

Energy 2020



Directorate-General
for Energy



- A STRATEGY FOR COMPETITIVE, SUSTAINABLE AND SECURE ENERGY

THIS ILLUSTRATED BROCHURE COMPRISES THE TEXT OF THE EUROPEAN COMMISSION'S COMMUNICATION 'ENERGY 2020 — A STRATEGY FOR COMPETITIVE, SUSTAINABLE AND SECURE ENERGY' (COM(2010) 639 FINAL OF 10 NOVEMBER 2010) AND A FOREWORD BY COMMISSIONER GÜNTHER OETTINGER.

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FOREWORD



Securing the future: time to Europeanise our energy policy

The energy challenge is one of the greatest tests faced by Europe today. Rising energy prices and increasing dependence on energy imports jeopardise our security and our competitiveness. Key decisions have to be taken to reduce drastically our emissions and fight climate change. What is more, huge investments of around €1 trillion will be needed in the next decade to make Europe's installations and infrastructure fit for the future.

It is high time that Europe got its act together. Thankfully, the 2020 strategy provides a solid and ambitious European framework for energy policy based around five pillars of action.

Firstly, Europe is blessed with a vast amount of potential when it comes to saving energy. Estimates show that average energy savings for a household could amount to €1 000 per year. But we must set ambitious objectives and develop innovative solutions for immediate and long-term action if we are to save more energy. These efforts will complement our increasing use of renewable energy.

Secondly, we cannot continue with our fragmented energy markets because they undermine our security of supply and limit the benefits of fair competition. The completion of a truly integrated internal market is a priority. Energy must be provided through a pan-European infrastructure similar to those enjoyed over the long-term by other sectors of public interest, such as telecommunications and transport. By 2015 every EU Member State should be fully integrated into the new infrastructure.

Our efforts must always ensure that consumers are treated as a priority. Citizens must benefit fully from their rights and should expect the highest levels of quality, safety and security in terms of production, transport and use of energy.

Fourthly, we need a step change in our research and innovation policies. Europe has some of the world's most successful renewable energy companies and research institutions – we must keep this leadership position and avoid being overtaken by our competitors.

Finally, we should exploit our geopolitical strength. The EU has the world's largest regional energy market – 500 million people – and accounts for one-fifth of the world's energy use. Europe needs to coordinate its efforts and liaise in a coherent manner with its main partners. After all, every time the EU speaks with one voice, it is heard.

Europe's energy sector is on the threshold of an unprecedented period of change. Secure energy supplies and affordable prices are crucial for our growth, job creation and quality of life. There is no time to waste if we are to ensure a brighter future for our energy market.

A handwritten signature in black ink, which appears to read 'G. Oettinger'. The signature is stylized and cursive.

Günther H. Oettinger
European Commissioner for Energy

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INTRODUCTION

The price of failure is too high

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Energy is the life blood of our society. The well-being of our people, industry and economy depends on safe, secure, sustainable and affordable energy. At the same time, energy-related emissions account for almost 80% of the EU's total greenhouse gas emissions. The energy challenge is thus one of the greatest tests which Europe has to face. It will take decades to steer our energy systems onto a more secure and sustainable path. Yet the decisions to set us on the right path are needed urgently as failing to achieve a well-functioning European energy market will only increase the costs for consumers and put Europe's competitiveness at risk.

Over the next ten years, energy investments in the order of €1 trillion are needed, both to diversify existing resources and replace equipment and to cater for challenging and changing energy requirements. Structural changes in energy supply, partly resulting from changes in indigenous production, oblige European economies to choose among energy products and infrastructures. These choices will be felt over the next 30 years and more. To enable these decisions to be taken urgently calls for an ambitious policy framework. Postponing these decisions will have immeasurable repercussions on society as regards both longer-term costs and security.

A common EU energy policy has evolved around the common objective of ensuring the uninterrupted physical availability

of energy products and services on the market, at a price which is affordable for all consumers (private and industrial), while contributing to the EU's wider social and climate goals. The central goals for energy policy (security of supply, competitiveness, and sustainability) are now laid down in the Lisbon Treaty⁽¹⁾. This spells out clearly what is expected from Europe in the energy area. While some progress has been made towards these goals, Europe's energy systems are adapting too slowly, while the scale of the challenges grows. Forthcoming enlargements of the EU will make this challenge even greater as the Union takes in countries with outdated infrastructure and less competitive energy economies.

The European Council in 2007 adopted ambitious energy and climate change objectives for 2020 – to reduce greenhouse gas emissions by 20%, rising to 30% if the conditions are right⁽²⁾, to increase the share of renewable energy to 20%, and to make a 20% improvement in energy efficiency. The European Parliament has continuously supported these goals. The European Council has also given a long-term commitment to the decarbonisation path with a target for the EU and other industrialised countries of 80 to 95% cuts in emissions by 2050.

⁽¹⁾ Article 194 of the Treaty on the functioning of the European Union (TFUE).

⁽²⁾ The European Council specified: "provided that other developed countries commit themselves to comparable emission reductions and economically more advanced developing countries to contributing adequately according to their responsibilities and respective capabilities".

Nevertheless, the existing strategy is currently unlikely to achieve all the 2020 targets, and it is wholly inadequate to the longer-term challenges. EU energy and climate goals have been incorporated into the Europe 2020 Strategy for smart, sustainable and inclusive growth⁽³⁾, adopted by the European Council in June 2010, and into its flagship initiative 'Resource-efficient Europe'. The urgent task for the EU is to agree the tools which will make the necessary shift possible and thus ensure that Europe can emerge from recession on a more competitive, secure and sustainable path.



⁽³⁾ Communication from the Commission (doc. 7110/10 of 5 March 2010).

Despite the importance of energy policy aims, there are serious gaps in delivery

The internal energy market is still fragmented and has not achieved its potential for transparency, accessibility and choice. Companies have grown beyond national borders, but their development is still hampered by a host of different national rules and practices. There are still many barriers to open and fair competition⁽⁴⁾. A recent study into consumer conditions in retail electricity markets indicates sub-optimal consumer choice⁽⁵⁾. Implementation of internal market legislation is disappointing, with over 40 infringement procedures under way as part of the second internal energy market package from 2003 alone.

The security of internal energy supplies is undermined by delays in investments and technological progress⁽⁶⁾. Currently, nearly 45% of European electricity generation is based on low-carbon energy sources, mainly nuclear and hydropower. Parts of the EU could lose more than a third of their generation capacity by 2020 because of the limited life time of these installations. This means replacing and expanding existing capacities, finding secure non-fossil fuel alternatives, adapting networks to renewable energy sources and achieving a truly integrated internal energy market. At the same time Member States still need to phase out environmentally harmful subsidies.

