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The structuring and financing of energy infrastructure projects, financing gaps and recommendations regarding the new TEN-E financial instrument

Tender No. ENER/B1/441-2010

– FINAL REPORT –

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Management summary

The European Commission (EC) is actively striving to promote the development of energy infrastructure in EU Member States. Transmission and transit system operators (TSOs) have been unbundled and partially privatised. As a result, the financing of infrastructure projects by national states or (current or former) parent companies is no longer automatic. Transmission infrastructure investments need to attract much more private capital than in the past, and under market conditions. If the goals of the EU's 2020 energy scenario are to be met, a significant increase in investment is required over the coming ten years for building new infrastructure.

To provide input for a new **legislative proposal** in 2011, the EC commissioned Roland Berger Strategy Consultants to perform a study on the structuring and financing of energy infrastructure projects, the financing gaps and recommendations regarding the new TEN-E financial instrument (Tender No. ENER/B1/441-2010). This final report **aims to answer three key questions:**

1. **What was the structure of energy transmission infrastructure investments** in the last five years in terms of investment volumes, financing structures, financing sources and the financing capacity of operators, and what do we expect to see in the future?

2. **What challenges arise** regarding the financing of such infrastructure projects, and where are the financing gaps?

3. **What measures and instruments** should be implemented to overcome such challenges and gaps?

The results of this study are based on close interaction with stakeholders in the industry. We carried out 32 interviews with TSOs in the electricity and natural gas sector and 15 interviews with financial institutions. We also assessed the results of 24 EC questionnaires circulated among TSOs in Europe. To evaluate **the key challenges that we identified and the proposed solutions from a multi-stakeholder perspective,** we distributed a questionnaire to key industry stakeholders: TSOs, providers of financing and National Regulatory Authorities (NRAs). We received answers from 17 TSOs, 9 financing institutions and 19 NRAs.

1. The financing of energy transmission infrastructure projects in the EU

Our study begins with an overview of the financing of energy transmission infrastructure projects in Europe. The first part is an analysis of past investment patterns by TSOs and planned investment compared to the investment needs identified by the EC for the period to 2020. This is followed by an analysis of the financial capabilities of European TSOs based on published credit ratings, a

description of the typical financing structures of energy infrastructure investment projects (including key factors in financing decisions) and an analysis of the sources of financing used in energy infrastructure investments.

Investment patterns of TSOs

In the EC Communication **"Energy infrastructure priorities for 2020 and beyond – A blueprint for an integrated European energy network"** (COM (2010) 677)), the EC identifies an **investment need of approximately EUR 200 billion for energy transmission Projects of European Interest** (excluding national projects and refurbishments of existing grids) in order to meet the EU's 2020 targets. At the same time, it questions whether such investment volumes can be met by the market. According to the EC, approximately EUR 100 billion in investment is at risk of not being realised due to delays in permitting procedures and the general "difficult access to finance and lack of adequate risk mitigation mechanisms".

To understand the **feasibility of the required investment by European TSOs,** we can compare total past and future TSO investments. Past investments by European TSOs for all types of project (European, national and refurbishment projects) between 2005 and 2009 totalled around EUR 9.1 billion per annum (5.8 in electricity, 3.3 in natural gas). For the period to 2020, TSOs indicate investments of around EUR 14 billion per annum. It is thus clear that TSOs need to **significantly increase their investment volume in the future** compared to current levels – and that they are indeed planning to do so. Consequently, there will be a much larger financing need than in the past, specifically in the electricity sector. While overall investment by natural gas TSOs will grow by almost 30%, electricity TSOs plan to increase investment by approximately 70% in the period to 2020.

Planned future investments by TSOs are lower than the investment requirement foreseen by the EC Communication, however. The Communication identifies an investment need of EUR 20 billion per annum for Projects of European Interest alone, while the figures for TSO investments identified in this study (EUR 14 billion per annum) are for total investments, including purely national projects. Assuming that the investment volumes of the EC are a valid approximation, there will therefore be a significant additional investment (and hence financing) need for TSOs in the future.

Financing capabilities – credit ratings

Given the significant investment volumes involved, we need to ask whether suitable financing will be available for TSOs. To answer this question, we analysed the credit ratings of European TSOs. The result was that – except for the non-investment ratings of natural gas TSOs in Hungary and Romania – there is **no indication that credit ratings will create serious financing problems for TSOs in Europe.**

For companies whose rating is in the investment grade range, the difference in the actual rating only affects the cost of debt, not overall credit availability. **However, in many cases, TSOs do not have a credit rating.** This is sometimes because they are part of a larger, rated group or are funded by their parent company. Yet there are 30 TSOs, in many cases state-owned, without a standalone or group rating. This reduces their ability to access corporate bond markets directly.

It should be noted that, besides the company-related criteria indicated above, major external factors such as the **financial crisis** can also impact on credit ratings. The TSOs in most countries said that the financial crisis had had no significant impact on their credit ratings and related financing conditions. Yet there was a clear negative impact on the credit ratings of TSOs in the countries severely affected by the crisis – such as Ireland, Portugal and Greece.

Financing structures

In order to analyse the core challenges facing energy infrastructure investments, it is necessary first to understand how TSOs typically perform their financing operations. This includes whether TSOs use **corporate or project finance, and how conditions such as ownership and debt/equity** ratios influence their investment and financing capabilities.

Project finance is more complex and typically more costly than corporate finance for TSOs, in the range of at least an additional 100 basis points for debt financing. As a result, only a minority of projects in energy transmission are financed in this way. **Corporate finance is thus the predominant financing approach** both in electric power and natural gas transmission. Indeed, practically all domestic projects included in the regulatory asset base are financed on a corporate level.

The **large extent of state ownership** also has an impact on the financing framework and conditions for TSOs. The main impact is on their options for raising further equity and acquiring debt. In particular, state ownership often results in less flexibility on the equity financing side. Sovereign ratings also have a major impact on financing and debt capital costs as sovereign guarantees support the acquisition of debt. This helps significantly with the acquisition of debt with respect to volume and debt capital costs.

The **leverage** of a TSO describes the relation of debt to equity on its balance sheet. This is influenced by regulatory frameworks and the TSO's commitment to keeping a certain credit rating and thus certain leverage. Our key finding with regard to leverage is that it lies **typically in the range of 60-70% (debt to total capital).** This is also a typical industry ratio for the financing of energy transmission projects, with a tendency towards 70-75% debt in pure project finance companies. Low leverage is common for TSOs that plan little or no investment in new infrastructure.

Sources of financing

The main sources of funding for energy infrastructure investments are equity and debt. The **most important sources** on the **debt side** are international financing institutions, commercial banks and corporate bonds. The European Investment Bank (EIB) is a key financing partner providing debt capital and its conditions are geared towards the need of the industry (e.g. long maturities and preferable conditions). However, corporate bonds will play a significant role in the future given the large future investment volumes.

On the **equity side,** internal equity stemming from the TSO's cashflows and external equity from investors are the key factors. Internal equity will typically not be sufficient to provide the required equity volume for major future investment programmes; external equity from investors needs to be acquired to finance these investments. Equity is considered a limiting factor and so further access to such capital is a key prerequisite for ensuring the financing of future investment programmes. In terms of volume, grants from the European Union play a limited role in funding.

2. Financing challenges for energy infrastructure projects

Based on our interviews of 32 TSOs and 15 financing institutions, and the results of the 24 EC questionnaires completed by TSOs, we identify six types of challenges for energy infrastructure projects:

i. Permitting issues: Challenges related to delays in the permitting processes for projects. Permitting processes pose a high risk of causing delay and generating additional costs. Such processes can take up to ten years and TSOs and financing institutions consider them the most important issue with regard to new projects – much more significant than financing challenges, say. These permitting issues form the topic of a separate study.

ii. Financing needs: Challenges in obtaining the funds required to carry out the planned investments. Financing institutions and TSOs generally believe that the planned investments in the period to 2020 can be financed, given suitable regulatory frameworks. However, raising the required capital on the debt and equity side to meet the increased annual investments will require major efforts.

iii. Regulatory issues: Challenges related to insufficient regulatory regimes or insufficient stability of regimes. According to almost all the experts we interviewed, regulatory issues are the most important factor in the financing of energy infrastructure projects. Key issues include regulatory remuneration (the foundation of all investment cases) and the stability of the regulatory regime and related remuneration. These issues are equally important for both the TSO planning the investment and the financing institution providing the funds.

iv. Financing conditions: Challenges related to the higher costs of capital and inadequate conditions for acquiring such capital. Besides the challenge of obtaining the required financing volumes from debt and equity sources, many TSOs raised concerns about recent increases in financing costs and inadequate regulatory remuneration diminishing the returns enjoyed by TSOs.

v. Operator capabilities: Lack of competence and experience in raising the required funds. Smaller TSOs, which in some cases only recently emerged as separate companies following unbundling, often lack the necessary capabilities for large-scale professional financing.

vi. Specific types of projects: Challenges for interconnectors, offshore grid connections, combined grid solutions and security of supply projects. Investments in these types of projects are particularly challenging due to their increased complexity from a commercial, technological and regulatory perspective.

3. Solutions to financing challenges of energy transmission infrastructure

Based on our identification of the main challenges, we developed a series of potential measures for addressing these challenges and discussed them with TSOs, financing institutions, NRAs and the EC. These measures can be clustered into five groups:

i. Improve the regulatory environment for financing energy infrastructure investments in terms of transparency, reliability and returns

According to practically all the financing institutions and TSOs we spoke to, **regulatory issues** are the most important factor in the financing of energy infrastructure projects. The general message from the interviews is: if the regulatory framework is **transparent, reliable and attractive enough** in terms of returns, then the financing of energy infrastructure projects poses very few serious problems. Yet this is not considered to be the case everywhere in Europe. For this reason, we propose a measure that addresses the issue of the **wide variety of regulatory regimes** – regimes which would need to be harmonised in the medium term to create more comparability and transparency for investors (see Section D.1.1). Following on from this, we propose a measure that would create long-term stability for investment cases (Section D.1.2). To bridge the specific financing gap in the **construction phase** of projects, indicated by some TSOs (Section C.2.5), we discuss extending regulatory periods (Section D.1.3). Finally, in Section D.1.4 we propose **priority premiums** (i.e. an equity return "adder" above the normal regulatory returns for specific projects, creating a further incentive for TSOs and equity providers) as an effective way to make transmission project investments more attractive.

ii. Facilitate equity financing by removing institutional barriers and using grants and new equity fund structures on a targeted basis

The investment volumes described in Section B.1 will require **significantly more equity to be raised in the future.** Companies' cashflows in most cases do not provide a sufficient basis for funding large investment programmes. For this reason, raising the necessary equity for future investment programmes can be considered even more challenging than raising the debt volumes, although the latter are greater in terms of size. There also exist institutional hurdles, such as state ownership and control or integration into larger groups of utilities, which make raising equity more difficult.

We discuss two approaches to improving equity supply in the industry. The first is **public grants,** the traditional but probably most expensive means of equity support (see Section D.2.1). The second is **institutional structures** such as the **Marguerite Fund,** which have a specific but probably limited positive effect on equity provision for the energy transport and transmission industry (Section D.2.2). Given the limitations of this latter approach, we propose an adjusted model in form of an **EU-initiated Transmission Infrastructure Fund (TIF)** in Section D.2.3. Finally, we address ways of removing some of the institutional barriers to equity investments in Sections D.2.4 and D.2.5, where we look at issues related to **public ownership of TSOs** and **below-critical size.**

iii. Enhance debt financing conditions by adjusting EIB lending and giving TSOs better access to corporate bond markets

As is the case for equity, raising the required amount of **debt** to support companies' investment plans in the period to 2020 is a challenge. It is assumed that around EUR 200 billion will be needed up to 2020 for Projects of European Interest. Assuming a typical debt/equity ratio of 70/30 at project level, roughly EUR 14 billion in debt will need to be raised on average by TSOs each year in the period to 2020. Acquiring such an amount is in itself a significant challenge.

One possible approach would be to **raise EIB lending volumes** again or change lending conditions in favour of TSOs or projects with financing challenges (see Section D.3.1). EIB lending is not the only source of debt funding for TSOs by any means, but it is an important source. However, increasing EIB lending will not be easy to achieve and, even if it can be done, it will not be enough to address the full financing need of projects.

TSOs with major funding needs must therefore turn to the **international bond markets.** Many larger TSOs already use corporate bond markets extensively. The **EU 2020 Project Bonds Initiative,** discussed in Section D.2.3, introduces an additional support mechanism mitigating specific project risks. It can also help large energy projects which use project finance structures. Nevertheless, some TSOs

would need **help sourcing debt in the form of corporate bonds** and the EU could consider creating incentives for TSOs to obtain credit ratings (see Section D.3.3).

iv. Introduce specific measures for particular types of projects such as inter-connectors, offshore grids and security of supply projects

In addition to the measures already discussed, instruments should be considered which help mitigate **challenges related to specific types of projects, specifically interconnectors, offshore grids and security of supply projects.** These challenges are as follows:

- **Risk-adequate remuneration:** Interconnector projects involve higher risk and often lack adequate incentives. The same is often true of offshore grid connections and potentially also security of supply projects. The most effective way to ensure risk-adjusted returns is through "priority premiums" which compensate the additional risk and complexity of such projects (see Section D.1.4).

- **Cost allocation:** Interconnector projects with complex cost/benefit allocations may face significant delay and potentially complex multi-country offshore grid connections. Cost allocation frameworks can be supported by developing **clear cost/benefit-allocation mechanisms** and by offering **EU support** e.g. via mediators (see Section D.4.1).

- **Advance capacity measures:** Especially in the case of **offshore grid connections** (to integrate future wind farms into the network, say) and gas interconnector projects, **advance capacity** challenges can be mitigated by means of the following:

  - Allowing such investments to be **included in the regulatory asset base** and "socialising" the related risks between customers (see Section D.4.2).

  - Providing **guaranteed volume bridging loans** securing the debt coverage where an advance capacity challenge arises (see Section D.4.3).

  - Supporting such projects directly via **grants** to cover risks relating to the advance capacity challenge and create incentives for investments (see Section D.4.4).

- **Commercial viability:** Some projects that are largely or entirely for the purpose of achieving security of supply (e.g. specific gas storage and reverse flow projects) face a significant challenge in terms of commercial viability. The market has no incentive to sponsor such projects. Commercial viability for security of supply projects can be ensured by including such investments in the regulatory asset base if a cost/benefit analysis shows them to be economically beneficial. If

such assets are not regulated (as is typically the case for storage projects), financing can be supported by specific fund structures (see Section D.4.5).

v. Enhance the transparency and comparability of the financing of energy infrastructure investment in general

A key issue mentioned by financing institutions in this study was the lack of transparency regarding factors influencing investment decisions. In general, there is limited transparency about the detailed **investment volumes** of TSOs on an individual TSO level (the European Network of TSOs' (ENTSO) Ten Year Network Development Plans will only provide regional and project-related data) and the progress and challenges related to investments. This reduces the possibility of timely intervention to mitigate such challenges. This issue could be addressed by a specific study (D.5.1).

Secondly, **regulatory mechanisms and remuneration** are difficult to understand and compare between countries. This area also merits more detailed investigation (see Section D.5.2). Thirdly, no **assessment of investor-friendliness in terms of the stability of regulatory remuneration over time** is available on a comparative basis. Yet this is a key area that investors need to understand before committing to such investments (see Section D.5.3).

Finally, for security of supply projects, the EU has introduced measures in Regulation (EU) No 994/2010 to safeguard the security of gas supply in Europe, including the requirement for each Member State to perform a risk assessment by the end of 2011. As these assessments are on-going, there is still a **lack of transparency about the current level of security of supply** in EU Member States. It is also unclear what security of supply levels is required or desired by individual Member States and which projects would improve security of supply in the most cost-efficient manner. This area also requires more detailed investigation (D.5.4).

4. Recommendations

This study recommends taking action in five areas:

i. Improve investment conditions specifically for challenging projects

Given the very large amounts of money which will be required, it is advisable to make the investment opportunities as attractive as possible. To this end, we recommend introducing a **priority premium** as described in Section D.1.4. The priority premium should apply to high-priority Projects of European Interest, especially those in the area of advance capacity and security of supply, which are subject to major risk or other challenges (see D.4).

ii. Enhance capital market readiness and facilitate more private investment

With the Marguerite Fund, the international financing institutions (IFIs) have taken a step in the right direction. Yet on its own this will probably not be enough to have a significant effect on the financing challenges facing the industry in the coming years. The IFIs will need to invest large amounts of money. A structure such as the proposed **Transmission Infrastructure Fund** (see Section D.2.3) could help release significant additional sums in public funds. On the debt side, the most important instrument for funding will be access to the global bond market. Many TSOs in Europe cannot access this market at the moment.
The EC could **help TSOs obtain a credit rating and access corporate bond markets** (see Section D.3.3).

iii. Provide support for specific types of projects

For projects aimed at mitigating the **advance capacity challenge,** we recommend introducing two specific measures:

- **Include anticipatory investments in the regulatory asset base** (D.4.2): This measure would effectively reduce risks of such investments. It would be more cost-efficient in the long term than providing short-term grants. Consumers would bear the risk in the short term but they would profit in the long run thanks to lower overall costs. This is an effective broad approach for dealing with the advance capacity challenge.

- **Financial support in the form of grants** (D.4.4): Direct grants would provide short-term support for anticipatory investments, removing part of the risk and aiding the investment decision.

iv. Remove institutional barriers

The institutional barriers to financing and investment in European TSOs mainly relate to **state ownership and control.** The EC should enter into conversations with shareholders and regulators of TSOs aimed at allowing more private sector equity into the industry.

v. Develop the TEN-E programme

The TEN-E programme should continue to manage Projects of European Interest. It should also help to create more transparency about the actual financing and investment framework of European TSOs for these projects. It can do this by **carrying out additional focused studies** such as those described in Section D.5 – a detailed

assessment of TSO investment patterns, a benchmarking study of regulatory regimes in terms of investor-friendliness and a detailed benchmarking study of returns. We also recommend that the EC acts as a mediator in negotiations about complex multi-country projects and their cost allocation processes (see Section D.4.1). The body responsible for the region where the project is located, e.g. the North-South High Level Group, can also play a role here.

Finally, the TEN-E programme should continue to finance feasibility studies but apply higher quality standards to them. In addition, it should take over responsibility for the administration of specific support instruments, such as grants for specific types of projects.

A. Introduction

A.1 Background and key questions

High-quality infrastructure is one of the most important factors in the economic growth of EU Member States and the EU as a whole. Reasonable prices for electricity, gas and oil in a unified European energy market depend on the existence of energy transmission grids covering the individual states and connecting them with each other. Looking to the future, the transformation to a sustainable economy with a large proportion of energy drawn from renewable sources will require major changes in the transmission grid infrastructure. Upgrading the existing infrastructure and building new infrastructure thus represents a major challenge for the coming decades.

The EC is actively striving to promote the development of energy infrastructure in EU Member States. A total of 568 energy infrastructure projects of European and national interest have been identified and given priority status under the Trans-European Networks for Energy (TEN-E) guidelines. EU Member States are obliged to facilitate the realisation of these projects within a reasonable timeframe.

If the goals of the EU's 2020 scenario are to be met, a significant increase in investment is required over the coming ten years for building new infrastructure, compared to current levels. The financing of energy infrastructure projects has become a challenge in recent years. As transmission system operators have been unbundled and partially privatised, the financing of infrastructure projects by national states or (former) parent companies is no longer automatic. Transmission infrastructure investments need to attract much more private capital than in the past, under market conditions. This new "midstream" energy sector is still in its infancy as an independent industry and it has a long way to go to achieve the necessary investor focus.

Under the TEN-E framework, the EC has to date focused its financial support on funding feasibility studies. It has also directed some resources – a maximum of 10% of project costs – towards a small number of construction projects. Co-financing studies (by up to 50% per study) accounted for 65% of the total amount spent. Some 35% was allocated to co-financing works. In addition, during the financial crisis, the European Energy Programme for Recovery (EEPR) directly co-financed 47 key energy infrastructure projects that would otherwise have been delayed or cancelled due to the crisis, with a total grant volume of EUR 2.7 billion.

The question now arises as to whether the EU can – or indeed should – support the financing of energy infrastructure projects and, if so, how it might do this. Such support could speed up the realisation of projects or tip the balance in favour of projects in the decision-making process.

To provide input to the legislative proposal for a new EU Energy Security and Infrastructure Instrument (EESII) in 2011, the EC commissioned Roland Berger

Strategy Consultants to perform a study on the structuring and financing of energy infrastructure projects, the financing gaps and recommendations regarding the new TEN-E financial instrument (Tender No. ENER/B1/441-2010). This final report **aims to answer three key questions:**

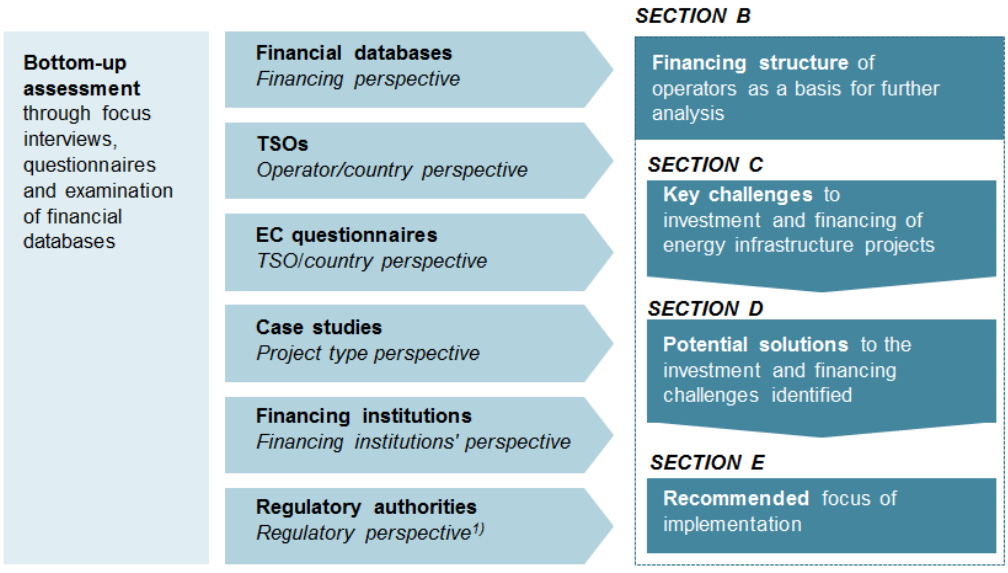
1. **What was the structure of energy transmission infrastructure investments** in the last five years in terms of investment volumes, financing structures, financing sources and the financing capacity of operators, and what do we expect to see in the future?

2. **What challenges arise** regarding the financing of such infrastructure projects, and where are the financing gaps?

3. **What measures and instruments** should be implemented to overcome such challenges and gaps?

A.2 Methodology and structure of the study

The challenges involved in creating the required energy infrastructure by 2020 are numerous and varied. They include issues such as the specific national framework in which TSOs operate and developments on the regulatory and financing side. To ensure all perspectives are included, we take a bottom-up approach based on six lines of analysis (see Figure 1 below). The study consisted of two phases: in Phase 1, we investigated the financing structure and identified key challenges; in Phase 2, we used this information to derive potential solutions and recommendations.



1) Only used in the evaluation of potential solutions (Section D)

Figure 1: Methodological approach of the study

Phase 1 – Financing structures and key challenges

We interviewed experts from 32 TSOs to obtain an in-depth view of their particular situation, as well as a broad, country-based perspective. We supplemented this with the results of 24 questionnaires produced by the EC, circulated among TSOs in Europe. We also conducted eight case studies on particular transmission projects to identify the challenges arising in projects which are especially important for further market integration in Europe – specifically interconnector projects between two countries. These include projects which involve complex cost/benefit allocations, offshore grids with specific advance capacity challenges and gas storage projects in different regulatory environments.

In addition, we interviewed 15 financing institutions, including commercial banks, International Financing Institutions (IFIs) such as the EIB, and equity investors (e.g. large international pension funds). This provided us with insights into the key challenges from the financing institutions' perspective. We also drew on financial databases for data such as credit ratings.

Phase 2 – Potential solutions and recommendations

To evaluate the **key challenges identified** and **our proposed solutions** (see Section D), we sent out questionnaires to 27 TSOs, 14 financing institutions and 28 National Regulatory Authorities (NRAs). Answers were received from 17 TSOs, 9 financing institutions and 19 NRAs. This multi-perspective feedback provides a balanced view of the situation from the perspective of key stakeholders and underlies our recommendations.

