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**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN COUNCIL**

**AN ENERGY POLICY FOR EUROPE**

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## COMMUNICATION FROM THE COMMISSION

### AN ENERGY POLICY FOR EUROPE

"To these ends, the ministers have agreed on the following objectives: ...putting more abundant energy at a cheaper price at the disposal of the European economies..."

The Messina declaration, 1955

#### 1. THE OBJECTIVES

Energy is essential for Europe to function. But the days of secure, cheap energy for Europe are over. The challenges of climate change, increasing import dependence and higher energy prices are faced by all EU members. A common European response is necessary to deliver sustainable, secure and competitive energy. Without this, the EU's objectives in other areas, including the Lisbon Strategy and the Millennium Development Goals, will also be more difficult to achieve. A new European Energy Policy needs to be ambitious, effective and long-term – and to the benefit of all Europeans.

##### 1.1. Sustainability

Energy accounts for 93% of carbon dioxide emissions<sup>1</sup>; it is at the root of climate change. It has been estimated that, without real efforts to reduce emissions, there is a more than 50% chance that global temperatures will rise during this century by more than 5°C<sup>2</sup>. The EU is committed to addressing this - by reducing EU and global CO<sub>2</sub> levels. However, current energy and transport policies would mean that far from falling, EU emissions would increase by around 5% by 2030. The EU's present energy policy is not sustainable.

##### 1.2. Security of supply

Recent developments have shown the risks of being overly dependent on oil and gas. Oil prices have shown great volatility, with gas prices following. There is every reason to expect this pattern to continue. The International Energy Agency (IEA) expects global demand for oil to grow by 41% by 2030. How supply will keep up with this demand is unknown: the IEA in its 2006 World Energy Outlook stated that "the ability and willingness of major oil and gas producers to step up investment in order to meet rising global demand are particularly uncertain". The risk of supply failure is growing.<sup>3</sup>

With current trends and policies the EU's energy import dependence will jump from 50% of total EU energy consumption today to 65% in 2030. Reliance on imports of gas is expected to increase from 57% to 84% by 2030, of oil from 82% to 93%. In volume terms, this represents a 40% increase on today's imports. It is not clear from where, and how, these supplies would come. The EU's external energy vulnerability is therefore increasing. In addition, the necessary mechanisms to ensure solidarity between Member States in the event of an energy crisis are not yet in place and several Member States are largely or completely dependent on one single gas supplier.

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<sup>1</sup> Source – European Environment Agency. Other data are European Commission unless otherwise stated

<sup>2</sup> Stern Review: The Economics of Climate Change, Oct 2006, HM Treasury

<sup>3</sup> IEA World Energy Outlook 2006

At the same time, EU electricity demand is, on a business as usual scenario, rising by some 1.5% per year. But existing infrastructure and electricity plants are reaching the end of their useful life. To replace ageing capacity and cope with rising demand over the next 25 years will require investment for generation alone costing as much as €900 billion.

Even with an effective energy efficiency policy limiting the growth in demand, major investment will still be necessary, not least in infrastructure to support a major increase in renewable electricity. Predictability and effective internal gas and electricity markets are essential to enable the necessary long term investments to take place.

### 1.3. Competitiveness

All European consumers, whether they are households or commercial and industrial users, depend on the secure and reliable provision of energy at competitive prices. This is essential to ensure jobs and growth. With the right policy and legislative frameworks, a European Energy Policy can make a real contribution to competitiveness.

- The EU's increasing import energy dependence is not just a threat to the EU's security of supply, but equally to its competitiveness; it is becoming increasingly exposed to the effects of price volatility on international energy markets. The potential effects of this are significant: if, for example, the oil price rose to 100 \$/barrel in 2030 in today's money, the EU-27 energy import bill would be around 170 billion, an annual increase of €350 for every EU citizen.<sup>4</sup> Very little of this wealth transfer would result in additional jobs in the EU.
- Providing that the right policy and legislative frameworks are in place, the Internal Energy Market would stimulate fair and competitive energy prices and energy savings, as well as higher investment in clean and sustainable energy technologies and renewable energy. The evidence suggests that more competitive markets are likely to deliver relatively lower energy prices. However, all the conditions to achieve this do not yet exist. This prevents EU citizens and the EU economy from receiving the full benefits of energy liberalisation.
- Boosting investment in energy efficiency and renewable energy should create many long-term, high quality jobs and help to promote a knowledge-based economy in the EU. The European Union is already the global leader in renewable technologies, which account for a turnover of €10 billion and employ 200,000 people<sup>5</sup>. It has the potential to lead the rapidly growing global market for low carbon energy technologies. In wind energy, for example, EU companies have 60% of the world market share. Europe's determination to keep leading the global fight against climate change creates an opportunity to drive the global research agenda.

## 2. THE MAIN ELEMENTS OF AN ENERGY POLICY FOR EUROPE

The point of departure for a common energy policy must be combating climate change, promoting jobs and growth and limiting the EU's external vulnerability to imported hydrocarbons. This means transforming Europe into a highly energy efficient and low CO<sub>2</sub> energy economy, by catalysing a **new industrial revolution**, accelerating the change to low carbon growth and, over a period of years, dramatically increasing the amount of local, low

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<sup>4</sup> Assumed dollar exchange rate of 1.25\$ per € and compared with an oil price of 60\$ (today's money) in 2030.

<sup>5</sup> European Renewable Energy Council "Renewable Energy Targets for Europe: 20% by 2020".

emission energy that we produce and use. The challenge is to do this in a way that maximises the potential competitiveness gains for Europe, and limits the potential costs.

In the light of the many submissions received during the consultation period on its Green Paper, the Commission proposes the following strategic energy objective for Europe, together with an Action Plan of measures, as requested by the European Council, to take the first concrete steps towards achieving it in practice. The Commission invites the European Council and the European Parliament to endorse this Action Plan as the consensus long-term vision for European energy policy.

[In its Communication *Limiting Climate Change to 2° - Policy Options for the EU and the world for 2020 and beyond*<sup>6</sup>, the Commission proposes a clear goal of **reducing greenhouse gas emissions (GHG) by developed countries by 30% by 2020** (compared to 1990 levels).

By 2050 global emissions must be reduced by up to 50% compared to 1990, implying reductions in industrialised countries of 60-80% by 2050. Many developing countries will also need to significantly reduce their emissions.