The quality of National Energy Efficiency Action Plans, developed by the Member States since 2008, is disappointing, leaving vast potential untapped. The move towards renewable energy use and greater energy efficiency in transport is happening too slowly. While we are broadly on track for the 20% target for renewables, we are a long way from achieving the objective set for energy efficiency.

At an international level, little heed is paid to warnings about tight oil supply in the future⁽⁷⁾. Despite serious gas supply crises that have acted as a wake-up call, exposing Europe's vulnerability, there is still no common approach towards partner, supplier or transit countries. The potential for further development of EU indigenous fossil fuel resources, including unconventional gas, exists and the role they will play must be assessed in all objectivity.

⁽⁴⁾ As evidenced by the Commission's Energy Sector Inquiry, Communication from the Commission of 1 January 2007, *Inquiry pursuant to Article 17 of Regulation (EC) No 1/2003 into the European gas and electricity sectors* - COM(2006) 851 - and the high number of investigations into anti-competitive behaviour in the sector (e.g. IP/10/494 of 4 May 2010).

⁽⁵⁾ Study of the functioning of retail electricity markets for consumers in the European Union, November 2010.

⁽⁶⁾ ENTSO-Electricity has estimated that the EU needs to build or renew 30 000 km of network cables in the next ten years.

⁽⁷⁾ For example, IEA World Energy Outlooks 2009 and 2010.

Member States' energy interdependence requires more European action

The EU is the level at which energy policy should be developed. Decisions on energy policy taken by one Member State inevitably have an impact on other Member States. The optimum energy mix, including the swift development of renewables, needs a continental market at least. Energy is the market sector where the greatest economic efficiencies can be made on a pan-European scale. Fragmented markets not only undermine security of supply, but also limit the benefits which energy market competition can bring. The time has come for energy policy to become truly European.

The EU must remain an attractive market for companies at a time of increasing competition for energy resources worldwide. The new European energy strategy must support the integrated industrial approach just presented by the European Commission⁽⁸⁾, in particular since energy remains an important cost factor for industry⁽⁹⁾. The EU must also consolidate its competitiveness in energy technology markets.



The share of renewable energy in the EU energy mix has risen steadily to some 10% of gross final energy consumption in 2008. In 2009, 62% of newly installed electricity generation capacity in the EU was from renewable sources, mainly wind and solar. However, Europe's lead is being challenged. The independent 2010 Renewable Energy Attractiveness Index⁽¹⁰⁾ now cites the US and China as the best investment opportunities for renewable energy. New stimulus is needed; more than ever EU leadership is called upon to address these challenges.

In international energy affairs, the EU could be much stronger and effective if it took charge of its common interest and ambition. Despite accounting for one-fifth of the world's energy use, the EU continues to have less influence on international energy markets than its economic weight would suggest. Global energy markets are becoming tighter, with developing Asian countries and the Middle East accounting for most of the growth in global demand⁽¹¹⁾. As the world's largest energy importer, the EU is likely to be more vulnerable to supply risks as a result.

The inclusion of energy policy in the EU Treaty calls for a new outlook.

We must build on what we have achieved, and be bold in our ambition

The EU cannot afford to fail in its energy ambitions. Therefore the Commission proposes a new energy strategy towards 2020. This will consolidate the measures which have been taken so far and step up activity in areas where new challenges are emerging. It is the result of extensive debates within the EU institutions and wide-ranging public consultations.

The focus here is not on a comparative analysis of different energy sources, but on the steps which are required to deliver Europe's medium-term policy objectives. Various scenarios in terms of energy mix will be presented in the forthcoming energy roadmap 2050, which will describe ways of achieving Europe's long-term decarbonisation goal and their implications for energy policy decisions. This strategy sets out initial policy decisions which will be needed to meet our 2020 energy objectives as they currently stand. The 2050 low-carbon economy and energy roadmaps will further inform and guide this programme of action and its implementation by offering a long-term vision.

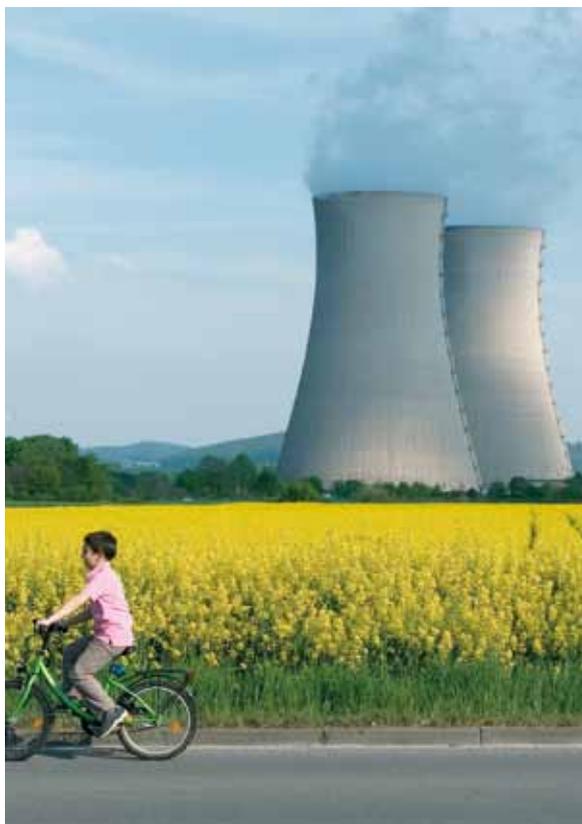
⁽⁸⁾ Communication on an "integrated industrial policy for the globalisation era" (COM 2010) 61.

⁽⁹⁾ For example, it is estimated that electricity prices in Europe are 21% more expensive than in the United States or 197% more expensive than in China.

⁽¹⁰⁾ Issue 26, August 2010.

⁽¹¹⁾ International Energy Agency, World Energy Outlook 2010.

We urgently need far-reaching changes in energy production, use and supply



First and foremost, the strategy underlines the need to rebalance energy actions in favour of a demand-driven policy, empowering consumers and decoupling economic growth from energy use. In particular, the transport and construction industries must pursue an active energy savings policy and diversify towards non-polluting energy sources. Beyond the Emissions Trading Scheme (ETS), the strategy should help create market conditions which stimulate higher energy savings and more low-carbon investments, to exploit a wide range of centralised and distributed renewable energy as well as key technologies for energy storage and electro-mobility (notably electric vehicles and public transport).

