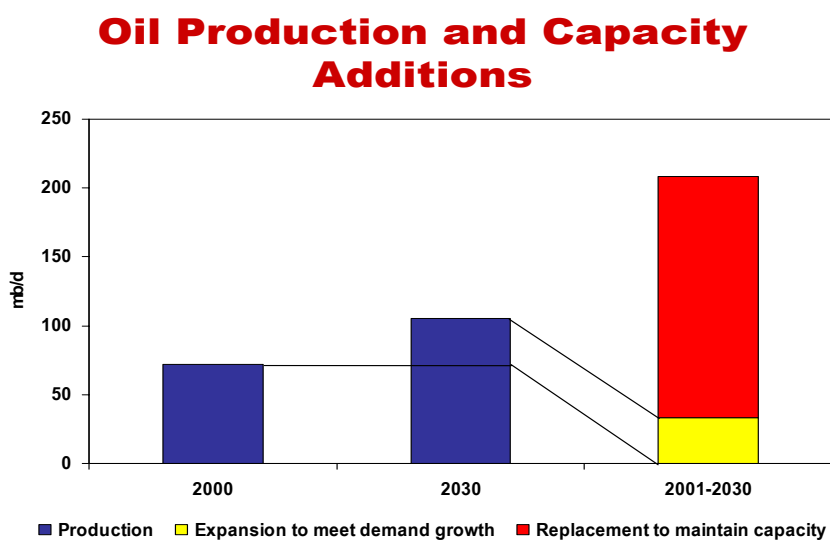
<sup>5</sup> IEA, World Energy Outlook 2004, figure 3.9, p. 91.

<sup>6</sup> Yet, investing in spare capacity is very costly and very likely the costs cannot be recouped in the market. Although OPEC countries attach great importance to their role as swing producer, both the ability and the solidarity to carry these costs as a group have been low. Most of these costs were carried by Saudi Arabia, United Arab Emirates and in the past Kuwait. The other OPEC members have had economic and political difficulties to keep up production and expenditures in the oil industry without this additional burden.

production capacities, Saudi Arabia has now expressed a concern that the demand projected by the IEA in 2020 will be hard to match with supply. *“At today’s prices, the world will need OPEC to boost its production from 30 million barrels per day to 50 million by 2020 to meet rising demand. ...”* senior Saudi energy officials have privately warned their US and European counterparts. *“By Saudi calculations, there is a gap of 4.5 million barrels of oil a day between what the world needs from the Kingdom and what Saudi officials think they can provide.”*<sup>7</sup> Since Saudi Arabia would be responsible for half of the projected oil production capacity growth of OPEC countries of 10 million barrels per day<sup>8</sup>, it would leave the world with a substantial gap between demand and supply. Such a gap could result in continued upward pressure on prices and subsequently most probably could stifle demand growth (and economic growth) in some emerging economies.

As a matter of fact most of the investment requirements in the coming years are replacement investments to compensate for maturing fields in various parts of the world (see figure 8). Only a few regions in the world offer these possibilities. These regions/countries are: Russia, Central Asia and the Persian Gulf, that will also continue to be in the future large net-oil-exporting countries. Smaller producing regions will be: the West African offshore and Latin America. Yet the main future oil and gas suppliers will be from the three regions mentioned before.<sup>9</sup>

Figure 8



***The bulk of additions to crude oil production capacity will be needed simply to maintain capacity***

Source: IEA WEIO 2003

<sup>7</sup> Financial Times, Thursday 7 July 2005, *OPEC can't meet west's oil demand, says Saudis*, p. 1

<sup>8</sup> Ibidem.

<sup>9</sup> For gas exports Russia, the Persian Gulf, central Asia, North Africa and to a lesser extent Latin America, will also be suppliers of the world market. These supplies will be brought to the market by pipelines and shipped as Liquefied Natural gas (LNG). Developments in the cost of LNG have unlocked the previously stranded reserves of the Persian Gulf. Yet gas reserves are also fairly concentrated, much like oil reserves.