To show leadership, while international negotiations are still under way, the EU would already put in place measures to achieve at least a [ ] reduction of GHG emissions by 2020.

With CO<sub>2</sub> emissions from energy making up the vast bulk of EU GHG emissions, the contribution of energy to meeting this core objective is enormous. The energy sector measures set out in this communication would bring cuts in EU GHG emissions most of the way towards meeting the target. At the same time, they would also limit the EU's growing exposure to increased volatility and prices for oil and gas, bring about a more competitive EU energy market, and stimulate technology and jobs. They add up to a mutually reinforcing package of actions to bring about a sustainable, secure and competitive EU energy policy. ]

#### **An Action Plan to achieve this:**

- The EU shall aim to become the world's most energy efficient region, meeting the objective of improving its energy efficiency by 20% by 2020.
- The EU will maintain its position as world leader in renewable energy, by ensuring that, by 2020, [ ]% of its overall energy mix will be sourced from renewable energy, with a minimum target for biofuels of [ ] % by 2020.
- The EU will ensure that every European citizen and business has a choice of suppliers for their energy, through further action to ensure a clearer separation of energy production from energy distribution, and through stronger independent regulatory control which considers the interest of Europe as a whole.
- The EU will increase its efforts to deliver on its target of 10% minimum interconnection levels through, *inter alia*, identifying key bottlenecks and appointing coordinators to tackle them.
- The EU will, by making electricity and gas liberalisation a reality for its citizens and businesses, also address missing interconnections, stimulate investment and innovation.
- The EU will redouble its efforts to get global action to combat climate change: it cannot deal with this problem alone.
- The EU will increase by at least 50% its annual spending on energy research over the next seven years, to accelerate the competitiveness of low carbon technology. In addition, the

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<sup>6</sup> p.m.

Commission will examine how to set up by 2015 up to 12 large scale demonstrations of Sustainable Fossil Fuels technologies in commercial power generation.

- The EU will develop effective solidarity mechanisms to deal with any energy supply crisis and actively develop a common external energy policy to increasingly "speak with one voice" with third countries. It will endeavour to develop real energy partnerships with suppliers based on transparency, predictability and reciprocity to our mutual benefit. The EU will continue to diversify the EU's external energy suppliers.
- The EU will refocus its development aid efforts and give increased priority to using decentralised renewable energy to bring concrete improvements to the lives of many of the world's poorest citizens. In particular it will focus on bringing clean energy to villages in Africa that today have little or no electricity.

Taken together, this strategic objective and Action Plan, shifting the EU decisively towards a more sustainable, secure and competitive low carbon energy economy, represent the core of a new **Common European Energy Policy**.

In doing so the Community would return to its roots. In 1952 with the Coal and Steel Treaty and 1957 with the Euratom Treaty, the founding Member States saw the need for a common approach to energy. Energy markets and geopolitical considerations have changed significantly since then. But the need for EU action is stronger than ever. This requires an imaginative partnership between the EU, its Member States, investors, businesses and individual citizens.

The measures proposed in the third part of the Review demonstrate in detail how the Action Plan will be implemented in practice.

### **3. THE CONCRETE STEPS TOWARDS A COMMON EUROPEAN ENERGY POLICY**

The EU needs a coherent and focussed common energy policy. It has a series of specific policy measures on areas such as renewable electricity, biofuels, energy efficiency and the Internal Energy Market. But these lack the coherence necessary to bring sustainability, security of supply and competitiveness. No one element of the policy provides all the answers – they must be taken together as a whole.

Energy requires a long term approach. Goals targeting action for 2020 and through to 2050 will need an agile energy policy, able to respond to the opportunities offered by new technologies. Achieving the goals will require global partners to address climate change seriously. Europe can however already put in place an ambitious set of policies which add up to a credible long-term strategy for energy, giving a clear direction to policymakers and certainty to investors.

The first step is for Member States to endorse a strategic vision and a plan of action for the next three years: with the explicit aim of making possible the goal of reducing the EU's greenhouse gas emissions by 2020 by []%. This will be backed up with careful monitoring and reporting of progress, as well as the effective exchange of best practice and continued transparency - through the regular presentation by the Commission of an updated Strategic Energy Review.

The measures outlined below will not only put the EU on the path to becoming a low carbon energy economy, but will at the same time improve its security of supply and make a progressively more significant contribution to competitiveness.

### 3.1. The Internal Energy Market

A real Internal Energy Market is essential to deliver all three of Europe's energy objectives:

- Competitiveness: a competitive market will cut costs for citizens and companies and stimulate energy efficiency and investment;
- Sustainability: A competitive market is vital for the emissions trading mechanism to work properly. Furthermore, companies must have an interest in promoting connection by renewable, combined heat and power and micro generation, stimulating innovation and encouraging smaller companies and individuals to consider non-conventional supply.
- Security of supply: an effectively functioning and competitive Internal Energy Market can provide major advantages in terms of security of supply. The effective separation of networks from the competitive parts of the electricity and gas business results in real incentives for companies to invest in new infrastructure, inter-connection capacity and new generation capacity, thereby avoiding black-outs and unnecessary price surges. A true single market promotes diversity.

The EU has already adopted a series of measures<sup>7</sup> to create an Internal Energy Market with the following specific objectives:

- Every EU consumer should have a genuine choice between fairly competing electricity and gas suppliers by 1 July 2007;
- Any EU company should have the right to sell electricity and gas in any Member State without discrimination or disadvantage,
- New interconnectors should permit the Internal Energy Market to function properly, with appropriate investment signals ;
- The different trading rules and technical standards necessary to permit cross-border trade to work effectively should be harmonised;
- Cross-border competition and investment by new entrants should mean that ex-incumbent electricity and gas companies no longer hold dominant positions on "their" national markets:
- Solidarity between Member States should be built up to improve security of supply.

The Internal Energy Market Communication and the final Report on the Competition Sectoral Enquiry demonstrate that the present rules and measures have not yet achieved these objectives. There are signs that this lack of progress is leading Member States to impose generalised caps on electricity and gas prices. This not only prevents the Internal Energy Market from functioning, it also suppresses price signals that new capacity is needed, leading to underinvestment and future supply crunches. And it makes it harder for new entrants, including those offering clean energy, to enter the market. This situation cannot continue.

