



Let us begin with the words of Günther H. Oettinger, European Commissioner for Energy... “Europe is at an unprecedented crossroads for its energy future. We are currently going through a paradigm shift in the way we produce, transmit, distribute and trade energy, as we try to reduce the carbon footprint of the energy sector as a whole. This shift will increase the role of electricity compared to other energy vectors.

“We will have to get the most promising renewable energy sources where they are, while further integrating the European energy market. And we will have to ensure continuous security of our energy supplies, notably from gas, in the context of an increasing dependency on imported fossil fuels. None of these goals can be reached without solid, reliable and smart energy networks. They are – and will become even more so – the backbone of our energy system.

“But our existing grid infrastructure is simply not up to the challenge. It has to be updated; it is too old, too fragmented, and already overloaded at several critical points. At the same time, over the last few years we have seen increasing scepticism from the general public towards any type

of new energy infrastructure, be it a power station, a wind farm, or an overhead high-voltage line.

“This is why the Commission is proposing a new strategy and toolbox to develop an integrated European energy network fit for the challenges of today and tomorrow. Our strategy builds on eight priority corridors for the period up to 2020 and on a new co-operative planning method to select projects within each corridor which are the most important and urgent to implement from a European perspective, while involving all concerned Member States and stakeholders. We also outline concrete tools to improve permit granting procedures and public acceptance of energy infrastructures and to leverage the necessary public and private financing for their realisation.


“These proposals are only the beginning. What we need now is to turn this strategy into real changes on the ground. I count on the Member States, the European Parliament and all relevant stakeholders at regional, national and European level to work together with the Commission in order to make this happen.”

Naturally, the venerable Commissioner

espouses a strong argument for overhaul, and for a new strategy that will revolutionise Europe. But what’s standing in his (and our) way?

Europe’s energy infrastructure is the central nervous system of our economy. EU energy policy goals, as well as the Europe 2020 economic aims, will not be achievable without a major shift in the way European infrastructure is developed. Rebuilding our energy system for a low-carbon future is not just a task for the energy industry. Technological improvements, greater efficiencies, resilience to a changing climate and new flexibility will be necessary. This is not a task which a single Member State can achieve on its own. A European strategy, and funding, will be necessary.

The Energy Policy for Europe, agreed by the European Council in March 2007, establishes the Union’s core energy policy objectives of competitiveness, sustainability and security of supply. The internal energy market has to be completed in the coming years and by 2020 renewable sources have to contribute 20 per cent to our final energy consumption, greenhouse gas emissions have to fall by 20 per cent and energy efficiency gains have to deliver 20 per cent savings in energy consumption.



Priorities for 2020 and beyond – an EC blueprint for an integrated European energy network

Europe's energy infrastructure must be updated and better connected, for it "pays the price for its outdated and poorly interconnected energy infrastructure," admitted the European Commission recently. In this exclusive report, we look at the plans to build an integrated European energy network, and discuss the potential obstacles.

The EU has to assure security of supply to its 500 million citizens at competitive prices against a background of increasing international competition for the world's resources. The relative importance of energy sources will change. For fossil fuels, notably gas and oil, the EU will become even more dependent on imports. For electricity, demand is set to increase significantly.

The Energy 2020 Communication, adopted on 10 November 2010, called for a step change in the way we plan, construct and operate our energy infrastructures and networks. Energy infrastructures are at the forefront of the flagship initiative "Resource efficient Europe".

Adequate, integrated and reliable energy networks are a crucial prerequisite not only for EU energy policy goals, but also for the EU's economic strategy.

Developing our energy infrastructure will not only enable the EU to deliver a properly functioning internal energy market, it will also enhance security of supply, enable the integration of renewable energy sources, increase energy efficiency and enable consumers to benefit from new technologies and intelligent energy use.

The EU pays the price for its outdated and poorly interconnected energy infrastructure. In January 2009, solutions to the gas disruptions in Eastern Europe were hindered by a lack of reverse flow options and inadequate interconnection and storage infrastructures. Rapid development of offshore wind electricity generation in the North and Baltic Sea regions is hampered by insufficient grid connections both off and onshore. Developing the huge renewables potential in Southern Europe and North Africa will be impossible without additional interconnections within the EU and with neighbouring countries. The risk and cost of disruptions and wastage will become much higher unless the EU invests as a matter of urgency in smart, effective and competitive energy networks, and exploits its potential for energy efficiency improvements.

In the longer term, these issues are compounded by the EU decarbonisation goal to reduce our greenhouse gas emissions by 80-95 per cent by 2050, and raise the need for further developments, such as an infrastructure for large-scale electricity storage, charging of electric vehicles, CO₂ and hydrogen transport and storage. The infrastructures built in the next decade will largely still be in use

around 2050. It is therefore crucial to keep in mind the longer term objective. In 2011, the Commission plans to present a comprehensive roadmap towards 2050.