The challenge for the world is thus to both meet new oil demand and, crucially, at the same time replace the production capacity in mature oil fields that cover current demand levels.<sup>10</sup> Large investments are required to meet this double challenge. Although many experts claim that the amount of required investments should not pose a problem, the shift in these markets from predominantly investments in OECD countries to less tested energy investment markets may pose a problem to employ this capital.<sup>11</sup> This is particularly clear when international oil companies with deep investment pockets of their own, cannot participate in these projects. In such cases, international banks will demand additional securities to cover the higher level of risk. This problem is connected to limited access to the oil sector for foreign direct investments in a large number of OPEC countries and the fact that national oil companies hold a monopoly on exploration and production. The IEA calculated that only 35% of the current proven oil reserves are accessible to foreign private investors. The remaining share belongs to national oil companies or other government arrangements. Furthermore, some countries that have opened up for foreign direct investments and have a potential for capacity enlargement are still considered to have an unstable investment climate due to underdeveloped legal systems and ownership rights, economic instability and/or political instability.

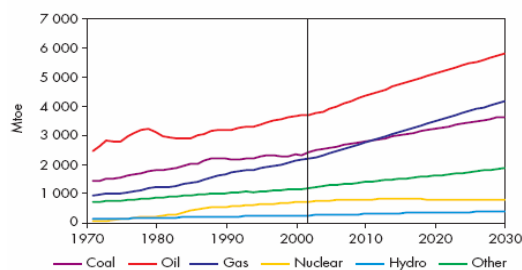
**Message 5: With future oil and gas supplies fairly concentrated in just a few countries, consuming countries may prefer to diversify their trade dependence to as many suppliers as possible in order to retain sufficient international access for energy investments.**

## 6. What is the outlook of world oil demand?

Demand for oil, gas and coal will continue to grow in the next 25 years, albeit at different growth rates (see figure 9). Demand for energy will be particularly strong in emerging market economies because these economies are still in a more energy intense phase of economic development. This also translates into a strong demand for oil.

Figure 9

**World Primary Energy Demand by Fuel**



Source: IEA WEO 2004

<sup>10</sup> CIEP Study on Energy Supply Security and Geopolitics for DGTREN, TREN/C1-06-2002, 30 January 2004, Brussels (available at [www.clingendael.nl/CIEP](http://www.clingendael.nl/CIEP))

<sup>11</sup> See [www.iefs.sa](http://www.iefs.sa) at previous IEF meeting, 9<sup>th</sup> meeting Amsterdam at papers: *Foreign investments and public goals*, Nor dine Ait-Laoussine and John Gault; *Investment and profitability of the oil and gas sector*, Olivier Appert; *Energy investments and Impediments*, Paul Horsnell.

According to the IEA Reference Scenario of the World Energy Outlook 2004, the world is expected to consume 121 million barrels per day in 2030, compared with 77 million barrels per day in 2002. The main drivers behind future demand growth will be demand growth in the main emerging economies, such as China and India, whose economies grew some two to three times faster than the western economies. The North American market will remain the largest market in terms of volume, with projected demand at 27.6 million barrels per day in 2030, but its average annual growth rate is only 1.1% compared to 0.5% for Europe, 3.4% for China, 2.9% for India and Indonesia, 3.0% for other Asia and 3.4% for Africa.<sup>12</sup> In 2030, the share of transportation in global primary oil consumption will increase to 54%, but transportation will continue to account for 95% of transportation energy demand. As growing demand will increasingly be met by imported oil, the European and Asian import dependencies will increase above 75% (compared to the import dependency of 55% for the US). However, in absolute volumes the US imports will increase to approximately 18-20 million barrels per day (depending on demand growth), by far the largest volume of all countries. The volume of oil trade will therefore increase substantially, while supplies will become more concentrated in a few countries.

