

**National Reports on
Global Energy Security Principles
and St. Petersburg Plan of Action**

July 2008

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IEA Overview



INTERNATIONAL ENERGY AGENCY
AGENCE INTERNATIONALE DE L'ÉNERGIE

St. Petersburg Plan of Action Global Energy Security

IEA evaluation of G8 countries' progress on the 7 key action areas

Context

This brief document provides the IEA's assessment of G8 member countries' progress in meeting the Global Energy Security Principles agreed to at the St. Petersburg G8 summit in 2006. It is based largely on each country's national self-assessment report, with additional information and analysis from IEA and other sources. The report serves as a synopsis and overview of country progress on what the IEA sees as the key energy security aspects of the seven principles; the seven Global Energy Security Principles cover many more issues than can be substantively addressed here. Part 1 provides the IEA's key messages for energy security. Part 2 gives our overview assessment of where we see progress towards adhering to the St. Petersburg Global Energy Security Principles and where we see challenges still remaining for governments. Finally, Part 3 gives brief country-by-country evaluations according to the seven principles. For more detailed descriptions of country progress, see each country's national self-assessment.

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Part 1: The IEA's key messages on energy security

Investment

- Processes for siting energy infrastructure should continue to be streamlined and made more transparent.
- Governments should continue work to improve the quality, timeliness and frequency of energy data with a view to providing more transparent and comprehensive access to energy data.
- Efforts to diversify energy sources should continue, particularly in the transport sector.
- Securing critical infrastructure will require vigilant oversight of existing infrastructure, detailed and dynamic analysis of network flows and close collaboration with all actors in the energy sector.
- Governments should ensure that expanding access to energy is a priority in all international energy projects with developing countries

Market development

- Well-functioning energy markets require free market prices and data transparency, independent regulators, effective non-discriminatory operations of networks and good physical and market integration across borders; more can be done by individual G8 countries to ensure these things are in place.
- Governments should resist the urge to reduce strategic oil stock levels as a tool to reduce domestic energy prices.

Good governance and regulation

- Good governance of national energy companies is critical.
- All countries should continue to engage in global energy dialogue.
- Governments should refrain from limiting international investments in their energy sectors where possible.
- Governments should limit undue interference in the consolidation and/or restructuring of the energy sector, and should not support the development of national energy champions.
- Governments should work more closely to accelerate development of renewables and alternative energy options, including carbon capture and storage (CCS).
- Ensuring a skilled energy workforce should remain a government priority.

Climate change and energy efficiency

- Addressing climate change requires a basket of different policies and measures across all sectors.
- Governments should continue to raise significantly the profile of energy efficiency across all sectors of the economy through policies and measures, including standards, taxes, incentives and other efforts. Among other things, governments should implement the IEA's concrete recommendations on energy efficiency as quickly as possible.
- A market signal that places a value on greenhouse gas emissions throughout the economy should be implemented in all countries as quickly as possible, with a view to developing a system that can be harmonised and integrated.
- Expansion of R&D for clean energy technologies should be strengthened.
- Government support for the development of renewable and alternative energy should keep a view to deployment in developing countries.

Part 2: Summary findings

Recent progress and improvements

In short, the IEA is generally pleased with the steps taken in recent years to enhance security, particularly in a few key areas: improving gas and electricity market functioning, promoting gas and electricity market physical integration, working to improve and shorten the infrastructure siting process and maintaining sufficient oil stocks. We see real progress in electricity market functioning in many G8 countries, though gas market functioning is moving more slowly. With respect to fuel mix, government policies are generally enhancing the basket of options through measures aimed at renewables and other alternative sources (including carbon capture and storage). Energy security may also be enhanced by a renaissance in nuclear power. All countries are stepping up attention and policies to address climate change, though the level of ambition, the quality of policies and the amount and type of financial support varies widely. Energy efficiency – usually the cheapest and easiest option – is taking primacy in most government policies, a move we wholeheartedly support.

Remaining challenges

One of the areas that the IEA has been asked to address – both in this assessment and in other tasks – is energy efficiency. Here we can be clear: governments are not taking full advantage of the many cost-effective opportunities to significantly reduce energy consumption and carbon dioxide emissions through their energy efficiency policies. Considerable progress has been made in strengthening standards and other measures, particularly in the lighting and appliances sectors. However, much work remains to capture the full benefit of the efficiency potential. Work is required in the transportation and building sectors among others. Also across the board action is needed that ensures full implementation of all relevant energy efficiency policies. Particular attention is needed on institutional issues such as compliance and enforcement. We urge G8 countries to continue to make progress to implement our 25 recommendations on energy efficiency as quickly as possible.

As mentioned, we are pleased to see that governments are generally pressing forward with market reform of gas and electricity markets. With independent, well-resourced regulators in place and a proper framework that levels the playing field for all participants, competition can develop. This competition brings new players to the sector to build new infrastructure and enhance economic efficiency (and lower consumer prices). To foster this competition, governments must set up good rules and regulations, but resist temptations to unduly protect or promote particular national interests. In addition, markets need economies of scale to develop – the progress on integrating physical infrastructure is encouraging, but more should be done, particularly as this is the best means of reducing the dominance of large incumbents. Increasing physical and market integration will require co-operation among countries; it will also require early and deep engagement with local communities. Finally, for sustainable competitive energy markets to develop, we urge governments to continue working towards creating a value for carbon dioxide emissions that permeates through and among economies.

Such a value for emissions will also help spur innovation in renewables and alternative energy technologies. While the private sector must have the right incentives to invest in energy innovation and clean technologies, governments will, at the same time, need to continue to play an active role in bringing these technologies to market. Investing public funds in energy R&D will bring long-term public benefits, and governments should further increase this funding, ensuring that it leverages private funding and does not unnecessarily attempt to pick technology winners. Governments are already working to increase this funding; we urge them to be even more courageous in their energy R&D budgets. As new technologies emerge, governments must be proactive in ensuring that the right legal and policy framework is in place for them to emerge. This will require continued international collaboration.

Part 3: Country evaluations

I. Increasing Transparency, Predictability and Stability of Global Energy Markets

Competition in energy markets: Overall competition in energy markets is improving in G8 countries. With respect to the oil market, historically OPEC has provided the marginal supply to the market, but its ability to do so now is limited by capacity constraints. Investment in refining capacity has been significant, but has been geared towards meeting new environmental regulations, rather than expanding the flexibility of product supply. Looking forward, however, we see extensive investments in upgrading refining capacity and new refining, particularly in Asia and the Middle East. Investment is taking place in upgrading capacity in OECD countries, though this is against the backdrop of stagnant product demand and competition from biofuels. However, rapidly growing demand for diesel over the medium term is expected to continue to provide an ongoing challenge for the refining industry, and further investment is needed. Improved downstream flexibility can result in lower and more targeted oil demand. Downstream oil supply is largely competitive across G8 countries. In electricity and gas, large incumbents dominate in **Canada, France, Germany, Italy, Japan, Russia** and parts of the **United States**, but governments are undertaking efforts to reduce their position. **Germany** has begun to tackle market liberalisation. A new, independent regulator and new gas transit rules bring significant improvements. Particularly in **Italy**, lack of competition in the gas sector hinders effective competition in the electricity sector, though the government is working to address this through actions by the Electricity Market Operator. Since the Italian market opened in 2004, the government, operator and regulator have continued to introduce new products and improvements to smooth market functioning and enhance competition. Competition in Italy's gas market is constrained by the strength of the incumbent, but rules are being developed to enhance competition here as well. Gas market liberalisation began in **France** in 2002, but has also been limited somewhat by the strength of the incumbents and poor market design. Domestic customers in France have been able to choose their gas and electricity suppliers since July 2007. Russia's electricity sector is currently undergoing a large-scale privatisation process. While the State will still control certain strategic assets like nuclear plants, hydro plants, some transmission and distribution lines, most electricity and heat generators will be privatised. The electricity wholesale market is expected to be liberalised by 2011, while household prices will continue to be regulated until 2015. In **Japan**, the government continues to improve the competitive framework for gas and electricity markets, such as by formulating guidelines for proper gas and electricity trade – nonetheless, competition within and between regions in gas and electricity is more limited than it could be.

Independence of gas and electricity networks: In Europe, progress is being made to develop a system for seamless trade between regions and a level playing field for network operations. The **United Kingdom** is becoming more interconnected with continental Europe. More work needs to be done, however, particularly with respect to the large incumbents in **France** and **Germany** that have a strong role in network operations. As anchors in continental Europe, more effective unbundling of network operations will be key. **Russia's** electricity transmission grid was unbundled into a separate company. The country's gas transmission system is fully owned and controlled by Gazprom, although some limited steps have been taken to provide reliable and transparent third-party access. In **Italy**, very good progress has been made in the electricity market, with full ownership unbundling of the network and network operator; little competition has developed in the gas market in part due to the strength of the incumbent and the lack of independent network operations. In the **United States**, reducing seams across states and regions has long been a priority; the Eastern corridor is well integrated, but progress remains to be seen on the West Coast and in the Midwest. **Canada** is well-integrated with the **United States** with good cross-border co-ordination and internal seams have been reduced as well. In **Japan**, regions are weakly interconnected, but competition is growing with the development of more independent system operations.

Data transparency and free flow of information: Data transparency and free flow of information have been elevated in importance in G8 countries, although transparency has been quite good historically in most countries, particularly the **United States** (e.g. the Energy Information Administration and its *Annual Energy Outlook*). The Federal Energy Regulatory Commission (FERC) also provides significant data transparency on market transactions. Data on **Canada's** energy markets and industry are also made readily transparent through Natural Resources Canada and other government sources. The government also issues annual reviews and long-term forecasts on oil and natural gas. Canada's National Energy Board is obliged to provide public information on market performance and outlook (e.g. *Canada's Energy Future: Reference Case and Scenarios to 2030*). In **Japan**, the government has undertaken over the last few years to revise substantially how energy statistics are organised. The data are now posted on the government's

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website. Furthermore, long-term information is made available through the government's *Long-Term Energy Supply/Demand Forecasts* released in early 2008. Exchanges are developing in Europe (e.g. in **France** and **Germany**), which can help develop the framework for transparency, but more needs to be done to push transactions to these platforms. **Germany** has recently enhanced access to its market data, requiring that gas data be made available to the public by the system operator. Similarly, new rules are in place for its electricity market. The Federal Network Agency is required to publish an annual report on the outcome of its monitoring activities in gas and electricity markets. Market and energy industry data are made readily available in the **United Kingdom** on the government's website and through its recently published *Energy White Paper* and *Energy Markets Outlook*. Market data are also readily available through National Grid, which operates the country's electricity and gas networks. **Italy** provides data on different energy supply and demand sources through its public Sistan system. It is currently planning to improve oil price accuracy through expanded price surveys. In **France**, operators of the gas and electricity networks provide public data on their websites. In **Russia**, limited transparency on upstream gas sector investments makes it very difficult for the global gas market to adequately assess long-term supply. There are positive developments in its electricity market, where the planned reforms in the electricity market would enhance market transparency. All IEA members are supportive of the Joint Oil Data Initiative, which is working to bring standardisation and transparency to oil data. So far only the **United States** and **Japan** provide weekly oil data; other countries are encouraged to do so. As regards data on natural gas trade, all countries are also encouraged to make a special effort to provide a detailed breakdown of imports and exports by country of ultimate origin and destination.

Greater international dialogue: All **G8 countries** participate in the International Energy Forum (IEF), which seeks to broaden dialogue between energy producing and consuming countries, an important process in ensuring energy market and supply stability. All countries but Canada and the United States have served on the Executive Board of the IEF at one point in time. In other arenas, **Russia** is engaging in dialogue with the all other G8 countries, which are members of the IEA. **Canada** and the **United States** have a long-standing and stable relationship, through such frameworks as the North American Energy Working Group and the North American Free Trade Agreement. In addition to its current presidency of the G8, **Japan** is fostering greater energy dialogue in the Asia-Pacific region through its leadership in Asia-Pacific Economic Cooperation (APEC) discussions as well as the Asia-Pacific Partnership (APP) on Clean Development and Climate (in which the **United States** and **Canada** are also members).

Independent regulation: Sound, independent energy market regulation is in place in **Canada** (the National Energy Board, NEB), **France** (the Commission for the Regulation of Energy, CRE), **Italy** (the Regulatory Authority for Electricity and Gas, AEEG), the **United Kingdom** (OFGEM) and the **United States** (the Federal Energy Regulatory Commission, FERC, and state regulators). **Germany** just developed the *Bundesnetzagentur*, which has also brought independent regulation to electricity and natural gas markets. While **Italy's** regulator is independent, the government does have authority to adopt certain provisions if the AEEG does not respond in a timely manner. The IEA is supportive of efforts underway to develop a European-wide regulator. **Japan's** gas and electricity market regulator has been made more independent in recent years, but is still not fully independent from the government. **Russia's** regulator is functionally independent from the government, but lacks the resources – both financial and in terms of expertise of personnel and access to information – given that it is faced with huge and powerful monopolies.

Emergency response measures: The **six G8 countries** that are members of the IEA and net oil importers are all in compliance with their oil stock obligation, requiring each country to hold 90 days of net oil imports. Table 1 shows both days of forward demand (an estimate of how long in-country oil stocks would cover demand in the first quarter of 2008) and days of net oil imports (an estimate of how long stocks that are eligible under IEA rules would cover net imports in the first quarter of 2008; as net exporters, this number is not relevant for Canada or Russia). As oil exporting countries outside of OPEC, supply from **Russia** and **Canada** helps to stabilise the world oil market. The United States has plans to further expand stocks held in its Strategic Petroleum Reserve (SPR) in order to maintain the public stock's total days of cover in light of growing net imports. Work to enhance competition, reserve margins and investment in the refining sector would also improve the ability to respond to oil emergencies. In addition, holding more stocks in the form of refined product would be beneficial, and we are pleased to see these are priorities in the **United States** and **Japan** in particular. Continued diplomatic efforts are helping ensure security of oil transport through strategic chokepoints in global sea routes, such as the Straits of Malacca, the Strait of Hormuz and the Turkish Straits.

Table 1: Oil Stocks (as of the end of December 2007)

	Stock level (million barrels) ¹			Forward demand cover (days) ²	Net import cover (days) ³
	Total	Industry	Public		
Canada	205.1	205.1		85.1	
France	179.9	79.9	99.9	92.4	104
Germany	274.6	86.9	187.8	110.3	124
Italy	132.9	132.9		82.0	101
Japan	621.0	292.7	328.3	114.0	151
Russia ⁴					
United Kingdom	97.7	97.7		55.3	1 057
United States ⁵	1 685.7	986.8	698.9	82.9	116

Notes: 1. Total stocks on national territory, excluding major consumer (utility) stocks and including pipeline and *entrepôt* stocks where known. 2. Total stocks divided by the estimated forward quarter's average daily demand. 3. Based on IEA methodology where total stocks are adjusted using an emergency reserve calculation. 4. Total stocks in Russia are 251.7 million barrels according to non-assessed JODI data. This estimate includes crude oil, motor gasoline, gasoil and residual fuel oil only. The IEA estimates Russia's total (weighted) forward product demand for January-March 2008 at 2 917.7 thousand barrels per day (kb/d). 5. Includes U.S. territories.

Source: IEA.

In addition to oil stocks, individual emergency plans for oil and other energy sources are necessary to assure energy security. The **United Kingdom** has developed such plans for natural gas and electricity under its Fuel Security Code, and for oil under its National Emergency Plan for Fuel. Under its Petroleum Stockpiling Law and Petroleum Supply and Demand Optimization Law, the Japanese government is authorised to gather more energy information under emergency conditions. Japan has put in place plans to prevent and manage LNG and oil emergencies. The government also has special authority under electricity supply emergencies. In **Italy**, an emergency procedure for residential electricity is in place (PESSE) and demand restraint programmes have been established for natural gas. Many emergency guidelines are in place in the **United States**, covering oil, natural gas and electricity, and the Department of Energy is working on technology to improve emergency tools. Such plans have also been developed for **France**. **Germany** is well prepared in terms of both total stocks and demand restraint measures. As a net exporter **Canada** has no IEA stockholding obligation. Due to its federal structure, most emergency preparedness instruments are on the province level; federal instruments are only implemented in a declared state of emergency.

Good governance of public revenues and action to reduce corruption: **Japan** recently strengthened in 2006 its rules in the electricity sector to reduce corruption. **Italy**, along with **Canada** (an energy exporter), has committed to endorsing the Extractive Industries Transparency Initiative. **Canada** is also a signatory of the OECD Guidelines for Multinational Enterprises, which provides a framework of standards for responsible business conduct. In the **United States**, the Federal Energy Regulatory Commission and the Commodity Futures Trading Commission have enhanced efforts to combat corruption in energy markets. Other countries, including the United Kingdom, maintain strong anti-corruption policies in the energy sector, both through general anti-corruption regulations and enforcement and through energy-sector specific regulation. **Russia** has received a declining rating by Transparency International, but the fund established for windfall oil and gas revenues has been managed very well.

IEA summary: Recommended action items

High energy prices, along with the twin challenges of concentrated energy supplies and climate change have put energy security at the top of **all G8 countries'** policy agendas. Efforts to move away from traditional fossil fuels to more diversity and sustainability have accelerated. We are pleased that **all G8 countries** have sufficient oil stocks on hand. We urge all countries to avoid the political pressure to reduce oil taxes or release oil stocks levels or intake to artificially lower prices temporarily – as this will undermine long-term energy security and provide only a tiny amount (if any) of short-term relief. Over the longer term, the IEA urges action in a few priority areas. Enhancing competition in gas and electricity is key. **Germany** and **France** should continue their ongoing work to anchor the continental European gas and electricity markets through greater independence and transparency, along with enhanced interconnections across borders. **Italy** should continue to focus on improving the functioning of its gas market in particular, as this will enhance operation of its electricity market. While progress has been made to open up the gas network in **Russia**, the regulatory authorities including the Anti-Monopoly Service, will need to strengthen their oversight of the network to ensure adequate investments are made by independent gas producers and oil companies to meet growing domestic and foreign natural gas demand in the most cost-effective and competitive way. In **Japan**, greater focus on independent regulation and market integration will enhance domestic security. In **Russia**, enhanced attention to openness and anti-corruption will aid global energy supply and market competition. The **United States** is encouraged to go ahead with plans to expand the SPR. **Canada**, while not obliged to hold emergency reserves, should consider the benefits these would have on its supply security. Both countries should continue their efforts to integrate electricity markets and remove seams across domestic and international borders.

II. Improving the Investment Climate in the Energy Sector

Facilitating investment in supply and demand infrastructure and measures: Much-needed investment is occurring in **Italy**, where significant electricity generation capacity is being constructed and planned. Grid investment, both for the gas and electricity sectors, is also expected. Given recent challenges in the country, this new investment is very welcomed. Under its recent Energy Policy Act, the **United States** has developed and enhanced many incentives for investments in energy infrastructure – in particular, streamlining the siting and permitting process. The Energy Policy Act works to facilitate the process of obtaining approval for LNG facilities by giving the Federal Energy Regulatory Commission (FERC) sole siting authority. The Energy Policy Act also increased incentives for new infrastructure, such as by removing limitations on investment, establishing last-resort federal siting authority for certain transmission lines and generally clarifying regulatory authority for siting of new projects. Under new regulations entering into force from June 2007, **Germany** has taken steps to ease the process of connecting new supply to the grid. It is also drafting a law to counteract delays in planning and authorisation procedures for new infrastructure – which will hopefully help address the poor north-south interconnections in Germany. Through the establishment of the Major Projects Management Office in 2007, **Canada** has streamlined infrastructure siting and permitting for major projects, while still ensuring the necessary transparency and regulatory oversight. The **United Kingdom** facilitates investment through its support of competitive markets, as well as through a transparent and stable regulatory framework. Forthcoming planning and energy bills will improve transparency within the planning system for potential energy infrastructure projects, with the aim of reducing delays. In **Japan**, public interest privilege and investment incentives have been provided to companies that build pipelines in areas where a pipeline network does not exist and/or where it would interconnect existing pipeline systems. The government is also providing long-term low-interest funding through fiscal investments and loans (*e.g.* the Energy Reform Tax Credit Programme). In addition, it provides incentives for private Japanese companies to invest in upstream hydrocarbon exploration and production (E&P) through its Japan Oil, Gas and Metals Corporation (JOGMEC). Under its Long-term Programme on Investment (PPI), **France** identifies necessary investment needs for the security of the electricity sector. Under a similar program for gas, the Long-Term Indicative Investment Planning programme (PIP), supply of gas for the coming decade is evaluated to ensure security. Investment in **Russia's** upstream oil and gas sector has been improving recently, but more must be done to ensure long-term supply. Given the decline at major existing fields and the need to open up greenfield regions, much more investment will be needed to ensure long-term supply. In addition, recent legislation sets guidelines for foreign investment in strategic assets, raising concerns about transparency and openness in the market, as the terms of the legislation are not sufficiently clear. Implementation of the legislation will be the key to whether foreign investors find Russia an attractive destination in the future. Implementation

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needs to be fair, transparent, consistent and stable. The investments needed by the oil and gas sector in Russia are very substantial if production is to be maintained at levels to meet future world demand. Furthermore, many of the fields lie in extremely technically and geographically demanding regions. Thus foreign finance and foreign know-how could make a real contribution to unlocking the potential.

Development of competitive power markets: As discussed, sound, competitive markets in energy already exist in the **United Kingdom**. Nevertheless, the government continues to work to enhance regulation of monopoly transmission of electricity and to enhance non-discriminatory access to network grids. To improve network regulation, **Germany** has been aggressively targeting network grid fees, lowering the costs of participating in electricity markets, along with improving overall grid regulation. **Canada** and the **United States** both support fair and competitive energy markets. In the United States, this is underpinned by FERC's network open access and real-time information rules. Both countries are working to remove seams between regions within each country and co-operatively to remove cross-border seams. Decisions to fully implement reform are, however, made largely at the state level in some cases. Similarly, market liberalisation is progressing in **Japan**; the market in electricity began in 2000 and by 2005, 63% of retail sales had been liberalised. Liberalisation of the power markets in **Italy** and **France** continue to press forward. As discussed, Russia is well-advanced in its efforts to liberalise the electricity sector, including through ownership unbundling of transmission networks.

Removing barriers to cross-national investments in the energy sector and market integration: Extended transmission capacity in electricity and gas between the United Kingdom and the continent further enhances UK markets, as do the country's LNG import terminals. The regulator and government are working to further integrate the gas market with continental Europe, and are in the process of developing electricity connections. **Canada** and the **United States** work together with Mexico on energy issues through the North American Energy Working Group, where collaboration is pursued, particularly addressing barriers to the expansion of clean energy supply. **Canada** also issued guidelines in 2007 clarifying rules for evaluating investments by foreign state-owned enterprises. **All G8 countries** are signatories to the 1991 Energy Charter political declaration; all bar the **United States** and **Canada** are parties to the 1994 Energy Charter Treaty, whose aim is to strengthen the rule of law on energy issues, by creating a level playing field of rules to be observed by all participating governments, thereby mitigating risks associated with energy-related investment and trade (**Russia** has accepted provisional application of the Treaty, but has not yet ratified it). The terms governing mutual investment along the energy value chain between **Russia** and other G8 countries members remain unclear; barriers to cross-border investment remain and some new limitations are either in place or under discussion. **Japan** continues to work to enhance energy import source and route diversity, such as through the Sakhalin-2 project to bring crude oil and natural gas to the southern tip of Sakhalin island in Russia. Italy is investing in cross-border power interconnections with Albania, Croatia, Sicily and Sardinia. In the gas sector, Italy is planning upgrades along its South-North and North-East backbones, and in the Po Valley. Many new LNG terminals are planned; one new terminal is planned to begin accepting imports in 2008. In the context of the Pentalateral Forum, **Germany** is working to better integrate its market with those of France, Belgium, the Netherlands and Luxembourg. Additional regional initiatives, such as with Denmark, are also bringing greater market integration.

Adequately maintaining and developing the energy labour force: Government efforts to identify and address shortages of key energy skills in the **United Kingdom** have evolved into a new skills academy (OPITO), driven by the private sector. After a review of energy and resource labour needs in 2007, the government of **Japan** plans to start supporting the efforts of academia and industry that are aimed at promoting international energy resource development in 2008. In 2006, the government started an effort aimed at training 20 000 nuclear workers, and has various efforts to cultivate talent in the nuclear sector aimed at primary, secondary and higher education. The **United States** has many programmes to develop the energy and technical workforce, such as through the Department of Energy, the Department of Labor, the National Science Foundation and the Nuclear Regulatory Commission. **Italy** and **France** do not have any government programmes specifically focused on developing the energy labour force.

IEA summary: Recommended action items

Ensuring energy security will require continued and stable investment in all parts of the energy supply chain, including exploration and production of hydrocarbons, development of renewables, construction of LNG import terminals, and maintenance and expansion of transmission and distribution grids for gas and electricity. We are pleased to see countries working to address NIMBY (“not in my backyard”) issues, by developing streamlined and transparent siting and permitting processes for critical energy infrastructure. In particular, developing new power lines is a complex process; initiatives to create collaborative and clear processes are welcomed. Investment in upstream hydrocarbon development is also important, thus we welcome the moves by **Canada** to create transparent processes to review investments by foreign state-owned firms. In general, limits on foreign ownership of energy assets hinders investment and should be avoided – the IEA does not see the current trend toward creation of national champions as helpful to investment as they crowd out other options and deters market integration. Many G8 countries are creating rules that detail the limits on foreign investment. We urge these rules to be clear and transparent – and limited to truly strategic assets. Long-term energy security depends upon a skilled workforce; we urge countries to continue to support human resource development and, in **Italy** and **France** in particular, develop new programmes where support is lacking. We urge **Germany** and **France** to continue efforts to integrate their markets with continental Europe, as expanding the market is the easiest way to enhance collective security and develop competition. As discussed in the first section, better market data is key to market functioning. We are pleased to see all G8 countries focusing on developing better and more transparent data as this will enhance energy markets’ ability to manage risk.

III. Enhancing Energy Efficiency and Energy Saving

Development of integrated efficiency policy: All G8 countries are placing priority on developing integrated and comprehensive energy efficiency policies. A notable recent development is in **Russia**, which is in the process of elaborating a programme and measures on energy efficiency. At the May 6 meeting of the Russian government, the Ministry of Economic Development together with the Ministries of Energy, Finance, Regional Development and Natural Resources, was asked to develop a concept of the programme on energy efficiency for Russia by 1 October 2008.

Strengthened policies in the building sector: We are pleased to see countries working to strengthen building codes. Notably, **Japan** has initiated work to expand its building code requirements, which currently cover only large buildings, to cover a larger share of smaller residential buildings. Many states in the **United States** and provinces in **Canada**, along with **Germany**, **France**, **Italy** and the **United Kingdom**, have updated or strengthened their standards since 2006 and/or are planning to do so in the next few years. **Russia’s** existing building codes are quite strong, but their implementation is not mandatory.

Enhanced energy efficiency data collection: Detailed, timely and reliable statistics is the basis for any sound energy policy on energy efficiency. A special effort should then be made by all countries to improve the timeliness, coverage and quality of their data. This is true for all sectors and in particular for buildings. **Germany**, **Italy**, **Japan**, the **United Kingdom** and the **United States**, now collect data on the energy performance of existing buildings. Further, many countries also have policies that aim to improve energy efficiency in existing buildings. A good example of recent developments in this regard is the EcoENERGY for Buildings and Retrofit programme of **Canada’s** federal government. However the uptake of these measures – i.e. the actual achievement or real efficiency improvements – in existing buildings is generally slow and all countries could substantially increase their efforts in this area. It is essential that such efforts include activities to increase the awareness of energy efficiency in the buildings sector and raise the market profile of the energy performance of buildings. Similarly, more work should be done to develop a comprehensive package of complementary measures that together address the key barriers to improved energy efficiency in existing buildings. In **Russia**, the lack of reliable demand side data hinders the ability to properly develop or analyse energy efficiency indicators necessary for sound policy formulation.

Enhanced uptake of more energy-efficient appliances: Most developed countries have established standards and labelling programmes that cover traditional major residential appliances, such as refrigerators and freezers, dishwashers, air conditioners and clothes washers, among others. One challenge has been in maintaining the stringency of policy measures and expanding their scope. One of the better examples of succeeding on this front is found in **Canada**. The **United States**, which had not meet its own expectations in this area in recent years, has now set strict timetables for updating standards and has adopted streamlined consultative processes in order to catch up with its backlog. Similarly the EU (covering **France**, **Germany**, **Italy** and the **United Kingdom**) has fallen behind many countries in terms of both the coverage and

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stringency of its mandatory programmes, but is now attempting to address these shortcomings. Turning to standby power, while most individual product policies are voluntary, the number of countries and products where standby power is the subject of regulation is growing. The **United States** and **Japan**, for example, have all introduced standby requirements in mandatory labelling or MEPS for some products, or will do so in the near future. Despite efforts to introduce the labelling of efficient appliances, electricity prices have only recently begun to provide the needed stimulus to encourage uptake of such appliances in **Russia**.

Moving to best practice in lighting: In **Canada**, a range of amendments took effect in July 2006, including the harmonisation of efficiency standards for fluorescent lamp ballasts with those of the Energy Star Program in the **United States**. The European Commission is currently considering options for the development of legislation on more stringent energy efficiency requirements for office and street lighting by 2008. **Canada's** federal government announced the phase-out of the use of incandescent light bulbs by 2012 in April 2007. Much activity is occurring with respect to phasing out inefficient incandescent lighting. In **Germany**, a phase-out will be implemented as part of its implementation of the EU ecodesign directive. In **Italy**, a phase-out is anticipated in the National Energy Efficiency Action Plan, submitted to the European Commission in July 2007. In the **United Kingdom**, the government announced in September 2007 that it would begin phasing out incandescent light bulbs in early 2008 by way of a voluntary agreement with major light bulb makers, retailers and energy utilities. In the **United States**, the Energy Law passed in December 2007 will require lighting to use up to 30% less energy, which effectively amounts to a phase-out of the traditional light bulb (by 2012 and 2014, depending on bulb type). The European Commission, covering **France**, the **United Kingdom**, **Germany** and **Italy**, has proposed more stringent energy efficiency requirements for incandescent lamps by 2009 and is in the process of considering regulatory options. **Japan** has set a target in principle to replace incandescent light bulbs with fluorescent light bulbs or other energy efficient light bulbs by 2012.

Improving transport sector efficiency: Target measures in the transport sector are improving tyre pressure and developing and strengthening fuel efficiency standards. The European Commission, covering **France**, **Germany**, **Italy** and the **United Kingdom**, announced in February 2007 that it would propose a legislative framework that includes setting maximum tyre rolling resistance limits for tyres fitted on passenger cars and light commercial vehicles. The IEA is not aware of any other country-specific developments of note with regard to maximum rolling resistance, nor with regard to measures to promote proper inflation levels. Turning to fuel economy, mandatory fuel efficiency standards exist in **Japan** and the **United States**. With regard to stringency, the levels set in **Japan** provide the best example at present. Additionally, the **United States** will set a fuel economy standard of 35 miles per gallon by 2020, which will increase fuel economy standards by 40% according to a recent federal government announcement. Canada and the EU have voluntary agreements on fuel economy standards with vehicle manufacturers. The EU voluntary agreement, for example, aims to reduce the average CO₂ emissions of new cars to 140 g/km by 2008-09. Although progress has been made in reducing average emissions of new cars across the EU, it appears possible that the 140 g/km target will not be achieved. Both the EU and Canada have recently announced an intention to develop mandatory measures. In February 2007, as part of its announcement to achieve a target of 120 g/km by 2012, the European Commission said that 130 g/km of this target should come from vehicle fuel efficiency. Subsequently, it announced a proposed regulation in December 2007. In an April 2007 policy statement, the Canadian government announced an intention to develop regulation for the fuel efficiency of cars and light duty trucks, beginning with the 2011 model year. It is also noted that some countries have other types of policy measures in place that are designed to encourage fuel efficiency, such as vehicle tax differentiation and consumer information schemes.

IEA summary: Recommended action items

Responding to G8 requests, the IEA presented a total of 16 recommended energy efficiency policies to the St Petersburg and Heiligendamm Summits in 2006 and 2007. In Heiligendamm, G8 leaders stated their willingness to take forward the concrete recommendations. If fully implemented, these recommended actions could save up to 5 700 megatonnes (Mt) of carbon dioxide (CO₂) globally per year by 2030. Progress in implementing the IEA recommendations varies across countries and between recommendations; no country has fully implemented all of the IEA recommendations, though some countries have established a range of pertinent measures. However, in most instances, these measures could be updated or further strengthened, the scope of their application broadened and compliance better monitored and enforced. This particularly applies to the recommendations on new and existing buildings, and to those on minimum energy performance and standby power requirements for appliances. In several other areas, for example, fuel efficiency standards for light duty vehicles and low power modes for

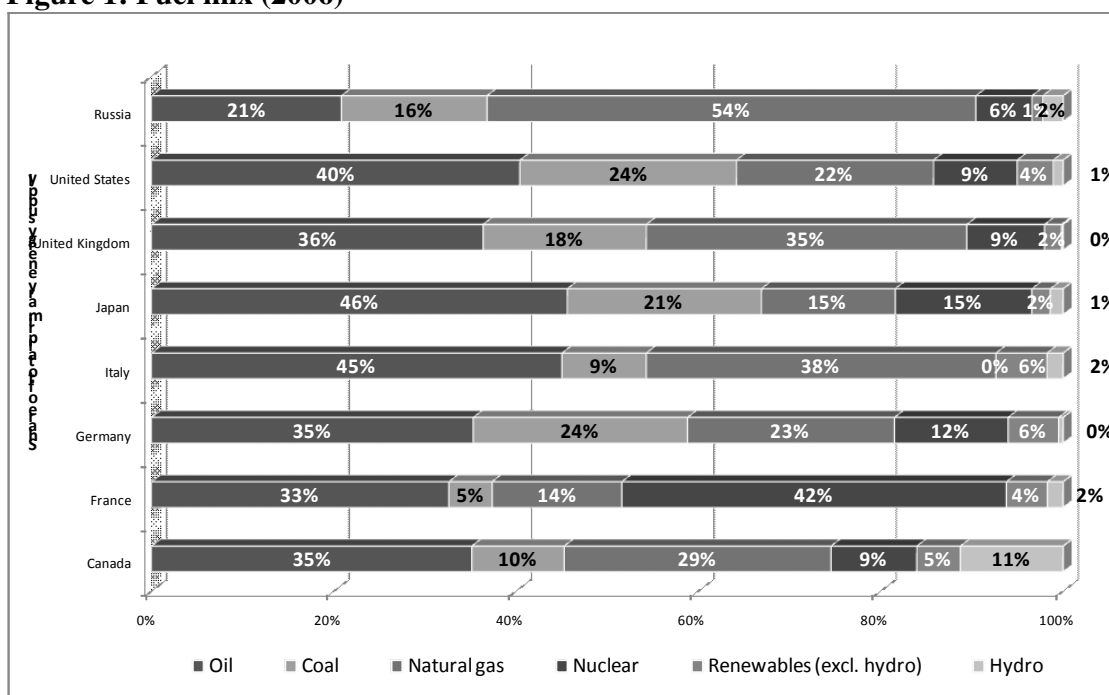
IEA Overview

electronic equipment, certain countries have introduced voluntary measures, but there are still few or no instances of mandatory requirements. In the case of these recommendations, the IEA considers mandatory measures to be an important part of ensuring that the full savings potential in the relevant sub-sector is met. Across all of the IEA recommended areas of activity, there are instances where relevant policy measures have been drafted or are being considered but have not yet been implemented. If fully and properly implemented, these measures could achieve significant savings, but of course, it remains to be seen if this will occur. This applies with regard to the recommendations on fuel-efficient tyres, on tyre-pressure monitoring systems and international test procedures, on the phase-out of incandescent lamps, and on the strengthening of building regulations. Finally, ensuring effective enforcement and compliance procedures remains a universal challenge across many of the recommendations, particularly in the buildings and appliances sub-sectors. Such procedures are a central aspect of successful policy development and implementation in all energy efficiency sub-sectors, and should be further pursued by all countries.

IV. Diversifying Energy Mix

Diversifying energy supply: As shown in Figure 1, supply of energy in G8 countries is relatively diverse, though oil continues to supply the lion's share in all countries. Nevertheless, this share has been decreasing in all countries. One major concern amongst G8 energy importing countries is their sources of supply. For example, in **Japan**, almost 90% of its supply of oil comes from OPEC countries. We are pleased to see it continue to be a top priority for Japan to expand sources of oil, including by import country and route, and of natural gas, including by import country, route and type (pipeline gas or LNG).

Figure 1: Fuel mix (2006)



Notes: Shares have been calculated excluding electricity and heat trade. Data for Russia are preliminary.

Source: IEA.

Developing domestic renewable resources: The IEA is pleased to see the importance being placed on rapidly deploying renewables. The renewables obligation is the primary mechanism for deploying renewables in the **United Kingdom**, and has led to a doubling of generation since its introduction in 2002. Some difficulties were encountered and adjustments to the scheme are under way. With respect to biofuels, the **United Kingdom** has put in place a renewable transport fuel obligation that rises from 2.5% in 2008/09 to 5% in 2010/11. In **Canada**, the ecoENERGY Renewable Initiative provides incentives to produce heat and power from renewable resources. It has also put in place a renewables obligation for biofuels in the transport sector, which has also been done in the **United States**, the European Union (**France**, **Germany**, **Italy**, the **United Kingdom**) and **Japan**. In **Japan**, the key means of promoting renewables is the

IEA Overview

renewable portfolio law, which calls for about 0.4% of electricity supply to come from renewables in 2006, climbing steadily through 2014. Japan is also supporting renewables through significant R&D funding. **Russia** has set renewables targets for electricity generation, as well as developed subsidy schemes for small-scale renewables.

Developing domestic cleaner coal resources (including CCS): The **United Kingdom** has launched a competition to support a coal plant with CCS on a commercial scale and is in the process of developing a regulatory regime for CCS. The government is investing in new technologies, including CCS, through a number of mechanisms, including the newly created Energy Technologies Institute. **Canada** has made the development of CCS a government priority, devoting substantial financial resources to a full-scale commercial demonstration project, as well as to R&D and the development of a sound institutional framework. **Japan** has prioritised CCS as a key technology under its Cool Earth Innovative Technology Programme, and promotes large-scale demonstration projects.

Reducing natural gas flaring: All offshore gas flaring is tightly controlled in the **United Kingdom** and, since the beginning of 2008, is also included in the EU Emissions Trading Scheme. The government also supports the World Bank-led Global Gas Flaring Reduction partnership. **Russia** is developing plans to reduce flaring of associated gas, which will include fees and increasing ecological penalties from 1 January 2011.

Developing nuclear resources: **Canada** has expanded its support of nuclear power, including operations and R&D, particularly through support of Atomic Energy of Canada Limited. Nuclear power is a key component of the country's long-term energy strategy, and receives much government attention. To further promote nuclear safety, the government's inspection system was reviewed and the government is educating local communities about the improved inspection system. Spurred by the Energy Policy Act of 2005, new nuclear projects are under development in the **United States**. In addition, **Italy** recently initiated efforts to commence construction of new nuclear power plants within the next few years.

Addressing long-term nuclear waste disposal: In 2007, **Canada** accepted the Nuclear Waste Management Organization's recommended approach of adaptive phased management for managing nuclear fuel waste over the long term. **Japan's** Specified Radioactive Waste Final Disposal Act was enacted in 2000 and sets out a process for selecting disposal areas and other processes.

Developing other alternative resources: In order to promote innovation and low-carbon technologies, public funding is increasing steadily in the **United Kingdom**. In **Canada**, innovative technologies are supported by the ecoENERGY Technology Initiative, which has identified eight priority areas for investment in sustainable energy.

IEA summary: Recommended action items

The surest way to ensure energy security is through diversity and development of alternative sources. G8 countries continue to work to reduce their reliance on imported and domestic fossil fuels – and efforts in this area should continue – and are raising the diversity of fuel source generally. Diversity of import source and route is also key, so the development of new routes, such as through construction of new LNG terminals and pipelines, is also very welcome. More importantly, development of domestic resources is key, and we are pleased to see the efforts being paid to develop renewables. We are pleased to see that European countries, including **France, Germany, Italy** and the **United Kingdom** continue to work to develop a continental market for renewables, in order to lower the overall cost and accelerate the pace of development, as well as link it with that of the developing continental power market. In **Japan**, renewables remain a small piece of the country's energy fuel mix. While the large investments in R&D that the country is making are welcome, more aggressive targets should also be considered. We are pleased to see states in the **United States** developing regional renewables markets, but development of a federal system should be the ultimate goal. International efforts aimed at reducing gas flaring have succeeded in reducing wasted gas and excess emissions, but more work remains, particularly in **Russia**. Nuclear will need to be part of the long-term energy mix internationally and regionally – countries that can adequately address the nuclear waste disposal challenge through a transparent and reliable system will be successful in further expanding nuclear capacity. The IEA is pleased to see the attention being paid to developing a framework for introducing CCS to new and future fossil power plants. Successful deployment of CCS will require careful international collaboration, technology funding and engagement with the private sector.

V. Securing Critical Energy Infrastructure

Inventory of security priorities: The **United Kingdom** keeps the major areas of energy infrastructure under constant review to determine what elements are critical for energy delivery. Where key sites are identified, security requirements with industry are put in place. **Canada** has developed a National Strategy for Critical Infrastructure Protection, which lays out a partnership programme for information sharing and protection between the public and private sector. In addition, **Canada** and the **United States** are working collaboratively on security vulnerability assessments of critical cross-border energy infrastructure. **Japan's** inventory of security priorities focuses primarily on nuclear facilities. As such, it is establishing Nuclear Emergency Operations Facilities. **Russia's** legislation has been amended to implement measures to fight acts of terrorism against energy infrastructure. In accordance with these amendments, key infrastructure has been authorised to acquire necessary protection equipment.

Ensuring security of transportation routes: To ensure such security, information sharing with other countries is a high priority for the **United Kingdom**. Given the source of most of **Japan's** oil imports, the security of the Strait of Malacca is of vital importance for the country.

IEA summary: Recommended action items

It is difficult for the IEA to adequately assess the effectiveness of G8 countries' efforts to secure vital energy infrastructure, as limited information has been provided to us. This is likely with some good reasons, given the sensitivity of the subject. However, as energy security of one country is closely linked to that of others, we urge governments to create more openness. We also urge all governments to continue to maintain up-to-date inventories of existing infrastructure, to undergo rigorous sensitivity analysis to understand and identify critical points in network infrastructure, to develop emergency plans that take into account a variety of circumstances and to develop close collaboration with all actors in the energy sector.

VI. Reducing Energy Poverty

Progress towards funding the Millennium Development Goals: While there is not a specific goal focused on energy, expanding access to energy can contribute to the achievement of all the Millennium Development Goals (MDGs). Flowing from the United Nations MDGs, the **United Kingdom** supports several initiatives, including the EU Energy Initiative for Poverty Eradication and Sustainable Development and the Global Village Energy Partnership. **Canada** also supports the MDGs, including through financial support that goes to the World Bank's Clean Energy for Development Investment Framework and the Inter-American Development Bank's Sustainable Energy and Climate Change Initiative. **Japan's** official development assistance (ODA) charter designates poverty reduction as a priority issue; Japan supports the MDGs through its ODA. The **United States'** Millennium Challenge is one of the government's key tools to aggressively support poverty reduction in developing countries.

Other initiatives aimed at reducing energy poverty: The **United Kingdom** provides funding to the World Bank Energy Sector Management Assistance Programme, the new Clean Energy Investment Framework, the Infrastructure Consortium for Africa and through bilateral programmes in Bangladesh and Sierra Leone. Through its Canadian International Development Agency, **Canada** supports developing countries, with support not focusing more on enhancing the regulatory environment in which the power industry operates. Among industrialised countries, **Japan's** financial assistance to the energy sector in developing countries makes it the largest donor. The government also provides loans to the energy sector in developing countries. Further assistance will be provided through Japan's Cool Earth Partnership, launched in 2008. **Russia** has committed funds to both the Global Village Energy Partnership International (GVEP), focused on countries south of the Sahara Desert. The government is also in the final phase of establishing the International Sustainable Energy Development Centre (ISEDCC).

IEA summary: Recommended action items

Limited information was provided by most governments on initiatives to expand access to electricity and clean cooking fuels, apart from funding levels to various programmes. We are pleased to see governments commit funds to general poverty eradication programmes and programmes that target energy poverty specifically. However, we see that more work can be done to facilitate the creation of sound energy policies, to enhance institutional and human resource capacities and to integrate hydrocarbon development with energy poverty eradication. Efforts made to develop technologies to harness renewable and distributed energy in developed countries should continue to be cognisant of the technology's value in being transferred to developing countries.

VII. Addressing Climate Change and Sustainable Development

Progress towards achieving Kyoto targets (if applicable): **Canada, France, Germany, Italy, Japan, Russia** and the **United Kingdom** have put in place policies to achieve their Kyoto greenhouse gas emissions targets, most with the help of market-based mechanisms. These policies include emissions trading schemes that cap emissions for certain sectors of their economy as well as access to flexibility mechanisms as defined under the Kyoto Protocol. Greenhouse gas emissions from **France, Russia** and the **United Kingdom** are all already below their 2008-2012 targets. While **Canada** has put in place a framework to meet its target, this will be very difficult to achieve.

Other policies to reduce carbon dioxide emissions: The European Union's Emissions Trading Scheme, which covers **France, Germany, Italy** and the **United Kingdom** and has been in operation since 2005, is a key mechanism by which EU countries are achieving parts of their targets under Kyoto and the EU burden-sharing agreement. This system exists alongside a range of other policies and strategies at the national level. In addition, the United Kingdom's Climate Change bill, when passed, will make it the first country in the world to have a legally binding long-term framework to reduce greenhouse gas emissions and adapt to climate change. **Canada** is pursuing its climate change strategy through its Clean Air Agenda, currently under development, under which it has established emission-intensity targets for greenhouse gas emissions for 2010. The government has set a goal of reducing greenhouse gases by 20% from 2006 levels by 2020. Voluntary agreements in **Japan** continue to reduce emissions in industrial sectors, and other measures are in place under the country's Kyoto Protocol Target Achievement Plan. In **Russia**, the government is working to establish a Government Commission on Climate Change, which will introduce economic and administrative incentives for mitigating negative environmental impacts. The government is also elaborating its Priority Action Plan for Elimination of Environmental Damage.

Policies to implement a market signal for greenhouse gas emissions: Countries covered by the European Union's Emissions Trading Scheme, the **United Kingdom, France, Germany** and **Italy**, have a price signal that covers a significant share of their economies – industrial and energy installations. Additionally, the **United Kingdom** has a Climate Change Levy that taxes energy use to encourage energy efficiency. Some regions and states in the **United States** are developing or considering emissions trading schemes, and a federal system is under consideration by several bills currently before Congress. In **Japan**, a voluntary carbon offset system is in place and the government is considering a more expansive system that will cover small and medium-sized enterprises.

IEA summary: Recommended action items

Addressing climate change is a challenge for the entire globe, not only G8 countries. Nonetheless, it is imperative that G8 countries take the lead, setting an example by developing comprehensive and ambitious climate change policies and targets. The European Union Emissions Trading Scheme, which covers half of G8 countries (**France, Germany, Italy** and the **United Kingdom**), is a good starting point, as it provides a market signal for greenhouse gases across two large parts of the greenhouse-gas emitting economy. As the EU-ETS enters into Kyoto's first commitment period, we are pleased to see that governments and the European Commission have learned from earlier experience; particularly with respect to Germany, which had over-allocated emission rights to coal-fired power plants in the past. We are also pleased to see new initiatives to develop market signals for greenhouse gases in **Japan, Canada** and the **United States**. We urge these countries to implement meaningful systems quickly, and work together to create systems that may be linked over time, and for **Russia** to develop a system as well. In the shorter term, other policies will be needed, such as those covered earlier by enhancing energy efficiency and developing alternative and renewable resources. Governments must continue to urgently establish their own policies while developing comprehensive global and international ones as well. Stabilising anthropogenic greenhouse gas emissions will require bold leadership and strong political will.

Canada

Canada

**Canada's National Report to the Japanese G8 Presidency:
St. Petersburg Global Energy Security Principles
April 2008**

1. Increasing Transparency, Predictability and Stability of Global Energy Markets

- Provide more and better sector-specific and fuel-specific energy data to the public.
- Enhance the transparency of energy market transactions and network flows.
- Ensure independent regulation and clearly defined energy market conditions.
- Implement Energy Charter principles related to energy transit across borders.
- Meet obligations of the IEA's International Energy Programme (IEP).
- Put in place emergency plans to deal with domestic energy supply disruptions.
- Reduce corruption in energy market transactions and dealings.
- Enhance the security of oil and natural gas supplies.

Canada provides timely and accurate information to industry and the public concerning crude oil, natural gas and refined petroleum products. Such information is designed to impart transparency regarding the supply and pricing of these commodities and to enhance public awareness and understanding. Canada also supports the Joint Oil Data Initiative's improvement of international energy data quality and coverage through the International Energy Agency (IEA).

Internationally, Canada continues to promote open and transparent energy markets, the role of independent regulators and respects the rule of international law. Canada focuses on these priorities through work with international partners, multilaterally and bilaterally, including, the partners of the G8, the International Energy Agency, the North American Energy Working Group and others.

Canada promotes the responsible development of petroleum resources, and enhances the investment climate by ensuring regulatory efficiency and developing options for addressing Aboriginal community involvement in major energy projects.

In the current environment of increasing global energy demand for safe and secure supplies of energy, the National Energy Board (NEB) has a significant role as Canada's national energy regulator. The development of large and complex oil and gas projects and associated long-distance pipelines require multi-year lead times to successfully complete all of the development steps. Improving regulatory processes and providing effective and efficient regulatory outcomes is a top priority.

Canada-U.S. trade in energy is governed by the North American Free Trade Agreement. Canada also supports the efforts of those European countries participating in the Energy Charter.

Canada

Canada is in a unique position as both as producer and consumer of oil and gas. Canada is the only IEA country with growing indigenous oil production; new oil sands and offshore production more than replace declining production from aging fields. Analysis of Canada's emergency preparedness must fully consider the country's role as a stable and growing supplier of oil, and the contribution this makes to the collective security of all IEA member countries. We comply fully with the IEA's International Energy Program obligations, including full participation in the Emergency Response Exercise.

Canada is a signatory of the Organization of Economic Cooperation and Development (OECD) *Guidelines for Multinational Enterprises* which provide a framework of standards for responsible business conduct. Canada supports the principles of the Extractive Industries Technology Initiative, an international collaboration between states, international financial institutions, non-governmental organizations, and the private sector that presents a standard for improving transparency and accountability in resource-rich countries, and the aim of increasing the transparency of payments by oil, gas and mining companies to governments in developing countries.

2. Improving the Investment Climate in the Energy Sector

- Promote investment in energy infrastructure and streamline infrastructure siting
- Ensure a level playing field for all competitors in the oil, gas, coal and power sectors
- Expand trade and better integrate energy markets with neighbouring countries
- Provide regular forecasts to the public on which to base investment decisions
- Educate and train skilled energy personnel to meet long term labor requirements
- Drive cost-effective investment in renewable and alternative energy sources
- Facilitate energy efficiency investment in buildings, industry and transport

Canada has introduced new policies and fiscal incentives to improve the investment climate in energy projects. Major initiatives include the establishment of a Major Projects Management Office (MPMO) in October 2007. MPMO provides a single-window for major project approvals in mining and energy. It is intended to ensure regulatory reviews are carried out with greater efficiency and transparency and increase federal government ability to assess environmental concerns.

Canada supports a fair and competitive oil, natural gas and petroleum products marketplace that is consistent with Canada's social and economic goals.

Canada works together with the U.S. and Mexico on energy issues through the North American Energy Working Group (NAEWG). Priorities include: collaborating on energy science and technology activities; addressing barriers to the expansion of clean energy supply; aligning energy efficiency standards on products, and; cooperating on longer-term efforts to enhance energy security. The integrated energy market represents approximately US \$150 billion in trade between the three countries.

Canada

In December 2007, Canada issued guidelines clarifying the application of the *Investment Canada Act* as it relates to foreign state-owned enterprises. The guidelines will clarify factors for assessment of net benefit that are set forth in the Act, as they may apply to concerns about investments by foreign state-owned enterprises.

Canada provides annual reviews and long-term forecasts on oil and natural gas. The National Energy Board has a mandate to monitor the outlook of energy supply and demand in Canadian markets and to provide Canadians with energy information – a recent example is the NEB report “Canada’s Energy Future: Reference Case and Scenarios to 2030.”

In Canada’s 2008 Budget, the capital cost allowance (CCA) rate for CO₂ pipelines will be increased from 4 percent to 8 percent to better reflect the useful life of CO₂ pipelines, which are expected to be the primary means of transporting CO₂ from industrial facilities to geological storage locations; the CCA rate for pumping and compression equipment on CO₂ pipelines will be set at 15 percent.

The 2008 Federal Budget also proposes to extend accelerated CCA for clean energy generation equipment at a rate of 50 per cent per year to the following applications:

- Ground source heat pump systems used for space heating and hot water.
- Biogas production systems that use animal waste and sewage treatment residue as inputs and those that produce biogas for commercial sale.
- Electrical or thermal generating systems that use purchased biogas.
- Systems that produce bio-oil, or heat from specified a waste source, where the system output is sold to a third party that uses it for specified purposes.

Canada also proposed to enhance the tax incentives to Scientific Research and Experimental Development (SR&ED) for medium-sized Canadian Controlled Private Corporations by:

- increasing the maximum qualified expenditures on which investments tax credits (ITC) can be earned at the enhanced rate of 35% to \$3 million (from \$2 million)
- increasing the upper phase-out limit for prior-year taxable income for accessing the enhanced ITC rate to \$700,000 (from \$600,000)
- increasing the upper phase-out limit for prior-year taxable capital to \$50 million (from \$15 million).

Investments have been made through a series of programs to help Canadians use energy more efficiently, boost renewable energy supplies, and develop cleaner technologies. Specific actions include:

- The \$1.5 billion Trust Fund for Clean Air and Climate Change supports provincial and territorial initiatives aimed at reducing GHGs and air pollution.
- The \$300-million ecoENERGY Efficiency Initiative to promote smarter energy use and energy-efficiency improvements in homes, and small buildings and industries.

Canada

- The \$230 million ecoENERGY Technology Initiative in energy science and technology to fund the research, development and demonstration of clean energy technologies.

To ensure the long-term availability of a secure workforce, Canada established and supports both an Electricity Sector Council and a Petroleum Human Resources Council of Canada to address human resource issues.

3. Enhancing Energy Efficiency and Energy Saving

- Implement the 16 energy efficiency measures that the G8 have specified for appliances, lighting, buildings, transport, industry, and across sectors.
- Ensure cost-reflective pricing to drive cost-effective energy efficiency steps
- Promote demand-side measures in the electric power sector.
- Encourage public and private financing for energy efficiency improvements.
- Develop efficiency standards and labels for buildings, appliances and equipment.
- Provide energy efficiency audits to homes, offices, and industrial firms.
- Raise public awareness of energy efficiency opportunities.
- Improve end-use data and track progress towards energy efficiency goals.

Canada has taken a legislative and regulatory approach, as well as developed targeted incentive programmes, to encourage energy efficiency and energy savings.

Canada is a leader in regulating consumer and commercial products that affect or control energy consumption. Currently, 35 products are regulated. It is proposed that new regulatory requirements will affect the energy efficiency of 20 additional products, such as traffic signals, battery chargers and commercial clothes washers. Additionally, the stringency of existing standards for 10 products will be increased. Minimum energy-performance standards will then cover 80 percent of the energy used in homes and businesses.

Canada will put in place regulations for stand-by power in 2008, with more stringent standards to follow in 2010; we have also announced a commitment to set performance standards for all lighting that would phase out inefficient incandescent light bulbs in common applications by 2012.

In 2007, Canada announced a suite of complementary energy efficiency measures in support of the Clean Air Regulatory Agenda; the measures are intended to promote smarter energy use and energy-efficiency improvements in homes, small buildings and industries including:

- The \$220 million ecoENERGY Retrofit Program provides financial support and direct incentives to support homeowners, small- and medium-sized businesses, public institutions and industrial facilities to invest in energy efficiency retrofits.

Canada

- The \$60 million ecoENERGY for Buildings and Houses Program encourages the construction, operation and retrofit of more energy efficient houses and buildings through a range of complementary activities such as rating, labelling and training.
- The \$20 million ecoENERGY for Industry program encourages the accelerated uptake of energy-saving investments by Canadian industry by promoting the transfer of knowledge, new technologies and best practices.

The *Motor Vehicle Fuel Consumption Standards Act* provides the authority to set fuel consumption standards for light duty and motor vehicles. Canada has made a commitment to implement fuel consumption regulations for the 2011 model year that are benchmarked against a stringent North American standard.