Structure of the study

Section B, below, presents an analysis of the financial structure of TSOs, looking at the prevalent financing approaches (corporate and project finance), financing capabilities (as indicated by credit ratings), leverage and key sources of financing (debt and equity). This forms the framework for our subsequent analysis of key challenges and potential solutions. Section C presents the main challenges identified in the interviews, questionnaires and case studies. Section D then discusses and evaluates levers for mitigating these challenges and finally Section E summarises our recommendations.

B. The financing of energy transmission infrastructure projects in the EU

This section provides an **overview of the financing of energy transmission infrastructure** projects in Europe. It includes the following analyses:

- **Analysis of past investment patterns** by TSOs and **planned investment** in relation to the investment needs identified by the EC for the period to 2020
- **Analysis of the financial capabilities** of European TSOs based on credit ratings
- **Analysis of the typical financing structures** of energy infrastructure investment projects, including key factors in financing decisions, such as:
  - Project versus corporate finance and their relation to the underlying business models
  - Use of debt financing/leverage by TSOs
  - Ownership patterns of TSOs as a key factor in the provision of equity
- **Analysis of the sources of financing** of energy infrastructure projects

B.1 Investment patterns and investment requirements of European TSOs

In its Communication **"Energy infrastructure priorities for 2020 and beyond – A blueprint for an integrated European energy network"** (COM (2010) 677)), the EC identifies an **investment need of approximately EUR 200 billion for energy transmission Projects of European Interest** (excluding national projects and grid refurbishments) in order to meet its 2020 targets. At the same time, it questions whether such investment volumes can be met by the market. According to the EC, approximately EUR 100 billion of investment is at risk of not being realised due to delays in permitting procedures and the general "difficult access to finance and lack of adequate risk mitigation mechanisms".

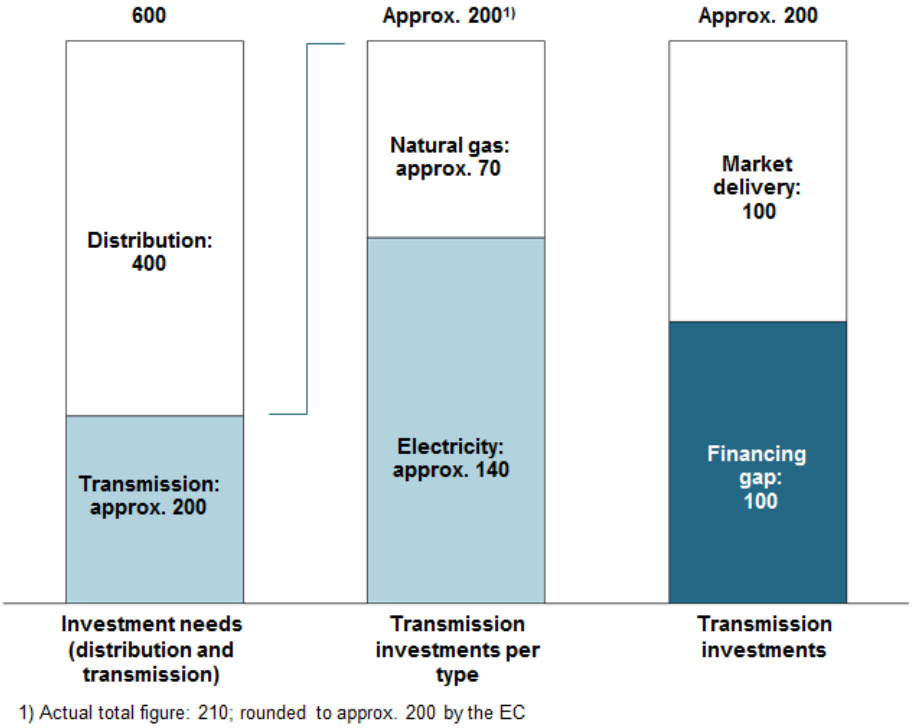


Figure 2: Energy transmission investment gap analysis 2010-2020 [EUR billion]
(Source: European Commission)

To assess this **financing gap,** we need to analyse the volume of past investments by TSOs and compare them to the planned investment volume for the future. We can then compare this to the investment requirement foreseen by the EC for Projects of European Interest.

B.1.1 Past and future planned investments by European TSOs

To shed light on the **feasibility of the required investments by European TSOs,** we compared total past and future TSO investments. We identified the annual average investments between 2005 and 2009 and planned investments between 2011 and 2020 on the basis of information contained in companies' annual reports, other data sources (such as published investment plans, company overviews and the AMADEUS database) and telephone interviews with TSOs. As the timeframes used in sources sometimes differ, we aggregated the data into an annual average investment figure, containing all the available information and taking into account differing timeframes.[1]

[1] For example, some companies state their investment plans to 2015, others to 2020.

Past investments by European TSOs in network extensions and refurbishments between 2005 and 2009 were around EUR 9.1 billion per annum (EUR 5.8 million for electricity projects, EUR 3.3 million for natural gas). This compares to an average annual required investment of around EUR 20 billion for Projects of European Interest to meet the EU 2020 targets. For the period to 2020, TSOs indicate investments of around EUR 14 billion per annum (EUR 9.8 million for electricity, EUR 4.2 million for natural gas; see Figure 3).

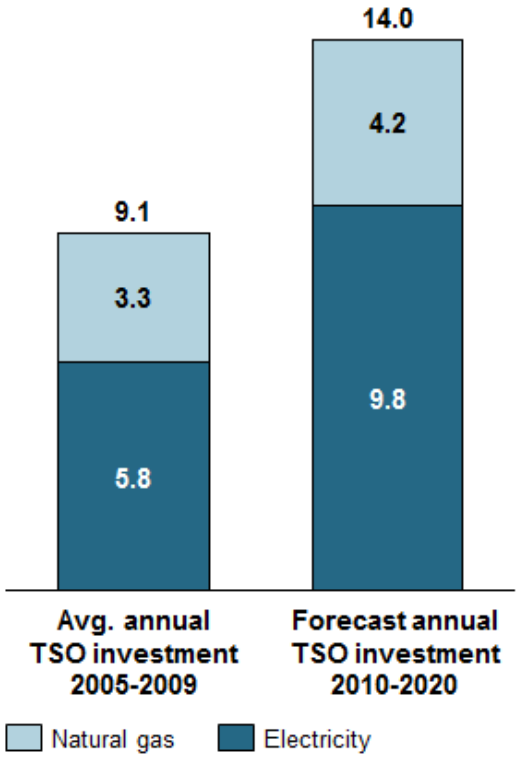


Figure 3: Comparison of past and planned future TSO investments [EUR billion]
(Source: Annual reports, interviews, Roland Berger research)[2]

Data was not available for all TSOs, especially in the natural gas segment. The true investment volumes and projections can therefore be expected to be higher than the figures given here. Nevertheless, **two points** are clear:

1. TSOs must **significantly increase their investment volume** compared to current levels – and indeed they are planning to do so. The financing need in the electricity sector will grow particularly strongly: while overall investments by

[2] Investment figures are based on companies' total investments in the transmission and transport of electricity and gas. It was not possible to break down investments by type of project. For a detailed breakdown of investments by operator, see Appendix A.

natural gas TSOs will increase by almost 30%, electricity TSOs plan to raise their investments by approximately 70%.

2. Planned investments by TSOs still fall short of the investment requirement foreseen by the EC Communication. Moreover, the EC Communication only relates to Projects of European Interest, while the figures for TSO investments are for total investments, including purely national projects. On the basis of the investment volumes indicated by the EC, there will be a significant additional investment (and hence financing) need for TSOs in the future.

The increase in the volume of investment needed will represent a major challenge for the industry in the coming years. In this context, the question arises of **which geographical regions** will face the biggest challenges in terms of increased investment. We address this question in the following section.

B.1.2 Regional perspective on electricity

Major differences exist between electricity TSOs in Europe in terms of their **past investments.** In the period 2005-2009, investments in energy transmission infrastructure were focused on Western Europe (AT, BE, DE, FR, UK, IE, LU, NL), which saw annual investments of EUR 3.2 billion. This was approximately twice as high as in Southern Europe (CY, EL, ES, IT, PT), where annual investments were EUR 1.7 billion in the same period. Northern Europe (DK, FI, SE) came next, with annual investments of EUR 0.7 billion, followed by Eastern Europe (BG, CZ, EE, HU, LI, LV, PL, RO, SK, SI), with annual investments of EUR 0.4 billion. Differences between individual countries were primarily due to the size of the country in question and the corresponding investment requirements.

Forecast investments also show wide variation. Thus in the period 2010-2020, TSOs in Western Europe are planning the biggest increase in annual investments, up some 94% to EUR 6.3 billion a year. This is mainly due to the massive investment in renewable energy planned and the necessary upgrading of the transmission grid – e.g. investments in offshore wind farm connections and interconnectors to deliver excess energy from fluctuating renewable energy generation to pumped storage reservoirs in Norway. Southern Europe is planning a more moderate increase in planned investments, up 26% to EUR 2.1 billion a year. Northern Europe is planning an increase of 85% to EUR 1.3 billion a year, while Eastern Europe is planning an increase of 68% to EUR 0.8 billion a year, mainly due to grid modernisation and the integration of renewable energy. Thus three of the four regions are planning a massive increase in annual investment of between 68% and 94%. This will create significant challenges for TSOs in terms of both increased investment and absolute financing volumes.

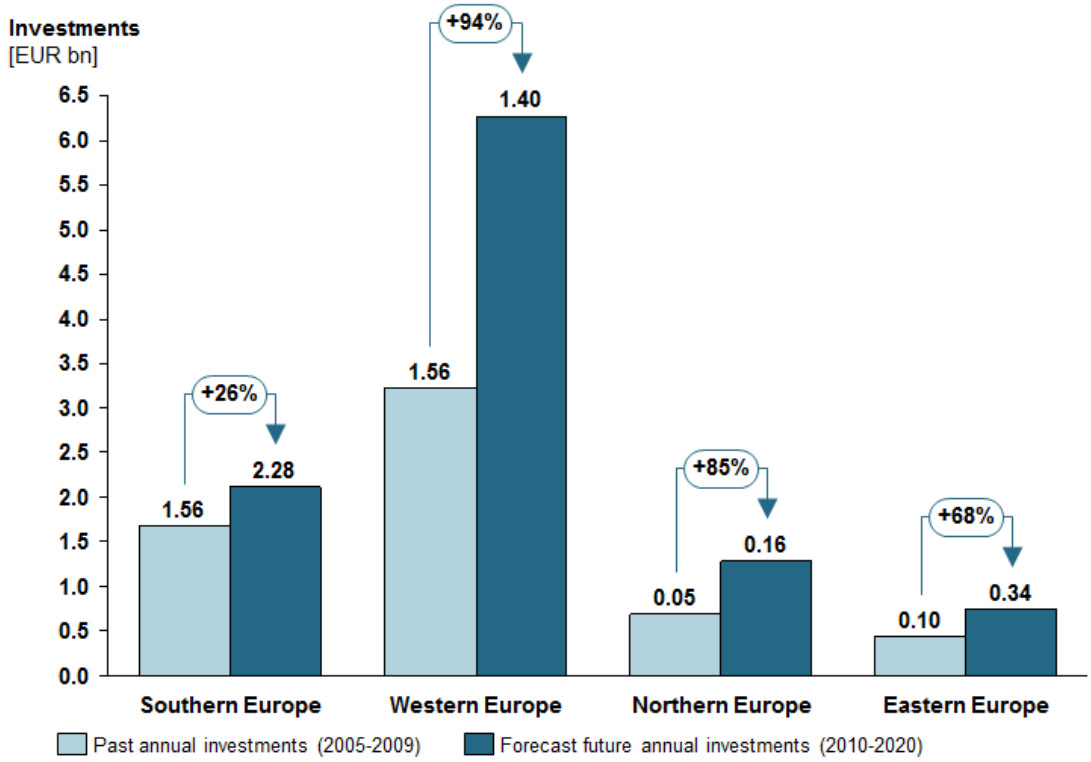


Figure 4: Comparison of past (2005-2009) and planned future (2010-2020) investments in European regions by selected electricity TSOs in Europe (EUR billion per annum][3]
(Source: Annual reports, interviews, Roland Berger research)[4]

It is worth noting that smaller TSOs in particular will have to deal with major increases in investment volumes and the challenges that these bring. Five out of the seven TSOs planning an increase of over 100% in annual investments currently have annual revenues of EUR 1 billion or less (see Figure 13 in Section D.2.5 for an indication of the size of TSOs).

B.1.3 Regional perspective on natural gas

Major differences are also found in terms of **past investment by natural gas TSOs** in Europe. In the period 2005-2009, investments were clearly concentrated on

[3] Based on available data. The following countries are clustered to the respective regions: Southern Europe (CY, EL, ES, IT, PT), Western Europe (AT, BE, DE, FR, UK, IE, LU, NL), Northern Europe (DK, FI, SE), Eastern Europe (BG, CZ, EE, HU, LI, LV, PL, RO, SK, SI)
[4] Of the 27 EU Member States, 8 were excluded from the analysis as data was not available or could not be validated. Norway was included for comparison reasons due to its importance in future Northern European electricity networks, specifically offshore projects, interconnectors and electricity storage.

Southern Europe (IT, ES, PT) and Western Europe (BE, UK, FR), each with an annual investment volume of EUR 1.6 billion. Italy in particular saw major investments. Northern Europe (DK, FI) experienced relatively low levels of investment, at just EUR 0.05 billion a year, while Eastern European countries (CZ, SI, PL) invested EUR 0.1 billion a year.

Wide variation between TSOs is also found in their **future investment plans.** Italy contributes strongly to the overall planned investment volume, with the Italian TSO Snam Rete Gas planning to invest EUR 1,600 million annually.[5] The other TSOs in this study plan to invest a total of EUR 2,500 million taken altogether.

Regarding **forecast investments,** some **Eastern European** TSOs (Czech Republic, Slovenia and Poland) plan to **increase investments significantly, by a factor of 2.4** (see Figure 5 below). However, they are starting from a much low level than in Western and Southern Europe, say. Western European TSOs face higher investment levels than their Eastern European counterparts in absolute terms, but are starting from a much higher level.

A moderate **decline (11%) in future annual investments** is expected in **Western European** countries on average. This is mainly due to strong investments in the past, which mean that the current transmission infrastructure is adequate.

[5] See Snam Rete Gas, 2011-2014 Strategic Plan; annual investments refer to the period 2011-2014.

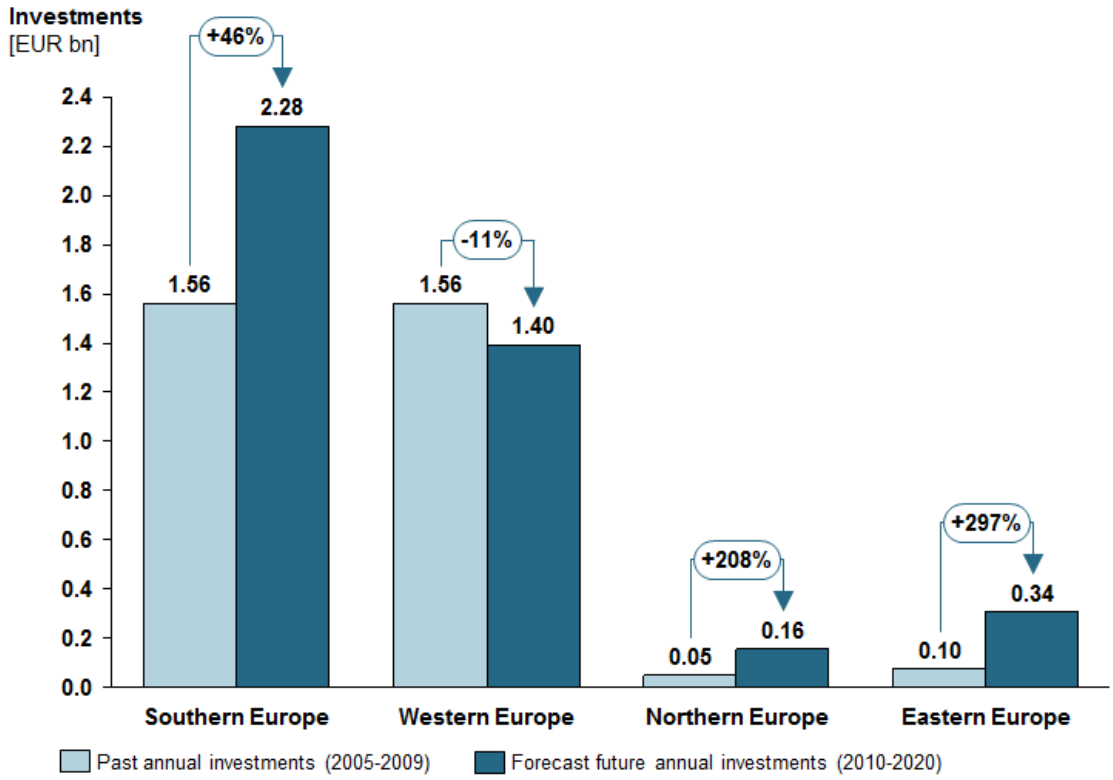


Figure 5: Comparison of past (2005-2009) and planned future (2010-2020) investments by natural gas TSOs in European regions (EUR billion per annum)[6]
(Source: Annual reports, interviews, Roland Berger research)

B.1.4 Summary of TSO investment patterns

When we compare the future investment activities of electricity and natural gas TSOs, some clear regional patterns emerge. TSOs in Southern and Western Europe will see the highest absolute investment volumes both in electricity and natural gas, with an overall volume of EUR 12.0 billion (80% of the overall annual investment volume). The total investment volume of TSOs in Eastern European countries is lower in absolute terms, but with planned increases of 100% (overall average figure for electricity and natural gas).

It should also be noted that the TSOs facing the largest future investments typically already have a well-established position regarding the capital markets, be it in the form of listings on stock exchanges, support from large parent companies or good

[6] Based on available data. Southern Europe (IT, ES, PT), Western Europe (BE, UK, FR), Northern Europe (DK, FI), Eastern Europe (CZ, SI, PL)

credit ratings (see Section B.2). Securing large amounts on the capital markets is not as straightforward for Eastern European TSOs (see Sections B.2 and B.3.2).

To summarise, a significant increase in overall investment volumes is expected in Europe in the period to 2020. TSOs will need to find the required financing volumes on the market. Certain countries, especially in Eastern Europe, will have to cope with increases of more than 200% in investment. This requires both access to funding on this scale from the market and a professional financing approach on their part. Yet some TSOs – for example, those created by recent unbundling – do not yet have the experience required to meet the demands of the capital market and lack sufficient access to financing markets.

B.2 Financing capabilities of European TSOs

B.2.1 Credit ratings – a key factor in TSOs' financing capabilities

Credit ratings issued by the rating agencies Standard & Poor's, Moody's and Fitch are an important indicator of the financial health of corporations. A TSO's credit rating expresses the risk for financing institutions of providing funds to that TSO, and as such gives an indication of its ability to acquire debt. Given the large investments planned by TSOs, it is important that they have access to significant volumes of capital at market conditions. A credit rating is an important basis for this, and in some cases – such as for issuing corporate bonds – it is a precondition. To assess the financial strength of European TSOs and their borrowing capability, we therefore examined the publicly available investment ratings of TSOs.

A credit rating typically involves an assessment of a variety of different areas relevant for the TSO's creditworthiness. For instance, according to Moody's, four factors influence the final credit rating. These factors each include a number of sub-factors, and vary in terms of their relative importance (see Figure 6; relative importance is shown by the weighting given as a percentage in the boxes).[7]

[7] See Moody's Global Infrastructure Finance, Regulated Electric and Gas Networks (2009)

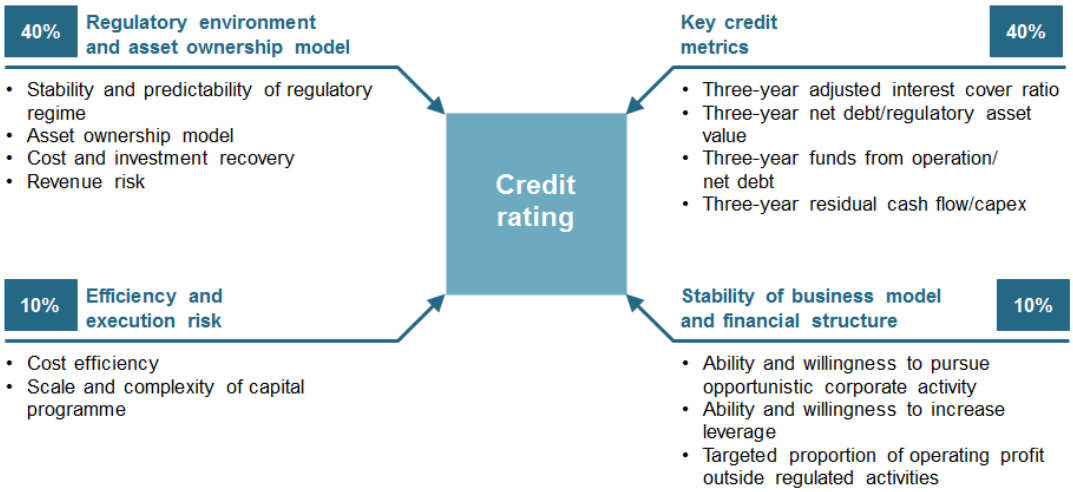


Figure 6: Credit rating – factors and weighting (Source: Moody's)

The credit rating methodology used for unregulated utilities differs from that of TSOs in a number of ways. In particular, it **does not consider the regulatory regime** – crucial for TSOs operating in a regulated market.[8]

The **existence of at least one and typically two different credit ratings** is a key prerequisite for issuing corporate bonds on the market. Bonds offer advantages over bank loans due to their longer maturities (ten years on average, compared to five to seven years for commercial bank loans) and better interest rates, which are somewhat counterbalanced by their lower flexibility and high transaction costs. Their main advantage, however, is that they typically allow much larger volumes to be placed (in the range of EUR >1 billion) than typical bank loans, as the bond market is a theoretically unlimited source of funds, whereas bank lending appetite is typically limited.

Today, only a minority of TSOs enjoy a "standalone" credit rating (12 out of 34, or 35%, for electricity TSOs; 4 out of 34, or 12%, for natural gas TSOs). In a number of cases, however, TSOs are vertically integrated into their majority shareholder, normally a larger utility company. These larger utilities in turn typically have credit ratings (7 out of 34 electricity TSOs, 15 out of 34 natural gas TSOs) and often take on financing functions for their subsidiaries.

In almost a third of cases, (14 of the 34 electricity TSOs and 6 of the 34 natural gas TSOs), TSOs are majority state-owned and **no meaningful rating or no rating at all** is available. In cases of majority state ownership, the sovereign rating can serve as an indication for the TSO's rating and would be a key factor in whether the TSO would receive its own rating.

[8] See Moody's Global Infrastructure Finance, Unregulated Utilities and Power Companies (2009)

If a rating is available for a TSO or the financing parent company, its level is a key determinant of the cost of borrowing and the ability of the TSO to increase its lending volumes. Financing institutions generally consider the energy transmission industry to be a low-risk business and stable with regard to future cashflows. As such, the volume of lending is not severely constrained by TSOs' ratings, as long as they are in the "investment grade" range.[9] This is the case for all TSOs except two natural gas TSOs in Eastern Europe. We discuss the credit ratings of electricity and natural gas TSOs below in more detail, using data from Standard & Poor's, Moody's and Fitch.

[9] A rating level at or above BBB- (S&P, Fitch) or Baa3 (Moody's).