In the light of the many submissions received during the Green Paper consultation period, the Commission considers that a coherent series of measures now need to be taken with the objective of creating within three years a European Gas and Electricity Grid and truly competitive European-wide energy market.

In order to achieve this, the Commission has identified the following requirements:

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<sup>7</sup> Including the second market opening Directives, the Regulations aimed at harmonising the technical standards necessary to make cross-border trade work in practice, and the Directives on security of supply.

### 3.1.1. *Unbundling*

The Internal Market Report and Sector enquiry show the danger of discrimination and abuse when companies control energy networks as well as production or sales, protecting national markets and preventing competition. Such a situation also creates a disincentive on vertically integrated companies from investing adequately in their networks, since the more they increase network capacity, the greater the competition that exists on their “home market” and the lower the market price.

The Commission considers that two options might be considered to redress this: a full Independent System Operator (where the vertically integrated company remains owner of the network assets and receives a regulated return on them, but is not responsible for their operation, maintenance or development) or ownership unbundling (where network companies are wholly separate from the supply and generation companies)<sup>8</sup>.

[.....]

In addition, the provisions regarding the unbundling of distribution activities – which presently exempt distributors with less than 100,000 customers from most of the unbundling requirements – need to be re-examined.

### 3.1.2. *Effective regulation*

First of all, the levels of powers and independence of energy regulators need to be harmonized on the basis of the highest, not the lowest, common denominator in the EU. Secondly, they must be given not only the task of promoting the effective development of their national market, but also that of promoting the development of the Internal Energy Market.

In addition, the technical standards necessary for cross-border trade to function effectively need to be harmonised. Progress to date has fallen far short. The creation of the European Regulators' Group for Electricity and Gas (EREG) and the electricity and gas regulations, have not provided the governance required. Most of the relevant technical standards remain different in each Member State, making cross-border trade difficult and often impossible. Three main options merit consideration:

- **“Gradually evolving the current approach”**: reinforcing collaboration between national regulators, improving the functioning of the procedures already foreseen in the electricity and gas Regulations and introducing a mechanism whereby the Commission plays a role reviewing some decisions of national Regulators which affect the Internal Energy Market, based on the approach already used in the telecoms sector<sup>9</sup>;
- **“EREG+” with binding decision taking power**: EREG could be granted the power to take binding decisions on certain issues and could be provided with a Secretariat at European level to enable it to properly prepare harmonised technical standards;
- **A new body at Community level** with the responsibility of setting rules for the EU electricity and gas market covering regulatory and technical issues relevant to making cross border trade work in practice.

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<sup>8</sup>. This already exists for electricity in the Czech Republic, Denmark, Finland, Hungary, Italy, Lithuania, the Netherlands, Slovakia, Slovenia, Spain, Sweden and The United Kingdom. And for gas in Denmark, the Netherlands, Sweden and the United Kingdom. The unbundled TSO is also the owner of the network.

<sup>9</sup> Article 7 of the framework directive for electronic Communications, 2002/21/EC

There is a clear link between unbundling and the powers of the regulator. Markets in which there is less than full ownership unbundling would require a more detailed, complex and prescriptive approach for the regulator; giving regulators at national and EU levels more effective powers to prevent abuse.

[.....]

In anticipation of a formal decision being taken and implemented, Regulators should be encouraged to work more closely together to use existing powers more effectively on a voluntary basis.

### *3.1.3. Transparency*

Transparency is essential to allow the market to work properly. At present, Transmission System Operators provide varying levels of information, making some markets easier than others to compete in for new entrants. Furthermore, some regulators require generators to be more transparent regarding generation availability than others, which can help prevent price manipulation. New legislation is needed establishing minimum requirements to be respected by all EU companies, similar to that already adopted for telecommunications<sup>10</sup>.

### *3.1.4. Infrastructure*

The Priority Interconnection Plan sets out five priorities:

- Identifying the most significant missing infrastructure up to 2013 and ensuring pan-European political support to fill the gaps.
- Appointing four European co-ordinators to pursue the four most problematic priority projects: the Power-Link between Germany, Poland and Lithuania; connections to off-shore wind power in Northern Europe; electricity interconnections between France and Spain; and the Nabucco pipeline, bringing gas from the Caspian to central Europe;
- Agreeing a maximum of 5 years within which planning and approval procedures must be completed for projects that are defined as being "of European interest" under Trans-European Energy Guidelines;
- Examining the need to increase funding for the Energy Trans-European networks, particularly to facilitate the integration of renewable electricity into the grid; and
- Establishing a new Community mechanism and structure for Transmission System Operators (TSOs), responsible for co-ordinated network planning.

### *3.1.5. Network security*

Common minimum and binding network security standards are necessary in the EU. The new Community mechanism and structure for Transmission System Operators should also be tasked with proposing common minimum security standards. These would become binding following approval by energy regulators.

### *3.1.6. Adequacy of electricity generation and gas supply capacity*

. During the next twenty five years, Europe will need to invest €900 bn on new electricity generation. Gas remains a fuel of choice given its high efficiency, but even gas will need €150 bn of investment on gas-fired power plant and an additional €220 bn on gas infrastructure. The overriding priority in terms of securing adequate new investment is a properly

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<sup>10</sup> Directive 2002/19/EC of the European Parliament and the Council on access for electronic communications

functioning Internal Energy Market, providing transparency, predictability, equality of access and the correct investment signals. In addition, close monitoring of the demand/supply balance is also needed, to identify any potential shortfall. This will be a key role for the new Office of the Energy Observatory (see below). The Commission will also monitor the investments needed in electricity generation in the framework of the Electricity Security Directive<sup>11</sup>, and examine the investment framework to have sufficient capacities created in Member States.

### *3.1.7. Energy as a public service*

Energy is essential not just for big companies but for every European. Existing European legislation already requires the respect for Public Service Obligations. But the EU needs to go further in tackling energy poverty. The Commission will develop an Energy Customers' Charter with four key goals:

- tackle fuel poverty;
- improve the minimum level of information available to citizens to help them choose between suppliers and supply options;
- reduce red tape when customers change supplier;
- protect customers from unfair selling practices.