The ecoTransport Strategy is a \$100 million investment to promote clean, sustainable transportation options. It is comprised of the following measures:

- The \$61 million ecoFREIGHT Program and the ecoENERGY for Fleets Program reduce the environmental and health effects of freight transportation through accelerated adoption of emissions-reducing technology, information-sharing, workshops, and training.
- The \$36 million ecoTECHNOLOGY for Vehicles Program and the ecoENERGY for Personal Vehicles Program provide funding for: testing and promoting environmentally friendly vehicle technologies; building partnerships with the automotive industry, and providing fuel consumption information and decision-making tools to encourage consumers to purchase fuel-efficient vehicles that are currently available in the market.
- The ecoMOBILITY Program will help municipalities reduce urban passenger transportation emissions by increasing transit ridership and the use of other sustainable transportation options.
- The ecoTECHNOLOGY for Vehicles Program involves purchasing and testing a range of advanced technologies and showcasing them at public events across Canada.

Canada's Federal Budget 2006 dedicated \$1.3 billion to public transit capital improvements through the Public Transit Fund and the Public Transit Capital Trust and offers individuals a non-refundable tax credit to help cover the cost of public transit passes.

Canada has also announced a Green Levy on fuel-inefficient vehicles and funding of \$36 million, to support measures to remove older, high-emitting vehicles from Canadian roads.

Canada's ecoAUTO Rebate Program encourages Canadians to buy fuel-efficient vehicles, up to an including model year 2008, by offering rebates towards the purchase of more fuel-efficient vehicles that meet the required criteria.

The *Survey of Household Energy Use* is a survey used to collect data on the energy consumption habits of households in Canada. The *Commercial and Institutional Building*

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Energy Use Survey provides detailed information on energy use in the commercial sector to assess progress against Canada's commitment to reduce greenhouse gas emissions.

The *Industrial Consumption of Energy Survey (ICE)* survey results track energy efficiency improvements and calculate carbon dioxide emissions. Industry also uses the information to monitor the results of their energy reduction efforts and to measure their contributions to Canada's climate change goals.

4. Diversifying Energy Mix

- Develop technologies and facilities for carbon capture and storage
- Reduce natural gas flaring
- Ensure the safety and security of civilian nuclear power facilities
- Provide for safe disposal of low-, medium-, and high-level nuclear waste.
- Establish a robust, competitive, and cost-effective renewable energy industry.
- Develop biofuels in a cost-effective and environmentally sustainable fashion.
- Enhance development and deployment of new energy technologies.
- Cooperate with other countries in R&D of new energy technologies.

Alternative, Cleaner, Lower-Carbon Energy

Canada supports the diversification of the world's energy sources to mitigate global energy security risks.

In 2007-08 Canada announced the following:

- \$240 million to the province of Saskatchewan to put in place a full-scale commercial demonstration of carbon capture and storage in the coal-fired electricity sector in that province.
- \$5 million which, along with complementary investment by the province of Nova Scotia, will support geological research examining the potential for carbon storage in the province.
- \$5 million in to the Institute for Sustainable Energy, Environment and Economy at the University of Calgary to work with a broad range of stakeholders on a number of regulatory, economic, and technological issues that need to be resolved to accelerate deployment of carbon capture and storage technologies.

In November 2007, Canada organized the 3rd workshop on Near Term Opportunities for Carbon Capture and Storage, in collaboration with the International Energy Agency and Carbon Sequestration Leadership Forum as part of the Gleneagles Plan of Action. The workshop produced recommendations that highlighted the importance of urgent and concerted international action, legal and regulatory issues, and raising public education and awareness of this technology.

In January 2008, the Canada–Alberta ecoENERGY Carbon Capture and Storage Task Force released a report, entitled *Canada's Fossil Energy Future: The Way Forward on*

Canada

Carbon Capture and Storage. The report provides advice on how governments and industry can work together to facilitate and support the development of carbon capture and storage opportunities in Canada.

Canada was recently elected Chair of the International Partnership for the Hydrogen Economy and continues to support hydrogen and fuel cell technologies.

Renewables

Canada supports renewable energy sources including wind, biomass and small hydro through:

- The \$1.5 billion ecoENERGY Renewable Initiative to boost Canada's use and supply of renewable thermal energy and renewable energy supplies and create up to 4,000 megawatts of new renewable energy generating capacity.
- The ecoENERGY for Renewables Initiative includes the ecoENERGY for Renewable Power program which offers incentives for the production of power from eligible low-impact renewable electricity projects and the ecoENERGY for Renewable Heat program which is designed to support the increased use of renewable thermal energy.

To help foster the adoption of renewable energy technologies, Canada is developing and sharing knowledge that allows the global community to make cleaner energy choices - Canada's RETScreen International Clean Energy Project Analysis Software is an analysis tool that allows project planners to evaluate the feasibility of renewable and energy efficiency projects in the early stages. The latest version of includes a full array of financially viable clean power, heating and cooling technologies, and energy efficiency measures and is freely available for download in 26 languages.

The Government of Canada has a 4-prong renewable fuels strategy to encourage the production and use of renewable fuels in Canada, which includes:

- Regulation of renewable content. In December 2006, Canada announced its intention to regulate a minimum 5 percent renewable content based on the gasoline pool by 2010 and 2 percent renewable content in diesel and heating oil by 2012.
- Encouraging a domestic renewable fuels industry. The \$1.48 billion ecoENERGY for Biofuels program, managed by Natural Resources Canada, provides an operating incentive to producers of renewable alternatives to gasoline and diesel.
- Providing opportunities to farmers in the bioproducts sector. The \$200 million ecoAGRICULTURE Biofuels Capital Initiative provides up to \$25 million towards the capital costs of each new facility based on the level of farmer ownership.
- Accelerating next-generation biofuels. Sustainable Development Technology Canada has launched \$500 million NextGen Fund to invest with the private sector for the establishment of large-scale facilities for the production of 'next-generation' renewable transportation fuels such as cellulosic ethanol.

Canada

In addition, \$20 million has been invested in a Biofuels Opportunities for Producers Initiative, which assists farmers to develop business plans and feasibility studies to expand biofuels production capacity. As well, Budget 2008 announced that \$3 million would be provided to Natural Resources Canada to improve the access of e85 fuels in Canada.

The \$200 million ecoAGRICULTURE Biofuels Capital Initiative, which provides up to \$25 million towards the capital costs of each new facility based on the level of farmer ownership, is assisting farmers in the agricultural bioproducts sector. Additionally, \$20 million has been invested in a biofuels Opportunities for Producers Initiative, which assists farmers to develop business plans and feasibility studies to expand biofuels production capacity.

The importance of sustainability of Canada's forests from environmental, economic, social, cultural and international perspectives has placed sustainable forest management high on Canada's foreign policy agenda.

The issue of illegal logging captures a significant number of high-level policy issues such as deforestation and resulting GHG emissions, governance and poverty. Canada continues to encourage strengthened regional and multilateral cooperation and sharing of best practices and to call for the negotiation of a legally binding agreement among like-minded countries prepared to promote sustainable forest management beyond voluntary actions and cooperation.

Canada continues to support existing processes to combat illegal logging, and remains engaged in supporting developing countries to achieve their self-commitments for halting forest loss and to implement sustainable forest management, as stated in various regional initiatives, i.e. the Congo Basin and the Asia Forest Partnerships, which will focus on areas such as illegal logging, governance and institutional capacity, and poverty alleviation.

The Strategic Plan for the Canadian Biomass Innovation Network (CBIN) has been developed to guide federal S&T investments in the areas of biomass supply for energy and industrial applications; the production of bio-energy, biofuels and bioproducts; and bioprocesses, including industrial biotechnology. The Strategic Plan outlines the energy-climate change challenge of meeting rising energy needs and GHG constraints. It describes the potential contributions that bio-based solutions could make to meet these opposing objectives while contributing to the economic well being of the country.

Innovative Energy Technologies

Under the \$230 million ecoENERGY Technology Initiative, Canada will invest in energy science and technology to fund the research, development and demonstration of clean energy technologies. Eight priority areas were identified to concentrate RD&D efforts and accelerate outcomes: 1) Clean fossil fuels focusing on the environmental aspects of oil sands development; 2) Clean coal and carbon capture and storage; 3) Distributed electricity generation from renewable energy and other clean energy sources, including grid management; 4) Next-generation nuclear energy technologies; 5) Bio-based energy

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systems; 6) Low-emission industrial systems; 7) Clean transportation systems; and 8) Built environment, focusing on the integration of renewable energy technologies into buildings and community systems.

Canada's 2008 Federal Budget announced \$250 million over five years to support strategic, large-scale research and development projects in the automotive sector to develop innovative, greener and more fuel-efficient vehicles.

Canada's 2007 Federal Budget expanded the existing Accelerated Capital Cost Allowance for Clean Energy Generation that will enhance the investment environment for renewable energy technologies by broadening the definition of already eligible technologies to include: active solar equipment, small photovoltaic and fixed-location fuel cell systems, biogas production equipment, pulp and paper waste fuels, biomass drying and other fuel upgrading equipment, and waste-fuelled thermal energy systems. The changes also add a new class of technologies: wave and tidal energy equipment.

Nuclear

In February 2008, Canada announced an additional \$300 million in 2008–09 to Atomic Energy of Canada Limited (AECL) for its operations, including the development of its next generation nuclear power reactor, the Advanced CANDU Reactor, and to maintain the safe, reliable operations of the Chalk River Laboratories.

In February, 2008 Canada announced \$20.2 million of funding to the Canadian Nuclear Safety Commission over three years from 2008-2009 to 2010-2011 to respond to pressures from fee-exempt licensees, such as hospitals and universities from whom the CNSC cannot recover costs.

In November 2007, Canada joined the Global Nuclear Energy Partnership (GNEP), an international partnership that promotes a safer, more secure and cleaner world through the responsible development of nuclear energy for peaceful purposes. The Reliable Nuclear Fuel Services Working Group of GNEP seeks to ensure reliable access to low enriched uranium for power reactor fuel and spent fuel recycling.

Canada also announced it will conduct a review of the Atomic Energy Canada Limited (a nuclear technology and services company that provides a range of services to utilities worldwide) to consider whether the existing structure is appropriate in a changing marketplace.

In June 2007, Canada announced its decision to accept the Nuclear Waste Management Organization's recommended approach of adaptive phased management (APM) for managing nuclear fuel waste over the long-term. This APM approach includes isolating and containing the spent fuel waste in a deep geological repository, with an option for temporary shallow-underground storage. This approach will ensure that spent fuel is monitored and retrievable.

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Canada and 12 other countries work together as the Generation IV International Forum to lay the groundwork for the fourth generation of nuclear energy systems.

5. Securing Critical Energy Infrastructure

- Inventory and upgrade critical energy infrastructure.
- Ensure long-term security of energy transportation routes and infrastructure.

Canada's national approach to critical energy infrastructure protection is two-fold: develop a National Strategy for Critical Infrastructure Protection and a flexible Action Plan to build on the themes of the Strategy: sustainable partnerships with all levels of government and the private sector; improved information sharing and protection, and a commitment to hazards risk management.

Canada and the U.S. are working collaboratively on security vulnerability assessments of critical cross-border energy infrastructure systems based on an all hazards approach which addresses both natural hazards and malicious attacks. Ensuring the integrity of the energy supply systems contributes to energy trade, employment and economic prosperity for both countries.

Canada has recently updated the *Emergency Management Act*; amendments will strengthen the governments readiness to respond to all types of major emergencies, and updates Canada's emergency management system for the 21st century.

6. Reducing Energy Poverty

- Support progress toward the UN Millennium Development Goals.
- Reduce energy poverty in developing countries.
- Enhance energy efficiency in low-income households.

Ensuring access to environmentally and economically sustainable energy services in order to reduce poverty in developing countries is an important part in achieving Canada's developmental objectives. Energy sector-related activities create an enabling environment for the development of environmentally and economically sustainable sector policies, ensure appropriate regulatory frameworks are based on transparency and fair competition, and provide access to sustainable energy services to the poor.

Canada makes an important contribution in support of the UN Millennium Development Goals, and toward reducing energy poverty, through annual assessed and voluntary contributions to International Financial Institutions such as the World Bank Group, International Monetary Fund, and the Asian Development Bank and Fund, which go, in part, to supporting important new energy poverty related initiatives such as the activities

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flowing from the World Bank's Clean Energy for Development Investment Framework and the Inter-American Development Bank's Sustainable Energy and Climate Change Initiative.

Through the Canadian International Development Agency (CIDA), Canada has supported the energy sector throughout the Americas, Asia, Africa and Eastern Europe over the last 35 years, with support now exceeding \$1 billion. The emphasis of current programming is on enhancing the regulatory environment in which the power industry operates, increasing the role of the private sector (and its capital), and encouraging more equitable distribution of the benefits from the industry. CIDA also works to promote the participation of indigenous and local communities in energy development initiatives.

7. Addressing Climate Change and Sustainable Development

- Reduce GHG emissions domestically and measure GHG emissions reductions achieved.
- Establish a carbon price signal in the economy as a whole or in major energy sectors
- Limit emissions via international efforts and mechanisms such as CDM and JI.
- Complete a high-quality GHG inventory and GHG emissions reduction plan.
- Develop a broad strategy that combines energy and climate objectives.

Since 2007, Canada has been pursuing an integrated strategy to address climate change and air pollution through its Clean Air Agenda. The centrepiece of this approach is mandatory national regulation of greenhouse gas (GHG) and air pollutant emissions from major sources – industry, transportation, and consumer and commercial products.

The *Regulatory Framework for Greenhouse Gas Emissions* established emission-intensity targets for greenhouse gas emissions (GHGs). Existing facilities have a target of an 18 percent reduction in emissions intensity from 2006 levels by 2010, with an annual intensity improvement of 2 percent required thereafter. New facilities are provided a three year grace period. Initial targets will be based on emissions intensities achievable through the use of cleaner fuels, with an annual intensity improvement of 2 percent required thereafter.

The *Regulatory Framework for Greenhouse Gas Emissions* also established national caps on emissions of nitrogen oxides, sulphur oxides, volatile organic compounds, and particulate matter to help protect human health and Canada's environment. Canada's plan to regulate both greenhouse gas emissions and air pollutants from industrial emitters will pave the way for a cleaner, healthier environment. The Regulatory Framework will contribute to the Government's goal of an absolute reduction of 20 percent in greenhouse gas emissions by 2020 (from 2006 levels) and impose targets on industry so that air pollution from industry is cut in half by 2015. These regulations will change how Canada produces and uses energy, and will impose a price on carbon that will rise over time and

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impact the entire economy. As such it will provide important new incentives for innovation and new opportunities to develop Canadian green technologies. New oil sands plants starting operations in 2012 will have to implement carbon capture and storage, and the construction of new dirty coal plants starting in 2012 will be banned.

In February, 2008 Canada announced \$66 million over two years to set up key features of the regulatory regime for industrial air emissions, including an electronic tracking system for units traded in the carbon market, a single-window reporting system for industry, an industry-supported technology fund to invest in emission reduction projects, an offset system to finance emission reduction projects in non-regulated sectors, and better modeling of air quality.

Under the United Nations Framework Convention on Climate Change (UNFCCC), countries recently agreed to launch negotiations on a post-2012 agreement for climate change. Canada is committed to working constructively to 2009 with other countries to develop this agreement.

Canada joined the Asia-Pacific Partnership on Clean Development and Climate in October 2007. By joining the partnership, Canada is contributing to a public private partnership that focuses on deploying clean technologies to address climate change and clean development. Canada is also a member of several international technology partnership including the Carbon Sequestration Leadership Forum, Methane to Markets, the International Partnership for the Hydrogen Economy, and the Renewable Energy and Energy Efficiency Partnership, as well as the International Energy Agency's Climate Technology Initiative.

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ST. PETERSBURG MATRIX GUIDANCE

The major priorities of French policy were defined by the programme act outlining energy policy, promulgated on 13 July 2005, which defines the guidelines for French energy policy for the coming years, in particular with regard to the objectives of energy independence, security of supply, protection of human health and the environment and control of the greenhouse effect, competitive energy pricing and social and territorial cohesion through access to energy for all.

I. Increasing Transparency, Predictability and Stability of Global Energy Markets

With respect to networked industries (natural gas and electricity), governments should work to make information about energy flows transparent and open to all market participants. Predictability of regulatory regimes is also a critical component. Governments can help ensure predictability by establishing regulators that are independent from government, and thus cannot be directly influenced by changing political circumstances. Such institutions should be given a clear mandate to establish and maintain a level playing field among energy market participants.

Please detail policies and measures to:

Provide more and better sector-specific and fuel-specific energy data to the public.

France, wishing to improve transparency of gas flows, gas storage and internal demand, ensures that daily data are available (weekly for stocks) on the websites of the operators. It also advocates the introduction of a similar system at European level, with weekly publication of European oil stocks.

Enhance the transparency of energy market transactions and network flows.

Electricity

Electricity production is now a competitive business carried on under ministerial authorisation. Tendering procedures can be organised within the framework defined by the programming of electricity production investment (refer to PPI below). This organisation ensures security of supply and the development of renewable energies and cogeneration, sectors which benefit from a mandatory purchase scheme. Electricity trading takes place within the framework of a declaration system. A system of regulated access to the transmission systems with rates set according to proposals by the CRE (Commission de régulation de l'énergie - Energy regulation commission) has been adopted in order to provide transparency and effective competition. This situation is backed by the implementation of provisions concerning the separation of regulated activities and competitive activities: for example, the transmission business is carried on by RTE EDF-Transport, legally separate from EDF. RTE EDF-Transport operates and

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maintains the public electricity transmission system; it is responsible for system development to allow connection and access by users (producers, distribution systems, consumers) and interconnection with other systems.

Gas

Since 2002 the liberalisation of the gas sector has developed jointly with that of the electricity sector. Directive 98/30/EC lays down the conditions of opening of national gas markets, defining the eligibility criteria and the authorised opening thresholds. Directives 2003/54/EC and 2003/55/EC of 26 June 2003 concerning common rules for the internal markets in electricity and gas laid down the deadlines for full market opening to non-household customers (1 July 2004) and for all customers (1 July 2007).

The acts of 3 January 2003 and 9 August 2004 transpose these directives into French law. EDF and GDF become corporations with more than 70% of their capital held by the state.

In its annual report the CRE notes that, since 1 July 2004, 70% of the national market has been opened to competition, representing 675,000 sites with an annual consumption of 380 TWh. In the retail market, as of 1 April 2006 9% of eligible sites, i.e. 63,900 sites, purchased their gas at market prices. 45,500 sites have signed contracts at market prices with their previous suppliers. Dominated to a large extent by Gaz de France, most of whose supplies are based on long-term contracts signed with the national companies of the producer countries, the wholesale market is seeing new suppliers take a growing share of imports.

Ensure independent regulation and clearly defined energy market conditions

With regard to regulation, along with the minister for energy, responsible for definition of electricity policy and public service needs, the CRE (Commission de régulation de l'énergie) is an independent specialised regulatory authority. Through its powers regarding system access, it is responsible for ensuring proper competitive operation of the electricity market. The energy sector bill, finally voted by Parliament on 8 November 2006, aligned the powers of the CRE in the area of natural gas with those that it has in the area of electricity, and the CRE's role in monitoring the operation of the markets has increased.

Implement Energy Charter principles related to energy transit across borders.

France complies with European regulations, which incorporate the principles of the Energy Charter.

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Meet obligations of the IEA's International Energy Programme (IEP) (if applicable).

Put in place emergency plans to deal with domestic energy supply disruptions.

Emergency plans for oil have been in place for a number of years.

Emergency plans for gas were put in place by France in 2006 in accordance with directive 2004/67/EC on the security of natural gas supply.

Reduce corruption in energy market transactions and dealings.

France is particularly vigilant with regard to compliance with competition rules in the energy sector, which is also of course subject to all the provisions of ordinary law against illegal activities.

Enhance the security of oil and natural gas supplies.

France has well-diversified supplies of hydrocarbons. 27% of its oil comes from the Middle East, 26% from the North Sea (of which 19% from Norway), 12% from Russia and 10% from Kazakhstan.

Norway supplies 23% of France's gas, the Netherlands 16%, Russia 20% and Algeria 16%.

Most of the supplies from these major suppliers are covered by long-term contracts (91% of French imports), ensuring that this diversification will last in the long term. Under the effect of the opening of the European gas market, which was completed on 1 July 2007, market contracts have started to develop (8% of French gas imports).

In addition, liquefied natural gas (LNG) accounts for 27% of France's total gas imports, a level similar to the world average. The construction of new gas infrastructures such as the Fos Cavaou methane terminal should allow access to additional sources of supply.

Beyond this, the economic and financial soundness of the operators provides an assurance that French supply security is maintained, particularly regarding natural gas. It is also an important factor in our energy independence.

Finally, it enables the financing of the expenditure on the construction and maintenance of gas distribution systems in France and the discovery of new fields.

II. Improving the Investment Climate in the Energy Sector

There are many components to improving the investment climate for energy infrastructure and the energy supply chain. As discussed, stable and transparent

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regulatory regimes are critical. In addition, all undue barriers to investment in countries should be removed. In consumer countries, an area of focus should be developing policies to streamline new infrastructure development, such as through enhanced siting procedures that integrate all the relevant planning agencies. With respect to energy supply, energy security can be enhanced with energy diversity, so efforts should be undertaken to attract investment across all technologies, including renewables. Energy markets require large capital investments, which in some cases may require larger market areas for such investments to be attractive. To that end, governments should work to integrate their energy markets with those of neighbouring countries, harmonise market rules and regulations across borders, implement more market-based means of managing cross-border flows, and generally strive to liberalise energy markets. Well-developed liberalised markets also foster the development of trading and contract arrangements, which provide liquidity and enhance security. As discussed previously, high-quality forecasts are also critical, so governments should regularly release and update supply-demand forecasts and identify where investment is needed. Finally, efforts should be undertaken to ensure the long-term availability of a skilled workforce.

Please detail policies and measures to:

Promote investment in energy infrastructure and streamline infrastructure siting

There are constraints on investments in energy at all stages of supply (production, transmission, distribution). The long implementation times of the various infrastructures necessitate decisions a very long time before their commissioning dates. These characteristics have made it essential to conduct medium-term electricity flow (demand, supply) forecasting exercises associated with two instruments, one for electricity and the other for gas.

Electricity

PPI (Programmation Pluriannuelle des Investissements – multiyear investment programme): the principal objective of the PPI is to identify investments needed in generation facilities with regard to security of electricity supply. Within the framework of French energy policy, the PPI defines the development objectives for electricity generation facilities located in France in terms of breakdown of generation capacities by primary energy source and of generation techniques implemented. The PPI also considers the particular situation of certain geographical areas.

The PPI is based in part on the preliminary assessment of the balance between electricity supply and demand. The sole purpose of this assessment is security of electricity supply, and it plays a warning role. The scope of the PPI is broader than that of the preliminary assessment because, applying the national energy policy in the area of electricity, it also incorporates economic and environmental aspects. It provides an overview for the public authorities of the future of the generation stage of the electricity sector. It gives the government the possibility of intervention if necessary in the development of electricity

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generation facilities, and is thus the reference document for French energy policy in the electricity sector.

Gas

PIP (Plan Indicatif Pluriannuel des investissements – multiyear guideline investment plan): article 18 of the act of 3 January 2003 stipulates that a report be submitted to Parliament describing the forecast trend of demand for natural gas, its geographical breakdown, the adequacy of the gas infrastructure (underground storage facilities, methane terminals, pipelines, interconnection installations) and the forecast 10-year trend of the contribution of long-term supply contracts for the French market.

It is a forward-looking document (present period covered: 2006-2015) containing: a gas demand growth forecast; a description of the principal gas infrastructure investments decided; an analysis of the balance between natural gas supply capacities and national needs; a set of recommendations on the instruments available to the state for ensuring the long-term security of national supply and on the investments themselves.

Its main purpose is to contribute to shared knowledge of the determinants of demand for natural gas and the prospects for development of gas infrastructures.

Unlike the electricity PPI, the PIP does not lead to a mandatory programme of investments. Investment decisions in the gas sector are taken by the operators, although the public authorities have several levers for supporting the development of new infrastructures essential for the security of national supply.

We would like at least the “situation and investment scenario” part of the PPI/PIP to be extended to European level.

Ensure a level playing field for all competitors in the oil, gas, coal and power sectors

In accordance with European legislation, the market in these sectors is fully liberalised in France. In particular, the act of 7 December 2006 has completely opened the sale of gas and electricity to competition, enabling domestic customers to choose their supplier from 1 July 2007. Furthermore, for the largest grids, electricity and gas must now be distributed by undertakings legally separate from undertakings operating in competitive markets. Customer protection mechanisms have also been introduced, covering for example formal pre-contract proposals and energy bills. A national energy mediator has also been established, and the powers of the CRE (Commission de régulation de l'énergie - energy regulation commission) have been upgraded and strengthened.

Expand trade and better integrate energy markets with neighbouring countries

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The French energy market is integrated into the European single market.

Provide regular forecasts to the public on which to base investment decisions

In addition to the PIP and PPI, which give 10-year projections (see above), the Observatoire de l'énergie (energy monitoring unit) prepares and publishes scenarios (in 2003 and at the beginning of 2008) on long-term energy prospects (up to 2030 in the 2008 edition) giving forecasts of demand and forecasts of energy production infrastructures.

Educate and train skilled energy personnel to meet long term labor requirements

France ensures that personnel working in these strategic areas maintain a high level of skills, for example through continuing training of public-sector personnel and implementation of training plans by energy-sector undertakings/operators.

Drive cost-effective investment in renewable and alternative energy sources

The development of renewable electrical energy has been supported by the system of mandatory purchase of the generated electricity at regulated rates and by the mechanism of compensation for public service electricity costs (CSPE).

France continues in this way to further diversify its energy mix, increasing the share of renewable energies and optimising its hydroelectric potential.

The “Grenelle act” on environmental measures, currently in preparation and which should be voted in the near future, will also include provisions to this end.

Facilitate energy efficiency investment in buildings, industry and transport

Residential and service sectors

The state regularly tightens the minimum overall energy performance requirements for new buildings within the framework of the thermal regulations, with a target of 40% improvement by 2020. It also encourages the construction of a significant proportion of dwellings in which more energy is produced than consumed.

A special effort is being made to improve the energy efficiency of old buildings in order to reduce carbon dioxide emissions by 75% before 2050; for such buildings the requirements change in parallel with the thermal regulations for new-build. For publicly-

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owned property, partnerships with the private sector enable promotion of energy-saving measures and renewable energy development measures by the state and the local authorities.

Instruments: energy performance assessments for new and existing buildings, the 2005 thermal regulations for new construction, the high energy performance label for new construction, the decree on energy performance requirements for materials used in renovation of existing buildings, tax incentives (a particularly substantial tax credit), reduced VAT rate to encourage district heating systems, national research programme (PREBAT).

Transport

The state is taking measures to reduce all polluting vehicle emissions and to impose an urban organisation limiting journeys by encouraging European agreements with the industrial companies concerned, the adoption of a European Community regulation limiting consumption relating to the use of ancillary equipment, the marketing of vehicles with the lowest energy consumption (consumer information, tax credit), improvement of driving behaviour, definition by local authorities of urban planning policies encouraging the development of urban public transport, continued expansion of the high-speed train network, reduction of aircraft greenhouse gas emissions within an international framework, etc. All the protagonists are involved (EU, state, local authorities, businesses, consumers).

Instruments: a compulsory label for private car fuel consumption and CO₂ emissions, introduction of the tax surcharge on private cars with emissions exceeding 200 g CO₂/km, reform of the tax on company cars according to CO₂ emissions, tax credit for clean vehicles, national research programme (PREDIT).

Industry

The largest emitters are subject to the European directive on emission permits. The state is supporting continued efforts to improve the energy efficiency of “utilities” (electric motors, compressed air, ventilation) through incentives and standardisation work. There are regulations on minimum boiler efficiencies and periodic checks on combustion installations.

Within the EC framework, France is proposing a regulation on maximum standby consumption limits for electrical appliances.

III. Enhancing Energy Efficiency and Energy Saving

G8 countries have made specific commitments with respect to energy efficiency on appliances, lighting, buildings, transport, industry, and across sectors. Meeting

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these commitments will enhance energy security in one of the least costly ways possible.

The first priority of the energy policy is to manage energy demand in order to increase the annual rate of reduction of final energy intensity to 2% in 2015 and 2.5% by 2030, as stipulated in the act of 13 July 2005.

Please detail policies and measures to:

Implement the 16 energy efficiency measures that the G8 have specified for appliances, lighting, buildings, transport, industry, and across sectors.

Refer to the table communicated to the Japanese presidency in April 2008.

Ensure cost-reflective pricing to drive cost-effective energy efficiency steps

Energy prices are set within the framework of the liberalised energy market described in I-.

Promote demand-side measures in the electric power sector.

With regard to demand, a number of energy management measures are implemented; they cover all energies and are implemented by bodies including the ADEME (see below).

Encourage public and private financing for energy efficiency improvements.

The energy saving certificate scheme was introduced by the programme act of 13 July 2005. This innovative energy management instrument, complementing the existing instruments including public tax credits, aims to exploit the substantial but diffuse sources of energy savings in residential and service-sector buildings. The energy saving certificates give rise to the establishment of a market mechanism with:

- a demand, by imposing on energy sellers an obligation proportional to their share of sales in the residential-services sector and subject to a penalty in the case of non-compliance;
- a supply, by allocation of certificates rewarding actions undertaken to obtain energy savings. These certificates are tradeable and can be allocated to energy sellers, but also to all the other protagonists under certain conditions, including to public institutions.

Develop efficiency standards and labels for buildings, appliances and equipment.

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To improve its security of supply, and given its limited energy resources, following the first oil crisis France decided to take action on energy demand by developing affirmative measures in favour of energy savings. Improved energy efficiency has since been one of the priorities of French energy policy, including in the areas mentioned in the question.

To attain this objective, France is using all the instruments available to it: promotion/awareness-raising actions conducted in particular by the ADEME (french environment and energy management agency) (advertising to encourage energy savings), tax incentives (tax credits), public aid (the sustainable development savings account introduced on 1 January 2007, state and local authority aid schemes in partnership with the ADEME, which had a budget for this work of €137m in 2007), public-sector action (measures intended to make public services exemplary with regard to energy efficiency – circular of 28 September 2005, national action plan for sustainable purchasing, guides for public-sector buyers, awareness-raising campaigns organised by the ADEME), research and innovation (the 2005 act places strong emphasis on these two aspects, with the establishment of two complementary agencies, the ANR (national research agency) and the AII (industrial innovation agency)) and, of course, standards and regulations. Regarding the latter, French policy is substantially aligned with the European framework, which comprises the measures outlined below.

Product energy labelling

There have been European regulations on appliance energy efficiency since 1995, with the framework directive on labelling paving the way for several implementing directives concerning refrigeration appliances, washing machines, tumble dryers, dishwashers, lamps, ovens and air conditioners. These regulations have produced results, to such an extent that the labelling of refrigeration appliances has had to be revised by adding additional classes (A+ and A++), as the majority of products were placed in classes A and B while the higher energy consumption classes were empty.

Other labelling systems have been introduced: for cars (display of fuel consumption and CO₂ emissions) and for buildings (energy performance assessment). The directive on building energy performance makes this information compulsory for sale or rental transactions. France is very much in favour of the labelling system and has incorporated it into its guideline act on energy.

Regarding office equipment, in 2006 the EU signed a five-year renewal of the agreement with the United States to participate in the Energy Star specifications. This renewal comes after a satisfactory first period insofar as the EU (through the Commission acting on the opinion of the Energy Star board on which the member states and the trade associations are represented) participated effectively in the definition of specifications. For such products (world markets, existing label) it was difficult to justify the application of a European label.

The 2005 directive on eco-design of energy-using products should allow this path to be pursued effectively and rapidly through committee work.

France

Good practices

Regarding good practices, the voluntary European GreenLight programme should be mentioned. Launched in 2000, it aims to encourage public- and private-sector non-residential electricity consumers, listed as partners (26 in 2006, representative of the programme application sectors: municipalities, industries, shops, offices, healthcare), to give undertakings to the Commission on the installation of energy-efficient lighting technologies in facilities under certain conditions:

- in existing spaces: improve lighting quality in existing spaces and reduce consumption;
- in new spaces: install the lighting system providing the best possible performance;
- in all cases: a return on investment in less than five years.

Lighting is an important consumer of electricity in France: a study conducted by the ADEME shows that lighting accounts for 10% of French consumption but offers high potential energy savings, which explains its interest for energy saving certificates (see above), operational since July 2006: of the first 70 applications defined by the order of 19 June 2006, 14 concern lighting systems (20% of the proposed actions). Moreover, there is strong demand by the manufacturers in this sector for a European regulation on energy performance.

Provide energy efficiency audits to homes, offices, and industrial firms.

See above.

Raise public awareness of energy efficiency opportunities.

Information campaigns such as those conducted by the ADEME have given positive results on different targets: professional training, public information, information for schools, etc.

Improve end-use data and track progress towards energy efficiency goals.

France is obviously closely monitoring data on developments in energy efficiency at national level. The trend shows a continuous reduction of overall energy intensity since the 1970s which is accelerating: - 0.9% for 1982-1995 and - 1.4% for 1995-2005.

IV. Diversifying Energy Mix

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Ensuring a diverse array of energy technologies requires continued government commitment and the development of appropriate policies. The key to achieving energy diversity is to have a set of policies that provide the right incentives to energy markets. With respect to the nuclear industry, it is critical that there is sufficient transparency about nuclear safety and waste disposal, in order to secure public support. Public support is paramount for companies to invest in the technology. R&D also plays a critical role in ensuring long-term supply diversity, and here there is a very big role for government to play, particularly with respect to ensuring the deployment of near-market technologies.

Please detail policies and measures to:

Develop technologies and facilities for carbon capture and storage

In France as in several other European Union countries, the government supports R&D on capture and geological storage of carbon dioxide. In addition to the development of a more competitive carbon dioxide capture technology, the major challenge is undoubtedly the mastery of long-term underground storage and social acceptance of such storage facilities.

This is one of the major priorities of recent contracts of objectives signed by the French state with IFP (French oil institute) and BRGM (geology and mining research bureau). It is also one of the priorities of the R&D programmes combining the public and private sectors and funded by the ADEME or by the ANR.

The French operator Total is preparing a pilot project for CO₂ capture, transport and storage in south-western France (Lacq) which should start up soon. This should be one of the very first truly integrated pilot plants, including CO₂ capture from a boiler and injection into an old onshore gas field.

Reduce natural gas flaring

Not applicable.

Ensure the safety and security of civilian nuclear power facilities

The use of nuclear energy is a success of the energy policy pursued in France for 30 years, is a response to the rareness of our fossil energy resources, enables our country to have one of the lowest levels of CO₂ emissions in Europe and is also an industrial success, with in particular AREVA, which masters the entire nuclear fuel cycle, and EDF, whose competence in nuclear engineering and power plant operation is recognised worldwide.

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Nevertheless, France recognises that there are risks associated with nuclear energy, including with regard to the processing of radioactive waste and the safety of installations, which have to be taken into account in a strict regulatory framework. It has therefore consolidated its legal framework for the nuclear industry with the passing of the act of 28 June 2006 on the sustainable management of radioactive materials and waste and the act of 13 June 2006 on nuclear transparency and safety.

It should also be noted that France has undertaken the development of future reactors through research on fourth-generation reactors and, in the longer term, the ITER project.

Lastly, observing the very strong interest in nuclear energy shown by many states around the world, France is ready to examine cooperation actions with those that so wish in order to help them develop a nuclear electricity generation programme, subject to signature of the IAEA international conventions and, more generally, to compliance with the strictest standards regarding nuclear safety and security, non-proliferation and preservation of the environment for future generations.

Provide for safe disposal of low-, medium-, and high-level nuclear waste.

FRENCH POLICY ON RADIOACTIVE WASTE MANAGEMENT

The framework of French policy on radioactive waste management is defined by the programme act of 28 June 2006 on the sustainable management of radioactive materials and waste, succeeding the act of 30 December 1991.

French policy on radioactive waste management is organised in three stages:

- reduction of the quantity and harmfulness of the waste, for example by processing and packaging;
- interim storage of radioactive materials pending processing and of ultimate radioactive waste pending disposal;
- choice of reversible deep geological disposal for ultimate radioactive waste which cannot be disposed of on the surface or at shallow depth for reasons of nuclear safety or radiation protection.

This management policy is described in detail in the national radioactive materials and waste management plan (PNGMDR), submitted by the government to Parliament in March 2007, which is organised in three pillars described below.

1) Research and development

It is essential to ensure that the necessary research work is done for ultimate management of waste. That is why the PNGMDR details the three research priorities defined by the act of 28 June 2006 for long-lived medium- and high-level waste:

- separation and transmutation of long-lived radioactive elements;
- reversible deep geological disposal of waste;
- interim storage.

A national assessment board is tasked with producing an annual assessment of the state of progress of research and studies on the management of radioactive materials and waste.

2) Transparency and democracy

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The second pillar consists in ensuring democratic dialogue at all levels:

- at local level, and continuously, through the setting-up of local information committees associated with processing and disposal facilities, as is also the case for any basic nuclear installation;

- with the general public: the PNGMDR, itself based on the publication of the national inventory of radioactive materials and waste, is an essential element of transparency. France also holds national public debates. Such a debate was organised prior to the act of 28 June 2006, and another will have to be organised before the inquiry into the opening of deep geological storage facilities stipulated by the act;

on the basis of the constituent elements of democracy in France, through the preponderant role played by Parliament in this area. With regard to the process of authorisation of a future deep geological disposal facility, the act of 28 June 2006 stipulated two parliamentary milestones, the first in 2015 to define the reversibility conditions before a decree can authorise the facility, and the second in the longer term to authorise the final closure of the disposal facility.

3) Financing

Given the long-term issues raised by radioactive waste management, the public authorities have wanted to secure the financing of research and the financing of the management itself.

Research on deep disposal is financed by an additional tax supplementing the tax on basic nuclear installations, applied to waste producers on the “polluter pays” principle. Research on separation/transmutation is financed through grants to the CEA.

The system chosen by France to finance the decommissioning of basic nuclear installations (BNI) and the management of the radioactive waste produced by BNIs is based, in application of the polluter-pays principle, on full financial liability of the industry protagonists, which is thus not a burden on the investments by the state. The mechanism for securing this expenditure is based on the elements outlined below.

BNI operators must estimate the cost of decommissioning their installations and managing the spent fuel and the radioactive waste that they produce, calculate the related provisions conservatively, and finally establish assets allocated exclusively to the coverage of these provisions. This enables sufficient resources to be available when an installation reaches the end of its working life to finance decommissioning and the management of the radioactive waste produced by the installation.

State monitoring is stipulated, associated with powers of prescription and sanction including seizure of funds. This monitoring is based on reports which the operators must submit every three years describing their implementation of this mechanism.

Lastly, a second-level audit body, the CNEF (national financial assessment commission), has been established, reporting to Parliament.

OUTLINE OF FRENCH NUCLEAR SAFETY POLICY

To ensure the safety of French civil nuclear installations, France has set up an organisation described in the act of 13 June 2006 on nuclear transparency and safety. This act defines nuclear safety as all the technical provisions and organisational measures relating to the design, construction, functioning, shutdown and decommissioning of basic nuclear installations and to the transport of radioactive substances aimed at preventing nuclear accidents or mitigating their effects.

France

The act defines the obligations of nuclear installation operators, in particular regarding information and the financing of preventive measures.

It confirms the application of the “polluter pays” principle and the principle of precaution. It lays down the principle according to which the operator of a basic nuclear installation is responsible for the nuclear safety of its installation, and it stipulates that the entities responsible for activities with a risk of exposure of persons to ionising radiation bear the cost of preventive measures, including analyses and measures to reduce risks and effluent discharges.

The 2006 act establishes an independent nuclear safety authority tasked with monitoring compliance with the rules on nuclear safety and radiation protection and with contributing to informing the public on these topics. This authority draws up an annual report which is submitted to Parliament. It organises a continuous watch on radiation protection on French territory. The nuclear safety authority (ASN) participates in the exercise of the regulatory power of the government with regard to the construction, shutdown and decommissioning of basic nuclear installations by issuing opinions which are rendered public. It defines the requirements for the design, construction and operation of the installation that it considers necessary and is tasked with monitoring throughout the lifetime of the installation.

ASN authorises the commissioning of the installation. In the event of serious and imminent risks, it has the power to suspend operation of the installation temporarily as a precautionary measure. In such cases it must inform the ministers responsible for nuclear safety without delay.

With regard to informing the public, the act lays down the principle of state responsibility for informing the public about the procedures and results of the monitoring of nuclear safety and radiation protection. It stipulates that any person has the right to obtain information from the operator of a nuclear installation on the risks related to exposure to ionising radiation that might result from the operation of the installation and on the nuclear safety and radiation protection measures taken to prevent or reduce such risks or exposures.

The act stipulates the establishment of a local information committee for each site on which one or more basic nuclear installations is located; this committee has a general task of monitoring, information and consultation on nuclear safety, radiation protection and the impact of nuclear activities on persons and the environment involving the installations of the site. These committees consist of national and local elected representatives and representatives of associations (environmental protection, trade unions, etc.). Lastly, a parliamentary high committee for transparency and information on nuclear safety is established, which can issue opinions and demand expert assessments.

OUTLINE OF FRENCH NUCLEAR SECURITY POLICY

The French act requires prior authorisation of physical or legal persons carrying on activities concerning the importation, exportation, production, holding, use, transfer and transport of nuclear materials. It defines their responsibilities and requires them to comply with provisions intended to provide physical protection, tracking and accounting of such materials and introduces an inspection mechanism to monitor the application of these provisions. Lastly, it defines certain serious acts as criminal offences, including wrongful appropriation of nuclear materials and obstruction of inspections.

France

National monitoring is organised in such a way that the aspects relating to physical protection, tracking, accounting and inspection complement each other and form a coherent whole. Its objective is to prevent theft or diversion of nuclear materials held in the installations or during transport, with a view to internal security (prevention of nuclear terrorism) and compliance with international undertakings on non-proliferation given by France. Given its objective of prevention, it also participates in the control of illegal trafficking of nuclear materials. It should be noted that national monitoring does not deal with radiation protection nor with the nuclear safety of nuclear installations.

Since 1981, in application of the act of 25 July 1980, which itself implements the IAEA convention on the physical protection of nuclear materials ratified by France in 1987, the drafting of texts relating to the protection and monitoring of nuclear materials, verification of their proper application and a number of related operational tasks have been conferred upon the ministry with responsibility for industry.

As the global threat has changed over time, from the risk of diversion for proliferation to the risk of terrorism, the ministry with responsibility for industry has extended its action to the monitoring of the protection of installations against the risks of criminal or terrorist attack.

Furthermore, the French defence code (article L1332 and following, formerly order 58-1371 of 29 December 1958, reinforcing the protection of installations of vital importance) stipulates that businesses operating establishments or using installations and structures, unavailability of which would risk substantial diminution of the military or economic potential, the security or the survival of the nation, are required to cooperate at their own expense in the protection of the said establishments, installations and structures against any attempted sabotage. These obligations can be extended to establishments the destruction of which or the failure of certain of their installations might cause a serious danger to the population.

Special case of transport of nuclear materials

Transport is potentially the most vulnerable activity with respect to the security of nuclear materials. Depending on the category of nuclear materials it is planned to transport (from category I, the most sensitive, to category III via irradiated fuel) and the type of transport considered (road, rail, sea or air), different means are used to secure transport.

Each operator wishing to carry on an activity of transport of nuclear materials must have prior authorisation and submit an application to this end. After examination of the quality of the application and an opinion from the ministry of the interior, the ministry with responsibility for industry delivers these authorisations. As stipulated by the regulations, the ministry uses the EOT (Echelon Opérationnel des Transports – transport operations squad) of the IRSN (Institut de Radioprotection et de Sûreté Nucléaire – institute for radiation protection and nuclear safety) to manage and track all transport of nuclear materials.

Before undertaking a transport operation, an authorised carrier gives notice to the EOT or, for international transport, submits a special authorisation request to it. For international transport of categories I, II and II irradiated, the ministry with responsibility for industry delivers the special authorisation; for the other cases the EOT is delegated by the ministry to deliver the authorisations.

France

For all categories of transport, the monitoring of the nuclear materials must be active and continuous and remains the responsibility of the carrier. Category I and II non-irradiated nuclear materials are transported in approved secure containers carried in special vehicles also fitted with safety devices and approved by the ministry. They are subject to continuous remote monitoring by the EOT and are escorted by the French Gendarmerie. All means of transport are inspected every year by EOT inspectors acting by ministerial order. In addition, any stops during road transport must be made at establishments approved by the ministry. Road vehicles for the transport of irradiated fuel are also approved by the ministry and subject to regular checks by the EOT (at least one-third of the fleet is inspected each year).

These transport operations (about 1500 per year) are subject to unannounced random inspections by nuclear materials inspectors acting by ministerial order.

Establish a robust, competitive, and cost-effective renewable energy industry.

The outline energy act defines the objective for France of producing 21% of its electricity from renewable energies and increasing heat production from renewable resources by 50% by the end of 2010, and installing 200,000 solar water heaters and 50,000 solar photovoltaic roof systems per year in 2010; it sets biofuel development targets of 5.75%_{NCV} (percentage energy content) in 2008 and 7%_{NCV} in 2010. A guideline target of 10%_{NCV} is defined for 2015.

The outline energy act also provides for preserving and optimising French hydroelectric potential by favouring use of the minimum flow rates left downstream of dams to drive turbines, by improving the productivity of the present plants and by encouraging the construction of new plants. New energy sources, including wind and biomass, will be developed by the dual mechanism of rates and mandatory purchase on one hand and tendering procedures on the other.

Taken together, these measures made France the second producer of renewable energy in Europe in absolute terms in 2006.

Develop biofuels in a cost-effective and environmentally sustainable fashion.

A biofuels plan has been implemented to attain the target of 7%_{NCV} in 2010 mentioned above; it is based on the use of two incentive instruments:

- the fiscal system of partial exemption from the TIPP (domestic tax on petroleum products), which compensates the extra production cost of biofuels compared with fuel from fossil sources. This tax exemption is granted to biofuels produced by units which have been approved following European tendering. These amounts are adjusted each year in the budget act to take account of changing economic conditions.

- to encourage the incorporation of biofuels into diesel fuel and petrol, since the budget act for 2005 (article 32) the operators (refiners, supermarkets and independent

France

service stations) which market fuels containing a lower proportion of biofuel than the stipulated level of incorporation must make an additional payment of the TGAP (general tax on polluting activities). Its rate is reduced by the share of biofuels marketed in % NCV, for premium grade petrol on one hand and diesel fuel on the other. The amount of this tax is a very strong incentive.

A new fuel type (Superéthanol – E85) with high biofuel content, intended for flex-fuel vehicles, has been introduced with effect from 1 January 2007, enabling customers to choose between a fossil fuel or an almost pure biofuel by the end of the decade.

On 13 November 2006, a charter formalising the undertakings of all the partners alongside the prime minister (local authorities, vehicle manufacturers, farmers, oil companies and fuel distributors) was signed. All the conditions have been established to enable the sale of E85 throughout France for professional and private customers from 1 January 2007. For example, E85 benefits from an attractive tax rate of €28.33/hl in 2008. In addition, to facilitate and accelerate the uptake of E85, favourable fiscal measures have been adopted taking account of the interest in terms of the environment and energy independence: granting of an exceptional facility for depreciation over 12 months, reduction of the tax on company vehicles for eight quarters, and 50% exemption from the additional tax on registration certificates.

The government's "Plan Terre-Energie" (Earth-energy plan) should save at least 3 million tons of oil equivalent of imports in 2010 thanks to the contribution of biofuels.

France is also advocating at European and international level the establishment of sustainability criteria for the use of biofuels.

Enhance development and deployment of new energy technologies.

France has decided to keep the nuclear option open, with the publication in April 2007 of the decree authorising the construction of the EPR third-generation reactor, and to further diversify its energy mix, in particular by increased development of renewable energies, including for electricity.

In general, over the last few years France has developed an unprecedented policy of support and guidance for research and technologies in the area of sustainable energy. A public programme of support for new energy technologies is being managed jointly by the ministries of research and industry. A new act on research in 2005 enables better synergy between public research and industrial research. The ministry of research is introducing fiscal measures in favour of industrial research. The establishment of the ANR (national research agency), the AII (industrial innovation agency) and OSEO (SME innovation and support) is intended to develop public-private research partnerships, and the actions of the AII and OSEO ensure that the results of this research is transferred to industry. The work of the ADEME (environment and energy management agency) involves more applied research programmes.

France

This policy covers priorities defined in the following five major areas: launch of a new R&D programme on hydrogen and fuel cells; management of the CO₂ chain: from combustion of possible resources to CO₂ capture and storage; the establishment of a coordinated research programme on solar photovoltaic energy; management of energy consumption in construction; development of the potential of biomass, particularly with regard to uses in the transport sector.

Development times for new nuclear technologies justifies the determination to invest now in research on innovations for the fourth generation of reactors: the challenge is to remedy the weak point of previous reactor generations, which is the relatively limited use of natural uranium resources which could lead to substantial pressure on the uranium market. To avoid this, fourth-generation systems will be based on a fast reactor and a processing procedure for closed-cycle operation. This will ensure that resources will last for several millennia, giving this form of energy a sustainable aspect.

Cooperate with other countries in R&D of new energy technologies.

France is an active supporter of the SET-Plan adopted in Spring 2008 by the European Council.

It is also involved in many international forums intended to encourage R&D on future low-carbon technologies, such as:

- for CCS, participation in the Carbon Sequestration Leadership Forum (CSLF) which enables it to discuss the development of the capture and geological storage of carbon dioxide and coordinate its action with that of other governments;
- for nuclear energy, participation in the major international fusion project ITER, with an experimental site in France.

Implementation of French research in bilateral international cooperation involves three separate strategic phases: the setting-up of incentive measures aimed at building research collaborations on fundamental subjects or emerging technologies, usually capable of mobilising university researchers (e.g. exchanges, training grants); longer-term partnerships at research team level with agreements on relations or programmes; technology transfers to partners in developing and emerging countries. This is the level at which projects identified by embassies and conducted by the AFD (French development agency) and the FFEM (French global environment facility) are initiated. Examples include: the development of a process with very low CO₂ emissions with the Senegalese phosphate industry; a French-Indian platform for research on energy production from biomass; biofuel production from cotton oil in Burkina Faso; architectural research and energy efficiency of buildings in China; development of artificial riprap for coastal protection in the Far North.

France

V. Securing Critical Energy Infrastructure

Securing critical energy infrastructure requires detailed inventories of existing infrastructure in order to highlight which infrastructures require upgrading or enhanced security.

Please detail policies and measures to:

Inventory and upgrade critical energy infrastructure.

Ensure long-term security of energy transportation routes and infrastructure.

The necessary provisions for the protection of infrastructures and routes associated with energy issues are adopted as part of national programmes and plans on security and protection of the national territory and critical infrastructures.

VI. Reducing Energy Poverty

Energy security is not only an issue of securing supplies for G8 and other developed countries. There is a moral and political imperative to reduce energy poverty throughout the world. To that end, progress towards meeting the UN Millennium Development Goals is of the utmost importance.

Please detail policies and measures to:

Support progress toward the UN Millennium Development Goals.

Reduce energy poverty in developing countries.

Enhance energy efficiency in low-income households.

In addition to the bilateral cooperation operations mentioned in IV- and more generally, we consider it essential to involve the emerging and developing countries still more closely in our research and development work. The ADEME, the BRGM and the IFP are already heavily involved in the transfer of knowledge to the emerging countries.

French energy development assistance policy is aimed at making effective, sustainable, secure and economically competitive energy accessible to as many as possible.

In addition to the preferred European political framework of the EUEI (European Union Energy Initiative for Poverty Eradication and Sustainable Development), French action is based on four priorities (each contributing to several of the above objectives):

- the definition of national and regional public energy policies and the taking of energy into account in the Poverty Reduction Strategy Papers (PRSP) which are indispensable

France

prerequisites for access improvement. Energy policies must be based on the energy needs of the populations concerned and not on technologies, as the major objective is to enable as many as possible to have access to energy as a development objective.

- governance and regional integration: France is also working on the integration of energy markets at regional level, in close liaison with national territorial development policies. It supports the setting-up of regional regulation of the electricity sector and the development of regional policies for access to energy.

- spatial planning and infrastructures: this includes projects for electricity networks and the provision of decentralised energy services, in which priority is given to the establishment of public-private partnerships with a substantial financial leverage effect.

- use of local energy resources and energy management are priorities for our cooperation, since they contribute simultaneously to energy security, prevention of climate warming and improved access to energy in both rural and urban areas. These measures must encourage the use of renewable energies.

The funding committed by France to energy for development amounted to €90m/year (grants and loans combined) over the period 1998-2004; French bilateral ODA for energy increased to €650m per year for the period 2005-2006.

The situation of the French households with the lowest incomes, made more precarious by the increase in energy prices, is taken into account through specific aid programmes, such as housing support benefits or funds or special tax credits (e.g. the “tank bonus” for households not paying income tax which use oil for heating). A special assistance rate has been introduced for gas supply to the most deprived persons, similar to the existing scheme for electricity.

VII. Addressing Climate Change and Sustainable Development

Efforts to reduce greenhouse gas emissions take varying forms in G8 countries, comprising domestic and international actions.

Please detail policies and measures to:

Reduce GHG emissions domestically and measure GHG emissions reductions achieved.

France has adopted a “Facteur 4” plan aiming to reduce its emissions four-fold by 2050.

Establish a carbon price signal in the economy as a whole or in major energy sectors

France is part of the EU Emissions Trading Scheme (ETS).

France

France is also taking steps to develop “polluter pays”-based tax schemes, as illustrated by the recent introduction of the “vehicle eco-disc”, a bonus-penalty system (bonus for buyers of low-CO₂-emission vehicles, penalty for buyers of high-CO₂-emission vehicles).

Limit emissions via international efforts and mechanisms such as CDM and JI.

France makes sure that it complies with its undertakings within the framework of the Kyoto Protocol, i.e. stabilisation in 2008-2012 at 1990 levels. For information, the observed reduction was – 1.9% in 2005.

Regarding CDM/JI, a number of projects have been developed by French operators, including major projects. France accounts for about 2% of the CDMs already registered.

Complete a high-quality GHG inventory and GHG emissions reduction plan.

The act of 13 July 2005 supports an international objective to reduce worldwide greenhouse gas emissions by 50% by 2050, which requires a 75% or 80% reduction of emissions by the developed countries; in France as elsewhere, the control of climate change is highly interdependent with energy consumption management (energy is responsible for 75% of French greenhouse gas emissions).

France has also made climate change one of the major topics of discussions between the state and civil society within the framework of the “Grenelle” environmental forum, which will lead to a package of legislative measures in the coming weeks.

Develop a broad strategy that combines energy and climate objectives?

In order to optimise the synergies between these different issues, in 2007 France established a single ministry with responsibility for all energy and climate matters: the ministry for ecology, energy, sustainable development and spatial planning.

Germany

GERMANY

Germany

**Report by the Government of the Federal Republic of Germany
evaluating the efforts to adhere to the Global Energy Security Principles of the
G8 St Petersburg Plan of Action**

Ad Chapter I, "Increasing Transparency, Predictability and Stability of Global Energy Markets"

1. Germany fully agrees with the St. Petersburg Principle No. 2 that regular exchanges of timely and reliable information among all market participants are essential for the smooth functioning of world energy markets and that transparent, predictable national energy policies and regulatory environments facilitate the development of efficient energy markets.

The new German statutory provisions on gas contain requirements, to be met by the system operators, that data be made available to the public. These include details on available capacity and a joint gas grid map of all system operators. Furthermore, the provisions of the EU Regulation on conditions for access to the natural gas transmission networks contain the obligation to publish data on all relevant points of the system. Exceptions are permitted only under certain conditions and are subject to the approval of the regulatory authority, which can also enforce compliance with the publication requirements.

Germany's electricity market is already characterised by a large number of publication requirements to ensure a high degree of transparency. These requirements are largely directed towards the operators of electricity networks. In order to make the published data easier to find, and to ensure a uniform interpretation of the relevant provisions, guidelines on the publication of the data were drawn up and published in January 2008.

As a second pillar of the high level of transparency in the German electricity sector, German law imposes a host of comprehensive reporting requirements on its authorities. For example, the Federal Network Agency is required by law to publish an annual report on the outcome of its monitoring activities, covering both the current regulatory situation and the developments on the electricity and gas markets, and the status of energy security and consumer aspects. Furthermore, every two years the Federal Network Agency publishes a report evaluating the reports by the German electricity transmission system operators on the status and expansion of the system, thereby creating transparency on the situation and development of Germany's power line infrastructure.

Germany

Every other year, the Federal Ministry of Economics and Technology publishes a report on the findings gained in the monitoring of energy security in the field of network-based electricity supply, and any planned or implemented measures.

In addition to the already very far-reaching reporting requirements on electricity grid data, a number of energy utilities also publish various data on generation by their power stations. The scope of these publications is currently being substantially widened.