Energy policy is a key contribution for achieving the objective of the new strategy for smart, sustainable and inclusive growth in support of a strong, diversified and competitive industrial base. In this context, Europe has to acknowledge that its industrial base is in need of all sectors across the entire value chain.

Public authorities have to lead by example. Each year, 16% of EU GDP, around €1 500 billion, is spent by public authorities. Public procurement rules should insist on efficiency conditions

to increase energy savings and spread innovative solutions, notably in buildings and transport. The potential of market-based and other policy instruments, including taxation, to enhance energy efficiency should be fully exploited.

On the supply side, the priority must continue to be the development of secure and competitive sources of energy. In the field of electricity generation, investments should lead to nearly two thirds of the electricity coming from low-carbon sources by the early 2020s, the current level being 45%. In this context, priority should be given to renewable energies. The strategy must provide a framework at EU level which, while respecting national differences, would not only allow the Member States to outperform their respective targets, but also ensure that the renewable energy sources and technologies are economically competitive by 2020.

The contribution of nuclear energy, which currently generates around one-third of EU electricity and two-thirds of its carbon-free electricity, must be assessed openly and objectively. The full provisions of the Euratom Treaty must be applied rigorously, in particular in terms of safety. Given the renewed interest in this form of generation in Europe and worldwide, research must be pursued on radioactive waste management technologies and their safe implementation, as well as on preparing the longer-term future through development of next-generation fission systems, for increased sustainability and cogeneration of heat and electricity, and nuclear fusion (ITER).

For oil and gas, rising import requirements and increasing demand from emerging and developing countries call for stronger mechanisms to secure new, diversified and safe supply routes. As well as crude oil access, refining infrastructure is a crucial part of the supply chain. The EU is a strong geopolitical partner in energy markets and must have the ability to act accordingly.

The new energy strategy focuses on five priorities:

1. Achieving an energy-efficient Europe;
2. Building a truly pan-European integrated energy market;
3. Empowering consumers and achieving the highest level of safety and security;
4. Extending Europe's leadership in energy technology and innovation;
5. Strengthening the external dimension of the EU energy market.

products and technologies. In the residential sector, the issue of divided incentives between owners and tenants needs to be addressed. Regarding the substantial stock of public buildings, the authorities need to exploit all available opportunities, including those offered by EU regional policy, to improve the energy efficiency and autonomy of the buildings. In the transport sector, significant potentials for example in multimodal solutions, efficient vehicles and efficient driving should be tapped.

Information and communication technologies have an important role to play in improving the efficiency of major emitting sectors. These technologies offer potential for a structural shift to less resource-intensive products and services, for energy savings in buildings and electricity networks as well as for more efficient and less energy-consuming intelligent transport systems⁽¹⁴⁾.

The industry sector needs to incorporate energy efficiency objectives and energy technology innovation into its business model. The ETS contributes significantly to doing

so for larger companies, but there is need for a wider use of other instruments, including energy audits and energy management systems in smaller companies and supporting mechanisms for SMEs. Efficiency benchmarking can indicate to companies where they stand in efficiency terms in comparison with their competitors. Efficiency, including in electricity use, must become a profitable business in itself, leading to a robust internal market for energy-saving techniques and practices and commercial opportunities internationally. A wide framework for resource efficiency would increase such savings.

The public sector needs to lead by example. Ambitious objectives ought to be set for public-sector consumption. Public procurement should support energy-efficient outcomes. Innovative integrated energy solutions at local level contributing towards transition to so-called 'smart cities' should be supported. Municipalities represent a major actor in the required change, thus their initiatives like the Covenant of Mayors should be further strengthened. Cities and urban areas, which consume up to 80% of energy, are at the same time part of the problem and part of the solution to greater energy efficiency.

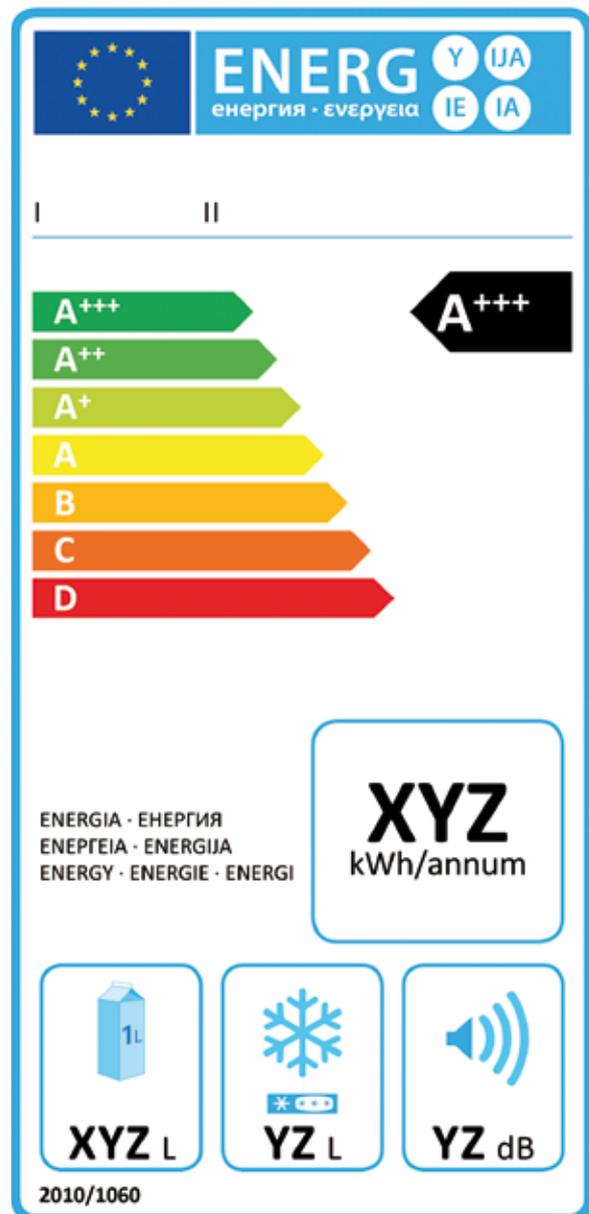
⁽¹⁴⁾ Specific actions have been set out in the Digital Agenda for Europe, COM(2010)245.



Resource efficiency policies, including energy efficiency investments, often have short-term, up-front costs before the medium- and longer-term benefits are felt. Tools are needed to encourage new investments in energy-efficient technologies and practices. EU financing can have a high leverage factor and innovative solutions must be developed. Innovative and carefully considered⁽¹⁵⁾ uses of taxation and pricing should also be explored as tools to encourage behavioural changes or to fund investments.