B.2.2 Credit ratings of electricity TSOs

Summarising the information from figure 7 below, we conclude that all **electricity TSOs** under investigation have an **"investment grade"** rating.[10]

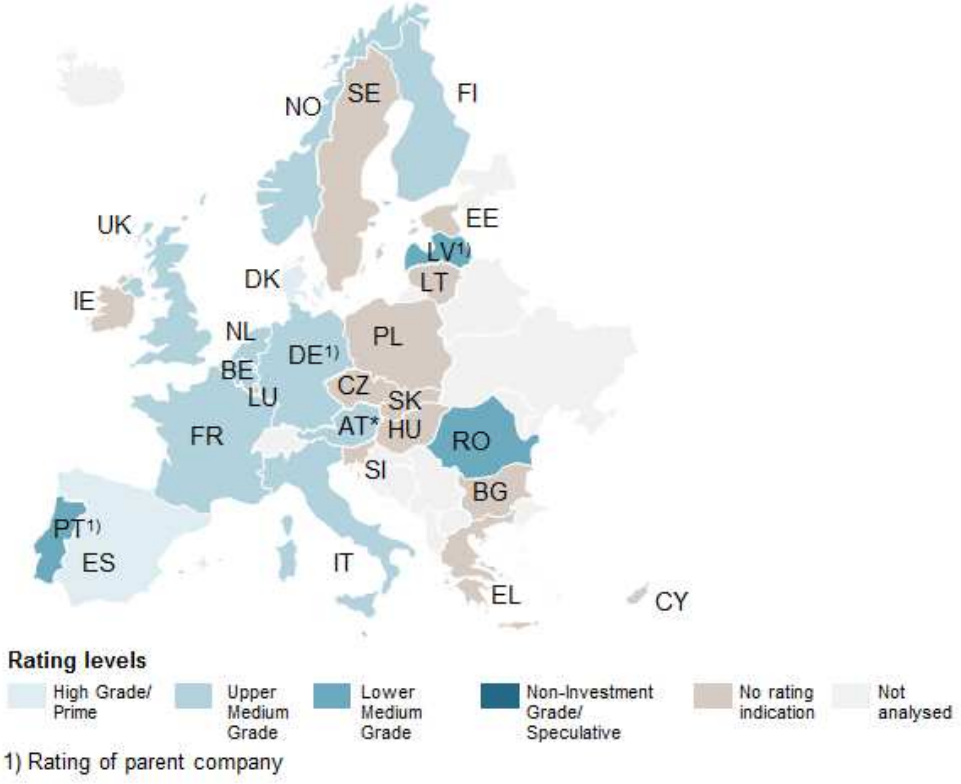


Figure 7: Comparison of credit ratings for electricity TSOs in Europe
(Source: Standard & Poor's, Moody's, Fitch, Roland Berger research)[11]

[10] We use the most recent rating available (from 2009, 2010 or 2011) and the long-term investment rating to illustrate creditworthiness. To make the credit ratings of different companies comparable, we align them by classifying them as shown in Appendix A. In countries with several TSOs, we take the average rating. Where TSOs are not listed by any of the three rating agencies, the classification shows the rating of the majority shareholder (*).

[11] **High Grade/Prime:** An obligor has very strong capacity to meet its financial commitments. It differs from the highest-rated obligors only in small degree (S&P AAA to AA-).
Upper Medium Grade: An obligor has strong capacity to meet its financial commitments but is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligors in higher-rated categories (S&P A+ to A-).
Lower Medium Grade: An obligor has adequate capacity to meet its financial commitments. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its financial commitments (S&P BBB+ to BBB-).
Non-Investment Grade/Speculative: An obligor is less vulnerable in the near term than other lower-rated obligors. However, it faces major ongoing uncertainties and exposure to adverse business, financial or economic conditions which could lead to the obligor's inadequate capacity to meet its financial commitments (S&P BB+ and below).

The **highest credit ratings** are found for Energinet.dk (Denmark, S&P, AAA) and RED Eléctrica De España S.A. (Spain, S&P, AA-). In Germany, we need to differentiate between the four operating TSOs: Ampiron is rated A (S&P), EnBW Transportnetze AG and TenneT TSO GmbH are rated A- (S&P) and 50Hertz Transmission GmbH is rated Baa1 (Moody's Lower Medium Grade).

In summary, the current credit ratings of all electricity TSOs are in the "investment grade" range and, as such, are not an obstacle to TSOs acquiring debt at favourable conditions.

B.2.3 Credit ratings of natural gas TSOs

Summarising the information from figure 8 below, one can conclude that the majority of natural gas TSOs have an "investment grade" rating.

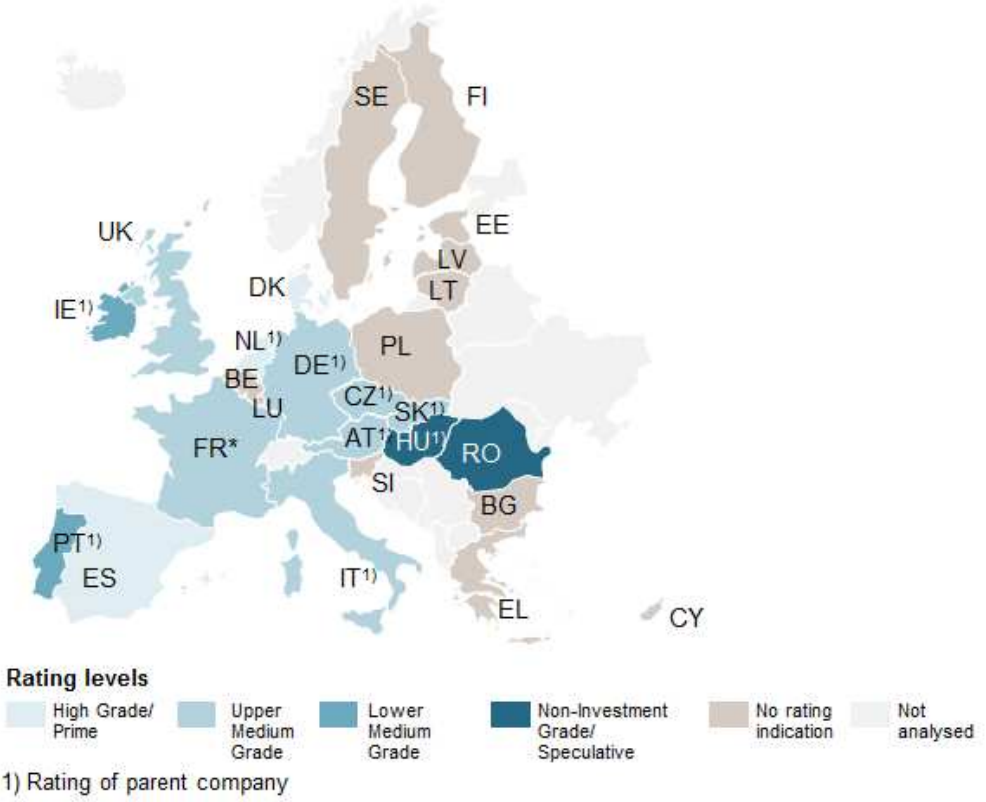


Figure 8: Comparison of credit ratings for natural gas TSOs in Europe
(Source: Standard & Poor's, Moody's, Fitch, Roland Berger research)

Using the methodology outlined above, we were unable to identify a rating for TSOs in Belgium, Bulgaria, Cyprus, Estonia, Finland, Greece, Latvia, Luxemburg, Lithuania, Poland, Slovenia and Sweden, either on an individual level or for parent companies.

B.2.4 Summary of ratings

To summarise, except for the non-investment ratings of natural gas TSOs in Eastern Europe, there is **no indication that credit ratings would create serious financing problems for TSOs in Europe.** For companies whose rating is in the investment grade range, the difference in the actual rating merely has an effect on the cost of debt, not on the availability of credit in general. Ratings below investment grade in most cases limit the general availability of debt and lead to increased debt capital costs, as the market is generally much less interested in lending to such companies. Looking at published credit ratings, this challenge does not appear to be generally applicable at present to the energy transmission industry.

In many cases, however, TSOs do not have a credit rating at all. This is sometimes because they are part of a larger (rated) group or are funded by their parent company. Yet there are still 30 TSOs, in many cases state-owned, without a standalone or group rating. This reduces their ability to access corporate bond markets directly.

It should be noted that, besides the company-related criteria indicated above, major external factors such as the **financial crisis** can also impact on credit ratings. Most TSOs we spoke to said that the financial crisis had had no significant impact on their credit ratings and related financing conditions. Yet there was a clear negative impact on the credit ratings of TSOs in the countries severely affected by the crisis – such as Ireland, Portugal and Greece. The effect of downgrading a credit rating is primarily to increase the cost of borrowing. A negative effect on the availability of sufficient financial resources was not reported by our interviewees. The main impact of the financial crisis has thus been to increase financing costs. As long as the general volume of funds available for borrowing is not constrained – which has not been reported – the financial crisis does not therefore appear to represent a direct challenge to the delivery of planned investments.

B.3 Financing structures of energy infrastructure projects

In order to analyse the core challenges facing energy infrastructure investments and the potential instruments that can be used to support them, we need first to understand how TSOs typically perform their financing operations. This includes whether TSOs use corporate or project finance, the influence of underlying business models on the financing structure, and how conditions such as ownership and debt/equity ratios influence their investment and financing capabilities.

B.3.1 Corporate finance as the predominant approach for financing energy infrastructure projects

In general, two financing approaches are possible for energy infrastructure projects: **corporate finance** and **project finance.** The table below shows the key differences.

	Corporate finance	Project finance
Approach	• **Financing on a group level** of the TSO for a portfolio of projects, not on an individual project basis • **Projects appear on the balance sheet** of the TSO	• **Financing on a project-specific level** • **Projects do not appear directly on the balance sheet of the TSO** but on that of a separate project company
Financing costs	• **Good company-specific financing conditions** on a group level can be passed on to specific projects	• **Higher financing costs,** as the risk for investors/lenders is greater on a project-specific level than for the whole project portfolio. This is especially the case during the preparation and construction phase of projects
Application	• **All domestic projects and many interconnectors are corporate-financed** (according to interviewees)	• **Project finance for specific projects** – Merchant interconnectors that are run and structured on a commercial basis (usually with greater expected returns from congestion rents reflecting the greater risks) – Specific regulated interconnectors that are set up as a joint venture by related TSOs – Specific natural gas storage/LNG projects

Table 1: Differences between the corporate finance and project finance approaches (Source: Interviews, Roland Berger research)

Project finance is more complex and typically more costly for TSOs, by at least 100 basis points. As a result, only a minority of projects in energy transmission are financed in this way. **Corporate finance is the predominant financing approach for energy infrastructure projects, both in electric power transmission and natural gas transmission.** Indeed, practically all domestic projects which are part of the regulatory asset base are financed on a corporate level.

Project finance is more complex on both the organisational and the financing side. On the organisational side, projects need to be separate from other (regulated) assets – in form of an independent project company, say – to be open to project finance. On the financing side, project finance requires the acquisition of separate equity and debt for each of the projects in question and the subsequent management of this capital. This significantly increases the complexity compared to having a single financing process and related structures for a broader portfolio of projects.

This complexity is reflected in the procedure commonly used for such investments. From a procedural perspective, energy infrastructure **investments are handled on a portfolio rather than a single-project basis.** Generally, a portfolio of energy infrastructure projects is defined in the context of a mid- and long-term investment plan, commonly for five to ten years, based on the initiative of the TSOs and coordinated with certain governmental bodies. With the approval of the national regulator, projects become part of the "regulatory asset base" (RAB) and financing for them is sought on a portfolio basis. The acquisition of related capital in large tranches reduces the level of complexity. For example, on the bond market, large volumes of more than EUR 1 billion can be placed by larger TSOs, providing financing for large parts of an investment plan. This also translates into lower transaction costs. Instead of requiring the acquisition of funding on a single-project basis, with the related costs (i.e. separate processes for acquiring and managing project-related funds), the corporate finance process acquires large volumes of funds for the group of projects and the related transaction costs arise once only.

Apart from less complexity, the key advantage of corporate financing is the **possibility of securing better financing conditions,** mainly due to the lower level of risk involved. Risk related to individual projects (i.e. unsystematic risk) is diversified by the TSO's overall portfolio of investments. As the TSO typically covers debt service with its entire balance sheet, lenders provide better conditions on a corporate level as the loans do not relate to specific individual projects with their own economic lifetime, associated risk, and so on. Moreover, interest repayment is guaranteed through the revenues generated by a broader set of projects.

While it is not feasible to compare corporate and project finance on a general level due to factors such as guarantees and specific project-related risks, estimations by financing institutions indicate some 100 basis points as a mark-up for project finance compared to corporate finance on the debt side in order to compensate for the additional risk.

Three main business models are typically found for energy infrastructure projects, each with its own implications for financing:

1. **Fully regulated projects:** These projects are approved beforehand or after the fact by the relevant national regulatory agency and become part of the regulatory asset base (RAB). The repayment of investment expenses for these projects is through regulated revenues, i.e. the project costs are directly "socialised" and consumers pay via a share of the energy prices. This business model is found for the vast majority of projects, i.e. all domestic electricity and natural gas projects and a large share of interconnector projects. The **most common financing approach for these projects is corporate finance.**

2. **Projects with a mixture of merchant and regulated elements:** These projects are typically interconnectors for which TSOs apply for specific exemptions from

the third-party access requirement, as outlined in Regulation 714/2009 (relating to Directive 2009/72/EC) for electricity projects and Regulation 714/2009 (relating to Directive 2009/73/EC) for Natural Gas projects. The underlying business model includes market elements, for example when exemption from regulation and rules of allocation for congestion management income is sought. It also includes regulated elements. Consequently, the revenues used for refinancing the project are generated from congestion rents between the countries involved, within certain limits set by the NRAs. For example, for interconnectors from the UK to the Netherlands (BritNed) and Belgium (Nemo), there is a regulated cap and collar, including both a market-based auction mechanism and a regulated maximum revenue. This ensures that returns above or below a specified range are returned to consumers or supplemented by them. The cap ensures that consumers also benefit from the interconnector through lower prices, while the collar ensures that the investment risk is not borne solely by the investor (who is already capped in the upside potential) but also to some extent by the consumers. The **most common financing approach here is corporate finance channelled to the project company.** Project finance would generally be feasible, as a separate company is created for such projects (this is a requirement for the application of exemptions under Regulation 714/2009, Article 17 referring to Directive 2009/72/EC for electricity interconnectors and Regulation 715/2009, Article 30 referring to Directive 2009/73/EC Article 36 for natural gas interconnectors). However, money is usually transferred from the TSO to the project company using the preferable corporate financing conditions of the TSO to fund the interconnector project. Project finance would imply higher financing costs, as the risk profile of a single project would need to be included in the cost of borrowing or return on equity.

3. **Merchant projects:** This business model is used for specific interconnector projects run on a fully commercial basis outside the regulatory scheme, with full exemption from Regulation 714/2009 (relating to Directive 2009/72/EC) for electricity projects and Regulation 715/2009 (relating to Directive 2009/73/EC) for Natural Gas projects. An example is the EstLink 1 project linking Estonia and Finland and the related markets. Revenues are determined entirely by a market mechanism. Refinancing of the project is conducted entirely via the income from the congestion rent of the interconnector. The **most common financing approach for such projects is project finance with corporate guarantees.** Financing is conducted directly via the project finance for the separate project company. To support the financing conditions and readiness of lenders to support the project, shareholder guarantees are used (in the EstLink 1 cable, for instance, this was a prerequisite for borrowing). It should be noted that the shareholders investing in the merchant interconnector are typically not directly responsible for providing reinforcement of the connecting transmission infra-structure, which may potentially be required. Rather, this is the responsibility of the TSO under the respective regulatory regime. As these TSOs are usually shareholders in such interconnector projects, the required reinforcement of onward transmission capacities is typically ensured.

Table 2, below, summarises the three models.

Business model	Fully regulated projects	Projects with a mixture of merchant and regulated elements	Merchant projects
Revenue generation	• Determined by the regulator	• Determined by the market within a defined bandwidth (cap/collar)	• Determined by the market
Refinancing	• Via regulatory remuneration	• Via congestion revenues, kept within a certain limit (cap and floor)	• Via congestion revenues or capacity booking for gas
Exemption from Regulation 714/2009, Directive 2009/73/EC	• No exemption	• Partial exemption	• Full exemption
Predominant financing method	• Corporate finance	• Corporate finance channelled to the project company	• Project finance with corporate guarantees
Example	• Domestic projects • SK-HU Interconnector (natural gas)	• BritNed (UK, NL) • Nemo (UK, BE)	• EstLink 1 (EE, FI)

Table 2: Different energy transmission business models and their impact on financing (Source: Interviews, Roland Berger research)

The fact that so little project finance is used in energy transmission is a major factor in **making access more difficult to certain debt facilities** (such as the Europe 2020 Project Bond Initiative) **and even the equity market** (e.g. investors that have a strategy to invest in clearly separable projects with transparency about the individual risk-return profile; see Section C).

B.3.2 Degree of sovereign ownership influences the financing framework on both the debt and equity side

Many TSOs are still fully or partly state-owned. This has a major influence on the financing framework and financing conditions available to them. An analysis of the ownership structures of TSOs in Europe reveals different patterns in the electricity and gas segments.

For **electricity transmission** operators, our key findings are as follows:

- All Eastern European electricity TSOs are majority state-owned
- In the UK and Germany, where there are a number of different TSOs, both majority state-owned and majority privately-owned operators exist
- Even in the case of privatised TSOs (as in Belgium, Finland, Italy and Spain), the state or municipality in question holds a minority stake
- The TSO in France is in public ownership (as a 100% subsidiary of the utility company EDF, which is 84% state-owned)

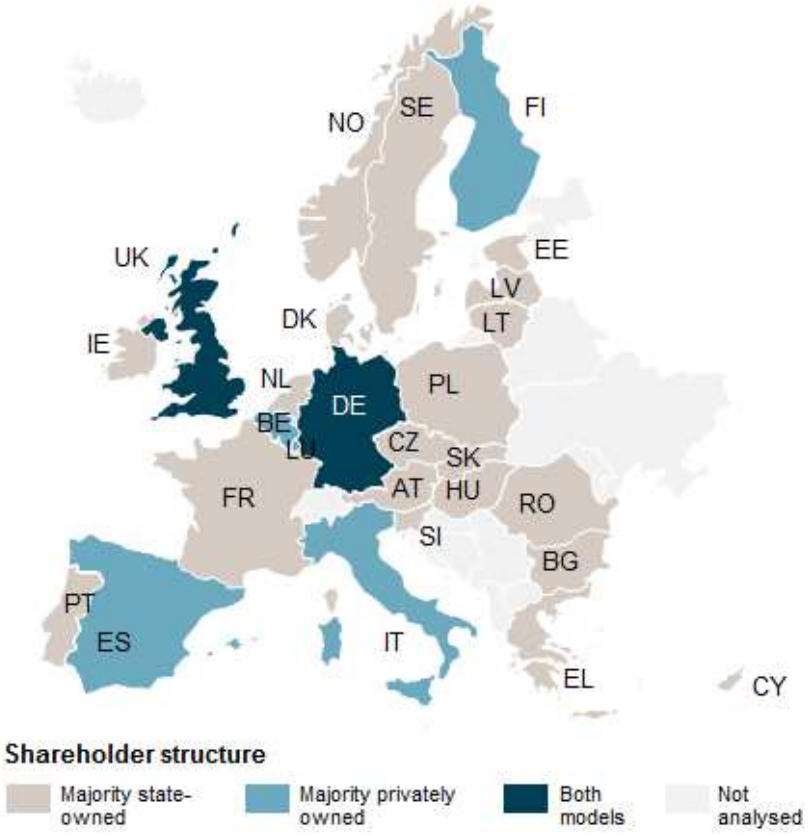


Figure 9: Ownership structure of electricity TSOs in Europe
(Source: Annual reports, interviews, Roland Berger research)

There is no clear pattern of differences between Western and Eastern Europe. However, there is a tendency towards privatised electricity TSOs in Western Europe. In Western Europe, only Ireland (EirGrid plc), the Netherlands (TenneT TSO B.V.) and Denmark (Energinet.dk) have fully state-owned TSOs. In Eastern Europe, fully state-owned TSOs are found in Estonia (Elering OU), Latvia (AS Augstsprieguma Tikls), Lithuania (LITGRID AB), Poland (PSE Operator S.A.), the Czech Republic (Ceps, a.s.), Slovakia (Slovenska elektrizacna prenosova sustava, a.s.), Hungary (MAVIR Hungarian Transmission System Operator Company Ltd.) and Bulgaria (Electroenergien Sistemen Operator EAD).

In the UK, four TSOs exist, of which three are fully privately-owned. Only System Operation Northern Ireland Ltd, which belongs to EirGrid, is state-owned. In Germany, two of the four TSOs are privately-owned: TenneT TSO GmbH is fully owned by TenneT TSO B.V., with the Netherlands as the sole shareholder, and EnBW Transportnetze AG is owned by EnBW Energie Baden-Württemberg, which in turn is still owned by the national French electricity operator EDF together with a number of German municipalities.

For **natural gas transmission** operators, our key findings are as follows:

- Most Western European TSOs are majority privately-owned
- Large Eastern European TSOs are majority state-owned

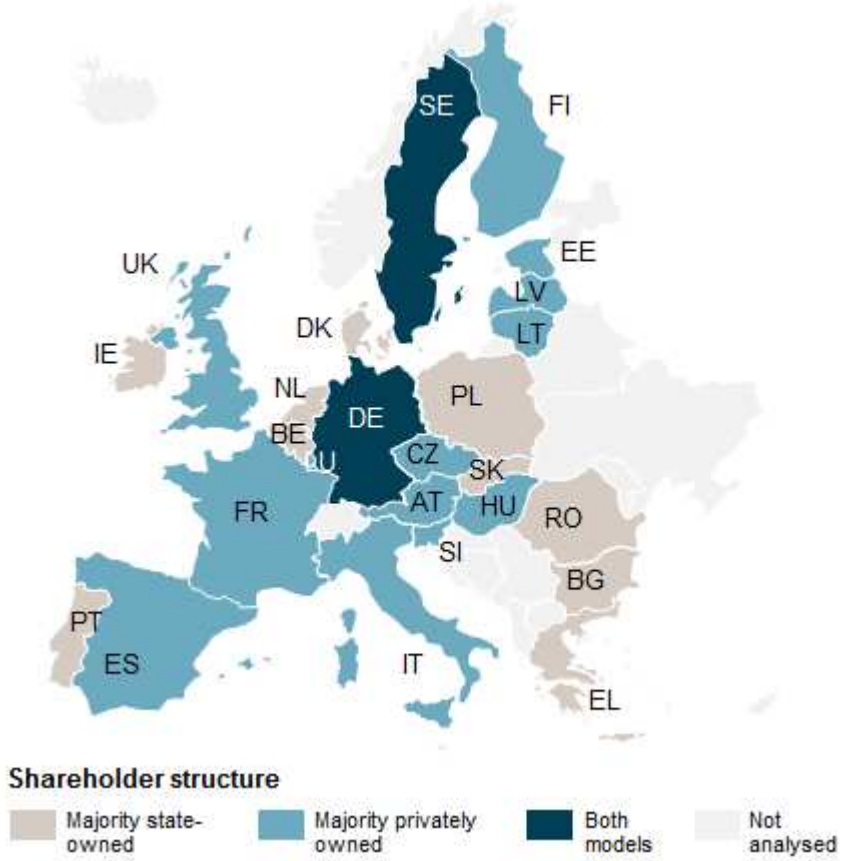


Figure 10: Ownership structure of Natural Gas TSOs in Europe
(Source: Annual reports, interviews, Roland Berger research)

Amongst European natural gas TSOs, privatisation is far advanced in Western Europe. The only wholly state-owned TSOs in Western Europe are found in Denmark (Energinet.dk), Ireland (Gaslink) and the Netherlands (Gas Transport Services B.V.). In Belgium and Portugal, the state holds the majority of shares but is not the sole shareholder. In Sweden there are two natural gas TSOs: Svenska Kraftnät is wholly owned by the state and Swedegas AB is fully privatised. In Eastern Europe, only six TSOs are majority privately-owned. Only in Hungary (FGSZ Ltd.), Latvia (Latvijas Gaze) and Estonia (Eesti Gas) are the natural gas TSOs completely privatised.

Looking at Europe as a whole, we find that a large share of natural gas TSOs are in full or majority private ownership, especially in Western Europe. By contrast, private ownership of electricity TSOs is still rare and state ownership is the most common

model. Comparing different regions in Europe, we find that Eastern European TSOs are still predominantly state-owned in both the electricity and natural gas sectors, whereas the participation of private investors is further advanced in the rest of Europe.

State ownership has an important **impact on the financing framework** and financing conditions of TSOs. On the downside, it reduces flexibility and can have serious consequences if the sovereign ratings fall (see C.2.6). On the upside, state ownership often makes it easier to secure sovereign guarantees, which helps TSOs acquire debt.