### **3.2. Solidarity between Member States and security of supply for oil, gas and electricity**

The internal energy market increases the interdependence of Member States in energy supply for both electricity and gas. Even with the targets on energy efficiency and renewables, oil and gas will continue to meet over half the EU's energy needs, with import dependence high in both sectors (over 90 % for oil and some 80% for gas in 2030). Electricity generation will be heavily dependent on gas. Without a significant technology breakthrough, oil will continue to dominate transport. Therefore, security of supply of these fuels will continue to be paramount to the EU economy.

The EU has successful and established relationships with traditional gas suppliers from inside and outside the European Economic Area (EEA), notably Norway, Russia and Algeria. The EU is confident that these relationships will strengthen in the future, through a European Energy Policy that promotes effective energy partnerships based on mutual confidence, transparency, predictability, regulatory certainty and reciprocity.

Nevertheless, it remains important for the EU to promote diversity with regard to source, supplier, transport route and transport method. In addition, effective mechanisms need to be put into place to ensure solidarity between Member States in the event of an energy crisis. This is particularly important given that a number of Member States are highly or completely reliant on a single gas supplier.

Energy security should be promoted in different ways:

- Measures are needed to assist Member States that are overwhelmingly dependent on one gas supplier to diversify. The Commission will monitor implementation of the Gas

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<sup>11</sup> Directive of the European Parliament and the Council 2005/89/EC of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure OJL033, 04/02/2006 p. 22-27

Security Directive<sup>12</sup> recently transposed by Member States and assess its effectiveness. Projects should be developed to bring gas from new regions, to set up new gas hubs in central Europe and the Baltic countries, to make better use of strategic storage possibilities, and to facilitate the construction of new liquid natural gas terminals. Ways to strengthen existing crisis solidarity mechanisms such as the Energy Correspondents Network and the Gas Co-ordination Group should also be examined.

- The EU's strategic oil stocks mechanism, effectively co-ordinated with stocks of other OECD countries through the IEA, has worked well and should be maintained. The manner in which the EU manages its contribution to this mechanism could however be improved. Reporting requirements on Member States should be reinforced, there should be more analysis of the sufficiency of the stocks, and there should be better coordination if the IEA calls for stocks to be released. The Commission will make an analysis of these issues in 2007.
- Strategic gas stocks would help security of gas supply and address short term supply disruptions, such as accidents to gas pipelines. However, this would imply major new investment in new storage and pipeline capacity, to be used only in the event of emergency. An exhaustive cost-benefit analysis is needed before EU consumers are asked to pay these costs.
- Electricity interconnections (see 3.1.4 above) will form a fourth element of this approach. This will in particular help to address concerns about security of electricity supply.

### **3.3. A long-term commitment to carbon dioxide reduction and the carbon-trading mechanism**

In its Communication *Limiting Climate Change to 2° - Policy Options for the EU and the world for 2020 and beyond*<sup>13</sup>, the Commission has set out how the emissions trading mechanism is and must remain a key mechanism for stimulating reductions in carbon emissions. By allowing the market to determine how to reduce its CO<sub>2</sub> most efficiently, it finds the best way to reduce emissions and limit costs. This Communication points to the need for improvements to ensure that emissions trading reaches its full potential: this is critical to creating the incentives to stimulate changes in how Europe generates and uses its energy.

### **3.4. An ambitious programme of energy efficiency measures at Community, national, local and international level**

For Europe's citizens, energy efficiency is the most immediate element in a European Energy Policy. Improved energy efficiency has the potential to make the most decisive contribution to achieving sustainability, competitiveness and security of supply.

On 19<sup>th</sup> October 2006 the Commission adopted the Energy Efficiency Action Plan<sup>14</sup>, containing priorities and a long list of specific measures that would put the EU well on the path to achieving a key goal of reducing its global primary energy use by 20% by 2020. If successful, this would mean that by 2020 the EU would use approximately 13% less energy than today, saving €100 bn and around 780 millions tonnes of CO<sub>2</sub> each year.

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<sup>12</sup> Directive of the European Parliament and the Council 2004/67/EC of 26 April 2004 concerning measures to safeguard security of natural gas supply OJ L 127, 29.4.2004, p. 92–96

<sup>13</sup> p.m.

<sup>14</sup> Action Plan for Energy Efficiency: Realising the Potential COM(2006)545 of 19 October 2006

Key measures include:

- Accelerating the use of fuel efficient vehicles for transport, making better use of public transport; and ensuring that the true costs of transport are faced by consumers<sup>15</sup>;
- Tougher standards and better labelling on appliances;
- Rapidly improving the energy performance of the EU's existing buildings and taking the lead to make very low energy houses the norm for new buildings;
- Improving the efficiency of heat and electricity generation, transmission and distribution;
- A new international agreement on energy efficiency to promote a common effort.

#### ***A new international agreement on energy efficiency?***

*This could bring the OECD and key developing countries (such as China, India and Brazil) together to ban products failing to meet minimum standards and agree common approaches to saving energy. The EU could formally table a proposal in 2007 which could then be discussed and taken forward during a major international conference on energy efficiency during the German Presidency of the G8. The aim could be to sign the agreement during the Beijing Olympic Games. The potential energy saving and CO<sub>2</sub> reduction is enormous - improved energy efficiency alone could cut, according to the IEA, around 20% of current global CO<sub>2</sub> emissions.*

### **3.5. A longer term target for renewable energy**

In 1997, the European Union started working towards a target of a 12% share of renewable energy in its overall mix by 2010, a doubling of 1997 levels. Since then, renewable energy production has increased by 55%. Nevertheless the EU is set to fall short of its target. The share of renewable energy is unlikely to exceed 10% by 2010. The main reason for the failure to reach the agreed targets for renewable energy is the lack of a coherent and effective policy framework throughout the EU and a stable long-term vision. As a result, only a limited number of Member States have made serious progress in this area and the critical mass has not been reached to shift niche renewables production into the mainstream.

The EU needs a step change to provide a credible long term vision of the future of renewable energy in the EU. This is essential to realise present targets and trigger further investment, innovation and jobs. The challenge for renewables policy is to find the right balance between installing large scale renewable energy capacity today, and waiting until research lowers their cost tomorrow. Finding the right balance means taking the following factors into account:

- Using renewable energy today is generally more expensive than using hydrocarbons, but the gap is narrowing – particularly when the costs of climate change are factored in;
- Economies of scale can reduce the costs for renewables, but this needs major investment today;
- Every unit of renewable energy produced in the EU replaces energy that would otherwise be imported, improving the EU's security of energy supply and creating new jobs in Europe;
- Most renewable energies emit few or no greenhouse gases.