2. Germany supports as well the proposal to invite the International Energy Forum (IEF) to study ways of broadening the dialogue between energy producing and consuming countries on their medium- and long-term policies.

Germany attaches great significance to international co-operation in the context of the International Energy Forum (IEF), through its membership in the Executive Board of the IEF. Germany is prepared to co-host the 12th meeting of the IEF in 2012 in Mexico.

This also applies to the IEF's Joint Data Initiative, which aims at greater transparency on the oil markets.

3. We also actively support the principles of the Energy Charter, which Germany has already ratified on 14 March 1997, as well as the obligations of the IEA's International Energy Programme.

Germany

Ad Chapter II. "Improving the investment climate in the energy sector"

Germany agrees with para. 7 of the Action Plan that ensuring an adequate global energy supply will require substantial investment through the entire energy chain by 2030. Germany has therefore created and maintained favourable framework conditions to attract funds into the energy sector through competitive, open, equitable and transparent markets.

Germany fully supports the IEA Secretariat's view that there are many components to improving the investment climate for energy infrastructure and the energy supply chain. Stable and transparent regulatory regimes are critical, as is the integration of the national energy markets with those of neighbouring countries.

An area of focus should also be the development of policies to streamline new infrastructure development, such as through enhanced siting procedures.

The following measures have therefore been taken in recent years in Germany:

Regulation of grids

Access and connection to the system are ensured by the Act on Electricity and Gas Supply (Energy Industry Act) and ordinances based on this, and can be enforced by decisions by the Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway (Federal Network Agency) and the regulatory authorities of the Länder, as well as by court rulings. Access to the system in the gas sector has been rendered substantially easier since 1 October 2007.

Regulation of grid fees

As a result of the regulation of grid fees, grid costs have been cut by up to 20%, and in individual cases by even more, due to instructions from the Federal Network Agency and the regulatory authorities of the Länder.

Furthermore, the incentive Regulation Ordinance, which entered into force at the end of 2007, will ensure a further increase in the efficiency of the operation of electricity and gas grids. So far, the admissible grid fees have been calculated on the basis of operating costs. This system is being replaced by incentive regulation. From 1 January 2009, upper limits for revenues - and hence efficiency paths - will be stipulated for system operators.

Germany

Unbundling of grid and generation

In energy utilities which operate both in the monopoly sector of the grids and in the competitive sectors of generation or sales, the operation of the grids must take place in a separate company, in which the decision-making powers on the running of the grid, invoicing, grid and grid user information, and accounting are located, and are thus separate from the competitive sectors.

Easier connection to the system for new power stations

The Power Plant System Connection Ordinance entered into force at the end of June 2007. It accelerates and facilitates the non-discriminatory access of new power stations to the electricity system. The ordinance offers new providers improved opportunities to establish themselves - with their own power stations - on the German market, thereby ensuring greater competition.

Making it easier for consumers to switch providers

The Federal Government adopted several ordinances in November 2006, making it substantially easier for residential customers to switch their suppliers of electricity and gas. This improves consumers' ability to defend themselves against excessive prices by switching to a lower-price provider. Private customers can already choose between numerous providers nation-wide in the electricity sector; the emergent competition is also now beginning to bear fruit in the gas sector.

Increased supervision to prevent abusive pricing

However, as long as competition does not function as desired in the field of networked supply of electricity and gas, there is a need for enhanced antitrust laws as a short-term measure. The revision of the Act against Restraints on Competition, which entered into force in December 2007, makes it easier for the cartel authorities to demonstrate that dominant energy utilities are charging excessive and abusive electricity and gas prices. However, this revision of the Act, which remains valid until 2012, is not resulting in ex-ante price supervision.

Easier procedures for the expansion of the system

In order to counteract delays in planning and authorisation procedures, the Federal Government has drafted a law on accelerating the expansion of the system. An act on energy line expansion is a key element. It stipulates in law the need for certain urgent line construction projects involving extra-high voltage power lines. Legal remedies against urgent line construction projects are to be limited to a single court, as is already the case with other important infrastructure projects.

Germany

Further, connection to the system of offshore wind power facilities is to be made easier.

Cross-border electricity market integration

In the context of the Pentalateral Energy Forum (North-western Europe), a memorandum of understanding was signed on 6 June 2007 by all participants at the initiative of the governments of Germany, France, Belgium, the Netherlands and Luxembourg; it aims at the flow-based interconnection of the electricity markets in this region and at measures to improve energy security, particularly via co-operation between system operators, by the beginning of 2009. The Forum has also embarked on consultations on gas. Further regional initiatives, e.g. at the German-Danish border, led by the regulatory authorities are driving market integration.

Germany

Ad Chapter III, "Enhancing energy efficiency and saving"

Germany agrees with para. 17 of the Action Plan that a comprehensive approach within the international community to energy saving, energy efficiency and the extension of relevant efforts, including sharing best practices, to the entire energy value chain are important in this respect. Germany has made and will make further substantial efforts to fulfill the following IEA recommendations which were presented to the Heiligendamm G8 summit.

Buildings

Mandatory energy efficiency standards for new buildings: The building standards of the German Energy Conservation Ordinance are among the most stringent in the EU. The IEA recommendation to significantly strengthen these standards is taken up in the Integrated Energy and Climate Programme. The standards are to be raised by an average of 30% by 2008/2009 and will be raised once again by up to the same percentage in a second stage (envisaged for 2012).

Support and encourage construction of zero/low energy buildings: Special goals for market shares are not envisaged so far. However, the coalition agreement stipulates the goal to retrofit 5% of the building stock built before 1978 each year in terms of energy consumption. Several support programmes exist which are to be extended considerably.

Collect information on energy efficiency in buildings-increase awareness of energy efficiency in buildings: Information is provided by the energy passports/ID cards which are obligatory for sales/rentals by 1 January 2008. Overall data are provided by several research studies and the evaluation of state support programmes for energy efficiency in buildings. As for the harmonisation of these indicators, we have suggested the sustainable buildings network agreed upon in Heiligendamm. As for raising awareness, measures are foreseen in the Integrated Energy and Climate Programme (see Chapter IV).

Electrical Equipment/Appliances

Adopt mandatory energy performance requirements and comparative energy labelling: Is already/will be implemented by EU labelling and eco-design directives.

Germany

Low power modes-limit standby-power use to 1 Wait for electric appliances: We intend to raise the subject once the concrete outcomes of the EU eco-design are available. This should be the case in 2008/2009.

Establish efficiency standards for television set top boxes: This recommendation is already/will be implemented by EU-labelling and eco-design directives.

Transport

Introduce new mandatory fuel efficiency standards: In place by means of EU directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and the introduction of a mechanism to monitor and reduce greenhouse gas emissions from the use of road transport fuels.

Rolling resistance of tyres/implement a fuel-efficient tyre programme: This Recommendation has been included in the national efficiency action plan. All the same we would like to discuss the issue at the global level for international harmonisation.

Adding to these recommendations, the above-mentioned Integrated Energy and Climate Programme proposes a large number of further measures.

Lighting

Achieve ware energy-efficient light ing/ Phase out incandescent light bulbs: These recommendations will be implemented by means of the EU eco-design directive.

Industry

Support IEA's energy efficiency indicator network: More detailed data on industry energy efficiency will be available through the monitoring of the EU's energy services directive 2006/32/EC. Monitoring is foreseen for the support programmes included in the Integrated Energy and Climate Programme.

Cross sectoral

Energy savings and measurement protocol, review subsidies, public procurement etc.: As part of the implementation of the EU energy services directive, a national action plan on energy efficiency has been developed. A savings and measurement protocol will be compiled based on the monitoring of the directive. The Federal Government has committed itself to develop technical guidelines on energy efficiency that will form the basis for procurement decisions.

Track process on recommendations and inform IEA:

The IEA has announced that it will circulate a questionnaire on member countries' progress.

Germany

Ad Chapter IV. "Diversifying energy mix"

Germany fully subscribes to para. 23 of the Action Plan that diversification of the energy mix reduces global energy security risks. The development of low-carbon and alternative energy, the wider use of renewables and the introduction of innovative technologies is therefore recommended.

The German government has therefore taken the following steps in response to this recommendation;

On 5 December 2007 the Federal Cabinet adopted the Integrated Energy and Climate Programme (IECP) consisting of 29 concrete measures. With this comprehensive package of measures Germany will ensure that its climate protection targets - approved by the Council of the EU - are achieved by 2020.

At the same time, the Integrated Energy and Climate Programme serves to improve energy security, because increased efficiency and the rising use of renewables are leading to the reduced consumption of coal, oil and gas in the transport, heating, hot water and power generation sectors: this in turn reduces Germany's very high dependency on imports of fossil fuels.

To this respect 4 important points contained in the package can be emphasised:

- **Germany will expand the share of renewable energies.** For electricity from renewables an expansion target of 25 - 30 percent by 2020 was agreed. It was also agreed to increase the share of renewables in the heat sector to 14 percent by 2020. Facilitating the injection of biogas into natural gas systems rounds off the measures in the field of renewables. In this way we are ensuring that there is an increased use of biogas as a fuel and in power plants in future.
- Germany will substantively expand the environmentally friendly and particularly efficient **generation of electricity and heat in combined heat and power (CHP)** plants. With an amendment to the law we aim to achieve our long-stated aim of doubling the share of CHP in electricity generation by 2020. to approximately 25 percent.
- Germany will press forward with more stringent requirements for **energy efficiency in buildings**. The energy efficiency requirements placed on buildings will be progressively adjusted so reflect the latest technological developments and movements in energy prices.
- A further key issue is the promotion of **research, development and demonstration of** new, modern and competitive technologies.

Germany

Germany agrees with the IEA that ensuring a diverse array of energy technologies requires continued government commitment and the development of appropriate policies and that R&D also plays a critical role in ensuring long-term supply diversity. By developing the necessary preconditions for a broad-based, forward-looking energy supply, Germany is making an important contribution towards ensuring energy security. In order to further accelerate the processes of innovation, the Federal Government will enhance ongoing activities in energy and climate research and launch selected new initiatives. This includes support for strategic partnerships between public and privately funded research. The individual measures include:

- A new programme of non-nuclear energy research in the fields of modern power plant technologies and *C.O2* capture and storage; fuel cells; energy-optimised construction; efficient use of energy in industry, trade and services; electricity storage; and energy systems based on information and communications technologies.
- Expansion of renewables, especially in innovative fields (photovoltaics, wind power, geothermal energy, low-temperature solar thermal energy, solar thermal power plants, integration of renewable energy in energy supply structures)
- Intensification of basic research (thin-film photovoltaics, anorganic photovoltaics, solar and biomimetic generation of hydrogen, fusion research)
- Strengthening of research into the use of biomass for energy
- Technology and efficiency programme for future propulsion technologies

Furthermore, the Federal Government is also looking to international, project-oriented partnerships to develop low-emission fossil fuel power plants (particularly via the Carbon Sequestration Leadership Forum and the IEA) and to further develop the fuel cell and the hydrogen economy.

The Federal Government also supports structural change in the interest of a sustainable energy supply abroad. Political support is also provided to such producer and transit countries for projects that lead to a diversification of our supply sources and transport routes. Existing energy-related partnerships with producer and transit countries are being expanded for the mutual benefit of the respective parties.

Germany

Ad Chapter V. "Securing critical energy infrastructure"

In Germany, critical infrastructures are regarded as facilities which are of major importance to the community and whose failure or impairment would cause a sustained shortage of supplies, significant disruptions to public order or other dramatic consequences. These include energy supply.

In co-operation with the relevant sectors, the German government has developed guidelines intended to offer the operators of critical infrastructure help with regard to structured risk analyses, preventive measures and effective crisis management. Checklists have been drawn up which should help the operators develop security concepts adapted to the individual situation.

The operation of energy generation and distribution facilities, and the transport of energy, is organised on a private-sector basis in Germany. International and national rules impose obligations on these companies which are intended to ensure a reliable energy supply.

For example, they are obliged to operate a secure, efficient and reliable supply system. All measures related to the supply of energy (e.g. feeding in and taking out of energy) are to be brought in line with the requirements of a secure and reliable network operation. The facilities must be set up in such a way that they satisfy the recognised technological standards.

At regular intervals, a monitoring of the security of supply is carried out in which not least the following aspects are scrutinised:

Planning of additional capacity, maintenance: analysis of disruptions, responding effectively to technical failures.

The companies are required to co-operate in this respect.

A report on all interruptions to supply must be submitted to the Federal Network Agency (cf. Chapter II); the report is then evaluated, furthermore, the operators of long-distance or transmission systems, for example, must undertake a regular analysis of weak points and inform the regulatory authorities,

in addition to this, there is the system of preventive protection against sabotage by staff. This provides that only vetted staff can be deployed in certain security-relevant parts of vital facilities, in order to protect against sabotage by insiders.

Germany

Ad Chapter VI. "Reducing energy poverty"

The German government has made substantial efforts in almost all aspects mentioned in the Action Plan Chapter on "Reducing Energy Poverty",

Energy is more than just a driving force for the economy, it is a vital element in the fight against poverty. High oil prices hit the poorest countries particularly hard. It is therefore important, also in view of climate change, to bring about and support a turnaround in energy policy in developing countries. This can be achieved through the targeted promotion of renewable energies and energy efficiency. Germany, as the twin presidencies of the EU and G8 in 2007 have shown, has played and is prepared to continue to play a leading role in this field.

Within the framework of its development cooperation activities, the German government is presently helping more than 50 developing countries - including virtually all emerging economies- to improve their energy systems. At present the amount of bilateral and multilateral funding allocated annually for this purpose is about 450 million euros. This amount will be increased to 800 million euros of new commitments in 2008, of which a minimum of 120 million will stem from a new international climate protection initiative.

A high proportion of this funding is used to support energy infrastructure and provide advice on policy design. Projects dealing with the general development of markets - such as developing maintenance and distribution structures, training skilled workers and setting up energy institutes -are also becoming increasingly important areas of cooperation. Such structure-building measures are the main prerequisite for the independent, sustainable development of supply and demand for environmentally sound and climate-friendly energy services. The same thing is true for policy advice: creating a suitable legal and institutional framework is the goal being pursued by development cooperation.

In the field of renewable energies, support is provided for wind and hydropower plants: the sustainable and development-oriented use of biomass; tapping geothermal energy; photovoltaics; and solar thermal energy. In order to improve energy efficiency, measures are being promoted that aim to increase efficiency in delivering energy and generating power, to reduce losses during power transmission, to employ clean technology and support technology transfer and to promote rational energy use on the demand side.

Germany

At the 2004 Renewables Conference in Bonn, German development cooperation made a commitment to set up a Special Facility for Renewable Energies and Energy Efficiency. Because of the huge demand from partner countries, the original credit volume of the Facility was doubled in 2007 -just two years after it was launched - bringing to 1 billion euros the sum available for KfW to grant governmental and parastatal institutions in developing countries interest-subsidised loans for investments. Starting in 2008, the possibilities for using the Facility for Africa have been extended. To achieve this, 20 million euros per year in grant funds will be deployed under the action programme Climate and Development. These funds will be used to mobilise and secure loans, including by providing suitable risk instruments.

The German government is increasingly focusing on climate change. For this purpose an action programme "Climate and Development" was produced which was presented to the public in April 2007. Core themes addressed in the action programme include: the particular responsibility of industrialised countries as the leading contributors to climate change; the target of stabilising CO₂ emissions at a level of 2 tonnes per person per year in every country; protecting the poor from the consequences of climate change; expansion of measures and funds; engaging in lobbying efforts in developing countries for an effective follow-up to the Kyoto Protocol (reducing emissions in emerging economies; expanding existing flexible mechanisms for reducing CO₂).

The shared interests of Europe and Africa in the field of climate and energy were the basis for the comprehensive Africa-EU energy partnership launched in December 2007 in Lisbon and prepared during Germany's EU Presidency. The energy partnership is a major part of the EU Energy Initiative (EUEI). The aims of the partnership are increased cooperation on energy security, access to energy, climate change and its consequences, promoting a favourable climate for investment, and promoting renewable energies and energy efficiency. Further topics include the responsible use of revenues from oil and gas exports for development and greater transparency in the field of energy. In addition, Germany is an active supporter of the EU-Africa Infrastructure Trust Fund where the regional integration of energy markets is an important element.

To help reduce energy poverty, private-public partnerships (PPP) are an increasingly important element of German policy. There are many different opportunities to link development policy goals with private sector involvement. Development cooperation is helping to create favourable conditions for investment and for economic activities in general. Capacity development activities

Germany

are a core element of German development cooperation and are making an important contribution to the development of foreign markets.

On the topics of clean energy, energy access, climate change and energy technology Germany is discussing with and actively supporting the World Bank and the Regional Development Banks in strengthening their instruments.

Germany

Ad Chapter VII. "Addressing Climate Change and Sustainable Development"

In time for the start of the UN Climate Change Conference in Bali, the German government elaborated a historic energy and climate programme, the so called Integrated Energy and Climate Package (IECP) which is outlined in Chapter IV. This package is without precedent both in the history of German climate policy and internationally.

It doubles Germany's previous climate protection efforts. At present, we have achieved an 18 percent reduction in greenhouse gas emissions compared to 1990.

This package of measures aims primarily at efficient climate protection. This includes ensuring that climate protection is affordable and keeps pace with economic development - an aim which is equally valid for industrialised and newly industrialising countries. For this reason, the German government will implement measures which reduce CO₂ emissions and are as cost-effective as possible.

This will ensure that the competitiveness of companies is not impaired and that excessive burdens for consumers are avoided. As outlined in Chapter IV the IECP also enhances the security of Germany's energy supply. The German government's guiding principles for energy policy remain the three objectives of security of supply, economic efficiency and environmental protection.

This also means giving energy suppliers and industry reliable and competitive framework conditions for their investments. At the same time, consumers need cost-efficient solutions and transparent, reliable conditions for their purchasing and investment decisions. The legislative proposals presented ensure such conditions by defining targets up to the year 2020 for their respective areas and supporting these with concrete measures.

If the enhancement of energy security and climate protection is to succeed, we need a further global transformation of energy supply structures through increased efficiency and renewable energies. We will be able to tackle this challenge only if the major industrialised countries lead the way so that other countries, including newly industrialising and developing countries, can be included.

By implementing the IECP, Germany will demonstrate that climate protection can be implemented in all sectors in an economically viable way.

Germany

Germany and the EU have put their offer to their negotiating partners on the table: the EU is willing to reduce its emissions by 30 percent by 2020, provided that other developed countries commit themselves to comparable emissions reductions, and provided that economically more advanced developing countries commit themselves to contributing appropriately in accordance with their responsibilities and respective capabilities.

Under these conditions, Germany is willing to commit to a 40 percent reduction in the same period. We are now counting on similarly ambitious responses and commitments from our partners.

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ST. PETERSBURG MATRIX GUIDANCE (SPB MG)

I. Increasing Transparency, Predictability and Stability of Global Energy Markets

SPB MG: PROVIDE MORE AND BETTER SECTOR-SPECIFIC AND FUEL-SPECIFIC ENERGY DATA TO THE PUBLIC.

The Italian statistical system (Sistan) was created by Legislative Decree No 322 of 6 September 1989, which laid down guiding principles and criteria for reforming public statistics. This decree rules the activity of public statistical bodies and agencies with the objective of ensuring unity of purpose, consistent organisation and central and local rationalisation of information.

Sistan's mission is to provide official statistics to Italy and to international organisations. There is a statistical national Programme (NSP), approved each year. The NSP sets out the surveys and analyses in the public interest that the Sistan bodies and agencies intend to carry out over a three-year period and defines their objectives.

For the 2006-2008 period, 23 projects are planned for the energy sector, performed by Ministry of Economic Development, TERNA (the operator of the national grid of electricity), ENEA (the Agency for research in energy and environment) and ISTAT (National Institute for Statistics).

Energy statistics made by Ministry of Economic Development:

- Import, export and consumption of petroleum products
- Import, export and consumption of carbon products
- Import, export and consumption of natural gas
- Uses of energy sources in industrial concerns with more than 50 employees (not carried out in the last 3 years)
- National energy balance
- Monitoring of the oil market
- Structure and activities of the extractive industry in Italy
- Prospection and production of liquid and gaseous hydrocarbons and geothermal prospecting
- Oil refinery production
- Petrochemical industry production
- Weekly prices of several petroleum products (super-grade petrol, diesel, etc.)

For prices of oil products, the Ministry of economic development has established a price Survey.

For oil products made available by the oil companies, this survey:

- uses a sample for fuel oil and heating gas-oil.
- in total, approximately 40 operators are concerned and submit the product prices weekly.
- the size of the sample will increase in order to ensure better representativity throughout Italy.

Italy

The quality control is assured by these requirements:

- All players in the sector are consulted.
- A legal obligation to respond is set out in the SISTAN law or by specific legislation
- Data is cross-checked with statistics from other sources (Istat, external trade)
- An expert working group (natural gas and petroleum) meets monthly at the Ministry to examine and validate provisional data from the previous month and definitive data from the two previous months.

For the gas sector:

- AEEG, the energy regulator, since 2005 started a survey each three months for households and industrial prices for gas
- Extended survey on about 400 companies, 4 time for each year.
- 2 type of prices for industry: net of tax and with all the taxes
- 3 type of prices for Domestic: net of TVA, net of TVA + Accise, etc) and with all the taxes.
- 22 companies were involved on a monthly base during the 2005

SPB MG: ENHANCE THE TRANSPARENCY OF ENERGY MARKET TRANSACTIONS AND NETWORK FLOWS.

Electricity Market design

The electricity market has seen entry into full operations of the bidding system in April 2004 and the active participation of demand in the bidding system one year later. When the Power Exchange opened in 2004, transitional provisions were adopted restricting access to the Exchange to the supply side, the aim being to enable the new negotiating mechanism to build up gradually to full operational status.

The regulated market run by the Electricity Market Operator (*Gestore del Mercato Elettrico S.p.A.*, GME) can be divided into two sub-markets: the day-ahead market (MGP), and the adjustment market (MA). Then there is the dispatching service market (MSD), in which first GRTN and now Terna procure the resources they need to carry out their transmission and dispatching activities and guarantee the security of the electricity system. The regulations envisaged for the dispatching market in its fully operational form envisage the active participation of demand in all these markets, but under the transitional provisions for 2005 it participates only in the MGP.

The fact that demand only takes part in the MGP has made it necessary to introduce transitional mechanisms to make up for the reduced negotiating flexibility of demand-side operators unable to take part in the MA and MSD. These mechanisms take the form of:

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- scheduled imbalances, which enable operators who are party to contracts drawn up out with the bidding system to present unbalanced input and off-take schedules on the MGP. In such cases, inputs must be higher than off-takes and the difference is considered as a sale on the MGP by the purchasing operator to GRTN/Terna at a price equal to the National Single Price (*Prezzo Unico Nazionale*, PUN);

- the Bilateral Adjustment Platform (*Piattaforma di aggiustamento bilaterale per la domanda*, PAB) for the demand side, in which balanced hourly electricity trading can be conducted by operators of off-take points belonging to the same geographical zone. Any trading notified to the GME through this platform, which performs a similar function to the MA, along with any commitments deriving from bilateral contracts or from purchases on the MGP, determine the binding schedule for each off-take point.

In addition to the above measures, and the envisaged simplified system for quantifying imbalances, the electricity market regulations also provide for GRTN/Terna to present supplementary offers/bids on the MGP to ensure that the level of demand resulting from this market does not diverge from its projections by more than 5% in absolute terms.

In 2005 the new mechanisms introduced with the active participation of demand affected significant volumes of electricity which, with respect to the volumes traded overall on the Italian system (trading on the MGP plus bilateral contracts), amounted on average to 2.7% for the supplementary GRTN/Terna bids/offers, 2.9% for the PAB and 4% for scheduled imbalances.

In 2007 a new Energy Accounts Platform (*Piattaforma Conti Energia*), a new system, managed by GME (the MO) on behalf of Terna (the TSO), for the registration of energy sold and acquired with Forward Energy Contracts was introduced. Such a system decouples the registration of the energy traded (forward energy contract volume notification) from in-takes and withdrawals or the submission to GME of the production and consumption scheduling).

Gas Trade and transit

Gas transport activity is carried out by Snam Rete Gas S.p.A., Società Gasdotti Italia S.p.A., Edison Stoccaggio S.p.A. and some other small companies that operate at a local or regional level. Snam Rete Gas owns and operates approximately 95% of the Italian transport grid. It is listed on the Italian stock exchange since December 2001 and about 50% of its shares are owned by ENI group. Snam Rete Gas also fully controls GNL Italia that owns and operates the only re-gasification plant in Italy.

The system has a Virtual Trading Point (Punto di Scambio Virtuale, PSV) that make gas trading possible. In order to operate to the PSV it is necessary to accept the PSV Usage Conditions approved annually by the Regulatory Authority. It is possible to sign up to the PSV as a transportation contractor of Snam Rete Gas or as subject with a purely financial trading activity. In thermal year 2007/2008 about 50 users and 10 traders operate through the PSV.

Network users can perform bilateral transactions of gas on daily basis. The number of transactions at the PSV in 2007 amounted to approximately 68.000 and total volumes

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traded corresponded to 12 billion Sm³. This represents approximately 15% of domestic consumption of 2007. In 2007, maximum total trade with respect to the domestic market, approximately equal to 20% was experienced in January, while the minimum value, equal to 3%, was experienced at the end of the summer.

In 2007, in order to stimulate exchange at the PSV, Government has issued a decree by which royalties on domestic production (0,3 bmc/year) are to be sold on the PSV through public auction. The same decree provides for newly authorised gas imports to be offered in part at the PSV.

Gas Market design

The transport system is based on an Entry-Exit model both for capacity and tariffs. According to the model, transportation capacity booked by network users and the costs associated to the service do not depend on a specific transportation path.

Transport service is undertaken on the basis of daily transportation programs defined by the network users. These programs specify the quantity they intend to intake and to off-take in each point of the network where capacity is booked. The quantities actually transported through the network are allocated to network users according to specific rules defined in the Network Code.

The balancing regime has a daily basis with storage and linepack representing the main balancing tools. Balancing (operational and commercial) is settled through Stogit storage rather than on the grid, with balancing charges – determined by AEEG with no correlation to gas prices – applied only where allocated flows overrun storage capacities.

SPB MG: ENSURE INDEPENDENT REGULATION AND CLEARLY DEFINED ENERGY MARKET CONDITIONS.

The role of the Italian Regulatory Authority for Electricity and Gas (AEEG), established under Law 481 of 14th of November 1995, has been reinforced by both the Legislative Decree 79/1999 on the liberalisation of the electricity market and the law 239/2004 on the Reorganisation of the energy sector

The board of AEEG is composed of the president and four members. The number of full-time staff on the AEEG's payroll is 120, while the number of staff on set-term contracts is 60. AEEG is funded through annual contributions by the service providers, calculated as a set percentage of the previous financial year revenues. All commissioners are appointed for seven years (mandates not being renewable) by decree of the President of the Republic, designated by a bipartisan parliamentary commission on government proposal.

Law 239/2004 moreover introduced some new features and defined more precisely some elements of the AEEG's activity and operations, namely: it envisaged that the state can make use of the AEEG's consultative and advisory role and specifies that if the AEEG does not express its opinion within 60 days of receiving such requests, the provisions in question may be adopted by the Government. Similarly, Law 239 establishes that if the AEEG does not adopt acts or provisions for which it is competent pursuant to the current legislation, the Government should adopt the provisions in question. With respect to the

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AEEG's tasks the law provides that the Government should inform it of the development needs of the public utility services provided by the electricity and gas sectors in the general national interest. It also provides that the Council of Ministers can establish general policies for the performance of the functions attributed to the AEEG.

Transport, distribution, storage of gas and regasification activities are regulated on the basis of special orders issued by the AEEG. Regulated third party access (TPA) to infrastructures are offered according to Codes - defining rules for access, terms of service and roles/responsibilities of the involved parties - adopted by the regulated companies after AEEG approval.

AEEG has competences in setting tariffs, in defining service quality standards, technical and economic conditions governing access and interconnections to the networks and in ensuring transparency while the Italian Antitrust Authority is in charge of measures apt to ensure competition in the gas market.

SPB MG: IMPLEMENT ENERGY CHARTER PRINCIPLES RELATED TO ENERGY TRANSIT ACROSS BORDERS.

Italy, as an EU member state applies EU energy transit regulations:

- Council regulation (EC) N.1228/2003 on conditions for access to the network for cross-border exchanges in electricity
- Council regulation (EC) N.1775/2005 on conditions for access to the natural gas transmission networks

SPB MG: MEET OBLIGATIONS OF THE IEA'S INTERNATIONAL ENERGY PROGRAMME (IEP) (IF APPLICABLE).

The IEP Agreement requires IEA countries to hold oil stocks equivalent of at least 90 days of net imports of the previous calendar year and to release oil stocks, restrain demand, switch to other fuels, increase domestic production and, if necessary, share available oil, in the event of an oil supply disruption of 7 per cent or more to the IEA or individual countries.

Italy fully complies to the IEP and is able to supply IEA countries with agreed levels of stock if necessary. Oil stocks are permanently monitored in order to guarantee obligations.

Several EC directives, the latest being directive 98/98/EC, have established for all EU member states mandatory stocks of oil and refined oil products at levels such as to cover at least 90 days of oil consumption. The objective is to mitigate the negative effects of supply disruption on the social and economic activities.

European single market rules permit to keep these stocks in other member states as long as a bilateral intergovernmental agreement is in place. By virtue of these rules Italy has

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made agreements with Germany, Spain and Slovenia while new agreements are being made with Cyprus, Denmark and Malta.

SPB MG: PUT IN PLACE EMERGENCY PLANS TO DEAL WITH DOMESTIC ENERGY SUPPLY DISRUPTIONS.

For the protection of households customers there is a general emergency procedure for the electric system (PESSE) that provides for the possibility to reduce electricity demand in certain areas in order to balance the system. Each area of the grid is divided in zones where customers are informed in advance of the possibility that in determined hours of the day electricity could be switched off in case of a peak demand that could not be covered by production.

The activation of the system is decided by the national operator of the transmission grid and is managed by local distribution companies. This system has been used only in very limited cases in the last years.

The grid development plan includes interventions to enhance electricity security, as well as to improve economics by reducing the dispatching cost to solve congestions.

SPB MG: REDUCE CORRUPTION IN ENERGY MARKET TRANSACTIONS AND DEALINGS.

Italy has made a formal commitment to endorsing EITI (Extractive Industries Transparency Initiative) at the Heiligendamm G8 Summit in 2007 although Italy's involvement in EITI dates back to 2002.

Italy's endeavour has been to encourage international financial institutions such as the World Bank and the IMF to adhere to EITI. The agenda for the next years is firstly to involve all remaining large energy producing countries in EITI that are absent from the initiative to date. Secondly there is the will to provide technical assistance to one specific African country geographically coherent with G8 priorities (but yet to be determined) to implement all EITI principles and criteria in order to make it fully EITY compliant (no country is yet fully EITI compliant).

SPB MG: ENHANCE THE SECURITY OF OIL AND NATURAL GAS SUPPLIES.

Oil security

Italy has an important role as Europe's largest refining centre, and is a net exporter of refined products, providing a large share of its finished products to other countries. There are 16 refineries operating in Italy, with a total crude distillation capacity of slightly more than 2.3 mb/d. Four of these refineries are located in the northern part of the country (in the Po Valley); the others are situated along the Mediterranean coast.

The majority of crude and product pipelines is located in the north of the Italian peninsula. Because most refineries are situated along the coast, Italy has relatively few crude oil pipelines. The four inland refineries in the north receive crude by pipeline from Genova, Venezia and Vado Ligure.

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Italy has 704 industrial and commercial depots across the country, with a total storage capacity of some 163 mb (25.9 mcm). This is split roughly into one-third crude and two-thirds finished products.

Responsibilities for energy policy design and implementation are shared between the government and regional authorities. The Ministry of Economic Development, formerly the Ministry of Productive Activities, is responsible for energy policy and for maintaining an operating handbook on emergency procedures and measures for oil supply disruptions. In a disruption, the Ministry would convene the full NESO body, called the Conference of Services. This includes representatives from several relevant ministries: the Ministry of Foreign Affairs; the Ministry of the Interior and its Department for the Civil Defence; the Ministry of Transport; the Ministry of Defence; the Ministry of Environment; the Ministry of Health; and the Ministry for Communications. The Conference of Services also includes representatives from the oil industry and industry associations.

Stocks - Stockholding Structure

All stocks in Italy are held by industry. Legislation passed in 1998 established the National Reserve Stock Agency. To date, this agency has not played a role in the holding or managing of emergency reserves.

Italy allows companies with individual stockholding commitments to transfer their commitments to another company through leasing or storage rental agreements.

In general all compulsory stocks must be held as products. The exception is that companies with holding obligation may hold crude to meet up to 40% of light/middle distillate stocks obligations and up to 50% of fuel oil stock obligations according to European legislation.

At the end of 2006, Italy's overall stock cover equated to nearly 100 days of net imports. This was composed of roughly one-third crude and two-thirds refined products. Some 40% of the refined product stocks were in the form of middle distillates.

Monitoring and Non-compliance

Companies are obliged to report, on a monthly basis, to the Ministry of Economic Development the exact location, product and quantity of stocks. In times of possible tensions on the international markets or in a supply crisis, the ministry can demand more frequent reporting. In collaboration with the Finance Police and the Customs Agency, the ministry monitors each company's compliance with the decree obligations.

The standard sanction for breaching stock obligations is a fine of EUR 5.165/t per day, for each tonne by which the company falls short of its prescribed minimum for that specific location.

Stock and Timeframe Drawdown

The NESO decision to use emergency reserves in a supply disruption would be announced in a ministerial decree that would authorise companies to reduce their mandatory stocks by a certain amount and to make these stocks available to the market. NESO would inform oil companies about the content of the ministerial decree through a directed and personalised communication to each company, which would include an indication of its share of stock drawdown.

Other Measures - Demand Restraint

Italy

The Conference of Services, once activated by the Minister of Economic Development, has the legal authority to decide upon and implement demand restraint measures. These include appeals to the public for voluntary measures to limit consumption and reduce domestic heating. In case of necessity the ministry may also impose driving restrictions. During the crisis, monitoring activities would be intensified, including increased frequency of reporting of stock levels and product deliveries to the market. Industry participants would also be required to submit forecasts of anticipated sales on a regional basis. The regional prefectures would become responsible for monitoring deliveries to vital sectors and making initial data verification of regional reporting. Should the crisis become more severe, the restraint measures would be tightened. Regional shortages of oil products could be addressed through a redistribution of supplies, subject to the approval by the ministry.

Gas security - supply

SNAM Rete Gas, the largest Italian gas shipper, defines each month an operational programme for transportation based on:

- the monthly and weekly consumption programme of customers;
- the monthly programme (updated every week) of storage companies;
- the monthly and weekly programme of of TERNA, the company in charge of electricity transmission and dispatching over the high-voltage (HV) and extra-high voltage (EHV) grid throughout Italy: TERNA's programme is based on daily gas volumes consumed by thermoelectric power suppliers' gas and dual fuel plants
- stock consumption with regard to system balance;
- gas exit to end user regional or local distribution grids;
- the gas system's internal transportation capacity;
- the previous period and demand forecast for the following four days;
- the coordination of the external transport pipelines and the LNG terminal's administrators with the national gas grid.

Programme implementation is constantly monitored in order to detect possible bottlenecks in a timely fashion. If bottlenecks are detected by Snam Rete Gas, an intensified monitoring procedure is activated and the Ministry of Economic Development is informed as well as storage companies, TERNA, transport companies and end users. This emergency procedure provides for actions to be taken accordingly to the further development of the critical situation.

Gas security – demand

Decree 164/2000, provides for:

- dispatching rules, to be issued by the Ministry of Economic Development, in case of emergency and mandatory security measures for the national gas system;

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- authorisation procedures for gas imports to Italy and requirements for strategic and working gas storage;
- mandatory modulation for shippers supplying civil customers;
- the designation of the Ministry of Economic Development for matters regarding security, economy and long term programming of the national gas system; these goals are pursued by means of specific measures aimed at reducing price fluctuation and increasing supply security, coordinating the storage system and reducing the vulnerability of the gas system.
- the adoption of temporary measures by the Ministry of Economic Development in case of severe risks for collective security or the integrity of gas facilities;
- institution of the Gas Emergency and Monitoring Committee within the Ministry of Economic Development;

Italy

II. Improving the Investment Climate in the Energy Sector

SPB MG: PROMOTE INVESTMENT IN ENERGY INFRASTRUCTURE AND STREAMLINE INFRASTRUCTURE SITING

SPB MG: ENSURE A LEVEL PLAYING FIELD FOR ALL COMPETITORS IN THE OIL, GAS, COAL AND POWER SECTORS

SPB MG: EXPAND TRADE AND BETTER INTEGRATE ENERGY MARKETS WITH NEIGHBOURING COUNTRIES

Electricity Infrastructure – power grid

By the end of year 2010, new generation is planned by +12,865 MW, located by approximately 60% in the southern part of Italy.

The grid development plan includes interventions to enhance electricity security, as well as to improve economics by reducing the dispatching cost to solve congestions. Main interventions in the short-medium term include:

- Increase of Northern side cross border interconnection capacity by construction of merchant lines (by a value of 1000-2000 MW, considering lines yet authorized or engaged in the authorization process), and a new 380 kV line to Slovenia, planned by year 2011, (by a value of about 1000 MW);

- Increase of South-East side cross border interconnection, by construction of 400 kV HVDC connections to Albania (planned by year 2015) and Croatia (planned by year 2013);

- Increase of interconnection capacity between Sicily and mainland (taking interconnection capacity from 600 to 1000 MW), with the construction of a new line planned by year 2010;

- Increase of interconnection capacity between Sardinia and mainland (taking interconnection capacity from 350 to 1150 MW), with the construction of a new line planned by year 2009.

Gas Infrastructure – pipelines

The Snam Rete Gas transport system consists of 31,081 km of natural gas pipelines (as at 31/12/2007) with a diameter from 25 to 1.400 mm and a pressure between 0.5 and 75 bar. Ten compression stations dedicated to line pressure service are part of the network, along with gas regulation, reduction and mixing plants and other plants necessary for the transport and dispatch of gas. In accordance with Legislative decree n.164 of 23 may 2000, the Snam Rete Gas natural gas pipelines have been divided into two parts: the first belonging to the National Gas Pipeline Network, for a total of 8,548 km. and the second to the Regional Gas Pipeline Network, for the remaining 22,533 km.

Network upgrades are planned along the South-North, the North-East backbones and in the Po valley.

Gas Infrastructure - LNG terminals

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The LNG regasification plant at Panigaglia (La Spezia) is owned and managed by GNL Italia S.p.A., a company fully owned by Snam Rete Gas. The terminal can receive tankers with payloads varying from 25,000 to as much as 65,000/70,000 cubic metres and is equipped with two vertical, cylindrical LNG tanks, each with a capacity of 50,000 cubic metres. The regasification of the LNG is achieved by means of submerged combustion vaporisers.

Planned LNG regasification terminals are 13 in number; one will begin operations by 2008 (the Rovigo LNG terminal) while the existing terminal in Panigaglia is awaiting authorisation for expansion the doubling of its capacity.

SPB MG: PROVIDE REGULAR FORECASTS TO THE PUBLIC ON WHICH TO BASE INVESTMENT DECISIONS

There is no specific institutional activity on forecasting data to the public other than the yearly publication of the energy sector regulator AEEG.

SPB MG: EDUCATE AND TRAIN SKILLED ENERGY PERSONNEL TO MEET LONG TERM LABOUR REQUIREMENTS

Upstream activity in Italy has strongly decreased over the past decade due to environmental constraints. Notwithstanding, energy companies have intensive vocational training in the energy sector such as ENI's "Enrico Mattei" school. Universities provide several specialist courses in the downstream energy sector.

SPB MG: DRIVE COST-EFFECTIVE INVESTMENT IN RENEWABLE AND ALTERNATIVE ENERGY SOURCES

SPB MG: FACILITATE ENERGY EFFICIENCY INVESTMENT IN BUILDINGS, INDUSTRY AND TRANSPORT

Measures taken in past years aim at integrating energy and environmental policy while guaranteeing supply security and economic competitiveness. The national implementation plan of the Lisbon Strategy of October 2007 envisages various policy measures: market liberalisation, strengthening and widening of energy infrastructure and incentives for the use of renewable sources of energy.

In February 2007 a new incentive scheme for solar energy has been approved called "Conto Energia" ("Energy Account") aimed at reaching 3000 MW of power capacity from solar energy by 2016.

As for efficiency, decree 20/2007, implementing directive 2004/8/CE, defines, among others, measures aimed at promoting high efficiency co-generation and simplifies administrative procedures for installation of new capacity.

The white certificates system for energy saving is properly working as the AEEG has found in its second annual report on this matter. The national goal for 2006 of 468.000 toe of savings attributed to energy distributors was almost doubled with 900.000 toe saved.

Italy

The second national plan for energy efficiency, as provided by directive 2006/32/CE, was adopted in August 2007. Said plan provides for measures to be taken to reach the 9% energy savings target by 2016 set by the directive. Other energy savings measures are being implemented through the “Industria 2015” development programme aimed at raising the Italian industry's competitiveness.

The budget law for 2008 provides further measures for energy efficiency:

- fiscal incentives for energy efficient restructuring of buildings and for installation of solar panels;
- contributions for the replacement of of civil and industrial engines with high efficiency ones;
- reduced municipal real estate taxation for residential buildings that are powered with renewable energy;
- new rules for the construction of industrial buildings that make renewable energy mandatory;
- increased share of renewable energy that has to entered into the national electric system: the share rises from 0,35% to 0,75%;
- a series of measures aimed at increasing the energy efficiency of public buildings.

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III. Enhancing Energy Efficiency and Energy Saving

SPB MG: IMPLEMENT THE 16 ENERGY EFFICIENCY MEASURES THAT THE G8 HAVE SPECIFIED FOR APPLIANCES, LIGHTING, BUILDINGS, TRANSPORT, INDUSTRY, AND ACROSS SECTORS.

SPB MG: ENSURE COST-REFLECTIVE PRICING TO DRIVE COST-EFFECTIVE ENERGY EFFICIENCY STEPS

SPB MG: PROMOTE DEMAND-SIDE MEASURES IN THE ELECTRIC POWER SECTOR.

SPB MG: ENCOURAGE PUBLIC AND PRIVATE FINANCING FOR ENERGY EFFICIENCY IMPROVEMENTS.

SPB MG: DEVELOP EFFICIENCY STANDARDS AND LABELS FOR BUILDINGS, APPLIANCES AND EQUIPMENT.

SPB MG: PROVIDE ENERGY EFFICIENCY AUDITS TO HOMES, OFFICES, AND INDUSTRIAL FIRMS.

SPB MG: RAISE PUBLIC AWARENESS OF ENERGY EFFICIENCY OPPORTUNITIES.

SPB MG: IMPROVE END-USE DATA AND TRACK PROGRESS TOWARDS ENERGY EFFICIENCY GOALS.

The most recent international target, relevant to Italy, is represented by the objective of achieving a 20% saving of the EU's primary energy consumption compared to projections for 2020, as set out by the European Council on 8-9 March 2007. This saving is in addition to improvements in energy intensity due to expected structural change, the effects of previous policies and autonomous changes brought about by natural replacement of technology, energy price changes, etc.

At national level, an overall national indicative energy savings target of 9,6 % has been set up for the nine years (2008-2016) period of application of the Directive 2006/32/CE within the National Energy Efficiency Action Plan (NEEAP), to be reached by way of energy services and other energy efficiency improvement measures.

Policies and measures overview

Household

1. Energy Auditing of Buildings

The Legislative Decree issued by the Ministry of Economic Development, on 3.1.2007, foresees the implementation of energy audits in public buildings and of the resulting cost-effective interventions; this Decree set up also the breakdown of the total available funds (8.5 M€) between Regions and autonomous Provinces. Eligible end-users to apply for the energy audits scheme are: public schools, hydro systems, public lighting, public buildings or buildings for public use, residential buildings, hospitals.

2. Fiscal incentives for energy enhancement of buildings

Budget Law 2007 includes provision allowing a fiscal deduction worth 55% of the total amount of expenditures, borne by 31/12/2007, for projects implementation addressed to energy enhancement of buildings. Namely, eligible expenditures refer to

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projects aimed at: reduction of building thermal losses (paragraphs 344 and 345); installation of solar collectors for hot water production (paragraph 346) and of condensing boiler (paragraphs 347); construction of very high efficiency new buildings (paragraph 351).

3. Implementation of EU Energy Performance of Buildings Directive (EPBD)

The Legislative Decree 192/05 (and its corrections and integrations by Legislative Decree 311/06) establishes the criteria, the conditions and the modalities to improve the energy performance of buildings.

D.Lgs. 192/05 establishes:

a) the methodology for calculating the integrated energy performance of buildings; b) the application of requirements in energy performances of buildings; c) the criteria for buildings' energy certification; d) the periodic inspections of air conditioning systems; e) the criteria guaranteeing the qualification and independence of experts in charge of energy certification and the inspections of systems; f) the collection of information and the experiences, the elaborations and the necessary studies to the guide energy sector politics; g) the promotion of the rational use of energy through the education of energy's end-users and customers and the training of energy sector workers.

The State, the Regions and the independent Provinces pledged to cooperate within the bounds of their various competences to implement and manage these decrees.

EPBD principal objectives are:

- To promote the improvement of the energy performance of buildings within the EU through cost effective measures;
- To promote the convergence of building standards towards those of Member States which already have ambitious levels.

Measures include:

- Methodology for calculating the energy performance of buildings;
- Application of performance standards on new and existing buildings;
- Certification schemes for all buildings;
- Regular inspection and assessment of boilers/heating and cooling installations.

In planning to transpose the EU Directive on 6 October 2006, Italian law establishes the following additional measures:

-From 1 July 2007, existing buildings and those under construction must issue an "energy certificate" when they enter the real estate market. Public fiscal assistance for any subsequent renovation work will require such certificate.

-To decrease the current thermal demand of buildings by 20 - 25%, the state plans a 2008/2009 law to strengthen thermic insulation.

-All new buildings are obliged to satisfy at least 50% of hot water demand by mean of solar generation.

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Transport

1. Enhancing energy efficiency and environmental sustainability of vehicles

Budget Law 2007 includes provisions guaranteeing incentives for the enhancement of energy efficiency and environmental sustainability of vehicles. These incentives are provided in the form of a financial grant for: replacing polluting vehicles (i.e. passenger cars and goods vehicles “euro 0” and “euro 1) with new reduced pollution vehicles (i.e. “euro4” and “euro5” vehicles); buying passenger cars and goods vehicles utilizing natural gas or liquefied petroleum gas.

2. Implementation of EU Directive on use of biofuels

Budget Law 2007 contains provisions for promoting the use of biofuels for transport. In particular, to comply with the EC Directive: new quantitative national targets for biofuels have been set up for the period 2005 - 2010 ; an excise tax reduction for vehicle biofuels has been introduced.

Industry

1. Revolving fund to finance measures for GHG reduction (for the period 2007-2009):

Budget Law 2007 includes a provision concerning the establishment of a revolving fund having a yearly budget of 200.000.000 €. The priority measures to be funded through available financial resources include: a) high performance micro-cogeneration plant; b) high efficiency electric motor substitution (more than 45 kW).

Cross-cutting

1. National Energy Efficiency Action Plan

In accordance with EU Directive 32/CE/2006, Italy notified the EC its National Energy Efficiency Action Plan on July 2007. The plan considers measures already taken under Budget Law 2007 and other measures like application of energy efficiency standard in building and promotion of high efficiency CHP plants. Proposed measures will allow to reach an energy saving target of 9.6% by 2016. The EEAP has been developed in collaboration with the major national stakeholders organizations with the aim to share priorities and objectives of the plan. All economic sectors (industrial, residential, tertiary and transport) have been considered with the aim of reaching the energy saving national target of 118.464 GWh by 2016. The burden sharing among different sectors is: 45% residential; 20% tertiary; 17% and 18% respectively for industry and transport.

2. White Certificate Scheme

Since 2001 two further amended versions of the decrees have been issued. The most recent version, of December 2007, introduced the following major changes: a) it increases the annual quantitative targets for DSOs; b) it decreases from 100.000 to 50.000 the threshold of customers for which DSOs are obliged to achieve predefined targets of energy savings; c) it extends the implementation period from 2009 to 2012, and, finally, it allows companies with an appointed energy manager to operate in the scheme.

The Regulatory Authority for Electricity and Gas (AEEG), which has responsibility for implementation and monitoring of the results, with the active collaboration of the

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National Agency for New technology, Energy and the Environment (ENEA), has certified, till March 2007, about 2,000 projects corresponding to a saving of about 900,000 tons of oil equivalent (toe); the target for 2005-06 (468,000 toe) was thus amply exceeded. The total energy saving achieved to date, has permitted avoiding emissions of about 2.4 million tons of carbon dioxide. The avoided energy costs on the side of end users, receiving the energy saving applications, was far greater (from six to ten times) than both the average price of white certificates traded on the market and the value of the tariff contribution granted by the Authority to the distribution companies for each toe saved.

3. Fiscal incentives for promoting high efficiency electric motors and variable speed drivers

Budget Law 2007 includes provision allowing a fiscal deduction worth 20% of the total expenditure, borne by 31/12/2007, for promoting high efficiency electric motors and variable speed drivers. The Budget Law 2008 confirmed the above mentioned fiscal incentive and extended the deadline of borne expenditures from 31.12.2007 to 2010.

4. Implementation of EC Directive “on the promotion of cogeneration based on a useful heat demand in the internal energy market”

The legislative decree n.20/07 issued to transpose in the Italian Legislation the European Directive 2004/8/EC “on the promotion of cogeneration based on a useful heat demand in the internal energy market”. This decree established that up to 31 December 2010, high efficiency cogeneration systems must comply with criteria defined by the Regulatory Authority deliberation 42/02. So that a simultaneous production of heat and power will be considered energy produced in cogeneration if it complies with the following requirements: a) a primary energy saving of 10%, compared with the separate production of heat and power; b) a minimum useful heat of 15%.

Major policies objectives and priorities

The National Research Programme is the main Italian R&D policy document. The current Programme covers the period 2005-2007 and was elaborated according to the Government’s guidelines for scientific and technological policy. The Ministry of Education, University and Research (now Ministry of Universities and Research) coordinated its preparation, that was made taking into consideration the European Commission documents and action plans and after extensive consultation with relevant stakeholders: Ministries, Regional Governments, the scientific community, the Confederation of Italian industries, *Accademia dei Lincei* and Labour Unions. The new National Research Programme will cover the period 2008-2010 and will be issued in 2008. The funding was granted according to the four macro-areas set out in the 2002-2006 Government Guidelines for R&D:

- curiosity driven research;
- research with medium term impact;
- industrial R&D;
- local development (high-tech districts).

Priority was attached to: Environment, Transport, Energy, Agrifood, Health, Innovation and Communication Technology (ICT), New Materials and Nanotechnology, Production Systems and

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Cultural Heritage. In the frame of the Strategic Action on Industrial Innovation, the Ministry of Economic Development has launched the Programme **Industria 2015** that foresees Projects on Energy Efficiency with the following priority funding areas: photovoltaic, thermodynamic solar, bioenergy and energy production from wastes, hydrogen and fuel cells, distributed generation, wind energy, ecobuilding, electric engines, lighting, appliances, energy-intensive industrial processes, with the final goal of improving industrial innovation and competitiveness in the energy efficiency sector.

The **Fund for Research on the Electrical System** of the Ministry of Economic Development foresees four main areas: power grid management, generation, transmission, end-use, with the main goal of technology innovation of the electricity system, enhancing the cooperation among R&D Centres, Universities and Industries.

The **Italian Technological Districts**:

One of the main priority objective of the S&T Italian policy is the promotion of companies' innovation capability through aggregations at territorial level. The Italian government has adopted two new initiatives to operate in this direction:

- the creation of “joint labs” between university or public research bodies and industry, in a specific area (i.e. new materials, biotechnology, nanotechnology and other areas crucial to sustain new high –tech industries);
- the creation of technological districts in some carefully chosen geographic locations in Italy.

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IV. Diversifying Energy Mix

SPB MG: DEVELOP TECHNOLOGIES AND FACILITIES FOR CARBON CAPTURE AND STORAGE

CARBON CAPTURE AND STORAGE

In the R&D sector the role played by ENEA and its associated companies is relevant. Sotacarbo and CESI Ricerca which can be considered as an integrated group of capabilities and experiences able to put in place all the competencies needed for CCS R&D.

Carbon sequestration in Sotacarbo project on hydrogen and energy production from Sulcis coal
Design, construction and experimentation of a test facility for syngas production from Sulcis coal with CO₂ and H₂ separation.
Partners: Sotacarbo (project coordinator), Ansaldo Ricerche, ENEA and the University of Cagliari
Funding Source: The project has been partially funded by European structural funds through the Italian Ministry for Universities and Research. The project started on January 2003 and will last 6 years
Overall Project Costs: The total cost (including both investment and testing) is estimated at approx. € 12 millions

ENEL has launched a very intensive R&D program on CCS, mainly funded by its own resources, in the frame of its participation to the European Technology Platform on Zero Emission Power Plants. The program can be broken down into the following main projects:

SPB MG: REDUCE NATURAL GAS FLARING

Not applicable. Gas flaring is not permitted in Italy.

SPB MG: ENSURE THE SAFETY AND SECURITY OF CIVILIAN NUCLEAR POWER FACILITIES

Not applicable. No active nuclear power plants are in place in Italy.

SPB MG: PROVIDE FOR SAFE DISPOSAL OF LOW-, MEDIUM-, AND HIGH-LEVEL NUCLEAR WASTE

Nuclear fuel cycle

In 1999, all ENEL Spa liabilities and assets connected to nuclear power were assigned to a newly established company, named Sogin (Società Gestione Impianti Nucleari) S.p.A., whose shareholder is the Ministry of Economy, while the strategic and operational aims are given by the Ministry of Economic Development. In 2003 FN (Fabbricazioni Nucleari) and ENEA's nuclear related liabilities were also transferred to Sogin.

The primary mission of the Sogin Spa is to cover, among other activities, the decommissioning of old Italian nuclear installations and the safe management of the spent fuel and radioactive waste.

In Italy, four nuclear power stations (i.e. Garigliano, Latina, Trino and Caorso) were operated until middle of 80's. At present they are, at different stages, in the process of

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being decommissioned according to a strategy for immediate decommissioning established on late 90's.

The spent fuel and the largest part of the radioactive waste to be managed in Italy derive from the operation of the above mentioned NPPs and fuel cycle facilities. As far as concern spent fuel, part of that has already been transferred abroad for reprocessing (namely the fuel of Latina and part of the fuel of Garigliano and Trino NPPs). The decommissioning activities will be completed in 2024. Also the reprocessing strategy for spent fuel management was accordingly adopted by Sogin in 2005, and planned the shipment of the spent fuel for reprocessing in foreign facilities.

At present, almost all the waste generated by the operation of nuclear installations are stored in the sites of origin. The Ministry of Economic Development has indicated that the procedure for the definition of a suitable site for final disposal of low- and intermediate-level wastes and for temporarily high-level waste storage will be available in 2008. The national repository is scheduled to operate within 2020.

SPB MG: ESTABLISH A ROBUST, COMPETITIVE, AND COST-EFFECTIVE RENEWABLE ENERGY INDUSTRY

Renewables promotion policies

Civil sector

- 55% tax allowance for investment in solar thermal, PV modules, biomass heaters and geothermal heat changers.
- 36% tax allowance for investment in mini wind;
- VAT reduction to 10% for the components of the technologies mentioned above.

Agriculture

- 36% tax allowance for investment in mini wind and VAT reduction to 10%.
- Local biomass use is incentivated by higher coefficients applied to electricity generation plants that uses biomass coming from crops that are less than 7 km far.

Photovoltaics

In 2005, jointly with the Ministry of the Environment and Land Protection, the Ministry of Productive Activities issued the Ministerial Decree defining criteria for supported electricity generation by photovoltaic solar plants. The incentive scheme applies to photovoltaic (PV) solar plants or systems (new, renovated or repowered/upgraded) which have a capacity of 1 to 1,000 kW and which have become operational after 30 Sept. 2005.

The PV projects which may be implemented and benefit from supported tariffs for twenty years fall under three capacity classes and varies from 0,445 to 0,490 €/kWh.

The supported tariffs are increased by 10%, if the PV modules are used in new or renovated buildings.

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SPB MG: DEVELOP BIOFUELS IN A COST-EFFECTIVE AND ENVIRONMENTALLY SUSTAINABLE FASHION.

Budget law 2007 provides for:

- increased share of biofuels to 1% of total vehicle fuels
- In the agriculture sector self consumption of vegetable oil for energy use is exempted from the excise tax (up to an expenditure of 1 million €/year starting from 2007).
- Excise tax reductions:
 - -20% of the excise tax applied to diesel oil for:
 - Biodiesel (up to 250000t);
 - Bioethanol (up to an expenditure of 73 million €/year).