B.3.3 Leverage is generally 60-70% and influence TSOs' ability to raise further debt

The leverage of a TSO describes the relation of debt to equity on its balance sheet. This is influenced by regulatory frameworks and the TSO's commitment to keeping a certain credit rating and thus certain leverage. Our key findings with regard to leverage are as follows:

- **Debt is the key source of financing for infrastructure – leverage is 60-70% (debt to total capital).** This is a typical industry ratio for the financing of energy transmission projects, with a tendency towards 70-75% debt in pure project finance companies. In some cases there is a regulatory reason for this, for instance in Germany, where equity shares of >40% are remunerated only with lower debt capital costs, or in Estonia, where the regulatory authority sets a fixed ratio of 50/50.

- **Low leverage is common for TSOs which plan little or no investment in new infrastructure.** This is particularly true for those natural gas TSOs, which prefer to focus on replacement investments (see Section B.1.3).

In terms of financing conditions, **high leverage affects the possibility of acquiring further debt.** Increasing leverage has a negative effect on the development of the credit rating and the related cost of debt. TSOs reaching a leverage of 60-70% (debt to total capital) plan to maintain this level to keep their credit rating. Given the benchmarks for the cost of debt used by the regulator as a basis for remuneration (e.g. the cap based on a benchmark of commercially available interest rates for comparable investments in Germany), TSOs must keep their existing credit rating.

Acquiring further funds for planned investment programmes means that TSOs **have to raise additional equity** to allow for the acquisition of additional debt while maintaining the current credit rating. A simple example illustrates this: A TSO with 70% debt and 30% equity requires further funds. If these funds are acquired via the debt market the leverage would further increase, e.g. to 80/20. However, this would imply that there is a higher risk that the TSO would default on its credit (i.e. due to

higher volumes of repayment and the same underlying securities in the form of equity). The result would be a lower credit rating. To maintain balance, the TSO would need to raise further funds in the relation of 30% equity to 70% debt.

Raising further external equity is particularly challenging for TSOs with a high degree of public ownership and where there is a general reluctance to inject further public money on the shareholder's side (see Section C.2.6). It is also challenging for TSOs in countries where regulatory returns on equity are too low to act as a sufficient incentive for equity investors (see Section C.3.3). EU grants (see B.4.3) can alleviate this situation as they reduce the equity volumes required to finance a project, for example in cases where a non-refundable grant under the European Energy Programme for Recovery is given (see B.4.3 for an overview).

B.4 Key sources of financing for energy infrastructure investments

B.4.1 Debt

There are three main sources of debt for energy infrastructure projects: loans from international financing institutions (IFIs) such as the European Investment Bank, loans from commercial banks, and corporate bonds.

International Financing Institutions (IFIs)

Below we discuss the European Investment Bank (EIB), the European Bank for Reconstruction and Development (EBRD), and other IFIs.

European Investment Bank (EIB): EIB loans are a popular form of debt financing and are used for projects in nearly all European countries. Small and medium-sized TSOs in Eastern Europe in particular use EIB loans as a major source of funding on the debt side (see Table 3 below). The main advantages of EIB loans are their low interest rates (the EIB assigns the AAA rating to TSOs with relatively low spreads) and long maturities – 15 years on average – which meet the requirements of energy infrastructure investments.

EIB loans can cover up to 50% of the total investment in a specific project. This limit was exploited in most of the cases we investigated in the course of this study. In addition, there is a limit on unsecured loans of up to 10% of the equity volume of the TSO; further EIB loans must be backed by third-party guarantees. Additional country or TSO-specific covenants apply, putting further limiting factors on the involvement of the EIB.

The EIB provides loans solely for specific "investment programmes" (i.e. projects). However, these loans are typically on a corporate level and function as senior debt, with guarantees from the state or the corporation. The overall annual lending volume

of the EIB for energy grid investments was EUR 6 billion in 2010, of which approximately EUR 3 billion related to actual transmission infrastructure investments. The remainder related to distribution networks.

			2007	2008	2009	2010	Total 07-10
	Electricity grids	EUR m	1,00	2,48	4,16	4,01	**11,65**
TOTAL	Gas Grids incl. Storage and LNG	EUR m	1,47	2,31	1,55	2,09	**7,42**
	Electricity grids	EUR m	0,95	2,21	4,01	3,91	**11,08**
EU-27	Gas Grids incl. Storage and LNG	EUR m	0,78	2,28	1,54	1,39	**5,99**
	TEN-e electricity	EUR m	0,31	0,69	1,02	0,96	**2,98**
	TEN-e Gas	EUR m	1,16	1,82	0,98	1,49	**5,46**

Table 3: EIB loans in 2007-2010 for energy grids and gas transport infrastructure (Source: EIB, 2011)

European Bank for Reconstruction and Development (EBRD): The EBRD is active in Eastern and South-Eastern Europe, with a current focus on Russia, Serbia, Romania, Macedonia, Ukraine, and Bulgaria, for both inland lines and cross-border lines. The current overall debt volume is approximately EUR 1 billion, with a related total project value of approximately EUR 2.1 billion. The EBRD typically follows commercial bank pricing with a 1-7% spread and tries to involve corporate banks as co-lenders. It offers loans on both a project and corporate level. Loans are typically backed by sovereign guarantees to lower the debt capital costs.

Table 4 outlines the project portfolio of the EBRD in the past ten years, showing a volume of approximately EUR 1.1 billion. The EIB plays a much more significant role than the EBRD: its annual lending volume is some EUR 3 billion, approximately 30 times the average annual EBRD lending volume. However, the EBRD plays an important role in the sector in Eastern Europe, bundling regional competence and providing expertise in smaller deals with a greater structuring need.

Operation Name	Country	Total Project Value [EUR m]	EBRD Finance [EUR m]	EBRD Finance [% of total]	Signing Date
Total		**2.557**	**1.105**	**43%**	
EU 27 countries		**296**	**89**	**30%**	
Bulgarian Transmission Network	BULGARIA	139	41	29%	2002
Romania National Power Grid Company (NPGC)	ROMANIA	145	36	25%	2000
National Power Transmission Co. "Transelectrica" SA	ROMANIA	12	12	93%	2004
Non-EU countries		**2.261**	**1.017**	**45%**	

Table 4: EBRD loans in 2000-2010 for energy electric power transmission infrastructure (Source: EBRD, 2011)

Other IFIs: A range of other IFIs are involved in debt financing for projects. These players are less dominant than the EIB/EBRD. They include the Nordic Investment Bank (focused on Northern and Eastern Europe), the World Bank through the IBRD (focused on Eastern Europe), and the German Kreditanstalt für Wiederaufbau (KfW).

Corporate bonds

Bonds are a popular financing instrument, especially for large TSOs (e.g. Elia, TenneT, Terna) with good credit ratings. Relatively long maturities – ten years on average – combined with low costs where ratings are good represent the main advantages. Smaller TSOs, especially in Eastern Europe, cannot use the bond market as source of financing. As a result, these TSOs often turn to EIB loans supported by commercial bank loans as the most cost-effective instrument.

Commercial bank loans

Loans from commercial banks are the third pillar of debt financing. They are considered less attractive financing instruments as the conditions they offer are generally less favourable than EIB loans or corporate bond financing. In particular, their relatively short maturities (five to ten years on average) make them less attractive as more refinancing operations are required for energy infrastructure projects with an economic lifetime of 20-50 years.

We summarise the views of TSOs on different debt funding options in Table 5, below.

	EIB loans	Corporate bonds	Commercial bank loans
Assessment by TSOs	• **Best debt financing source** due to lowest cost and longest maturity available on the market	• **Preferable instrument to raise large volumes of debt** at average maturities and costs	• **Viable option**, speed of loan acquisition is best
Maturity (average)	10-25 years	10 years	5-10 years

Table 5: TSOs' views on EIB loans, corporate bonds and commercial loans
(Source: Interviews, Roland Berger research)

B.4.2 Equity

The provision of equity is dominated by government involvement, as a large share of TSOs in Europe have public institutions as their majority shareholder. This often limits the potential involvement of external shareholders on the equity side (as

outlined in Section B.3.2). Further equity sources can be divided into **internal equity** (stemming from the TSO's own cashflows) and **external equity** (provided by external investors).

Internal equity is the basic source of funding on the equity side. Cashflows from the TSO's own operations contribute to equity and are an important source of basic financing for energy infrastructure investments. For some TSOs, internal equity is the major source of financing. Where the investment volume is low and stable, with no significant new infrastructure investments required, internal equity can suffice in itself. This is often the case in markets with overcapacity (e.g. the Slovak natural gas market) where the main costs relate to maintenance, replacement and decommissioning. Where substantial new investments are required, internal equity financing is not sufficient as a standalone model.

External equity is a key source of additional equity funding. Where external equity investments are feasible (in their simplest form via the free float listed on the national stock exchange), some investors seeking long-term investments with a low risk/low return profile see TSOs as an attractive investment, as long as certain return on equity thresholds are met (e.g. a return on equity of more than 10% for large infrastructure funds). These investors are typically large pension funds, the infrastructure funds of investment banks, and insurance companies.

The possibility of raising equity is especially important where equity is a limiting factor for raising additional capital. This is the case where a specific leverage levelneeds to be maintained (e.g. to maintain a credit rating) or where specific covenants for loans require additional equity in order to raise further debt.

B.4.3 Grants from the European Union

A third important source of co-funding is grants from the European Union. Typically, banks require the developer to come up with a certain amount of equity, usually in the range of 20-40% of the total project volume, in order to provide the rest of the capital in the form of debt.

In Section B.3.3, we noted that equity is a limiting factor for obtaining further debt, especially for TSOs that are already highly leveraged. In this situation, grants can be regarded as a means of replacing or freeing up a TSO's equity. In other words, the grants serve to ease the difficulty of raising the equity required for a project. Likewise, where specific financing challenges exist – for example due to the financial crisis or a temporary "non-investment grade" credit rating – grants can be a viable and important tool. Moreover, grants help stabilise electricity transmission fees and hence electricity prices to consumers. In addition, receiving a grant from a public institution typically has a signalling effect for financing parties, generating increased trust in the overall project. However, such grants do not typically reduce the overall risk structure

of a project, nor do they in many cases help to increase the actual return on equity for developers (see Section D.2.4, below).

EU grants are direct financial contributions issued under specific programmes. For energy infrastructure projects, such grants are allowed under the European Energy Programme for Recovery (EEPR) and the Trans-European Networks for Energy (TEN-E) programme, for example.

Since 2008, **European Energy Programme for Recovery** (EEPR) funding has been used to support 47 key energy infrastructure projects that would otherwise have been delayed or cancelled due to the economic crisis (for an overview of funding volumes, see Table 6, below). Financial support from the EEPR is seen by project developers as a successful instrument for speeding up or supporting the viability of certain investments. Specific investments that have been supported include the following:

- The East-West Interconnector project (IR, UK): The EEPR provided non-remunerated funds, helping to raise additional debt for the required investment volume of EUR 600 million.

- The Kriegers Flak project (DK, DE): The EEPR finances approximately 50% of the additional costs of a "combined grid solution", expanding the radial connection of wind farms in Germany and Denmark to an interconnector solution between both countries. This improves the viability of the business case for the TSOs involved.

	Type	**Volume** (EUR billion)
Natural gas	Interconnectors	1.3
	Reverse flow	0.08
	LNG	0.08
	Storage	0.04
	Total natural gas	**1.5**
Electricity	Interconnectors	0.9
	Offshore wind farm connections	0.3
	Total electricity	**1.2**
Total natural gas & electricity		**2.7**

Table 6: EEPR grant volumes by energy infrastructure type
(Source: European Commission, 2010)

EEPR grants help to reduce the amount of equity financing required for specific projects – financing which is usually difficult to obtain due to the risk associated with the development and construction phase. In this way, the grants help companies face

the challenge of obtaining further debt (30% equity is usually required in project finance). However, the grants do not change the overall risk structure of projects. Consequently, they do not help attract further equity from external investors. Nevertheless, EEPR grants can speed up or enable certain investments on a project basis. In the case of the Kriegers Flak Project, for instance, they created an incentive for choosing a more expensive combined grid solution, which had certain socio-economic benefits.

Trans-European Networks for Energy (TEN-E) grants are seen as an important instrument by TSOs, especially for kick-starting feasibility studies for infrastructure projects and thus accelerating the first stage of projects. The total volume of funding via the TEN-E programme for the period 2007-2013 is EUR 155 million (EUR 70 million for the period 2007 to 2009; see Table 7, below, for details). The grants focus on electrical energy infrastructure projects: 58% of funds in the period 2007 to 2009 were allocated to the electricity sector and 42% to the natural gas sector. Content-wise, the focus was on co-financing studies (by up to 50%); this accounted for 65% of the total amount. Some 35% was allocated to co-financing works (by up to 10%).

	Type	Volume (EUR m)
Natural gas	Studies	23
	Works	7
	Total natural gas	**30**
Electricity	Studies	23
	Works	17
	Total electricity	**40**
Total natural gas & electricity		**70**

Table 7: TEN-E grant volumes by energy infrastructure type, 2007-2009
(Source: European Commission, 2010)

B.4.4 Summary of funding sources

Funding for energy infrastructure investments can be divided into sources on the equity side and sources on the debt side. The **most important sources** are as follows:

- On the **debt side,** international financing institutions, commercial banks and corporate bonds. While the EIB is a key financing partner that provides debt at conditions geared towards the needs of the industry (e.g. long maturities and preferable conditions), corporate bonds will play a significant role in meeting the large future investment volumes. Significant amounts of capital can be raised by this instrument, and as such it is a key funding source for TSOs which are strongly capital-market oriented (e.g. Terna in Italy).

- On the **equity side,** internal equity from the TSO's own cashflows and external equity from investors. Internal equity will typically be insufficient to provide the equity volumes required by future investment programmes. Here, external equity from investors is needed. Equity is considered a limiting factor and, as such, further access to it is a key prerequisite to ensuring the financing of forthcoming investment programmes.

Volume-wise, grants from the European Union play a limited role as a source of funding.

C. Financing challenges for energy transmission infrastructure projects

Based on our interviews with 32 TSOs, 15 financing institutions and the 24 questionnaires distributed by the EC and completed by TSOs, we identify 6 general categories of challenges facing energy infrastructure projects, described in detail further below:

1. **Permitting issues:** Challenges related to delays in the permitting processes for projects

2. **Financing needs:** Challenges in obtaining the funds required to carry out the planned investments

3. **Regulatory issues:** Challenges related to insufficient regulatory remuneration or insufficient stability of regimes

4. **Financing conditions:** Challenges related to the higher costs of capital and inadequate conditions for acquiring such capital

5. **Operator capabilities:** Lack of competence and experience in raising the required funds

6. **Specific types of projects:** Challenges for interconnectors, offshore grid connections and security of supply projects

C.1 Permitting issues

Feedback from the interviews in this study reveals that **delays to permitting procedures are considered by far the most pressing challenge relating to the financing of projects in the period to 2020.** Permitting processes can take up to ten years at present and almost all large projects are subject to significant delays.

Permitting processes pose a high risk to the timely completion – and the cost – of projects. This has an impact on the financing of the projects, especially in the case of **project finance** via a separate project company. In particular:

- **Before funding for a project is obtained,** the risk of a complex or lengthy permitting process implies a longer period of time until (regulatory or other) revenues are generated. These revenues are used to pay interest, repay loans and remunerate equity investors for their expenses up to this point. If such a risk is already assessed as high before a project is developed, potential lenders and investors tend to be reluctant to provide the required funds. Funding is also

typically only provided subject to successful completion of the permitting process.

- **During the permitting process,** significant delays can result in additional financing requirements to cover the extra costs of the lengthy permitting process. Obtaining financing is then both challenging and costly, as lenders adjust the financing costs to match the risk profile of the project.

To summarise, permitting processes pose a severe challenge to projects in a critical phase of their development. For this reason, we examine this issue in a **separate, parallel study by Roland Berger Strategy Consultants**.[12]

C.2 Financing needs

The EC has raised concerns about an investment gap for projects that are not commercially viable under current market and regulatory conditions. In fact, the general financial viability of the planned investments in the period to 2020 was confirmed in our study by both the financing institutions and the TSOs. Nevertheless, they mentioned challenges to raising the required capital on the debt and equity side. Below, we discuss first the general challenges of providing the required financing, and then specific challenges on the debt and equity side.

C.2.1 Potential financing gap due to the limited availability of financing

In general, the investment requirements indicated by the EC Communication are considered to be challenging, but not a major hurdle. It is assumed that around EUR 200 billion will be needed in the period to 2020. Assuming a typical debt/equity ratio of 70/30 on a project level, roughly EUR 14 billion in debt and EUR 6 billion in equity will need to be raised on average each year by the TSOs for Projects of European Interest alone. To put this into perspective, on the debt side, the EIB – one of the major lending parties – committed some EUR 6 billion annually in 2009 and 2010. However, it plans to reduce this volume significantly in coming years, probably to around EUR 4 billion annually.

Corporate bonds – another major source of debt financing – were used in 2010 by TenneT to raise EUR 1.4 billion and by Elia to raise EUR 0.5 billion, to give two examples. These companies have very good credit ratings and provide a fair indication of the amount of financing that can be achieved by this means. Clearly, much more financing would have to be raised in future to reach the required average annual EUR 14 billion in debt funding. Nevertheless, the debt financing institutions in

[12] Permitting procedures for energy infrastructure projects in the EU: evaluation and legal recommendations; Tender No. ENER/B1/452-2010.

the survey stated that, in principle, higher debt financing volumes would be acceptable to the markets given the right conditions.

The key message from our interviews with TSOs and financing institutions was that **acquiring the financial means to conduct the planned infrastructure investments is generally feasible.** The fact that investments are approved by the regulator means that they will generate a stable revenue stream. This, in turn, provides sufficient security for financing institutions to lend to TSOs. The industry is considered a low risk/low return business, attractive both for lenders on the debt side (as there is low risk to debt service) and for equity investors seeking long-term investments with stable returns, such as pension funds and specific infrastructure funds.

However, our respondents also mentioned specific challenges. Most of these challenges stem from the fact that the massive investment programmes foreseen in the next ten years require TSOs to increase their annual investment volumes by an average of 70% in the electricity segment and 30% in the natural gas transmission segment. To finance these investments, large additional volumes of both debt and equity need to be raised – in a generally tightening market on the debt side (see, for example, our discussion of decreasing EIB lending volumes in C.2.2 and limits on long-term commercial debt provision in C.2.3). Preconditions for additional equity investments are limited in various cases due to a high degree of public ownership (C.2.6) or a return on equity that is too low for certain investor groups (C.3.3).

C.2.2 Reduced future financing for the energy infrastructure sector by the European Investment Bank

The European Investment Bank (EIB) is seen by TSOs as the most important financing partner on the debt side. This is due to the preferable conditions offered on loans compared to commercial banks and the long maturities of 10 to 20 years, which reduce annual debt servicing amounts and the risk of not obtaining the required volumes or conditions during refinancing.

In the course of including the energy sector into the EIB's Corporate Operational Plan as a priority lending objective, the EIB has steadily increased its lending volume to the energy infrastructure industry over time, from EUR 2.5 billion in 2007 to EUR 6 billion in 2010 (EUR 3 billion for energy transmission infrastructure and EUR 3 billion for energy distribution infrastructure). This steep increase was mainly intended to deal with the financing challenges resulting from the economic crisis. The future level of EIB lending to the sector will, according to plan, fall to an annual volume of EUR 4 billion, i.e. its pre-crisis levels (implying around EUR 2 billion for energy transmission infrastructure projects) – a cut of one third. As EIB loans are the most important funding source for energy infrastructure, this cut increases the challenge of obtaining long-term debt by TSOs.

C.2.3 Limits on long-term commercial debt provision due to constraints on lending volumes for banks

The financing institutions we interviewed as part of this study said that due to BASEL II and III for commercial banks and decreasing funding of the energy infrastructure sector by the EIB, long-term bank loans will become more difficult to acquire in future. The major concerns of commercial banks and other private financial institutions in terms of financing infrastructure investments are the long credit maturities of these forms of investments. When engaging in infrastructure investments, they would welcome maturities in the range of 10 to 25 years due to the high capital expenditure and risk associated with refinancing during the project lifetime.

Basel III comes into force in 2013. After this, banks will have to keep a higher percentage of equity on their balance sheets. Long-term capital commitments for infrastructure projects will become more expensive and difficult to execute. Insurance companies face similar issues under the Solvency II regulation. Investment funds also face new requirements relating to the Alternative Investment Fund Managers (AIFM) Directive. This may make it less attractive for non-European funds in particular to enter the European market.

C.2.4 Limitations on TSOs acquiring EIB loans

Loans from the EIB are seen as the most important component of debt financing by many TSOs, especially smaller TSOs in Eastern Europe. This is because they offer preferable conditions and relatively long maturities (10-25 years), which meets the requirements of energy infrastructure projects. Particularly in countries where the cost of raising debt capital is rising, EIB loans with their preferable conditions are an important factor in the financial viability of investment plans.

Respondents also said that the involvement of the EIB has a signalling effect for other lenders such as commercial banks. In this respect, the limitations on EIB lending volumes for individual companies are seen as rigid (a maximum of 50% of specific projects, loans up to a total of 10-20% of the equity of a TSO, debt/equity ratio limits of 2.3 in Romania, for example). Some TSOs have already reached or are close to the limit of their EIB financing.

In the broader context of increasing debt requirements, the planned decrease in annual EIB lending for energy networks from EUR 6 to 4 billion means further pressure on TSOs to acquire adequate debt with the necessary conditions and maturities.

C.2.5 Financing gap for greenfield investments during the development and construction phase

Capital expenditure is required by the TSO or project company in the construction phase of a project. However, remuneration only begins when a project has been commissioned and becomes operational, except in cases where regulations are specifically adapted (the only such case mentioned in the interviews was the East-West Interconnector between Ireland and the UK). This means that large volumes of cash need to be provided with perceived risk in terms of cost overruns and potential delays to the start of operations.

In this context, the challenge of raising external equity is **especially acute for project companies** which cannot diversify the risk of the project in a broader portfolio – unlike TSOs that invest in various projects with a corporate finance approach. Infrastructure funds, and typically all pension funds, can only invest in existing and operational assets: they do not want to take any construction-related risk and they need to see initial cashflows before investing. This finding agrees with statements made by TSOs that the construction phase represents the most challenging phase in terms of equity financing. While projects are rated BBB during the construction phase, this usually increases to A during the operational phase, resulting in an average spread of approximately 100 basis points (based on industrial bonds in the Eurozone with a maturity of ten years).

C.2.6 Inflexibility in raising additional equity due to a high level of state ownership

In order to maintain credit ratings and meet the requirements of debt providers, the acquisition of further external equity must allow for further debt financing. This is especially true where extensive investment plans exist and the TSO already has a high leverage (>70-75% debt; for more details on debt/equity, see Section B.3.3). For TSOs with a high share of public ownership or which are entirely state-ownership (e.g. most Eastern European TSOs), the possibility of raising further equity is to a large extent dependent on the government's position. Governments are often reluctant to inject further equity into projects due to their own budgetary constraints. This can limit the TSOs options for raising further equity.

In one specific case, a large part of the TSO’s equity is provided by municipalities. These are reluctant to provide further capital injections beyond a recent equity increase used to finance an acquisition. Raising further equity is difficult in this context, according to our interviewees. A similar concern was raised by another TSO which is in full public ownership and sees raising additional equity as very difficult. The result is an increasing requirement for debt financing, leading to higher leverage, a lower credit rating and consequently higher funding costs.

Moreover, state ownership may have an effect on the cost of capital when sovereign ratings deteriorate. If the state is a key shareholder, the TSO's credit rating and debt costs are closely correlated to the financial standing of the state and the sovereign credit rating. This can be advantageous where the sovereign credit rating is good. Rating agencies typically increase the credit rating by one to three notches for state-owned companies in states with a good credit rating.

C.2.7 Financing of feasibility studies

A prerequisite for encouraging new investments in energy infrastructure is the assessment of a broad range of possible projects through feasibility studies. Here, the concern was raised by IFIs that **TSOs tend to undertake feasibility studies only for projects that are almost certain.** This is especially true for Eastern European TSOs, who have limited financial resources for financing such studies. To encourage the creation of investment cases, a **broader range of feasibility studies is required** – including feasibility studies for projects with a higher uncertainty as to their outcome. Financing such feasibility studies is a challenge: TSOs often refrain from making such investments and the TEN-E instrument is not considered to provide sufficient support.