The Energy Efficiency Plan to be presented in early 2011 will be followed by concrete regulatory proposals in the course of that year. It will also address the issue of financing in terms of access to finance, the availability of innovative financing products, incentives to induce energy efficiency investments as well as the role of EU funding, in particular the structural funds, building further on existing successful examples.

⁽¹⁵⁾ Notably with regard to the possible cumulative effects of different market-based measures.



Priority 1: Achieving an energy-efficient Europe

Action 1: Tapping into the biggest energy-saving potential — buildings and transport

- The energy efficiency renovation rate should be accelerated by investment incentives, wider use of energy service companies, innovative financial instruments with high leverage factors and financial engineering at European, national and local levels. In this context, division of investment incentives between owners and tenants and energy labelling of buildings (certificates used in the real estate market and public support policies) will be addressed in forthcoming proposals by the Commission.
- Public authorities need to lead by example. Energy criteria (regarding efficiency, renewables and smart networking) should be used in all public procurement of works, services or products. Programmes and technical assistance facilities are needed that build the capacities of energy services market participants to develop and structure finance for projects that target both public authorities and private actors. EU financial programmes will target energy savings projects and make energy efficiency a strong condition for allocating financial support.
- The forthcoming White Paper on future transport policy will present a menu of measures to improve transport sustainability and reduce oil dependence. This will include initiatives aimed at increasing the energy efficiency of the transport system, including support for clean urban mobility as well as multimodal transport solutions, intelligent traffic management and energy efficiency standards for all vehicles, adequate economic signals and the promotion of sustainable behaviour. In this context, more efficient car-labelling systems should be explored.

Action 2: Reinforcing industrial competitiveness by making industry more efficient

- The Commission will seek to support European industries' competitiveness through energy efficiency by widening the Eco-design requirements for energy and resource-intensive products complemented by system level requirements where relevant. The potential effect of voluntary agreements with energy and resource-intensive industry branches should be explored. More extensive energy labelling should be introduced to ensure more comprehensive comparison between products.
- Energy management schemes (e.g. audits, plans, energy managers) should be implemented in industry and in the services sector. A particular emphasis on SMEs through dedicated support mechanisms should be established.

Action 3: Reinforcing efficiency in energy supply

- Energy efficiency, in both production as well as distribution, should become an essential criterion for the authorisation of generation capacities, and efforts are needed to substantially increase the uptake of high-efficiency cogeneration, district heating and cooling.
- Distribution and supply companies (retailers) should be required to secure documented energy savings among their customers, using means such as third-party energy services, dedicated instruments such as 'white certificates', public benefit charges or equivalent and speeding up the introduction of innovative tools such as 'smart meters' which should be consumer-oriented and user-friendly so that they provide real benefits for consumers.

Action 4: Making the most of National Energy Efficiency Action Plans

- The National Energy Efficiency Action Plans provide comprehensive benchmarking on energy efficiency, including measurable objectives and indicators to monitor progress, taking into account the relative starting positions and national circumstances. An annual review mechanism should feed into the Europe 2020 objective for energy efficiency.

2. ENSURING THE FREE MOVEMENT OF ENERGY

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Europe's energy markets have been opened up to enable citizens to benefit from more reliable, competitive prices as well as more sustainable energy. This potential will not be fully realised unless robust efforts are made to create a more integrated, interconnected and competitive market.

Electricity and gas markets are not yet working as a single market. The market is still largely fragmented into national markets with numerous barriers to open and fair competition. Most energy markets remain national in scope and are highly concentrated, often with incumbent companies having a *de facto* monopoly position. Regulated energy prices further reduce competition in many Member States⁽¹⁶⁾. Given the remaining anti-competitive practices in the energy sector⁽¹⁷⁾, pro-active competition enforcement, not only by the Commission, but also by Member States, is needed. Improving competition in the energy markets will contribute to setting the right incentives for the investments required and reducing their cost to what is necessary.

By introducing a legislative framework designed to promote the achievement of the 20% target for renewable energy in 2020, Europe has just taken the first step in this area. It is necessary to ensure that the legislation is fully implemented

and to pave the way for large-scale use of renewable energy in the decades beyond 2020. The legal framework must be properly enforced to give investors the confidence to invest in new production, transport and storage options for renewable sources. The effects of the Renewable Energy Directive will be assessed as from 2011 with a view to strengthening or extending it where and when needed.

The further development of renewable energy will continue to rely for some time on support schemes. The Commission must play its part in ensuring that these are sustainable, consistent with technological progress and not hindering innovation or competition. It must however also ensure the required degree of convergence or harmonisation between national schemes as the market for renewables is moving from a local to a cross-border supply. In this context, the necessary requirements for a pan-European trade in renewable energy should be defined on the basis of best practice. Greater use of balanced, cost-effective and predictable feed-in premiums, more technology-specific support and financing instruments should be mobilised in accordance with state aid rules when applicable. In particular, retroactive changes to support schemes should be avoided given the negative effect such changes have on investor confidence.

As the Monti Report outlined, the new challenge for 2020 is to provide the backbone for electricity and gas to flow where it is needed. Without a proper infrastructure across Europe, comparable to the means of transport of other strategic

⁽¹⁶⁾ Report on progress in creating the internal gas and electricity market - COM(2010) 84.

⁽¹⁷⁾ After the Energy Sector Inquiry revealed manifold competition problems in the energy sector, which led to the adoption of nine major anti-trust decisions, the Commission continues to assess the competitive landscape in European energy markets.

sectors such as telecommunications or transport, the market will however never deliver on its promises. Further efforts need to be made to upgrade energy infrastructure, particularly in Member States that joined as of 2004 and in less developed regions.

Most important, Europe is still lacking the grid infrastructure which will enable renewables to develop and compete on an equal footing with traditional sources. Current projects for large-scale wind parks in the North and solar facilities in the South need corresponding power lines capable of transmitting this green power to the areas of high consumption. Today's grid will struggle to absorb the volumes of renewable power which the 2020 targets entail (33% of gross electricity generation).

Smart meters and power grids are the keys to full exploitation of the potential for renewable energy and energy savings as well as improvements in energy services. A clear policy and common standards on smart metering and smart grids⁽¹⁸⁾ are needed well before 2020 to ensure interoperability across the network.

Finally, the obligation of solidarity among Member States will be null and void without a sufficient internal infrastructure and interconnectors across external borders and maritime areas. As a major energy importer, the EU is directly affected by the evolution of networks in neighbouring countries. The construction of new interconnections at our borders should receive the same attention and policies as intra-EU projects. Such links are essential not only for our neighbours, but to ensure the EU's stability and security of supply. There will be specific emphasis on the southern corridor and the effective start of projects of European interest, in particular Nabucco and ITGI.

