

Executive Summary

- **The energy sector plays a key role for the sustainable development of the EU economy.**

It is both a critical sector for the recovery and growth of industry in the EU, and also a major player in the decarbonisation strategy of the EU at the horizon 2020 and 2050.

The special role of the energy sector has been highlighted recently by the Communication on the European energy strategy towards 2020 (EC, 2010b), which was picked up and developed by a Communication on energy and climate policy towards 2050 (EC, 2010d). In this context, the so-called Energy Infrastructure Package (EIP) (i.e. the Commission's Communication "Energy infrastructure priorities for 2020 and beyond" of November 2010¹) is the centerpiece of an infrastructure strategy to support the transforma-

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tion of the energy system. However, important questions remain open, such as cross-border regulation and financing the future European energy infrastructures.

- **The transformation of the European energy system towards a low-carbon industry requires substantial investment and financing.**

On the one hand, the increasing geographical distances between electricity generation and consumption in a renewable-based electricity system require substantial network investment. On the other hand, the fluctuating generation patterns will also require new approaches for network stabilisation and the integration of new infrastructures, in particular control technologies, storage capacities for electricity, and a secure and reliable gas supply as a backup fuel.

Particularly, from a technical perspective, the integration of HVDC (High-Voltage Direct Current) technologies as so-called “overlay-networks” to the existing HVAC (High-Voltage Alternating Current) system will be necessary. Moreover, regulatory approaches will have major implications for financing these trans-national infrastructure projects.

- **Experience with current instruments for financing trans-European projects is mixed.**

The implementation of the Trans-European Networks for Energy (TEN-E) projects over the last 15 years remains insufficient given the EU goals for the year 2020. The staggered prioritisation of projects as (1) projects of European interest, (2) priority projects, and (3) projects of common interest has shown that there is a need to narrow the focus of TEN-E from the approximately 550 TEN-E projects to a reduced number of strategic priority projects.

Thus, new organisational models, a revision of the role of national and European regulators and adjusted regulatory and financing instrument designs are required.

- **According to the Energy Infrastructure Package (EIP), around one trillion euros must be invested in the European energy system until 2020** (EC, 2010b, p. 9).

Half of the amount is required for energy network investments (both transmission and distribution networks). Out of the €200 bn. required investment for transmission networks, only half of the capital will be provided by markets. This leaves a financial gap of approximately €100 bn. and poses a question on the EU role in financing European energy infrastructure.

This question is not only crucial as a supplement to the existing national regulations, but also asks for a development of the existing EU budgetary instruments, which have been rather ineffective in the provision and financing of trans-national energy infrastructures to meet the EU's 2020 targets (both in the mid-term and in its long-term implications set by the EIP).

Thus, the EU and the Member States should adopt a more proactive role in infrastructure planning and financing to internalise the effects and make infrastructure cheaper.

- **This paper provides a survey of issues on the future financing of the energy sector, with a focus on infrastructure developments.**

It first provides an **overview of the long-term forecasts on energy supply and demand** in Europe and different scenarios on the way towards a 80% CO₂ reduction by 2050. We then focus on the **infrastructure needs** that are identified as an “enabler” of a sustainable development: our focus is on electricity, natural gas, and CO₂ transportation infrastructures that are

expected to become the backbone of a future single integrated European energy market. In discussing the infrastructure needs identified by various actors, we also highlight **potential discrepancies** between the social welfare effects at the European and cross-border level, and the national effects: these differences may suggest a more important role to be played by European institutions.

We then describes in section II the various instruments that exist at the EU level to **finance trans-national energy infrastructures**.

A **case study** in section III highlights different aspects related with future financing of trans-European energy infrastructures: we compare different network designs for the North Sea Offshore Electricity Grid, and their different financial and distributional consequences.

On the basis of this analysis, section IV addresses the question of the **appropriate financial instruments to support infrastructure investments**, both at the national level and at the European level, where such instruments are not yet sufficiently developed. We discuss advantages and potential obstacles to pooling financial resources at the EU level, and different possible institutional settings.