C.3 Regulatory issues

According to almost all the experts we spoke to, regulatory issues are the most important factor in the financing of energy infrastructure projects. Key issues here are the regulatory remuneration, which forms the foundation of all investment cases, and the stability of the regulatory regime and related remuneration. Both issues are equally important for the TSO planning the investment and the financing institution providing the funds. Challenges relate to decreasing returns on equity due to regulatory issues, which reduce the availability of equity.

C.3.1 Lack of regulatory stability creates a risk of regulatory changes and related changes in future remuneration

The risk of **changing regulatory approaches creates uncertainty for both debt and equity providers.** This is especially problematic for financing institutions that provide capital on a long-term basis. For example, Spain saw a downgrading of its evaluation basis for remuneration from gross assets to net assets for LNG/gas storage. Similarly, Hungary experienced a drop in the regulatory return on assets from 10.5% to 4.5%.

The stability of regulatory regimes is not primarily seen as dependent on the length of the regulatory period: certainty of remuneration generally exists for three to five years. Rather it depends on the commitment and track record of regulators in

ensuring stable returns over a longer timeframe. This stability is especially important for equity providers, who in our survey considered regulatory stability a key concern for investments – even more important than an achievable return on equity.

Regulatory stability was seen as a major criterion by numerous TSOs, e.g. in Austria, Belgium, Ireland, Finland, the Netherlands, Norway, Spain, France, Germany, Hungary and Italy, as well as by financing institutions. On the positive side, the regulatory system in the UK was highlighted by financing institutions as positive due to its long track record of stability and investor-friendly returns. Consequently the UK market attracts equity and debt for investments.

C.3.2 Regulatory returns are too low to provide investment incentives

TSOs are driven by the regulatory remuneration, which forms the basis for the recovery of investment costs. The return on equity (ROE) or return on assets (ROA) allowed by the regulator is the clearest incentive for further investments. Some **TSOs** in our study stated that this **remuneration is too low to create a significant incentive for increasing investment.** For example, the permitted ROE in the Czech Republic for natural gas transmission investments is 8%, considered insufficient to give the TSO an incentive to further expand the network. In another example, the decrease in ROA from 10.5% to 5-6% in Hungary made investment in further gas storage systems unviable for a large gas storage supplier. As a consequence, investment plans have been put on hold.

Similar statements were made by TSOs in in Lithuania, in the UK and in Germany. They said that expansion investments do not yield adequate ROE in the current regulatory framework due to the low ROE allowances, further depressed by regulatory shortcomings such as a compulsory debt ratio, delayed consideration of capital costs and regulatory uncertainty about the acceptance of costs.

Insufficient ROE incentives are a particular problem where investments are prioritised within a larger holding structure. Financing of these TSO subsidiaries takes place via the corporate finance of the parent company. Thus investments compete with other projects in the holding structure on the basis of their achievable levels of return. The lower priority of some projects can **cause a delay in investment,** particularly projects that lack strong commercial validity (e.g. projects with a security of supply focus).

C.3.3 Permitted regulatory returns are too low to attract the required equity funding from external investors

Besides their negative effect on the investment decisions of TSOs (see above), limited permitted regulatory returns have a significant effect on the availability of external equity. In certain situations, **TSOs need to raise further external equity as a basis for financing their planned investment programmes.** This is particularly

true of TSOs with large investment programmes for the coming years and high leverage levels (generally 70-75% debt). Additional equity and debt is required while maintaining the current debt/equity ratio in order to preserve the existing credit rating. On the equity side, this capital can come from three sources: internal equity from the company's own cashflows, new equity from existing shareholders, and new external equity investors. Internal equity from the company's operating cashflows is insufficient, especially in the case of large-scale investments. External investors – old or new – thus become the key source of additional equity.

Three different types of equity investors exist, each with their own investment approach and related risk/return requirements. This first is public shareholders. These investors are generally satisfied with low returns (e.g. compensation for inflation, as in the case of Denmark) in the range of a 0-6% return on investment. The second type of equity investors are those focusing on low risk/low return investments, such as large pension funds. These investors generally strive for ROE of 7-10%. The third type is large infrastructure funds and related investors, who become active at above 10% ROE. **Where these return levels cannot be offered by the regulator and TSO in question, equity investors simply refrain from investing.** This further increases the financing challenges facing large investment programmes.

Concerns in this regard were raised by TSOs with high leverage levels. In the interviews, financing institutions also voiced their concern at the growing competition for equity investors from other types of infrastructure, such as transport (roads, harbours, airports) and social infrastructure (schools, hospitals).

Table 8, below, summarises the situation with regard to regulatory returns. A major challenge for investors is the comparability of ROE levels, as rates are based on country-specific calculation methods and underlying assumptions. To compare the pre-tax ROE of Germany, the UK, France, Italy and the Netherlands, for instance, it is necessary to deduct tax in the range of 26-40%. To compare after-tax ROE, it is necessary to consider different underlying inflation rates and calculation bases (e.g. nominal interest for the electricity segment in France, but real interest for the natural gas segment). Although the rates are not comparable, the table shows that these regulatory schemes do not offer returns above 10%, which limits the potential number of equity investors.

Country	Type of remuneration	Calculation	Percentage
AT	WACC (electricity) cashflow calculation with a maximum rate of return allowance (natural gas)	Pre-tax	6.32% 8.30%
CZ	WACC (electricity) WACC (natural gas)	Pre-tax	7.65% 8.02%
DE	ROE (expansion investments) ROE (maintenance investments)	Pre-tax	9.29% 7.56%

EL	WACC	Pre-tax	8.00%
ES	ROA	2009	6.00%
FI	WACC	Pre-tax, 2006	6.50%
FR	ROE ROA	After tax Pre-tax	6.90% 7.30%
HU	ROA		4.50%
IR	WACC	Pre-tax	5.95%
IT	WACC	Pre-tax	6.90%, adder of 2/3%
LT	ROA		5.00%
NL	WACC (electricity)		6.00%
NO	WACC	2009	6.19%
PT	WACC (electricity)		7.80%
UK	WACC	Post-tax cost of equity, pre-tax cost of debt net tax shield	5.05%
Sources: Bremen Energy Institute (study on the regulatory framework for energy infrastructure investments from 2010), CER (2010), BILLIONetzA (2010), TSO interviews, NRA questionnaires, PwC (Comparison Study of the WACC, 2006), CRE (2008), Terna (2008), NMa (2006), NVE (2009), OFGEM (2006), Cambini/Rondi (Incentive Regulation and Investment: Evidence from European Energy Utilities, 2009), NCC (2010)			

Table 8: Overview of regulatory remuneration in Europe (based on available data from the sources listed)

C.3.4 Late recognition of pre-operational costs

In certain cases, investment costs are not remunerated adequately due to a time lag between when they are set and when the regulatory remuneration begins. This is because a mechanism is used that approves investment costs after the fact, based on the actual costs (as in Germany, Italy and the Netherlands) rather than in advance based on planned costs (as in the UK and France). The investment costs are based on financial information of a reference year with a remuneration of these costs two years later. In the case of increasing investment volumes, the related costs grow and have to be covered by bridge financing during these two years. With rising investment programmes as foreseen for the next ten years, systematic accumulation of these costs would take place, with no compensation for the costs of additional capital that would be required for such a bridge financing.

To a certain extent, this challenge has been tackled by the regulators. For example, the German BNetzA provides discounted cashflow-neutral compensation. However, the problem persists in Austria. The returns achieved do not match the permitted regulatory returns and operating profits fall such that the ROE actually achieved by the TSOs shrinks to a rate below that permitted by the regulator. The decreased ROE then reduces the attractiveness of the TSO for external equity investors.

C.4 Financing conditions

Besides the challenge of obtaining the required financing volumes from different debt and equity sources (discussed above), many TSOs raised concerns about recent increases in financing costs and inadequate regulatory remuneration. We discuss this in more detail below.

Increasing financing costs for debt and the lack of flexibility in regulation

Debt capital costs are rising in some countries as a result of the financial crisis. This is due to the strong correlation between companies' ratings and the sovereign rating, especially for companies largely in public hands. The growing cost of borrowing, combined with an increase in planned investments, is seen as a potential challenge to the financing of projects in situations where the regulator caps the remunerable financing costs but fails to increase the debt capital cost remuneration quickly enough.

In Germany, for example, remunerable debt capital costs are capped. The cap is based on an average yield on bonds, using data from past years. Our interviewees stated that these limits are very tight and do not adapt quickly enough to current market conditions. This is especially problematic where the cost of borrowing increases over a short period of time. If the costs exceed the permitted regulatory remuneration, they have to be borne by the TSO, which reduces the ROE.

However, in some countries, debt financing conditions adapt to the changing financing conditions. For example, in Estonia and Austria the WACC calculation is reviewed every year. Similarly, in the UK, TSOs can re-open a price control settlement in extreme cases where sharp rises in interest rates make projects impossible to finance. An example: Changing debt financing conditions were a major challenge in the negotiations over the Kriegers Flak Project. The issues still need to be resolved before the project goes ahead on the German side. The challenge of rising debt costs and uncertainty as to the regulatory remuneration was voiced by a number of TSOs in our survey. They included TSOs in Germany, Portugal, the Netherlands and Spain.

Mismatch between the maturities of loans and project lifetimes

The maturities of loans are on average 5-10 years for commercial banks, 10 years for corporate bonds and 10-25 years for EIB loans. Energy infrastructure projects have an average economic lifetime of 20-50 years and require corresponding maturity structures to reduce the refinancing risk. This results in a potential challenge for the refinancing of projects during their lifetime, with the risk of less favourable conditions.

The result of this is uncertainty for the TSOs, especially in markets with rising debt capital costs, since the regulatory remuneration of increasing debt capital costs may be inadequate (see Section C.4.1). Current developments reduce the availability of

long-term loans even further. Thus Basel II and III will make long-term capital commitments more expensive and decrease commercial banks' interest in long-term lending. The one-third cut in EIB lending will also make the challenge more difficult.

Lack of long-standing credibility as a reliable debtor

Some TSOs with a long history of pure equity financing enter negotiations on debt capital acquisition as a new, unknown player. They face difficulties in obtaining the required debt volumes to deliver the planned investments. Alternatively, they have to pay significant risk premiums to obtain the funding.

C.5 Operator capabilities

Smaller TSOs relatively new to the market due to recent unbundling often lack the necessary financing capabilities. They face the challenge of obtaining the required volumes of debt and equity at favourable conditions.

C.5.1 Lack of credit rating or insufficient credit rating

To expand their debt financing opportunities from bank loans to corporate bonds, TSOs need a credit rating. Corporate bond markets in particular are practically inaccessible without a credit rating.

Exploiting further opportunities for obtaining debt financing is becoming more and more important for TSOs, especially given the scale of the planned investments and the importance of debt, which generally makes up 60-70% of the financing volume (see Section B.3.3). Corporate bonds are considered an important funding source by TSOs active in this area, including TenneT, Terna and Elia, all of whom have recently issued bonds on the debt markets.

The databases of the three major rating agencies Standard & Poor's (S&P), Fitch and Moody's reveal that TSOs in many countries do not have a credit rating (see Table 9, below). This is particularly true for smaller TSOs and Eastern European TSOs. Having a "non-investment grade" rating also limits access to affordable borrowing, as is the case with several Eastern European TSOs.

Electricity TSOs		Natural gas TSOs	
Austria	VKW-Netz AG	**Belgium**	Fluxys
Bulgaria	Electroenergien Sistemen Operator EAD	**Bulgaria**	Bulgartransgaz EAD
Cyprus	Cyprus Transmission System Operator	**Germany**	Ontras - VNG Gastransport GmbH
Czech Republic	Ceps, a.s.		WINGAS TRANSPORT GmbH
Estonia	Elering OU	**Estonia**	Eesti Gas
Greece	Hellenic Transmission System Operator S.A.	**Greece**	DESFA
Hungary	MAVIR Hungarian Transmission System Operator Company Ltd.	**Finland**	Gasum Oy
Ireland	EirGrid plc	**Lithuania**	Lietuvos Dujos
Lithuania	LITGRID AB	**Luxemburg**	Creos Luxembourg S.A.
Luxemburg	Creos Luxembourg S.A.	**Latvia**	Latvijas Gaze
Poland	PSE Operator S.A.	**Poland**	GAZ -System S.A.
Sweden	Svenska Kraftnät	**Sweden**	Svenska Kraftnät
Slovenia	Elektro - Slovenija, D.O.O.		Swedegas AB
Slovakia	Slovenska elektrizacna prenosova sustava, a.s.	**Slovenia**	Geoplin Plinovodi
United Kingdom	System Operation Northern Ireland Ltd	**United Kingdom**	Interconnector (UK) Ltd.

Table 9: Overview of countries with TSOs with no credit rating of their own or of their parent company (Source: Annual reports, Standard & Poor's, Moody's, Fitch, Roland Berger research)

C.5.2 Limited financing expertise leads to delays or problems acquiring the necessary funds

TSOs with a long history of pure equity financing or which have recently gone through unbundling processes face challenges when it comes to defining a financing strategy for obtaining in the required financial means for planned investments. Obtaining funds under market conditions is also difficult, i.e. selecting suitable financing partners and negotiating loan conditions. These challenges delay the acquisition of the required debt. They can also develop into more significant problems threatening the entire project if not resolved at an early stage.

C.6 Specific types of projects

In its explanatory note on energy infrastructure investment, the EC describes the needs of specific types of projects that are particularly challenging due to their increased complexity from a commercial, technological or regulatory perspective. In particular, these are interconnector projects combining transmission grids in two or more countries on both the electricity and natural gas side, offshore grid combined projects and combined grid solutions integrating offshore cable projects, and security of supply projects such as gas and electricity storage.

Investments in interconnector projects present specific challenges not found for normal domestic energy infrastructure investments. They involve complex coordination between NRAs to agree on a common regulatory approach and cost/benefit allocation. They are also affected by non-commercial factors such as increasing security of supply or market integration, which are not reflected in commercial benefits. In such cases, projects are often delayed until an appropriate regulatory remuneration or cost/benefit allocation can be established.

Offshore grid connection projects are projects that allow the interconnection of offshore cable projects to form meshed networks, combining the connection of offshore wind farms and international electricity interconnectors in an efficient way, as proposed by the North Sea Countries' Offshore Grid Initiative (NSCOGI). The focus is on intelligent solutions that go beyond mere radial connections of offshore wind farms to the mainland. This can be achieved either by expanding an offshore wind farm connection to an interconnector or by connecting wind farms to an interconnector later on. These projects face challenges that go beyond those identified for interconnector projects.

C.6.1 Lack of harmonisation between regulatory regimes and cost allocation mechanisms

A common regulatory approach is required between the different countries involved in interconnector projects. This entails agreement on a general regulatory model, e.g. a merchant interconnector with regulatory elements, such as a revenue cap. This is particularly challenging for regulatory regimes that differ their general approach, for example the UK (which requires a commercial approach to interconnector investments) versus the Dutch and Belgian regimes (which treat interconnectors as standard regulatory assets). In the case of the Nemo interconnector, for example, the developers approached the regulators and found a joint solution. In the case of BritNed, the result was a merchant interconnector with a regulatory cap, i.e. revenues exceeding a specific limit must be passed on to the customers or reinvested in interconnectors.

Cost allocation between NRAs must also be agreed before an interconnector investment becomes feasible on a regulated basis. The benefits to each country have

to be determined and the costs distributed accordingly (and financed through an increased transmission component in energy prices, say). The distribution of non-commercial externalities also causes problems. This is due to uncertain future developments, the non-commercial nature of benefits, and the complex inter-relationships existing in highly meshed networks such as electric power transmission.

Agreement between NRAs on a common approach is a prerequisite for inter-connector investments. Lengthy coordination processes can delay investments. This happened, for example, with the MidCat pipeline between France and Spain. The pipeline generated insufficient market interest based on an open season procedure and now requires a cost/benefit assessment and successful negotiations between the two NRAs on the allocation of the resulting costs.

In general, cost/benefit allocation is considered easier for clearly definable projects such as natural gas pipelines, which have a precise calculation basis in the form of their transported natural gas capacity. This is also the case for DC interconnectors, which have calculable congestion rent revenues based on the price differences between countries.

C.6.2 Limited commercial interest and stranded investment risk for natural gas interconnectors

As a basis for natural gas transmission infrastructure investments, it is common to conduct open season procedures to determine market interest via capacity auctions. Recent open season procedures (e.g. in the case of the MidCat pipeline and the Slovak-Hungarian interconnector or the Tauerngasleitung) generated limited interest from shippers in booking long-term capacities: in both cases, only about 30% of available capacities were booked. This reluctance to commit to long-term booking results mainly from the uncertainty of future market developments – for example, uncertainty as to whether pipeline capacities will be required in the long run or competing supply routes or LNG will be delivered.

The outcome of the open season procedures proved that the commercial viability of these projects cannot be taken for granted, and both projects now face a considerable risk of stranded investments. However, from a market integration and security of supply view, both projects are highly important. The Slovak-Hungarian interconnector is a key project in the implementation of the North-South Gas Corridor (and the connection of planned projects such as the Nabucco and South Stream pipelines to the European gas market), and the MidCat pipeline would benefit the North-South Gas Corridor in Western Europe. Both pipelines are likely to become part of the future priority corridors defined by the EC.

Economic tests using open season procedures do not evaluate the greater socio-economic advantages of a project; these advantages were well established in both of the cases considered. The key challenge for the MidCat pipeline is now to reach an

agreement between the regulators on the issue of cost/benefit allocation, followed by subsequent approval of the investments and inclusion in the regulatory asset base. In the case of the Slovak-Hungarian interconnector, the incentives from the regulator on the Hungarian side need to be increased to make the investment viable for the TSO.

C.6.3 Projects with higher risk and complexity that are not granted higher returns

TSOs prioritise their investment portfolio according to a set of criteria that ensures the operability of the transmission network. One key economic criterion is the expected return on investment. In the case of regulated interconnectors, a clear incentive for TSOs to invest in such interconnectors is lacking, as related congestion revenues have to be either passed on to the customers or invested in new interconnection capacities under Regulation (EC) 714/2009 (relating to Directive 2009/72/EC) for electricity interconnectors and Regulation (EC) 715/2009 (relating to Directive 2009/73/EC) for natural gas interconnectors. At the same time, these projects carry with them higher costs and risks than normal domestic projects, especially in the case of offshore interconnectors using new technology.

If no exemption from regulation can be secured, or if such exemption is not desirable (e.g. due to limited congestion rents), these interconnector projects tend to be downgraded in terms of priority in the overall project portfolio. This is because they involve greater risk and complexity but only receive the normal regulatory return, that given for less complex projects. The challenge is especially severe in countries with very low regulatory compensation and in countries with strong prioritisation needs within the project portfolio.

C.6.4 Advance capacity challenge

An advance capacity challenge arises where the viability of an investment is dependent on a complementary investment or additional future supply or throughput. An example is the investment in transmission infrastructure for as yet unclear future market demand for offshore wind farm capacities. Here, the complementary investment must have a high degree of certainty for TSOs to invest in connections. The transmission infrastructure for a wind farm may take five years to build but the wind farm itself may take seven, leaving the transmission infrastructure investments stranded for two years. This uncertainty brings the corresponding transmission infrastructure projects to a standstill or leads to underinvestment with regard to anticipated future capacity.

The Kriegers Flak and COBRA cable projects are examples of this problem in the area of electric power transmission. The lack of a wind farm investor on the Danish side of the Kriegers Flak offshore wind farm project is delaying investment in the combined grid solution, which involves upgrading the connection to the wind farm to

an interconnector between Germany and Denmark, on both the Danish and German side.

Uncertainty regarding future capacities can also lead to underinvestment in current infrastructure projects. For example, the COBRA cable interconnector between Denmark and the Netherlands has a 700 MW transmission capacity. The cable allows the future connection of a wind farm (potentially built on the German continental shelf close to the cable) with around 350 MW generation capacity (50% of the cable capacity). Increasing transmission capacity from 700 MW to 1400 MW would provide twice the connection capacity for wind farms and reduce the requirement for additional cable projects to connect future wind farms. However, making this change would imply significant advance capacity and a stranded investment risk if the wind farm investments did not materialise. Thus the advance capacity challenge prevents an increase in capacity that will most likely be required in the future.

The same problem arises for natural gas pipelines where future capacity requirements are clear but the timing for the build-up of the capacity demand remains uncertain, as in the case of the Nabucco pipeline. Here, the expected final volumes of gas transports are not yet substantiated by supply contracts. The gas currently available from the field in Azerbaijan is not enough in itself to make the pipeline a bankable project. However, with additional volumes transported from other fields in the region, the project would be commercially viable. The uncertainty and risk of stranded investments at the present time does not make it a viable investment case.

C.6.5 Technological risks for offshore grid connections

New voltage source converter-based high-voltage direct current (VSC-HVDC) technology for offshore connections and wind farm integration faces a number of specific risks. It is not clear whether this technology, currently in its final stage of development, will be delivered on time for the corresponding infrastructure projects. It is also unclear whether the quality and reliability of the new technology is sufficient to ensure the necessary high degree of availability of the transmission line. The new technology implies additional cost and technological risk to projects, coupled with a lack of clear incentives for project developers to invest in it.

C.6.6 Additional costs for combined grid solutions

In specific cases, it is possible to go beyond a mere radial connection to offshore wind farms from the national territory and to combine the connection with an interconnector between different countries, forming a combined grid solution, as in the case of the Kriegers Flak project. A similar possibility exists where an interconnector project can be upgraded to connect nearby wind farm projects, as in the case of the COBRA cable running from Denmark to the Netherlands.

Enabling such combined grid solutions or wind farm integration implies additional costs for the corresponding technological requirements (such as enabling an interconnector for multi-platform solutions based on VSC-HVCD technology). There is no direct financial incentive for TSOs or project companies to choose such a solution, especially in the case of regulatory schemes with a strong focus on commercial viability (as in the Netherlands, for instance).

This challenge is even more complex in the case of the planned North Sea Offshore Grid. The project requires a forward-looking investment approach from TSOs: planning with higher capacities for interconnectors to enable the integration of greater wind power capacity in the future, or upgrading planned radial connections to wind farms with interconnectors. However, this implies higher investment costs and a lack of incentives for TSOs due to the risk of stranded investments.

The interviewees also commented that unclear regulatory treatment of combined grid solutions, as in the Kriegers Flak case, creates limited incentives for such a solution. In Germany, the capital expenditure for a radial connection to offshore wind farms is distributed between the TSOs, whereas the extension of such a connection to an interconnector (a combined grid solution) is considered to be an interconnector, the costs of which have to be borne by the relevant developer alone. This naturally limits the incentives for such combined grid solutions. Furthermore, in the case of the COBRA cable, an offshore wind farm owner would not receive feed-in tariffs in Germany when connecting the installation to a nearby interconnector in the Netherlands. This means that even if the technical possibility of avoiding the construction of an additional radial connection to the offshore wind farm exists, a lack of adequate consideration in the regulatory system may impede the creation of such a connection.

C.6.7 Challenges for security of supply (SoS) projects

Creating better security of supply (SoS) in energy networks in Europe is a core target of European energy policy. To this end, the supply of electricity and gas to EU Member States needs to be diversified. This requires new transport and transmission lines, as well as flexible supply sources such as gas and electricity storage plants and LNG terminals. Using this infrastructure, energy can be supplied in periods when demand exceeds supply (e.g. in winter) or when supply from specific sources is interrupted.

In the electric power transmission segment, security of supply can be achieved by building additional transport and transmission lines, increasing import and export capacities to or from a specific country via interconnectors (allowing for additional imports in case of domestic power shortages) or storing electricity in pumped storage power stations, say. SoS projects are even more critical in the natural gas segment. Four things can improve SoS for natural gas: additional transport routes, gas

storages projects, reverse flow projects and LNG terminals. We discuss each of these areas in more detail below.

The EU has already taken a number of steps to improve SoS in gas networks. Council Directive 2004/67/EC of April 26, 2004 concerning measures for safe-guarding the security of natural gas supply, provides recommendations for SoS levels. However, the implementation of this recommendation has not yet been sanctioned, which, according to several interviewees in this study, means that the incentive to invest in such assets is limited. The recent EU Regulation 994/2010 (repealing Directive 2004/67/EC) defines a SoS standard based on the n-1 principle, whereby EU Member States must be able to compensate for the loss of their major gas import route. This Regulation – a starting point for ensuring SoS for gas – must be implemented by Member States by December 2014 at the latest.

Specific challenges relate to the realisation of SoS projects. In the case of additional pipelines, their limited commercial viability is a major challenge. Projects such as these improve SoS for extreme events such as long, cold winters, but have problems achieving economic viability under normal circumstances. This results in a lack of long-term bookings by shippers (see Section C.6.2). Below, we discuss the specific challenges faced by gas reverse flow projects, gas storage and electricity storage projects in turn.