Investment of around €1 trillion will be needed by 2020 to replace obsolete capacity, modernise and adapt infrastructures and cater for increasing and changing demand for low-carbon energy. While investment decisions lie mainly with market players (energy companies, system operators and consumers), public policy is decisive in creating a stable and transparent framework for investment decisions. The new tools created by the third Internal Energy Market Package, including an Agency for the Cooperation of Energy Regulators (ACER) and the new Networks of Transmission System Operators for Electricity and Gas (ENTSO-E and ENTSO-G) should be fully utilised in the coming years for the further integration of energy markets.

⁽¹⁸⁾ The European Commission has set up a smart grid task force to discuss the implementation of smart grids at the European level: http://ec.europa.eu/energy/gas_electricity/smartgrids/taskforce_en.htm.

Regional initiatives⁽¹⁹⁾ should serve as stepping stones towards a European market.

Infrastructure investments will continue to be financed mainly from tariffs paid by the users. However, given the scale of the investments, their nature and their strategic character, it cannot be assumed that all the necessary investments will be delivered by the market alone. The Commission will adopt a new strategy on energy infrastructure development to encourage adequate grid investments in electricity, gas, oil and other energy sectors. Provided the supply is stable, natural gas will continue to play a key role in the EU's energy mix in the coming years and gas can gain importance as the back-up fuel for variable electricity generation. This calls for diversified imports, both pipeline gas and Liquefied Natural Gas terminals, while domestic gas networks are required to be increasingly interconnected.

Beyond the financing issue, complex and lengthy administrative procedures can be a major bottleneck. Existing rules and procedures for projects of European interest (e.g. serving security of supply, solidarity or renewables integration purposes) will need to be improved and streamlined significantly, while respecting the principles of public acceptance and existing environmental legislation. Communities at local, regional and national levels will engage more constructively in facilitating projects of European interest if these also bring concrete, shorter-term benefits for them through, for example, privileged access to public funds.

⁽¹⁹⁾ For example, Baltic Energy Market, Mediterranean Ring.



Priority 2: Building a pan-European integrated energy market

Action 1: Timely and accurate implementation of the internal market legislation

– The Commission will continue to ensure correct and timely implementation of the existing internal energy market and a forceful competition policy. For further integration of the energy market, the regulatory framework needs to be consolidated (e.g. network codes), complemented by other actions such as market coupling, target model development⁽²⁰⁾ and a robust framework for traded markets through effective transparency and oversight. If these measures prove not to be sufficient or ACER's remit too narrow, further legislative measures will be envisaged.

Action 2: Establishing a blueprint of the European infrastructure for 2020-30

– The Commission's forthcoming infrastructure communication will allow Europe to identify priority infrastructure to be deployed in order to have a functioning internal market, ensure integration of large-scale production of renewables and guarantee security of supply, in line with the vision for a sustainable European energy system by 2050. By 2015, no Member States should be isolated from the European internal market. Cross-border corridors will also be covered. The 10-year network development plans of ENTSO-E and ENTSO-G will be taken forward with the help of ACER, together with all other relevant stakeholders. This exercise will build on successful regional initiatives such as the one in the Baltic region and will also include an assessment of the necessary storage facilities and climate adaptation measures, including possible future needs for CO₂ transportation infrastructure in the EU.

– The Commission's proposal also aims at preparing the grid for the inevitable changes in demand which will ensue from energy and transport policies, such as electro-mobility and an increase in decentralised as well as large-scale renewable power generation.

– A set of policy tools will be proposed by the Commission next year to implement strategic infrastructure priorities in the next two decades. They will include a new method for defining the strategic infrastructures which will be essential for the European Union as a whole in terms of competitive energy provision, environmental sustainability and access to renewables as well as security of supply. These vital sections will be clearly identified in the overall mapping exercise and awarded a label of 'European interest' so that they can benefit from an improved permitting procedure and concentrated funding if necessary. Selectivity will be of the essence in this work. Network connections with third countries will be duly taken into account.

– ACER, ENTSO-E and ENTSO-G will be given a mandate to develop the blueprint of European electricity and gas grids by 2020-30. This should be followed by a longer-term vision on the basis of the energy 2050 roadmap to be presented in 2011.

Action 3: Streamlining permit procedures and market rules for infrastructure developments

– The Commission will propose to introduce a permitting scheme applying to projects of "European interest" to improve the current process through, for example, the nomination of a single authority at national level, while respecting safety and security standards and ensuring full compliance with EU environmental legislation. The streamlined and improved procedures will provide for more transparency and ensure open and transparent debates at local, regional and national level to enhance public trust in and acceptance of the installations. In addition, ways of positively rewarding, through enhanced access to public fund regions and Member States that constructively engage and succeed in facilitating the timely construction of projects of European interest will be explored.

– To establish market coupling by 2014, ACER will, within the scope of its mandate, ensure the definition and implementation of all necessary technical (harmonisation, standardisation, etc.) and regulatory issues linked to the interconnection of networks across borders; access to renewables; and the integration of new technologies. A detailed programme of action will be presented accordingly to assist the Member States in the process of rolling out smart metering/smart grids (including the issue of display of information for consumers) and encouraging new energy services.

Action 4: Providing the right financing framework

– Acknowledging the fact that most of the infrastructure development is of a commercial nature, a methodology will be defined by the Commission to analyse the optimum balance between public and private financing (on the following principles to be applied across the Union: 'user pays', 'beneficiary pays' - in terms of cross-border cost-benefit allocation, and 'tax payer pays' - burden-sharing for commercially non-viable and 'EU-wide benefit' infrastructure). This will be defined in accordance with applicable state aid rules. For projects of 'European interest' which have no or poor commercial viability, innovative funding mechanisms will be proposed for maximum leverage of public support to improve the investment climate for the coverage of main risks or to speed up project implementation. The development of proper energy infrastructure is critical and urgent; it requires a broader view of new funding instruments (both public and private) as well as the mobilisation of additional resources under the next multi-annual financial framework.

⁽²⁰⁾ An electricity target model has been developed in the context of the Florence Forum, in the so called ad hoc advisory group. The guidelines and codes to implement this target model are being prepared. A target model for gas is being developed in the framework of the Madrid Forum.



3. SECURE, SAFE AND AFFORDABLE ENERGY FOR CITIZENS AND BUSINESSES

A well-functioning, integrated internal market benefits consumers with wider choice and lower prices. Yet many consumers do not perceive that they are better off as a result of market opening and competition among different suppliers. Individual consumers must be aware of, and exercise, their rights under EU legislation. They should be able to take advantage of the opportunities which market opening creates and feel confident that they have access to the energy services they need in the quality and emission profile they want. The opening of markets can deliver the best prices, choice, innovation and service for consumers if it goes hand in hand with measures to guarantee trust, protect consumers and to help them play the active role expected of them by liberalisation.