The roadmap will present energy mix scenarios, describing ways to achieve Europe's long-term decarbonisation goal and the implications for energy policy decisions. This Communication identifies the energy infrastructure map which will be needed to meet our 2020 energy objectives. The 2050 low-carbon economy and energy roadmaps will further inform and guide EU energy infrastructure implementation by offering a long term vision. The energy infrastructures planned today must be compatible with the longer term policy choices.

A new EU energy infrastructure policy is needed to coordinate and optimise network development on a continental scale. This will enable the EU to reap the full benefits of an integrated European grid, which goes well beyond the value of its single components. A European strategy for fully integrated energy infrastructures based on smart and low-carbon technologies will reduce the costs of making the low-carbon shift through economies of scale for individual Member States.

A fully interconnected European market will also improve security of supply and help stabilise consumer prices by ensuring that electricity and gas goes to where it is needed. European networks including, as appropriate, neighbouring countries, will also facilitate competition in the EU's single energy market and build up solidarity among Member States. Above all, integrated European infrastructure will ensure that European citizens and businesses have access to affordable energy sources. This in turn will positively contribute to Europe's 2020 policy objective of maintaining a strong, diversified and competitive industrial base in Europe.

Two specific issues that need to be addressed are project authorisation and financing. Permitting and cross-border cooperation must become more efficient and transparent to increase public acceptance and speed up delivery. Financial solutions must be found to meet investment needs – estimated at about one trillion Euros for the coming decade of which half will be needed for energy networks alone. Regulated tariffs and congestion charges will have to pay the bulk of these grid investments. However, under the current regulatory framework, all necessary investments will not take place or not as quickly as needed, notably due to the non-commercial positive externalities or the regional or European value-added of some projects, whose direct benefits at national or local level is limited. The slowdown in investment in infrastructure has been further compounded by the recession.

Moves for a new energy strategy for the EU have the full support of Europe's heads of state or government. In March 2009, the European Council called for a thorough review of the trans-European Networks for Energy framework (TEN-E) by adapting it to both the challenges outlined above and the new responsibilities conferred to the Union by Article 194 of the Treaty of Lisbon.

Infrastructure challenges call for urgent action

Electricity grids and storage

Electricity grids must be upgraded and modernised to meet increasing demand due to a major shift in the overall energy value chain and mix and also because of the multiplication of applications and technologies relying on electricity as an energy source (heat pumps, electric vehicles, hydrogen and fuel cells, information and communication devices, etc.).

The grids must also be urgently extended and upgraded to foster market integration and maintain the existing levels of system security, but especially to transport and balance electricity generated from renewable sources, which is expected to

more than double in the period 2007-2020. A significant share of generation capacities will be concentrated in locations further away from the major centres of consumption or storage.

Up to 12 per cent of renewable generation in 2020 is expected to come from offshore installations, notably in the Northern Seas. Significant shares will also come from ground-mounted solar and wind farms in Southern Europe or biomass installations in Central and Eastern Europe, while decentralised generation will also gain ground throughout the continent.

Through a well interconnected and smart grid including large-scale storage the cost of renewable deployment can be brought down, as the greatest efficiencies can be made on a pan-European scale. Beyond these short-term requirements, electricity grids will have to evolve more fundamentally to enable the shift to a decarbonised electricity system in the 2050 horizon, supported by new high-voltage long distance and new electricity storage technologies which can accommodate ever-increasing shares of renewable energy, from the EU and beyond.

At the same time the grids must also become smarter. Reaching the EU's 2020 energy efficiency and renewable targets will not be possible without more innovation and intelligence in the networks at both transmission and distribution level, in particular through information and communication technologies. These will be essential in the take-up of demand side management and other smart grid services. Smart electricity grids will facilitate transparency and enable consumers to control appliances at their homes to save energy, facilitate domestic generation and reduce cost. Such technologies will also help boost the competitiveness and worldwide technological leadership of EU industry, including SMEs.

Natural gas grids and storage

Natural gas will continue, provided its supply is secure, to play a key role in the EU's energy mix in the coming decades and will gain importance as the back-up fuel for variable electricity generation. Although in the long run unconventional and biogas resources may contribute to reducing the EU's import dependency, in the medium term depleting indigenous conventional natural gas resources call for additional, diversified imports.

Gas networks face additional flexibility requirements in the system, the need for bi-directional pipelines, enhanced storage capacities and flexible supply, including liquefied (LNG) and compressed natural gas (CNG). At the same time, markets are still fragmented and monopolistic, with various

barriers to open and fair competition. Single-source dependency, compounded by a lack of infrastructure, prevails in Eastern Europe. A diversified portfolio of physical gas sources and routes and a fully interconnected and bi-directional gas network, where appropriate, within the EU are needed already by 2020. This development should be closely linked with the EU's strategy towards third countries, in particular as regards our suppliers and transit countries.

District heating and cooling networks

Thermal power generation often leads to conversion losses while at the same time natural resources are consumed nearby to produce heating or cooling in separate systems. This is both inefficient and costly. Similarly, natural sources, such as sea or groundwater, are seldom used for cooling despite the cost savings involved. The development and modernisation of district heating and cooling networks should therefore be promoted as a matter of priority in all larger agglomerations where local or regional conditions can justify it in terms of, notably heating or cooling needs, existing or planned infrastructures and generation mix etc. This will be addressed in the Energy Efficiency Plan and the 'Smart Cities' innovation partnership, to be launched early 2011.