C.6.7.1 Gas reverse flow projects

Gas reverse flow projects are investments that enable a natural gas pipeline to be operated bi-directionally. Such capabilities may be used under normal market conditions if there are regular transport flows sometimes in one direction and sometimes in the other, depending on changes in the market, or if there is a long-term shift of transport direction. If national users stand to benefit from the project, reverse flow investments can be financed by the market or by the regulatory asset base.

Reverse flow projects can also be geared towards SoS. This is the case where they are designed to deal with extreme events, such as the need to import (rather than export) gas due to a sudden supply shortage. There is usually no specific incentive for TSOs to propose this type of investment, and no incentive for NRAs to include them in the regulatory asset base. This is particularly true where no clear national benefit exists, as is the case when projects improve SoS in another country but have limited benefits for the domestic market. Generally, investments in reverse flow projects are currently based on demand for capacity from shippers, for whom SoS is a minor consideration.

With Regulation 994/2010, the EC has taken an important step towards tackling this problem. The Regulation requires TSOs to submit proposals for projects improving SoS to the relevant NRA. These projects are then considered for inclusion in the regulatory asset base. To avoid proposed projects being rejected automatically by the NRA, any such decision needs to be justified to the EC. However, the challenge remains of how costs should be allocated, as many transmission projects which improve SoS are cross-border projects, often with additional transit countries (see C.6.1).

C.6.7.2 Gas storage projects

Gas storage projects benefit shippers commercially, but may also help improve SoS and flexibility in the overall gas supply network. Investments in such projects differ from other investments. At present, a market-based approach without regulation of remuneration is the most common approach. However, some countries also regulate tariffs for gas storage – Hungary, for example. Investments in gas storage projects are thus to a large extent delivered by the market, and capacity requirements are based on demand from natural gas shippers. Our interviews with gas storage companies indicated that this market mechanism provides the required storage capacities in an efficient manner, avoiding both over- and underinvestment.

In the interviews, TSOs stated that the market also generally provides enough flexibility to cope with situations of extreme demand. In Germany, for example, around 30% of traded volumes are stored in gas storage facilities. Thus the demand levels of the coldest winter in the past 20-30 years could easily be met. However,

countries with less flexible reserves – especially countries which do not have multiple pipelines allowing gas imports from different sources – may not be able to meet extreme demand situations. This applies to most Eastern European countries.

One key challenge is to analyse the current level of SoS in a country (taking into account other infrastructure such as LNG and pipeline capacities, which add flexibility), what level of SoS is desirable, and how incentives can be created for traders (or how they can be compelled) to book adequate storage capacities on a long-term basis. These bookings would then facilitate the related investments. In this context, medium- to long-term development and further integration of markets should be considered. In line with the EU's goal of creating regional markets, it is necessary to evaluate SoS investments from a regional and European perspective rather than just a national perspective.

One factor leading to delays in investments in gas storage projects is uncertainty about regulation. For example, Germany and France currently only regulate access to gas storage facilities, not remuneration via tariffs. However, it is considered likely that regulation will be expanded in the future to include tariffs. This is seen as a highly significant development by gas storage companies, as it would potentially reduce the returns for such projects by more than 10%. In anticipation of such regulatory change, investors are already acting more cautiously and the volume of planned investments is decreasing, according to one expert.

In Austria, where there is currently neither an access nor a tariff regulation, the potential introduction of an access regulation is already having a strong negative effect on investments, according to our interviews. It is likely that the contracting of short-term capacities will be favoured by the regulator to ensure that third parties can access the storage capacities currently blocked by long-term contracts. This significantly increases the risk of investments, since there is no certainty of a high level of utilisation in the long term, leading to an increased risk of stranded investments.

LNG terminals are a source of flexibility in the natural gas market, in direct competition with gas storage facilities. The current strong support for forthcoming LNG projects, partly through direct subsidies, sends out a strong signal to gas storage project developers that there is a potential risk of stranded investments. This in turn leads to an increasingly risk-averse investment approach.

C.6.7.3 Electricity storage projects

Many different technologies exist for electricity storage, from batteries and compressed air energy storage to water-pumped storage plants. Different technologies have different levels of power, efficiency and storage capacity. Currently, only water-pumped storage plants are able to store large amounts of electric energy. Such plants can be thought of as power plants rather than parts of the transmission

network. They are typically owned and operated by utilities or independent power producers (IPPs), such as Hydro in Norway, the country with the largest water-pumped storage capacities in Europe. TSOs typically only provide the connection to the grid for these plants. The challenges that this involves can be seen in Norway. Thus the construction of new water-pumped storage plants focuses on smaller and more remote plants, which leads to discussions about who should bear the costs for the related transmission investments. According to our interviewees, however, investment in water-pumped storage facilities does not represent a major challenge, as such plants are typically profitable. More significant problems arise with regard to their environmental impact and therefore their permitting procedure.

C.7 Evaluation of challenges

The sections above give an overview of the key challenges faced by the energy transmission infrastructure industry with regards to investment and financing. To determine which issues are the most pressing, we evaluate them according to two criteria – their scope and their impact:

- **"Scope"** refers to the number of TSOs affected by the challenge. For example, all TSOs will be affected by the reduced availability of long-term commercial bank loans, so this challenge is rated "very high" in terms of scope. The evaluation of the **scope** of the challenge is based on the initial set of interviews with 32 TSOs and 15 financing institutions (this also forms the basis for the challenges outlined in the preceding section).

- **"Impact"** refers to how severely the financing conditions for energy infrastructure projects are affected by the challenge. To ensure that our assessment reflected the views of the three key stakeholder groups (TSOs, financing institutions and NRAs), a special questionnaire was distributed to these institutions. In it, participants were asked to rate the challenges according to their "risk of hindering investment in energy infrastructure projects". Ratings were given by 17 TSOs, 9 financing institutions and 19 NRAs across Europe.

Tables 10 and 11, below, summarise our findings:

Challenge		Description	EVALUATION Scope	Impact TSOs	Impact Fin. org.	Impact NRAs	Impact Average
1	**Permitting challenges**						
1.1	**Challenges relating to permitting aspects**	Delays to key projects due to permitting processes	●	●	●	●	●
2	**Financing needs**						
2.1	**Limited availability of financing**	Financing gap due to poor investment conditions	●	◑	◑	◔	◑
2.2	**Reduced EIB lending volume**	EIB lending to the sector will be reduced by a third to EUR 4 billion annually; key EIB loans cut	◕	◔	●	◔	◑
2.3	**Limits on EIB loans to individual corporations**	Some TSOs are already reaching their EIB lending limits; a particularly tough challenge for smaller TSOs lacking access to large volumes of debt (e.g. on bond market)	◑	◔	◑	◔	◔
2.4	**Limits on long-term commercial debt**	Long-term commercial debt will most likely be more difficult to obtain due to Basel II and III rules	◕	◑	●	◔	◑
2.5	**Financing gap during construction phase**	Difficult for TSOs to attract financing in the initial phase of projects due to the lack of cashflows and the high risks	◔	◑	●	◔	◑
2.6	**Lack of flexibility for raising equity due to high level of public ownership**	A problem for TSOs with large investment programmes and high leverage, and for many Eastern European TSOs with a high degree of public ownership	◑	◕	◑	◑	◑
2.7	**Financing for feasibility studies**	Financing of feasibility studies is still considered a challenge, especially in Eastern Europe	◔	◔	◔	◔	◔
3	**Regulatory issues**						
3.1	**Regulatory uncertainty**	A key concern expressed by TSOs and financing organisations; long-term equity investors in particular look for stable regulation	●	●	●	◔	◕
3.2	**Returns too low to act as an incentive for investments**	A significant challenge leading to certain investments being seen as lower priority and decreasing investment volumes overall	◕	●	●	◔	◕
3.3	**Returns too low to attract external equity**	An appropriate return on equity is essential for equity investors; current return on equity levels in Europe are considered too low, especially by infrastructure funds	◕	●	●	◔	◕
3.4	**Late recognition of pre-operational costs**	A specific regulatory shortcoming due to which capital expenditures are not reflected appropriately by the NRA; relevant for some countries	◔	●	●	◔	◕

Scope/impact: ◔ Low ◑ Medium ◕ High ● Very high

Table 10: Evaluation of key challenges (1)
(Source: Focus interviews, Challenge Survey, Roland Berger)

Challenge		Description	EVALUATION Scope	Impact TSOs	Impact Fin. org.	Impact NRAs	Impact Average
4	**Financing conditions**						
4.1	**Changing financing costs not taken into account**	Changing debt costs are not sufficiently covered by regulation					
4.2	**Refinancing risk due to short maturities of loans**	Risk associated with the need to obtain required volumes of debt for refinancing at suitable conditions					
4.3	**Lack of long-standing credibility as a debtor**	Risk of not obtaining the required debt volumes at suitable conditions is a challenge for some small TSOs, especially in Eastern Europe					
5	**Operator capabilities**						
5.1	**Lack of credit rating or insufficient credit rating**	This is challenging as access to bond markets is important, especially in the context of decreasing levels of long-term debt (from the EIB, commercial banks)					
5.2	**Limited financing expertise**	In the short term, it is difficult for small or recently unbundled TSOs to obtain the required funds at favourable conditions					
6	**Specific types of projects**						
6.1	**Regulatory harmonisation/cost allocation**	A delaying factor in some important projects; will become a challenge more generally for projects (e.g. NSCOGI)	1				
6.2	**Limited commercial interest and stranded investment problem**	Limited long-term commercial interest (as indicated by open season procedures, for instance); this is an investment hurdle for projects that are viable only from a socio-economic perspective	1				
6.3	**Lack of incentives for interconnectors**	Regulated interconnectors receive no more remuneration than common domestic projects – higher risks and complexity are not recognised; TSOs give this type of project lower priority	1				
6.4	**Advance capacity challenge**	A major challenge for investments which provide greater capacity or more efficiency than is required at present	1				
6.5	**Technological risk**	New or as yet unproven technology, e.g. for offshore wind farm projects; related risks	1				
6.6	**Lack of incentives for additional costs of combined grid solutions**	No incentive to invest additional money to combine offshore wind farms with interconnector solutions, for example	1				
6.7	**Regulatory uncertainty for security of supply (SoS) projects**	Uncertainty about required SoS levels and unclear regulatory treatment of SoS projects	1	2	2	2	2

Scope/impact: Low Medium High Very high

① Only applies to specific project types ② No evaluation performed

Table 11: Evaluation of key challenges (2)
(Source: Focus interviews, Challenge Survey, Roland Berger)

Comparing the ratings given by the three different groups (TSOs, financing institutions and NRAs), we find the following:

- **NRAs generally consider the challenges less significant than TSOs and financing institutions.** This may partly reflect the fact that it is the NRAs' job, as stakeholders in the energy transmission industry, to ensure that financing and investment challenges do not arise in the first place. It may also indicate that NRAs are not as aware of challenges as TSOs and financing institutions.

- **TSOs and financing institutions rate the challenges similarly.** Ratings by TSO and financing institutions show strong convergence in Tables 10 and 11. However, financing institutions consider the decreasing availability of debt (from the EIB and commercial banks) a greater challenge than TSOs. This may be because financing institutions have a broader view of the market and clearly see the challenge of meeting the required future financing volumes themselves. Financing institutions also view the lack of a credit rating as a significant disadvantage – not such a challenge for TSOs as many of them already have a credit rating.

To **summarise**, based on the interviews and our evaluation, it appears that the available financing volumes are generally considered sufficient to fund current investments. However, the large increase in investments in the period to 2020 will bring significant challenges for TSOs – an issue that at this stage is primarily perceived by financing institutions.

The main challenges faced by the industry are as follows:

1. Challenges relating to the stability of regulation: This relates particularly to the challenges of insufficient regulatory stability (see Section 3.1) and remuneration (3.2), the key basis for creating incentives for TSOs to commit themselves to further investments. For financing institutions, regulatory instability (3.1) is considered the most important challenge, especially for equity investors, as it makes it difficult to evaluate long-term investments properly. Regulatory stability was ranked as even more important than the return on equity requirement by equity investors seeking low risk/low return investments.

2. Challenges relating to obtaining additional equity financing: Obtaining equity is a key challenge, especially given the planned large-scale growth in investment programmes and TSOs' already high leverage level. Neither internal equity nor equity from current investors is generally sufficient, so additional external equity is required. The main challenge is that the return on equity is considered too low by equity investors (see Section 3.3), especially infrastructure funds, which usually require internal rates of return of over 10%. Another key challenge given the high levels of public ownership is the limited flexibility for obtaining additional equity (2.6). This is due to budget constraints on the part of the public shareholder and the lack of flexibility for raising external equity.

3. Challenges relating to obtaining debt at favourable conditions: EIB loans are viewed as the cornerstone of debt financing in all countries due to their long maturities and good conditions. Consequently, the decrease in overall EIB lending volumes (see Section 2.2) combined with further constraints on commercial banks for long-term lending (2.4) may pose a challenge. This is not yet widely perceived as a challenge by TSOs (see Table 10), but financing institutions see that it might materialise as a major challenge for debt financing in the medium term (2015-2020) when investment volumes peak. The lack of a credit rating, or a poor credit rating (5.1), can also be considered as a key disadvantage for TSOs, preventing further diversification of sources of debt. Again, this challenge is primarily perceived as such by financing institutions.

4. Challenges relating to specific types of projects: The expansion of interconnector capacity is essential for the further integration of European energy markets. In a regulated framework, such projects face higher risks but fail to provide higher returns, so the incentives for such projects are considered insufficient (6.3). For offshore grid expansions, the advanced capacity challenge (6.4) and lack of incentives given the additional cost of combined grid solutions (6.6) are the biggest factors hindering the creation of forward-looking investment programmes. A lack of clarity about the level of security of supply required and the question of who should finance such non-commercial projects poses a significant challenge (6.7). Regulatory harmonisation and cost allocation problems are also viewed as important challenges (6.1).

5. Challenges relating to the lack of transparency in the market: An issue, especially for financing institutions, is the lack of transparency about key areas that are vital for their investment decisions. For example, the exact mechanisms and remuneration that can be expected in different countries are difficult to understand and cannot easily be compared between countries. No assessment of investor-friendliness in terms of the stability of regulatory remuneration over time is available on a comparative basis – yet this is a key aspect that investors want to understand before committing to such investments. Another issue is the limited transparency about TSOs' plans to invest within a certain timeframe, the progress of such projects and any challenges they face. This limits the possibility of timely intervention by the EU to mitigate such problems. Finally, for security of supply projects, there is a lack of transparency regarding the existing level of SoS in some Member States, what level of SoS is required or desired, and what projects would improve SoS in the most cost-efficient manner. This poses a challenge to the timely and cost-efficient improvement of SoS on both a national and European level.

D. Solutions to financing challenges facing energy transmission infrastructure projects

On the basis of the challenges identified in Section C, we developed a series of potential measures for addressing the issues and discussed them with TSOs, financing institutions, NRAs and the EC. These measures are described and evaluated in the following section. They are of five types, reflecting the five types of challenges identified above:

1. Improve the **regulatory environment** for financing energy infrastructure investments in terms of transparency, reliability and returns

2. Facilitate **equity financing** by removing institutional barriers and using grants and new equity fund structures on a targeted basis

3. Enhance **debt financing** conditions by adjusting EIB lending and giving TSOs better access to corporate bond markets

4. Introduce **specific measures for particular types of projects** such as inter-connectors, offshore grids or security of supply projects

5. **Enhance the transparency and comparability** for the financing of energy infrastructure investment in general

Measures related to **permitting procedures** were confirmed as a major problem for the realisation of energy infrastructure projects. These measures are covered by Roland Berger Strategy Consultants in a separate study and **will not be further addressed here.**

Our discussion assumes that clear criteria exist for identifying **Projects of European Interest** (PEI), criteria which are updated regularly and can be referred to in forthcoming legislation. Projects with PEI status should be the main focus of the measures initiated by the EU to reach the 2020 targets. However, since it is also important to ensure that the major investments planned by TSOs are feasible, the proposed measures are geared towards mitigating the challenges on a broader basis – for example by improving the general investment conditions in the regulatory context.

In the following sections, we describe individual measures and how they can be implemented. We then assess the measure using the following criteria:

- **Impact** – How will the measure solve particular challenges?

- **Feasibility** – How easy is the measure to implement? How quickly will it take effect?

- **Costs** – How much will it cost?

  – **Administrative costs:** For example, for detailing the measure and its implementation plan, managing its implementation and administering it on an ongoing basis

  – **Recoverable lending/investment costs:** For example, for the EIB or in form of contributions to an investment fund such as the Marguerite Fund

  – **Co-financing via non-refundable contributions:** For example, in the form of grants

- **EU support** – What financial and personnel support will the measure need from the EU?

- **Evaluation (pros & cons)** – What are the arguments for and against the implementation of the measure?

- **Stakeholder assessment** – How is the measure evaluated in terms of its "usefulness to enable and/or speed up financing"? Results are based on completed questionnaires by 17 TSOs, 9 financing institutions and 19 NRAs.

- **Overall assessment** – Summary of the measure and overall assessment by Roland Berger Strategy Consultants, taking into account the assessment by stakeholders.

Each section includes a summary table. In the tables, we use Harvey Balls to show our findings: an empty Harvey Ball indicates a low rating in relation to the criterion in question, a full Harvey Ball a high rating.

D.1 Improve the regulatory environment for the financing of energy infrastructure investments

According to almost all the financing institutions and TSOs we interviewed, the **regulatory framework** is the most important factor in the financing of energy infrastructure projects. The general message from the interviews was as follows: If the regulatory framework is **transparent, reliable and attractive enough** in terms of returns, the financing of energy infrastructure projects poses very few serious problems. However, this is not the case throughout Europe. Our interviewees specifically mentioned Eastern European countries in this context.

We therefore begin our discussion with the issue of **variation in regulatory regimes.** Regulatory regimes need to be harmonised in the medium term to create more comparability and transparency for investors (see Section D.1.1). We then turn to the key issue of the **reliability and stability of the regulatory regime.** Here, we propose a measure that would create longer-term stability for investment cases (Section D.1.2). To bridge the financing gap that some TSOs say arises in the **construction phase** of projects (see Section C.2.5), we discuss extending regulatory remuneration for this phase (Section D.1.3). Finally, in Section D.1.4, we propose **priority premiums** as an effective way to make transmission project investments more attractive.

D.1.1 Harmonise regulatory regimes in the EU in terms of core aspects relating to financing conditions

Description

Currently there is great diversity in regulatory frameworks with regard to investment in energy transmission projects and the financing of such projects. Many of the measures discussed below will face implementation hurdles due to the differing regulatory regimes in Europe.

To take one example, the costs of borrowing are dealt with quite differently by regulators when determining remuneration. In some cases, lower costs are advantageous for the project developer and can increase equity returns, thereby providing an incentive for further investment. In other cases, lower costs are simply reflected in smaller returns and there is no significant effect on the operator. In order to **increase transparency and comparability,** regulatory frameworks should be harmonised across Europe. This would also **make it possible to coordinate actions in the regulatory arena.**.

This process of harmonisation should address two crucial aspects, as well as a number of other areas:

- **Investment approval processes:** Typically, TSOs submit their investment plans to the NRA for evaluation and approval. Such approval can be given in advance or after investments have already been committed to. For approvals requested after investments have already begun, there is the risk that plans will not be fully approved by the regulator. This can have a negative impact on the risk perception of potential investors. For this reason, investment approval processes should be harmonised in the medium to long term.

- **The use of financial indicators**: Different indicators are used in the handling and steering of investment projects. For example, a wide range of indicators are used across Europe in published return levels – the weighted average cost of capital (WACC), return on equity (ROE) or return on assets (ROA), say (see

Section C.3.3 for an overview). The same type of ratio may be calculated in different ways, using nominal ROE rather than real ROE including the effect of inflation, for instance. The result is that return levels are difficult to compare between countries.

Proposed implementation steps

As a first step, the investment approval processes and financial indicators should be **assessed in detail,** compared, and proposals derived for how to harmonise them (see also Section D.5, below). The harmonisation process should be a medium-term, step-by-step approach bringing regulatory regimes closer together. It is vital that all relevant stakeholders – especially TSOs – are involved in this process, so that the carefully crafted incentives and innovation mechanisms developed over the years are preserved and the predictability of the regulatory regime is ensured. As there is a working group inside CEER currently addressing this issue, we will not discuss this measure further here.

Evaluation

<table>
<tr><th>Criteria</th><th colspan="2">Assessment</th><th>Evaluation</th></tr>
<tr><td>Impact</td><td colspan="2">• Significantly improves the investor-friendliness of the sector in the long run but has only limited direct impact on reducing the investment and financing challenges for specific TSOs</td><td>  </td></tr>
<tr><td>Feasi-bility</td><td colspan="2">• Significant challenges for implementation as such a harmonisation of regulatory regimes requires consensus about a common approach and the subsequent adaptation of national regulatory regimes</td><td>  </td></tr>
<tr><td>Costs</td><td colspan="2">• Administrative (very low) – Personnel resources must be dedicated to coordinate and drive the increased harmonisation of regulatory regimes</td><td>  </td></tr>
<tr><td>EU support</td><td colspan="2">Funding
• No financial support required
Implementation
• Strong coordination and moderation of the regulatory harmonisation process (e.g. through ACER and CEER, with further support on the EU level)</td><td></td></tr>
<tr><td>Evalua-tion</td><td>Advantages</td><td>Disadvantages</td><td></td></tr>
<tr><td></td><td>• Improved investor-friendliness of the sector due to increased transparency in the medium and long run</td><td>• Significant hurdles in defining and implementing the harmonisation process</td><td></td></tr>
</table>

Assess-ment of stake-holders	TSOs	Financing institutions	NRAs	
				
Overall assess-ment	• This measure should be followed as a **medium-term goal** to **enhance transparency, increase investor-friendliness** and increase the availability of equity and debt – significant challenges to implementation • Both TSOs and financing institutions consider this measure highly important, so it should be implemented in a gradual but committed fashion			

D.1.2 Create longer-term stability for investment cases

The interviews with TSOs and financing institutions revealed that the most important issue for investments in energy transmission infrastructure is the **long-term reliability of the regulatory regime.** In most countries, regulatory periods are just three to five years for both the electricity and the natural gas sector, i.e. the expected remuneration for new projects included in the regulatory asset base is fixed for a much shorter period than the project lifetime.

Project developers and investors need to trust that the regulatory regime will not change to their disadvantage during the project lifetime. Trust in the regulatory regime takes time to build (financing institutions cited the UK as a successful example here). For this reason, other measures would have to be designed to bridge the gap and provide longer-term stability, specifically with regard to expected remuneration in the medium to long term.

One way to create more long-term transparency for investors would be to **extend regulatory periods** beyond the current three to five years. This would reduce uncertainty. This has happened, for example, in the UK, where an extension of price control periods from five to eight years was introduced in 2010.

The EU could therefore consider introducing a **requirement for national regulatory regimes to provide longer-term security for investment cases,** for example regulatory periods that provide predictable returns for at least eight to ten years.

Evaluation

Criteria	Assessment	Evaluation
Impact	• **Improves investor-friendliness** of the sector in the long term, with a strong impact on the readiness of equity investors in particular to allocate funds to the market	

Feasi-bility	• **Significant challenges for implementation,** as a change of national regulatory regimes is required. This might face significant opposition • Implementation may take **considerable time**	
Costs	• **Administrative (very low)** – Personnel resources will be needed on the EU level to enforce and moderate the adaptation of national regulatory regimes • In the long term, longer security of remuneration might lead to **higher overall transmission costs**	
EU support	***Funding*** • No financial support required ***Implementation*** • The definition and implementation of measures for enhancing regulatory stability need to be closely monitored (e.g. through ACER, with support on an EU level)	

Evaluation	**Advantages**	**Disadvantages**
	• Addresses a **main concern** raised by investors • Has a **positive impact** on the attractiveness of transmission investments	• **Significant hurdles to implementation** as the adaptation of national regulation is required • May **conflict with incentive regulation** and efficiency requirements, and may lead to overcompensation if cost levels are reduced over time • **Adjustment mechanisms** would still be needed even during longer regulatory periods in case of significant changes in market conditions

Assess-ment of stake-holders	**TSOs**	**Financing institutions**	**NRAs**	
				
Overall assess-ment	• This measure addresses a key concern raised by investors. Investors and TSOs are both strongly in favour of such an instrument. However, it may be very difficult to implement and would only be available in the medium to long term			

D.1.3 Provide regulatory remuneration during the construction phase of projects

Description

In the **construction phase** of projects, a financing challenge arises: equity and debt providers are hesitant to take on the risk of delays, cost overruns and technical problems (see Section C.2.5). As soon as the asset is in operation and starts creating cashflows, the investment conditions improve significantly (in general, the rating improves from a BBB to a single A level).