However citizens appear to be unaware of their rights under EU legislation, or reluctant to exercise them. Far greater efforts are needed to inform consumers about their rights and involve them in the internal market. Likewise, the potential for reducing energy bills through energy savings needs to be better articulated. The Citizens' (London) Forum and the Sustainable Energy (Bucharest) Forum were established with a view to improving the energy situation of household consumers, and ways should be explored to make them more responsive to consumers' needs.

The competitive position of important sectors of the European economy also depends on the availability of secure energy at affordable prices. Energy, in particular electricity, constitutes a substantial part of the total production costs of key European industries, including large as well as small and medium-sized enterprises.

The international market for oil supplies could become very tight before 2020, which means that it is important for EU consumers to step up their efforts to reduce oil demand. This is not happening at the moment. Consumers need to be made more aware of the necessity to reduce their consumption of fossil fuels and they need to know how they can reduce their bills at a time of rising prices. "User-friendly" smart grids, smart meters and billing can help in this respect. But consumers also need to become more pro-active. To help consumers participate in the market, measures should be put in place to raise awareness of opportunities, enhance price comparison, facilitate switching and improve complaint-handling procedures.

Providing affordable but cost-reflective and reliable supplies to consumers is mainly the task of the internal market. A functioning internal market on the basis of sufficient transmission and storage infrastructure is the best guarantee for security of supply, as energy will follow market mechanisms

and flow to where it is needed. However, safety nets are necessary, in the case of vulnerable consumers for example, or at the time of a supply crisis which market mechanisms cannot sufficiently address. The internal market is also hampered when Member States are not fully interlinked, such as in the Baltic States. The Gas Security Regulation is important in that it ensures that markets are fully prepared to cope in a crisis and that domestic consumers are protected. Furthering interconnection between Member States as well as active competition enforcement by the Commission and Member States can contribute to a further diversification of supply sources, particularly in those Member States which currently depend on only one or just a few supply sources.

Energy policy is also responsible for protecting European citizens from the risks of energy production and transport. The EU must continue to be a world leader in developing systems for safe nuclear power, the transport of radioactive

substances, as well as the management of nuclear waste. International collaboration on nuclear safeguards plays a major role in ensuring nuclear security and establishing a solid and robust non-proliferation regime. In the oil and gas exploitation and conversion sector, the EU legislative framework should guarantee the highest level of safety and an unequivocal liability regime for oil and gas installations.



Priority 3: Empowering consumers and achieving the highest level of safety and security

Action 1: Making energy policy more consumer-friendly

- Active competition policy enforcement at European and national levels remains indispensable to foster competition and guarantee that consumers have access to energy at affordable prices.
- The Commission will propose measures to help consumers better participate in the energy market in line with the third energy package. These measures will include the development of guidance based on best practice in the area of switching suppliers, the further implementation and monitoring of billing and complaint-handling recommendations, and the identification of best practices in alternative dispute resolution schemes. A price comparison tool based on a methodology to be developed by energy regulators and other competent bodies should be available to all consumers, and all suppliers should provide updated information on their tariffs and offers. Finally, further efforts should be aimed at moving focus from energy prices to energy costs by developing the market for energy services.
- The Commission will publish regular benchmark reports assessing the level of implementation of the regulatory provisions relating to consumers and the overall level of protection across the internal market. Particular emphasis will be given to vulnerable customers and to practices which enable consumers to reduce energy use.
- Efforts to improve the functioning of the retail market should be stepped up by regulatory authorities with the help of the London Citizens' and the Sustainability (Bucharest) Fora.

Action 2: Continuous improvement in safety and security

- The safety conditions of offshore oil and gas extraction are being reviewed by the Commission in the light of the Deepwater Horizon accident, with the aim of introducing stringent measures from prevention to response and liability issues which will guarantee the highest level of protection throughout the EU and the rest of the world.
- The legal framework for nuclear safety and security will be further enhanced through the mid-term review of the Nuclear Safety Directive, the implementation of the Nuclear Waste Directive, the redefinition of the basic safety standards for the protection of workers and the population, and a proposal for a European approach on nuclear liability regimes. Greater harmonisation of plant design and certification at the international level should also be actively pursued. All these measures should allow the EU to keep its leadership in safe nuclear energy and contribute to responsible use of nuclear energy worldwide.
- The same security and safety considerations will also be upheld in the development and deployment of new energy technologies (hydrogen safety, safety of CO₂ transportation network, CO₂ storage, etc.).

The European Strategic Energy Technology Plan

SET-Plan

Towards a low-carbon future

4. MAKING A TECHNOLOGICAL SHIFT

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Without a technological shift, the EU will fail on its 2050 ambitions to decarbonise the electricity and transport sectors. Given the time scale for the development and dissemination of energy technology, the urgency of bringing new high-performance, low-carbon technologies to the European markets is more acute than ever. The EU ETS is an important demand-side driver supporting the deployment of innovative low-carbon technologies. However, new technologies will reach markets more quickly and more economically if they are developed through collaboration at the EU level.

Europe-wide planning and management is paramount for investment stability, business confidence and policy coherence. The Strategic Energy Technology (SET) Plan sets out a medium-term strategy valid across all sectors. Yet development and demonstration projects for the main technologies (second-generation biofuels, smart grids, smart cities and intelligent networks, Carbon Capture and Storage, electricity storage and electro-mobility, next-generation nuclear, renewable heating and cooling) must be speeded up. Similarly, the crucial nature of innovation was highlighted in the Europe 2020 flagship initiative on 'Innovation Union'⁽²¹⁾.

The resources required in the next two decades for the development of these technologies are very significant, especially when seen in the context of the current economic climate. Major projects, such as the ones for over 140 GW of

offshore wind power currently being planned by European utilities, developers and governments, mostly in the North Sea or the Desertec and Medring initiatives, affect several Member States. Europe-wide coordination and collaboration should include the pooling of different funding sources. All stakeholders will be expected to contribute. The Commission will seek to leverage the EU budget to raise further the overall level of funding.

The EU is facing fierce competition in international technology markets. Countries such as China, Japan, South Korea and the USA are pursuing an ambitious industrial strategy in solar, wind and nuclear markets. EU researchers and companies need to increase their efforts to remain at the forefront of the booming international market for energy technology and, where it is mutually beneficial, they should step up cooperation with third countries in specific technologies.