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<sup>15</sup> See also *Keep Europe moving - Sustainable mobility for our continent - Mid-term review of the European Commission's 2001 Transport White Paper COM(2006)314 of 22 June 2006*

In the light of the information received during the public consultation and the impact assessment, the Commission proposes that a commitment is made to **increase the level of renewable energy in the EU's overall mix from less than 7 % today to [ ]% by 2020.** Targets beyond 2020 would be assessed in the light of technological progress.

#### ***How do we get there?***

*Meeting the [ ]% target will require a massive growth in all three renewable energy sectors: electricity, biofuels and heating and cooling. But in all sectors, the policy frameworks set up in particular Member States have achieved results which show how this is possible.*

*Renewables has the potential to provide around a third of EU electricity by 2020. Wind power provides approximately 20% of electricity needs in Denmark, today, as well as 8% in Spain and 6% in Germany. Costs in other new technologies - photovoltaic, solar thermal power, and wave & tide, are projected to fall.*

*In the heating and cooling sector, progress will have to come from a number of technologies. Sweden, for example, has over 185,000 installed geothermal heat pumps. Germany and Austria have led the way on solar heating. If other Member States matched these levels, the share of heating and cooling to EU electricity production would jump by 50%.*

*As for biofuels, Sweden has already achieved a market share of 4% of the petrol market for bioethanol, and Germany is the world leader for bio-diesel, with 6% of the diesel market. Biofuels could expect to make up 14% of transport fuels by 2020.*

This [ ]% target is truly ambitious and will require major efforts by all Member States. A legally binding target needs to be married with freedom for each Member State to determine the best renewables mix for their own circumstances. Member States should establish National Action Plans to offer a clear long-term path to meet the targets, divided according to electricity, heating and cooling and biofuels, with benchmarks on the way. The Commission will set out this architecture in a new renewables legislative package in 2007. Already measures on the internal market and on infrastructures will help to stimulate a vibrant renewables sector.

A particular feature of this framework is the need for a minimum and coordinated development of biofuels throughout the EU. While biofuels are today more expensive than other forms of renewable energy, they are the only way to significantly reduce oil dependence in the transport sector over the next 15 years. It is therefore proposed to set a binding minimum target for biofuels of [ ]% of vehicle fuel by 2020. In addition, the 2007 renewables legislative package will include specific measures to facilitate the market penetration of both biofuels and heating & cooling. The Commission will also continue and intensify the promotion of renewable energy through other policies and flanking measures with the aim of creating a real internal market for renewables in the EU.

#### ***How much will it cost?***

*To achieve a [ ]% share for renewables will result in an additional average annual cost of approximately €18 bn – around 5% extra on the EU's total expected energy import bill in 2020. But this assumes oil prices of \$48/barrel by 2020. If these rose to \$78/barrel, the average annual cost would fall to €10.6 bn. If a carbon price of more than €20 is factored in, the [ ]% would cost practically nothing, but create many jobs in Europe and develop new, technology driven European companies.*

### 3.6. A European Strategic Energy Technology Plan

Europe has two key objectives for energy technology: to lower the cost of clean energy and to put EU industry at the forefront of the rapidly growing low carbon technology sector. To meet these objectives, the Commission will propose a Strategic European Energy Technology Plan. This Plan will need a long term vision to match the long term challenge of moving towards a low carbon energy system in a competitive manner:

- By 2020, technologies will have to make the [ ]% renewable target a reality by permitting a sharp increase in the share of lower cost renewables (including the roll-out of off-shore wind and 2<sup>nd</sup> generation biofuels);
- By 2030, electricity and heat will increasingly need to be produced from low carbon sources and extensive near-zero emission fossil fuel power plants with CO<sub>2</sub> capture and storage. Transport will need to increasingly adapt to using 2<sup>nd</sup> generation biofuels and hydrogen fuel cells;
- For 2050 and beyond, the switch to low carbon in the European energy system should be completed, with an overall European energy mix that could include large shares for renewables, sustainable coal, sustainable hydrogen, and, for those member states that want, Generation IV fission power and fusion energy.

This is a vision of Europe with a thriving and sustainable energy economy, that has grasped the opportunities behind the threats of climate change and globalisation, gained world leadership in a diverse portfolio of clean, efficient and low-emission energy technologies and become a motor for prosperity and a key contributor to growth and jobs. To achieve this vision the European Union must act jointly and urgently, agreeing and implementing a European Strategic Energy Technology Plan accompanied with realistic resources. A commitment to increase annual spending in energy research by at least 50% over the next seven years would offer credibility to Europe's research aspirations. The Technology Plan must be ambitious; it needs to set clear targets with precise roadmaps and milestones. It should use all available EU tools, including Joint Technology Initiatives and the European Institute for Technology.

Priorities of such a targeted initiative could include:

- Developing second generation biofuels to become fully competitive alternatives to hydrocarbons;
- Getting large scale offshore wind competitive within the short term and paving the way towards a European offshore supergrid;
- Getting photovoltaic electricity competitive to harness solar energy;
- Using fuel cell and hydrogen technologies to exploit their benefits in decentralised generation and transport;
- Sustainable coal and gas technologies, particularly carbon capture and storage (see below);
- The EU should maintain its technological lead in fourth generation fission nuclear reactors and future fusion technology to boost the competitiveness, safety and security of nuclear electricity, as well as reduce the level of waste.

These sectoral objectives should be underpinned by specific milestones and an increase in energy research spending. The Commission will propose a concrete Strategic European Energy Technology Plan for the 2008 Spring European Council.

### **3.7. Towards a low CO<sub>2</sub> fossil fuel future**

Coal and gas account for over 50% of the EU's electricity supply and are certain to remain an important part of our energy mix. Long-term reserves are substantial. But coal is dirty in terms of emissions. If the EU is to achieve its longer term climate change aspirations, much cleaner coal generation and CO<sub>2</sub> abatement will be necessary. Furthermore, developing clean coal and carbon capture and storage is crucial at the international level: the IEA expects twice more electricity to be produced from coal by 2030. That would release around 5bn tonnes of CO<sub>2</sub>, representing 40% of the expected increase in global energy-related CO<sub>2</sub> emissions. In addition to the Strategic Energy Technology Plan, other action will be required to catalyse international research and action on CO<sub>2</sub> capture and storage.