Budget law 2008 increases the share of biofuel to 3%

SPB MG: ENHANCE DEVELOPMENT AND DEPLOYMENT OF NEW ENERGY TECHNOLOGIES.

The Government has approved within the 2007 and 2008 Budget Laws new tax incentives for firms that invest in Research and Development. The new industrial policy “*Industria 2015*”¹. The related “Fund for Competitiveness and Enterprise Financing (Industria 2015)” foresees grants for 990 Million € for 2007-2009.

Another funding instruments, in addition to government funding to universities and public research institutions, are the following ones:

1.FIRST: Fund for the Investments in Scientific and Technological Research: 300 Million €/y for 2007-2008 and 360 Million € for 2009

2.Fund for Research on the Electrical System: created, by a levy on electricity bill, to finance research on the electrical system (<0,03 cents €/kWh):

3.Program Agreements with Public Research Institutions: 60 Million €/y for 2006-2008

4.In the frame of the European Strategy for Sustainable Development, Italy has approved for the period 2007-2009:

Fund for Sustainable Mobility: 90 Milion €/y

Fund for Implementation of the Kyoto Protocol: 200 Milion €/y

Fund for Sustainable Development: 25 Milion €/y

¹ see paragraph III

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SPB MG: COOPERATE WITH OTHER COUNTRIES IN R&D OF NEW ENERGY TECHNOLOGIES.

The implementation of the *Industria 2015* program foresees the definition of agreements among the Government and the regional authorities in order to disseminate the results of the R&D projects and get the industrialisation phase started to be funded with resources partially provided by the European Union.

V. Securing Critical Energy Infrastructure

SPB MG: INVENTORY AND UPGRADE CRITICAL ENERGY INFRASTRUCTURE.

SPB MG: ENSURE LONG-TERM SECURITY OF ENERGY TRANSPORTATION ROUTES AND INFRASTRUCTURE.

In the energy sector in Italy the main critical energy infrastructures are the gas network and the electricity network. Considering that the power plants are about 55% gas fired, a significant failure or a disruption of the gas network could have serious consequences also for the electricity sector.

Gas demand is covered for 86% by imports and domestic production is decreasing; more than 67% of the gas supply is coming from two countries (Russia and Algeria) and this situation is not going to change in next years.

The level of security of the energy networks is adequate and linked to the possibility for the structure of the grids to cope with negative events without serious consequences of the security of supply. The grids have remote control stations adequately protected and with a redundant level of monitoring and energy flow control.

Any event is immediately monitored and the dispatching centres have the possibility to adopt emergency measures (e.g. in the electricity grid, the activation of interruptible customers without delay, and then the possibility to increase production or import of electricity) to assure the balancing of the system.

In the gas system the network operator can change the dispatching arrangements of the compression stations to change flow patterns, and there is the possibility, in case of events lasting for longer periods, to use the strategic gas storage, with a total amount of 5.1 bcm of gas available.

During the last three years the gas system, due to the increase of the gas demand coming from power generation plants, in case of extremely severe winter conditions, or of reduction of external supply (as during the dispute between Russia and Ukraine) have experienced some emergency situation that have been faced by means of measures to increase flows from other pipelines and gas withdrawal from storages, and to reduce gas demand from power generation and industrial customers.

During 2008 this situation will be solved thanks to the operation of two de-bottlenecking along the transit pipelines in Tunisia and Austria, that will increase gas flows from Algeria and Russia for 9.7 bcm/y and the start of the operation of a new offshore regasification plants in the Adriatic Sea with a capacity of 8 bcm/y.

Italy

A large program of new infrastructures for gas import have been promoted by the Government that will give a significant contribution to ensure long term security of energy routes to the Caspian area and to Algeria.

Italy

VI. Reducing Energy Poverty

SPB MG: SUPPORT PROGRESS TOWARD THE UN MILLENNIUM DEVELOPMENT GOALS.

UN Millennium Goal 7a: Integrate the principles of sustainable development into country policies and programmes; reverse loss of environmental resources

Italy fully adopted directive 2001/42 of the European Commission. Said directive provides for:

- 1) a high degree of environmental protection
- 2) a contribution to integrating environmental constraints, in order to promote sustainable development, in both drafting and implementing of development programmes.

Environmental Impact Assessment (EIA) on a project level and Strategic Environmental Assessment (SEA) on a programme level are mandatory requirements for all investment above a certain threshold.

In the energy sector Italy will implement EU programmes and directives based on Kyoto commitments established by the EU Council in spring 2007 to be achieved within 2020 for CO₂ reduction, energy efficiency, renewables and biofuels as described in detail in other parts of this document.

UN Millennium Goal 8g: In cooperation with the private sector, make available the benefits of new technologies— especially information and communications technologies

SPB MG: REDUCE ENERGY POVERTY IN DEVELOPING COUNTRIES.

SPB MG: ENHANCE ENERGY EFFICIENCY IN LOW-INCOME HOUSEHOLDS.

No specific projects are in place in the energy sector. Italy takes active part in bilateral and multilateral programmes in the sector of international cooperation with developing countries.

Italy

VII. Addressing Climate Change and Sustainable Development

SPB MG: REDUCE GHG EMISSIONS DOMESTICALLY AND MEASURE GHG EMISSIONS REDUCTIONS ACHIEVED.

SPB MG: ESTABLISH A CARBON PRICE SIGNAL IN THE ECONOMY AS A WHOLE OR IN MAJOR ENERGY SECTORS

SPB MG: LIMIT EMISSIONS VIA INTERNATIONAL EFFORTS AND MECHANISMS SUCH AS CDM AND JI.

SPB MG: COMPLETE A HIGH-QUALITY GHG INVENTORY AND GHG EMISSIONS REDUCTION PLAN.

SPB MG: DEVELOP A BROAD STRATEGY THAT COMBINES ENERGY AND CLIMATE OBJECTIVES?

National Plan of GHG emissions Reduction

Italy is now in the process of reviewing the National Plan of GHG emissions Reduction, CIPE (Comitato Interministeriale per la Programmazione Economica – Interministerial Committee for Economic Programming) 123/2002, to update the policies and measures needed to meet the Kyoto target by the first budget period 2008 – 2012.

The contribution of voluntary agreements to emission reductions in the industrial sector has decreased after the entry into force of the EU emissions trading scheme.

The Interministerial Technical Committee for greenhouse gas emissions (CTE), set up by the CIPE deliberation 123/02, has the responsibility to regularly monitor progress in the implementation of policies and measures, on the basis of indicators and sectoral-level emissions. It also has the task to carry out cost-effectiveness analysis to identify additional measures needed to meet the Kyoto target.

The IV National Communication to the UNFCCC (submitted on 29.11.2007), assesses the progress made towards the Kyoto target and identifies further measures to fill the remaining gap.

The effects on emissions of the planned increase in coal use for electricity generation are assessed through the National Allocation Plans submitted in accordance with directive 2003/87/EC.

Following a steep rise in the fuel prices, Italy's carbon tax, introduced in 1998, was suspended already in September 2000. Its envisaged transformation into a tax on actual emissions has not taken place yet.

As for the *dissemination of energy efficiency technologies and measures to small and medium-sized enterprises the main instruments are* Industria 2015² and the White certificates scheme representing a cross cutting policy aimed at promoting energy efficiency and delivering emissions reductions in all the energy end use sectors.

Greenhouse gas and CO₂ targets

² see chapter III

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–Italy is a member State of the European Union. In the framework of the EU Burden Sharing Agreement, Italy has committed itself to reduce its greenhouse gas emissions by 6.5% below base-year levels over the first commitment period, 2008-2012.

–The Kyoto target is therefore set at 483,3 Mt CO₂ eq.

–The European council of 8-9 march 2007 adopted an independent commitment for the EU to achieve at least a 20% reduction of greenhouse gas emissions by 2020 compared to 1990. The Commission has recently presented a package of proposals to achieve this target. In the framework of the proposal for a decision on the effort of the Member States to reduce their GHG emissions in the non-ETS sectors, Italy has been assigned a 13% reduction by 2020.

Progress towards targets

–According to the latest official data (APAT, 2007) in 2005, GHG emissions were 12,13% over 1990 levels

–Trends indicate that, despite the envisaged additional policies and measures, the target will not be met domestically.

–As reported in the IV National Communication to the UNFCCC, even with the implementation of planned measures and the contribution of the LULUCF sector and the flexible mechanisms of the Kyoto Protocol, there is still a gap of about 20 Million of CO₂ equivalent.

- In the framework of the current revision of the national strategy, the general approach requires 80% of the reduction effort to be achieved through the implementation of domestic policies and measures and the remaining 20% through the use of the Kyoto mechanisms

Japan

JAPAN

Japan's Report in adhering to the St. Petersburg Energy Security Principles

I . Increasing Transparency, Predictability and Stability of Global Energy Markets

● Provide more and better sector-specific and fuel-specific energy data to the public

The comprehensive energy statistics was revised substantially when the fiscal 2001 results were compiled. Subsequently, as a study was conducted during the period from Mar. 2004 to Aug. 2006 in order to refine the statistics, the comprehensive energy statistics for fiscal 2004 was again revised retroactively to fiscal 1990. This series of revisions expanded the energy conversion sector in the comprehensive energy statistics from the past 15 items to 89 items and expanded final energy consumption from the past 23 items to 90 items (including reference values). In addition, the fuel types were expanded from the past 40 items to 172 items. In order to ensure transparency, these comprehensive energy statistics were posted on the website of the Government of Japan (GOJ) to allow everybody to download them.

The price of crude oil imported from the Middle East to Japan is generally determined on the basis of the Dubai and Oman Average Price. Following the listing of gasoline on the Tokyo Commodity Exchange (TOCOM) in 1999, the volume of transactions expanded in the futures and spot markets. Prices determined in these futures and spot markets are now used as wholesale price indicators in transactions between wholesalers and leading distributors or major customers.

Moreover, a survey of energy consumption in agriculture, forestry, fisheries, mining, construction, small and medium-sized manufacturing, and tertiary industries was initiated in fiscal 2004. The third preliminary survey of the results for fiscal 2006 covered approximately 210,000 business establishments and the results of this survey covering 96 different types of industrial sectors and 37 items of fuel types were posted on the GOJ's website. From fiscal 2007, a formal survey of the results will be started.

● Enhance the transparency of energy market transactions and network flows

The Japan Electric Power Exchange (JEPX) started the operation in 2005 in order to enhance utilities' risk management function in investment, and to secure supply capacities on the nationwide scale. At present, bilateral contracts for the majority of trade being conducted on the wholesale electricity market, but the Electricity Industry Committee is now considering policy options aimed to revitalize JEPX. JEPX is now keeping a watch over unfair trade and is verifying the acts of prevailing business operators. Some measures will be implemented to step up monitoring over activities on the market. And the GOJ has formulated the "Guidelines for Proper Electric Trade". The guidelines prescribe for desirable acts and avoidable acts in market transaction. In addition, Market Monitoring Subcommittee, composed of neutral members, is responsible for settling disputes, including cases related to unfair trade.

Regarding gas market, the GOJ has formulated the "Guidelines for Proper Gas Trade". The guidelines stipulate that using information gained in the performance of wheeling services for purposes other than intended ones is prohibited, and discriminatory treatment is prohibited.

The favorable system has been created to encourage as many business enterprises as possible to actively invest in the construction of pipelines - and for this purpose, public interest privileges and investment incentives have been provided to those who construct pipelines in areas where a pipeline network is yet to be constructed and those pipelines that would connect several consumption areas with one another.

In a bid to improve transparency in crude oil and refined products futures markets and ensure appropriate pricing, commodity exchanges publishes daily total trading volume and market prices pursuant to the Commodity Exchange Act and TOCOM provides various market data, e.g. real-time pricing, on a real-time basis on its website.

- **Ensure independent regulation and clearly defined energy market conditions**

The electricity market is regulated in a stratified manner by the Agency for Natural Resources and Energy, the Fair Trade Commission, and the Market Monitoring Subcommittee of the Electricity Industry Committee, which is composed of neutral members. The subcommittee was established in 2005 from the viewpoints of increasing the neutrality of the administration authorities and reinforcing the specialty by actively utilizing external well-informed personalities. As for important matters among disputes related to the Electricity Business Act and part of the orders by the act, the subcommittee discusses whether it is appropriate to invoke orders and administrative measures in response to requests from the administrative side.

As the trends of prices of oil products have impact on the life of the people, Ministry of Economy, Trade and Industry (METI) surveys retail prices every week. Since fiscal 2007, METI increased the number of samples from 1,300SS to 2,000SS. METI also conducts hearings of oil distributors on the methods of deciding prices, and requests them to prevent "me-too" price hikes and ensure stable supply. Regarding crude oil and refined products futures markets and commodity exchanges, the GOJ implements the market regulations based on the Commodity Exchange Act and TOCOM have also addressed the improvement of the market surveillance system.

- **Implement Energy Charter principles related to energy transit across borders**

The GOJ has placed high priority on this framework as a multilateral agreement and the only legally binding international instrument in energy sector, conducive to the transparency, predictability and stability of the global energy market. The GOJ has emphasized efforts to expand member states of this framework among member states, particularly Asian countries. In concrete terms, the GOJ announced in Dec. 2006 its candidacy to the chairman of the Energy Charter Conference from the perspective of strengthening Asia's presence in this framework. Consequently, Takekazu Kawamura, Ambassador of Japan to the European Union, assumed the post of Chairman in Jan. 2007. Moreover, the GOJ has extended appeals to Asian nations in collaboration with the Secretariat at every opportunity.

The GOJ has suggested initiating multilateral consultations on the provisions of the Transit Protocol that have not yet been agreed upon. In response to the Japanese proposal, active multilateral consultations are currently under way, notably with the positive involvement of Central Asian countries where substantial energy transit takes place.

- **Meet obligations of the IEA's International Energy Programme (IEP) (if applicable)**

Japanese systems for stockpiling petroleum and liquefied petroleum (LP) gas are composed of the national one by the GOJ and the private one in accordance with the "Petroleum Stockpiling Law."

As of Jan. 2008, the national and private systems altogether store petroleum and LP gas with the amount corresponding to net import for 151 days (IEA base).

The information on demand and supply is constantly gathered, but in an emergency, the "Petroleum Stockpiling Law" and the "Petroleum Supply and Demand Optimization Law" stipulate that it is possible to gather more detailed information from oil refiners, oil importers, and oil distributors, etc.

The GOJ have concluded an agreement with New Zealand for the cooperation in petroleum stockpiling with New Zealand. The GOJ is also promoting international cooperation for petroleum stockpiling with Asian countries by encouraging the improvement in emergency response capacity, providing them know-how.

- **Put in place emergency plans to deal with domestic energy supply disruptions**

In an emergency, such as the disruption of supply of petroleum and LP gas, the GOJ will take measures, such as requesting oil-producing nations to increase their output, curbing

Japan

domestic demand, and using the stockpiled petroleum. The release of national stockpile is made by selling them to private firms, etc. while private stockpile is used by decreasing the minimum number of days for oil stockpiling. With regard to petroleum stockpiling, the introduction of state petroleum product stockpiling systems is being prepared.

Regarding natural gas supply, Japan's LNG procurement is characterized by steady transactions built on mutual trustful relations under long-term commitments with gas-producing countries. During the 1990 Gulf War, LNG supplies to Japan were never interrupted. Japan is reliant on as diverse LNG supply sources as eight countries (on a long-term contract basis) and sufficient supplies can be secured 1) by drawing down on private enterprises' voluntary stockpiles (for 20 to 30 days' supplies), 2) by utilizing other projects' surplus supply capacities (which are generally believed to be around 10% for each project) or 3) by intersupply between LNG importers.

With regard to electricity supply, Japan's Electricity Business Act requires general and wholesale electricity utilities to submit the supply plans for 10 years from the next fiscal year, to METI by the end of each fiscal year. This makes it possible to secure reserve capacity for use in case of accidental short-term changes in supply and demand. In addition, the act establishes the system where the Minister can order electricity utilities to supply electricity to protect the public interest in an emergency such as a disaster and allows the Minister to restrict electricity usage, if it is decided that supply shortage may adversely affect the national economy and people's life.

● **Reduce corruption in energy market transactions and dealings**

METI that takes charge of the Electricity Business Act and the Fair Trade Commission (FTC) that takes charge of the Antimonopoly Law are held responsible for the scope of their respective jurisdiction, cooperate with each other, and formulate and operate the "Guidelines for Proper Electric Trade". The guidelines were revised in Dec. 2006 in consideration of the commencement of operation in JEPX and individual cases of consultations with FTC and METI. Moreover, regarding crude oil and refined products futures markets and commodity exchanges, the GOJ sets stringent rules based on the Commodity Exchange Act.

● **Enhance the security of oil and natural gas supplies**

The GOJ has intensified its support for private corporations by increasing equity financing for E&P projects from Japan Oil, Gas and Metals National Corporation (it has raised the percentage ceilings for equity capital and liability guarantees from 50% to 75%), and creating an "Insurance for Natural Resources" (an export insurance scheme more favorable than ordinary ones) by Nippon Export and Investment Insurance, to take a couple of examples.

In addition, utilizing its technologies in the upstream and downstream sectors as described below, the GOJ contributes to increasing supply of oil and gas through the development of new oil and gas fields.

- ① In producing and transporting heavy oil and ultra-heavy oil, the GOJ proposes to oil producers our technology of upgrading heavy oil, and sets up joint projects.
- ② Utilizing our technology for E&P projects in active oil fields (e.g. the application of CO₂-EOR technology) and ultra-deep water oil and gas fields, the GOJ contributes to exploring additional supplies and new sources of supply.
- ③ The GOJ tries to contribute to discovering unconventional sources of oil and gas supply in E&P projects of small and medium gas fields and undeveloped hydrocarbon resources, by developing and utilizing new ways to use existing natural gas resources (e.g. GTL) and undeveloped hydrocarbon resources (e.g. methane hydrate) for technological and economical reasons.

In order to expand its multi-layered cooperations to education and cultural exchange as well as energy and environment, in additions to economic cooperations, the GOJ has strived to promote trade and investment (by signing several EPAs), support industrial policy-making,

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cooperate in industry based on regional research, build up human resources, cooperate in R&D, promote small and medium enterprises, develop water resources, construct infrastructure, launch joint projects in education and medical care, support local population, and expand human exchange with taking circumstances in each resource producer into consideration.

II. Improving the Investment Climate in the Energy Sector

● Promote investment in energy infrastructure and streamline infrastructure siting

METI formulated the New National Energy Strategy in May 2006 to cope with changes in energy situations including tightening demand and supply in recent years and global warming issues, ensure stable supply of energy in medium- and long-term period, and solve environmental problems related to energy use.

In consideration of the above, the Basic Energy Plan was revised in March 2007. The plan lays down a basic policy to utilize market principles taking due consideration of ensuring stable supply and adapting to the environment. The plan has four major pillars; 1) taking measures for promotion of nuclear energy and steady introduction and expansion of new energy, 2) making a strategic and comprehensive effort to ensure stability of oil supply, 3) taking leadership in creating an effective international framework, and 4) achieving a technological breakthrough to solve energy and environmental constraints.

In addition to long-term low-interest funding through fiscal investments and loans, the GOJ is offering financial incentives to promote energy-related infrastructure, including the Energy Reform Tax Credit Program; special cases of taxable basis concerning fixed property tax on substation facilities, power transmission facilities and others; provisions for reprocessing spent fuels generated in nuclear power plants; and provisions for decommissioning nuclear power facilities.

● Ensure a level playing field for all competitors in the oil, gas, coal and power sectors

The GOJ has regulated foreign direct investment in some limited industries in view of national security under Foreign Exchange and Foreign Trade Control Law within the framework of OECD Code of Liberalization of Capital Movements.

Liberalization of the retail electricity market started in 2000, and 64% of the amount of retail electricity sales is liberalized in fiscal 2006. Under the discussions started by the Electricity Industry Committee in Apr. 2007, the committee submitted a report in Mar. 2008 that called for reforms to review the wheeling charge and imbalance charge systems and invigorate transactions and dealings in the wholesale electric power exchange (creation of the intraday market to cope with unexpected supply and demand mismatch, invigoration of forward market, etc.). Detailed system designs are made from now on, and then measures are taken as early as possible.

The Japanese retail gas market was liberalized with the annual contract gas consumption of 500,000 m³ or more in 2004 and further to the customers with 100,000 m³ or more in 2007. In order to ensure fair and transparent access, the Gas Utility Industry Law was revised in 2003 to require all general gas utility companies and gas pipeline operators to prepare, notify, and announce wheeling service rules and provide wheeling services under terms and conditions prescribed by the wheeling service rules. Following the implementation of these institutional reforms, new entrants to the gas supply business have been increasing at a steady pace and progress has made in competition in the large-lot gas market. Also city gas supplies have been steadily increasing.

● Expand trade and better integrate energy markets with neighbouring countries

The GOJ regards the Pacific Pipeline project as a promising project that would bring oil to the coast without crossing any country borders. The first stage of the pipeline is scheduled to start operation in 2009. For the second stage of the pipeline, the dates of installation and start-

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up of operation have not yet been decided. In the Sakhalin-1 project, the crude oil shipment to other countries including Japan began in Oct. 2006. In Sakhalin-2, crude oil and natural gas are to be brought to the southern tip of Sakhalin. Natural gas will be exported as LNG to customers including Japanese companies. The operation of the project is expected to start in 2008 or 2009.

In regard to nuclear power, the GOJ extends its assistance to Asian countries, considering introduction of nuclear power generation in promoting earlier conclusion of relative international conventions and treaties related to nuclear non-proliferation, safety and security. Along with these efforts, the GOJ began a program from fiscal 2006 aiming at the development of nuclear non-proliferation regimes, the introduction of nuclear safety regulation systems, the development of nuclear damage compensation systems, and the training of personnel. The GOJ is supporting the development of institutions for nuclear non-proliferation and safety in Vietnam and Indonesia and has also been carrying out personnel-training cooperation and institution development support with Kazakhstan since fiscal 2007. The GOJ has implemented support such as seminars and technical cooperation through the IAEA to strengthen the nuclear security of Asian countries and decided to extend cooperation of about \500 million to upgrade nuclear security for nuclear related facilities in Kazakhstan. Additionally, in fiscal 2008 a special contribution of \90 million will be newly established for the project to support the development of the foundation needed for the introduction of nuclear energy generation in Asia.

Regarding bioenergy, "Japan's Initiative in Energy Cooperation" by former Prime Minister Abe at the East Asia Summit in Jan. 2007 created the Asia Biomass Energy Research core and carried out a joint research intended to formulate a uniform benchmark that would provide guidance of use in formulating standards on the quality of biodiesel fuel in various countries. This research is also positioned as a pilot project by the Economic Research Institute for ASEAN and East Asia (ERIA).

● **Provide regular forecasts to the public on which to base investment decisions**

METI published Long-Term Energy Supply/Demand Forecasts in Mar. 2008. After review of measures described in the previous Kyoto Protocol Target Achievement Plan as well as newly added measures to be taken, it is found that Japan could meet its emissions reduction target set for the first commitment period of the Kyoto Protocol. Moreover, if energy saving effects are attained to the degree that technology potential might fully turn into reality without imposing obligatory measures on the people in 2020, it is shown that energy-derived CO₂ emissions could be reduced by 13 % as compared with the 2005 level.

● **Educate and train skilled energy personnel to meet long term labor requirements**

The education programs to be provided by resource-oriented universities and graduate schools were reviewed by the "review meeting on development of human resources for international resource development" in fiscal 2007. Based on the results, the GOJ plans to start supporting the efforts of academia and industry aiming at human resource development for international resource in this fiscal year. The GOJ established the national system to support local efforts to train on-site skilled workers of nuclear power facilities, started in fiscal 2006. The GOJ launched the projects in July 2006. Workers covered by the system are expected to reach more than 20,000. In addition, Ministry of Education, Culture, Sports, Science and Technology and METI worked together to launch a university-level program called "the Human Resources Development Program in the Nuclear Power Sector" in fiscal 2007 carrying out practical training and internship projects and curriculum development. In addition, supporting projects such as provision of supplementary readers and workshops for teachers are conducted in primary and secondary education.

The GOJ has made efforts to send experts to and accepting trainees from Asian countries including China, India and others to promote dissemination of energy conservation and

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renewable energy, and that of energy diagnosticians, plant engineers and other professional persons. Particularly, in the “Japan’s Initiative in Energy Cooperation”, the GOJ promised to send 500 experts and accept 1,000 trainees (for energy conservation) and 500 trainees (for biomass energy) in five years. In the field of energy conservation, the GOJ has accepted 577 trainees and sent 151 experts to date. In the field of renewable energy, the GOJ has accepted 240 trainees and sent 14 experts.

● **Drive cost-effective investment in renewable and alternative energy sources**

Photovoltaic power generation equipment have been introduced in the buildings of central government (ministries, agencies and other related organs). Moreover, the use of renewable energy at events held by the GOJ is also promoted.

RPS Law that makes it mandatory for electric utilities to purchase electricity generated by renewable energy is in force. The amount of electricity supplied by renewable energy in fiscal 2006 was 6.51 billion kWh (the amount increased by twice as much in four years since fiscal 2003 when RPS Law was enforced). After the council meeting in Mar. 2007, the target amount of use of renewable energy in fiscal 2014 was set at 16 billion kWh with the special promotion on photovoltaic power. Furthermore, various support measures including, among others, subsidies for introduction of power generation facilities with emphasis on new energy have been taken by the GOJ.

With regard to biofuel, an introduction amount of 500,000 kℓ (crude oil equivalent) in fiscal 2010 is set as a goal in the “Kyoto Protocol Target Achievement Plan”. The GOJ is striving to conduct wide-scale demonstrations and develop technologies for producing cellulosic biofuels which do not compete with food supply. The GOJ will also amend the “Law on the Quality Control of Gasoline and Other Fuels” in order to secure the quality of biofuel-mixed gasoline, and plans to establish a system in fiscal 2008 in which the gasoline excise will be exempted based on the amount of biofuel contained in the products.

● **Facilitate energy efficiency investment in buildings, industry and transport**

The GOJ implements the projects for energy conservation by subsidizing a portion of the costs for installing facilities or technologies (fiscal 2007 Budget: 26.9 billion yen). Also, the GOJ implements a tax break and public loan and investment program for the facility investment with high energy efficiency. In addition, importance is increasingly placed on support for innovative technology developments based on energy conservation technology strategy (budget appropriation for such support in fiscal 2007 amounted to 47.8 billion yen).

Regarding construction, the Act on the Rational Use of Energy imposes an obligation to put efforts into taking energy efficiency measures at the time of new construction or modification of buildings or residences and submit the plans describing the energy efficiency measures of large scale residences and buildings (with a floor area of 2,000 m² or more) to relevant ministries. In case where energy efficiency measures are materially inadequate, the relevant ministries will issue an order to change inadequate parts of the measures. In the event where these changes are not corrected, the name of the building’s owner is publicly announced. These measures are of help to raise the compliance rate of energy efficiency standards. Furthermore, in order to reinforce regulations, a revision to the Act on the Rational Use of Energy was proposed to the Diet to newly incorporate the following measures.

- Reinforcing of regulations (introduction of mandates (with legal penalties) in addition to direction and public announcements) regarding energy efficiency measures taken in large scale residences and buildings
- Addition of reporting obligations to certain small- and medium-sized residences and buildings, etc.

Also, in addition to creating a tax system to promote energy efficiency improvements for cases where specified energy conserving improvements (double sash windows, etc.) are made in existing residences, construction of energy conserving residences and buildings is

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facilitated by extending and expanding tax incentives. Moreover, the GOJ will also support and stimulate the dissemination of model projects in which advanced and effective CO₂-reduction technologies are introduced, through the subsidy system. To encourage investments in energy conservation, support is provided through tax breaks and subsidies and businesses such as ESCO companies are promoted.

Regarding transport, the GOJ put into force the Act on the Rational Use of Energy on Apr. 1, 2006, carriers with capacity over a certain level (for example, a fleet of 200 trucks or 350 taxis) are designated as specified carriers, and shippers with capacity over a certain level (an amount of 30 million ton-kilometers or more of cargoes entrusted to freight in their business activities) are designated as specified shippers. These operators are required to report the amount of energy consumption, etc.

III. Enhancing Energy Efficiency and Energy Saving

- **Implement the 16 energy efficiency measures that the G8 have specified for appliances, lighting, buildings, transport, industry, and across sectors**
 - **Standby Power and Low-power Modes:** Standby power consumption has been reduced to 1 W or less for major domestic products through voluntary control in the industry. Low-power modes are already included in the Top Runner Program.
 - **Fuel-Efficient Tire:** Fuel-efficient tire program for non pre-configured tires is to be discussed with the parties concerned.
 - **Set-Top boxes:** Top Runner Program applies to television sets and provides standard also for television sets with additional function such as tuners. Extensive discussion is to be made whether television peripheral equipments such as set-top box should be included in the Program considering their status of market diffusion, technology development.
 - **Efficient Lighting:** In April 2008, the Minister of METI announced the target to replace incandescent light bulbs generally used in the households with fluorescent light bulbs or other energy efficient light bulbs in principle by 2012, except when it is not possible. Responding to this statement, METI will make policy. The Top Runner standard has applied to fluorescent lamp and the efficiency was improved by 35.6 % from fiscal 1997 to 2005. METI is revising the energy efficiency standard of lighting sector with the possible inclusion of filament lamps into the Top Runner Program.
 - **Buildings:** Refer to Bullet 7 of Section II. The Energy Conservation Judgment Criteria has been tightened twice since its establishment in 1980. The GOJ has offered subsidies for the innovative technology development by private business entity including passive energy house and zero-energy building.
 - **Energy Performance Requirements or Labels:** Refer to Bullet 5 of Section III.
 - **Fuel Efficiency Standards for Light-duty Vehicles:** Fuel efficiency standard targeted fiscal 2010 has been set for passenger cars and small freight cars. In order to further improve fuel consumption, new fuel efficiency standard with fiscal 2015 as a target year was established in July 2007.
 - **Energy Efficiency Data for Industry:** Refer to Bullet 1 of Section I .
 - **Increased Investment in Energy Efficiency:** Refer to Bullet 7 of Section II.
 - **National Energy Efficiency Strategies:** Refer to Bullet 7 of Section II and Bullet 5,6,7 and 8 of Section III. METI formulated the New National Energy Strategy in May 2006 and set the target aiming to improve the energy consumption efficiency by at least another 30% by 2030. The GOJ actively supports IEA works for developing sectoral energy efficiency benchmarks and compiling good practices and participates in the related workshops and offer and examine data from the industrial sector. In addition, the GOJ is encouraging the coordination with IEA activities in the sectoral data collection work implemented by APP or IISI.
- **Ensure cost-reflective pricing**

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There is no subsidy to prevent electricity and gas rates from soaring. In addition, with the intention of reflecting changes in external factors such as fluctuations in fuel prices to electricity and gas prices, "Fuel cost adjustment system" and "Gas rate slide system" have been introduced, by which electricity and gas rates are automatically adjusted on a 3-month basis in accordance with fluctuations in fuel costs and exchange rates.

While these systems are not in the category of energy efficiency measures, they are well-functioning as systems which smoothly reflect fluctuations of fuel prices in rates.

- **Promote demand-side measures in the electric power sector**

Frameworks that provide incentives for customers to curtail their demand are classified into price-oriented incentives based on time of use rates and other incentives that include load adjustment contracts. In Japan, both forms of incentives are being implemented by electricity industry firms.

As cross-sectional measures for energy conservation beyond the electricity sector, the Conference on the Promotion of Energy and Resource-Saving Measures has been calling on citizens of all strata to save energy prior to the energy demand peak seasons of summer and winter every year. Also, energy suppliers are mandated under the Energy Conservation Law to make an effort to provide information to general consumers.

- **Encourage public and private financing for energy efficiency improvements**

Refer to Bullet 7 of Section II .

- **Develop efficiency standards and labels for buildings, appliances and equipment**

METI reviews and improves energy-saving standards for consumer electronics while broadening their applications under the Top Runner Program (the standards are currently applied to 21 types of consumer electronics, etc.). Regarding office equipments, further discussions are to be made in consideration of the actual conditions to establish and improve the standards.

In regard to construction, refer to Bullet 7 of Section II.

The assessment and display of the energy efficiency of residences and buildings are promoted through the development and spread of the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) and a system to display the efficiency of residences based on the "Housing Quality Assurance Act."

And, in order to further promote the display of energy conservation efficiency of buildings and residences, a revision to the Act on the Rational Use of Energy was proposed in the Diet.

- Guidance and advice from the Minister of Land, Infrastructure, Transport and Tourism to those who carry out the planning and construction of buildings and residences on the advancement of energy efficiency and the display of energy efficiency
- Specification of an obligation for those who sell and rent residences or buildings to make efforts to provide general consumers with information through the display of energy efficiency, etc.

Also, aiming to foster the widespread use of higher-performance insulating windows, the GOJ introduces the energy efficiency labeling system for windows in Apr. 2008.

The energy efficiency labeling system for electric appliances was introduced in 2000. The energy efficiency labeling system for microwaves, rice cookers and DVD recorders was implemented in Feb. 2007. In Oct. 2006, the GOJ introduced a new energy efficiency labeling system pursuant to Article 86 of the Act on the Rational Use of Energy. Under the system, retailers should attach "Uniform Energy Efficiency Labels" showing a product evaluation in light of the standards, estimated annual electricity usage to televisions, air-conditioners and refrigerators. A new system for evaluation of liquid crystal display televisions and plasma display panel televisions was adopted in response to the sales of over 60% models in their most efficient product category.

- **Provide energy efficiency audits to homes, offices, and industrial firms**

To monitor compliance with the standards based on the Act on the Rational Use of Energy, an industry-specified on-site investigation has been conducted at factories and workplaces since 2001. In addition to it, another on-site investigation started to be conducted at randomly-selected factories and workplaces in 2006. When they are considered by the results of those investigations not to fully comply with the standards, measures such as guidance are taken.

Furthermore, in a bid to improve energy management and introduce more comprehensive industry-led energy management, the legal unit under the Act on the Rational Use of Energy was proposed to be changed from that of factory or workplace to that of company. At the same time, franchise chains on a certain scale constitute one unit and should be responsible for their energy management as such. In this way, the regulations are applied to a wider range and more effective energy-saving efforts should be made at factories and office buildings.

- **Raise public awareness of energy efficiency opportunities**

METI and Ministry of the Environment (MOE) jointly established the “Forum for the Promotion of the Spread of Energy Saving Home Electronics” made up of manufacturers and retailer of home electronics and consumers groups in Oct. 2007 in order to promote the spread of energy saving home electronics as a national movement. In addition, an energy conservation contest which seeks unique energy conservation ideas for schools and residences and their application was carried out from Nov. 2007 to Mar. 2008. In addition to giving Prime Minister’s or other awards for exceptional efforts, a wide range of activities such as advertisements are carried out.

- **Improve end-use data and track progress towards energy efficiency goals**

In regard to improving end-use data, refer to Bullet 1 of Section I.

Concerning the state of progress of domestic energy conservation measures, in the short-term the GOJ is performing follow ups of the CO₂ emissions reductions of the Kyoto Protocol Target Achievement Plan. In the mid-term, the General Natural Resources and Energy Investigative Committee’s Supply and Demand Panel reviews the current or forecast energy efficiency and amount of energy consumed once every three years and has performed 14 reviews up until this point. Furthermore, ex-ante and post evaluations at each budget request or phase of execution are carried out, and during these assessments energy efficiency improvements, the progress towards achievement of final energy consumption amounts, and changes in indicators are reviewed.

IV. Diversifying Energy Mix

- **Develop technologies and facilities for carbon capture and storage**

The GOJ paved the pathway for commercialization of technology that can reduce the present cost of separation and capture technologies to about half. The GOJ has obtained the world's top class data on a laboratory basis to reduce the present cost to about one-fourth. As for the underground storage technology, the GOJ has achieved high precision of monitoring technology and long-term behavior prediction technology by storing about 10,000 tons of CO₂ in an aquifer about 1,100 meters deep underground and observing conditions for more than three years. The development of CCS technology is listed as one of the 21 technology fields selected in "Cool Earth - Innovative Energy Technology Program" on Mar. 5, 2008. As for the processes from coal gasification power generation to CCS, the GOJ plans to design a consistent total system with commercialization in view. In 2007, the GOJ revised its relevant law (Law Related to the Prevention of Marine Pollution and Maritime Disaster) to establish regulatory framework for the CO₂ storage in sub-seabed formations. The GOJ is now actively promoting the Callide-A Project as the world's first large-scale demonstration test that combines oxygen-fired coal power generation and CCS together under a bilateral

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international cooperation project between Japan and Australia. The GOJ also intends to participate in the FutureGen Project of the U.S. under a new framework that focuses on CCS technology.

● **Reduce natural gas flaring**

In Japan, oil and natural gas fields are much smaller than those in other oil-producing countries in terms of reserves and production. Natural gas derived from oil production is supplied through pipelines to use effectively in the form of town gas etc. Therefore, there are only a few cases where natural gas is flared in Japan and the GOJ don't take measures.

● **Ensure the safety and security of civilian nuclear power facilities (including the promotion of safe and peaceful use of nuclear energy)**

The GOJ revised the "guideline for review of earthquake-resistant designs of nuclear reactor facilities for power generation" in Sep. 2006. The revised guideline requires establishing the stronger basic earthquake ground motion than the one in the former guideline as a premise of earthquake-resistant designs.

Responding to the revision, the government gave directions to all electric power companies to evaluate the seismic safety of their existing nuclear power facilities and others (seismic reevaluation) in light of the revised guideline for review of earthquake-resistant designs, and to report the results of evaluation. Moreover, in response to the Chuetsu-Oki Earthquake in Niigata Prefecture in July 2007, the GOJ gave directions to all electric power companies and others to "appropriately reflect the findings from the Chuetsu-Oki Earthquake in Niigata Prefecture in their evaluation of seismic safety," and "review their plans to implement the seismic reevaluation to complete their evaluation with reliability but as soon as possible in consideration of the present status of evaluation of seismic safety."

The GOJ accepted twice (Aug. 2007 and Jan. 2008) the IAEA fact finding mission with an aim to internationally share the discovered facts and lessons concerning the impact of the Chuetsu-Oki Earthquake on nuclear power stations. The results of the study are publicly announced in the report to all over the world.

To promote further improvement of safety of nuclear power facilities, the improvement of inspection system was reviewed in the "review meeting on desirable inspection" and a report was worked out in Sep. 2006. Vigorous efforts such as the holding of explanatory meetings are now under way to promote the understanding of local communities and others about the improved inspection system.

When the Nuclear Reactor Regulation Law was revised in 2007, the regulations on safety of the business to dispose of high-level radioactive wastes by burying them deep underground were stipulated, and this business was made subject to physical protection of nuclear materials, and vitrified wastes were also made subject to physical protection of nuclear materials.

Japan Atomic Energy Commission developed the Framework for Nuclear Energy Policy in Oct. 2005. Under the Framework, the GOJ set the following three basic domestic targets:

- Maintain and increase the current level of nuclear power generation (30 to 40% of the total electricity generation) even after 2030
- Promote the nuclear fuel cycle
- Aim at the commercialization of fast-breeder reactors

In order to realize the basic targets, the Nuclear Energy Subcommittee of the Advisory Committee at METI compiled the Nuclear Energy National Plan in Aug. 2006. On the basis of the Framework for Nuclear Energy Policy and the Nuclear Energy National Plan, GOJ has promoted nuclear energy policies including following measures:

- Building new nuclear power plants in Japan
- Promoting R&D about light water reactors, nuclear fuel cycle and fast reactors
- Development of human resources
- Promoting international cooperation

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- Positive involvement in creating an international framework to uphold both non-proliferation and the expansion of nuclear power generation
- Reinforcement of measures for radioactive waste disposal

● **About the measures for disposing of radioactive wastes smoothly**

With regard to high-level radioactive wastes, the “Specified Radioactive Waste Final Disposal Act” was enacted in May 2000, to specify disposers of high-level radioactive wastes, processes for selecting disposal areas, and how to secure the costs for disposal. In Jun. 2007, the act was amended, to add TRU wastes, etc. that require geologic disposal to the targets of the act. In addition, the “Law regarding the Regulations on Nuclear Source Materials, Nuclear Fuel Materials, and Nuclear Reactors” was amended, to formulate safety regulations regarding geologic disposal. With regard to the costs for disposing of high-level radioactive wastes and TRU wastes, METI monitors the management of funds used for disposal, in accordance with the current system, and in order to secure long-term fund stability to a sufficient degree, appropriate system management is carried out, for example, by reviewing disposal costs every year.

● **Establish a robust, competitive, and cost-effective renewable energy industry**

Refer to Bullet 6 of Section II. Also, the GOJ has promoted projects that support technological development to increase the number of companies expanding into the renewable energy sector. For instance, the photovoltaic power generation sector has grown into an approx. 400 billion yen market, thanks to the efforts of the industrial sector backed up by such government assistance.

● **Develop biofuels in a cost-effective and environmentally sustainable fashion**

METI has been assisting Petroleum Association of Japan in demonstration projects for distributing ETBE-blended gasoline, since fiscal 2007. In addition, related ministries, including METI, Ministry of Agriculture, Forestry and Fisheries (MAFF), and MOE are collaboratively conducting demonstration projects of bio-ethanol-mixed gasoline in Miyakojima, and MOE is carrying out a demonstration project of bio-ethanol-blended gasoline in Osaka region. In addition, in order to promote smooth introduction and diffusion of biofuel, secure safety and security, and protect customers, METI will amend the “Law on the Quality Control of Gasoline and Other Fuels,” and take measures of obliging the firms that blend biofuel with gasoline and light oil to register their businesses and monitor the quality of their gasoline and light oil. METI formulated “Bio-fuel Technology Innovation Program” in Mar. 2008 to specify clear goals regarding cellulosic biofuel which do not compete with food supply, technology development, and roadmap, etc.

● **Enhance development and deployment of new energy technologies**

The GOJ formulated the Energy Technology Strategy 2007 in Apr. 2007. Some 235 energy technologies that have the potential for commercialization by around 2030 were identified in this Strategy. The new technologies are sorted out according to different policy goals and each technology is discussed under the headings of “Technology Map,” “Roadmap” and “Introduction Scenario” with predictions on their developmental phases, performance targets, cost targets and other items. It also contains explanations on common associated measures as well as broad methodology and direction of introduction and dissemination to achieve the policy targets.

The development of innovative technology is essential in achieving the long-term target of halving global greenhouse gas emissions by 2050 from the current levels under the Cool Earth 50, proposed in May 2007. METI organized an investigative commission comprising key intellectual figures and announced "Cool Earth - Innovative Energy Technology Program" in

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Mar. 2008. The commission selected 21 innovative technologies that should be prioritized to achieve the target and revealed the direction toward international cooperation..

- **Cooperate with other countries in R&D of new energy technologies**

International cooperation frameworks in which the GOJ is currently participating are International Energy Agency (IEA), Implementing Agreements, Generation IV International Forum (GIF), Carbon Sequestration Leadership Forum (CSLF), International Partnership for the Hydrogen Economy (IPHE), Asia-Pacific Partnership on Clean Development and Climate (APP) and Global Nuclear Energy Partnership (GNEP).

V. Securing Critical Energy Infrastructure

- **Inventory and upgrade critical energy infrastructure**

As for the measures to cope with nuclear disasters, the GOJ enacted the Nuclear Accident Prevention Law in Dec. 1999 in the wake the criticality accident at JCO's uranium processing facility in Sep. 1999, and promoted thorough reinforcement of accident prevention systems at nuclear power facilities.

Based on the law, the GOJ assigns senior specialists for nuclear emergency and strengthens emergency preparedness systems by establishing Nuclear Emergency Response Operations Facilities. Also, the GOJ conducts a comprehensive nuclear accident prevention drill every year, which is participated in by the Prime Minister and other ministers. In Oct. 2007, a drill was conducted at the reprocessing facility of Japan Nuclear Fuel Ltd. in Rokkasho-mura, Aomori Prefecture with participation and cooperation of 70 organizations and a total of 1,800 people.

Responding to the Niigata Chuetsu-oki Earthquake, the "committee on investigation of and measures for nuclear power facilities hit by the Niigata Chuetsu-oki Earthquake" discussed and reviewed the problems involved in self-defensive fire-fighting and communications and provision of information as well as measures to be taken from now on, and worked out a report on Feb. 2008.

- **Ensure long-term security of energy transportation routes and infrastructure**

In the case of Japan, keeping safety in sea lanes, including the Strait of Malacca, is a vitally important issue. For ensuring sailing safety in the Strait of Malacca, the GOJ thinks that it is important to make comprehensive efforts in view of maritime security, environmental protection and others.

The GOJ cooperates with ReCAAP (Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships) in terms of human resources and funds.

The GOJ also provides administrative authorities of the maritime law in other countries with the support, including capacity building through joint training seminars, dispatching of experts, and provision of equipment and materials.

VI. Reducing Energy Poverty

- **Support progress toward the UN Millennium Development Goals (MDGs)**

Japan's ODA Charter designates poverty reduction as a priority issue. Also, Japan's Medium-Term Policy on ODA states MDGs are goals that the international community should work in concert to achieve in order to build a better world. At the same time, the Policy identifies the improvement of basic social services including electrification as being one of specific approaches and measures toward poverty alleviation. As a nation that attaches importance on "human security," a concept that proposes to protect individuals as well as to empower them so that they can realize their full potential the GOJ has made active contributions to achieving MDGs through effective use of ODA.

- **Reduce energy poverty in developing countries**

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Japan's financial assistance in the energy sector totaled approx. 170 billion yen in 2006, or about US\$5 billion over three years between 2003 and 2005, making it the largest donor among the industrialized countries. Also, the GOJ provides "Private Sector Assistance Loans under the Joint Initiative entitled "EPSA for Africa". In fiscal 2007, the following projects were implemented:

- (a) "Bujagali Interconnection Project" in Uganda (Exchange of notes signed in October 2007, Amount: 3.484 billion yen)
- (b) "Power Generation, Transmission and Distribution Capacity-Building Project on Santiago Island" in Cape Verde (Exchange of notes signed in Mar. 2008, Amount: 4.468 billion yen)

At the East Asia Summit, the GOJ proposed "Fueling Asia - Japan's Cooperation Initiative for Clean Energy and Sustainable Growth" where the GOJ announced its intention to implement energy-related ODA worth 2 billion yen over the next three years.

In Jan. 2008, Prime Minister Fukuda announced a new financial mechanism, Cool Earth Partnership, on the scale of US\$10 billion at the World Economic Forum in Davos. Through this partnership, the GOJ will offer assistance to developing countries aiming to achieve both emissions reductions and economic growth and working to contribute to climate stability. One possible area for such assistance is improvement of access to clean energy.

● Enhance energy efficiency in low-income households

The GOJ is now actively promoting eco-conscious cooperation in the energy field in poor countries through official development assistance (ODA) with emphasis on reduction of energy loss, improvement of energy use efficiency, and creation of energy-related infrastructures including power generation facilities that utilize renewable energy, among others.

The GOJ has been conducting international model projects for increasing the efficient use of energy. Through this project, highly energy-efficient technologies already commercialized in Japan are to be demonstrated and disseminated in developing countries. By the end of 2007, 38 projects have been conducted in China, Indonesia, Thailand, Vietnam, Myanmar, Malaysia, India and Kazakhstan and have been contributing to technology transfer.

VII. Addressing Climate Change and Sustainable Development

● Reduce GHG emissions domestically and measure GHG emissions reductions achieved

Under Kyoto Protocol Target Achievement Plan, which was revised in Mar. 2008, a shortfall of between 2.2 Mton and 3.6 Mton of CO₂ is anticipated when considering only pre-revision counter-measures. However, it was found that the Kyoto Protocol's target of a 6% reduction can be reached through the efforts of each actor in each sector in revised counter-measures and policies because these policies and counter-measures are anticipated to have the effect of reducing CO₂ emissions by more than 3.7 Mton. As policies and countermeasures for target achievement, the GOJ implements promotion of voluntary action plans, improvement of the energy efficiency of houses and buildings, countermeasures through Top Runner Program, etc., thoroughness in energy conservation measures at factories and offices, promotion of new energy measures, improvements in automobile fuel efficiency, promotion of emission reduction measures for small and medium-sized businesses, countermeasures for the agriculture, forestry, and fisheries industries, water and sewage operations, and traffic flow, the development of green spaces in cities and countermeasures for waste and the 3 greenhouse gases such as CFC substitute gases. In addition, as countermeasures and policies regarding greenhouse gas sinks, the GOJ develops a national movement to promote the creation of beautiful forests and forest maintenance such as thinning. As cross-cutting policies, the GOJ implements system for the accounting, reporting, and publication of emissions and develop of a national movement.

● **Establish a carbon price signal in the economy as a whole or in major energy sectors**

Currently in Japan, at present, MOE has launched Japan's voluntary emissions trading scheme, and METI is considering an introduction of the domestic CDM system. Japan's voluntary emissions trading scheme (JVETS) which MOE take charge of started in fiscal 2005. The first round, which started from fiscal 2005, was completed by the summer of 2007. Considering the results, MOE will expand this scheme through means such as an expansion of participating entities, diversification of commitment, and formation of an efficient verification system, with a view of accumulating both more useful knowledge and experience. Under the domestic CDM system which METI take charge of, the amount of greenhouse gas emissions reduced by small-to-medium businesses with the technologies and funds provided by large businesses can be utilized by such large businesses to achieve the targets of their plans such as Voluntary Action Plan (small-to-medium businesses do not participate in the Voluntary Action Plan). For this system, a certification system for the amount of reduction by a third party is to be set in 2008. Accordingly, METI made a budget to develop human resources for review of such certification in fiscal 2008.

Regarding the domestic emissions trading scheme, under Kyoto Protocol Target Achievement Plan revised on Mar. 2008, Japan would like to consider comprehensively, focusing on a wide range of issues such as comparisons with other methods and their effects, impact on industry activities and the national economy, and international trends, including the evaluation of a concrete plan and appropriateness of its introduction, while also taking into account the considerable emission-reducing effects of enlarged and enhanced voluntary action plans including from the perspective of realizing Japan's mid-term global warming strategy.

Also, regarding the environment tax, it is stated in the Revised Kyoto Protocol Target Achievement Plan that ,since an environment tax would impose a burden on a wide range of citizens, it is an issue for which comprehensive studies must be seriously advanced, in tandem with efforts to obtain the understanding and cooperation of citizens, companies and other entities, taking into account the specific role of the tax in the context of overall climate change policies and measures, its effects, its impact on the national economy and the international competitiveness of industry as well as the current state of climate change policies and measures in foreign countries, etc.

The GOJ has broadly reviewed the effectiveness of the introduction of carbon price signal, its merits and demerits, and appropriate measures thereof, etc., through such systems.

● **Limit emissions via international efforts and mechanisms such as CDM and JI**

The GOJ considers to achieve the target of the Kyoto Protocol by acquiring emission credits through the utilization of the Kyoto Mechanism in a definite manner on the basis of the principle of supplementation.

In a specific approach, the GOJ - METI and MOE - launched a project designed to acquire emission credits in fiscal 2006. With the entrustment of the two ministries, the New Energy and Industrial Technology Development Organization (NEDO) served as an implementing organization of this project, invited public participation in the project, and has entered into an emission credit agreement with business operators selected.

Regarding CDM or JI projects, the GOJ established the Liaison Council for the Promotion and Utilization of the Kyoto Mechanisms, guidelines for government approval were enacted, and individual projects were screened to determine whether they would be approved by the GOJ. The screening process was initiated in 2002 and to this date approximately 300 projects have already been approved by the GOJ.

At the 3rd Conference of the Parties to the Kyoto Protocol in Indonesia in 2007, the GOJ distributed copies of Japan's proposal for improving the CDM process to participants and the proposal won the vehement approval of many participating countries. The GOJ is also rendering willing cooperation to the JI Supervisory Committee. The GOJ has long been

Japan

making efforts to support governments, private companies and other entities in host countries to build capacity and implement CDM projects. To be specific, the GOJ has held CDM seminars and training workshops for personnel in developing countries through JICA to develop human resources, and has provided untied loans through JBIC to support promotion of proposed CDM project.

● **Complete a high-quality GHG inventory and GHG emissions reduction plan**

MOE prepares national inventories (inventory of GHG gas emissions and removals) that are submitted annually to the United Nations Framework Convention on Climate Change secretariat under the Convention. In the course of preparation of inventories, the Group for Examining Methods Calculating GHG Emission examines calculation methodologies adapted to the conditions in Japan. The GOJ sets its own emission factors when measurement data are available and the results are believed to appropriately reflect the condition of emissions in this country. On the other hand, the default values in the Revised 1996 IPCC Guidelines, GPG (2000) and other sources are used when measurement data are not available, or when sufficient in-depth review is deemed necessary even in the presence of measurement data. In future, examinations will be made on the condition of emissions of the NE (not estimated) emission category in view of their emission potential. At the same time, efforts will be made to consider set emission factors which is unique to Japan in emission categories calculated using the default emission factors. In regard to GHG emissions reduction plan, refer to Bullet 1 of Section VII.

● **Develop a broad strategy that combines energy and climate objectives?**

METI formulated the New National Energy Strategy in May 2006. The New National Energy Strategy sets its objectives on establishment of the foundation for sustainable development through a comprehensive approach for energy issues and environmental issues.

The basic policy for achieving environmental compatibility in the Basic Energy Plan (approved by cabinet) revised in Mar. 2007 proposes: 1) maximizing restraints on energy consumption through energy conservation without compromising utilities as much as possible; 2) promotion of nuclear power generation based on the paramount prerequisite of securing safety; 3) development and utilization of renewable energy, and development of hydrogen energy; 4) conversion to energies with less carbon dioxide emissions (particularly gaseous energy), promotion of clean use of oil, coal and other fuels, and development and introduction of more efficient utilization technology including improved power generation efficiency.

In addition, in May 2007, the GOJ announced a proposal comprising the following three pillars based on the perception of the need to build a new framework beyond the Kyoto Protocol, in which the entire world can participate in emissions reduction.

(1) Advocating a long-term strategy to reduce global greenhouse gas emissions

(2) Three principles for establishing an international framework to address global warming beyond 2012

(3) Launching of a national campaign for achieving Kyoto Protocol targets

In Jan. 2008, on the occasion of World Economic Forum held in Davos, Prime Minister Fukuda presented the proposal Cool Earth Promotion Program, which sets the specific medium/long-term direction of international measures against climate change. As a means to put this program into concrete action, the Prime Minister proposed the following three pillars: Post-Kyoto Framework, International Environment Cooperation and Innovation. Among them, energy related aspects can be summarized as follows:

(1) Post-Kyoto framework

- Japan will, along with other major emitters, set a quantified national target for the greenhouse gas emissions reductions.

- The target could be set based on a bottom-up approach.

Japan

- The base year should also be reviewed from the standpoint of equity.

(2) International Environment Cooperation

- The world must make efforts to maximize the improvement of energy efficiency.
- Japan proposes to set a global target of 30% improvement of energy efficiency by 2020.
- Japan can take action to transfer high quality environmental technology to a greater number of countries.
- Japan will establish a new financial mechanism, Cool Earth Partnership, on the scale of US\$10 billion.

(3) Innovation

- It will be absolutely critical that there be breakthroughs in technological innovation.
- Japan will be investing approximately US\$30 billion in this effort over the next five years.
- We will formulate an international framework in cooperation with international agencies such as the IEA to accelerate technology development and share the fruits of such efforts.
- We will undertake a fundamental rethinking of societal systems to shift Japan to a low-carbon society.

Russia

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Russia

ST. PETERBURG G-8 SUMMIT

Implementation of the Global Energy Security Principles and Plan of Action
Contribution of the Russian Federation

Introduction

The present report has been prepared in accordance with the decision on the preparation of national reports by G8 member countries on their progress in implementing the St. Petersburg Principles and Plan of Action on Global Energy Security.

The report contains information on the activities conducted in the Russian Federation, on proposed actions called for in the Plan of Action, and their results.

Some of the activities presented in this report are multidimensional in nature and simultaneously cover several areas of the Plan of Action. However, these actions are presented only in one section of the present report and are not mentioned subsequently in other sections.

Russia

-Increasing Transparency, Predictability and Stability of Global Energy Markets

Implemented Measures

The progress in this area is based on successful implementation of the main priorities and guidelines of the Russian Federation's Energy Strategy for the period up to 2020 (hereafter referred to as "ES-2020"), aimed towards maximising the effective use of natural fuel and energy resources and the potential of the energy sector for economic growth as well as towards improving the quality of life of Russian citizens. There are annual monitoring reviews of the ES-2020.

In accordance with the ES-2020, measures for creating a rational market environment are being implemented.

Predictability

In November 2007, the government of the Russian Federation decided on transition to gas supplies based on signing long-term 5-year agreements on gas prices with electric power organisations, geared toward achieving equal profitability from gas sales on the domestic market and from exports in 2011, as well as gradually increasing the share of electricity produced at not regulated prices, with increasing this share to 100% by 2011.