This challenge can be mitigated by regulatory means by **allowing the developer to be remunerated for the project during the construction phase** (at least partially, depending on the state of construction). In this way, the risk for lenders and equity investors of a potential lack of funds to cover the debt service is mitigated. The measure would mean that there is no difference between the start-up phase and the operational phase from a risk point of view. An example is the case of the East-West-Interconnector from Ireland to the UK, where the Irish regulator adapted the regulation to provide just this kind of security.

Proposed implementation steps

The European Union should draw up a **legislative proposal enforcing remuneration** by NRAs during the development and construction phase of projects. The detailed design of the measure could be left to individual Member States. To reduce operational complexity for NRAs, TSOs should be required to apply for this support instrument if desired.

Evaluation

Criteria	Assessment	Evaluation
Impact	• **Improves the availability of financing for projects** in the risky development and construction phase (especially important for projects that are financed and operated by separate project companies)	
Feasibility	• **Medium level of feasibility** as adaptations to the national regulatory regime are required, based on an EU regulation	
Costs	• **Administrative (very low)** – personnel resources on an EU level would be needed to enforce and monitor the adaptation of national regulatory regimes. On the regulatory side, this measure simply means that the regulatory remuneration begins earlier, i.e. later remuneration is reduced by the same extent	

EU support	***Financing*** • No financial support required ***Implementation*** • Initiation and management of a coordination process with NRAs	

Evaluation	**Advantages**	**Disadvantages**
	• **Solves a specific challenge to obtaining financing** in the development and construction phase of projects that are project financed and run as separate project companies	• **Limited scope** – A financing gap that would seriously endanger the project only exists in a limited number of cases • **Requires adaptation of national regulation** to some extent, so there would be a time lag before this measure took effect

Assessment of stakeholders	**TSOs**	**Financing institutions**	**NRAs**	
				
Overall assessment	• This measure would specifically tackle the financing challenge during the construction phase of projects, without requiring funds. However, implementation is difficult as regulatory adaptations are required • The measure is evaluated as highly useful by all stakeholders. However, as it is only relevant for a limited range of projects, we give it a lower overall rating			

D.1.4 Make investments more attractive by introducing priority premiums

Description

An approach to make investments in infrastructure more attractive has already been implemented in Italy, France and the USA with the introduction of **"equity return uplifts"** or **"equity return adders".** The general idea behind such **"priority premiums",** as we may call them, is to allow project developers additional return on equity (ROE) for certain projects, specifically new investments geared towards market integration and security of supply (SoS). Typically this addition return is in the order of a few percentage points.

The goal of this measure is to provide focused incentives to speed up investments specifically for Projects of European Interest. Incentives that increase the return on assets (ROA) or ROE are a tried-and-tested tool. In Italy, for example, adders creating an incentive for certain types of projects were introduced in 2008. Incentives

are given for 12 years and are effective immediately. Work in progress is also remunerated with the adders, thus incentives are provided in the year the capital expenditure takes place. The incentive scheme is focused on new investments, specifically those that contribute to congestion relief and SoS. In the Italian example, the premiums are as follows:

- In **electricity transmission**
  - **Three percentage points for congestion-relieving investments** (relating to interconnector projects and all investments reducing congestion between the six balancing zones in Italy), resulting in a real pre-tax return (WACC) of 9.9%
  - **Two percentage points for system security investments,** resulting in a real pre-tax return (WACC) of 8.9%
- In **new natural gas storage investments** a premium of four percentage points

In 2009, **71%** of the total investment volume of Terna (the Italian electricity TSO) **attracted incentives of this type.** Some 47% related to congestion-relieving investments (eligible for the three percentage point adder) and 53% to projects enhancing SoS (eligible for the two percentage point adder). Projects which did not attract incentives were mainly replacement investments and a few non-regulated investments.

In Italy, many investments were covered by the incentive scheme. A large proportion of them received the incentive after the introduction of the adder mechanism, but there was also a **positive effect on further investments** as a result of the introduction of incentives. Figure 11 shows how Terna's investments developed over time, revealing growth in anticipation of the introduction of adders for congestion-relieving and system security investments.[13] The introduction of adders was announced by the Italian NRA AEEG in 2006 and took effect in 2008.

[13] While a positive effect can be confirmed for the electricity sector, there is no clear effect in the natural gas sector.

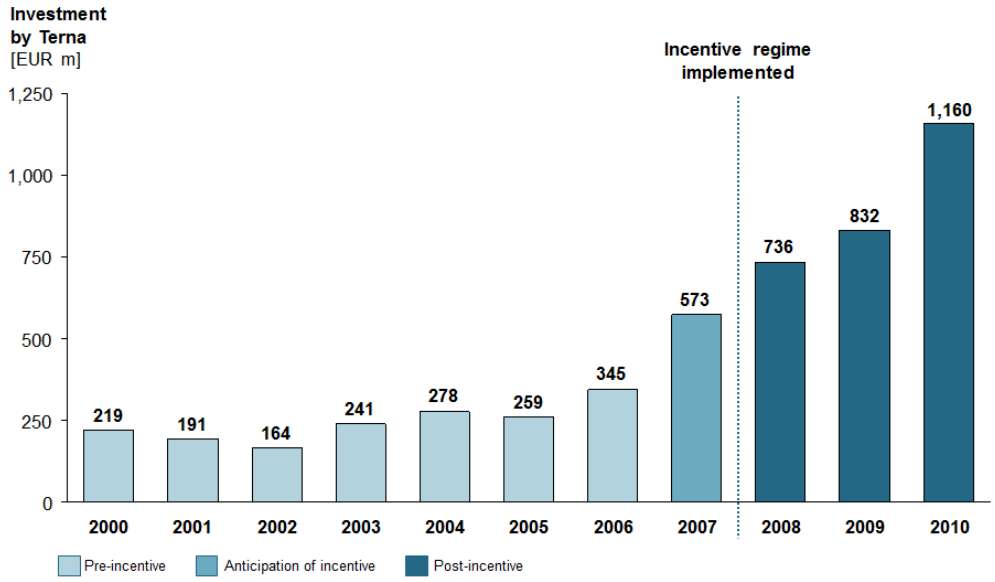


Figure 11: Effect of equity adders on investments in Italy (electricity)[14]
(Source: Terna, annual reports)

A **similar effect** can be observed in the **USA.** Following liberalisation of the electricity sector, the transmission sector faced underinvestment and declining investment volumes between 1975 and 1998. The underlying reason was the limited profit potential combined with a significant perceived investment risk. With increasing energy consumption and rising electric loads, a SoS problem became evident. This challenge was recognised by the NRA FERC in 2006, which responded by introducing an incentive scheme for new energy infrastructure investments.

Rather than just using a return adder, the US incentive system consists of a number of specific measures which the operators of transmission grids can apply for. Operators decide on incentives on a case-by-case basis, and the NRA evaluates them on a similar basis. Applicants must demonstrate that a "nexus" exists between the incentive sought and the specific investment. In general, ROE adders are granted in the range of one to three percentage points, based on the benefit of a project for regional development and the risks to the project. Expedited procedures exist for approving incentives, providing utilities with greater regulatory certainty and facilitating financing. As in Italy, incentives have had a visible effect on investments, as illustrated in Figure 12 for the TSO California ISO.

[14] It should be noted that from 2005 to 2009 there was a general increase in investments by TSOs in Europe, e.g. Red Electrica (ES) – compound annual growth rate (CAGR) of 14%, National Grid (UK) – 9%, RTE (FR) – 15%. However, in the same period Terna showed a much stronger CAGR at 34%.

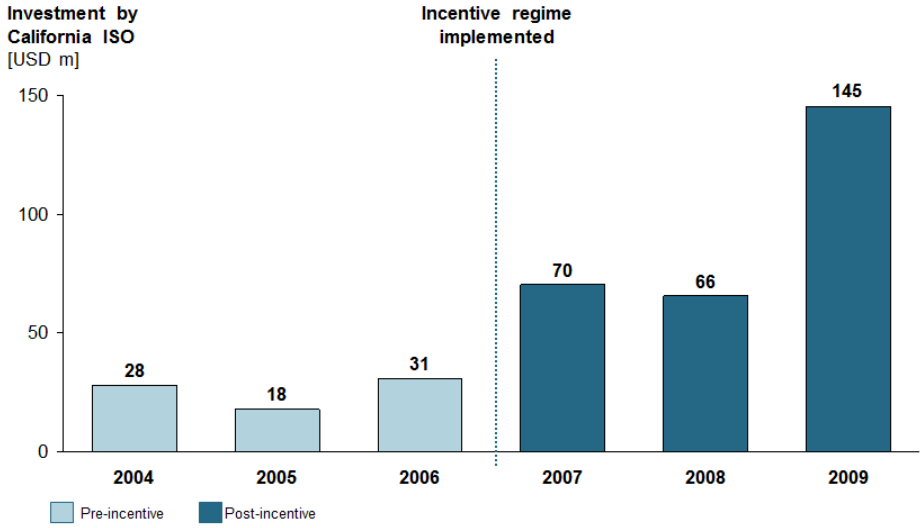


Figure 12: Effect of incentives on investments in the USA (example: TSO California ISO)

Thus return adders can quickly encourage additional investments, particularly if they are linked to certain criteria such as on-time delivery or specific milestones.

Proposed implementation steps

To date, equity return adders have only been introduced on a national level. It would be difficult for the EU to impose the introduction of return adders on Member State level. Such an approach would result in a wide variety of different national models – reducing transparency and comparability. The EC would also have to impose changes to regulatory frameworks which would result in additional transmission costs. Consequently it is likely that adders would not be implemented either to the extent required or within the desired timeframe. Furthermore, if NRAs were responsible for implementing adders, the EC would not be able to focus support on Projects of European Interest. We therefore propose implementing a priority premium on a European level. This means that the **priority premium would be offered, administrated, provided and at least partially funded by the EU.**

Implementation would entail a number of actions:

- **Designing an appropriate premium mechanism:** We recommended that the return premium be introduced in the form of a "priority premium" for TSOs, to be paid annually for a fixed period of time (e.g. ten years) on a non-refundable basis. The amount of the premium would be determined using an equity return adder. If a project has no strictly defined equity stake (e.g. if it is fully financed by corporate means), a maximum equity percentage of 30-40% could be assumed.

- **Aligning premiums with national legislation:** European legislation must ensure that the premium is not considered a grant and is not deducted from eligible project costs, i.e. it must serve as a real "on top" incentive for project developers.

- **Setting the scope of the premium:** Priority premiums should be used primarily to support Projects of European Interest.

- **Designing the access mechanism:** To facilitate defining and selecting eligible projects (based on a pre-selection such as whether the project has Project of European Interest status), an application process should be introduced. TSOs would apply for the premium on a competitive basis and the EC would evaluate and select the eligible projects. In the application process, the applicant should submit a detailed project implementation plan (this would mean that the project would have to be in an advanced stage of the permitting process). Typical levels of equity and debt for the country and type of project should be used as a calculation basis for the ROE adder. Alternatively, a maximum equity share of 30-40% should be assumed.

- **Linking premiums to incentives:** To ensure that the premium speeds up projects, a mechanism coupling the payments to clear project milestones and timelines is needed. For example, the premium should only be paid out if a project is realised within a certain timeframe. This timeframe should be set on an individual basis and can reflect its position in the permitting process, say. It should be noted that some factors – such as the duration of the permitting process – are to a certain extent beyond the control of TSOs; this should be taken into account when setting milestones.

- **Choosing the source of funding:** To avoid simply creating new project-based subsidies, the costs of financing the priority premium should be shared between the European Union and the Member State in question, e.g. on a 50/50 basis:

  – Funds on the EU level could come from redirecting part of the money used for direct subsidies (e.g. EEPR and TEN-E grants) to the incentive mechanism.

  – Funds on a national level should come from reallocation between TSOs. A mechanism should be established ensuring that TSOs with projects eligible for the premium receive funds from TSOs that do not have such projects in their portfolio. This contribution would need to be enforced by the European Union. If multiple countries are involved (e.g. in an interconnector project), the distribution of the premium from both the EC and the NRAs should follow the agreed cost allocation for the project (e.g. if 50% of the costs have to be borne by a certain TSO, these costs should form the calculation basis for the premium).

Implementing a contribution mechanism on a national level is complex as it involves creating a legal basis at EU level. This would require a specific regulation. Furthermore, mechanisms must be established for collecting funds from TSOs at a national level in all Member States. Until this process is in place, full funding can come from the EU. This would **speed up the application of the priority premium.**

Evaluation

In terms of the **costs of the priority premium,** a premium **of two percentage points** applied to new investments of EUR 10 billion would mean a **EUR 60 million direct financial contribution** annually. This initial evaluation is based on the data for the average annual new investments planned by TSOs in Europe, on the assumption that 30% of these assets are equity financed. This could be seen as the first step in EU implementation of the priority premium. If the premium is effective, it could be applied to all PEIs. This would mean an annual contribution of EUR 120 million, creating an incentive for EUR 20 billion in potential investments each year, the amount envisaged in the EC Communication COM (2010) 677.

In the electricity sector, this would be equivalent to an **increase of just 0.3% or so in overall transmission costs in Europe.** Considering the fact that transmission costs on average account for approximately 7% of total electricity costs, this increase represents a very moderate amount compared to the potential impact.

The priority premium would have to be funded over a long period of time. The cumulative costs would be several hundred million euros. For this reason, we recommend passing on the costs to TSOs via national funds, as described above.

Criteria	Assessment	Evaluation
Impact	• **Significant and proven effect on increasing the volume and speed of investments for which the premium applies** • Premiums can **speed up investment in specific types of Projects of European Interest** such as interconnector and SoS projects. There is also a secondary effect where premiums increase the ROE, say: investing in specific projects or TSOs becomes more attractive for external equity investors, thereby increasing the availability of such equity	
Feasibility	Feasibility is relatively good if adaptations to national regulatory regimes are initially kept to a minimum and EU funds can be used. The main hurdles are: • The **preparation phase requires good coordination and agreement between key stakeholders on the EU level,** such as the EC, ENTSO-E and ENTSO-G • **NRAs must agree** that the **premium will not be deducted** from regulatory remuneration	

	• **Required funds to finance the measure have to be raised**/allocated on the EU level	
Costs	• **Co-financing via non-refundable contributions (moderate)** – An equity adder of two percentage points to EUR 10 billion in new investments would require a EUR 60 million direct financial contribution by the EU • If costs are (at least partially) passed on to TSOs for recuperation via the regulatory asset base in transmission fees, there is hardly an effect on transmission tariffs or energy prices	
EU support	***Funding*** • **Direct co-funding by the EU,** e.g. by shifting funds form grant programmes to this initiative or using additional funds ***Implementation*** • **Management of the preparation and implementation of the measure,** management of the ongoing operations, e.g. in the framework of the TEN-E programme	

Evaluation	**Advantages**	**Disadvantages**
	• **Significant and proven effect** on **boosting investments** for specific important types of projects • **Immediate effect of the measure on investment decisions** (see example of Italy, above) • **Attractiveness for external equity investors increases where there is a positive effect on ROE**, so raising equity to finance the related investments is easier	• **Close coordination with NRAs required** to ensure that the premium has a direct effect on ROA/ROE and is not deducted from the regulatory remuneration • **Direct EU funding is required** – challenges relate to raising additional funds or re-allocate funds from other sources

Assessment of stakeholders	**TSOs**	**Financing institutions**	**NRAs**	
				
Overall assessment	• This measure would provide proven incentives for investments, e.g. in Projects of European Interest, and attract equity investors. It is considered highly useful by TSOs, financing institutions and even by some NRAs (who should by definition be concerned about changes in return regimes)			

D.2 Facilitate equity financing

The investment volumes outlined in Section B.1 will require **more equity to be raised in future** as company cashflows are too small to provide the necessary funds. In a sense, raising the necessary equity will be even more challenging than raising the required debt – even though more debt is needed than equity. This is for example because of institutional hurdles, such as state ownership or companies belonging to larger groups of utilities, which make equity injections more difficult. These challenges are described in detail in Section C.2.

There are two approaches to improving equity supply in the industry. The first is **public grants,** the traditional but probably most expensive means of equity support (see Section D.2.1). The second is **institutional structures** such as the **Marguerite Fund,** which have a specific but probably limited positive effect on equity provision for the energy transport and transmission industry (Section D.2.2). Given the limitations of this latter approach, we propose an adjusted model in form of an **EU-initiated Transmission Infrastructure Fund (TIF)** in Section D.2.3. We then address ways of removing some of the institutional barriers to equity investments: in Sections D.2.4 and D.2.5 we examine the **privatisation of TSOs** and **industry consolidation** as possible levers to allowing more external equity funding to be channelled into the industry.

D.2.1 Direct public co-sponsoring via grants to reduce the required equity financing volumes

Description

A simple and traditional way to provide incentives to projects is to sponsor them directly by grants, for example via the **European Energy Programme for Recovery (EEPR).** Such grants form a **fast and direct instrument of support** by decreasing the required overall financing volume as well as the amount of equity required (when the grants are given on a non-refundable basis, as is the case with the EEPR).

Grants can make it easier to obtain equity financing for specific projects. They are also useful where specific financing constraints exist. However, they represent direct subsidies by the European Union and are therefore costly, especially compared to instruments which draw on capital from private investors (see D.2.3 and D.2.4 for examples).

Grants should therefore be used in a cautious and targeted manner to support projects in situations where the market cannot provide the financial means in the required volume or with the necessary speed. This may be the case due to **external factors such as the financial crisis,** or where TSOs face major financing problems (e.g. due to a "non-investment grade" rating). In such situations, grants under

programmes such as the EEPR can help alleviate funding constraints that would otherwise delay ongoing projects or put investments in important new projects at risk.

One positive effect of grants is that they directly reduce the financing volume required for an investment. As such, grants can reduce transmission costs, since the share of the investment covered by the grant would normally be passed on to the energy consumer in the form of transmission costs. This may limit the increase in energy prices in countries where large future investments would otherwise drive up transmission fees, which would have an especially severe effect on consumers where transmission costs are already high in relation to energy prices.[15]

In specific situations, then, grants can reduce the need for equity financing. But in a more normal economic environment, with financially healthy TSOs, grants are not the preferred tool from a cost-efficiency perspective. For this, other tools are more appropriate, e.g. a Transmission Infrastructure Fund (see D.2.3).

In order to ensure that grants are cost-effective and achieve their aim, a certain amount of co-financing should be required from the beneficiary. This approach is already followed in programmes such as the:

- **EEPR,** which provides maximum financing of 50% of the eligible costs of a project[16]

- **TEN-E** programme, which provides maximum financing of 50% of the eligible costs for feasibility and other studies and 10% of works[17]

Co-financing requirements give EU grants leverage. Thus, in the ideal case, the 50% provided for a feasibility study under the TEN-E programme means that the TSO also makes a 50% investment. For this to happen in practice, it is important that grants are only provided where investments would not otherwise happen or would be significantly delayed. This can be ensured by carefully examining the underlying business case.

Thus there are specific situations where grants are useful: in times of general financial constraint, in the case of specific TSOs with substantial financial problems, or to reduce transmission costs for consumers. Besides reducing the required financing volume, grants can also help solve specific challenges related to the type of project, such as the advance capacity challenge outlined in Section D.4.4.

[15] For example Lithuania, where transmission costs make up 11% of the energy price (excluding tax) compared to an EU average of 7% and a planned threefold increase in average annual investments in the period 2011-2020 compared to 2005-2009.
[16] Regulation 663/2009, Article 9
[17] Regulation 680/2007, Article 6

Proposed implementation steps

The EC should use grant programmes to support investment cases that are affected by significant external factors and in the case of TSOs or project companies facing substantial financing challenges. Furthermore, grants can be a useful instrument for mitigating financing challenges in specific types of projects (see below, Section D.4).

Evaluation

Criteria	Assessment	Evaluation
Impact	• **Direct reduction of the required equity financing volume of projects** (through the non-refundable character of grants). The equity financing volume may be required to achieve a certain leverage (30% equity finance is the industry standard in project finance) • Can **facilitate investment decisions by TSOs** • **No effect on the ROE situation and potential related incentives for investors** as grants are usually deducted when calculating the regulatory asset base • **Positive effect in terms of supporting TSOs with financial problems** and providing financial support in times of severe external economic conditions	
Feasi-bility	• **High** – programmes and structures that are already in place (TEN-E, EEPR) could be used to continue giving grants with the same or a new focus • **Little legislative adaptation** would be required	
Costs	• **Co-financing via non-refundable contributions** (medium to high) – depending on co-financing approaches, 10-50% of non-refundable support has to be contributed to projects • **Significant costs are involved in this measure** (grants are direct subsidies with no significant leverage)	
EU support	***Funding*** • **Full public financing** via funds of the European Union ***Implementation*** • **Grant allocation would be managed by the EU** – from selecting appropriate beneficiaries (based on clearly defined eligibility criteria) to coordinating the process and related monitoring (e.g. impact analysis)	
Evalua-tion	**Advantages**	**Disadvantages**
	• **Reduces equity constraints** – e.g. in cases of already high leverage or situations in which equity is difficult to obtain due to a high degree of public	• **Costly measure** – grants in the form of non-refundable financial support are direct subsidies and thus the most costly option for supporting individual projects

	ownership/financing of individual projects in the development and construction phase • **Immediate effect** – grants have an immediate effect on improving business cases and the financing of projects • Reduces transmission costs (as investments covered by a grant are not passed on to customers); however, this effect is limited • Simple to implement	• **No effect on ROE** – as grants are deducted from the regulatory asset base there is no positive effect on ROE or other incentives for TSOs to prioritise investments

Assess-ment of stake-holders	TSOs	Financing institutions	NRAs	
				
Overall assess-ment	• In a normal economic environment, this instrument provides only a minor incentive to make investments and brings with it substantial costs (due to the direct transfer of non-refundable contributions) • Stakeholders generally said that they appreciate the direct and non-remunerable injection of funds. However, the measure should be treated very carefully due to its cost implications • Grants can be a useful way of supporting TSOs with financial problems or mitigating the effects of extreme external events (e.g. the economic crisis), as well as speeding up or triggering additional projects			

D.2.2 Publicly supported equity financing (Marguerite Fund)

Description

Publicly supported equity financing involves initiatives such as the **Marguerite Fund,** set up by a consortium of IFIs. The Marguerite Fund has a target investment volume of EUR 1.5 billion, which will be contributed by both public and private investors (such as large pension funds) with an emphasis on long-term investments. The general **investment focus** will be on the transport and energy sectors, particularly greenfield investments (65% of projects) and projects that contribute to key long-term goals of the EC in these sectors. The target sector breakdown is as follows:

- **Transport:** 30-40%

- **Energy** (including transmission): 25-35%
- **Renewable energy:** 35-45%

Overall, **the idea of the Marguerite Fund is viewed as positive by TSOs and financing institutions** as it provides an instrument on the equity side that is focused on the long-term investment requirements of the target sectors. However, some investors believe that public financing institutions play too big a role in the Fund. The Fund was set up by six main sponsors: the EIB, KfW (DE), Instituto de Crédito Oficial (ES), PKO Bank Polski (PL), Cassa Depositi e Prestiti (IT) and the Caisse des Dépôts (FR). Each of these invested EUR 100 million in the first closing round, of the Fund's target volume of EUR 1.5 billion. Thus public investors play a leading role in the fund. Furthermore, concerns have been raised that the **rate of return expected internally is 10-14%,** whereas the **existing regulated return structure** in the energy transmission sector is in the single-digit range. This return requirement is mainly due to the broad investment focus of the Fund, which is also aiming at projects with higher returns. Another concern is that the focus on greenfield projects means that projects must be handled in separate project companies, which is not typically the case today in the electricity transmission sector.

The **target investment volume of the Fund directed towards the energy sector is EUR 375-525 million** (25-35% of the Fund's total EUR 1.5 billion). The volume directed towards the transmission segment will be even lower. This compares to an annual investment requirement in the energy transmission infrastructure industry of around EUR 7 billion (assuming a 30% equity share of annual investments in Projects of European Interest, which have a total value of EUR 20 billion; see Section B.1). **Significantly larger equity volumes will therefore be required,** even if only part of the equity has to be raised from external equity investors.