To provide global leadership, the EU must provide a clear vision for the introduction of CO<sub>2</sub> capture and storage in the EU, establish a favourable regulatory framework for its development, invest more, and more effectively, in research, as well as take international action. The EU Emissions Trading Scheme will also need to incorporate capture and storage in the future.

The Commission will in 2007 start work to:

- Design a mechanism to stimulate the construction and operation by 2015 of up to 12 large-scale demonstrations of sustainable fossil fuels technologies in commercial power generation in the EU.
- Provide a clear perspective when coal- and gas-fired plants will need to install CO<sub>2</sub> capture and storage. On the basis of existing information, the Commission believes that, in principle, by 2020 all new coal-fired plants will need to be fitted with CO<sub>2</sub> capture and storage and existing plants should then progressively follow the same approach. Whilst it is too early to reach a definite view on this, the Commission hopes to be able to make firm recommendations by 2010.

### **3.8. The future of nuclear**

At present nuclear electricity makes up 14% of EU energy consumption and 30% of EU electricity. It raises important issues regarding waste and decommissioning, but it is the largest low-carbon energy source produced in the EU. Nuclear power is less vulnerable to fuel price changes than coal or gas-fired generation, as uranium represents a limited part of the total cost of generating nuclear electricity and is based on sources which are sufficient for many decades and widely distributed around the globe.

As can be seen from the table attached to this document which outlines the advantages and disadvantages of different sources of energy, nuclear energy is one of the cheapest sources of low carbon energy that is presently produced in the EU and also has relatively stable costs<sup>16</sup>. The next generation of nuclear reactors should reduce these costs further.

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<sup>16</sup> According to the IEA 2006 World Energy Outlook "new nuclear power plants could produce electricity at a cost of less than 5. \$ cents per kWh [3.9 Euro cents at mid November 2006 exchange rates] if construction and operating risks are appropriately managed by plant vendors and power companies" and that this, at "10 \$ per tonne of CO<sub>2</sub> emitted makes nuclear competitive with coal-fired power stations".

It is for each Member State to decide whether or not to rely on nuclear electricity. However, in the event that the level of nuclear energy reduces in the EU, it is essential that this reduction is phased in with the introduction of other low-carbon energy sources for electricity production; otherwise the objective of cutting GHG emissions will be doubly difficult to meet.

It is therefore an inescapable conclusion that a significant reduction in the level of nuclear electricity produced in the EU compared to present levels will make the core objective of cutting GHG emissions in a manner compatible with its competitiveness and security of supply objectives even more challenging.

In the current energy context, the IEA expects the world-wide use of nuclear power to increase from 368 GW in 2005 to 416 GW in 2030. There are therefore economic benefits in maintaining and developing the technological lead of the EU in this field.

At EU level, the role should be to develop further 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. This should include nuclear waste management and decommissioning. The EU should also continue their efforts to ensure that such high standards are observed internationally. In order to make progress on this the Commission proposes to establish an EU High Level Group on Nuclear Safety and Security with the mandate of progressively developing common understanding and, eventually, additional European rules, on nuclear security and safety.

### **3.9. An International Energy Policy that actively pursues Europe's interests**

The EU cannot achieve its energy objectives on its own. Its obligation to reduce CO<sub>2</sub> emissions is clear: together with the US we account for 70% of carbon dioxide in the atmosphere today. But the EU today accounts for only 15% of new emissions and, by 2030, with the new objectives, will consume less than 10% of the world's energy. So the challenges of security of supply and climate change cannot be overcome by the EU or its Member States acting individually. It needs to work with both developed and developing countries, energy consumers and producers, to ensure competitive, sustainable and secure energy. The EU and Member States must pursue these goals with a common voice, forging effective partnerships to translate these into a meaningful external policy. There must be an external aspect to its internal policies; otherwise they will not deliver.

In the same vein the ability of the EU to speak with one voice will help to develop balanced and mutually beneficial long term partnerships with energy producing countries such as Russia, Norway, Algeria, countries of the Caspian and Black Sea region and OPEC and accelerate progress on energy efficiency and new low carbon technologies to limit increasing energy demand. Working hand in hand with the International Energy Agency on these issues will be vital.

High energy prices are particularly damaging for developing countries. Whilst a few may benefit as producers, most find that the increased costs of energy imports outstrip their development aid receipts<sup>17</sup>. Africa and some other developing regions are particularly vulnerable. The EU needs to develop new ways to help them promote sustainable energy and use.

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<sup>17</sup> 137 billion US\$ annually for developing oil importers against an ODA of 84 billion US\$ in 2005, net of additional debt relief. See "The Vulnerability of African Countries to Oil Price Shocks: Major factors and Policy Options. The Case of Oil Importing Countries". ESMAP Report 308/05, World Bank, August 2005.

The European Council has endorsed the vision of a long term framework for the external energy dimension set out jointly by the Commission and the Council<sup>18</sup>. The EU must now follow through these principles into action.

### 3.9.1. *Speaking with one voice*

The first step towards "speaking with one voice" is to set out clear objectives, and the means to coordinate effectively. The regular Strategic Reviews will provide the overall framework for frequent discussion of external energy issues in the EU institutions.

This needs to be complemented by a series of concrete measures.

- The EU should be a key driver in the design of international agreements, including the future of the Energy Charter Treaty, the post-Kyoto climate regime, the extension of emissions trading to global partners and the development and deployment of clean and renewable energy technologies.
- The further extension of the EU's energy market and energy model beyond its borders, for example through the enlargement process, the Energy Community Treaty and bilateral agreements with key producer and transit countries in our neighbourhood.
- The promotion of non proliferation, nuclear safety and security, in particular through a reinforced cooperation with the International Atomic Energy Agency.
- The continued development of international cooperation in research, for example with the US and Brazil on biofuels and with China on clean coal and carbon sequestration.
- A network of energy security correspondents will offer a practical demonstration of how the EU can respond in times of pressure.
- The improvement of the conditions for investments in international projects, working to secure a clearly defined and transparent legal framework and appointing European coordinators to represent EU interests in key international projects.
- Better coordination is needed in international fora and organisations to enable the EU to speak with an effective common voice.