Market prices

A gradual transition to market conditions for the sale of hydrocarbon raw materials to all CIS countries is taking place. Furthermore, gas prices will be determined on the fixed-formula basis and will depend on a number of objective conditions.

Energy export tariffs

A decision by the Government of the Russian Federation from December 2006 introduced a 0% export tariff duty on liquefied natural gas.

Long-term energy infrastructure development

The Government of the Russian Federation has adopted the General Plan for the Placement of Electricity Facilities, which has entered the implementation phase. According to this document, by 2020 the total capacity of nuclear power plants will increase more than two-fold, coal-fired power plants – about two-fold, hydroelectric plants – by more than 60%, and gas generation – about 40%. To achieve this, a significant increase in capital investment in energy will be required. Today the needed amount is estimated to be 21 trillion roubles – moreover, the investment will be towards developing generation as well as networks.

A series of large scale infrastructure projects in the gas sector (generally with the participation of foreign companies) has been carried out or is being implemented, including:

- Blue Stream gas pipeline has reached a design capacity (16 billion m³);
- Completion of the Yamal-Europe gas pipeline construction with a design capacity of 33 billion m³ per year has increased Russian gas deliveries to the European market and diversified export routes for Russian gas;
- The beginning of the Nord Stream gas pipeline project construction with a capacity of 27.5 billion m³ during its first phase, and 55.0 billion m³ at full capacity, will allow to satisfy the growing demand for gas in Central Europe and the UK;
- The South Stream gas pipeline construction project with a capacity of approximately 30 billion m³, through which gas from Russia will be exported to Southern Europe, may become a significant factor in improving the security of energy security for countries in the region, and in strengthening their long-term energy cooperation;

Russia

- Implementation of the Caspian gas pipeline construction project (taking into account the reconstruction and modernisation of the Central Asia-Centre gas pipeline system in Uzbekistan and Kazakhstan) will create a gas transport capacity of approximately 100 billion cubic meters per year in this region.

Diversified energy potential development

The Eastern regions of the country are playing a greater role as the new base for developing the oil and gas industry.

Gas

In 2007 the Programme for Setting up a Unified System of Natural Gas Extraction, Transport, and Distribution in Eastern Siberia and the Far East was adopted, taking into account potential gas exports to markets in China and other countries in the Asia-Pacific Region. As a result of implementing the Programme, not only have new gas production centres been set up and developed – in Sakhalin, Yakutia, Irkutsk, and Krasnoyarsk – but there has also been a sharp increase in petrochemical and gas-chemical production.

Oil

The Baltic Pipeline System has been expanded to the capacity of 74 million tons of oil per year. Construction of the Eastern Siberia – Pacific Ocean pipeline system is continued. The intergovernmental agreement on the Burgas-Alexandropolis oil pipeline project with a capacity of 35 million tons and with a potential capacity of up to 50 million tons if expanded is being implemented.

Long-term approach

In the nearest future the preparation of the General Plans for Developing the Gas production Sector, Oil Pipelines, and Oil Products Pipelines will be finalized.

The “Long-Term State Programme on Studying Mineral Resources and Reproduction of Russia's Mineral Resource and Raw Material Foundation on the Basis of a Balance in Consumption and Renewal of Mineral Raw Materials (2005-2010 and up to 2020)” has been adopted and is being implemented.

Joint Oil Data Initiative

The Russian Federation supports and actively participate in the activities of the International Energy Forum on setting and running the joint oil data initiative (JODI).

Extractive Industries Transparency Initiative

The Russian Federation shares the goals of the Extractive Industries Transparency Initiative (EITI). In November 2007, the Federal Law defining clear rules on allocating oil and gas income between the federal budget, the Reserve Fund, and the Fund for National Well-Being, was passed.

Energy Research

A Working group for energy research has been established between Russia (the Russian Federal Agency for Science) and the EU (the European Commission) aimed at enhancing research and technological cooperation. There have been agreed research and technological development areas of mutual interest. Corresponding projects will be co-financed by the Russian and the European side on parity basis.

To promote dialogue on priority issues of global energy security a memorandum of understanding has been signed between the Ministry of Industry and Energy of the Russian Federation and the IEA as well as between the Russian Federal Agency for Science and Innovation and the IEA.

Russia

Next Steps

Updating Energy Strategy

Drawing up a new Russia's Energy Strategy for the period up to 2030 (projected deadline for completing work is December 2008).

Continental Shelf

Drawing up a federal targeted programme on the long-term development the continental shelf of the Russian Federation (at the first phase a concept is supposed to be developed).

Oil and Oil Product Exchange

Trading of oil and oil products to meet government and municipal needs will be established (the first trading session at the Saint Petersburg exchange took place on 3 March 2008).

Gas Exchanges

Further developing gas trading (currently 15 billion cubic meters per year, with a potential of up to 40-45 billion cubic meters per year). Setting up an electronic trading platform for natural gas futures.

Energy Dialogues

Russia participates in the following major energy dialogues:

- Exchanging information with the EU on the state and development of the legal and regulatory framework, harmonization of energy policies and strategies, developing cooperation on issues related to the sustainability, reliability and predictability of production, distribution, transportation, and effective use of energy resources (including within the framework of continuing the work of the three Thematic groups: on energy strategies, forecasts, and development scenarios, on developing energy markets, and on energy efficiency);
- Continuing the process of discussion and harmonization of the national Energy Strategy with the long-term documents of other key players in the international energy market (particularly within the framework of the annual International Energy Week, held in Moscow);
- Actively participating in the Executive Board of the International Energy Forum (IEF), including Russia's proposal to host a Ministerial Meeting of IEF member countries in 2012;
- Discussing issues in reforming the Energy Charter Treaty and bringing the Charter process in line with the realities of current international cooperation in the energy field;
- Energy Group in the framework of the Heiligendamm Process;

- Continuing cooperation with the OPEC as an observer country, reflecting an objective mutual interest in obtaining accurate information on the situation in international oil markets, forecasts for their short- and medium-term development; in providing transparency and predictability in the functioning of oil markets, and in strengthening cooperation and partnership among all stakeholders in oil markets;
- Considering issues of Russia's participation in the Gas Exporting Countries' Forum.

Russia

Synchronized International Power Grid Interconnection

Completion of the IPS/UPS – UCTE interconnection feasibility study (in February 2008 an inter-system agreement on trans-border 400 kW electric power links between Russia and Finland was signed).

Outcomes

National energy production

In 2007 Russian production of primary fuel and energy resources continued its growth. Oil production, including gas condensate grew by 2.1%, coal production – by 1.5% and power generation by 2%.

Last year 491 million tons of oil were produced, and 228 million tons of oil were refined. Production of natural gas was 653 billion cubic meters; coal extraction – 312 million tons; total power generated – 1015 billion kWh.

Energy Export

There has been growth in primary fuel and energy resources exports – first, this is due to growth in coal, oil, and oil products exports – of 7.3%, 4%, and 8%, respectively, compared to 2006. In absolute figures, in 2007 export volumes were as follows: coal – 98 million tons; oil – 258 million tons, oil products – 112 million tons; natural gas – 192 billion cubic meters.

Future

As a result of the implemented and planned measures, according to forecasts, by 2020 oil extraction in Russia can grow up to 565-595 million tons; crude refining capacity – up to 265-270 million tons; gas extraction – up to 815-825 billion cubic meters; coal – up to 445-490 million tons; at the same time, the degree of oil refining will increase from 71.4% in 2007 to 80-85% in 2020.

Russia

-Improving the Investment Climate in the Energy Sector

Implemented Measures

Foreign Investments

With the aim to improve investment climate the Federal Law “On Foreign Investment in Legal Entities of Strategic Importance to the National Defence and State Security of the Russian Federation” was passed. The law defines the procedure for foreign investments in the Russian Federation in legal entities of strategic importance to national security of the Russian Federation. This law will help create the legal conditions and mechanisms for the participation of foreign investors in the capital of Russian strategic sector companies, which on the one hand, will provide protection of Russia's national interests, and on the other hand, will help foster a predictable and transparent business climate in the country for foreign investors, even in the most sensitive sectors of the economy. The law also covers activities linked to developing mineral resource sites of national importance. In drafting this law the views of international experts were taken into account.

Electric power sector

The power sector reform is successfully drawing to its planned completion. It is geared towards liberalising the sector while increasing public control over electricity entities that are fulfilling monopolistic functions. The Government of the Russian Federation has approved a mechanism for guaranteeing investment in construction of power generation facilities.

Mineral extraction taxation

A law has come into force that provides tax breaks on the mineral extraction tax (MET) including on oil from developing fields located in the East Siberian Oil and Gas Province (which includes the Sakha Republic (Yakutia), Irkutsk Oblast, and the Krasnoyarsk Krai), as well as the differentiated rates of the MET for fields in the final phase of development (above 80%).

Import tariff break

By a decision of the Government of the Russian Federation, a temporary tariff rate of 0% was introduced for import of certain types of technological equipment that is not produced in Russia, including equipment needed for the oil refinery and chemical industries.

Role of Investment Fund

The Russian Government is supporting strategic initiatives on developing the mineral and raw material base of the fuel and energy industry and developing energy infrastructure by drawing on the Investment Fund. These include projects on the comprehensive development of Southern Priangaria; on building an oil refinery and petrochemical plant complex in Nizhnekamsk; “Industrial Ural – Polar Ural”; “Comprehensive Development of Southern Yakutia”; building the Kyzyl-Kuragino railway line related to developing the mineral resources and raw materials potential of Tuva.

Next Steps

Subsoil legislation

Drafting and passing the bill on “Amendments into ‘the Subsoil Law’”, which defines, *inter alia*, requirements to technological documentation on field development and contents of the licences as well as to procedure of investment tenders.

Mineral extraction tax improvement

Preparing and passing bills on the methodology and procedure for the calculation of the MET:

Russia

- In coal production aimed at creating economic conditions for implementing technical retrofitting programmes in coal mining companies and increasing competitiveness of coal as fuel on the domestic market as well as at accelerating the development of coal-based power sector;
- In oil production at off-shore fields aimed at extending tax breaks on the MET;
- In natural gas production aimed at differentiating MET rates.

Excise taxes

Introducing differentiated excise tax rates on gasoline and diesel fuel linked to their ecological parameters.

Outcomes

Fossil fuels

For the first 9 months in 2007 direct foreign investment in production of fossil fuels in Russia was \$12.5 billion, or 63.5% of total foreign direct investment.

Investments in power sector

During an investment phase of electric power sector reform, more than \$30 billion was invested in the sector thanks to the sale of shares (including to foreign investors) in power generation companies.

Joint projects

The number of large-scale projects in the fuel and energy sector carried out jointly by foreign and Russian companies (Sakhalin-1, Sakhalin-2, Sakhalin-3: Veninsky block, development of the Shtokman and Yuzhno-Russkoe fields, design and construction of the North Stream and South Stream gas pipelines as well as the Burgas-Alexandropolis oil pipeline, etc.) is growing.

Future

As a result of the implemented and planned measures, experts forecast further growth in investment in the Russian fuel and energy sector, in oil refining volumes, and in oil products exports.

Russia

-Enhancing Energy Efficiency and Energy Saving

Implemented measures

Federal level

Public monitoring and control over effective use of energy (including in electricity and heating, whose share of total fuel consumption in the country is around 70%) is expanding. Adopted measures include annual setting of standards for:

- fuel use per unit of marketed heat and electrical energy;
- creating fuel stocks at thermal power plants and boiler facilities;
- technological losses during delivery of electricity or heating;
- hydrocarbon losses (in electricity and heating delivery to more than 6,000 legal entities, in hydrocarbon raw materials – in almost 900 fields).

Federal targeted programmes

The Federal Targeted Programme “National Technological Foundation” for 2007-2011 is being implemented, which provides, *inter alia*, for the creation and roll-out of resource-saving and environmentally sound industrial technologies.

The Federal Scientific and Technical Targeted Programme “Research and Development in Science and Technology Priority Areas for the Period of 2007 – 2012” is being implemented, which provides, *inter alia*, for carrying out projects in developing state of the art technologies for burning hydrocarbon fuels, including clean coal technologies. Public support is provided for research and other large-scale complex projects aimed at development and deployment of high-performance energy efficient technologies which simultaneously allow to decrease anthropogenic impact on the environment.

Energy saving standards

In 2007 eight projects on national standards in the “Energy Savings” group were developed, including those related to the fuel and energy balance assessment for industrial firms, to the setting up of energy efficiency indicators for the energy equipment in the housing and public utilities sector, to energy performance certificates and the procedure for carrying out energy inspectors for consumers of fuel and energy resources, and labelling energy consuming equipment.

Sub-law / regulatory measures

While implementing the Federal Law “On Energy Saving”, a series of regulatory documents (8 building codes and regulations on the Federal level, including – “Heating Protection for Buildings”, “Energy Efficiency in Residential and Public Buildings” in 52 regions of the Russian Federation) were developed and implemented on the regional and Federal levels. These documents cover building design and oversight for compliance with standards on reducing energy consumption for heating. Energy efficiency indicators are in line with the EU legislation (Directives 2002/91/EC and 93/76/ SAVE).

Practice

From 2001 to 2007, in accordance with the above mentioned regulatory documents, 296 million square meters of floor space were constructed, which represents more than 10% of all housing stock in Russia (this indicator for Moscow is more than 25%). The total estimated energy saving effect of the above in fuel by the end of 2007 was 550 pJ (approximately 20

Russia

million tons of fuel in coal equivalent), which also led to a total reduction in green house gas emissions of 37.5 million tons.

Within the framework of implementing the national project “Affordable and Comfortable Housing for Citizens of the Russian Federation”, a programme for low-rise residential buildings called “My Own Home” has been developed. It is geared toward building houses with reduced energy consumption and an optimal level of comfort. The plans are to build 32-35 million square meters of such housing in 2010.

SubFederal

On the level of the constituent subjects of the Russian Federation, nearly 50 regional laws on energy saving have been adopted and have entered into force, 13 funds have been set up, and more than 70 energy saving centres have been created.

International

The TACIS project “Enhancing Energy Efficiency in the Kaliningrad, Astrakhan, and Arkhangelsk Oblasts” have been carried out. Within the framework of the project, we have prepared recommendations on improving the legislative framework for energy delivery on the regional level. We have carried out feasibility studies on a number of priority energy efficiency projects in industry, fuel and energy sector, housing and utilities sector.

Russian proposals on establishing and financing partner relations in the sphere of ecological and technological safety of the field energy have been discussed with our foreign partners (in particular, at the 14th and 15th Sessions of the UN Commission on Sustainable Development).

Next Steps

Federal law on energy saving

A Draft Law Amending the Federal Law on Energy Saving will be prepared and adopted, including *inter alia* the following provisions:

- National standards for equipment, materials, structures, and transport vehicles will include energy efficiency criteria;
- There will be voluntary confirmation of compliance and, for items specified by an authorized Federal Executive body, mandatory certification or mandatory declaration of compliance with the standards and criteria of energy efficiency;
- Establishment of a National Energy Register that will provide a structured compilation of documented information concerning “energy scorecards”, that are now binding for entities irrespective of their legal or institutional form, the amount of their consumption of energy resources, efficiency of their use and any energy-saving measures taken;
- All entities where more than 25% of the authorized capital is owned either by the Russian Federation, subjects of the Russian Federation or municipal districts, as well as Federal State Unitary Enterprises, Government-funded institutions, enterprises and joint-stock companies of strategic importance to the Russian Federation, will be obliged to undergo regular environmental audits
- Federal, regional and municipal authorities will have the obligation to regularly develop and update energy savings action plans.

Public measures

A set of measures to increase efficiency of energy consumption in the Russian Federation will be developed and implemented, that would *inter alia*:

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- Set up mechanisms for rational consumption of energy resources, and development of infrastructure and conditions for effective growth of energy-savings businesses;
- Launch Russia-based industrial production of energy-saving machinery, equipment, instruments, and technologies;
- Develop and implement energy-saving technological processes and facilities in economic sectors that are the most suitable for achieving energy savings.

Associated gas

The Government of the Russian Federation will finalize and adopt a Plan of Major Actions on More Efficient Use of Associated Petroleum Gas (APG), that would, *inter alia*, provide for:

- Tightening requirements for the scope and the content of engineering design documents on setting metering system for minerals production and usage;
- Thorough check-up of the state of measuring equipment and the availability of technical measuring devices for released or flared APG or natural gas;
- Establishing and keeping a registry of flaring systems;
- Starting from January 1, 2011, introducing a progressive fee system for releasing or flaring APG and natural gas, and increasing ecological penalties for any pollution above permitted standards resulting from burning of natural gas;
- Formulation and adoption of National standards to regulate collection and pre-treatment of APG and natural gas by the oil and gas industry, as well as setting up APG production and flaring metering .

Energy efficiency road map for 2030

A “Road Map” and its implementation procedures will be prepared to build an energy-efficient society in Russia for the period through 2030.

International

Multidisciplinary cooperation will be started between Russia and the EU in the area of energy and climate (the first joint meeting of the working groups on energy efficiency and climate change with participation of the Russian Regional Environmental Centre (RREC) and the Renewable Energy and Energy Efficiency Partnership (REEEP) took place in Moscow in February 2008).

Outcomes

Compared to 2006, overall energy intensity of the Russian economy decreased in 2007 by 6% which made it possible to limit primary energy consumption to only 1% while the GDP grew at a rate of 8.1% per annum.

Implementation of regional energy-saving programs and projects in 2007 helped to save 5.3 million tons of fuel in coal equivalent.

Since the year 2000 the GDP grew by 56.4% while the domestic consumption of primary energy resources saw an increase of only 10.7%.

The specific fuel consumption per unit of marketed electric power decreased from 335.9 g. in coal equivalent per kWh in 2006 to 334.4 g. per kWh in 2007.

Future

By 2020 the weighted average fuel consumption per unit of marketed electric power is set to decline to 286.1 g. in coal equivalent per kWh.

As a result of the above mentioned energy efficiency and energy saving measures, it is expected that a total of 100 million tons of fuel in coal equivalent will be saved

Russia

over the next three-year period (2008-2010); and starting from 2015, a yearly fuel savings would amount to at least 100 million tons in coal equivalent.

It is planned to raise the utilization rate of associated petroleum gas to at least 95% by 2011.

If implemented, energy loss mitigation plans would cut hydrocarbon, heat and electric power system losses by 3 to 5%.

Russia

-Diversifying Energy Mix

Implemented measures

Russian renewable energy potential

In order to diversify the energy mix, economic capability assessment has been refined and a region-by-region national inventory of wind, sun and other renewable energy sources has been prepared, as well as a catalogue of Russian-manufactured small-size and unconventional energy equipment.

As energy costs rise, Russia enhances its renewables potential that now stands at 320 million tons in coal equivalent (equal to about one third of the total energy consumption), including, in coal equivalent: (i) geothermal, 115 million tons; (ii) biomass, 70 million tons; (iii) small hydro, 70 million tons; (iv) low-grade heat, more than 50 million tons; and (v) wind and solar, 15 million tons.

Renewable energy legislation

In order to provide better market conditions for increasing the use of renewables, changes were made in November 2007 to the Federal Law on Electric Power Industry to define, *inter alia*, competences of the Russian Government and of the Federal and Regional executive institutions in the following major areas:

- Setting generation and consumption targets for electric power generated from renewable sources;
- Encouraging the use of renewables and creating incentives for using energy-efficient technologies;
- Approval of criteria for allocation of federal subsidies to compensate grid connection costs for renewables-based generating capacities of up to 25 MW.

The Law also provides for price subsidies for electricity generated from renewable sources.

Sub-law and regulatory documents

Since the Law sets the framework conditions, the development of relevant by-law and regulatory legal documents is critical for successful implementation of renewable energy policy and launching of renewable energy business in Russia. A credible schedule has been developed to draft needed eight specified by-laws. At the end of May 2008 the European Parliament hosted a jointly organized conference “Russia’s Renewable Energy” where the Russian policy on renewables and drafting its implementation instruments were comprehensively discussed by the Russian and EU law-makers, high government officials, businessmen and experts. The exchange of experience helped to fine-tune the work on creating practical rules for developing the use of renewable energy in Russia.

Other relevant legislation

Several other legislative bills have been drafted to complement the above renewable energy legislation and to expand opportunities in the areas of renewables, energy efficiency and energy savings. They include amendments to:

- the Russian Federation Water Code, that set special water usage rates for low-impact (submerged, low-pressure, and similar) hydro power plants;
- the Russian Federation Forestry Code, that set utilization of biofuels as a necessary condition for forestry projects to qualify as priority investments.

Russia

In addition two new legislative drafts have been prepared:

- a draft Federal Law on Natural Gas Supply in the Russian Federation, that support gradual natural-gas price increases and more stringent consumption allowances as a way to ultimately assure rational and efficient consumption of natural gas;
- a draft Law on Alternative Transportation Fuels.

Federal target program

In the framework of the Federal Target Program on Research on Priority Scientific and Technological Areas of the Russian Federation for the period of 2007 – 2012 companies are taking part in co-financing projects aimed at developing and deploying high-performance and resource-saving technologies and new energy sources; 18 projects have been launched for commercialising the above-mentioned technologies on the basis of public-private partnership principle, with the total amount of investments of over 10 bln. rubles.

A Federal Target Program for Development of Nuclear Power Industry in Russia between 2007 and 2010 and for the period up to 2015 has been approved. It sets the following major objectives:

- Accelerate nuclear power development by implementing new line of nuclear power generating units of at least 2 GW in total installed capacity per year;
- Promote launch of NPP construction and operation projects outside Russia.

Energy regulation

Work on drafting Law on State Nuclear Energy Regulation has been started.

A draft Technical Regulation on Safety and Security of Electric Power Plants that Use Non-conventional Energy Sources has been prepared that sets safety and security requirements for renewables-based (i.e. wind, solar, biomass, hydro, geothermal, tidal, hydrogen, etc.) power plants, throughout their lifecycle.

International cooperation

Russia actively participates in multilateral cooperation on innovative technologies within the framework of International Partnership for the Hydrogen Economy (IPHE), Methane to Markets (M2M), Carbon Sequestration Leadership Forum (CSLF), Global Bioenergy Partnership (GBEP) and in implementing Japan's 3R (Reduce, Reuse, Recycle) initiative on comprehensive use of secondary resources and waste products.

In order to increase effectiveness of regulation in atomic energy use Russia takes part in the Multinational Design Evaluation Program (MDEP). The MDEP was set up to share the resources and knowledge accumulated by national nuclear regulatory authorities during their assessment of new reactor designs, with the aim of increasing harmonization between regulatory regimes.

In accordance with the Intergovernmental Agreement between the Government of the Russian Federation and the Government of the Republic of Kazakhstan an International Uranium Enrichment Centre has been established on the base of Angara Electrolytic Chemical Facility. New members (for example, Armenia) are expected to join the Centre. Economic structure of the Centre is being developed.

Next Steps

Next steps include:

Regulations

Russia

The development and approval of additional *regulations* (“by-laws”) to foster renewable energy that would, *inter alia*, define:

- key areas of Government policy to achieve energy efficiency gains in the electric power sector based on renewable energy;
- eligibility rules for renewables-based generating facilities;
- economic incentives and support for renewable energy use;
- procedures for grid operators in priority purchasing electric power from renewables-based power plants.

This set of by-law and regulatory documents should be in place by the end of 2008.

Concept and action plan

Drafting a Concept and a Plan of Action for long-term renewable energy development in Russia for the period through 2020.

International cooperation

Drafting a Russian Renewable Energy Development Program (RREDP) co-financed by Russia and the Global Energy Facility (GEF).

Cooperation agreement on information exchange, establishment of the CIS-wide information network on peaceful nuclear energy use.

Visit of the IAEA mission to Russia in 2009 with the aim to assess work of the national nuclear and radiation safety regulatory authority.

Outcomes

Present

In 2007, the share of renewables-based energy in the total energy balance in Russia amounted to approximately 2% (1% for electricity not counting the power generated at hydro power stations of more than 25 MW), and to 8% if large hydro power stations are included.

Future

The draft Long-term Social and Economic Framework for Russia 2020 provides for power generation from alternative and renewable sources to increase from 0.5 billion kWh in 2007 to between 10 and 20 billion kWh in 2020 to between 50 and 70 billion kWh in 2030 (accounting for 2 to 3 % of the total output). The substantial rise in renewables-based generation after 2020 would be associated with expected coming on-stream of high-capacity tidal and geothermal power plants (including the 8 000 MW-rated Mezenskaya tidal power plant at the White Sea coast and the similarly-rated Tugurskaya tidal power plant at the Okhotsk Sea coast).

Under the Power Sector Master Plan, from 2006 to 2020:

- the power generation mix will evolve as follows: from 44.9 million kW (21.3%) to 71.7 million kW (20.6%) for hydro, from 23.5 million kW (11.1%) to 53.2 million kW (15.3%) for nuclear, and from 142.4 million kW (67.6%) to 222.5 million kW (64.1%) for thermal;
- the share of natural gas in the structure of fuels used by thermal power stations will decrease from 68.1% in 2006 to 56.4% in 2020 while the share of coal is set to increase from 25.3 to 39.5 accordingly. At the same time, in absolute figures the gas consumption will only increase by 20%, and that of coal, by 2.3 times;

Russia

- in view of the rapidly escalating demand for coal mining capacity, new coal-fired power generation plants are planned for the total of 53.9 GW, that would rely on innovative and clean coal technologies.

Russia

-Ensuring Physical Security of Critically Important Energy Infrastructure

Implemented Measures

Federal laws “On Federal State Procurement” and “On Weapons” have been amended to implement measures on fighting potential terrorism against energy infrastructure. In accordance with these amendments oil and gas companies that operate trunk oil pipelines have been authorized to acquire civilian and service weapons as well as special equipment for the purpose of protecting trunk oil pipelines facilities and the commodities they transport.

Next steps

The Russian 2020 Energy Strategy spells out specific actions to counter threats to energy infrastructure. They include measures on:

- making components of energy systems and energy supply more reliable;
- reducing of possibility of emergence of external threats;
- reducing susceptibility of fuel and power supply systems to threats;
- setting up a core fuel and power supply system for possible emergency situations;
- ensuring industrial safety;
- countering potential terrorist attacks against energy infrastructure facilities.

Drafting specific technical regulations for setting up and maintaining backup energy facilities in appropriate readiness condition.

Continuing cooperation within the framework of the international organizations (IEA, GEF, OPEC, etc.) will be used as *fora* to discuss, develop and consistently implement measures to enhance energy security.

Russia

-Reducing Energy Poverty

Implemented measures

Global Village Energy Partnership International (GVEP)

In internationally shared efforts on widening access to modern energy services for the poorest population in the developing countries Russia committed \$30 million for GVEP to implement energy programmes in the countries south of Sahara Desert. The first contribution of this 4-year commitment has been made with involvement of the World Bank. The Russian representatives have been elected to the Partnership and to its Board of Trustees.

International Sustainable Energy Development Center

The establishment of the International Sustainable Energy Development Center (ISED) as a category 2 UNESCO institution is at the final phase.

Next Steps

The ISED plans to participate in a global educational programme on renewable energy for energy deficient developing countries and countries with transitional economy.

It also plans to acquire the status of a UNESCO Center of Competence for renewable and alternative energy education.

The ISED will regularly publish "The Energy Bulletin" that would cover *inter alia* issues of fighting energy poverty.

Outcomes

The ISED has announced the provision of the first series of educational grants for professionals from energy-poor developing countries and countries with transitional economy.

Russia

-Addressing Climate Change and Sustainable Development

Implemented measures

In May 2007, the Russian Federation Government approved the Rules for preparation and implementation of Joint Implementation (JI) Projects at the national level. Reception of approval requests for Kyoto Article 6 projects started on March 11, 2008.

Methodology guidelines have been developed for project documentation review, as well as the Charter of the Review Board that will deal with projects implemented under Article 6 to the Kyoto Protocol to UN Framework Convention on Climate Change.

In February 2008 the Government of the Russian Federation approved the Technical Regulations on Requirements for Automotive and Aviation Gasoline, Diesel and Ship Fuel, Jet Engine Fuel and Furnace Oil that focus on environmental and quality specifications of oil refinery products marketed in the Russian Federation. The document is consistent with European petrol and diesel standards and provides for the following production capping dates per class of fuel: class 2, from 31.12.2008; class 3, from 31.12.2009; and class 3, from 31.12.2012.

Russia takes part in all the UNFCCC and Kyoto Protocol sessions and meetings including those devoted to post-Kyoto climate regime.

Russia submits to the UNFCCC Secretariat its annual national report on inventory of anthropological emissions and absorption of the greenhouse gases.

Next Steps

Further improvement of interagency interaction of Federal executive bodies involved in developing climate policies for the post-2012 period. This includes establishment of a Government Commission on Climate Change and execution of a comprehensive plan of action to implement the Kyoto Protocol in Russia in the years 2008 through 2010 as well as measures aimed at longer perspective.

A set of environment protection measures will be developed with the objectives of improving regulation in the area of environmental protection, utilization of production and consumption waste substances, as well as introducing economic and administrative incentives for mitigating negative impact on environment by adopting appropriate regulatory legal documents.

A Priority Action Plan for Elimination of Environmental Damage (for the period of 2008 through 2010) will be elaborated, and will include implementation of the joint project with the International Bank for Reconstruction and Development in this area.

The Russian Federation recognizes an important role of forests in tackling climate change issues and initiated a conference on the Role of Forests in Managing Climate which will take place in Moscow in October 2008.

Outcomes

In 2007, GHG emissions in Russia's energy sector amounted to 72% as compared to the level of 1990.

According to current forecasts, by 2020, GHG emissions in the Russian energy sector will not exceed their 1990 level, no matter the economic development scenario might be in place.

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**ST. PETERSBURG PLAN OF ACTION
GLOBAL ENERGY SECURITY PRINCIPLES**

CONTRIBUTION OF THE UNITED KINGDOM

I. Increasing Transparency, Predictability and Stability of Global Energy Markets

Please detail policies and measures to:

- *Provide more and better sector-specific and fuel-specific energy data to the public.*

The UK Government regularly updates and publishes statistics on energy. These cover production, transformation from one type of energy into another (e.g. coal used for electricity generation), consumption, stocks, imports and exports, and energy prices. As well as spreadsheets containing the data presented as tables in these publications, the publications themselves are available in pdf format. These publications are compliant with published standards and are validated externally (through the National Statistics Standard and audit). They can be found at:

<http://www.berr.gov.uk/energy/statistics/source/index.html>

A detailed series of energy and carbon emission projections were also published in February 2008 as part of the supporting material to the UK's Energy White Paper. These are available at <http://www.berr.gov.uk/files/file39580.pdf>

In addition, the Department for Business Enterprise & Regulatory Reform (BERR) recently published the Energy Markets Outlook as an information source for market participants on energy security of supply for different fuels.

<http://www.berr.gov.uk/energy/energymarketsoutlook/page41839.html>

At the global level, the UK is a member of the International Energy Forum's (IEF) Executive Board, and fully supports and participates in the Joint Oil Data Initiative (JODI).

- *Enhance the transparency of energy market transactions and network flows.*

National Grid, who operate the main gas and electricity network in the UK, are obliged under their licence conditions to provide real time data on the flows of gas into the National Transmission System. They also provide real time information on the demand and frequency of electricity within the UK. On a European level, BERR has been working on a project with Eurostat to map the gas transit network across Europe, in order to increase transparency of gas flows through Europe.

- *Ensure independent regulation and clearly defined energy market conditions.*

The UK gas and electricity markets are governed by OFGEM, an independent regulator whose main priorities are promoting competition, wherever appropriate, and regulating the monopoly companies which run the gas and electricity networks. The supply of transport fuels is subject to UK competition law under the Competition Act 1998. The regulation of supply of transport fuels to consumers is therefore the

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responsibility of the Office of Fair Trading, which monitors the market and has the power to investigate allegations of anti-competitive agreements and abuse of dominant market position in the fuel market.

Both forms of regulation ensure that the gas, electricity and oil markets are competitive, transparent and monitored and therefore not susceptible to manipulation and corruption.

- *Implement Energy Charter principles related to energy transit across borders.*

Third party access to energy transit infrastructure is enshrined in EU internal energy market regulation.

- *Meet obligations of the IEA's International Energy Programme (IEP) (if applicable).*

BERR does comply with its obligation under the IEP and provides monthly and annual returns to the IEA covering all energy statistics, such as stocks and prices.

- *Put in place emergency plans to deal with domestic energy supply disruptions.*

The UK Government has a number of methods that it can use to stop a shortfall of gas, electricity or oil causing a situation to deteriorate into an emergency. In the case of gas and electricity it could invoke powers available to it under the Fuel Security Code. This enables it to direct generators to use alternative sources of fuel to generate electricity.

In the case of oil it has the National Emergency Plan for Fuel. This contains measures to reduce demand and if necessary limit supplies to essential users. If the situation were to become an emergency, the Government works closely with industry to understand and plan for these eventualities. Emergency plans are in place to deal with oil, gas and/or electricity emergencies; these have been agreed with industry and are tested on a regular basis to insure that they are robust and fit for purpose.

Further details of the above are published on the BERR web site:-

<http://www.berr.gov.uk/energy/reliability/downstream/page30313.html> for gas and electricity and http://www.og.dti.gov.uk/downstream/emergencies/down_emerge.htm for oil.

In addition on the oil side, our emergency response procedures are also regularly tested through participation in the IEA Emergency Response Exercises.

- *Reduce corruption in energy market transactions and dealings.*

The forms of regulation already mentioned above ensure that the gas, electricity and oil markets are competitive, transparent and monitored and therefore not susceptible to manipulation and corruption.

- *Enhance the security of oil and natural gas supplies.*

The Energy White Paper published in May 2007 sets out the UK Government's policies to maintain reliable and affordable energy supplies, manage our reliance on them, their potential environmental effects and the risks associated with higher levels of import dependency. These policies include:

- Measures to encourage energy efficiency and the adoption of technologies that mitigate the environmental impacts of fossil fuels;
- Supporting and maximising economic production of fossil fuels in the UK;

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- Ensuring effective energy markets at home and abroad.

More detailed information is included in the document itself published at: <http://www.berr.gov.uk/energy/whitepaper/page39534.html>

II. Improving the Investment Climate in the Energy Sector

Please detail policies and measures to:

- *Promote investment in energy infrastructure and streamline infrastructure siting*

A more detailed description of many of the measures referred to below is set out in the Energy White Paper, available at the link above.

The Government primarily promotes investment in energy infrastructure through supporting a liberalised, competitive, transparent and independently regulated energy market in order to provide a stable and predictable environment in which investors can have confidence.

The Government is working on improvements to the regulatory framework that will encourage investment through reduced risks and costs. The Planning and Energy Bills will improve transparency within the planning system for potential energy infrastructure projects, and reduce delays.

- *Ensure a level playing field for all competitors in the oil, gas, coal and power sectors*

The Government fully supports an open and competitive market within these sectors. This is facilitated through the separation of market functions. The transmission and distribution of gas and electricity are carried out by regulated monopolies, which are separate from supply and production functions, and which are legally required to provide non-discriminatory access to the transmission and distribution systems.

- *Expand trade and better integrate energy markets with neighbouring countries*

The All-Island Electricity Market (bringing together Northern Ireland and the Republic of Ireland) was launched in November 2007. Work is ongoing between Northern Ireland and the Republic of Ireland to create an all-Island market for gas as well.

At the European level, OFGEM and BERR are active participants in the Regional Markets Initiative, led by the European regulators CEER, which is making concrete progress in integrating gas and electricity markets in North West Europe.

The UK Government has also strongly supported the creation of a Balkan Electricity Market, working with the Slovenian Government to provide training for Ministry officials in the SEE area.

- *Provide regular forecasts to the public on which to base investment decisions*

The Energy Markets Outlook published in October 2007, available at <http://www.berr.gov.uk/energy/energymarketsoutlook/page41839.html>, alongside the Ministerial Statement of need for additional gas supply infrastructure in 2006; provide a broad overview of the likely future drivers of energy supply and demand to help market participants to assess the need for additional energy infrastructure.

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More detail is available in National Grid's Ten Year and Seven Year Statements on the supply and demand of gas and electricity respectively. These are available at <http://www.nationalgrid.com/uk/Gas/TYS/>
<http://www.nationalgrid.com/uk/Electricity/SYS/>

- *Educate and train skilled energy personnel to meet long term labour requirements*

The UK PILOT programme (<http://www.pilottaskforce.co.uk/data/aboutpilot.cfm>) continues to work with industry with the aim of ensuring the long-term future of the Oil and Gas industry and to maximise recovery of our reserves from the UK Continental Shelf. Through PILOT the work on identifying and addressing skills shortages has evolved into 'OPITO the Oil and Gas Academy' a new skills academy which is driven by employers and trade unions in the oil and gas industry and linked to Cogent. Its key aims are:

- Skills solutions - tools, frameworks and programmes based on identified gaps or shortages
- Competence development - safety, technical and leadership/managerial and supervisory and Industry approved delivery networks
- Workforce development programmes

BERR through PILOT work in partnership with industry (including OPITO) on a number of initiatives around skills including engaging with schools and sponsoring events to promote STEM subjects in various parts of the UK.

- *Drive cost-effective investment in renewable and alternative energy sources*

The UK government has put in place financial incentives to encourage growth in renewable electricity (the Renewables Obligation, which was introduced in 2002) and to encourage growth in renewable transport fuel (the Renewable Transport Fuel Obligation, which will start in April 2008), and is considering methods to encourage renewable heat. This summer the UK will launch a consultation on what more should be done to increase renewable energy use to meet our share of the EU 2020 target. As part of this work we are considering how to remove planning and other barriers, how to incentivise further deployment of renewables, and how to create a stable investment framework.

The UK will publish a new renewable energy strategy in spring 2009, once agreement has been reached on the new EU Renewables Directive, and it is clear what the UK and others have to achieve and how we can do so by 2020.

- *Facilitate energy efficiency investment in buildings, industry and transport*

The UK is investing £400 million in the Environmental Transformation Fund (ETF) to bring forward the development of new low carbon energy and energy efficiency technologies in the UK. The fund will formally begin operation in April 2008, specifically focusing on the demonstration and deployment phases of bringing low carbon technologies to market.

III. Enhancing Energy Efficiency and Energy Saving

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The Government of the United Kingdom is committed to the promotion of energy efficiency through national and international action as the quickest, cleanest and most cost effective means of simultaneously reducing carbon emissions, increasing business competitiveness and improving energy security.

Please detail policies and measures to:

- *Implement the 16 energy efficiency measures that the G8 have specified for appliances, lighting, buildings, transport, industry, and across sectors.*

The UK has put in place a number of key policies and measures to take forward the recommendations made to the St Petersburg and Heiligendamm Summits and looks forward to submission by the International Energy Agency (IEA) of further recommendations for concrete action on the part of the G8 and others. We believe the important and detailed analysis of the IEA under the Gleneagles Plan of Action and the recommendations it has made to the G8 have made a significant contribution to driving action on energy efficiency internationally and provide a clear road-map for action going forward.

The UK has strongly endorsed the adoption of the target for improving energy efficiency by 20% by 2020 across the European Union as part of the ambitious climate and energy package, endorsed by EU governments in 2007. Energy efficiency is a key pillar of our domestic energy and climate policies, and we have adopted a comprehensive framework of policies and measures for delivering energy savings as set out in detail in our Energy Efficiency Action Plan published in 2007.

<http://www.defra.gov.uk/environment/climatechange/uk/energy/pdf/action-plan-2007.pdf>

We are addressing the energy performance and labelling of appliances and other energy-using products, including horizontal standards for stand-by power, through the standard setting framework provided by the European Union's Eco-Design of Energy Using Products Directive, informed by our own market transformation programme. In addition we are working with retailers and manufacturers to develop voluntary agreements to phase-out inefficient products, starting in 2008 with a commitment to phase out inefficient incandescent lighting by 2011.

- *Ensure cost-reflective pricing to drive cost-effective energy efficiency steps*

The EU Emissions Trading Scheme provides an important driver for energy efficiency in industry, ensuring that energy prices reflect the environmental impact of production. We have recently announced an extension of cap and trade to the non-energy intensive sector through the Carbon Reduction Commitment (CRC) which will target emissions from energy use by large organisations whose annual mandatory half hourly metered electricity use is above 6,000MWh.

- *Promote demand-side measures in the electric power sector*

We are continuing to develop our policy for metering and billing in the electric power sector. The UK announced in its recent budget report that it would require energy suppliers to provide smart meters for medium and large businesses within 5 years.

- *Encourage public and private financing for energy efficiency improvements.*

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In the business and public sectors we are providing financial incentives and setting emissions reduction targets for organisations, as well as providing loans, information and advice through the Carbon Trust.

One of the UK's key levers for driving efficiency, the Climate Change Levy, (a tax on energy use) will continue to rise with inflation as announced in the recent UK budget, ensuring its environmental impact is maintained. Linked to the levy are Climate Change Agreements with key energy-intensive sectors, which provide for reductions in the levy if energy efficiency or carbon reduction targets are met. The Agreements currently cover over 5,000 companies.

- *Develop efficiency standards and labels for buildings, appliances and equipment.*

In the household sector we are improving the efficiency of buildings themselves as well as the products and services within them, and providing consumers with information and advice on how to improve their energy efficiency.

Addressing the efficiency of our existing building stock is a key issue for the UK and we have a well-established obligation on net-bound energy suppliers to promote energy efficiency in the domestic sector to deliver energy-saving targets – the Energy Efficiency Commitment (EEC). This scheme will have its scope extended, and from April 2008 will be known as the Carbon Emissions Reduction Target (CERT) which will extend EEC's coverage to micro-generation and behavioural measures. The target for CERT will be overall lifetime carbon dioxide savings of 154 MtCO₂ delivering annual net savings of 4.2 MtCO₂ at the end of the programme.

- *Provide energy efficiency audits to homes, offices, and industrial firms.*

As well as the policies above, we have also launched a Green Homes Service to be run by the Energy Saving Trust to provide a single point that people can contact for a home energy audit, plus advice on how they can save water, reduce waste, green their travel, and connect to grants and offers from energy companies. The Service will help consumers implement recommendations for improving energy efficiency contained in the Energy Performance Certificates that are being rolled-out to cover all dwellings and non-residential buildings sold or leased and which provide buyers and tenants with important information about the efficiency of buildings on the market.

For new buildings we have strengthened Building Regulations, improving efficiency 40% since 2002 with further uplifts scheduled for 2010 and 2013, with the ambition of moving to zero-carbon new dwellings by 2016, and zero-carbon new non-domestic buildings by 2019.

- *Raise public awareness of energy efficiency opportunities.*

The public sector has a key leadership role in raising public awareness as well as the promotion of energy efficiency. To that end, in the UK we have ambitious targets for sustainable operations on the government estate, including improvements in energy efficiency. We have also adopted a Sustainable Procurement Action Plan to use the government's purchasing power to build the market for the most energy efficient goods and services.

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In the transport sector we are working within the EU and with industry and other governments to improve awareness of vehicle efficiency. We are also promoting innovation and encouraging awareness of sustainable transport choices through promotion of public transport and provision of information and advice, including labelling of vehicles and advice on tyre pressure and rolling resistance of tyres. Government also utilises fiscal measures to provide incentives for choosing fuel efficient vehicles through differentiated vehicle excise duty and company car tax, with higher rates for vehicles with higher emissions.

- *Improve end-use data and track progress towards energy efficiency goals.*

The UK is keen to engage internationally to improve end use data, track progress, and promote energy efficiency. To this end, we welcome the proposals for the International Partnership for Energy Efficiency Co-operation. We also provide support for the Renewable Energy and Energy Efficiency Partnership's important work on energy efficiency, and the International Task Force on Sustainable Products' work on standards for energy-using products.

IV. Diversifying Energy Mix

Please detail policies and measures to:

- *Develop technologies and facilities for carbon capture and storage*

The UK has launched a competition to support a coal-fired power plant demonstrating the full chain of CCS technologies (capture, transport, and storage) on a commercial scale. We are one of the first countries to commit to such a demonstration, and it is likely that the resulting CCS demonstration plant will be one of the first in the world – operational in 2014. We aim to share as much learning and experience from this demonstration as possible to facilitate the worldwide deployment of CCS.

It is important to establish a suitable regulatory regime for CCS operation. The UK is developing this through an Energy Bill currently before Parliament, and the proposed EU Directive on CCS storage. We will also shortly be consulting on the detailed secondary legislation needed to support CCS operations in the UK.

The UK Government also supports smaller scale demonstration of the component parts of CCS through the Environmental Transformation Fund (ETF). The newly formed Energy Technologies Institute (ETI) also considers CCS one of its possible future technology themes. With a potential billion pound budget for investment across a broad range of low carbon technologies, ETI is bringing together government and some of the world's biggest companies with a view to accelerating the development of low-carbon energy technologies towards commercial deployment.

- *Reduce natural gas flaring*

The UK Government's policy is to restrict flaring of natural gas where it is technically possible and economically sensible to do so, whilst recognising that the flaring of some gas is unavoidable for safety or operational reasons.

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All offshore flaring is tightly controlled by the issue of flaring consents and, since the start of this year, flaring is also included in the EU Emissions Trading Scheme. BERR continually looks for opportunities to keep offshore flaring to a minimum.

Through the European Union, the UK supports the World Bank-led Global Gas Flaring Reduction partnership which, by sharing global best practices and implementing country specific programmes, facilitates and supports national efforts to use currently flared gas by promoting effective regulatory frameworks and tackling the constraints on gas utilisation.

- *Ensure the safety and security of civilian nuclear power facilities*

The Office for Civil Nuclear Security (OCNS), which is part of the Health and Safety Executive (HSE), is the security regulator for the UK's civil nuclear industry. It is responsible for approving security arrangements within the industry and enforcing compliance. OCNS also undertakes vetting of nuclear industry personnel with access to sensitive nuclear material or information. In the UK, civil nuclear operators must have site security plans dealing with the security arrangements for the protection of nuclear sites and nuclear material on such sites. The arrangements cover, for example, physical protection features such as fencing, CCTV and turnstile access, the roles of security guards and the Civil Nuclear Constabulary, the protection of proliferation-sensitive data and technologies and the trustworthiness of the individuals with access to them.

The Health and Safety Executive (HSE), through its Nuclear Installations Inspectorate (NII), regulates nuclear safety under licences with conditions covering the design, construction, operation, maintenance and decommissioning of nuclear installations. The nuclear industry is subject to the Health and Safety at Work Act 1974 (and subordinated legislation including the Nuclear Installations Act 1965 providing for nuclear site licensing) which places general duties on employers and others in charge of premises to ensure, as far as is reasonably practicable, the health, safety and welfare of their employees and that their activities do not expose other persons to health and safety risks, also enforced in the case of the nuclear industry by the HSE.

The Ionising Radiations Regulations 1999, which apply at licensed and other sites using ionising radiation, require employers to keep workers and public exposure to radiation as low as reasonably practicable, and to comply with maximum exposure limits.

The recent UK Nuclear White Paper sets out in detail how we have taken into account concerns of safety and security raised during public consultation, and we are keeping our regulatory regime under review to ensure it remains effective.

- *Provide for safe disposal of low-, medium-, and high-level nuclear waste.*

The UK Government has accepted independent recommendation that long-term geological disposal, coupled with safe and secure interim storage for legacy waste, is the best available approach. This transparent approach was taken forward through public consultations on both nuclear policy and on the UK's waste management programme (Managing Radioactive Waste Safely).

In our Nuclear White Paper, we said that Government also believes that the approach being developed for handling legacy wastes can also be applied to new build wastes. We

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believe that nothing has emerged from consultations that casts serious doubt on geological disposal as a means of ensuring long-term waste disposal.

Government will publish, this spring, a White Paper setting out the next steps for implementing geological disposal of higher activity radioactive waste. The UK Government has publicly stated that before development consents for new nuclear power stations are granted, it will need to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste they will produce.

- *Establish a robust, competitive, and cost-effective renewable energy industry.*

The Renewables Obligation has been our chief mechanism for incentivising growth in the renewable energy industry, and has led to more than a doubling of UK renewable electricity generation since its introduction in 2002. The 2007 Energy White Paper detailed proposals to reform the Renewables Obligation to make it more efficient and effective as well as policies to address key barriers to renewable deployment arising from planning controls and grid connection issues.

At the Spring Council 2007, the UK played a key role in securing agreement among EU Heads of Government for a target to source 20% of Europe's energy from renewables by 2020.

As previously stated, this summer we will launch a consultation on what more we should do to increase renewable energy use to meet our share of the target. We will publish our new renewable energy strategy in spring 2009, once agreement has been reached on the new EU Renewables Directive, and it is clear what the UK and others have to achieve and how we can do so by 2020. The strategy will focus on measures needed to meet the 2020 target, but will also consider our longer term renewable and carbon targets.

- *Develop biofuels in a cost-effective and environmentally sustainable fashion.*

The Renewable Transport Fuel Obligation (RTFO) will require the major oil companies and fuel suppliers that supply fossil fuels for road transport to ensure that a proportion of the road fuel supplied in the UK comprises renewable fuels such as biofuels. The scheme comes into effect in April 2008. The level of the obligation will be 2.5% of total fuel supplied by the supplier in the first year (2008/09), rising to 3.75% in 2009/10 and 5% in 2010/11.

The objective of the RTFO is that biofuel is supplied in the UK. However, the scheme will contain a buy out price which allows obligated suppliers to pay a certain amount per litre of their obligation rather than supply biofuel. This will act as a safety valve allowing the supplier an alternative way of meeting their obligation if biofuels become too expensive relative to fossil fuels and also protect consumers. In the future the great hope for biofuels is that over time their costs will come down and their carbon savings go up. The UK Government is setting the right market conditions for the best biofuels to flourish through the RTFO.

The RTFO includes a sophisticated reporting mechanism so that suppliers of biofuel wishing to earn certificates under the scheme will need to complete reports on the environmental effects of the biofuels they supply. This will encourage transport fuel suppliers to source sustainable, low carbon biofuels. The Renewable Fuels Agency (RFA), as the Administrator of the scheme, will also be leading a study of the wider

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economic and environmental impacts of biofuel production. This will help to provide the evidence on which longer-term UK biofuel policies will be based.

- *Enhance development and deployment of new energy technologies.*

The 2007 Energy White Paper sets out the Government's policy to promote energy innovation. The government is supporting a wide range of technology push measures to stimulate research and development and demonstration in new low carbon and renewable technologies.

Public sector funding for renewable and low carbon technology innovation is increasing steadily, both in the UK and EU. In the UK there are major changes in how this funding is being delivered such as the Technology Strategy Board, Energy Technologies Institute and Environmental Transformation Fund. These bodies will work closely together to ensure that funding activities are complimentary and together effectively supports a portfolio of technologies. Government support is provided via:

- Research Councils - £70m pa by 2007/09 for basic and applied research.
- Energy Technologies Institute – current public/private investment £600m over the next 10 years, with potential to increase to £1bn with additional partners for research and development of technologies.
- Technology Strategy Board – total budget of over £1bn which will include funding for energy development technologies.
- Environmental Transformation Fund - £370m budget to invest in low carbon and energy efficiency demonstration technologies.

- *Cooperate with other countries in R&D of new energy technologies.*

One of the Energy Technologies Institutes' objectives is to promote international technology collaboration, and it is currently exploring expanding links with other countries. Sharing as much learning and experience as possible to facilitate the worldwide deployment of CCS technology is also an aim of the UK CCS demonstration project. As well as this, there is of course the European Strategic Energy Technology (SET) plan, which focuses on improving joint planning of research, making better use of the potential of the European Research and Innovation area and fully exploiting the possibilities opened up by the Internal Market.

V. Securing Critical Energy Infrastructure

Please detail policies and measures to:

- *Inventory and upgrade critical energy infrastructure.*

The UK government keeps the major areas of energy infrastructure under constant review to determine what elements are critical for delivery of the various service areas. Within the sector, each sub-sector is examined to identify key processes and the systems that are

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essential to their operation. This review has highlighted major dependencies on sites that have enabled the security effort to be focused on key components and systems to enable best use of expenditure on mitigating risk. A holistic approach is taken for the sector recognising the need to co-ordinate between physical and personnel security areas to ensure the integrity of the overall system.

There has been a review of the categorisation of each sub-sector based on the impacts of loss of service on the population and national economy. This has been undertaken for the electricity and gas sectors and is in the early stages of application in the oil sector.

Sub-sector analysis has enabled key interdependencies in the sector to be recognised (i.e. upstream oil and downstream gas and associated refinery areas) so that key systems can be identified and where required mitigation applied. This work is ongoing and will be developed to refine the sub-sector categorisation work so that the impacts on the other sectors of the Critical National Infrastructure can be fully reflected.

Where key sites have been identified, the requirements for protection have been agreed with the industry concerned and the sites categorised as high priority addressed first to improve security. A number of measures have been undertaken ranging from additional policing to hardening of security measures at sites. Plans have been developed with key sub-sectors so that improvements at these sites can be achieved and that companies can take responsibility to deliver the improvements to expectations agreed with Government.

- *Ensure long-term security of energy transportation routes and infrastructure.*

Information sharing agreements have been established with some G8 members for various aspects of security in order that best practise can be shared and applied with what are increasingly multi-national service providers, such as information technology and control systems areas associated with this sector. Protective measures are tailored to the particular threat to the sector concerned. Central advice on a functional basis is supplied, allowing individual companies to develop solutions to a minimum requirement, and allowing them the scope to exceed this minimum standard if possible under their own procurement arrangements. Investment funding is primarily from shareholders funds, however, in regulated industry sectors, funding can be agreed with the regulator and industry concerned for defined security works.

As a signatory to the Euratom Treaty, IAEA Convention and the Convention on the Physical Protection of Nuclear Materials and Nuclear Facilities, the UK has demonstrated its continuing commitment to the area of nuclear security and non-proliferation.

The UK government has recently published a National Security Strategy that recognises the need to take a non-isolationist view of security, and the need to work now and in the future with other states to ensure international as well as national security.

VI. Reducing Energy Poverty

Please detail policies and measures to:

- *Support progress toward the UN Millennium Development Goals.*

As confirmed at the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg, improved access to adequate and affordable energy supplies and services are essential to achieving the UN Millennium Development Goals. The UK has

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responded to this by sustaining our support for several initiatives launched at the WSSD and through other measures.

The initiatives launched at WSSD included the following;

- The EU Energy Initiative for Poverty Eradication and Sustainable Development (EUEI). The UK provided a seconded energy expert to the European Commission and has provided £950,000, including £350,000 in March 2008, to the EUEI Policy Dialogue Facility to help countries in the design of their energy strategies. Through the EUEI, a €220 million EU-ACP Energy Facility was launched in 2006 for rural energy projects, mainly in Africa. Implementation commences in 2008.
- The Global Village Energy Partnership (GVEP). The UK loaned a full time energy expert to GVEP for three years (2003 to 2006) and provided £900,000 of grant money to promote improved energy access in developing countries. Following the Russian G8 commitment in 2006 of \$30 million to GVEP for energy programmes in Africa, the UK signed an agreement with GVEP in 2007 to provide £4 million over 4 years to cover all GVEP's institutional and staffing costs. By this means, GVEP now has the capacity to make effective use of the Russian grant and of contributions by other donors for direct action in developing countries in 2008 and beyond.
- The Extractive Industries Transparency Initiative (EITI). The EITI was hosted and launched by the UK in 2003, with the aim of improving the accountability of revenues received and paid by governments and companies from the extraction of natural resources, especially oil. Through continued UK support, including full-time staff seconded in 2007, EITI has set up permanent secretariat in Norway.

- *Reduce energy poverty in developing countries.*

The UK provides core finance to the World Bank Energy Sector Management Assistance Programme (ESMAP), including £500,000 in 2006 and again in 2007. As a multi-donor funded, global technical assistance partnership, ESMAP's mission is to promote energy in poverty reduction and growth. In addition, the UK has provided £2.8 million to ESMAP in 2005 to 2007 for the development of small and medium private enterprises in energy services delivery, including for households.

The 2005 Gleneagles G8 summit agreed that the World Bank should lead on a new Clean Energy Investment Framework (CEIF) to support global action to tackle climate change. The framework aims to accelerate public and private sector investments in three areas, including improving access to modern energy services in developing countries. To date, the UK has committed £15 million to the CEIF.

Measures to reduce energy poverty include the UK's initiative and support for the Infrastructure Consortium for Africa, which is hosted by the Africa Development Bank. Much of this work is in the energy and power sector, coordinating efforts to make progress on priority energy projects, including cross border electricity connections.

Through its bilateral programmes, the UK is supporting India in two states in the reform of their electricity sectors, aimed at improving services. In Bangladesh, the UK is providing up to £45 million for rural electrification. In Sierra Leone, the UK is providing £20 million from 2008 over the next 5 years to improve electricity services.

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- *Enhance energy efficiency in low-income households*

On household energy, in 2007 the UK committed £3.75 million over the next 4 years on new research towards sustainable bio-energy production and efficient use, especially in Africa.