**Message 6: Demand for oil is projected to grow substantially, import dependence will increase and consumer countries will focus more on security of supply in order to diversify their trade dependence.**

## *7. Security of supply*

The distribution of future demand and supply leads to one conclusion: the import dependency of major consuming countries/regions is not only set to increase, but will also be concentrated on only a few suppliers. This will heighten concerns about security of supply. It is seen as both politically and economically undesirable to import oil from only a few suppliers. Security of supply concerns are further sharpened because consumer countries must increasingly compete for supplies. The buyers market of the 1980s and 1990s has turned into a seller market. Given the political tension in the world, politics matter again and oil flows could again become politically determined. For countries that had planned on purchasing oil in the international market place, where oil is stripped of its nationality, this might be a crucial change in focus on international oil relations.

At the moment, the high rate of dependency of the transportation sector implies that oil will remain an important fuel in our economies for some time to come. Although coal reserves are abundant, environmental policies steer demand away from coal. The policy response for consumer countries could be to diversify to other fuels, such as gas. Gas reserves are substantial and its emission of CO<sub>2</sub> is lower than that of oil. For instance, the large gas reserves of the Persian Gulf have become available to the market as a result of both developments in the cost of LNG and opportunity for foreign energy companies to acquire equity stakes. Currently many LNG projects in various parts of the world are developed that will make more gas available to the international market. LNG also offers

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<sup>12</sup> IEA World Energy Outlook 2004, table 3.1, p. 82.

the opportunity of gas markets developing from regional gas markets into an international gas market.

In the future, under the pressure of security of supply issues in oil and gas and environmental needs, clean coal technologies could become an important instrument to address security of supply problems. Renewable and nuclear energy could to a certain extent help manage the import dependency.

**Message 7: Diversification of oil suppliers and diversification to other energy sources will become a core issue for consumer countries' government energy policies. However, diversification of producing countries and diversification of the energy mix have limited potential. As a result, policies to develop alternative low-carbon sources and sustainable energies and policies to manage demand might gain importance.**

## **8. Energy efficiency**

One of the key methods to deal with the security of supply challenge, in addition to diversification of supply and resources and developing alternative energy resources, as also recently indicated by the IEA, is energy efficiency.<sup>13</sup> To cap the world's energy demand at present levels and subsequently reduce it, would represent an important contribution to promote the security of supplies for consuming regions. Energy savings is also the most cost-effective way to reduce greenhouse gas emissions, as well as improve air quality, especially in densely populated areas.

The combined effort of increased production and greater trade flows in oil and gas and energy efficiency allow governments to manage their energy dependency and reduce the impact of price volatility on economic growth.

In order to manage energy demand and to help the EU meet its Kyoto commitments, the European Commission adopted a Green Paper on Energy Efficiency in June 2005.<sup>14</sup> The Green Paper lists a number of options to save 20% of energy consumption by 2020 in a cost effective way through changes in consumer behaviour and energy efficient technologies.

**Message 8: It is important to discuss energy availability in the world market and the possibilities of increasing energy production (though investment and trade). At the same time, it is crucial to also discuss investment in energy efficiency in consumer countries.**

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<sup>13</sup> For instance in *New Energy Policies to Combat Climate Change*, Article by Claude Mandil, Executive Director IEA for G-8 Summit at Gleneagles, UK, 7-8 July 2005, found at [www.iea.org](http://www.iea.org).

<sup>14</sup> *Green Paper on Energy Efficiency or Doing More with Less*, European Commission, Brussels, 22 June 2005, COM (2005) 265 final

## **9. Concluding remarks**

The world needs ever more energy, and it becomes harder to keep production in balance with demand. The key challenge for world energy markets is expanding oil and gas production capacity. In order to let supply meet demand, substantial investments along the entire value chain of oil need to be realised. By 2020 the world could consume an additional 20 million barrels per day, on top of the present consumption of 82 million barrels per day. Without new oil production capacity, the present situation of tight oil markets (and relatively high prices) could persist much longer and could impede economic growth in the world. To safeguard the security of supply, the consuming countries will want to build an effective (international) policy framework to deal with these issues.

In a setting of high and unpredictable oil prices, an energy efficiency initiative is in the interest of all energy importing countries and should be integrated into their strategies for both trade and investment and also security of energy supply.