### 3.9.2. *Effective dialogue and cooperation*

Energy must become an integral part of all external EU relations; it is crucial to geopolitical security, economic stability, social development and international efforts to combat climate change. The EU must therefore develop effective energy relations with all its international partners, based on mutual trust, cooperation and interdependence. This means relations broadened in geographical scope, and deepened in nature.

EU energy relations with its neighbours are fundamental to European security and stability. The EU should aim to build up a wide network of countries around the EU, acting on the basis of shared rules or principles derived from the EU energy policy. The Energy Community Treaty is the basis for an emerging regional energy market, embracing initially the EU and western Balkan states: this should gradually incorporate other neighbouring countries. The recent admission of Moldova, Norway, Turkey and Ukraine as observers can be seen as a first step towards full membership of the Energy Community.

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<sup>18</sup> European Commission/High Representative paper *An external policy to serve Europe's energy interests*, June 2006 S160/06; followed by *External Energy Relations - from principles to action*, COM(2006)590 final

In addition, the EU should continue to build up targeted initiatives. The following are considered as priorities:

- Enhance relations with Russia through the negotiation of a new robust, comprehensive framework agreement for energy cooperation in the context of the overall post-Partnership and Cooperation Agreement (PCA) agreement. This should emphasize the mutual long-term benefits to both Russia and the EU and include the principles of the Energy Charter Treaty and draft Transit Protocol;
- Consolidate the energy relationship with Norway through the Joint EC-Norway Energy Cooperation Group;
- Develop a strategic energy partnership with Algeria. This should recognise its importance and reliability as the EU's third largest gas supplier as well as its role in the Euromed energy cooperation process;
- Deepen the EU-OPEC dialogue through joint projects and further develop energy relations with the Gulf Cooperation Council.
- Fully implement and closely monitor the established Memoranda of Understanding (MoU) with Azerbaijan and Kazakhstan to ensure the convergence of their legislative and regulatory frameworks in the energy sector with EU principles and rules, and to facilitate the transport of Caspian energy resources to the EU;
- Start negotiations in 2007 with other important Central Asia energy producers, notably Turkmenistan and Uzbekistan, with a view to conclude, circumstances permitting, relevant MoUs on energy cooperation;
- Develop enhanced energy relationships with Egypt and other Mashrek/Maghreb energy supplier and transit countries as well as with Libya if possible;
- Continue to develop closer energy relations with the US through strategic energy cooperation, in particular on common interests such as promoting open and competitive global energy markets as well as energy efficiency and developing regulatory and RDT co-operation including on bio-fuels and development of cleaner energy technologies.
- Further progress the EU-China Partnership on climate change established in 2005 in order to strengthen cooperation and dialogue on climate change and energy between the EU and China. This should focus in particular on the development and demonstration in China and the EU of advanced "near-zero-emissions" coal technology and clean coal technologies, the promotion of energy savings and energy efficiency, on renewable energies and on significantly reducing the cost of key energy technologies and promoting their deployment and dissemination. A further objective should be to develop co-operation with China in the area of energy security.
- Develop a strategic energy partnership with Turkey, given its increasingly important role as a transit country for energy resources from the Caspian basin and the Middle East region to the EU,
- Fully implement and closely monitor the established Memorandum of Understanding with Ukraine. This should also be seen in the context of its planned future membership of the Energy Community, where it is currently an observer;
- Reinforce regional energy cooperation, such as the 'Euromed energy cooperation' and 'Baku Initiative', which have the objective of a gradual convergence with the EU's internal market. It is important to ensure a practical follow-up of the conclusions of the Astana

Energy Ministerial Conference of 30 November 2006 (Baku process) and of the forthcoming Euromed Ministerial Energy to be held in 2007.

- Explore the possibility of new bilateral partnerships with Qatar, as well as Caribbean and Latin American countries in order to enhance the geographical diversification of EU energy supplies; Develop energy dialogue with Brazil in particular on biofuels - in this respect the Commission intends to organize in 2007 an international conference on biofuels with international partners .

### 3.9.3. *Integrating Europe's Energy and Development Policies: a win-win game*

High energy prices are particularly damaging for developing countries. Whilst a few developing countries might benefit as producer, others can find the increased costs of energy imports outstripping their development aid receipts<sup>19</sup>. Africa and other developing regions have a vital interest, like Europe, to boost diversification and energy efficiency – this can make a major contribution to the Millennium Development Goals. The EU is therefore committed to support developing countries in promoting sustainable and secure energy supply and use.

To deliver on the above commitment, the EU should focus on renewable energy. Africa offers a unique opportunity to install renewable energy technology in a competitive manner. It can by-pass the need to build expensive transmission grids and "leap-frog" to a new generation of clean, local low carbon energy sources and technologies – as already seen for mobile telecommunications. This is a real "win-win" opportunity, increasing the penetration of clean renewable energy and bringing electrification to some of the world's poorest citizens. A special effort will be needed in Sub-Saharan Africa, where rates of access to electricity are the lowest in the world.

The EU will leverage the different instruments at its disposal to this end: the 10<sup>th</sup> European Development Fund, the EU-Africa Partnership for Infrastructure, the ACP-EU Energy Facility, and the EC COOPENER programme and its successor.

In addition, a comprehensive Africa-Europe Energy partnership should be developed. The importance of Africa as an energy supplier has increased greatly in recent years, but its potential is still greater. The dialogue should include security of supply, technology transfer in renewable energy, sustainable exploitation of resources, transparency of energy markets and respect for good governance. The dialogue should be launched through a joint event at the highest level.

### **3.10. Effective monitoring and reporting**

Monitoring, transparency and reporting will be essential elements in progressively developing an effective European energy policy. The approach proposed in this Review – clear mandatory targets, with freedom for Member States to choose the mix needed to reach these – implies a need for clear governance to follow progress.

The Commission proposes to establish an **Office of the Energy Observatory** within the Directorate General for Energy and Transport. This Office should undertake core functions regarding Europe's energy policy, notably:

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<sup>19</sup> 137 billion US\$ annually for developing oil importers against an ODA of 84 billion US\$ in 2005, net of additional debt relief. See "The Vulnerability of African Countries to Oil Price Shocks: Major factors and Policy Options. The Case of Oil Importing Countries". ESMAP Report 308/05, World Bank, August 2005.