VII. Addressing Climate Change and Sustainable Development

Please detail policies and measures to:

- *Reduce GHG emissions domestically and measure GHG emissions reductions achieved.*

The UK is on track to reduce its greenhouse gas emissions by over 23% by 2010. This is almost double the reduction target – 12.5% – required of the UK under the Kyoto Protocol. When the effect of the EU Emissions Trading Scheme (EU ETS) is taken into account, UK greenhouse gas emissions in 2006 were 20.7% below 1990 levels.

The Climate Change Bill will make the UK the first country in the world to have a legally binding long-term framework to cut carbon dioxide and adapt to climate change.

It will put in statute medium- and long-term targets to reduce carbon dioxide emissions by at least 26% by 2020, and by at least 60% by 2050, on 1990 levels. A system of five-year carbon budgets will be established through which the Government will manage the emissions-reduction trajectory to 2050. These carbon budgets will be set three periods ahead to provide increased certainty for business planning and investment.

The Climate Change Bill will also establish a new independent expert body – the Committee on Climate Change – to advise Government on the level of each carbon budget. As part of its advice on the first three carbon budgets (covering the period 2008-2022), the Committee is required to review the level of the 2050 target to consider whether it should be tightened up, eg. to 80%; this review is to report by 1 December 2008.

The Bill also introduces new powers to introduce domestic emissions trading schemes. The first use of these powers is expected to be to implement the Carbon Reduction Commitment, a UK-wide mandatory cap-and-trade scheme targeting large non-energy intensive business and public sector organisations. It is expected that around 5,000 organisations will be covered by the scheme, including supermarkets, banks, large office buildings, local authorities and Government departments. This scheme will commence in 2010 and is expected to deliver some 4 million tonnes of cost-effective carbon dioxide savings per annum by 2020.

The UK's policies and measures for reducing greenhouse gases are set on in two key documents: the 2006 Climate Change Programme, which sets out the details of various policies to reduce sectoral emissions in key areas including the transport, housing, agriculture, and business sectors; and the 2007 Energy White Paper. The key policies and measures are described below.

The EU Emissions Trading Scheme is a Europe-wide scheme which aims to reduce emissions of carbon dioxide and combat the serious threat of climate change. The EU ETS puts a price on carbon that businesses use and creates a market for carbon. It has

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been in place since 2005 and is the first scheme of its kind in the world. It will deliver emission reductions in the UK of 29 million tonnes of carbon dioxide per annum against “business as usual” during Phase II (2008-12).

The Climate Change Levy is a tax on energy use to encourage businesses to improve their energy efficiency. It works alongside Climate Change Agreements, which allow energy intensive business users to receive an 80 per cent discount from the Climate Change Levy, in return for meeting energy efficiency or carbon saving targets. It is estimated that together these policies will save around 22 million tonnes of carbon dioxide per year by 2010.

The Energy Efficiency Commitment and its successor, the Carbon Emissions Reduction Target, are expected to save more than 16 million tonnes of carbon dioxide per year by 2011 through placing obligations on electricity and gas suppliers to meet targets for promoting improvements in home energy efficiency.

Government-funded UK bodies to tackle climate change

The UK invests significant amounts in research and supporting technologies through various bodies:

- Over £90 million is invested in the **Carbon Trust** to help provide energy efficiency support for business and the public sector, and develop low carbon technology.
- The **Energy Saving Trust** received £30 million in 2007-8 to promote carbon abatement in the household sector.
- The **Environmental Transformation Fund** is a new initiative to bring forward the development of new low carbon energy and energy efficiency technologies in the UK. It will formally begin operation in April 2008, with funds totaling £400 million available during the period 2008-09 to 2010-11.
- The **Energy Technologies Institute**, announced in 2006, is a new energy and environmental research institute to increase the level of funding devoted to R&D to meet the UK’s energy policy goals. It will be funded on a 50:50 public private partnership basis and the UK Government has announced it will provide up to £500 million in funding.
- The Government launched a competition in November 2007 to select a **Carbon Capture and Storage** project to be supported. The Government will provide up to 100 per cent of the additional capital and operating costs incurred by the project developer in successfully demonstrating the technology on a long term commercial scale.

- *Establish a carbon price signal in the economy as a whole or in major energy sectors*

A key element in achieving our climate change goals is the establishment of a thriving and competitive carbon market. The EU ETS gives industry a clear incentive to reduce carbon emissions at least cost. The 'least cost' approach means that installations within the Scheme have a choice between investing in abatement measures to cut emissions or buying allowances on the market to cover any emissions produced over and above their cap.

The EU ETS covers 50% of the UK economy, focuses on the energy intensive and power generation sectors and is based on an absolute cap in emissions. This cap is key to

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limiting the supply of carbon; it drives the carbon market and therefore reductions in emissions. A market price for carbon stimulates efficiency savings, and the development and implementation of new technologies.

- *Limit emissions via international efforts and mechanisms such as CDM and JI.*

The UK has the highest number of registered CDM projects of all the investor countries (41% ~350 projects) which is expected to reduce 119.73 MtCO₂ equivalent per year. This can be explained by the lead that the UK has taken in project approvals and our proactive financial services industry. The carbon market has proved to be a key tool in engaging with the private sector in reducing emissions.

Other initiatives of note include:

- The UK-India Collaboration to identify the barriers to the transfer of low carbon energy technology
 - Nero Zero Emissions Coal Initiative
 - Africa Biofuels Taskforce
 - Renewable Energy and Energy Efficiency Partnership (REEEP)
 - The Global Opportunities Fund Climate Change and Energy Programme
 - Climate Change Projects Office
 - Regional Consultations Under Gleneagles Dialogue
- *Complete a high-quality GHG inventory and GHG emissions reduction plan.*

The UK GHG inventory has been submitted to the UNFCCC every year since 1995. By participating in development of the IPCC GHG Guidelines in both 1996 and 2006, UK experts have developed a wide range of expertise in inventory development. This has insured that not only do UK experts ensure that our inventory is of the highest possible quality, but also that UK experts contribute to international efforts to improve preparation of GHG Inventories worldwide.

As of 2006 the UK has in place a National System for GHG Inventory preparation that meets all legal requirements as set out by the UNFCCC with regard to Kyoto reporting. In the longer term, the Energy White Paper of 2007 set out additional savings of up to 70 million tonnes by 2020.

- *Develop a broad strategy that combines energy and climate objectives?*

The UK Government Energy White Paper published in May 2007 was designed to address two key challenges - climate change and maintaining a stable and affordable energy supply in an increasingly unstable world. The White Paper sets out a long term framework for action to address these challenges at home and abroad.

Following publication of the White Paper, a cross-government Climate Change and Energy Programme was established with an over-arching Strategy Board and separate domestic and international Climate and Energy Programme Boards, co-chaired at senior level by representatives of the Departments for Business Enterprise and Regulatory Reform (BERR) and Environment, Food and Rural Affairs (DEFRA).

At Ministerial level, Energy and Environment matters are considered by a single Cabinet Committee.

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I. Increasing Transparency, Predictability and Stability of Global Energy Markets

With respect to networked industries (natural gas and electricity), governments should work to make information about energy flows transparent and open to all market participants. Predictability of regulatory regimes is also a critical component. Governments can help ensure predictability by establishing regulators that are independent from government, and thus cannot be directly influenced by changing political circumstances. Such institutions should be given a clear mandate to establish and maintain a level playing field among energy market participants.

Please detail policies and measures to:

- Provide more and better sector-specific and fuel-specific energy data to the public.
- Enhance the transparency of energy market transactions and network flows.
- Ensure independent regulation and clearly defined energy market conditions.
- Implement Energy Charter principles related to energy transit across borders.
- Meet obligations of the IEA's International Energy Programme (IEP) (if applicable).
- Put in place emergency plans to deal with domestic energy supply disruptions.
- Reduce corruption in energy market transactions and dealings.
- Enhance the security of oil and natural gas supplies.

U.S. Efforts to Provide More and Better Sector-Specific and Fuel-Specific Energy Data to the Public

The Energy Information Administration (EIA) is an independent statistical and analytical agency within the U.S. Department of Energy. EIA maintains a comprehensive data and information program relevant to energy resources and reserves, energy production, energy demand, energy technologies, and related financial and statistical information. EIA's mission is to provide high quality, policy independent energy information to meet the requirements of government, industry, and the public in a manner that promotes sound policy making, efficient markets, and public understanding. This wealth of information is available at www.eia.doe.gov and from experts identified in reports.

U.S. Efforts to Enhance the Transparency of Energy Market Transactions and Network Flows

Due to a variety of regulations issued by the Federal Energy Regulatory Commission (FERC) and other agencies, market transactions and network flows are quite transparent on both the electric power grid and the natural gas pipeline network.

Transparency of Transactions and Flows in the Power Sector

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Open Access Transmission Tariffs: FERC Order 888 requires utilities that own, operate or control wholesale transmission facilities to file *nondiscriminatory open-access transmission tariffs* that offer service to third parties on a comparable basis to the utilities' own uses of their transmission facilities.

Real Time Information: FERC Order 889 establishes Open-Access Same-time Information Systems (OASIS) on which utilities must post real-time information about their transmission networks. The rule requires utilities to obtain transmission information for wholesale transactions via OASIS just like their competitors.

Regional Transmission Operators: A large portion of wholesale electricity trade and transmission (network) flows occur in states that have Regional Transmission Operators (RTOs) or Independent System Operators (ISOs). These not-for-profit, independent entities operate large portions of the electric grid and are present in 33 out of 48 continental states. These include ISO New England, Inc. (ISO-NE), New York Independent System Operator, Inc. (NYISO), PJM Interconnection, LLC (PJM) (in the mid-Atlantic), Midwest Independent Transmission System Operator, Inc. (MISO), Southwest Power Pool, Inc. (SPP), Electric Reliability Council of Texas, Inc. (ERCOT), and California Independent System Operator Corp. (CAISO). RTOs and ISOs are similar for most market purposes, but offer a range of information on network prices and flows:

- All operate real-time (hour-ahead or balancing) markets.
- All the ISOs and RTOs with day-ahead markets also offer virtual bidding, which is designed to promote price convergence between the day-ahead and real-time markets.
- ISO-NE, NYISO, PJM, and MISO operate day-ahead markets. The others do not.
- PJM, ISO-NE and NYISO operate capacity markets.
- All except SPP offer financial transmission rights (FTRs). SPP offers physical transmission rights.
- All except MISO and SPP offer ancillary service markets.

Bilateral Markets: In the United States, there is robust bilateral trading of electricity. Much of this trading occurs outside of visible markets, for example through voice brokers or direct contacts, particularly for long-term transactions or highly structured products. But trading on spot markets for short-term needs is quite transparent. Trading takes place in over-the-counter markets, on organized exchanges like ICE and NYMEX, and in ISO/RTO markets. The most active Hub is the PJM west hub. Other liquid hubs include ERCOT, Mid Columbia, and SP15 in California. Bilateral trading in ISO markets is mostly financial where in non-ISO markets trading is both physical and financial. It is typical for tens of thousands of trades to take place on any day.

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One of the most important visible bilateral markets is the Intercontinental Exchange (ICE). In RTO regions, ICE (and the New York Mercantile Exchange – NYMEX) offer a variety of financial products to complement the RTO day-ahead and real-time markets. Elsewhere, ICE forms much of the short-term physical market. The West has always seen a significant amount of trade. ICE trades physically at 14 points in the West with a total volume of 243 million MWh in 2007. In the Southeast, trading is much sparser. ICE trades at 3 points in the Southeast with a total volume of 4 million MWh in 2007.

Transparency of Transactions and Flows in Natural Gas Markets

Natural gas markets in the United States are entirely bilateral. The largest visible markets are ICE and NYMEX. Many trades also occur through voice brokers and direct contact, particularly for longer-term deals. Many prices from the various categories of trades are collected through the trade press and quoted as indices. For physical gas markets, ICE and NYMEX trade at over 100 geographic points around the United States. The trade press quotes prices at almost 100 such points, price information is widely available.

U.S. Efforts to Ensure Independent Regulation and Clearly Defined Energy Market Conditions

Natural gas and electricity markets in the United States have a mixed system of regulation in which the Federal government dominates for wholesale (business to business) transactions and the state governments dominate for retail (business to customer) transactions. The specifics vary quite a lot from state to state with respect to the retail sector, especially in the power sector where there are many different types of suppliers (vertically integrated utilities, private distribution-only utilities, competing generators, municipal and other publicly-owned utilities, rural electric cooperatives, and so forth). However, the regulatory environment for each type of supplier and each type of customer is clearly defined, and there are well-established Federal and state regulators with very substantial independent authority.

Wholesale Electric Power Transmission: The Federal Energy Regulatory Commission (FERC) regulates interstate wholesale transmission of electricity and associated transmission interconnections. The Federal Power Act confers jurisdiction on the FERC over interstate sales of electric power and interstate transmission of electricity for sale. Every wholesale transaction is subject to FERC jurisdiction, except in Hawaii, Alaska, Puerto Rico and in the Electric Reliability Council of Texas (ERCOT) power pool, which are not interconnected with the three major networks. Federally owned utilities, and state and other publicly-owned utilities are not regulated by FERC, but voluntarily follow Federal regulations in order to operate in the wholesale market or use the transmission facilities of utilities that are subject to FERC regulation. The construction of interstate transmission (high voltage) facilities, and the operation of intrastate transmission facilities are subject to state siting laws, safety and environmental reviews.

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Electric Power Distribution and Retail Sale: State public utility commissions regulate the provision of distribution services for electric power sales by privately owned utilities to end-users within their borders and the rates for sales of distribution services and electric power. Most states allow locally elected or appointed boards to regulate publicly-owned and cooperatively-owned utilities. The construction and operation of distribution facilities are subject to state siting laws, safety and environmental reviews.

About 15 states have adopted laws requiring retail choice and competition in retail electricity, with another eight states having suspended their own movement to retail choice and competition. To reduce or eliminate impediments to competition, laws in these states unbundle the prices of electricity generation, as a product, from the prices of transmission and distribution of electricity, as a service. State restructuring legislation has required or encouraged the divestiture of generation assets in order to foster competition among generating companies, and prevent a few companies from dominating the market. Divestiture of generating assets is a condition for the recovery of costs incurred by utilities for power plants and contracts under a regulated environment that may not be recoverable in a competitive market for generation (i.e., stranded costs). In practice, achieving effective retail competition with real benefits to ratepayers has proven more difficult to achieve by states than had been expected. As a result, many observers do not expect more states to move to retail competition and consider the movement stalled.

Natural Gas Production and Transport: Natural gas purchases are essentially free from regulation, while transport and storage remain subject to FERC jurisdiction.

The Natural Gas Act (NGA) of 1938, the Natural Gas Policy Act (NGPA) of 1978, the Outer Continental Shelf Lands Act (OCSLA), the Natural Gas Wellhead Decontrol Act (NGWDA) of 1989, and the Energy Policy Act (EPA) of 1992 are the primary laws the Commission administers to oversee the gas pipeline industry. Under the NGA, the Commission regulates both the construction of pipeline facilities and the transportation of natural gas in interstate commerce. Companies providing services and constructing and operating interstate pipelines must first obtain Commission certificates of public convenience and necessity. In addition, Commission approval is required to abandon facility use and services, as well as to set rates for these services. The Commission also regulates the transportation of natural gas as authorized by the NGPA and the OCSLA.

The NGPA's wellhead pricing program required FERC to administer ceiling prices for certain categories of natural gas production in interstate commerce. On January 1, 1993, the NGWDA removed all remaining NGPA wellhead price controls for natural gas and all NGA filing requirements for natural gas producers. The Department of Energy Organization Act vests approval authority in FERC to oversee construction and operation of facilities needed by pipelines at the point of entry or exit for gas imports and exports.

Oil Pipeline Transportation: Under the Interstate Commerce Act and the Energy Policy Act of 1992, FERC regulates interstate oil pipelines, or more precisely, the rates and practices of oil pipeline companies engaged in interstate transportation of oil. States

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regulate pipelines that serve both intrastate and interstate shippers. Some states require that oil pipelines obtain certification to begin and to cease operations. The FERC and state regulators must ensure that tariffs charged by oil pipelines are just and reasonable, and are applied in a non-discriminatory manner. The FERC and state regulators require oil pipeline companies to maintain a prescribed uniform accounting system to protect shippers from unjustified costs. As common carriers, oil pipelines must provide access and service on a non-discriminatory basis. The construction and operation of oil pipelines are subject to state siting laws, safety and environmental reviews.

U.S. Efforts to Implement Energy Charter Principles Related to Energy Transit Across Borders

The Energy Charter Principles call for progressive removal of barriers to trade in energy products, equipment and services, the transit of energy products in economic and environmentally sound conditions, and development of commercial international energy transmission networks, especially for the transport of electricity and natural gas.

Most natural gas imports and exports in the United States are free of fees and tariffs. The Canada-U.S. Free Trade Agreement eliminated all fees and tariffs on Canadian natural gas coming into the U.S. as well as on U.S. natural gas going to Canada as of January 1, 1994. On August 16, 1999, Mexico abolished a 4 percent duty on natural gas from the U.S. However, natural gas imported from Mexico, Algeria and other sources besides Canada must still pay a small merchandise processing fee to the U.S. Customs Service. Gas transmission networks between the United States and Canada are so closely linked that the gas market in the two countries is effectively unified both physically and economically.

Electricity imports and exports in the United States are not subject to tariffs. A well-established process is in place for approval of new international transmission lines as well as authorizations for exports of U.S. electricity to Canada and Mexico. The Department of Energy undertakes reliability and environmental reviews for permits, but price is not a criterion. Eastern and Western power grids in the United States and Canada are fully synchronous.

U.S. Efforts to Meet Obligations of the IEA's International Energy Programme

The Energy Policy and Conservation Act (EPCA) of 1975, as amended, authorizes and enables U.S. participation in the emergency oil measures encompassed by the International Energy Agency Agreement on an International Energy Program (IEP) and related decisions by the IEA Governing Board. EPCA also authorized the formation of the U.S. Strategic Petroleum Reserve (SPR). The SPR plays a key role in enabling the United States to meet the IEP's emergency stockholding commitment of 90 days of oil import equivalent. As of March 2008, the SPR holds 700 million barrels of crude oil,

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equivalent to roughly 58 days of net imports. Oil stocks held by industry make up the balance of U.S. oil reserves, which as of January 2008 stood at 116 days of net imports.

Planned expansion activities would increase SPR protection to 75 days of net imports provided by a one billion barrel Reserve by 2019 and to 90 days of net imports provided by a 1.5 billion barrel Reserve by 2029. The Department of Energy (DOE) is studying alternatives for the increment between 1.0 and 1.5 billion that may include alternative locations (on east and west coasts and/or product storage). This increment would enable the U.S. to meet its IEA obligations solely through the use of government-owned stocks.

U.S. Efforts to Put in Place Emergency Plans to Deal with Domestic Energy Supply Disruptions

During times of heightened security alert or emergency, the best information sources are the trusted relationships between government and industry. Such relationships ensure that necessary information is provided when and where it is needed and can be directly applied to protect and recover key energy infrastructure and resources. Established relationships between industry and all levels of government will be relied upon where necessary to facilitate the flow of information. State energy emergency preparedness and response plans identify assets and the role of officials, in conjunction with their private sector counterparts, in addressing energy emergencies of varying degrees of severity.

The energy sector has extensive experience in developing and applying methodologies to assess risks to facilities and systems and to prioritize assets to be protected. Such methodologies have been developed by a variety of sector security partners, including energy companies that own and operate energy assets, professional and trade associations, academic institutions, research centers, and the Department of Energy. Because of the diversity of energy sector assets, many risk assessment methodologies are used. Some are tailored to a specific subsectors (such as electricity, oil, or gas) while others assess risks for the broader energy sector or a across multiple sectors of the economy.

Screening methodologies help identify which assets are significant for further assessment. That is, they enable a determination of the need for a more detailed vulnerability or risk assessment. In light of the large number of energy facilities and assets spread throughout the country, many of which may pose little or no security risk, as well as the limited resources available to address their security, it is neither practical nor financially responsible to perform comprehensive risk assessments of all assets or facilities. Thus, as a precursor to in-depth risk assessment efforts, screening is used to identify which facilities warrant the expenditure of additional resources.

Many screening approaches are used by energy companies to prioritize facilities for more rigorous assessments. These approaches commonly focus on health and safety consequences as well as broader economic consequences. Energy industry associations have developed and disseminated security guidelines to help screen assets, including:

- *Guidelines for Developing and Implementing Security Plans for Petroleum Pipelines*, API, July 2002.
- *Security Guidelines for the Petroleum Industry*, API, May 2003.

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- *Security Guidelines: Natural Gas Industry Transmission and Distribution*, American Gas Association (AGA), Interstate Natural Gas Association of America (INGAA), and the American Public Gas Association (APGA), September 2002.
- *Security Guidelines for the Electricity Sector*, NERC, 2005.
- *Cyber Security Standards*, NERC, June 2006. (NERC standards provide a framework to identify and protect cyber assets for reliable operation of the bulk electric system.)

Emergency Response for the Electric Power Network

The Department of Energy's Office of Electricity Delivery and Energy Reliability has several support functions, in coordination with the Department of Homeland Security and Federal Emergency Management Agency, during a declared national or state emergency:

- Deploying DOE technical response teams to ensure consistency in energy response and restoration efforts among Federal and state governments and electric utilities.
- Helping states and utilities priorities plans and actions for the restoration of electric energy during response and recovery operations.
- Monitoring energy system damage and repair work and identifying the supporting resources needed for system restoration.
- Collecting, assessing and providing information on energy supply, demand and market implications.
- Preparing situation reports for the public.

Emergency Response for Natural Gas Supply

The Department of Energy sponsored a project with the Gas Technology Institute to assess the capabilities and resiliencies of natural gas delivery infrastructure in different regions to withstand disruption in gas deliverability and efficiently reallocate gas supplies when a disruption occurs. The information and analyses assist development of effective action plans to assure natural gas deliveries in the face of potential disruptions.

DOE has also developed a "Touch Automated Convergence Control System" tool that assists emergency response by aggregating production data from Gulf of Mexico wells in Federal waters. This tool provides real-time information on total production from Gulf of Mexico and estimated shut-in wells on tracts leased by the Department of Interior's Minerals Management Service.

Emergency Response for Oil Supply

The Energy Policy and Conservation Act (EPCA) requires that before crude oil from the Strategic Petroleum Reserve (SPR) can be drawn down and sold, the President must find

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that “drawdown and sale are required by a severe energy supply interruption or by obligations of the United States under the International Energy Program.” EPCA defines “severe energy supply interruption” as a national energy supply shortage that: “(A) is, or is likely to be, of significant scope and duration, and of an emergency nature; (B) may cause major adverse impact on national safety or the national economy; and (C) results, or is likely to result, from (i) an interruption in the supply of imported petroleum products, (ii) an interruption in the supply of domestic petroleum products, or (iii) sabotage or an act of God.”

In the event of a drawdown, the SPR is released to the market by price- competitive sale to the highest qualified bidders. The Department of Energy has established publicly available Standard Sales Provisions which are supplemented at the time of a sale with additional information describing the quantities, types and locations from which the oil is to be sold. In making crude available for sale, the SPR takes into consideration the characteristics of the disruption and its impact on supplies and logistics systems.

Offers are made by means of an internet-based system which allows for quick determination of successful purchasers. After submission of financial guarantees, the purchasers are responsible for transporting their supplies from SPR terminals. The four SPR sites are located and engineered to interface with and make maximum use of the commercial marine and pipeline distribution network originating in the U.S. Gulf Coast. Each SPR site is connected to one or more marine terminals and multiple pipeline systems to provide redundancy of distribution capabilities.

EPCA also provides the Secretary of Energy alternative means of releasing oil from the SPR which could be employed to respond to domestic supply disruptions. He may conduct a test sale of up to five million barrels using the sales and delivery model described above. Alternately, he may conduct time exchanges with individual refiners affected by local or regional disruptions with no alternative sources to prevent refinery operations from shutting down. This authority has been used extensively during tropical storms and in response to localized logistical blockages. He may also conduct an emergency sale of oil that has been purchased but not yet delivered to the SPR facilities.

U.S. Efforts to Reduce Corruption in Energy Market Transactions and Dealings

Power and Natural Gas Sectors: The United States has a long history of energy market regulation that guards against public corruption. Reforms have resulted in regulations being relaxed or eliminated for some sectors and a greater reliance on competition to ensure just and reasonable prices in remaining regulated sectors. Competition in wholesale electricity and natural gas markets is firmly established. However, Congress and the Federal Regulatory Commission retain regulatory oversight, and enforcement authority if needed, of electric and market transactions and dealings at the wholesale level. Since the 1999-2000 problems with California electricity markets and resulting market abuses, FERC has increased its resources devoted to electric market oversight and enforcement.

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The Commodity Futures Trading Commission works to guard against corruption in electricity and natural gas futures and options trading. State public utility commissions and state attorneys general also have oversight responsibilities under state laws to help prevent corruption in electricity and natural gas markets.

U.S. Efforts to Enhance the Security of Oil and Natural Gas Supplies

In a world of global markets, there are multiple threats that keep supply from reaching consumers. About half of these threats relate to *force majeure*, where extraordinary circumstances like war and natural disaster free market actors from the obligation to supply or take delivery. Other threats include geopolitical differences, price disputes, and technical issues with supply or delivery of supply, such as damage to geological structures which decrease recoverable reserves or pirates in the Straits of Malacca.

The most effective way for governments and companies to manage these risks and thereby enhance the security of oil and natural gas supplies is by diversifying sources of supply and supply routes. U.S. oil supplies are sourced from all over the world. In 2006, the United States received at least 100,000 b/d of oil from 21 different countries. Nine countries exported at least 500,000 b/d to the United States during the same period.

The United States wishes gas imports to be similarly diversified. It imports LNG from at least seven different countries. In 2007, LNG imports were 770.8 billion cubic feet, representing about 20 percent of imported natural gas. LNG imports are projected to increase to 2.8 trillion cubic feet in 2030, thereby representing an estimated 90 percent of net imports. As LNG will be a critical element in the United States' energy profile, the U.S. government is actively encouraging the development of a world gas market with the depth and transparency of world oil markets. The United States encourages countries to monetize their natural gas resources into LNG, which is then capable of serving markets virtually anywhere in the world. In the U.S. downstream market, the Energy Policy Act of 2005 has facilitated the process of obtaining approval for LNG facilities by giving the Federal Energy Regulatory Commission sole siting authority.

II. Improving the Investment Climate in the Energy Sector

There are many components to improving the investment climate for energy infrastructure and the energy supply chain. As discussed, stable and transparent regulatory regimes are critical. In addition, all undue barriers to investment in countries should be removed. In consumer countries, an area of focus should be developing policies to streamline new infrastructure development, such as through enhanced siting procedures that integrate all the relevant planning agencies. With respect to energy supply, energy security can be enhanced with energy diversity, so efforts should be undertaken to attract investment across all technologies, including renewables. Energy markets require large capital investments, which in some cases may require larger market areas for such investments to be attractive. To that end, governments should work to integrate their energy markets with those of neighbouring countries, harmonize market rules and regulations across borders, implement more market-based means of managing cross-border flows, and generally strive to liberalize energy markets. Well-developed liberalised markets also foster the development of trading and contract arrangements, which provide liquidity and enhance security. As discussed previously, high-quality forecasts are also critical, so governments should regularly release and update supply-demand forecasts and identify where investment is needed. Finally, efforts should be undertaken to ensure the long-term availability of a skilled workforce.

Please detail policies and measures to:

- Promote investment in energy infrastructure and streamline infrastructure siting
- Ensure a level playing field for all competitors in the oil, gas, coal and power sectors
- Expand trade and better integrate energy markets with neighbouring countries
- Provide regular forecasts to the public on which to base investment decisions
- Educate and train skilled energy personnel to meet long term labor requirements
- Drive cost-effective investment in renewable and alternative energy sources
- Facilitate energy efficiency investment in buildings, industry and transport

U.S. Efforts to Promote Investment in Energy Infrastructure and Streamline Infrastructure Siting

Recent major Federal laws, including the Energy Policy Acts of 1992 and 2005 (EPAct 1992 and EPAct 2005) and the Energy Independence and Security Act of 2007 (EISA), as well as current Administration policy, all emphasize the need for the United States to increase its investment in energy infrastructure and streamlining of infrastructure siting. The laws require a combination of tax policy, Federal research and development, regulatory standards and reform/streamlining all to encourage developing adequate infrastructure, use of advanced technologies, accessing new sources of supply such as renewable energy, advanced nuclear and clean coal, oil and gas production, and using energy wisely through more energy efficiency.

Power Sector: Other sections of this report list many efforts underway under Federal laws like EPAct 1992 and 2005 and EISA to ensure adequate investment in energy efficiency as well as fossil, renewable, and nuclear electric generation infrastructure.

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States have enacted their own laws, regulations, and other measures to assist in these areas.

Measures in EPAct 2005 to strengthen electricity infrastructure include:

- Requirement for mandatory reliability standards to better protect power grids against outages in a competitive marketplace for electricity generation.
- Establishment of last-resort Federal government siting authority for transmission lines in areas where electric transmission congestion is found to be of national interest, to ensure a better-functioning power grid.
- Elimination of the Public Utility Holding Company Act (PUHCA), which should help to expand investment in electric generation and transmission by eliminating many restrictions on the ability of integrated utilities to engage in such investment.
- Clarification of Federal Energy Regulatory Commission's jurisdiction as lead agency in the regulatory approval of onshore LNG facilities, which should facilitate the siting of such facilities where needed and thereby encourage global natural gas trade.
- Clarification that the U.S. Department of Interior's Minerals Management Service has authority to regulate off-shore alternative energy projects such as offshore wind energy, wave energy, ocean current energy, offshore solar energy, and hydrogen generation on the Outer Continental Shelf, including offshore wind energy projects (final regulations are currently expected by the end of 2008).

EPAct 2005 instructed the DOE to conduct a study of electricity transmission congestion in the continental United States (excluding Texas), and if appropriate, designate areas adversely affected by congestion as national interest electric transmission corridors. The first report in 2006 identified three categories: areas of critical congestion concern (Atlantic coast from New York to Northern Virginia, Southern California), congestion areas of concern, and conditional constraint areas, which are areas where potential large scale development of remote renewables, coal or nuclear capacity might strain existing transmission capacity. The DOE is looking to states, utilities and regional transmission organizations to show leadership in developing either transmission, local generation, or demand-side solutions to these existing and emerging problems. DOE expects that positive state and industry decisions will be needed in the next few years to address these issues, and it will issue its next congestion study in August 2009.

EPAct 2005 also provided FERC with a backstop (under limited conditions) siting authority over normal state siting authority for new transmission lines that are in a corridor that has been a DOE-designated a national interest electric transmission corridor. In October 2007, DOE issued an order for two national corridor designations: the Mid-Atlantic Area National Corridor; and Southwest Area National Corridor. These corridors include areas in two of the nation's most populous regions with growing electricity congestion problems.

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EPAct 2005 directed the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior (the Agencies) to designate under their respective authorities corridors on Federal land in the 11 Western States for oil, gas and hydrogen pipelines and electricity transmission and distribution facilities (energy transport corridors). The Agencies determined that designating corridors as required by Section 368 constitutes a major Federal action which may have a significant impact upon the environment within the meaning of the National Environmental Policy Act of 1969 (NEPA). For this reason, the Agencies issued in November 2007 for public comment a draft programmatic environmental impact statement, "Designation of Energy Corridors on Federal Land in the 11 Western States" to address the environmental impacts from the proposed action and the range of reasonable alternatives. The proposed action calls for designating more than 6,000 miles of energy transport corridors across the West on Federal lands.

U.S. Efforts to Ensure a Level Playing Field for All Competitors in the Oil, Gas, Coal and Power Sectors

Oil Sector: Oil markets in the United States are highly competitive. FERC and the states establish just and reasonable rates to encourage maximum use of oil pipelines, allowing a wide range of competitors to bring oil to market while protecting shippers and consumers from unjustified costs. Fair competition is encouraged by equal access to pipeline transportation, equal service conditions on each pipeline, and reasonable pipeline rates.

Natural Gas Sector: Gas markets in the U.S. are highly competitive, with widespread access to pipeline transportation, on non-discriminatory terms, for competing producers. The Natural Gas Policy Act of 1978 ended wellhead price controls for "new" gas as of 1985, and the Natural Gas Wellhead Decontrol Act of 1989 lifted all remaining wellhead price controls. Order 436, issued by the Federal Energy Regulatory Commission (FERC) in 1985, required regulated third-party open access to the high-pressure gas transmission network. Order 636, issued in 1992, required interstate pipeline companies to unbundle their supply and transportation functions. This means that pipelines may only sell gas through functionally separate affiliates, helping to ensure that they will transport third-party gas on a non-discriminatory basis. By the end of 2001, 20 states had provided for open access to local distribution grids, allowing small customers to choose their gas suppliers, and 150 competing retail gas suppliers had emerged.

Coal Sector: There are many competing coal producers in the United States, with the 27 largest ones accounting for 81 percent of production in 2006. There are no major barriers to entry, and coal moves freely over an extensive network of roads, railways and barges.

Power Sector: The Federal Power Act authorizes the FERC to require open and non-discriminatory access to interstate transmission lines for all electricity producers for interstate sales of electric power. Orders 888 and 889, issued on April 24, 1996, require open and non-discriminatory access to interstate transmission services. These orders facilitate the restructuring of the retail electric power industry by each state government, and encourage each state to require distribution utilities to allow end users to obtain direct

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access to the retail power generation source of the end user's choice. Under these orders, the FERC allows utilities and power marketers to sell electricity at market-based rates if the seller and its affiliates do not have, or have adequately mitigated, transmission market power and cannot erect other barriers to entry. U.S. utilities must demonstrate the lack of transmission access market power by showing that their affiliates offer non-discriminatory service to competitors.

Order 888 requires all “jurisdictional” utilities that own, operate or control wholesale transmission facilities to file *nondiscriminatory open-access transmission tariffs* that offer service to third parties on a comparable basis to the utilities’ own uses of their transmission facilities. The order provides a single “pro forma” tariff for third-party transmission service that utilities must also use for their own wholesale energy sales and purchases. In return for utilities offering open access to their transmission facilities, the order allows them to recover all legitimate, prudently incurred, and verifiable investment costs which are stranded by such access. Such costs are assigned to wholesale customers who depart from their traditional utility’s system for another power supplier. Customers may also seek contract revisions allowing them to seek alternative supply options.

In addition, Order 888 issues guidelines for the creation of *independent system operators (ISOs)* under FERC jurisdiction though it does not require utilities to relinquish control of their transmission systems to an ISO. Finally, while the order does not require corporate divestiture of utilities’ generation and transmission operations, it does require *functional unbundling* of utilities’ transmission business from their power marketing business.

Order 889 establishes Open-Access Same-time Information Systems (OASIS) on which utilities must post real-time information about their transmission networks. It also prescribes what procedures utilities must follow when responding to requests for transmission services and proposes standards for information posted on OASIS to ensure uniformity. Beyond this, the rule requires utilities to separate wholesale power marketing from transmission operations, and to obtain transmission information for wholesale transactions via OASIS just like their competitors.

Regulatory reforms providing for non-discriminatory access to transmission grids (with FERC action at the Federal level on wholesale market access) and distribution grids (with state action on retail market access) have substantially broadened the scope for effective competition in the U.S. electric power sector. The reforms have catalyzed large-scale divestiture of generating facilities by traditional utilities that had been vertically integrated, as well as large-scale construction of generating facilities by non-utility generators. The result has been a huge increase in the market share of independent power producers. As of 2005, non-utility independent power producers accounted for 35.7 percent of the generating capacity and 28.8 percent of the electricity generated in the United States.

U.S. Efforts to Expand Trade and Better Integrate Energy Markets with Neighbouring Countries

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Natural Gas Markets: The gas markets of Canada and the United States are linked by an extensive network of high-pressure pipelines. The grid is used to move large amounts of Canadian gas to the U.S. market, as well as smaller amounts of U.S. gas to the Canadian market. Consequently, gas markets in the two countries are tightly linked and changes in gas demand in either economy may significantly affect gas prices in both.

Moreover, the United States and Canada have similar gas market structures and have reformed their gas markets for similar reasons on similar schedules. Both countries have many different gas producers. In the mid-1980s, both economies deregulated wellhead gas prices and required that access to the gas pipeline network be provided to all gas suppliers on equal terms. This allowed gas pipeline companies, large industrial firms and electricity generators to buy gas from the cheapest available source. Many states and provinces have since provided for open, non-discriminatory access to local distribution networks, extending competition to small commercial and residential customers.

There are 18 natural gas import and export pipelines between the United States and Mexico. While gas periodically flows in both directions, each pipeline flow is primarily either export or import. In 2007, the United States exported over 280,000 million cubic feet (MMcf) of gas to Mexico and imported slightly over 50,000 MMcf from Mexico.

Electricity Markets: The Eastern and Western grids of North America are completely synchronous between the United States and Canada, but grid interconnections with Mexico are very limited. Power flows on a competitive market basis, with hydropower flowing back and forth on a seasonal basis between the U.S. Northwest and British Columbia and sizeable amounts of hydropower flowing from Quebec to the U.S. Northeast. A well-established process is in place for approval of international transmission lines as needed.

U.S. Efforts to Provide Regular Forecasts to the Public on which to Base Investment Decisions

Each year, EIA publishes an *Annual Energy Outlook*. The 2007 *Outlook* includes energy market projections through 2030 which examine a wide range of economic growth cases, price cases, and side cases. Economic growth rates per annum range from 2.3 percent in the low case to 2.9 percent in the reference case to 3.4 percent in the high case. Light, sweet crude oil prices in 2030 range from \$36 per barrel in the low case to \$59 in the mid case to \$100 in the high case. Side cases examine the possible impacts of advanced technologies (in the residential and commercial sectors, industrial sector, and transportation sector) electric power sector technologies (nuclear, fossil and renewable), oil and gas technologies, renewable energy portfolio standards, geographical expansion of allowed areas for oil drilling, availability and price of ethanol, and costs of coal. Thus, investors have a wide range of government forecasts on which to base their decisions. In addition, many oil companies, non-governmental organizations and consulting firms

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make their own forecasts, further expanding on the range of information widely available to investors.

U.S. Efforts to Educate and Train Skilled Energy Personnel to Meet Long-Term Labor Requirements

U.S. efforts to educate and train skilled energy personnel include programs at the Federal, state and local level. These programs include efforts to train needed engineering, research and advanced degree staff as well as programs to train skilled technical workers at other levels. They include the Office of Workforce Development for Teachers and Scientists at the U.S. Department of Energy, the Educational Assistance program at the U.S. Nuclear Regulatory Commission, the President's High Job Growth Training Initiative and the Community Based Job Training Initiative at the U.S. Department of Labor, the Advanced Technology Education Program at the National Science Foundation, and numerous state based initiatives that support local energy workforce development., In addition, the non-profit Center for Energy Workforce Development works closely with Federal and state energy workforce development and training programs to communicate energy sector workforce development and training needs and to encourage private sector involvement in these education and training initiatives.

The U.S. Nuclear Regulatory Commission is providing some \$20 million under the Nuclear Education Program for four separate grant initiatives: curricula, fellowships and scholarships, faculty development, and trade school scholarships. The curricula initiative seeks to develop, revise, implement or improve nuclear education infrastructure, teaching competencies, subject matter expertise and skills in serving students in significant nuclear programs. The other initiatives include support for education in nuclear science and engineering to develop a workforce capable of supporting the design, construction, operation, and regulation of nuclear facilities and the safe handling of nuclear materials.

U.S. Efforts to Drive Cost-Effective Investment in Renewable and Alternative Energy Sources

Please see material in section IV below on U.S. Efforts to Establish a Robust and Competitive Renewable Energy Industry

U.S. Efforts to Facilitate Energy Efficiency Investment in Buildings, Industry and Transport

Please see material in section III below on U.S. efforts to implement St. Petersburg recommendations (Measure 2007-10: Facilitating Energy Efficiency Investments and Financing).

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III. Enhancing Energy Efficiency and Energy Saving

G8 countries have made specific commitments with respect to energy efficiency on appliances, lighting, buildings, transport, industry, and across sectors. Meeting these commitments will enhance energy security in one of the least costly ways possible.

Please detail policies and measures to:

- Implement the 16 energy efficiency measures that the G8 have specified for appliances, lighting, buildings, transport, industry, and across sectors.
- Ensure cost-reflective pricing to drive cost-effective energy efficiency steps
- Promote demand-side measures in the electric power sector.
- Encourage public and private financing for energy efficiency improvements.
- Develop efficiency standards and labels for buildings, appliances and equipment.
- Provide energy efficiency audits to homes, offices, and industrial firms.
- Raise public awareness of energy efficiency opportunities.
- Improve end-use data and track progress towards energy efficiency goals.

U.S. Efforts to Implement 16 Energy Efficiency Measures That the G8 Have Specified For Appliances, Lighting, Buildings, Transport, Industry, and Across Sectors

Measure 2006-1: One-Watt Limit on Standby Power

The Energy Security and Independence Act of 2007 (EISA) requires that test procedures for covered consumer products be amended to include standby mode and off mode energy consumption, taking into consideration the most current versions of Standards 62301 and 62087 of the International Electrotechnical Commission. EISA mandates that any final rule establishing or revising a standard for a covered consumer product, adopted after July 1, 2010, incorporate standby mode and off mode energy use.

DOE is revising test procedures for battery chargers and external power supplies and undertaking an efficiency standard to address standby energy use. EISA set standards for External Power Supplies (0.5 watts for units up to 250 watts). The Federal government is required to buy devices with standby power that uses less than 1 watt of standby power. Some states have implemented standby limits on certain consumer electronics products.

Measure 2006-2: Maximum Rolling Resistance and Proper Inflation of Tires

The Energy Security and Independence Act of 2007 (EISA) directs the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) to establish a tire rating and labeling program for tires. NHTSA has already issued a standard that required all light duty vehicles to have a tire pressure monitoring system by August 31, 2007.

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Measure 2006-3: Energy-Efficient Digital Television Adaptors

The Energy Security and Independence Act of 2007 (EISA) mandates the labeling of energy use of set-top boxes and stand alone digital recording devices. The National Telecommunications and Information Administration Government, a bureau of the Commerce Department, subsidizes consumer purchase of digital television adaptors with low standby power and auto power down features through disbursement of \$40 coupons.

Measure 2006-4: Best Practice in Lighting

EISA outlines a rigorous lighting efficiency program, which mandates increases in the energy efficiency of light bulbs by 30 percent. This will effectively phase out most common types of incandescent light bulbs by 2014. EISA mandates revised lighting efficiency standards effective in 2020 which could be met by compact fluorescents, LED or other energy efficient bulbs (EISA). EISA sets efficiency standards for metal halide lamps and requires amended standards in 2012 and 2019.

DOE is progressing on rulemakings to update and expand the scope of energy efficiency standards for fluorescent lamps and ballasts, and incandescent reflector lamps.

Solid-State Lighting R&D: DOE has a major R&D activity underway in solid state lighting to demonstrate energy-efficient, high-quality, long-lasting lighting technologies by 2025 that have the technical capability of illuminating our buildings using 50 percent less electricity compared to technologies in 2005. In support of this overall goal, DOE has made a long-term commitment to advance the development and market introduction of energy-efficient white-light sources for general illumination. Solid-state lighting (SSL) differs fundamentally from today's lighting technologies, and its unique attributes drive the need for a coordinated approach that guides technology advances from laboratory to marketplace. DOE has developed a comprehensive national strategy that encompasses Basic Energy Science, Core Technology Research, Product Development, Commercialization Support, Standards Development, and an SSL Partnership. DOE's solid-state lighting research activities represent an essential component of the Department's strategy for achieving Zero Energy Buildings (noted below). More about DOE's comprehensive SSL program is available at <http://www.netl.doe.gov/ssl/>

Commercial Lighting Initiative: The goal of this DOE initiative is to realize energy savings of 30 percent below the prevailing U.S. commercial buildings energy standard, that established by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the Engineering Society of North America (IESNA), known as ASHRAE/IESNA Standard 90.1-2004. This Initiative has been launched to support advanced lighting energy efficiency solutions using voluntary market pull strategies. It has been fully coordinated with activity on commercial buildings systems integration to improve performance in stores, offices, hospitals and other commercial buildings.

Energy Star® Labels for Lighting: Energy Star® is a joint program of the U.S. Department of Energy and the U.S. Environmental Protection Agency to label energy-

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efficient products in the marketplace, including lighting. Energy Star qualified light bulbs and fixtures use about 75 percent less energy than standard lighting.

Measure 2007-1: Strengthened Energy Efficiency Standards for New Buildings

The United States has developed energy efficiency standards for new buildings since 1975, with the first codification of those standards taking place in 1977. Adoption and enforcement of these codes and standards is the responsibility of the states, with the U.S. Department of Energy playing a major support role in the development of new national model codes. In 2007, DOE undertook to support a 30 percent improvement in ASHRAE/ IESNA Standard 90.1 for the year 2010 (relative to Standard 90.1-2004). Standard 90.1 is the primary reference for national model commercial codes. In 2008, DOE is providing support to a 30 percent improvement in the national model residential code – the International Energy Conservation Code.

Measure 2007-2: Support for Zero Energy Buildings

Federal government research programs aim to achieve net-zero-energy residential buildings by 2020 and commercial buildings by 2025. DOE's supporting portfolio of component and systems research and development and deployment is focused on realization of this goal. There are three main components of the research effort:

Residential Sector: The specific goal for the residential sector is to develop integrated energy efficiency and onsite/renewable power solutions that will be evaluated on a production basis to reduce whole house energy use in new homes by an *average* of 50 percent by 2015 and 70 percent by 2020 (compared to a clearly established DOE benchmark) at positive cash flow. This will help to achieve the strategic goal of net zero energy homes by 2020 when combined with renewable energy supply. The DOE Office of Building Technologies' *Multi-Year Program Plan* can be consulted for further detail at <http://www.eere.energy.gov/buildings/about/mypp.html>.

Research on *residential systems integration* focuses on progressively higher levels of energy performance over time. Phase 1, systems evaluation, involves the design, construction and testing of subsystems for whole house designs (by climate zone) in research houses to evaluate how components perform. In Phase 2, prototype houses are designed and built using successful Phase 1 subsystems. Phase 3 evaluates production prototypes in a housing subdivision. For the *Building America* program, which develops best practices for homebuilding, by 2025, the objective is develop and demonstrate marketable energy systems that can achieve "net-zero" energy use in new buildings through a 70 percent reduction in building energy use. By 2030, the goal is to enable complete integration of the building envelope, equipment, and appliances with on-site micro-cogeneration and zero-emission technologies.

Commercial Sector: For commercial buildings, the goal is net-zero energy new buildings by 2025. In support of this goal, DOE is developing integrated whole-building strategies to enable commercial buildings to be designed, constructed, and operated to use up to 70 percent less energy relative to the relevant commercial building energy standard, ASHRAE Standard 90.1-2004. The balance of the buildings' energy requirements (30 percent or more) will be met by renewable energy sources. (See the Office of Building Technologies' Multi-Year Program Plan referenced above for more information.)

Research on *commercial buildings integration* includes developing the decision tools, guides, and underlying technology options necessary to realize 50 and 70 percent energy savings levels across a variety of building types, energy intensities and sizes. There are three elements of activity. First, advanced energy design guides and technical support documents are information products that indicate how to achieve exemplary whole-building energy performance levels, in new construction, for specific building types. Second, building decision tools enable building designers and owners to look across sets of energy efficient technology solutions, and then to select appropriate ones for inclusion in building designs. Third, technology option sets are defined as specific energy efficient solutions for a specific building type or process-specific design. Technology option sets may include equipment, strategies, algorithms, methods, and systems.

Building Systems and Components: For both residential and commercial buildings, research activities on systems and components address three main areas:

- Research on the *building envelope* focuses on systems that determine or control the flow of heat, air, moisture, and light in and out of a building; and on materials that can affect energy use. Goals include market-viable windows with R5 insulation performance by 2010, advanced systems capable of net-zero energy use by 2025, and eventual reduction in average thermal load of 30 percent for existing residential buildings and 66 percent for new buildings.
- Research on *building equipment* focuses on means to significantly improve efficiency of heating, cooling, ventilating, thermal distribution, lighting, home appliances, and on-site energy use. This area also includes advanced refrigerants and cycles, solid-state lighting, smart sensors and controls, microturbines, and heat recovery. A research goal is to develop solid state lighting equipment which provides 79 lumens per watt in general applications by 2008 and 200 lumens per watt in laboratory devices by 2025.
- Development of *analysis and design tools* emphasizes areas such as performance simulation software, and design tools for building technology professionals. Home performance programs for builders and home buyers/owners have also been supported.

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Measure 2007-3: Indicators and Initiatives for Energy Efficiency in Buildings

Since the late 1970s, the U.S. Energy Information Administration (EIA) has collected information on energy use, energy efficiency and building characteristics, principally via periodic national surveys, the Commercial Building Energy Consumption Survey (CBECS) and the Residential Energy Consumption Survey (RECS). CBECS is a national sample survey that collects information on the stock of U.S. commercial buildings, their energy-related building characteristics, and their energy consumption and expenditures. The CBECS is conducted on a quadrennial basis; the first survey was done in 1979, the eighth and most recent in 2003. The RECS is a national area-probability sample survey that collects energy-related data for occupied primary housing units. The first RECS was conducted in 1978, the twelfth and most recent was conducted in 2005.

As part of a national priority for improving energy efficiency, the Department of Energy has established a new national system of indicators to track changes in the energy intensity of the United States economy and economic sectors over time. This is available on the internet at <http://intensityindicators.pnl.gov/index.stm>

The Department of Energy's annual planning process for building R&D, as reflected in the Office of Building Technologies' Multi-Year Program Plan, explicitly delineates barriers to success, and links actions to those barriers. (See R&D section of the MYPP, <http://www.eere.energy.gov/buildings/about/mypp.html>, tables 2-12, 2-16, and 2-17.)

The IEA recommends that based on energy efficiency information and indicators for existing buildings, governments should construct a package of initiatives to address the most important barriers to energy efficiency in buildings. Such initiatives in the United States include efficiency standards, labels, model codes and tax credits.

Efficiency standards: Minimum efficiency standards for appliances and equipment, including those in EISA, ensure that "refurbishment" that includes equipment and appliance replacements will realize upgrades in energy performance;

Efficiency Labels: Labeling of appliances and equipment lets decision makers in the market make more informed choices regarding energy efficiency. (See details under *Measure 2007-4: Efficiency Standards and Labels for Appliances and Equipment.*)

Model Building Codes: All national model building energy codes in the United States are written to apply to new construction, additions, and new systems and equipment in existing buildings. The key to enforcement of these codes is the building permit process utilized by the adopting states and jurisdictions. If a proposed change to a building requires a building permit, then energy code compliance will be required as specified in the energy code. The codes generally differentiate between repairs and replacements. Mending and routine replacement of parts are generally not subject to code, while replacement of equipment and major components with new or upgraded equipment or components requires compliance with the current code. A special case is changes in occupancy requiring greater energy efficiency, such as from semiheated warehouse to

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office or residential occupancy. These are often accompanied by major changes to the building which can be predicted to use more energy than the existing building. In these cases, full compliance with the energy code for the new occupancy is required.

Some recent tax provisions to promote energy-efficient refurbishment are as follows:

Tax Credits for Individuals Who Make Their Homes More Energy Efficient: The Energy Policy Act of 2005 (EPAAct 2005) provided tax credits for energy efficiency improvements in the building envelope of existing homes and for purchase of high-efficiency heating, cooling, and water heating equipment. Efficiency improvements and/or equipment had to be placed in service from January 1, 2006 through December 31, 2007 and had to serve a dwelling in the United States owned and used by the taxpayer as a primary residence. The maximum credit for all improvements combined was \$500 over the two-year period. Buyers of qualified energy efficient property are eligible for tax credits up to the total expenditures on such property. The credit could also be applied to labor costs for assembly and installation.

EPAAct 2005 provided a 10 percent credit for qualified energy efficiency improvements. To qualify, a component had to meet or exceed the criteria established by the 2000 International Energy Conservation Code (including supplements) and must be installed in the taxpayer's main home in the United States. The following items are eligible:

- Insulation systems that reduce heat loss/gain
- Exterior windows (including skylights)
- Exterior doors metal roofs (meeting applicable Energy Star® requirements).

In addition, there was a credit for costs relating to residential energy property expenses. To qualify as residential energy property, the property must meet certification requirements prescribed by the Secretary of the Treasury and must be installed in the taxpayer's main home in the United States. Eligible property and maximum credit amounts are as follows:

- \$50 for each advanced main air circulating fan
- \$150 for each qualified natural gas, propane, or oil furnace or hot water boiler
- \$300 for each item of qualified energy efficient property (electric heat pump water heaters, electric heat pumps, geothermal heat pumps, central air conditioners, and natural gas, propane, or oil water heaters)

Although these credits expired at the end of 2007, there are pending legislative proposals to reestablish a similar set of financial incentives.

Tax Credit for Manufacturers of Energy-Efficient Appliances: The Energy Policy Act of 2005 established tax credits for manufacturers of high-efficiency residential clothes washers, refrigerators, and dishwashers produced in calendar years 2006 and 2007. Manufacturers only receive these credits for the increase in production of qualifying appliances over a three-year rolling baseline, and only appliances produced in the United States are eligible. Credits available to manufacturers are as follows:

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- Dishwashers : A credit based on an energy savings calculation is available for models that meet the 2007 Energy Star® criteria.
- Clothes washers: \$100 for models that meet the 2007 Energy Star® criteria.
- Refrigerators: \$75 for models that save at least 15 percent relative to 2001 Federal standards (available only in 2006); \$125 for models that save at least 20 percent relative to 2001 Federal standards; \$175 for models that save 25 percent or more relative to 2001 Federal standards. Each manufacturer is limited to a total of \$75 million for all credits under this provision. Of that cap, no more than \$20 million can be claimed for the lowest tier of qualifying refrigerators.

Energy Efficient Commercial Buildings Tax Deduction: The Energy Policy Act of 2005 established a tax deduction for energy efficient commercial buildings applicable to qualifying systems and buildings placed in service from January 1, 2006 through December 31, 2007. This tax deduction was subsequently extended through 2008 by Section 204 of the Tax Relief and Health Care Act of 2006 (H.R. 6111).

A tax deduction of \$1.80 per square foot is available to owners of new or existing buildings who install (1) interior lighting; (2) building envelope, or (3) heating, cooling, ventilation, or hot water systems that reduce the building's total energy and power cost by 50 percent or more in comparison to a building meeting minimum requirements set by ASHRAE Standard 90.1-2001. Energy savings must be calculated using qualified computer software approved by the Internal Revenue service (IRS). Note that the eligible technologies listed above are provided as examples and do not represent an official list specified in the statute. Deductions of \$0.60 per square foot are available to owners of buildings in which individual lighting, building envelope, or heating and cooling systems meet target levels that would reasonably contribute to an overall building savings of 50 percent if additional systems were installed.

New Energy-Efficient Home Tax Credit for Builders: The Energy Policy Act of 2005 established tax credits of up to \$2,000 for builders of all new energy-efficient homes, including manufactured homes constructed in accordance with the Federal Manufactured Homes Construction and Safety Standards. Initially scheduled to expire at the end of 2007, the tax credit was extended through 2008 by Section 205 of the Tax Relief and Health Care Act of 2006 (H.R. 6111).

Measure 2007-4: Efficiency Standards and Labels for Appliances and Equipment

Appliance Standards: The DOE Appliance Standards program develops, promulgates, and enforces test procedures and energy conservation standards for residential appliances and certain commercial equipment. DOE has energy efficiency standards in place for most major types of energy-using appliances, including air conditioners, clothes washers and dryers, space and water heaters, kitchen ranges and ovens, refrigerators and freezers, and lighting. Some of the impetus for national efficiency standards came from manufacturers who wished to avoid the costly confusion of multiple state standards.

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In 2004, DOE established a minimum-efficiency standard for residential central air conditioners of SEER (Seasonal Energy Efficiency Ratio) 13. The new standard took effect in January 2006, reducing energy use by new air conditioners by 23 percent relative to the prior standard. Also in 2004, DOE published Advance Notices of Proposed Rulemakings regarding energy efficiency standards for three products: distribution transformers, commercial air conditioners and heat pumps, and residential furnaces and boilers. Section 135 EPAct 2005 establishes new or revised energy conservation standards for a number of products including:

Residential

- o Ceiling fans
- o Compact fluorescent lighting fixtures (medium base)
- o Dehumidifiers
- o Torchiere lighting fixtures

Commercial

- o commercial refrigerators & freezers
- o commercial package air conditioning and heating equipment
- o fan-type unit heaters
- o coin-operated clothes washers
- o low-voltage dry-type distribution transformers
- o illuminated exit signs
- o traffic signal indicator light module
- o pedestrian signals
- o automatic ice makers
- o commercial ice cream freezers
- o mercury vapor light ballasts
- o tubular fluorescent lamp ballasts (34, 60, 95 watts)
- o pre-rinse spray valves
- o air flow through duct work
- o refrigerated beverage vending machines
- o Determination of standards for battery chargers and external power supplies

The Energy Independence and Security Act of 2007 (EISA) set standards for certain consumer and industrial products and requires new or revised standards for others. EISA sets incandescent lighting standards that will cut energy consumption 30 percent by 2014 and substantially more by 2020. These standards will encourage but not require the use of compact fluorescent bulbs and advanced solid state lighting technologies. Other related provisions of EISA include:

- statutory efficiency standards for external power supplies, residential boilers, dehumidifiers, electric motors & walk-in coolers
- water use standards for clothes washers & dishwashers
- authority to set regional standards for home heating & cooling equipment
- mandates to develop standards for furnace fans, refrigerators & standby power
- requirements for periodic updating of all standards & test procedures

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- labeling of electronic products

In January 2006, the Department of Energy released a 5-year plan to issue new or amended efficiency standards. DOE has since completed four energy efficiency standards, six test procedure rulemakings, and begun eight standard-setting rulemakings.