⁽²¹⁾ SEC(2010)1161, 6 October 2010.

Priority 4: Extending Europe's leadership in energy technology and innovation

Action 1: Implementing the SET Plan without delay

- The Commission will reinforce the implementation of the SET Plan, in particular the Joint Programmes of the European Energy Research Alliance (EERA) and the six European Industrial Initiatives (wind; solar; bio energy; smart grids; nuclear fission; CCS). Work will intensify with Member States to finance the activities of the Technology Roadmaps for 2010-20 and to ensure the success of related large-scale demonstration programmes such as under the New Entrants Reserve (NER300) programme⁽²²⁾. Available Community funding⁽²³⁾ will be concentrated on the SET Plan initiatives.
- The Technology Roadmaps of the European Industrial Initiatives for 2010-20 are being implemented from this year on and will be given additional support. They will be the cornerstone for the preparation of the next financial framework as regards a consolidated, regularly assessed, more efficient and focused energy research programme. In this context, the Commission will promote the development of strategic energy research infrastructures in Europe as they strongly contribute to the shortening of the distance between research and technological development. It will also pursue other avenues with great potential, such as marine renewable energy and renewable heating and cooling.

Action 2: The Commission will be launching four new large-scale European projects

- The Commission will take forward a major European initiative on smart grids to link the whole electricity grid system, from the offshore wind farms in the North Sea, solar plants in the South and existing hydro-electric dams, to individual households, while making power networks more intelligent, efficient and reliable.
- Re-establishing Europe's leadership on electricity storage (both large-scale and for vehicles). Ambitious projects will be developed in the fields of hydro capacity, compressed air storage, battery storage, and other innovative storage technologies such as hydrogen. These will prepare the electricity grid at all voltage levels for the massive uptake of small-scale decentralised and large-scale centralised renewable electricity.
- Implementing large-scale sustainable biofuel production, including in the light of the ongoing review concerning the impact of indirect land use change. The €9 billion European Industrial Bioenergy Initiative⁽²⁴⁾ will be launched shortly to ensure quick market uptake of sustainable second-generation biofuels.
- Providing cities, urban and rural areas with ways of making greater energy savings. The 'Smart Cities' innovation partnership to be launched early 2011 will bring together the best from the areas of renewable energies, energy efficiency, smart electricity grids, clean urban transport such as electro mobility, smart heating and cooling grids, combined with highly innovative intelligence and ICT tools. EU regional policy can play an important role in unlocking local potentials. Rural areas also have a significant potential in this respect and could make use of the EARDF that provides financial means to support such innovation projects.

Action 3: Ensuring long-term EU technological competitiveness

- In order to lay the foundations of our future competitiveness in the face of strong international competition, the Commission will propose a €1 billion initiative⁽²⁵⁾ to support the frontier research needed to deliver science necessary for low-carbon energy breakthroughs.
- EU leadership must also be maintained in the global flagship research project ITER. The Commission will ensure effective governance (including cost containment) and industrial value creation from ITER and the European fusion programme.
- The Commission will develop an EU research programme for energy materials, allowing the EU energy sector to stay competitive despite dwindling rare earth resources.

⁽²²⁾ The revised ETS Directive (2009/29/EC) foresees that €300 million worth of ETS allowances from the New Entrants Reserve (NER) shall be available to support commercial-scale CCS and innovative RES demonstration projects in the territory of the Union.

⁽²³⁾ Funding available under the current Financial Perspectives.

⁽²⁴⁾ See footnote 23.

⁽²⁵⁾ See footnote 23.



5. STRONG INTERNATIONAL PARTNERSHIP, NOTABLY WITH OUR NEIGHBOURS

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The European energy market is the world's largest regional market (over 500 million consumers) and largest energy importer. However, the same collaboration and common purpose that has led to the adoption of the EU's headline energy and climate targets is not yet evident in external energy policy. Several of the challenges facing the EU – climate change, access to oil and gas, technology development, energy efficiency – are common to most countries and rely on international collaboration. Member States have repeatedly called for the EU to speak with a common voice in third countries. In practice, national initiatives do not leverage the strength of the size of the EU market and could better express the EU interest.

International energy policy must pursue the common goals of security of supply, competitiveness and sustainability. While relations with producing and transit countries are important, relations with large energy-consuming nations and particularly emerging and developing countries are of growing significance. To lift people out of poverty will require access to energy since achieving the goal of eradicating extreme poverty by 2015 cannot be met unless substantial progress is made on improving access. In order to ensure that this does not harm other policy goals, sustainable development must be at the core of both energy and development policy, as proposed in the Green Paper on Development Policy⁽²⁶⁾.

⁽²⁶⁾ Non-OECD countries could account for all the projected growth in CO₂ emissions by 2030; however, ensuring universal access to modern energy services for all only means a rise of 0.8% in CO₂ emissions, according to the IEA World Energy Outlook 2009 and special early excerpts from the IEA WEO 2010 for the Millennium Development Goals Summit.

New patterns of supply and demand in global energy markets and increasing competition for energy resources make it essential for the EU to be able to deploy its combined market weight effectively in relations with key third-country energy partners. Europe should be in a position to rely on significant additional energy supply sources and routes by 2020.

The need for international solutions obliges us to push our agenda for decarbonisation and energy efficiency with our main partners and in international negotiations and frameworks. The ETS is a driver of international carbon markets, and further action should build on ongoing action to further develop these markets. As a frontrunner in policy development, the EU has more scope to influence standard-setting environmental issues, and to promote respect for transparent and competitive markets.

The EU already has a series of complementary and targeted frameworks ranging from specific energy provisions in bilateral agreements with third countries (Free Trade Agreements, Partnership and Cooperation Agreements, Association Agreements, etc.) and Memoranda of Understanding on energy cooperation, through to multilateral Treaties such as the Energy Community Treaty⁽²⁷⁾ and participation in the Energy Charter Treaty. It is currently negotiating new

⁽²⁷⁾ The Energy Community Treaty is promoting market integration, but also acquis transposition and implementation in the Western Balkans and is extending the EU internal energy market to South-East Europe. This is not only a framework of cooperation, but a legally binding instrument to prepare accession to the EU. Other parties are joining the Energy Community Treaty: Moldova is already a member; Ukraine and Turkey are in the process of joining.

agreements, including important energy provisions, with several countries.

The EU must now formalise the principle whereby Member States act for the benefit of the EU as a whole in bilateral energy relations with key partners and in global discussions. Building on the legal basis in the Lisbon Treaty, which clarifies and strengthens the external dimension, the EU's external energy policy must ensure effective solidarity, responsibility and transparency among all Member States, reflecting the EU interest and ensuring the security of the EU's internal energy market. More effective coordination at EU and Member State level needs to be put in place.