- Acting as the EU Energy central data point, complementing existing sources such as Eurostat and the IEA;
- Coordinating, with the view of simplifying the Member States' reporting requirements, the collection of data to be provided under the various EU instruments under the European Energy Policy;
- Involving Member States and stakeholders in assessing the data and progress;
- Monitoring effectively, through benchmarking exercises and the exchange of best practices, the success of Member States in ensuring that their energy mix evolves in a manner that will contribute effectively to the EU's energy goals;
- Monitoring and supporting the implementation of the agreements, memoranda of understanding and dialogue with third countries;
- Acting as the focal point of the network of energy correspondents, to identify sufficiently in advance any potential shortfalls in energy supply and infrastructure within the EU. This will be particularly important with respect to electricity generation capacity and gas and electricity infrastructure;
- Helping preparation of a biannual Strategic EU Energy Review.

The Commission will set out the specific responsibilities of the Observatory and propose in 2007 a legal base for financing its activities. In doing so it will examine and streamline existing energy related information and reporting obligations upon the Commission and Member States.

#### 4. TAKING WORK FORWARD

This Strategic Review has set out a set of policies required to achieve the goals of sustainable, secure and competitive energy. The first step is to secure clear decisions from the European Council and the European Parliament on the strategic approach, an Action Plan to enable the EU to achieve ambitious, broad and long term targets in the medium term. Future Strategic Reviews can help the EU refine and update its Action Plan to take account of change – most obviously, technological advance and common international action to address climate change.

The pursuit of reduced emissions in Europe and worldwide is indivisible from the European Energy Policy. Were the EU to succeed in meeting the specific objectives proposed regarding energy efficiency and renewables, this would put it on track to meet the 2020 greenhouse gas reduction of [%], and provide a springboard to achieve dramatic reductions by 2050 objectives. Determined action now will mean progress towards stabilising our import dependence, timely investment, new jobs and a technological lead for Europe in low carbon technologies. The EU would have set the pace for a new global industrial revolution.

Annex 1: The advantages and disadvantages of different sources of electrical energy, based on current oil, gas and coal prices

Annex 2: The advantages and disadvantages of different energy sources for heating

Annex 3: The advantages and disadvantages of different energy sources for road transport

Sources for the figures contained in the annexes can be found in the Commission's Staff Working Document: EU Energy Policy Data<sup>20</sup>.

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<sup>20</sup> SEC(2006)....plus website reference

Annex 1: The advantages and disadvantages of different sources of electrical energy

Energy sources	Technology considered for the cost estimate	2005 Cost	Projected Cost 2030	GHG emissions (Kg CO <sub>2</sub> eq/MWh)	EU-27 Import dependency		Efficiency	Fuel price sensitivity	Proven reserves / Annual production
		(€/ MWh)	(€/ MWh)		2005	2030			
Natural gas	Open cycle gas turbine	45 – 70	Using Carbon Capture	440	57%	84%	40%	Very high	64 years
	CCGT (Combined Cycle Gas Turbine)	35 - 45	Storage with natural gas and coal-fired power plants would increase costs by	400			50%	Very high	
Oil	Diesel engine	70 - 80		550	82%	93%	30%	Very high	42 years
Coal	PF (Pulverised Fuel with flue gas desulphurisation)	30 - 40		800			40-45%	medium	155 years
	CFBC (Circulating fluidized bed combustion)	35 - 45		800	39%	59%	40-45%	medium	
	IGCC (Integrated Gasification Combined Cycle)	40 - 50	20 to 30 €/MWh	750			48%	medium	
Nuclear	Light water reactor	30 - 35	30 - 35	15	Almost 100% for uranium ore		33%	low	85 years
Biomass	Biomass generation plant	25 - 85	25 - 75	30	nil		30 - 60%	medium	Renewable
Wind	On shore	35 - 175	28 - 170	30			95-98%	nil	
	Off shore	35 – 110	28 – 80	30			95-98%		
Hydro	Large	50 - 170	50 - 150	10			95-98%		
		60 – 150	40 – 120	20			95-98%		
		25 - 95	25 - 90	20			95-98%		

<b>Solar</b>	Small (<10MW)	<b>45 - 90</b>	40 - 80	5	95-98%	l e
	Photovoltaic	<b>140 - 430</b>	55 -260	100	/	

Annex 2: The advantages and disadvantages of different energy sources for heating

Energy sources	EU-25 market share by energy source	Market price (€/toe)	Lifecycle cost (€/toe)	GHG emissions (t CO <sub>2</sub> eq/toe)	EU-27 import dependence		
					2005	2030	
<b>Fossil fuels</b>	Heating gas oil	20%	<b>525</b> (€0.45/l)		<b>3.1</b>	82%	93%
	Natural gas	33%	<b>230 – 340</b> (€20-30/MWh)	<b>300-1300</b>	<b>2.1</b>	57%	84%
	Coal	1.8%	<b>70</b> (€100/tce)		<b>4</b>	39%	59%
<b>Biomass</b>	Wood chips		<b>280</b>	<b>545-1300</b>	<b>0.4</b>	0	?
	Pellets	5.7%	<b>540</b>	<b>630-1300</b>	<b>0.4</b>	0	?
<b>Electricity</b>		31%	<b>550 - 660</b> (€50-60/MWh)	<b>550 - 660</b>	<b>0 to 12</b>	<1%	?
<b>Solar</b>		0.2%	/	<b>680-2320</b>	Very low	0	0
<b>Geothermal</b>		0.4%	/	<b>230-1450</b>	Very low	0	0

Annex 3: The advantages and disadvantages of different energy sources for road transport

	Market price (€/toe)	CO <sub>2</sub> emissions (t CO <sub>2</sub> /toe)	Import dependence	
			2005	2030
<b>Petrol and diesel</b>	398-582	3.6–3.7	82%	93%
<b>Natural gas</b>	230–340 (NB: requires a specially adapted vehicle and a dedicated distribution system)	3.0	57%	84%
<b>Domestic biofuel</b>	609-742	1.9–2.4	0%	0%
<b>Tropical bio-ethanol</b>	327-540	0.4	100%	100%
<b>Second-generation biofuel</b>	898–1 109	0.3–0.9	/	15%