Energy Star® Labels: The Energy Star® labeling program is designed to clearly signal high efficiency in buildings and products to consumers and businesses. Over 50 types of products can now earn the label. DOE manages the labeling for a variety of residential products, including appliances, compact fluorescent lamps (CFL), solid state lighting, windows, and residential water heaters. The U.S. Environmental Protection Agency (EPA) manages the labeling of buildings, new homes, office equipment, home electronics, and residential heating, ventilation and air conditioning (HVAC).

The National Energy Plan (NEP) of 2001 recommended that the program be expanded from office buildings to include schools, stores, and health care facilities. The program has since been expanded to several new categories of commercial buildings including hospitals, supermarkets, hotels, financial centers, bank branches, courthouses, warehouses and residence halls. A national energy performance rating system, introduced in 1999 and expanded in 2002, lets interested parties rate a building's efficiency on a scale of zero to 100. Top performing buildings receive the Energy Star®. This system has been valuable in evaluating building energy efficiency and identifying cost-effective opportunities for improvements for a wide range of building types including hospitals, schools, grocery stores, office buildings, warehouses, and hotels.

The NEP also recommended that Energy Star® labels be extended to additional products, appliances, and services. The program has since been extended to include small commercial heating, ventilation and air conditioning units, ceiling fans, commercial portable phones, home insulation and air sealing, commercial cooking equipment, vending machines, water heaters and solid state lighting. Energy Star® specifications have also been upgraded for residential windows, CFLs, residential light fixtures, central air conditioners, televisions, video cassette recorders, clothes washers and dishwashers.

Measure 2007-5: Low-Power Modes for Electronic Devices

The Energy Independence and Security Act of 2007 (EISA) has key provisions related to low-power modes for electronic devices. EISA Sec. 524, Federally-Procured Appliances with Standby Power, mandates that Federal agencies buying eligible products shall purchase those using not more than 1-watt of standby power, given that it is lifecycle-cost effective and practicable. EISA Sec. 310, Standby Mode, mandates that test procedures shall include standby and off modes for a broad range of appliances and plug loads.

Research is underway on savings from and obstacles to forcing products to shift into low power modes when not used for long periods of time. Research is also underway to develop new protocols to permit more efficient operation while in low power modes.

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The Energy Star® label for home electronics products, including audiovisual products, includes consideration of energy use when in sleep or “standby” mode. Products that have earned the Energy Star® use up to 60 percent less energy for standby functions, while providing the same performance at the same price as less-efficient models.

Measure 2007-6: Fuel-Efficiency Standards for Vehicles

Corporate Average Fuel Economy (CAFE): The CAFE program has been in place since 1978. Each firm manufacturing or importing cars for sale into the United States must meet the fuel economy standard independently for each of three categories of vehicle: domestic passenger car, imported passenger, and light trucks.

From 1990s through 2002, the U.S. Department of Transportation (DOT) was prohibited by law from adjusting CAFE standards. In 2003, this prohibition was lifted, and DOT’s National Highway Traffic Safety Administration (NHTSA) raised the light truck fuel economy standard from 20.7 mpg by stages to 22.7 mpg for the 2007 model year. In 2006, NHTSA promulgated an innovative program for light trucks in which fuel economy is based upon vehicle size. Under this program, the impacts of the regulations are spread across more vehicles. The light truck fuel economy standard will rise to 24.1 mpg by model year 2011.

The Energy Independence and Security Act (EISA) of December 2007 mandates a national fuel economy standard of 35 miles per gallon by 2020 – which will increase fuel economy by 40 percent and save billions of gallons of fuel. This requirement represents the first statutory increase in automobile fuel economy standards since 1975.

Measure 2007-7: Tire Monitoring Systems and Rolling Resistance Test Procedures

EISA requires the National Highway Traffic Safety Administration to establish a tire rating and labeling program for tires. NHSTA has issued a standard that requires all light duty vehicles to have a tire pressure monitoring system by August 31, 2007.

Measure 2007-8: Phase-Out of Inefficient Incandescent Light Bulbs

EISA mandates a 30 percent increase in the energy efficiency of light bulbs. This will effectively phase out most common types of incandescent light bulbs currently on the market between 2012 and 2014. However, some leading manufacturers have indicated that new incandescent technology will be able to perform at the required levels, and other types, such as halogen, will meet requirements.

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Measure 2007-9: Reporting Industrial Sector Energy Intensity Data to IEA

As part of a national priority for improving energy efficiency, DOE established a new national system of indicators to track changes in the energy intensity of our economy and economic sectors over time, available at <http://intensityindicators.pnl.gov/index.stm>. This website features trend data and graphics for the 1985-2004 period for the industrial, residential, commercial and the transportation sectors. The U.S. Energy Information Administration gathers detailed information on industrial energy use every four years as part of its Manufacturing Energy Consumption Survey.

Measure 2007-10: Facilitating Energy Efficiency Investments and Financing

DOE through its Federal Energy Management Program (FEMP) is a participant in the development of the International Performance Measurement and Verification Protocol (IPMVP). FEMP actively promotes the use of alternative (private sector) financing contracting in the Federal sector that includes a provision for guaranteed savings and typically require use of the IPMVP developed savings measurement and verification protocols to confirm that the guaranteed savings requirements did indeed occur.

Energy Savings Performance Contracts: Federal agencies are encouraged to use Energy Savings Performance Contracts (ESPCs) to finance investments in energy-saving improvements. An ESPC is a contracting vehicle that allows agencies to accomplish energy projects for their facilities without up-front capital costs and without special Congressional appropriations to pay for the improvements. An ESPC project is a partnership between the customer and an energy services company (ESCO). The ESCO conducts a comprehensive energy audit and identifies improvements that will save energy at the facility. In consultation with the agency customer, the ESCO designs and constructs a project that meets the agency's needs and arranges financing to pay for it. The ESCO guarantees that the improvements will generate savings sufficient to pay for the project over the term of the contract. After the contract ends, all additional cost savings accrue to the agency. Contract terms up to 25 years are allowed. Federal agencies structure ESPCs so that financial savings cover costs of their investments. More than 400 ESPC projects have been awarded by 19 different Federal agencies in 46 states. \$1.9 billion has been invested in U.S. Federal facilities through ESPCs.

Utility Energy Service Contracts: In Utility Energy Service Contracts (UESCs), the utility arranges financing to cover the capital costs of an efficiency project. Then the utility is repaid over the contract term from the cost savings generated by the energy efficiency measures. More than 45 electric and gas utilities have provided project financing for energy and water efficiency upgrades at Federal facilities, investing more than \$600 million through utility energy services contracts since 1995.

Energy efficiency financing is also facilitated through energy efficient mortgages.

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Energy Efficient Mortgages: The Energy Efficient Mortgages Program (EEM) helps homebuyers or homeowners save money on energy bills by enabling them to finance the cost of adding energy-efficiency features to new or existing housing as part of their home purchase or refinancing mortgage. Cost-effective energy saving measures may be financed as part of the mortgage. A buyer's debt-to-income ratio on the loan for an energy efficient home could be stretched, so that a larger percentage of the borrower's monthly income can be applied to the monthly mortgage payment. All homes built to the Council of American Building Officials Model Energy Code (MEC) can qualify for an EEM. Since an Energy Star® Home is 30 percent more energy efficient than a home built to the MEC, it exceeds the minimum requirements for EEMs and automatically qualifies for the stretch. FHA-approved lending institutions-which include many banks, savings and loan associations, and mortgage companies can make loans covered by EEM insurance.

Measure 2007-11: Action Plans for Improving Energy Efficiency

The National Action Plan for Energy Efficiency: Leaders of the U.S. electric and gas utility industry, together with state utility regulators, released their National Action Plan for Energy Efficiency in July 2006. This Action Plan, facilitated by technical assistance from the U.S. Department of Energy and U.S. Environmental Protection Agency, has as its goal to create a sustainable, aggressive national commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organizations. To date, over 120 organizations, including leading electric and gas utilities, all three of their national trade associations, many State regulators and governors, and the National Association of Regulatory Utility Commissioners have endorsed the Action Plan's five main recommendations and have pledged to take individual actions to carry them out.

The Action Plan for Energy Efficiency was not issued by the Federal government, which has little jurisdiction over utility-delivered energy efficiency. Instead, the Action Plan for Energy Efficiency was issued by the electric and gas utility industry and State regulators who see the need to increase energy efficiency and are the entities who actually can deliver energy efficiency. The Action Plan is part of a strong renewed, as well as new for some, interest in energy efficiency by the utility industry and its state regulators. More information at <http://www.epa.gov/cleanenergy/energy-programs/napeel/>.

Assessing Energy Consumption by End Use: Most of this assessment is the province of the Energy Information Administration, based on its RECS and CBECS surveys – as discussed earlier. End-use detail in the buildings sector is featured in Tables A4 and A5 of the “Annual Energy Outlook.” Further, DOE conducts more detailed engineering and bottoms-up accounting assessments of end-use energy, when more resolution is required for program design and planning. Examples include assessments of lighting energy use, heating and cooling energy use and that by other equipment, all available on the web at <http://www.eere.energy.gov/buildings/info/publications.html#technicalreports>.

Energy Savings Potentials in the Buildings Sector: DOE annually estimates the energy savings potential of its R&D and demonstration portfolio, in response to the Government Performance and Results Act, as part of the budgetary process, and this is available at

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http://www1.eere.energy.gov/ba/pba/2008_benefits.html. DOE assesses energy savings potential of zero energy buildings, such as <http://www.nrel.gov/docs/fy08osti/41957.pdf>, and the energy savings potential of individual technologies, such as solid-state lighting, at http://www.eere.energy.gov/buildings/info/documents/pdfs/ssl_final_report3.pdf. EIA addresses the potential for energy efficiency improvements as part of its *Annual Energy Outlook* reports, including the potential savings resulting from accelerated adoption of new technologies and reduced demand in response to higher future energy prices.

Benchmarks: DOE has developed a standard benchmark for residential new home construction, against which to measure progress, over time, towards realization of net-zero energy performance by 2020. DOE has developed, and is about to release, a series of commercial new construction benchmarks, by building type, to measure progress over time relative to its 2025 net-zero goal.

Objectives and Evaluation Methods: DOE has implemented the Stage-Gate principles for R&D management that were developed by Dr. Robert C. Cooper in *Winning at New Products* (Basic Books, 2001). These principles call for regular evaluation of progress, against market and technical criteria, to maximize the yield of the R&D portfolio. See http://www1.eere.energy.gov/industry/financial/pdfs/itp_stage_gate_overview.pdf and <http://devafdc.nrel.gov/pdfs/9276.pdf> for industrial technology and biomass examples.

Measure 2007-12: Providing Progress Reports to IEA and G8

The U.S. government regularly reports to the IEA its progress in implementing its energy efficiency policies and programs, including this update on its progress in implementing the IEA recommendations to the St. Petersburg and Heiligendamm G8 Summits.

U.S. Efforts to Ensure Cost-Reflective Pricing to Drive Cost-Effective Energy Efficiency Steps

Energy prices in the United States are highly reflective of costs. Fuels such as oil, gas and coal are freely traded without price controls. Electricity is provided by a variety of competing generators in the wholesale power market, and retail customers either buy electricity directly from a supplier at market prices or pay rates that are regulated by state Public Utility Commissions on the basis of the costs of power supply (generation, transmission, distribution and other) as represented to them by utilities they regulate.

U.S. Efforts to Promote Demand-Side Measures in the Electric Power Sector

Demand-Side Management (DSM) has historically been an important contribution to the US electricity security of supply, and reduces the environmental impact of electricity use. From 1995 to 2006, the contribution of DSM has declined in relative terms compared to electricity demand growth in the area of energy efficiency, and in absolute terms in the area of load management (a form of “demand response”), largely as efforts were focused

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on increasing competition and uncertainty from the related restructuring of the electric power sector. However, there has been an upward trend in DSM since 2000 and a strong resurgence in the last two years. For example, a 2006 review of the integrated resource plans of major utilities in the West show plans to meet half of their customers' load growth with energy efficiency. There is a new emphasis in the electric utility industry and its state regulatory commissions in utility-delivered energy efficiency, particularly through the preparation and implementation of a National Action Plan for Energy Efficiency. There now exists an emerging view in the utility industry and their state regulators that energy efficiency can be used as a bridge fuel (as natural gas was used in the 1990s) to expanded use of zero-carbon and lower-carbon generation technologies.

Smart Metering: The Energy Policy Act of 2005 requires each state electricity regulatory agency to consider adopting a regulatory standard that requires their electric utilities to offer each of its customer classes (and individual customers upon request) a time-based rate schedule under which rates vary according to the utility's costs of generating and purchasing electricity at the wholesale level. Time-based rates help customers to manage energy use and cost if used with advanced metering and communications technology. More importantly, this EPAct provision, together with increased interest by state electricity regulators and their jurisdictional electric utilities, is causing proposals in a number of states, such as California, Maryland, Delaware, and the District of Columbia, for rollouts of smart meters to all electricity customers.

Demand Response: Demand response in the electric sector is on the increase. As reported by the Federal Energy Regulatory Commission (FERC) in its annual demand response reports, the United States already has about 5 percent of its electricity load under demand response, which is where the customer can take steps under either a price signal or automated technology to reduce its electric consumption, often during peak electricity demand periods. Retail level demand response is solely under the jurisdiction of states, and so the U.S. Department of Energy has been facilitating efforts by States on a regional basis (to date the regions of New England, Mid-Atlantic, Midwest, and the Pacific Northwest). All U.S. regional transmission operators/ independent system operators, with encouragement by FERC and technical assistance by the U.S. Department of Energy, are considering, developing, or have adopted wholesale market level demand response efforts, which in 2007 led to 40,000 MW of demand responsive load collectively among them.

Smart Grid: The Energy Independence and Security Act (EISA) of 2007 requires each state electricity regulatory agency to consider adopting a regulatory standard that requires their streamlined approval of investments by their jurisdictional electric utilities that will enable more automation at the distribution and transmission level of the electric grid, what the new law calls a "smart grid". In addition, EISA requires the National Institute of Standards and Technology (NIST) to deliver "interoperability" standards that can allow consumer appliances and other end-use customer equipment to communicate with the electricity grid, so as to better enable energy efficiency, demand response, storage, plug-in hybrid electric vehicles, and greater reliability.

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U.S. Efforts to Encourage Public and Private Financing for Energy Efficiency Improvements.

Please see section above on U.S. efforts to implement St. Petersburg recommendations (*Measure 2007-10: Facilitating Energy Efficiency Investments and Financing*).

U.S. Efforts to Develop Efficiency Standards and Labels for Buildings, Appliances and Equipment.

Please see section above on U.S. efforts to implement St. Petersburg recommendations (*Measure 2007-1: Strengthened Energy Efficiency Standards for New Buildings* and *Measure 2007-4: Efficiency Standards and Labels for Appliances and Equipment*).

U.S. Efforts to Provide Energy Efficiency Audits to Homes, Offices, and Industry

The U.S. government supports or encourages energy audits of homes, schools, offices and industry in a number of different ways. For the industrial sector, the United States has established Industrial Assessment Centers that conduct audits of qualifying small and medium-sized industries. The Department of Energy has developed and made widely available a range of software and other tools to assist individuals, institutions and businesses to conduct such energy audits. Finally, many states and utilities directly support the conduct of such audits, sometimes using Federal assistance to do so.

For the industrial sector, auditing efforts in the United States involve a mix of audits offered by the Federal government and self-auditing by energy-intensive firms.

Industrial Technologies of the Future Program: Working with industry, DOE's Industrial Technology Program seeks to reduce projected annual industrial energy consumption by 10 quads by 2020, returning \$26 billion in production cost savings to U.S. companies, workers, shareholders, and consumers. Central to this ambitious goal, ITP expects to help energy-intensive industries and their supply chains to reduce energy consumption per unit of output by 25 percent from 1990 levels. The first focus is on nine materials and process industries since they account for the majority of energy use in the industrial sector and present the greatest opportunity for limiting energy use. The second is on cross-cutting R&D which can help a variety of industries.

Under the program, each industry defines a vision of its marketing, business and technology goals through 2020, identifies its most critical needs for the future, and enters into public-private partnerships to share the costs and risks of the R&D and technology deployment required. Based on its vision, each industry develops one or more technology roadmaps, which articulate specific technology strategies and create a comprehensive research and development (R&D) agenda. DOE assists industries during this process and acts as a neutral party to help competitors, suppliers, customers, and

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other key stakeholders reach consensus. The published roadmaps align public and private research investments with industry and public needs. By letting industry take ownership of the planning process and requiring industry support for R&D activities, the strategy ensures that the developed technologies are quickly moved into commercial use.

Climate VISION—Voluntary Innovative Sector Initiatives: Opportunities Now: Climate Vision is a public-private partnership initiative for the industrial sector to boost its contribution to the national goal of reducing GHG intensity by 18 percent between 2002 to 2012. Business associations representing energy-intensive industry sectors and The Business Roundtable have become program partners with the Federal government and have issued letters of intent to meet specific targets for reducing GHG emissions intensity. Partners represent a broad range of industry sectors: oil and gas production, transportation, and refining; electricity generation; coal and mineral production and mining; manufacturing; railroads; and forestry products. Climate VISION works with its partners to standardize measuring and monitoring; find cost-effective solutions to reduce energy use and GHG emissions; accelerate R&D; and explore cross-sector efficiency gains to reduce emissions. The targets set by participating industries provide a short-term contribution to achieving the national emission intensity goal.

Save Energy Now: In 2006, DOE introduced a new campaign called Save Energy Now which offers energy savings assessments to 200 energy intensive facilities. Plants receive a no-cost targeted, three day steam or process heating assessment by a DOE energy efficiency experts using DOE software analysis tools. DOE also distributes Save Energy Now CD-ROMs containing a compendium of tip sheets, case studies, technical manuals and software tools to help plants assess energy-saving opportunities.

U.S. Efforts to Raise Public Awareness of Energy Efficiency Opportunities

A wide variety of outreach programs are in place in the United States to enhance public awareness of energy efficiency opportunities. Some of these are detailed below.

DSIRE – Database of State Incentives for Renewables & Efficiency: DSIRE is a comprehensive source of information on state, local, utility, and Federal incentives that promote renewable energy and energy efficiency. The DSIRE website provides Federal, state, local governments and the public with a fast and convenient method for accessing information about renewable energy and energy efficiency incentives and regulatory policies administered by Federal and state agencies, utilities, and local organizations across the country.

Change a Light, Change the World Campaign for Lightbulb Replacement: In October 2005, DOE and EPA launched the two-month Change a Light, Change the World Campaign for Lightbulb Replacement to encourage U.S. residents to replace a conventional bulb or fixture in their home or workplace with one that has earned the government's Energy Star® label for energy efficiency.

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Powerful Savings Campaign: In May 2004, DOE and the Alliance to Save Energy teamed up on a Powerful Savings campaign to help consumers reduce their energy bills and the nation reduce its energy use through smart energy practices and energy-efficiency. Powerful Savings focuses on increasing public awareness of the importance of energy efficiency and on smart energy practices both at home and on the road through an extensive media outreach campaign.

www.EnergySavingTips.gov: In December 2004, DOE launched a new website, www.EnergySavingTips.gov, as a consumer-friendly portal to detail energy saving information from various Federal agencies.

A National "Easy Ways to Save Energy": This campaign promotes energy savings through an "Energy Savers Guide." The Guide is being distributed to consumers across the country. Aggressive radio and print advertisements to promote more efficient energy use are also underway.

Advanced Technology Transfer Centers: The Energy Policy Act of 2005 directs DOE to provide grants to nonprofit institutions, state and local governments, or universities to establish a geographically dispersed network of Advanced Energy Technology Transfer Centers. DOE has so far funded pilot projects at the Florida Solar Energy Center and Washington State University. The centers are to encourage the demonstration and commercial application of advanced energy methods and technology through education and outreach to building and industry professionals.

Public Energy Education Program: The EPACT 2005 states that DOE is required to convene a conference with representatives from industry, education, professional societies, trade associations, and government agencies to design and establish an ongoing national public education program focused on energy efficiency and other topics. The Office of Science held this conference in January 2007.

Energy Efficiency Public Information Initiative: DOE is required to conduct an advertising and public outreach program about the need to reduce energy use, the consumer benefits of reduced use, the relationship to jobs and economic growth, and cost-effective consumer measures to reduce energy use. Funding at \$90 million per year is authorized for FY2006 to FY2010. DOE is implementing this provision within the limits of annual Congressional appropriations.

U.S. Efforts to Improve End-Use Data and Track Progress Towards Energy Efficiency Goals

Website on Energy Intensity in the United States Economy: DOE's Office of Energy Efficiency and Renewable Energy maintains an energy intensity website that provides detailed information and data on changes in energy intensity in the United States since 1985 to help document and describe how energy intensity trends in the United States have changed over the years. The website provides data on economy-wide energy

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intensity trends, as well as intensity changes in the four end-uses sectors and their subsectors: commercial buildings, residential buildings, transportation, and industry. The detailed energy intensity indicators on the website control for structural changes in the economy that are not directly associated with energy efficiency improvement (e.g., driving more trucks than cars, population shifts, etc.) which is key to having a meaningful measure of intensity associated with energy efficiency improvement. The website on energy intensity indicators may be found at <http://intensityindicators.pnl.gov/>.

EIA End Use Data Systems: In 1977, the Energy Information Administration was created and at that time three end-use surveys were mandated. The first survey to be fielded under this mandate was the Residential Energy Consumption Survey (RECS) followed by the Commercial Building Energy Consumption Survey (CBECS) in 1979. It was not until 1985 before the Manufacturing Energy Consumption Survey (MECS) was first undertaken. Although the frequency of the surveys is only every 4 years at present, the data collected present vital benchmark energy and energy-related statistics. The RECS is a two part national sample survey in that first characteristic data are collected on the housing unit, the household, and the energy-using appliances and equipment being used by the household members. For the second part, the consumption and expenditure data are collected from the household's energy supplier. The CBECS also is a two part national sample survey. First energy-related building characteristic and occupant data are collected followed by an energy supplier survey through which the buildings energy consumption and expenditures data are retrieved. Both the RECS and CBECS are personal interview surveys with a mail follow up for the energy suppliers. As with the RECS and the CBECS, the MECS is also a national sample survey. Energy-related data are collected by mail and the Internet from manufacturing establishments representing most of the U.S. manufacturing sector. The MECS, as part of the establishment survey, also collects the consumption and expenditure data since most manufacturers are able to provide the data. The latest surveys, either in the field or in the data processing mode, are the 2005 RECS, the 2006 MECS, and the 2007 CBECS.

DOE's Federal Energy Management Program (FEMP): FEMP reports annually on energy and water management activities for Federal government agencies that are required by the National Energy Conservation Policy Act (NECPA), Energy Policy Act of 2005 (EPA 2005), and Executive Order (E.O.) 13423 *Strengthening Federal Environmental, Energy, and Transportation Management*. Information and data collected from the agencies is used to develop DOE's *Annual Report to Congress on Federal Government Energy Management* which is distributed to key committees in Congress including House Committees on Appropriations, Energy and Commerce, Government Reform, and Science and Senate Committees on Appropriations, Energy and Natural Resources, and Homeland Security and Governmental Affairs. In addition, data contained in the annual report are provided to other Federal agencies, and State and local governments, private companies and citizens, and non-government organizations.

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IV. Diversifying Energy Mix

Ensuring a diverse array of energy technologies requires continued government commitment and the development of appropriate policies. The key to achieving energy diversity is to have a set of policies that provide the right incentives to energy markets. With respect to the nuclear industry, it is critical that there is sufficient transparency about nuclear safety and waste disposal, in order to secure public support. Public support is paramount for companies to invest in the technology. R&D also plays a critical role in ensuring long-term supply diversity, and here there is a very big role for government to play, particularly with respect to ensuring the deployment of near-market technologies.

Please detail policies and measures to:

- Develop technologies and facilities for carbon capture and storage
- Reduce natural gas flaring
- Ensure the safety and security of civilian nuclear power facilities
- Provide for safe disposal of low-, medium-, and high-level nuclear waste.
- Establish a robust, competitive, and cost-effective renewable energy industry.
- Develop biofuels in a cost-effective and environmentally sustainable fashion.
- Enhance development and deployment of new energy technologies.
- Cooperate with other countries in R&D of new energy technologies.

U.S. Efforts to Develop Technologies and Facilities for Carbon Capture and Storage

FutureGen and Related R&D Initiatives: FutureGen promotes advanced, full-scale integration of integrated gasification combined cycle (IGCC) and carbon capture and storage (CCS) technology to produce electric power from coal while capturing and sequestering CO₂ resulting in near-zero atmospheric emissions coal energy systems. FutureGen is being restructured to accelerate the commercial use of near-zero emissions clean coal technologies. The new approach proposes multiple 300-600 MW commercial scale demonstration clean coal power plants that will operate as demonstration facilities – as opposed to a single, 275 MW R&D facility – each producing electricity and capturing and safely sequestering at least 1 million metric tons each of CO₂ annually.

The Innovations for Existing Plants activity is supporting the economic post-combustion capture, separation, and compression of CO₂ from coal-fired utility boilers.

The Carbon Sequestration program is working on developing economical ways to separate and permanently store and offset greenhouse gas emissions from the combustion of fossil fuels. The technologies will help existing and future fossil fuel power generating facilities by reducing the cost of electricity impacts and also providing protocols for carbon capture and storage demonstrations to capture, transport, store, and monitor the CO₂ injected in geologic formations. Areas of focus include: CO₂ pre-combustion capture technology; geologic storage; measurement, monitoring and verification; methane from mine/landfills; and breakthrough concepts in support of core program technologies. In addition, the Department of Energy supports seven Carbon Sequestration regional Partnerships. This national network of partnerships is a cooperative effort among DOE, states, universities, and industry to identify and plan for sequestration approaches

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most suited to a region. Seven large-scale (1 million tons of CO₂ per year) sequestration demonstrations are being planned, one in each region.

U.S. Efforts to Reduce Natural Gas Flaring

The venting and flaring of natural gas is not only an environmental concern but also a waste of a limited natural resource. Most gas is flared or vented for economic reasons due to: the lack of markets to sell the gas; the lack of infrastructure such as an integrated gas pipeline network to use the gas locally; and the inability to convert the gas to a feedstock or usable fuel due to financial, infrastructure, and/or market constraints. Most flared gas is produced as a by-product of oil production, called associated gas.

The World Bank estimates that at least 150 billion cubic meters of natural gas are flared and vented annually, equivalent to 25 percent of gas consumption in the United States or 30 percent of gas consumption in the European Union. Global gas flaring releases about 400 million tons of CO₂ per year into the atmosphere. This is almost the same as the potential annual emission reductions from projects currently submitted under the Kyoto mechanisms.

World Bank Global Gas Flaring Reduction Program: The U.S. Department of Energy contributes to the World Bank's Global Gas Flaring Reduction (GGFR) Initiative. Launched at the World Summit on Sustainable Development in August 2002, the GGFR public-private partnership brings together governments of oil-producing countries, state-owned companies and major international oil companies to overcome barriers to reducing gas flaring by sharing global best practices and implementing country specific programs. Donors include Canada, European Union, France, Norway, U.K. Foreign Commonwealth Office, and the United States. Member companies include BP, Chevron, ConocoPhillips, ENI, ExxonMobil, Marathon Oil, Hydro, Shell, StatoilHydro, and TOTAL.

The GGFR partnership facilitates and supports national efforts to use currently flared gas by promoting effective regulatory frameworks and tackling the constraints on gas utilization, such as insufficient infrastructure and poor access to local and international energy markets, particularly in developing countries. The World Bank issued a voluntary Gas Flaring Reduction Standard in May 2004. The United States supports the Standard, it would have difficulty in meeting the reporting requirements due to the way that the Energy Information Administration and the states collect data on gas flaring and venting.

In partnership with the Russian State Duma Committee for Energy, Transport and Communications, the Russian Ministry of Industry and Energy and the Union of Oil and Gas Producers in Russia, GGFR organized the Associated Gas Utilization Conference in Moscow in October 2007. The forum allowed all stakeholders in Russia's oil and gas industry to discuss the conditions necessary to increase associated gas utilization and to understand the technical and commercial opportunities for associated gas utilization. The Russian Government stated in February 2008 that they will end state regulation of prices on associated natural gas. State caps on associated gas prices were one of the reasons why it was easier for firms to flare gas rather than sell it to trunk pipelines of Gazprom.

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The press reports that Russian oil firms, such as TNK-BP and Rosneft, plan to invest billions of dollars in new facilities after former President Vladimir Putin called on them to reduce gas flaring to 5 percent by 2011 from over 25 percent.

At Gleneagles in July 2006, the G8 called for the GGFR partnership to continue its work: “We encourage all oil producing states and private sector stakeholders to reduce to minimal levels natural gas venting or flaring by facilitating the use of associated gas, including its refining and processing into fuels and petrochemical products. In this respect we support the efforts of Global Gas Flaring Reduction Partnership (GGFR) and Methane-to- Markets Partnership (M2M) to implement projects on the production of marketable methane from landfills, agriculture waste and coal-bed methane.”

U.S. Efforts to Ensure Safety and Security of Civilian Nuclear Power Facilities

In the United States, 104 commercial nuclear power reactors provide almost one-fifth of all the electricity generated. These civilian nuclear power facilities are regulated by the Nuclear Regulatory Commission (NRC) which oversees safety through licensing, inspection, performance assessment, evaluation of operating experience, and enforcement. During the last two decades, nuclear power plants have achieved increasingly higher capacity factors with the same or greater levels of safety.

Licensing Requirements for Physical Protection

Physical Protection, Safeguards Contingency, and Training and Qualification Plans are submitted to the Nuclear Regulatory Commission for approval with license applications, as required by [10 CFR Part 73](#) of the Federal legal code. Licensees may subsequently revise the physical protection plans, without prior NRC approval, if the changes do not decrease the effectiveness of the plans. If proposed changes appear to decrease the effectiveness of the plans, the licensees must submit the change to the NRC requesting a license amendment. The physical protection plans for light water nuclear power plants are protected from disclosure. The physical protection plans of Category I fuel fabrication facilities are typically classified, so they also are protected from disclosure.

Physical protection (also called physical security) consists of a variety of measures for the protection of nuclear material or facilities against sabotage, theft, and diversion. NRC's approach to physical protection is graded based on the significance of the material or facilities being protected. NRC establishes the requirements and assesses compliance with the requirements, the licensees are responsible for providing the protection.

Nuclear facilities that require physical protection include nuclear reactors, fuel cycle facilities, and spent fuel storage and disposal facilities. Key features of the physical protection programs for these facilities include in-depth defense using graded physical protection areas, intrusion detection, assessment of detection alarms to distinguish between actual intrusions and false alarms, response to intrusions, and offsite assistance, as necessary, from local, state and Federal government agencies.

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Ensuring Safety of Nuclear Plant Operations

In addition to physical protection requirements, there are a variety of mechanisms in place for ensuring the safety of nuclear plant operations, including safe operational practices, personnel training and screening, and emergency management.

Operational Practices and Experiences: Stringent Federal regulation, automated, redundant safety systems and the industry's commitment to comprehensive safety procedures keep nuclear power plants and their communities safe.

Personnel Training and Screening: Operators receive rigorous training and must hold valid Federal licenses. All nuclear power plant staff are subject to background and criminal history checks before they are granted access to the plant.

Emergency Management: Every nuclear power plant in the United States has a detailed plan for responding in the event of an emergency. Companies test that plan regularly, with the participation of local and state emergency response organizations.

Protecting the Public from Radioactive Emissions

The NRC has a mission to protect public health and safety and the environment from the effects of radiation from nuclear reactors, materials, and waste facilities. It regulates use of radioactive materials through 10 CFR Part 20 *Standards for Protection against Radiation* and has a resident inspector at each nuclear power plant to monitor compliance. It regulates use of source material (uranium and thorium), special nuclear material (enriched uranium and plutonium), and byproduct material (material made radioactive in a reactor and residues from uranium and thorium milling). Plants are designed, built and regulated to prevent radioactive emissions. The companies that operate nuclear power plants also voluntarily work to protect nearby wildlife and their habitats.

U.S. Efforts to Provide for Safe Disposal of Nuclear Waste

The 104 commercial nuclear reactors in the United States together produce about 2,000 metric tons of used fuel annually. Today, this used fuel is stored safely at plant sites, either in steel-lined vaults filled with water or steel-and-concrete containers, i.e. dry storage. The Nuclear Regulatory Commission (NRC) determined that used fuel could be stored safely at power plant sites for 100 years. About one-half of U.S. nuclear plants are storing used fuel in large, rugged containers made of steel or steel-reinforced concrete. The NRC has certified several container designs for use by utilities. The containers have a 20-year license. After 20 years, they must be inspected and, with NRC approval, the license could be extended for another 20 to 40 years.

The Nuclear Waste Policy Act of 1982, as amended in 1987, affirmed the Federal government's responsibility for the disposal of high-level radioactive waste and established the scientific, regulatory, and funding framework supporting the development of a geologic repository. President Bush signed the Joint Resolution of Congress in July 2002

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designating Yucca Mountain in Nevada as the site for a proposed geologic repository. Yucca Mountain is located about 160 kilometers northwest of Las Vegas, Nevada, on unpopulated desert land owned by the Federal Government. Geological information indicates that the regional climate has changed little over the past million years, and the long-term average precipitation has been about 30 centimeters per year. Yucca Mountain itself is a ridge composed of a sequence of tilted layers of variably welded and fractured tuffs. The host rock proposed for the potential repository is a welded tuff unit located about 300 meters below the surface and 300 meters above the water.

DOE plans to submit the license application for repository construction to the NRC by June 2008. The repository could begin receipt of radioactive waste in March 2017 under the best achievable construction schedule. However, DOE has said that it is more likely to open around 2020. Energy security, homeland security and environmental protection will all be enhanced by siting a single nuclear waste repository at Yucca Mountain rather than leaving nuclear waste in temporary storage locations at 131 sites in 39 states.

The Nuclear Waste Policy Act of 1982 also established the Nuclear Waste Fund to finance this program. Since 1983, consumers of electricity produced at nuclear power plants have paid into the fund a fee of one-tenth of a cent for every kilowatt-hour of electricity generated and sold to ratepayers. Through September 2006, these customer commitments, including interest, totaled more than \$28 billion. The Federal government also pays a proportionate amount into the Nuclear Waste Fund for costs of disposing of defense generated high-level radioactive waste.

The repository is legislatively limited to a capacity of 70,000 metric tons of heavy metal (MTHM) until such time as a second repository is in operation. This capacity would include about 63,000 MTHM of commercial used nuclear fuel; about 2,333 MTHM of DOE used nuclear fuel; and about 4,667 MTHM of DOE high-level radioactive waste. The DOE is required to submit a report to the President and Congress on the need for a second repository and expects to do so by the end of 2008.

U.S. Efforts to Establish a Robust and Competitive Renewable Energy Industry

The United States has extensive efforts underway to establish robust markets for cost-competitive wind energy, solar energy, and geothermal energy (as well as biofuels, which are discussed in the section that follows). These efforts include sustained programs of research, development and demonstration as well as a variety of financial incentives.

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Rapidly Growing Renewable Energy Markets

Wind Energy Market Status: The United States installed 2,431 MW of wind capacity in 2005, 2,343 MW in 2006, and 5,244 MW in 2007, bringing total installed capacity to 16,818 MW, enough to power more than 4.5 million households.

- The cost of producing electricity from wind power has dropped from 80 cents per kilowatt-hour in 1980 (in current dollars) to 4 to 6 cents today.
- Wind energy is the fastest-growing energy generation technology, expanding by 30 percent to 40 percent annually.
- Commercial wind energy systems are currently installed in 34 states.
- The American Wind Energy Association estimates that 48 billion kWh will be generated from wind in 2008, providing about 1 percent of all U.S. electricity.

Solar Energy Market Status: Installed capacity of photovoltaic cells in the United States has grown from 275 MW in 2003 to 376 MW in 2004 to 479 MW in 2005 to 624 MW in 2006, more than tripling in just three years. Production of photovoltaic cells and modules grew by 31 percent from 154 MW in 2005 to 202 MW in 2006. Total installations of photovoltaics increased by 40 percent from 105 MW in 2005 to 145 MW in 2006, as the grid-connected segment of the PV market grew by 51 percent from 70 MW to 106 MW.

Geothermal Energy Market Status: In 2007, geothermal facilities supplied about 2,600 MW electric and 600 MW thermal capacity, mostly in nine Western states. A similar amount of geothermal capacity – as much as 2,566 MW electric (MWe) – is under development, of which as much as 371 MWe was under construction, 725 MWe securing final permits, 710 MWe drilling and confirming sites, and 760 MWe identifying sites, securing rights or doing exploration drilling as of May 2007. Strong recent interest is due to higher prices in the power market and Federal and state government incentives.

Renewable Energy Technology Development

Wind Energy Technology Development: Wind energy R&D, funded by DOE at the National Renewable Energy Laboratory (NREL) and elsewhere, focuses on developing technologies that will operate cost-effectively at lower wind speed sites as well as on increasing national wind power capacity. Competitive cost of energy (COE) levels have been achieved at higher wind speed sites with average wind speeds of 6.7 meters per second (m/s) at a height of 10 meters (15 miles per hour [mph] at a height of 33 feet [ft]). But many easily accessible prime high-wind-speed sites have already been taken. Sites with lower average wind speeds of 5.8 m/s at a height of 10 m (13 mph at 33 ft) cover vast areas of the Great Plains from central and northern Texas to the Canadian border and are found along many coastal areas in the Great Lakes and shallow coastal areas of the eastern United States. The program goals are:

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- By 2012, complete research that will achieve modeled cost of energy from large wind systems in class 4 winds to \$0.036/kWh for land-based systems (from a baseline of \$0.055/kWh in 2002);
- By 2014, complete research that will achieve modeled cost of energy from large wind systems in Class 6 winds to \$0.070/kWh for shallow water (depths up to 30 meters) offshore systems (from a baseline of \$0.095 in FY 2005);
- By 2015, expand by five-fold the number of distributed wind turbines deployed in the U.S. market from a 2007 baseline of 2,200 units; and
- By 2010, facilitate the installation of at least 100 MW in at least 30 States, from a baseline of 8 States that had 100 MW or more in 2002; and by 2018, facilitate the installation of at least 1000 MW in at least 15 States, from an estimated baseline of 3 states that had 1000 MW or more in 2008.

Solar Energy Technology Development: The Solar America Initiative (SAI) aims to make advanced solar photovoltaic technologies cost-competitive with grid electricity by 2015. The Department of Energy's Solar Energy Technology Program (SETP) will achieve SAI goals through partnerships and alliances with industry, universities, Federal and state governments, and non-governmental organizations. Partnerships will focus on R&D of photovoltaic component and system designs, including low-cost approaches for manufacturing. SETP also works to address barriers to solar energy market expansion.

Geothermal Energy Technology Development: The DOE geothermal program aims to reduce the levelized cost of geothermal electricity to \$0.03 to \$0.05 per kilowatt-hour by 2010. R&D is expected to increase the number of new domestic geothermal fields, boost the success rate of geothermal well drilling, and reduce costs of building and operating geothermal power plants. These improvements will increase the quantity of economically viable geothermal resources, leading to a larger number of geothermal power facilities serving more energy demand. The program is organized around two areas:

- *Technology Development* (improve knowledge of basic phenomena, drilling and exploration techniques, designs, components, and develop better generators);
- *Technology Application* (geothermal technology verification, geothermal technology deployment, and GeoPowering the West).

Renewable Energy Market Incentives

Renewable Electricity Production Tax Credit (REPC): REPC is a per kilowatt-hour tax credit for electricity generated by qualified energy resources. The Energy Policy Act of 2005 modified the credit and extended it through the end of 2007. Section 207 of the Tax Relief and Health Care Act of 2006 (H.R. 6111) extended it through the end of 2008. The REPC provides a tax credit of 1.5 cents/kWh, adjusted annually for inflation, for wind, closed-loop biomass and geothermal. The adjusted credit for projects is currently

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2.0 cents/kWh. Electricity from open-loop biomass, small irrigation hydroelectric, landfill gas, municipal solid waste resources, and hydropower receive half that rate - now 1.0 cent/kWh. The credit is received for the first ten years of a facility's production.

Residential Solar and Fuel Cell Tax Credit: EPAct provides a 30 percent tax credit up to \$2,000 for the purchase and installation of residential solar electric and solar water heating property. An individual can take both a 30% credit up to the \$2,000 cap for a photovoltaics system and a 30 percent credit up to a separate \$2,000 cap for a solar water heating system. A 30 percent tax credit up to \$500 per 0.5 kilowatt is also available for fuels cells. Initially scheduled to expire at the end of 2007, the tax credits were extended through the end of 2008 by Section 206 of the Tax Relief and Health Care Act of 2006.

Business Energy Tax Credit: The Energy Policy Act of 2005 expanded the business energy tax credit for solar and geothermal energy property to include fuel cells and microturbines installed in 2006 and 2007, and to hybrid solar lighting systems installed on or after January 1, 2006. These provisions of the tax credit were later extended through December 31, 2008, by Section 207 of the Tax Relief and Health Care Act of 2006 (H.R. 6111). (A 10 percent Federal energy tax credit was available to businesses that invested in or purchased solar or geothermal energy property in the United States prior to January 1, 2006.) For eligible equipment installed from January 1, 2006, through December 31, 2008, the credit is set at 30 percent of expenditures for solar technologies, fuel cells and solar hybrid lighting; microturbines are eligible for a 10 percent credit during this two-year period. For equipment installed on or after January 1, 2009, the tax credit for solar energy property and solar hybrid lighting reverts to 10 percent and expires for fuel cells and microturbines. The geothermal credit remains unchanged at 10 percent. The credit for fuel cells is capped at \$500 per 0.5 kilowatt (kW) of capacity. The maximum microturbine credit is \$200 per kW of capacity. No maximum is specified for the other technologies.

Solar Energy Market Transformation Program: The Solar America Initiative, begun in 2006, led to the establishment of a Market Transformation program whose goal is to identify and overcome the largest non-technical obstacles to the widespread adoption of solar technology. Activities include providing technical information to cities and states that encourages the installation of state-of-the-art solar technologies and applications, providing information to organizations that train solar system installers and building inspectors, and working with photovoltaic (PV) stakeholders to establish or update codes and standards for PV.

U.S. Efforts to Develop Cost-Effective, Environmentally Sustainable Biofuels *Renewable Energy Fuel Standard*

The Energy Independence and Security Act of 2007 (EISA) requires that annual biofuels production expand to 36 billion gallons by 2022. This represents about a five-fold increase in production from levels achieved in 2007, when the requirement of the Energy Policy Act of 2005 that biofuels production expand to 7.5 billion gallons by 2012 was

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met five years early. Of the 36 billion gallon EISA target, no more than 15 billion gallons may be met through production from crops, which is roughly equivalent to double the current production of ethanol from corn. Such incremental production from crops must demonstrate a life cycle greenhouse gas emissions reduction of at least 20 percent. Of the remaining 21 billion gallons in the annual target, 16 billion gallons must come from second-generation biofuels such as farm and forest residues and grasses which would have to demonstrate at least a 60 percent reduction in greenhouse gas emissions on a life-cycle basis, and 5 billion gallons could come from other sources which would have to demonstrate a 50 percent reduction in greenhouse gas emissions.

R&D on Second-Generation Biofuels

The Billion Ton Study, undertaken jointly by the U.S. Department of Energy and U.S. Department of Agriculture, indicates that the greatest potential for biofuels to displace conventional petroleum products in transport and to reduce greenhouse gas emissions lies in second generation biofuels from lignocellulosic feedstocks like farm and forest residues and grasses. In close cooperation with the National Renewable Energy Laboratory, other national laboratories, universities and private research firms, these agencies are working to make ethanol from lignocellulosic feedstocks cost-competitive with gasoline for motor fuel at a world oil price of \$58 per barrel by 2012. The cost reduction strategies include R&D to reduce the cost and improve the effectiveness of enzymes for converting cellulose to sugars, as well as R&D to make the cell walls of plants more amenable to being broken down by such enzymes.

There is also R&D to improve the yields of second-generation biofuels so that more can be grown on available land. Strategies include increasing feedstock per unit of land by raising plant photosynthetic efficiency and growth rate, increasing fuel yield per ton of feedstock, enhancing disease and pest resistance, allowing germination and growth of plants in cold weather, the use of perennial crops with efficient nutrient intake and reduced fuel input, plants with structures that allow dense planting and easy harvesting, and deep roots for enhanced drought tolerance and carbon uptake.

Commercial-Scale Biorefineries for Second-Generation Biofuels

To accelerate the introduction of second-generation biofuels, the Department of Energy funded six commercial scale biorefineries in 2007 using a variety of lignocellulosic feedstocks in a variety of locations. The idea is not only to demonstrate the technology at commercial scale, but also to show the feasibility of providing sufficient feedstock to a commercial plant on a continual basis, and of offloading the ethanol produced to the marketplace for fuel. Of the \$1.2 billion cost of the six projects, about one-third of \$385 million was provided by the government, while the remaining two-thirds was provided by participating firms. These biorefineries, to be completed between 2010 and 2012, are as follows:

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- Abengoa Bioenergy Biomass of Kansas (\$76 million): Capacity to produce 11.4 million gallons of ethanol annually using ~700 tons per day of corn stover, wheat straw, milo stubble, switchgrass, and other feedstocks.
- ALICO, Inc. (\$33 million, Florida): Capacity to produce 13.9 million gallons of ethanol annually using ~770 tons per day of yard, wood, and vegetative wastes and eventually energy cane.
- BlueFire Ethanol, Inc. (\$40 million, California): Sited on an existing landfill, with capacity to produce 19 million gallons of ethanol annually using ~700 tons per day of sorted green waste and wood waste from landfills.
- Poet (\$80 million, Iowa): Capacity to produce 125 million gallons of ethanol annually (~25% cellulosic ethanol) using ~850 tons/day of corn fiber, cobs, and stalks.
- Iogen Biorefinery Partners (\$80 million, Virginia): Capacity to produce 18 million gallons ethanol annually using ~700 tons/day of agricultural residues including wheat straw, barley straw, corn stover, switchgrass, and rice straw.
- Range Fuels (\$76 million, Georgia): Capacity to produce 40 million gallons of ethanol annually and 9 million gallons per year of methanol, using ~1,200 tons per day of wood residues and wood based energy crops.

Financial Incentives for Biofuels

Excise Tax Exemption for Ethanol Blends: Since 1979, the Federal government has exempted 10 percent ethanol blends (E10) from a portion of the 18.3 cent per gallon excise tax on gasoline. Now applicable to all ethanol blends, refiners receive a volumetric ethanol excise tax credit of 51 cents per gallon. This credit provides a considerable incentive for ethanol production. Current law extends the credit through 2009 at which time Congress is expected to consider whether to extend it further.

State Production Credits for Ethanol: Several farm states have production credits for ethanol. In 2001, credits per gallon were \$0.40 in North Dakota, \$0.30 in Montana, \$0.20 in Minnesota, Missouri, Oklahoma, and Wisconsin, \$0.18 for new capacity and \$0.075 for expanded capacity in Nebraska, and \$0.075 for new capacity and \$0.05 for expanded capacity in Kansas.

Federal Tax Credit for Biodiesel: The Energy Policy Act of 2005 extended the biodiesel tax credit through 2008, providing a credit of up to \$1.00 per gallon for the sale and use of biodiesel.

Production Incentives for Cellulosic Biofuels: Section 942 of the Energy Policy Act of 2005 authorizes incentives to ensure that annual production of one billion gallons of cellulosic biofuels is achieved by 2015.

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Cellulosic Biomass Loan Guarantee Program: This program guarantees loans by private institutions for the construction of facilities to process and convert municipal solid waste and cellulosic biomass into fuel ethanol. Each project must have a design capacity to produce at least 30 million gallons of cellulosic biomass ethanol per year. A loan guarantee may be issued for up to 80 percent of the estimated cost of a project, but may not exceed \$250 million for a project.

Fuel-Flexible Infrastructure: The Energy Policy Act of 2005 provides up to a \$30,000 tax credit for an E85 fueling station that can dispense a blend of 85 percent ethanol with gasoline. An Illinois program resulted in conversion of 100 gasoline pumps to E85 pumps for just \$500,000, with the state contributing \$5,000 per station to leverage a \$2,000 private contribution per station.

U.S. Efforts to Enhance Development and Deployment of New Energy Technologies

The United States has a broad range of efforts described above to boost the development and deployment of clean coal technology with carbon capture and storage and of renewable technologies such as wind, solar, geothermal and biofuels, as well as active support for bringing to market a new generation of safe, emissions-free nuclear power plants. Since 2001, the Federal Government has spent more than \$12 billion to research, develop, and promote alternative energy sources and currently has available \$42.5 billion in loan guarantees for new energy and energy efficiency technologies.

The Energy Policy Act of 2005 supports the development of nuclear power as follows:

- Loan guarantees for innovative and new low carbon emission generation.
- Nuclear energy production tax credits for 6,000 megawatts of electrical capacity from new advanced reactors at 1.8 cents per kilowatt-hour—a tax credit comparable to that provided for renewable electric energy.
- Delay risk insurance, underwritten by the Federal government, to protect those companies building new reactors from the risk of regulatory delays and litigation in advancing first-of-a-kind reactor technology.
- Authorization of almost \$3 billion in nuclear R&D to support testing of new licensing processes and the demonstration of nuclear energy to produce hydrogen.

The Nuclear Power 2010 program (NP-2010) aims at streamlining the licensing and approval process by the Nuclear Regulatory Commission. NP-2010 introduced the combined Construction and Operating License (COL), by which nuclear plant public health and safety concerns are resolved prior to commencement of construction, and NRC approves and issues a license to build and operate a new nuclear power plant. The technology focus of NP-2010 is on Generation III+ advanced light water reactor designs, which offer advancements in safety and economics over the Generation III designs certified by the Nuclear Regulatory Commission (NRC) in the 1990's.

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U.S. Efforts to Cooperate with Other Countries in R&D of New Energy Technologies

The United States cooperates extensively with other countries on R&D of new technologies for energy efficiency, renewable energy, and clean coal with carbon capture and storage:

International Cooperation on Energy Efficiency Technologies

IEA Implementing Agreement on Energy Conservation in Buildings and Community Systems, established in 1976, has current tasks on air infiltration and ventilation, building heat, air and moisture response, simulation of building-integrated fuel cell systems, testing and validation of building energy simulation tools, integration of environmentally responsive elements in buildings, energy-efficient lighting, assessment of energy efficient retrofits for government buildings, cost-effective commissioning of low-energy buildings, heat pumping and reversible air conditioning, low-energy systems for high-performance buildings and communities, prefabricated systems for low-energy renovation of existing buildings, and low-energy communities. Participants include EU member states Belgium, Czech Republic, Denmark, Finland, France, Greece, Italy, Netherlands, Poland, Portugal, Sweden, and United Kingdom as well as EC, US, Australia, Canada, Israel, Japan, Korea, Mexico, New Zealand, Norway, Switzerland, and Turkey. Further information can be found at www.ecbcs.org.

Other IEA Energy Efficiency Agreements: The United States also participates in IEA Implementing Agreements on Demand-Side Management (www.dsm.iea.org), District Heating and Cooling, Energy Conservation through Energy Storage (www.iea-ecses.org), Heat Pumping Technologies, Hybrid and Electric Vehicle Technologies, Energy Conservation and Emissions Reduction in Combustion, High-Temperature Superconductivity, and Technologies for the Pulp and Paper Industry.

International Cooperation on Clean Coal with Carbon Capture and Storage

Carbon Sequestration Leadership Forum (CSLF): CSLF is focused on the development of improved cost-effective technologies for the separation and capture of carbon dioxide for its transport and long-term storage. First hosted by the United States in 2003, CSLF has grown to include 22 governments as members. Six task forces covering risk assessment, storage capacity estimation, projects interaction and review, legal issues, capacity building in emerging economies, and financial issues have been established to advance the work of the partnership. The CSLF website is at www.cslforum.org.

IEA Clean Coal Agreements: The United States participates in the IEA Clean Coal Centre and IEA Implementing Agreements on Clean Coal Science, Fossil Fuel Multiphase Flow Sciences, and Greenhouse Gas Research and Development.

International Cooperation on Renewable Energy Technologies including Biofuels

IEA Implementing Agreement on Photovoltaic Power Systems, set up in 1993, has examined market opportunities for photovoltaics in village systems, building integrated systems, and power grids. Current projects deal with PV system performance and reliability, very large scale PV systems in remote areas, PV services for developing countries, urban-scale PV systems, PV hybrid systems in min-grids, and PV

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environmental, health and safety. Participants include Australia, Austria, Canada, Denmark, European Commission, Finland, France, Germany, Israel, Italy, Japan, Korea, Mexico, Netherlands, Norway, Portugal, Sweden, Switzerland and United Kingdom as well as the United States. Further information is available at www.iea-pvps.org.

IEA Implementing Agreement on Bioenergy, established in 1978, aims to accelerate the use of environmentally sound and cost-competitive bioenergy on a sustainable basis. It has active task annexes on socioeconomic drivers for bioenergy projects, short rotation crops for bioenergy systems, biomass production for energy from sustainable forestry, biomass combustion and cofiring, thermal gasification of biomass, pyrolysis of biomass, integration of energy recovery into solid waste management, energy from biogas and landfill gas, greenhouse gas balances of bioenergy systems, commercialization of liquid biofuels, sustainable bioenergy trade, bioenergy systems analysis, and biorefineries. Participants include EU member states Austria, Belgium, Denmark, Finland, France, Ireland, Italy, Netherlands, Sweden, and United Kingdom as well as the EC, US, Australia, Brazil, Canada, Japan, New Zealand, Norway, South Africa and Switzerland. More information on the agreement is available at www.ieabioenergy.com.

Other IEA Renewable Energy Agreements: The United States also belongs to IEA Implementing Agreements on Geothermal Energy, Hydropower Technologies and Programmes, Production and Utilization of Hydrogen, Solar Heating and Cooling Systems, Solar Power and Chemical Energy Systems, and Wind Turbine Systems.

Global Bioenergy Partnership (GBEP): GBEP is designed to power a cleaner future by supporting wider, cost-effective biofuels and biomass deployment, particularly in developing countries where biomass use is prevalent. The United States is actively supporting GBEP's work including leading work on developing common methodologies for measuring the GHG benefits of biofuels. For more information, please visit <http://www.globalbioenergy.org/>.

International Biofuels Forum (IBF): The IBF was established in 2007 by the United States, Brazil, the EC, China, India, and South Africa to promote the development of the international market for biofuels through information exchange and support for the development of internationally recognized standards and codes for biofuels.

International Partnership for the Hydrogen Economy (IPHE): Initiated in 2003, IPHE provides a mechanism to coordinate and leverage multinational hydrogen research programs. IPHE activities advance the deployment of hydrogen production, storage, transport, and distribution technologies; fuel cell technologies; common codes and standards for hydrogen fuel utilization; and efforts to develop a global hydrogen economy. Seventeen governments participate in the partnership. More can be found at <http://www.iphe.net>.

International Cooperation on Nuclear Energy Technologies

Global Nuclear Energy Partnership (GNEP), established in 2007, aims to accelerate development and deployment of advanced fuel cycle technologies to encourage clean

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development and prosperity worldwide, improve the environment, and reduce the risk of nuclear proliferation. GNEP consists of 21 member states that have signed the GNEP Statement of Principles, the policy framework for the partnership. By joining GNEP, these countries affirm that they share the common vision of the necessity of the expansion of nuclear energy for peaceful purposes worldwide in a safe, secure manner.