In the nuclear field, international cooperation has produced good results. This is particularly relevant since various neighbouring countries operate or plan to operate nuclear power plants. The EU must now encourage partner countries to make all existing international nuclear safety and security standards and procedures legally binding and effectively implement these worldwide. The EU is particularly well-placed, as it is the first to have taken such action both in the field of safety and security and has specific cooperation instruments for this purpose.

As well as being vital for the EU's security of supply, the external dimension of EU energy policy must be consistent and mutually reinforcing with other external activities of the EU (development, trade, climate and biodiversity, enlargement, Common Foreign and Security Policy, etc.). There must be synergies between energy objectives and other policies and instruments including trade, bilateral agreements, and development cooperation instruments and vice-versa.

Energy security is closely intertwined with EU foreign and security priorities⁽²⁸⁾. Diversification of fuels, sources of supply and transit routes is essential for EU security as are good governance, respect for the rule of law and protection of EU and foreign investments in energy-producing and transit countries. Moreover, EU policy will pay particular attention to safety and security of oil, natural gas pipelines and related production and transport infrastructure by combining energy policy and CFSP instruments.

In 2011 the Commission will present concrete proposals to reinforce the overall consistency and efficiency of our external energy policy, involving Member States, various external policies of the European Union and external support programmes.

⁽²⁸⁾ European Security Strategy adopted by the European Council in December 2003.



Priority 5: Strengthening the external dimension of the EU energy market

Action 1: Integrating energy markets and regulatory frameworks with our neighbours

- The Energy Community Treaty should be implemented and extended to all those EU neighbours who are willing to adopt the EU market model. In this context, market integration and regulatory convergence should be pursued through comprehensive EU agreements based on EU rules in the countries covered by the European Neighbourhood Policy and the Enlargement process, in particular in the Mediterranean region and with transit countries such as Ukraine and Turkey. Moreover, the Energy Community Treaty should be deepened by extending the new *acquis* to the signatories to the Treaty. This approach would strengthen the participation of neighbouring countries in the internal market, while providing a level playing field and a safeguard against the risk of carbon leakage through the power sector.
- Mechanisms will be proposed by the Commission to align existing international agreements (notably in the gas sector) with the internal market rules and to strengthen cooperation between Member States for the conclusion of new ones. Proposals will also be made to set the required regulatory framework between the EU and third countries to develop strategic routes from new suppliers, notably around the southern corridor and the Southern Mediterranean. Supply issues, including network development and possibly grouped supply arrangements as well as regulatory aspects, notably concerning the freedom of transit and investment security, would be covered.
- EU technical assistance will be mobilised for the effective implementation of the internal market *acquis* and the modernisation of the energy sector in neighbouring countries, while improving the coordination of support schemes provided by the EU, its Member States and the international community.

Action 2: Establishing privileged partnerships with key partners

- While pursuing diversification of import sources and routes, reinforced energy partnerships will be established by the EU with key suppliers and transit countries. They will be aimed at promoting key principles such as those contained in the Energy Charter Treaty (for example the freedom of transit, transparency, safety, investment opportunities as well as compliance with international law).

Action 3: Promoting the global role of the EU for a future of low-carbon energy

- Energy efficiency, clean technologies and safe and sustainable low-carbon energy should be integrated into EU and bilateral cooperation activities, particularly with major consumer and emerging economies and with global partnerships.
- The Commission will launch a major cooperation with Africa on energy initiatives in order to progressively provide sustainable energy to all citizens, in line with the Green Paper on Development Policy.

Action 4: Promoting legally binding nuclear-safety, security and non-proliferation standards worldwide

- The Commission will develop initiatives aiming at encouraging partner countries to make international nuclear safety, security and non-proliferation standards and procedures legally binding and effectively implemented around the globe, in particular through reinforced cooperation with the International Atomic Energy Agency and the conclusion of Euratom agreements with key nuclear suppliers and user countries.



CONCLUSIONS

The EU is on the threshold of an unprecedented period for energy policy. Energy markets have been largely cushioned from the effects of global market turbulence in recent years as a result of liberalisation, ample supply and production capacities and adequate import possibilities. However, dramatic changes are afoot. Energy prices will be affected by the huge need for energy sector investments, as well as carbon pricing and higher international energy prices. Competitiveness, security of supply and climate objectives will be undermined unless electricity grids are upgraded, obsolete plants are replaced by competitive and cleaner alternatives, and energy is used more efficiently throughout the whole energy chain.

Member States and industry have recognised the scale of the challenges. Secure energy supplies, an efficient use of resources, affordable prices and innovative solutions are crucial to our long-term sustainable growth, job creation and quality of life. Member States have agreed that these challenges will be tackled most effectively by policies and action at EU level, by 'Europeanising' energy policy. This includes directing EU funding support towards public priorities that markets fail to meet and which bring the most European value.

The new EU energy strategy will require significant efforts in technical innovation and investment. It will foster a dynamic and competitive market and lead to a major strengthening of institutional arrangements to monitor and guide these developments. It will improve the security and the sustainability of energy systems, grid management, and energy market regulation. It will include extensive efforts to inform and empower domestic and business consumers, to involve them in the switch to a sustainable energy future, for example by saving energy, reducing wastage and switching to low-carbon technologies and fuels. Investments in low-carbon energy production will be further encouraged by market-based instruments such as emissions trading and taxation. The new strategy will take the first steps towards preparing the EU for the greater challenges which it may well have to face already by 2020. Above all, it will ensure better leadership and coordination at the European level, both for internal action and in relations with external partners.

The global energy system is entering a phase of rapid transition with potentially far-reaching implications that will unfold in the next decades. Europe has to act before the window of opportunity closes. Time is short. Thus, the



Commission will present most of the proposals to achieve the 2020 goals in the coming 18 months.

Discussion, adoption and implementation will be needed quickly. In this way, the EU will be better able to put in place the building blocks for the 2020 outcome – standards, rules, regulations, plans, projects, financial and human resources, technology markets, social expectations, etc. – and prepare Europe's citizens for the challenges ahead.

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Due to the long lead-in times for energy system changes, taking action today does not guarantee that the structural changes needed for the low-carbon transition will be completed in the period to 2020, which this strategy covers. It is therefore necessary to look beyond the time scale of the present strategy to ensure that the EU is well-prepared for the 2050 objective of a secure, competitive and low-carbon energy system. The Commission will therefore follow up this strategy with a complete roadmap for 2050 which will set the measures covered in this paper in a longer-term context and consider further, complementary steps.



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