Co2 capture, transport and storage (CCs)

CCS technologies would reduce CO2 emissions on a large scale while allowing the use of fossil fuels, which will remain an important source for electricity generation over the next decades. The technology, its risks and benefits, are still being tested through pilot plants which will come on line in 2015. CCS commercial roll-out in electricity generation and industrial applications is expected to start after 2020 followed by a global roll-out around 2030. Due to the fact that potential CO2 storage sites are not evenly distributed across Europe and the fact that some Member States, considering their significant levels of CO2 emissions, have only limited potential storage within their national boundaries, construction of European pipeline infrastructure spanning across State borders and in the maritime environment could become necessary.

Oil and olefin transport and refining infrastructure

If climate, transport and energy efficiency policies remain as they stand today, oil would be expected to represent 30 per cent of primary energy, and a significant part of transport fuels are likely to remain oil based in 2030. Security of supply depends on the integrity and flexibility of the entire supply chain, from the crude oil supplied to refineries to the final product distributed to consumers. At the same time, the future shape of crude oil and petroleum

product transport infrastructure will also be determined by developments in the European refining sector, which is currently facing a number of challenges as outlined in the Commission Staff Working Document.

The market will deliver most of the investments, but obstacles remain

The policy and legislative measures the EU has adopted since 2009 have provided a powerful and sound foundation for European infrastructure planning. The third internal energy market package laid the basis for European network planning and investment by creating the requirement for Transmission System Operators (TSOs) to cooperate and elaborate regional and European 10-year network development plans (TYNDP) for electricity and gas in the framework of the European Network of TSOs (ENTSO) and by establishing rules of cooperation for national regulators on cross-border investments in the framework of the Agency for the Cooperation of Energy Regulators (ACER).

The third package creates an obligation for regulators to take into account the impact of their decisions on the EU internal market as a whole. This means they should not evaluate investments solely on the basis of benefits in their Member State, but on the basis of EU-wide benefits.

Still, tariff setting remains nationally focused and key decisions on infrastructure interconnection projects are taken at national level. National regulatory authorities traditionally have aimed mainly at minimising tariffs, and thus tend not to approve the necessary rate of return for projects with higher regional benefit or difficult cost-allocation across borders, projects applying innovative technologies or projects fulfilling only security of supply purposes.

In addition, with the strengthened and extended Emission Trading Scheme (ETS) there will be a unified European carbon market. ETS carbon prices influence already and will increasingly shift the optimal electricity supply mix and location towards low-carbon supply sources.

The regulation on security of gas supply will enhance the EU's capacity to react to crisis situations, through increased network resilience and common standards for security of supply and additional equipments. It also identifies clear obligations for investments in networks. Long and uncertain permitting procedures were indicated by industry as well as TSOs and regulators, as one of the main reasons for delays in the implementation of infrastructure projects, notably in electricity.

The time between the start of planning and final commissioning of a power line is frequently more than 10 years. Cross-border projects often face additional opposition, as they are frequently perceived as mere "transit lines" without local benefits. In electricity, the resulting delays are assumed to prevent about 50 per cent of commercially viable projects from being realised by 2020.

This would seriously hamper the EU's transformation into a resource efficient and low-carbon economy and threaten its competitiveness. In offshore areas, lack of coordination, strategic planning and alignment of national regulatory frameworks often slow down the process and increase the risk of conflicts with other sea uses later on.

Investment needs and financing gap

Around one trillion Euros must be invested in our energy system between today and 2020

in order to meet energy policy objectives and climate goals. About half of it will be required for networks, including electricity and gas distribution and transmission, storage, and smart grids. Out of these investments about 200bn € are needed for energy transmission networks alone. However, only about 50 per cent of the required investments for transmission networks will be taken up by the market by 2020. This leaves a gap of about 100bn €.

Part of this gap is caused by delays in obtaining the necessary environmental and construction permits, but also by difficult access to finance and lack of adequate risk mitigating instruments, especially for projects with positive externalities and wider European benefits, but no sufficient commercial justification. Our efforts also need to focus on further developing the internal energy market, which is essential to boosting private sector investment in energy infrastructure, which in turn will help to reduce the financial gap in the coming years. The cost of not realising these investments or not doing them under EU-wide coordination would be huge, as demonstrated by offshore wind development, where national solutions could be 20 per cent more expensive. Realising all needed investments in transmission infrastructure would create an additional 775,000 jobs during the period 2011-2020 and add 19bn € to our GDP by 2020, compared to growth under a business-as-usual scenario. Moreover, such investments will help promote the diffusion of EU technologies. EU industry, including SMEs, is a key producer of energy infrastructure technologies. ■

PES would like to thank the European Commission. For more information, please visit: http://ec.europa.eu/energy/infrastructure/strategy/2020_en.htm