GNEP currently has two working groups, one to address nuclear infrastructure development and one to address reliable nuclear fuel services. The Infrastructure Working Group focuses on the overall drivers for nuclear energy and associated infrastructure development. The areas of focus to instill a robust safety culture include, but are not limited to, regulatory requirements, nuclear safety, environmental impacts, emergency management, radiation protection, quality assurance, codes and standards, operational practices and experiences, physical protection and security. The Reliable Fuel Services Working Group focuses on the establishment of international supply frameworks to enhance reliable, cost-effective fuel services and supplies to the world market, providing options for generating nuclear energy and fostering development while reducing the risk of nuclear proliferation, thereby creating a viable alternative to the acquisition of sensitive fuel cycle technologies. Cooperation under GNEP is carried out under both bilateral arrangements and multilateral arrangements such as the Generation IV International Forum and the International Project on Innovative Nuclear Reactors and Fuel Cycles. Further information can be found at www.gneppartnership.org

Generation IV International Forum (GIF): GIF was established in July 2001 to lead the collaborative efforts of the world's leading nuclear technology nations to develop the next generation nuclear energy systems to meet the world's future energy needs. GIF's goal is to develop a fourth generation of advanced, economical, safe, and proliferation-resistant nuclear systems that can be adopted commercially by 2030. The GIF members include Canada, China, Euratom, France, Japan, South Korea, Switzerland, United Kingdom, and United States, with the OECD Nuclear Energy Agency and the International Atomic Energy Agency as permanent observers. Russia and South Africa are in the process of activating their membership. In 2005, the GIF reached a major milestone and implemented a multilateral intergovernmental agreement, called the "Framework Agreement" which has established several mechanisms to allow unprecedented coordination among the national research organizations of the various countries. GIF member countries are developing up to six next generation nuclear energy systems. The six concepts are: Gas-Cooled Fast Reactor (GFR), Lead-Cooled Fast Reactor (LFR), Molten Salt Reactor (MSR), Sodium-Cooled Fast Reactor (SFR), Supercritical Water-Cooled Reactor (SWCR) and Very High Temperature Reactor (VHTR). More information is available at <http://www.gen-4.org>.

ITER: In January 2003, President Bush announced that the United States was joining the negotiations for the construction and operation of the international fusion experiment ITER. The goal of this proposed collaborative project among seven partners is to design and demonstrate a fusion energy production system. In November 2007, the United States joined other partners in signing the ITER Agreement, which established the ITER Organization and launched the construction phase of the project. If successful, ITER will advance progress toward producing clean, abundant, commercially available fusion energy by the middle of the century. For more information, see <http://www.iter.org>.

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V. Securing Critical Energy Infrastructure

Securing critical energy infrastructure requires detailed inventories of existing infrastructure in order to highlight which infrastructures require upgrading or enhanced security.

Please detail policies and measures to:

- Inventory and upgrade critical energy infrastructure.
- Ensure long-term security of energy transportation routes and infrastructure.

U.S. Efforts to Inventory and Upgrade Critical Energy Infrastructure.

The U.S. energy sector has considerable data available on critical energy infrastructure. Such data can be used to assess the needs for upgrades and to support assessments of the risks and consequences of various incidents to which energy infrastructure might be exposed. These data are collected and used by owners, operators, trade associations and industry organizations such as the North American Electric Reliability Council (NERC), the American Gas Association (AGA), and the American Petroleum Institute (API). The government also collects a wide variety of energy sector information through Federal agencies and state energy offices and public utility commissions. Communications links are well established between Federal, state and local governments and industry.

Electric Transmission Infrastructure

The Energy Policy Act of 2005 requires that the Department of Energy issue a study of congestion on the U.S. transmission grid every three years, starting in August 2006. The first such *National Electric Transmission Congestion Study* provides a good indication of needed upgrades in electric transmission infrastructure. It identifies two critical congestion areas, in which it is important to remedy congestion problems because the current and projected effects of congestion are severe. One of these relates to power flows in the Mid-Atlantic area, the other to power flows in the Southwest . The study also finds several congestion areas of concern, in which a large-scale problem exists or may be emerging but further analysis is required to determine the size of the problem and possible solutions. Finally, the study indicates conditional constraint areas where there is no current transmission congestion yet significant congestion would result if large amounts of remote generating capacity, such as remote renewables and clean coal, were developed without associated transmission capacity.

Based upon the congestion study, with a finding that consumers are adversely affected by transmission constraints or congestion, EPAct 2005 allows the Secretary of Energy to designate National Interest Electric Transmission Corridors (National Corridors) under the Federal Power Act. The Energy Policy Act of 2005 also authorizes the Federal Energy Regulatory Commission (FERC) to issue, under certain circumstances, permits for new transmission facilities within a National Corridor. Generally, if an applicant does not receive approval from a State to site a proposed new transmission project within a National Corridor within a year, FERC may consider whether to issue a permit and to

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authorize construction of the project. FERC issued a rule on December 1, 2006 regarding procedures for considering transmission siting applications within a National Corridor.

In October 2007, after an extensive public comment period on two draft National Corridors published in April 2007, the Department of Energy designated two National Corridors -- the Mid-Atlantic Area National Interest Electric Transmission Corridor, and the Southwest Area National Interest Electric Transmission Corridor. These corridors include areas in two of the Nation's most populous regions with growing electricity congestion problems. The Department based its designations on data and analysis showing that persistent transmission congestion exists in these two areas. In its designation, the Department of Energy noted that transmission expansion is but one possible solution to a congestion or constraint problem. Other potential solutions include increased demand response; improved energy efficiency; deployment of advanced technology; and siting of additional generation, including distributed generation, close to load centers.

Natural Gas Infrastructure

The natural gas pipeline infrastructure is well-developed throughout the United States. For example, in the Gulf of Mexico region, which provides about one-fifth of U.S. natural gas production, there are approximately 33,000 miles of pipelines that link an estimated 4,000 operating platforms to onshore processing and transportation.

The Federal Energy Regulatory Commission (FERC) requires that interstate gas pipeline companies provide complete and timely information about available transportation capacity on user-friendly websites that are accessible by all customers on an equal basis. These provide information on daily scheduled capacity and available capacity by segment or by location. They also indicate total design capacity for each point in the network.

Based on the information available in a highly competitive market place, natural gas suppliers can make informed decisions about where natural gas pipeline infrastructure needs to be expanded or enhanced to meet the gas needs of their customers. Since FERC has clear jurisdiction over interstate pipelines, it has generally been possible to obtain the necessary zoning and operational permits for gas pipelines that are needed.

The U.S. natural gas pipeline network is a highly integrated transmission and distribution grid that can transport natural gas to and from nearly any location in the lower 48 States (that is, excluding Alaska and Hawaii). The natural gas pipeline grid comprises:

- More than 210 natural gas pipeline systems.
- 302,000 miles of interstate and intrastate transmission pipelines.
- More than 1,400 compressor stations that maintain pressure on the natural gas pipeline network and assure continuous forward movement of supplies.
- More than 11,000 delivery points, 5,000 receipt points, and 1,400 interconnection points that provide for the transfer of natural gas throughout the United States.
- 29 hubs or market centers that provide additional interconnections.

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- 399 underground natural gas storage facilities.
- 49 locations where natural gas can be imported/exported via pipelines.

The United States has five liquefied natural gas (LNG) import terminals, four onshore and one offshore. Three of the onshore terminals are located on the east coast, in Everett, Massachusetts; Cove Point, Maryland, and Elba Island, Georgia. One onshore terminal and the offshore terminal are located on the gulf coast in Lake Charles, Louisiana and approximately 125 miles south of Cameron, Louisiana in the Gulf of Mexico.

Another five LNG import terminals are currently under construction. There are four onshore terminals, all of which are located on the gulf coast: Cameron, Louisiana; two in Sabine Pass, Texas; and Freeport, Texas. Another offshore terminal is under construction approximately 10 miles east of Boston, Massachusetts in the Atlantic Ocean.

The Energy Policy Act of 2005 strengthened the process by which LNG import regasification terminals are sited and constructed. EAct gave the Federal Energy Regulatory Commission (FERC) sole siting authority and helped develop a transparent and efficient process that is intended to lead to a well diversified set of import routes. Siting approval of terminals is based on FERC's determination of a market need and the requirement that any terminal not pose an unacceptable danger to the general public. Market factors then decide whether a project is built. These factors include stakeholders' willingness to accept the project, availability of financing, and availability of supply.

U.S. Efforts to Ensure Long-Term Security of Energy Transportation Routes and Infrastructure

Secure and Reliable Operation of the Electric Power Grid

The Energy Policy Act of 2005 contains mandatory provisions to help ensure secure and reliable operation of the electric power system. It gives the Federal Energy Regulatory Commission authority to approve and enforce rules to assure the reliability of the bulk power system. It requires all users, owners and operators of the nation's transmission grid to comply with FERC-approved reliability standards. It requires FERC to certify an entity to be the "electric reliability organization" (ERO) for the United States. The ERO is responsible for developing and enforcing mandatory reliability standards, subject to commission approval, that provide for an adequate level of reliability of the bulk power system in the United States, Canada and northern Mexico.

FERC has certified NERC, the North American Electric Reliability Corporation (which was previously the voluntary North American Electric Reliability Council), as the nation's designated ERO. NERC submitted 107 reliability standards to FERC, requesting they be approved. In October 2006, FERC approved 83 of the standards, with instructions to make improvements to 62 of the 83. At the same time, the Commission announced that it would continue its review of the remaining 24 standards. A 60-day public comment period on the standards followed. The standards took effect June 1, 2007.

The electric grid operators utilize their energy management systems to run sophisticated contingency analysis programs every 5 to 10 seconds to identify the most critical

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components of the electric systems. The operators are always aware of the critical assets of the grids and the consequences if a key component is removed from service, and they operate the system to mitigate the loss of key components.

The importance of many of the individual components in the network is highly variable, depending upon location, time of day, day of the week, month of the year, and many other variables. Owners and operators of energy sector assets and networks have screening processes to identify internal priorities related to business conditions and supply/network reliability to help ensure continuity of operations. From a grid perspective, the country's oil and natural gas pipeline systems and electricity grid are designed and operated with built-in redundancy to ensure a certain degree of reliability and resiliency. Industry planning criteria assume a local grid area can be operated even if one asset is out of service. In addition, during unforeseen events, the industry provides mutual aid to assist in emergency response and prompt restoration of service.

Secure and Reliable Operation of Natural Gas Pipeline Networks

The reliable operation of the gas pipeline network is ensured by both regulatory and market mechanisms. The Federal Energy Regulatory Commission (FERC) requires annual filing of system flow diagrams by gas companies under its jurisdiction. These filings contain data on miles of pipeline, diameter of each section, maximum allowable operating pressures of each segment, direction of flow, total horsepower at each compressor station, daily and seasonal withdrawal volumes at each storage field, and volume delivered to each customer. FERC must be notified immediately of all serious service interruptions lasting longer than 3 hours, with reports on the location, time, number of customers affected, and emergency measures taken. Both physical and financial products are traded on the New York Mercantile Exchange (NYMEX). With transparent regulatory and market mechanisms in place, ample information is available to determine where upgrades to the pipeline network are needed to ensure reliable operation.

Secure and Reliable Operation of LNG Terminals

All LNG import terminals are considered critical infrastructure, and their design and operations are regulated under U.S. Federal regulations. The Federal Energy Regulatory Commission (FERC) is responsible for the siting of all new terminals, and conducts design reviews to ensure all infrastructure and safety equipment are in compliance with the regulations. FERC staff also conduct periodic on-site inspections of operational terminals. Federal regulations also require specific physical security measures. These include terminal access control, communications, lighting and monitoring systems, and written procedures. The primary responsibility for physical security of an operational LNG import terminal lies with the terminal operator. In addition to the above mentioned regulatory requirements, the terminal operator is responsible for developing an emergency plan for the terminal. This requires coordination with local emergency officials such as fire and police, and with state homeland security officials for implementation of protective measures when an LNG vessel is at the terminal.

There are also Federal regulations that address security measures for the terminal's waterfront. All terminal operators must submit a waterfront facility security plan to the Coast Guard for review and approval, and coordinate all LNG vessel transits to the terminal with the Coast Guard. The Coast Guard is responsible for coordinating security measures around LNG vessels, and all LNG vessel transits to an LNG terminal occur

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with some level of Coast Guard and local law enforcement escort. The level of escort depends upon the level of risk, taking account of local intelligence threat estimates, national terrorist threat levels, and general risks due to the location of the terminal.

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VI. Reducing Energy Poverty

Energy security is not only an issue of securing supplies for G8 and other developed countries. There is a moral and political imperative to reduce energy poverty throughout the world. To that end, progress towards meeting the UN Millennium Development Goals is of the utmost importance.

Please detail policies and measures to:

- Support progress toward the UN Millennium Development Goals.
- Reduce energy poverty in developing countries.
- Enhance energy efficiency in low-income households.

U.S. Efforts to Support UN Millennium Development Goals

The United States supports the Extractive Industries Transparency Initiative (EITI), which supports improved governance in poor but resource-rich countries through the verification and full publication of company payments and government revenues from oil, gas and mining. The United States provides political leadership in promoting EITI among countries that are engaged in international extractive industries, and assists implementation through direct bilateral support to EITI implementing countries.

EITI involves a unique array of stakeholders: donor (supporting) countries; developing (implementing) countries; oil, gas and mining companies; and non-governmental organizations. All participate on a voluntary basis, for a variety of reasons:

- Supporting countries participate to level the investment playing field and assist social and economic development.
- Poor implementing countries participate because they believe a transparent investment environment will bring more investment, and to assist social and economic development.
- Oil, gas and mining companies participate because they believe a transparent investment environment makes for a more stable working environment and they wish to burnish their own reputations for transparent behavior.
- Non-governmental groups participate because they believe a transparent investment environment and transparent revenue flows will assist social and economic development.

U.S. Efforts to Reduce Energy Poverty in Developing Countries

Global Village Energy Partnership (GVEP): GVEP is focused on increasing access to modern energy services in areas either not served or under-served by current energy delivery systems. Currently, over 1000 organizations (government, private sector, and civil society) representing over 90 countries have committed to the partnership's statement of principles, thereby becoming GVEP partners. USAID has provided direct support for GVEP since its inception in 2002. It has recently attracted over \$44 million from other donors. GVEP has initiated National Action Plans and energy-poverty program development in 19 countries. These include Latin America (Bolivia, Brazil,

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Dominican Republic, Guatemala, Honduras, Mexico), Africa (Burkina Faso, Cameroon, Ghana, Kenya, Mali, Senegal, South Africa, Tanzania, Uganda, Zambia), and Asia (India, Philippines and Sri Lanka). Currently GVEP is launching several clean energy investment funds for small and medium enterprises in Africa.

The Alliance for Mindanao Off-Grid Renewable Energy (AMORE) Program: AMORE is a partnership among USAID, Mirant Philippines, the Philippine Department of Energy, the Moro National Liberation Front, and Winrock International, to use energy as an enabling tool to further peace and development in Mindanao. Mindanao is a remote rural community in the Philippines where about 60 percent of the population lives below the poverty line, and many lack access to basic services for development, like electricity. AMORE supports use of renewable energy systems, such as solar and micro-hydro, for household electrification, power for social infrastructure such as schools for distance education, communications, water supply, and economically productive uses. Working mainly in the Autonomous Region in Muslim Mindanao (ARMM), including many communities comprising former MNLF combatants, the program has electrified 227 communities and over 6800 households, and provided power for distance education to over 60 schools. The program is expected to electrify at least 175 additional communities through 2009, supporting distance education, telecommunications service, and improved water supply in many of these communities, thereby continuing USAID support for peace in the region.

Wind Mapping for Generating Electricity in Afghanistan and Pakistan: Working with DOE's National Renewable Energy Laboratory (NREL), USAID has supported detailed regional wind resource assessments in Afghanistan and Pakistan. Wind mapping accelerates identification of promising areas for wind prospecting and project development, facilitates investment in large-scale wind energy projects, supports informed decision-making by public and private sectors, and accelerates the wind project deployment process. In Pakistan and Afghanistan, wind maps produced by NREL will be used by energy sector professionals to help create rural energy platforms in remote villages.

Slum Electrification and Loss Reduction Program: Recognizing the very large, growing number of slum residents lacking legal and affordable access to electricity in developing countries, USAID, in cooperation with the International Copper Association (ICA), launched the Slum Electrification and Loss Reduction Program (SELR) in October 2005. SELR is working in two cities in two countries (São Paulo, Brazil and Mumbai, India) to develop, test and evaluate sustainable and widely-replicable approaches for increasing access to electricity services for low-income urban consumers. In partnership with AES-Eletropaulo, the electricity utility serving the pilot area in São Paulo, system infrastructure was upgraded and improved electricity service was extended to 4,365 households and businesses with efficiency measures put in place to reduce consumption and improve affordability. Lessons learned from the pilot are informing the roll-out of the program by AES-Eletropaulo to hundreds of thousands of additional households and businesses in Sao Paulo. In Mumbai, USAID and ICA are partnering with the World Bank Output-Based Aid program to improve access to reliable and affordable electricity services to 22,000 households and businesses. A third pilot in the Africa region is being planned for.

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Reliable Renewable Energy Enables Effective Response to HIV/AIDS: Without electricity, health service provision is limited - facilities can only provide care and treatment during the day and providers cannot utilize the equipment essential for basic care. A lack of modern energy services at health facilities is a major impediment for the expansion of the USG's President's Emergency Plan for AIDS Relief (PEPFAR) programs beyond urban and peri-urban areas. The USAID Energy Team and USG PEPFAR programs in Haiti, Guyana, and Rwanda have joined together to improve energy systems of rural health facilities to help enable effective prevention, care, and treatment of HIV/AIDS.

U.S. Efforts to Enhance Energy Efficiency in Low-Income Households

Weatherization Assistance Program: The Department of Energy's Weatherization Assistance program provides cost-effective energy efficiency improvements to low-income households through the weatherization of homes. The program helps low-income families to permanently reduce their energy bills by making their homes more energy efficient. DOE's weatherization program performs energy audits to identify the most cost-effective measures for each home, which typically includes adding insulation, reducing air infiltration, servicing heating and cooling systems, and providing health and safety diagnostic services. Priority is given to the elderly, persons with disabilities, families with children, and households that spend a disproportionate amount of their income on energy bills (utility bills make up 15 to 20 percent of household expenses for low income families, compared to five percent or less for all other Americans). Section 122 of the Energy Policy Act of 2005 reauthorizes the program for fiscal years 2006 through 2008.

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VII. Addressing Climate Change and Sustainable Development

Efforts to reduce greenhouse gas emissions take varying forms in G8 countries, comprising domestic and international actions.

Please detail policies and measures to:

- Reduce GHG emissions domestically and measure GHG emissions reductions achieved.
- Establish a carbon price signal in the economy as a whole or in major energy sectors
- Limit emissions via international efforts and mechanisms such as CDM and JI.
- Complete a high-quality GHG inventory and GHG emissions reduction plan.
- Develop a broad strategy that combines energy and climate objectives?

U.S. Efforts to Reduce GHG Emissions Domestically and Measure GHG Emissions Reductions Achieved

Domestically, the United States has implemented a diverse portfolio of mandates, incentives, and partnership programs to slow the near-term growth of our greenhouse gas emissions. In 2002, President Bush set an ambitious but achievable national goal to reduce the greenhouse gas intensity – that is, emissions per unit of economic output – of the U.S. economy by 18 percent by 2012. At the time, the Administration estimated that achieving this commitment would avoid 106 million tons CO₂ equivalent emissions in 2012 compared to the Energy Information Administration's *Annual Energy Outlook 2002* business-as-usual base case projection, and would result in cumulative savings of more than 500 million metric tons of carbon-equivalent emissions over the decade.

Data from the Energy Information Administration show that the United States is on track to achieve or exceed this goal. From 2000 to 2005, while population grew 5 percent and economic output by 12 percent, emissions increased by just 1.6 percent, and data for 2006 show an absolute reduction in emissions of 1.5 percent despite economic growth of 2.9 percent.

On April 16th, 2008 President Bush announced a new national goal to stop the growth in U.S. greenhouse gas emissions by 2025. This new goal marks a major step forward in America's ongoing efforts to address climate change. By fully implementing our strong new laws, adhere to the principles the President outlined, and adopt appropriate incentives, we will put the United States on an ambitious new track for greenhouse gas reductions. The growth in emissions will slow over the next decade, stop by 2025, and begin to reverse thereafter, so long as technology continues to advance. Taken together, these landmark actions will prevent billions of metric tons of greenhouse gas emissions from entering the atmosphere.

To this end, the U.S. government is now implementing numerous programs – including partnerships, consumer information campaigns, incentives, and mandatory regulations – that are directed at developing and deploying cleaner, more efficient energy technologies, many of which are described elsewhere in this document.

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The United States also has set in place a range of mandates and other policies design to achieve significant emission reductions over the mid term. Two key pieces of legislation signed into law by President Bush, the Energy Policy Act of 2005 (EPAAct 2005) and the Energy Independence and Security Act of 2007 (EISA), contain far-reaching provisions that will help enable future reductions.

In addition to its research and development programs, EPAAct 2005 has a number of provisions designed to accelerate market penetration advanced, clean energy technologies. These include about \$11.5 billion in tax incentives over ten years to promote the use of clean energy technologies. These include tax incentives for production from advanced nuclear power, clean coal facilities, integrated gasification-combined cycle, energy efficient commercial buildings, energy efficient homes, energy efficient appliances, residential energy efficient property; business installation of fuel cells and stationary microturbine power plants, business solar energy investment, alternative fuel motor vehicles, and many other technologies.

EPAAct 2005 grants the Department of Energy the authority to issue loan guarantees for a variety of commercial projects that use technologies that avoid, reduce, or sequester greenhouse gases. Eligible technologies include renewables, carbon capture and storage, hydrogen fuel cells, advanced nuclear energy, coal gasification, energy efficiency, efficient generation and transmission and distribution, and production facilities for fuel efficient vehicles. It also provides standby support coverage to indemnify against certain regulatory and litigation delays for the first six new nuclear plants. Under this provision, DOE is authorized to indemnify certain covered costs up to \$500 million for each of the first two and \$250 million for each the next four new nuclear plants if full power operation is delayed because a regulatory scheduled is not kept or litigation occurs. These programs are detailed elsewhere in this report.

The Energy Independence and Security Act (EISA), which became law in December 2007, will improve vehicle fuel economy and help reduce U.S. dependence on oil. EISA responded to the "Twenty in Ten" initiative, which President Bush announced in January 2007. It represents a major step forward in expanding the production of renewable fuels, reducing our dependence on oil, and confronting global climate change.

EISA sets a mandatory Renewable Fuel Standard (RFS) that requires fuel producers to use at least 36 billion gallons (about 136 billion liters) of biofuels in 2022. This represents a nearly five-fold increase in annual biofuel use over current levels. The bill also sets a national fuel economy standard of 35 miles per gallon by 2020 and includes an important reform that allows for "attribute-based standards," which will ensure that increased fuel efficiency does not come at the expense of automotive safety.

EISA encourages energy conservation and efficiency by promoting residential efficiency, increasing the efficiency of appliances and commercial products, reducing Federal government energy usage, modernizing domestic energy infrastructure, diversifying the Nation's energy supply with renewable sources, and supporting a new generation of

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energy-efficient vehicles. It includes provisions to improve energy efficiency in lighting and appliances, as well as requirements for Federal agency efficiency and renewable energy use that will help reduce greenhouse gas emissions.

EISA updates existing appliance efficiency standards and sets new appliance efficiency standards affecting regional efficiency for heating and cooling products, procedures for new or amended standards, energy conservation, energy efficiency labeling for consumer electronic products, residential boiler efficiency, electric motor efficiency, and home appliances. It is estimated that implementation of these EISA provisions alone could avoid cumulatively about 5.3 gigatons of CO₂ emissions by 2030, not counting other greenhouse gases avoided.

In addition, 26 States have Renewable Portfolio Standards that require a certain percentage of their power production to come from renewable sources by a certain date.

U.S. Efforts to Establish a Carbon Price Signal

While the United States does not have a carbon trading system that establishes an explicit price for carbon, it nonetheless has a number of policies and measures that attach an implicit value to carbon. The Energy Policy Act of 2005 (EPAAct 2005) provides approximately \$11.5 in tax credits over 10 years for clean energy infrastructure, energy conservation and efficiency, and alternative motor vehicles and fuels. The bill also contains a number of production tax incentives for clean energy technologies (1.8 cents per kilowatt-hour for new nuclear power and an extension of the tax credit for renewable energy, currently 2.0 cents per kilowatt-hour). Also included is \$1.65 billion in tax incentives for construction of advanced clean coal facilities. In November 2006, the U.S. Departments of Treasury and Energy announced awards totaling about \$900 million for 8 projects, including IGCC projects for electricity generation, advanced coal electricity generation projects other than IGCC, and gasification projects for other than electricity generation. The remaining approximately \$750 million will be awarded in 2008.

EPAAct 2005 also grants the Department of Energy the authority to issue loans guarantees for up to 80 percent of project costs to accelerate commercial deployment of advanced energy technologies. To be eligible, a technology must avoid, reduce, or sequester greenhouse gases or air pollutants or employ new or significantly improved technology. In fiscal year 2007, \$4 billion was made available for loan guarantees, and a competitive solicitation took place. In the Department's fiscal year 2009 budget, an additional \$38.5 billion will be made available from 2008 to 2011 (\$20 billion of which will be for coal-based power, advanced gasification, uranium enrichment, renewables, and electricity delivery and \$18.5 billion for nuclear power). The bill also authorizes up to \$2 billion in standby support coverage for certain regulatory delays for up to 6 new nuclear plants.

Moreover, there is a trading element to the increased vehicle fuel economy standards in EISA. The bill increases light duty vehicle fuel economy standards by 40 percent to 35 miles per gallon for the combined car and light truck standard by 2020. To help auto

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manufacturers achieve this, the law creates a fuel economy credit trading mechanism among manufacturers, the details of which are being worked out.

These and many other programs and mandates combine to create important market signals for technology deployment.

U.S. Efforts to Limit Emissions via International Efforts and Mechanisms

The United States has initiated and participates in a number of innovative international partnerships aimed at addressing energy security, climate change, and clean development. Two of the best examples are the Asia-Pacific Partnership on Clean Development and Climate (APP) and the Methane to Markets Partnership (M2M).

Asia Pacific Partnership: The APP has brought together Australia, Canada, China, India, Japan, Republic of Korea, and United States into a public-private partnership established to promote economic development, reduce poverty, and accelerate the development and deployment of cleaner, more efficient technologies to address increasing energy needs and the associated issues of air pollution, energy security, and climate change. Engaging private industry and government ministries, the APP uses public-private partnerships to build local capacity, improve efficiency and reduce greenhouse gas emissions, create new investment opportunities, and remove barriers to the introduction of clean technologies.

APP activities are identified and supported using an innovative “bottom up” approach with eight Task Forces: (1) aluminum; (2) buildings and appliances; (3) cement; (4) cleaner fossil energy; (5) coal mining; (6) power generation and transmission; (7) renewable energy and distributed generation; and (8) steel. Each Task Force has developed an Action Plan to serve as their blueprint for cooperation and provide a strategic framework for identifying and implementing priority actions. Over 100 projects and activities have been identified, and work is underway in most of these areas.

Methane to Markets: Launched in 2004, Methane to Markets (M2M) is a multilateral initiative that promotes energy security, environmental stewardship, and greenhouse gas emissions reductions throughout the world. M2M has 21 Partners and a Project Network with over 600 participants. Capturing and using “waste” methane provides an additional energy source that stimulates economic growth while reducing global emissions of this powerful greenhouse gas. EPA estimates that this Partnership could recover up to 500 billion cubic feet of natural gas (183 MMTCO₂ equivalent) annually by 2015. Partner countries work closely with the Project Network to promote and implement methane recovery and use in four areas: oil & gas systems; coal mines; land fills; and animal waste management systems. For fiscal year 2006, M2M projects developed by the United States, when fully implemented, will result in estimated annual emission reductions of more than 9 million metric tons of CO₂ equivalent. In addition, U.S. government M2M activities have leveraged more than \$261 million for methane projects since its inception.

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Furthermore, the United States, United Kingdom, and Japan are working with other potential donor and beneficiary countries to create a fund to ensure the widespread adoption of clean technologies in the developing world. A new clean technology fund administered by the World Bank can help developing countries bridge the gap between dirty and clean technology. The fund will support publicly and privately financed projects that deploy technologies that can cut emissions, increase efficiency and save energy. The U.S. fiscal year 2009 budget contains \$400 million to support this fund, with an additional \$800 million planned in each of fiscal year 2010 and 2011 for a total of \$2 billion over three years.

The United States also is working to eliminate tariff and non-tariff barriers to clean energy goods and services. The United States and the EU have submitted a proposal as part of the Doha Round negotiations to increase global trade in and use of environmental goods and services. The United States and EU propose to eliminate tariff and non-tariff barriers to environmental technologies and services through a two-tiered approach: (1) a first-ever-in-the-WTO agreement on worldwide elimination of tariffs on a specific list of climate friendly technologies recently identified by the World Bank; and (2) a higher level of commitment on the part of developed and the most advanced developing countries to eliminate barriers to trade across a broader range of other environmental technologies and an array of environment-friendly services.

In addition, the United States believes that well-designed multilateral collaborations focused on achieving practical results can accelerate development and commercialization of new technologies. The United States has initiated or joined a number of multilateral technology collaborations in hydrogen, carbon sequestration, nuclear energy, and fusion that address energy security, climate change, and environmental protection. These programs are detailed under section IV.

U.S. Efforts to Complete a High-Quality GHG Inventory and GHG Emissions Reduction Plan

As part of its commitments under the UNFCCC, the United States produces and reports each year an inventory of greenhouse gas emissions. Led by the Environmental Protection Agency and in cooperation with many other agencies, the report tracks progress. The report adheres to the guidelines issued by the UNFCCC to ensure that it is well documented, consistently prepared, and as accurate as possible. Advances in scientific understanding and availability of data allow improvements in the quality and comprehensiveness of the inventory. The U.S. Department of Energy's Energy Information Administration also produces a high-quality inventory of greenhouse gas emissions annually.

U.S. Efforts to Develop a Broad Strategy that Combines Energy and Climate Objectives

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U.S. strategy takes as a starting point that climate change must be addressed as part of a larger agenda that includes providing energy security and stimulating economic growth. In February 2002, the government released a detailed policy document, *U.S. Climate Change Strategy: A New Approach* that outlines a broad range of steps to address climate change (see at <http://www.whitehouse.gov/news/releases/2002/02/climatechange.html>). An integral part of this strategy is a national goal to improve the GHG emission intensity of the economy by 18 percent between 2002 and 2012 (which is discussed earlier).

Using this policy document as its basis, the government established a number of new mandatory, voluntary, and incentive programs and sought out new opportunities to reduce emissions as our knowledge and technologies improved.

Energy security and climate concerns also animated the Administration's push for new energy legislation. This has resulted in two new energy bills signed into law by President Bush, the details of which were presented earlier in this report. Taken together, these bills provide a coherent and far-reaching strategy to address energy security and climate change.

The United States also is laying a strong scientific and technological foundation to reduce uncertainties, clarify risks and benefits, and develop realistic mitigation options through strategic integration and management of its climate change related scientific and technological activities. In February 2002, President Bush announced the creation of a cabinet-level Committee on Climate Change Science and Technology Integration, co-chaired by the Secretaries of Commerce and Energy. Two multi-agency programs were established to coordinate Federal government activities in climate change scientific and technological research. These are the U.S. Climate Change Science Program (CCSP), led by the Department of Commerce, and the Climate Change Technology Program (CCTP), led by the Department of Energy. Each of these has produced strategic plans that guide the government's R&D activities, helping U.S. policy makers to develop the most effective strategies to address climate change.

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**ST. PETERSBURG PLAN OF ACTION
GLOBAL ENERGY SECURITY PRINCIPLES**

CONTRIBUTION OF THE EUROPEAN COMMISSION

I. Increasing Transparency, Predictability and Stability of Global Energy Markets

The European Union has put the promotion of transparency, predictability and stability of energy markets, both within its territory and at a global level, at the core of its energy policy.

- *Provide more and better sector-specific and fuel-specific energy data to the public.*

The European Parliament and the Council adopted on 12 March 2008 a new regulation on energy statistics. The aim of the regulation is to provide publicly accessible Community statistics on energy production, imports and exports, transformation and consumption on an annual and monthly basis. Additional information, for instance on oil prices and their relevant tax components, as well as certain analyses and geographic information in relation to infrastructures will be made publicly available via the Energy Market Observatory System (EMOS), a database which is under construction by the Commission.

- *Enhance the transparency of energy market transactions and network flows.*

In September 2007 the Commission proposed a new legislative package concerning the functioning of its internal electricity and gas markets. The package contains new rules aiming at increasing transparency: Steps to improve market transparency on network operation and supply will guarantee equal access to information, make pricing more transparent, increase trust in the market and help avoid market manipulation. The proposed measures aimed at increasing the independence of transmission system operators, preferably by means of full ownership unbundling will also contribute to increasing transparency and equal conditions for access to networks. The correct and full application of these requirements needs to be controlled and monitored by the national regulatory authorities, so their powers need to be strengthened accordingly. The package is currently under consideration by the Council of Ministers and the European Parliament.

- *Ensure independent regulation and clearly defined energy market conditions.*

The above mentioned legislative package also contains measures to strengthen and guarantee the independence of national regulators in Member States and to promote their cooperation at European level.

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- *Implement Energy Charter principles related to energy transit across borders.*

The European Commission wishes to express its concern about the lack of progress concerning the implementation of the Energy Charter Treaty rules. This lack of implementation is jeopardising security of supply, as was evidenced by several recent disputes where continuity of gas transit was put at risk. Discussions on the Transit Protocol continue, but without much result.

- *Meet obligations of the IEA's International Energy Programme (IEP) (if applicable).*

The EU has its own system for emergency oil stocks. All Member States are obliged to keep emergency oil stocks or petroleum products equivalent to 90 days of consumption of the previous year.

- *Put in place emergency plans to deal with domestic energy supply disruptions.*

Member States shall adopt in advance and publish national emergency measures. These emergency measures shall ensure, where appropriate, that market players are given sufficient opportunity to provide an initial response to the emergency situation. In addition, the Commission is developing the above mentioned Energy Market Observatory System (EMOS), to gain better insight to the energy markets. EMOS will be a database containing reliable and transparent energy market data in order to identify threats to a secure energy supply for Europe.

Oil

All Member States are obliged to keep emergency oil stocks or petroleum products equivalent to 90 days of consumption of the previous year. They must provide monthly reports on the status of their oil stocks to the Commission. They are also obliged to have an intervention plan for use in the event of difficulties arising with regard to the supply of crude oil and petroleum products. The existing system is currently under review in order to strengthen it and to optimise the administrative obligations of the Member States.

Gas

All Member States are obliged to have a security of supply policy compatible with the requirements of a competitive internal gas market, indicating the general roles and responsibilities of the different market players and implementing specific non-discriminatory procedures to safeguard security of gas supply. In order to monitor the security of supply situation and provide a coordination mechanism in case of a supply crisis, a Gas Coordination Group has been established. In case of a major disruption of supply, a mechanism based on a three step approach is foreseen. The first step involves the reactions of the industry to the supply disruption. If this is not sufficient, Member States take measures to solve the supply disruption. If the measures taken at

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stages one and two have failed, appropriate measures shall be taken at Community level.

- *Reduce corruption in energy market transactions and dealings.*

The European Commission is expecting to become a supporting member of the Extractive Industries Transparency Initiative (EITI) in the first half of 2008 and will financially contribute to the Multi-Donor Trust Fund, administered by the World Bank, which supports the establishment of EITI in candidate countries, improvement of transparency in the extractive industries in interested countries, and supports global information coordination on EITI.

- *Enhance the security of oil and natural gas supplies.*

As part of the “Baku Initiative”, the Ministerial Declaration on enhanced energy co-operation is being implemented between the EU, the Littoral States of the Black and Caspian Seas and their neighbouring countries. This Declaration was adopted in November 2006 and addresses energy export/import, supply diversification, energy transit, and energy demand issues. Similarly the EU cooperates with Mediterranean countries in order to enhance security of supply. A Ministerial Declaration was adopted in December 2007, which incorporates a list of key priority infrastructure for improving security of supply. The EU-Russia Energy Dialogue also contributes to a better understanding of the evolution of the Russian supply compared to the evolution of EU demand. A special EU-Russia technical working group looks at energy scenarios and forecasts. An early warning mechanism in case of energy crises has been set up with Russia.

II. Improving the Investment Climate in the Energy Sector

The EU is trying to promote investments in the energy sector through a number of measures. However, it is clear that both within the EU and on a global scale much remains to be achieved in order to ensure the much needed investments.

Please detail policies and measures to:

- *Promote investment in energy infrastructure and streamline infrastructure siting*

The 2006 guidelines on Trans-European Network Energy (TEN-E) comprise projects of European interests. In total 286 projects (164 for electricity and 122 for gas) are listed as being "of common interest".

The Commission also adopted a Priority Interconnection Plan (PIP) as a part of its 2007 Energy package. This plan defines 71 projects of European Interest for electricity and gas main interconnections. The TEN-E label allows EU funding of the projects and facilitates the grant of bank loans, including from the European

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Investment Bank and the European Bank for Reconstruction and Development. For four strategic projects European Coordinators have been nominated.

The directives on the electricity market and on electricity security of supply contain obligations to monitor network and generation adequacy. The second directive also obliges Member States to establish a regulatory framework that provides investment signals for both the transmission and distribution system network operators to develop their networks in order to meet foreseeable demand from the market and facilitates maintenance and, where necessary, renewal of their networks.

The proposed new legislative package on the internal energy market of September 2007 (see above) aims to increase investments in energy networks. The proposed separation of network and supply should promote this goal, since in the current situation incumbent companies have little motivation to make new investments into the network to let their competitors in.

- *Ensure a level playing field for all competitors in the oil, gas, coal and power sectors*

The EU legislation concerning the establishment of integrated internal gas and electricity markets is based on the principle of ensuring a level playing field for all competitors. To implement this principle, the legal and operational unbundling of transmission, production and supply activities is obligatory. Since July 2007 all customers are free to choose their supplier. The functioning of the markets is overseen by independent national regulators. In order to address remaining obstacles to the functioning of the market, a revision of the legislation is currently under discussion (see above).

The oil and coal sectors are also both part of the single EU energy market and covered by EU legislation.

The European legislation for granting authorisations for the prospection, exploration and production of hydrocarbons ensures that procedures undertaken in individual Member States are open to all entities possessing the necessary capabilities, including entities from other Member States. Although Member States retain the right to determine the areas within their territory to be made available for such hydrocarbon-related activities, they need to ensure that there is no discrimination between entities with regard to access to and exercise of these activities.

Coal accounts for a significant part of the EU's energy, and in particular electricity, supply and its indigenous production reduces the energy dependency of the Union and contributes to the diversification of the sources of European energy supply. The maintenance of coal-producing capability can be supported by state aid under certain conditions. Aid to the coal industry may be considered compatible with the proper functioning of the common market if it complies with strict conditions, i.e. aid must not lead to distortions of competition in either the coal or the electricity markets.

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- Expand trade and better integrate energy markets with neighbouring countries

The Energy Community Treaty aims to establish an integrated energy market in a region bordering on the EU (currently the Balkan countries, further extension is foreseen). The general objective of the Energy Community is to create a stable regulatory and market framework, based on Community legislation, in order to attract investment in power generation and networks, and to enhance the security of supply in the region and in the EU. It entered into force in 2006. A list of priority investment projects for the region was adopted end of 2007.

- *Drive cost-effective investment in renewable and alternative energy sources*

The existing legislation on renewable energy sources includes indicative targets per country for the percentage of electricity produced from renewable energy sources to be achieved by 2010 (overall EU target to be achieved: 22.1% of electricity to be produced from RES). Member States may promote investments through specific support schemes and are obliged to tackle grid issues and administrative barriers.

The Commission proposed in January 2008 a legislative package on climate change which includes a directive obliging to achieve a 20% binding share for renewable energy in the EU energy mix, and a 10% share of biofuels in road transport fuels in each Member State. The proposal includes a number of supporting measures to promote cost-efficient investments in the sector, such as a system of tradable green certificates.

- *Facilitate energy efficiency investment in buildings, industry and transport*

To facilitate energy efficiency financing on the one hand and improve the way price signals impact on energy efficiency on the other, the EU Energy Efficiency Action Plan announces a variety of measures to improve investments in energy efficiency, which will be implemented between 2007 and 2012. These measures include the analysis of legal and market barriers to the use of financial instruments, Energy Service Companies and various contracting forms for energy efficiency as well as a cooperation with the private banking sector, the EIB and the EBRD, to further facilitate energy efficiency investments. The potential for energy efficiency improvements being particularly large in the new Member States, the Commission will further encourage the use of Structural and Cohesion funds to facilitate leveraging of private financing at national and local levels for energy efficiency.

In the framework of the Intelligent Energy- Europe Programme the Commission is funding various projects also aiming at facilitating the financing of energy efficiency measures.

In order to reach its 20-20 targets in GHG emissions, the European Union will need to develop a low carbon industry. For that purpose, the Directorate General for

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Transport and Energy has established a Task Force on "Financing the Low Carbon Economy", which will also focus on the financing of energy efficiency technologies.

III. Enhancing Energy Efficiency and Energy Saving

The European Community, together with its Member States, is working intensively to improve energy efficiency in all sectors whilst at the same time increasing the use of renewable energies. This can be a key issue to solve environmental, self-sufficiency and cost problems and adequately provide for increasing energy demand without major upheavals. This is especially true when seen in the light of the Kyoto Agreement to reduce CO₂ emissions, where improved energy efficiency will play a key role in meeting the EU Kyoto target in an economic way.

The Commission's 2006 Green Paper on Energy Efficiency points to the fact that the EU could save at least 20% of its present energy consumption in a cost-effective manner, equivalent to EUR 60 billion per year.

Please detail policies and measures to:

- *Implement the 16 energy efficiency measures that the G8 have specified for appliances, lighting, buildings, transport, industry, and across sectors.*

In October 2006, the European Commission proposed its Action Plan for Energy Efficiency with the aim of saving 20% of energy consumption in the EU by 2020. The Plan includes 75 measures such as minimum energy performance requirements and labeling for appliances, equipment, buildings, vehicles and energy services; targeted actions to improve efficiency in generation and transmission in the energy transformation sector; correct pricing and coherent energy taxation; and increased public awareness. This is in line with the IEA energy recommendations.

- *Ensure cost-reflective pricing to drive cost-effective energy efficiency steps*

Member States are responsible for designing their energy pricing policies. However, the European Commission has clearly recognized that a competitive internal market for energy is the only way to ensure fair energy prices to citizens and industries and to ensure competitive energy pricing, while eliminating energy price distortions. Energy prices reflecting the environmental impact of energy production (EU Greenhouse Gas Emission Trading Scheme) and the real demand and supply situation will stimulate a more rational use of energy by the relevant market actors.

- *Promote demand-side measures in the electric power sector*

The Directive on the promotion of end-use efficiency and energy services to enhance the cost-effective and efficient end-use of energy is currently being transposed by the Member States. One purpose of this Directive is to create the conditions for the

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development of a market for energy services and for the delivery of other energy efficiency improvement measures to final customers. The availability to final customers of energy audit schemes and individual meters accurately reflecting their actual energy consumption and costs are some of the demand-side measures to promote energy end-use efficiency.

- *Encourage public and private financing for energy efficiency improvements.*

The Intelligent Energy - Europe programme, managed by the Executive Agency for Competitiveness and Innovation, is the EU's tool for funding action to promote policies and favourable market conditions for energy efficiency and renewables and to support uptake of state of the art technologies. The budget for the programme for the period from 2007-2013 is € 730 million.

- *Develop efficiency standards and labels for buildings, appliances and equipment.*

The Commission is preparing to propose implementing measures under the eco-design directive and the revision of the energy labelling directive. Under the eco-design directive, the Commission has implementing measures for 20 energy using products (EUP) in preparation. The directive on the energy performance of buildings (EPBD) in force since January 2003 aims to provide for an ambitious step-ahead to increase the energy performance of public, commercial and private buildings in all Member States.

- *Provide energy efficiency audits to homes, offices, and industrial firms.*

In accordance with the Directive on the end-use efficiency and energy services, Member States have to ensure the availability of efficient, high-quality energy audit schemes which are designed to identify potential energy efficiency improvements measures to all final consumers, including smaller domestic, commercial and small and medium-sized industrial customers.

The European Commission is funding a whole range of energy efficiency projects, including energy efficiency auditing projects, as part of the Intelligent Energy - Europe Programme (see above). Furthermore the European Commission Directorate-General for Energy and Transport has also launched an initiative called ManagEnergy, to support the work of actors working on energy efficiency at the local and regional level. ManagEnergy offers sectoral advice, training, workshops as well as information on case studies, good practice, European legislation and programmes.

- *Raise public awareness of energy efficiency opportunities.*

The European Commission is undertaking a number of initiatives to raise public awareness of energy efficiency opportunities. The above-mentioned ManagEnergy programme includes a KidsCorner section providing educational resources for children (under 11), young adults (12-16) and their teachers in 23 languages.

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The Sustainable Energy Europe 2005-2008 Campaign is an initiative in the framework of the Intelligent Energy - Europe (2003-2006) programme, which aims to raise public awareness and promote sustainable energy production and use among individuals and organisations, private companies and public authorities, professional and energy agencies, industry associations and NGOs across Europe.

- *Improve end-use data and track progress towards energy efficiency goals.*

Under the Directive on Energy services, Member States have to submit their national efficiency action plans showing that they will reach the target of 9% savings by the 2016. The Commission has recently published a review of the current state of National Energy Efficiency Action Plans as well as the progress in implementing the Energy Efficiency Action Plan.

IV. Diversifying Energy Mix

The development of renewable energy - particularly energy from wind, water, solar power and biomass - is a central aim of the European Commission's energy policy. Renewable energy has an important role to play in reducing Carbon Dioxide (CO₂) emissions. Increasing the share of renewable energy in the energy balance enhances sustainability. It also helps to improve the security of energy supply by reducing the Community's growing dependence on imported energy sources. Renewable energy sources are expected to be economically competitive with conventional energy sources in the medium to long term.

EU Member States are free to choose their energy mix, including the use of nuclear energy. Nuclear energy will continue to play an important role in the EU's overall energy mix. At EU level, efforts focus on further developing the most advanced framework for nuclear energy in those Member States that choose nuclear power, in conformity with the highest standards of safety, security and non-proliferation as required by the Euratom Treaty.

Please detail policies and measures to:

- *Develop technologies and facilities for carbon capture and storage*

In January 2008 the Commission published the "Climate change and energy" implementation package that includes a carbon capture and storage (CCS) directive and a communication outlining initiatives to stimulate early large-scale CCS demonstration projects. The Commission proposes to launch the European Industry Initiative on CCS and a support action under the 7th framework programme for research and development, mainly to establish a project network to create a joint platform for individual early, large-scale demonstration projects.

In addition, the package includes a clear enabling legal framework for CCS that resolves a number of important problems concerning environmental security of storage sites, composition of CO₂ stream, permit review, monitoring. It also

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addresses liability and long-term stewardship as well as third-party access to transport network and storage sites. Finally, at this stage the Commission will not introduce mandatory CCS. The proposal for a revised EU directive on emission trading (part of the same package) should ensure a robust carbon price. Moreover, CCS demonstration projects will gradually contribute to economic viability of the technology, which could then be possible around 2020.

- *Reduce natural gas flaring*

In the first half of 2008, the European Commission will become a supporting member of the Gas Flaring Reduction Partnership, managed by the World Bank.

Gas flaring is a key issue in the EU-Russia Energy Dialogue. In the framework of this Dialogue, in October 2006 a seminar was organised in Moscow on energy service companies (ESCO's) and gas flaring.

- *Ensure the safety and security of civilian nuclear power facilities*

In order to promote a common approach to nuclear safety, and eventually to adopt additional European rules in this regard, the Commission has set up in 2007 a European High Level Group on Nuclear Safety and Waste Management. The Group is expected to identify priority safety issues and to advise the European Commission in developing European rules on the safety of nuclear installations and the safe management of spent fuel and radioactive waste.

- *Provide for safe disposal of low-, medium-, and high-level nuclear waste.*

A new directive on the supervision and control of shipments of radioactive waste and spent fuel was adopted by the EU Council in 2006. It extends the scope of application of the previous directive 92/3/Euratom to spent nuclear fuel. The Directive has to be transposed by Member States by 25 December 2008.

- *Establish a robust, competitive, and cost-effective renewable energy industry.*

The Commission proposed in January 2008 a legislative package on climate change which includes a directive obliging to achieve by 2020 a 20% binding share for renewable energy in the EU energy mix, and a 10% share of biofuels in road transport fuels in each Member State. A binding target will ensure investor confidence in renewables and therefore boost the market. The ambitious target will ensure increased take up of renewables, resulting in a reduction in cost due to mass deployment. The EU's RTD activities (7th RTD framework programme) also support technological innovation with an aim to reduce the cost of renewable energy technologies.

Reaching the ambitious targets can be done through cost-effective means, by allowing the transfer of "Guarantees of Origin" between Member States. This Guarantee will be the proof that a given quantity of renewable energy has been produced and could

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be traded between Member States for the purpose of complying with national renewable energy targets. More renewable energy will be produced in countries with potential to generate renewable energy at lower cost, thereby increasing the likelihood of ambitious targets being met.

- *Develop biofuels in a cost-effective and environmentally sustainable fashion.*

The existing biofuels Directive sets a 5.75% indicative target for the share of biofuels in transport in 2010. The above mentioned January 2008 legislative package on climate change foresees an obligation for a 10% share of biofuels in road transport fuels in each Member State. The draft Directive sets out stringent environmental sustainability criteria to ensure that biofuels that are to count towards the European targets are sustainable and that they are not in conflict with the EU's overall environmental goals. This means that they must achieve at least a minimum level of greenhouse gas savings and respect a number of requirements related to biodiversity. Among other things this will prevent the use of land with high biodiversity value, such as natural forests and protected areas, being used for the production of raw materials for biofuels. The Directive contains incentives for the longer-term development of "second generation" biofuels made from waste or solid biomass such as wood, which hold out the promise of much greater greenhouse gas savings and raw materials that are not also used as food.

- *Enhance development and deployment of new energy technologies.*

Second generation biofuels and lower cost renewable technologies (e.g. offshore wind) are currently promoted by the 7th Research and Development Framework Programme. Increased market deployment is promoted by the Competitiveness and Innovation Programme (CIP) 2007-2013.

A European Strategic Energy Technology (SET) plan was presented by the Commission in November 2007. The main goal of the SET-Plan is to accelerate the development and implementation of low carbon technologies. It focuses on improving joint planning of research, making better use of the potential of the European Research and Innovation area and fully exploiting the possibilities opened up by the Internal Market. In particular, the Plan includes the commitment to set up a series of new priority European Industrial Initiatives focusing on the development of technologies for which working at Community level will add most value.

- *Cooperate with other countries in R&D of new energy technologies.*

The 7th Research and Development Framework Programme foresees international energy cooperation. The SET plan (see above) underlines the need to take our international cooperation on energy technology to a new dimension. The measures proposed in the Plan should bring about a reinforced international cooperation strategy. At this moment some important cooperation projects are already ongoing, for instance the EU is cooperating with China on a CCS demonstration plant.

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V. Securing Critical Energy Infrastructure

The Commission is implementing a European Programme for Critical Infrastructure Protection with the general objective of improving the protection of critical infrastructures in the EU.

Please detail policies and measures to:

- *Inventory and upgrade critical energy infrastructure.*

In 2007, the Commission adopted a (restricted) Communication on Protecting Europe's Energy and Transport Critical Infrastructure. With this document, the Commission aimed at the selection of energy infrastructures to be further considered as potential European critical infrastructures. The European Programme for Critical Infrastructure Protection will cover infrastructure in oil, gas, electricity and nuclear industry.

- Ensure long-term security of energy transportation routes and infrastructure.

A proposal for a directive on the identification and designation of European Critical Infrastructure (ECI) and the assessment of the need to improve their protection is currently under discussion in the Council of the EU. This directive will allow the Commission to establish further action on those infrastructures that will be designated as ECI. Energy is one of the two sectors to which the directive will apply.

VI. Reducing Energy Poverty

The Commission fully supports the UN Millennium Development Goals and in this context promotes cooperation with developing countries in order to improve their access to energy and to address issues of climate change.

Please detail policies and measures to:

- *Support progress toward the UN Millennium Development Goals.*

In December 2007, the second EU-Africa Summit officially launched the new Africa-EU Partnership on Energy.

The Africa-EU Energy Partnership will be a long-term framework for structured political dialogue and cooperation between Africa and the EU on energy issues of strategic importance. The overall objective of the Africa-EU Energy Partnership is to ensure access to reliable, secure, affordable, climate friendly and sustainable energy services for both continents, and so to contribute to the achievement of the Millennium Development Goals (MDGs)

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- Reduce energy poverty in developing countries.

In support to the implementation of the Africa-EU Energy Partnership, a number of activities have been launched or are about to be launched for energy sector under the 9th and 10th EDF, Euro-Mediterranean energy cooperation and the energy activities conducted in the frame of the European Neighbourhood Policy, the GEEREF, as well as energy research activities under 7th Framework programme.

Another Partnership adopted under the Africa-EU Strategic Partnership which will also contribute to the improvement of energy security and accessibility in Africa, is the EU-Africa Infrastructure Partnership. The priority of this Partnership and its Trust Fund is to substantially increase EU investment in African infrastructure thereby securing the interconnectivity of Africa and its different regions including also energy infrastructures.

VII. Addressing Climate Change and Sustainable Development

Please detail policies and measures to:

- *Reduce GHG emissions domestically and measure GHG emissions reductions achieved.*

The European Council has agreed to a unilateral 20% reduction in greenhouse gas emissions by 2020 (compared to 1990), rising to 30% in the framework of an international climate agreement.

The package of proposals approved by the European Commission in January 2008 comprises of a set of key policy proposals, including a proposal amending the EU Emissions Trading Directive (EU ETS); a proposal relating to the sharing of efforts to meet the Community's independent greenhouse gas reduction commitment in sectors not covered by the EU emissions trading system (such as transport, buildings, services, smaller industrial installations, agriculture and waste); a proposal for a Directive promoting renewable energy, to help achieve both of the above emissions targets – all aiming to implement the greenhouse gas reduction and renewables targets.

- *Establish a carbon price signal in the economy as a whole or in major energy sectors*

The European Union Emissions Trading System (ETS) has proved a pioneering instrument to find a market-based solution to incentivise cuts in greenhouse gas emissions. The proposals for an enhanced Emissions Trading Scheme, put forward by Commission, would build on the positive experience so far and would be designed to deliver a new drive towards a climate-friendly economy. Some of the elements of the proposal include extending the scope of the ETS to all greenhouse gases other than CO₂ and all major industrial emitters, replacement of national allocation plans by

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auctioning of free allocation through single EU-wide rules, full auctioning in the power sector from 2013 and gradual introduction of full auctioning in most other industrial sectors, including aviation by 2020.

- *Limit emissions via international efforts and mechanisms such as CDM and JI.*

CDMs have proved their worth in cutting emissions, and offer access to more cost-effective options than sometimes available within Europe. Under the new ETS, companies will still have access to CDMs, but the use of credits generated by such mechanisms will be limited to the levels used in the current ETS period. This would leave room for access to this mechanism to be increased once an international agreement is signed – central to allowing the EU to step up swiftly to the more challenging 30% GHG reduction in the event of an international agreement.

- *Complete a high-quality GHG inventory and GHG emissions reduction plan.*

The European Commission provides for effective cooperation and coordination in relation to the compilation of the Community greenhouse gas inventory, the evaluation of progress, the preparation of reports, as well as review and compliance procedures enabling the Community to comply with its reporting obligations under the Kyoto Protocol.

The European Environment Agency assists the Commission with monitoring activities, especially in the scope of the Community inventory system, and in the analysis by the Commission of progress towards the fulfilment of the commitments under the UNFCCC and the Kyoto Protocol.

The European Commission has taken many climate-related initiatives since 1991, when it issued the first Community strategy to limit carbon dioxide (CO₂) emissions and improve energy efficiency. Its latest proposals were launched in January 2008, with the Climate Action package. This far-reaching package of proposals demonstrates that the targets agreed on reduction of greenhouse gases and the promotion of renewables are technologically and economically possible and provide a unique business opportunity for thousands of European companies. All major CO₂ emitters will be given an incentive to develop clean production technologies through a thorough reform of the Emissions Trading System (ETS) that will impose an EU-wide cap on emissions. The package seeks to deliver the European Union to reduce greenhouse gases by at least 20% and increases to 20% the share of renewable energies in the energy consumption by 2020. The emissions reduction will be increased to 30% by 2020 when a new global climate change agreement is reached.

- *Develop a broad strategy that combines energy and climate objectives?*

In March 2007, endorsing the Commission's energy policy proposals, the European Council agreed common energy and climate policy, based on three complementary and equal objectives of competitiveness, security of supply and sustainability.

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Additionally, they endorsed several targets, namely a unilateral 20% reduction in greenhouse gas emissions by 2020 (compared to 1990), rising to 30% in the framework of an international climate agreement; a 20% binding share for renewable energy in the EU energy mix, and a 10% share of biofuels in road transport fuels in each Member State; and an intention to realise a 20% reduction in anticipated energy demand by 2020.