For these reasons, the Marguerite Fund can be considered a **useful first step** towards creating better access to equity for the energy transport and transmission industry in Europe. However, it will not have a major impact on solving the challenges of equity provision.

Evaluation

Criteria	Assessment	Evaluation
Impact	• **Low impact,** as **the return requirements** are generally **too high** for TSOs, the Fund is too small (especially since the investment focus is not on TSOs) and the emphasis is on greenfield investments	
Feasibility	• **Marguerite Fund** already exists	
Cost	• **EU investment (recoverable)** of EUR 80 million, of the total planned volume of EUR 1.5 billion (5%)	

EU support	***Funding*** • **EU has invested EUR 80 million,** mainly from large public financing institutions (e.g. EIB, KfW) and private investors • Significant use of funds from the EIB and other IFIs ***Implementation*** • **Managing the preparation and implementation of the measure** in a typically separate and commercially-oriented fund structure	

Evaluation	**Advantages**	**Disadvantages**
	• **Equity source specifically focused on important European projects** • **Long-term investment focus** that reflects the requirements of the industry	• **Does not meet the requirements of the energy transmission industry,** which has – **Lower ROE levels,** typically single-digit – **A significantly larger equity volume requirement** than can be met by the Marguerite Fund

Assessment of stakeholders	**TSOs**	**Financing institutions**	**NRAs**	
				
Overall assessment	• The Marguerite Fund cannot help provide equity to TSOs as its return requirements cannot be met by the regulatory returns			

D.2.3 Set up an EU-supported Transmission Infrastructure Fund (TIF)

Description

Some interviewees stated that a **new, dedicated equity investment fund** could be set up to tackle the large financing needs of energy transmission projects – an EU-supported Transmission Infrastructure Fund (TIF). The Marguerite Fund outlined in D.2.2 is such a fund, but it does not fully meet the specific demands of the energy transmission industry. To ensure the effectiveness of a publicly supported instrument of this type, the following guidelines should be followed:

- Set a **clear investment focus on Projects of European Interest in energy transmission infrastructure, with risk-adjusted return requirements** – single-digit returns are typical in the industry.

- **Focus on transmission network investments at a corporate level** (i.e. by directly investing in TSOs) **and provide additional funding specifically for future investment programmes,** while allowing a small share of investments in individual projects. In this way, the TIF would reflect typical financing practice in the industry, with its strong focus on corporate finance. By allowing some investments in individual projects, the TIF's overall risk profile and related return requirements would not rise significantly while allowing individual projects (such as interconnectors run in separate project companies) to obtain the required funds.

- Give the **TIF a long-term perspective,** e.g. 25 years, reflecting the need for long-term investors in the energy infrastructure industry. This would give investors a long-term but clearly defined exit opportunity – a requirement of some investors. At the same time, it would ensure that the TIF attracts investors with a long-term horizon, such as pension funds.

- **Set up the TIF with the help of the EU but with funding mainly from private sources.** The EU should define the investment focus and goals of the TIF, but invest relatively little if any of its own money. Acquisition of investors should take place with the help of private investment banks (supported by the EU) or an infrastructure fund. The EU should be represented on the supervisory board of TIF.

- Use the TIF to establish **an initial investment vehicle** dedicated to the energy transmission infrastructure industry. This vehicle would then help set up a number of similar funds run by investment banks and companies in the medium to long term. The TIF would thus perform an important bridging function, directing investors towards the industry and raising the profile of the industry. It could also provide transparency for investors about regulatory stability and the expected returns in different countries. This will require dedicated studies to be performed (see Sections D.5.1, D.5.2 and D.5.3).

By ensuring that the TIF is geared towards the specific demands of the industry, the goal of contributing additional equity financing on both a corporate and project level can be achieved. It is the general view of the investment community that privately financed vehicles should be preferred to publicly supported structures for providing additional equity. This would be ensured by the TIF's strong focus on private investors.

The TIF would also be an **important instrument for fostering private investment** on the equity side, especially for TSOs with a **high level of public ownership.** Setting up such a fund under supervision of the EU would be an important step towards a more market-oriented industry structure. For the TIF to be fully effective, it must be ensured that this measure is combined with removing related barriers to investment on the equity side (see D.2.4.).

If the TIF achieves the typical volume of such infrastructure funds, i.e. several billion euros, and can be established with a relatively small initial investment by the EU, it could quickly be replicated by other such funds. In this way a larger share of the required equity volumes by 2020 could be met. Creating the TIF would thus send out a strong signal, attracting other equity investors seeking low risk/low return investments to the energy transmission and storage industry.

Proposed implementation steps

- **An initial workshop** should detail the **requirements for such a fund on the part of investors and TSOs.** Based on the results, the EU should draw up a rough initial outline of the investment strategy, volumes, conditions and potential investors.

- The **support of key stakeholders on a European level** (including the EC, EIB and EBRD) must be **ensured.** The TIF must also be supported by all stakeholder countries and related political decision-making processes.

- The detailed **structuring of the TIF should be mandated to a consortium of investment banks** coordinated and supervised by the EC, EIB and EBRD.

- The **detailed statutes of the TIF** and the volume of **direct financial commitment by the EU** need to be clarified. The goal is to ensure continued supervision of the TIF on a strategic level by the EU. Key questions relating to the potential source of EU funding and the requirements for obtaining such funding thus need to be clarified. To define the overall investment volume in the medium to long term, a dedicated analysis of the future requirement for external equity in the energy transmission infrastructure industry should be conducted in cooperation with investment banks. This would involve analysing the financing structures of TSOs with a focus on the availability of internal equity and the requirement for external equity.

- **Key investors need to be involved,** especially large pension funds interested in low risk/low return investments. This could be achieved with the **help of the investment banks involved.**

- The creation of the **TIF needs to be aligned** with the initiatives for **increased equity participation** (D.2.4), in order to allow TSOs in public ownership to acquire external equity via the TIF. Only when this precondition is met will the TIF be fully effective.

Criteria	Assessment	Evaluation
Impact	• **Increases the availability of equity for TSOs and greenfield projects** and helps overcome the related challenges. The TIF can fill gaps in current private equity	

	investment, e.g. for greenfield projects in the development and construction phase. By focusing on TSOs, equity can be directed more quickly to TSOs with increased equity requirements, for example • **Supports the opening up of publicly owned TSOs to external investors** by providing a stable EU-supervised investment instrument. However, the TIF has no direct impact on allowing further equity participation by public shareholders	
Costs	• **Limited or no direct financial commitment required from the EU** (the EU only needs to invest enough so that it can influence the investment guidelines and meet the costs of structuring the TIF)	
Feasi-bility	• **Good feasibility** – the main challenges are structuring the TIF and obtaining commitments from private investors that they will invest in it in significant volumes. The main challenge on the EU side is to define a structure that creates maximum leverage for EU funds	
EU support	***Funding*** • EU financing of a minority share in the TIF ***Implementation*** • **Coordinating the structuring of the TIF and performing a supervisory function** after its implementation	

Evalua-tion	**Advantages**	**Disadvantages**
	• **Industry-specific instrument that directly addresses specific challenges on the equity side** (financing gap for greenfield projects, meeting the risk/return profile on the corporate level) • Ensures **market orientation** by strongly involving **private investors** • **Publicly-owned TSOs could be made more open** to allow more **external equity participation** through this secure and EU-supervised instrument • Initial interest in setting up a TIF exists among investment banks • Measure would not need significant legal changes on an EU or country level	• Especially in the case of TSOs with a high level of public ownership, the TIF might still be regarded as mainly privately driven, thus reducing the willingness of owners to transfer shares in TSOs to such an entity

Assess-ment of stake-holders	TSOs	Financing institutions	NRAs	
				
Overall assess-ment	• This instrument could provide significant support for raising the large amounts of equity needed with return requirements and an investment strategy that matches the requirements of the industry • We see few alternatives for meeting the large equity volumes required by the industry, therefore we strongly recommend the creation of a TIF			

D.2.4 Create frameworks for increased equity participation/privatisation of TSOs

Description

In some countries, ownership structures and the associated regulations do not allow TSOs to raise additional private equity, or they make it time-consuming and difficult for them to do so. This is especially challenging where future investment needs are large and leverage is already high. In such cases, additional equity is required in order to raise further debt, as outlined in Section B.3.3.

Such ownership structures exist for many of the Eastern European TSOs (see Section B.3.2). Allowing more equity participation by external investors is therefore considered a key lever for enabling the provision of the required amounts of equity – both by TSOs and by financing institutions. Yet this is a complex and lengthy process, and public shareholders are often reluctant to allow external or foreign investors to own shares of what are considered national assets.

Proposed implementation steps

One step towards allowing more private participation in TSOs would be to **enhance the unbundling rules in the directives on common rules for the internal market in electricity and natural gas** (i.e. Directive 2009/72/EC for electricity and 2009/73/EC for natural gas). This would involve promoting unbundling of ownership and increasing the level of privatisation of TSOs. An initial goal could be to achieve the independence of TSOs within vertically integrated companies by March 2012.

The second step would be to require the gradual and partial privatisation of unbundled TSOs. The aim here would be to allow increased participation by external equity investors, thereby making more equity available to TSOs. To ensure the feasibility of such a measure, a moderate approach is called for – the goal for fully or majority publicly owned TSOs should be to allow at least minority private ownership

(e.g. 20-49%), leaving control in the hands of the majority public owners. **EU-supervised equity funds** (see D.2.2 and D.2.3) could be used as **anchor investors** to reduce the potential reluctance of public shareholders to allow private investors in.

Evaluation

Criteria	Assessment	Evaluation
Impact	• **Major impact on enabling private equity investors** (such as infrastructure funds) to provide the required equity to TSOs • Strongest lever for solving the challenge of equity constraints on publicly owned TSOs	
Feasi-bility	• As the Third Energy Package is not yet fully implemented, this measure would need to be coordinated with the implementation effort and potentially started only after the energy package implementation is complete • **Highly challenging, as the implementation of this measure requires commitment by the public shareholders of TSOs** that they will allow equity participation by private investors in an industry of public/national interest • **Directives 2009/72/EC and 2009/73/EC would have to be enhanced** to empower ownership unbundling and secure an increased level of privatisation, which may be hard to achieve politically	
Costs	• **Administrative (very low)** – personnel resources on an EU level to lobby for further privatisation of the sector and promote related tools (e.g. the TIF)	
EU support	***Funding*** • **No financial support required** ***Implementation*** • **Enhancement of the unbundling directive** and strong lobbying for further privatisation of the sector	

Evaluation	Advantages	Disadvantages
	• **Significant enabler for raising the required additional equity volumes** of TSOs with a high level of public ownership • **No significant costs for implementing the measure**	• **Significant challenge of obtaining the commitment of public shareholders** (government/ municipalities), **as the result would be reduced influence** on their part • Adjustment of the **Directives 2009/72/EC and 2009/73/EC** may well be difficult to achieve politically

Assess-ment of stake-holders	TSOs	Financing institutions	NRAs	
				
Overall assess-ment	• This measure aims to enable TSOs to obtain further equity from the market by gradually increasing the possibility of private shareholder involvement – a key prerequisite for allowing more market-based financing • Financing institutions and also many TSOs support such an approach, whereas NRAs are typically less concerned with the ownership structures of TSOs, so they consider this measure less important			

D.2.5 Support industry consolidation

Description

In smaller Member States, especially those who joined the EU recently, **TSOs tend to be small.** Often they are severely stretched when it comes to interconnector projects with investment volumes of several hundred million euros, say. For example, the Italian TSO Terna has approximately 11 times the asset base volume of the Lithuanian electricity TSO LitGrid. Figure 13 shows the revenues of electricity TSOs in different countries, which is an indicator of their size; it reveals that a number of TSOs in Eastern Europe are at least ten times smaller in revenue terms than the larger TSOs in Western Europe.

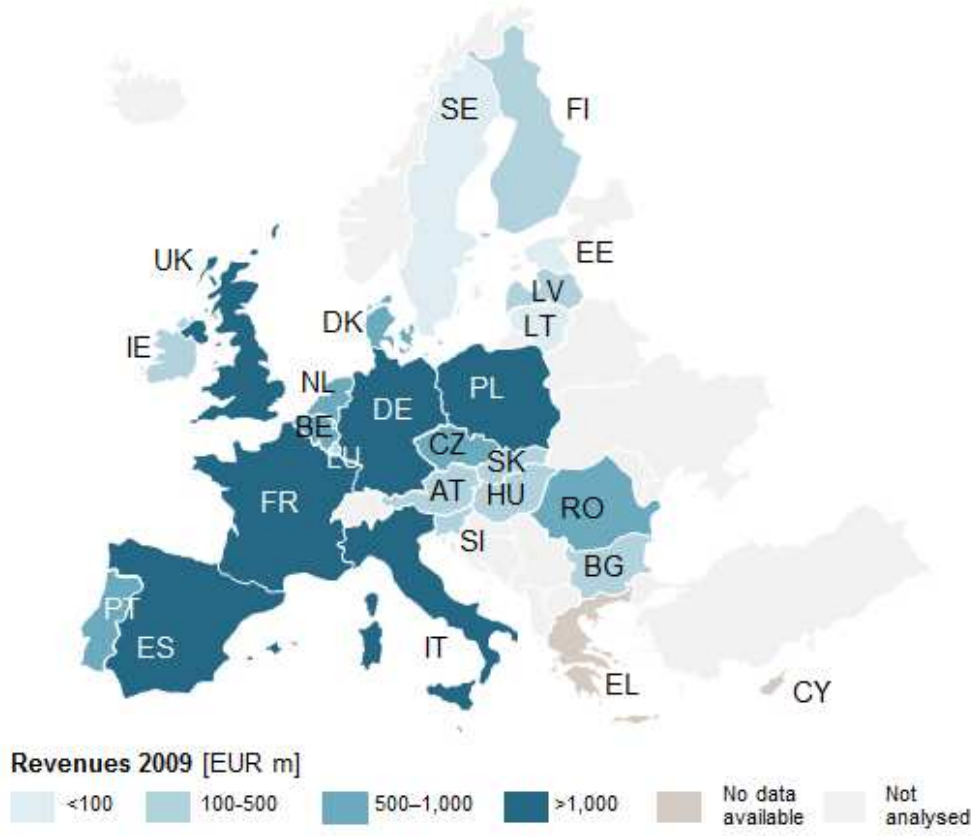


Figure 13: Overview of electricity TSO revenues in 2009 (EUR million)

As recent examples on the German market have shown, mergers of **TSOs and cross-border industry consolidation** can help strengthen the capital base and allow better access to capital markets. This is especially relevant for TSOs that are small in size, have large future investment plans but only limited capabilities on the financial markets (e.g. TSOs lacking the credit rating they need to issue corporate bonds). This applies to most Eastern European TSOs. We have seen positive examples of such mergers, such as the investments of TenneT and Elia in Germany, which show how even smaller players are able to leverage their competencies in larger networks. Such consolidation should be pursued as a long-term goal, since the processes involved take time and can only be influenced to a limited extent.

Besides the increased privatisation of TSOs (see D.2.4), increasing consolidation of TSOs is thus an important step towards boosting the capital market orientation of the energy infrastructure industry.

Proposed implementation steps

A platform could be initiated on EU level to facilitate this consolidation process in the form of targeted talks between NRAs, governments and the TSOs of the most suitable target countries. These countries would need to be identified beforehand, based on the size of the TSO (e.g. its annual revenues or the asset base). Smaller TSOs with large future investment plans should be targeted. These will generally be Eastern European TSOs in both the electricity and natural gas segment. In the longer term, a limited number of other TSOs across Europe should be targeted.

The talks could be tasked to high-level representatives of the EC. Regional networks that are already used by other EU initiatives in the energy sector should be exploited as a platform for communicating the benefits of further consolidation of TSOs. This can be done by illustrating the process and benefits by means of case studies, such as TenneT and Elia.

TSOs need to be more strongly oriented towards the capital market. A first step here would be to help TSOs go through the credit-rating process. For this, they need to meet certain capital market standards and ensure a fully professional internal organisation (see D. 3.3).

Evaluation

Criteria	Details	Evaluation
Impact	• **Significant lever for enhancing TSOs' ability to raise both debt and equity** and thus safeguard large investment programmes. Larger TSOs would be less dependent on country-specific risks and regulatory regimes, and have significantly better access to large cash-pools on the equity side, as they would be more visible and less risky for large investors such as pension funds. They would also have better access to debt from the corporate bond markets: larger volumes could be placed at even better conditions due to their reduced risk profile • Most effective lever for overcoming the challenge of equity constraints on publicly owned TSOs	
Feasi-bility	• **Highly challenging, as implementing this measure requires the entire industry to be more capital market-oriented.** National governments must also be prepared to allow foreign shareholders to hold majority stakes in national TSOs	
Costs	• **Administrative (very low)** – personnel resources on EU level to lobby for consolidation of the sector	

EU support	***Funding*** • **No financial support required** ***Implementation*** • **Facilitating cooperation** and providing a platform for exchanging best-practice examples of consolidation processes between TSOs	

Evaluation	**Advantages**	**Disadvantages**
	• **Significant enabler for enhancing** financing conditions and the ability to secure large investment volumes • **Significant driver for further professionalisation** of the industry • No significant costs involved in implementing the measure	• **Significant challenge of obtaining the commitment of public shareholders** (government/ municipalities) **as the result would be foreign companies taking direct majority shares in national TSOs**

Assessment of stake-holders	**TSOs**	**Financing institutions**	**NRAs**	
				
Overall assess-ment	• This measure is the next step (after gradually increasing the participation of private investors) for improving conditions for market-based financing • Financing institutions and even TSOs consider this measure useful for enhancing the investment and financing conditions in the industry			

D.3 Enhance debt financing conditions

To safeguard investment plans to 2020, there is a challenge not just on the equity side but also on the **debt side.** It is assumed that around EUR 200 billion will be needed in the period to 2020 to fund Projects of European Interest. Assuming a typical debt/equity ratio of 70/30 on a project level, roughly EUR 14 billion in debt will need to be raised on average each year by TSOs in the period to 2020. Acquiring such an amount is in itself a significant challenge. In addition, further constraints are expected in the form of limitations on EIB lending volumes, which have already been announced.

One approach would be to **increase EIB lending volumes** again (see D.3.1). This would not be easy, and, even if it were possible, the volumes would be insufficient. To raise larger debt volumes, TSOs with large funding needs must turn to the

international bond markets. Typically, larger TSOs already do this extensively. The **EU 2020 Project Bonds Initiative** (see D.3.2) is an additional support mechanism that mitigates specific projects risks. This can also help energy projects which have project finance structures and which themselves are large enough. On the corporate finance level, however, all TSOs would need **help with sourcing debt via corporate bonds.** Accordingly, the EU should consider incentives for TSOs to receive credit ratings (Section D.3.3)

D.3.1 Allow more funding at preferable conditions (EIB)

Debt financing by the EIB or EBRD is unanimously seen as a cornerstone of energy transmission infrastructure finance. Yet it has been announced that the current (2009/2010) financing volumes of the EIB will be reduced in the coming years. This will also affect energy transmission projects, particularly as investment requirements are set to double compared to their previous levels. By contrast, the EBRD has stated that in principle more lending volume could be released with a regional focus.

Two solutions are possible. On the one hand, the **financing volumes of the EIB could be increased** specifically **for energy transmission infrastructure industry.** This would enable TSOs to finance energy infrastructure projects at least at the same level as in previous years. A clear limitation of additional loans up to 2020 would be possible. However, as the reduction in the total EIB lending volume has already been announced as a matter of policy, such an increase is unlikely to be feasible.

Alternatively, **qualitative enhancements of the EIB lending conditions** should be considered, directing the available lending volumes to the **projects and TSOs that most urgently need them.** This could be achieved by implementing criteria that enhancing the current Special Activities envelope of the EIB, say (e.g. by having the EIB support priority projects with a higher risk profile than is normally acceptable). TSOs facing significant financing challenges – such as those with a "non-investment grade" credit rating – would have preferred access to EIB loans. This would avoid these TSOs failing to acquire the necessary debt to finance investments. At the same time, of course, the EIB and its shareholders would bear greater risk, as the lending portfolio would shift to financially weaker TSOs. For this reason it would be important to limit the extent to which TSOs could benefit from such special treatment and the timeframe over which it would apply, otherwise TSOs would have an incentive to simply rely on the EIB whenever they faced financing challenges.

To implement this measure, the EC would have to propose to the EIB (and subsequently its shareholders) an increase in its overall lending volume, specifically for energy transmission projects, and a change in its lending conditions, as described above.

Criteria	Assessment	Evaluation
Impact	• **High impact on the availability of debt financing** at conditions and maturities that best fit the need of energy infrastructure investments • **Helps TSOs with severe financing challenges** (e.g. "non-investment grade" credit ratings) to obtain the required debt volumes	
Feasi-bility	• **Low feasibility – a change to the EIB lending volumes would be difficult to achieve** as this would require approval by the shareholding countries, who have already decided to lower the overall EIB lending volume to its pre-crisis level. Changing lending conditions to support TSOs facing financing challenges is unlikely within the current limited envelope for the EIB's Special Activities and would require agreement from shareholders	
Costs	• **Increased (recoverable) lending requirement to keep the current EIB share aligned with the increasing overall investment volumes,** as well as additional equity requirements by the EIB to support increased lending	
EU support	***Funding*** • No financial support required by the EC • Shift of EIB investment priorities or increase in overall lending volume required ***Implementation*** • Initiating and managing a coordination process with the EIB and its shareholders	

Evaluation	Advantages	Disadvantages
	• **Improves the availability of debt** at conditions that fit the industry's requirements (conditions and maturities) • **Specific support for TSOs facing financing challenges** and important projects from a European perspective	• **Low feasibility of increasing lending volumes** due to the required approval of EIB shareholders (in the context of a recent reduction in lending volumes)

Assess-ment of stake-holders	TSOs	Financing institutions	NRAs	
				
Overall assess-ment	• Increasing the EIB lending volume would improve the availability of debt with maturities and conditions that match the requirements of the industry			

	• Enhanced lending conditions would improve the effectiveness of EIB lending by focusing on alleviating the financing problems of specific TSOs and supporting important projects from a European perspective. However, there are serious hurdles to implementing the measure • This measure is considered highly useful by all stakeholders; however, it is expected to face serious implementation hurdles in terms of increasing general lending volumes. For this reason, the overall evaluation is reduced	

D.3.2 EU 2020 Project Bond Initiative

Description

The **Europe 2020 Project Bond Initiative** initiated and currently under consultation by the EC aims to facilitate raising debt on a project level. The main idea behind the initiative is to provide EU support to project companies issuing bonds as a way of financing large-scale infrastructure projects. Such bonds usually receive a rating of BBB- and higher, reflecting the risk of standalone projects. Before the financial crisis, "monoline insurance companies" generally provided debt service guarantees for project bonds, so the rating of such bonds could be upgraded to AAA. Due to the financial crisis, however, monolines have now generally lost their AAA status and so credit enhancements to this level are no longer possible.

The Europe 2020 Project Bond Initiative aims to fill this gap. To lower the risk related to the repayment of senior debt, the EIB together with the EC would provide support in the form of a guarantee or subordinated debt layer and as such lower the risk of there being insufficient cashflow to repay the senior debt over the term of the senior debt. The result would be an increase in the credit quality of a bond, which would facilitate the acquisition of debt. This credit enhancement would either be provided in the form of a "debt service guarantee" (e.g. as a contingent credit line – actual funds would only be injected if the cash generated by the project was not sufficient to service the debt) or as an additional layer of debt at a subordinated level. This support would facilitate the issuing of project-related bonds on the capital market by reducing the costs of funding.

In interviews with TSOs and financing institutions, it was questioned whether project bonds would have a major effect on the financing of transmission infrastructure, since issuing such bonds requires considerable financing competence and effort by the TSOs. Moreover, for **debt service guarantees to apply, the asset would have to be financed as a separate, ring-fenced asset,** which is rarely the case at present. Project bonds are thus seen as an effective tool for supporting larger (EUR >300 million), more complex or risky projects that are easier to separate out of a meshed grid structure, such as offshore wind farm connections.

As the Project Bond Initiative is part of a current EC work stream in cooperation with the EIB, it will not be discussed in greater detail here.

Evaluation

Criteria	Assessment	Evaluation
Impact	• **Improves the availability of debt financing for important projects** (either indirectly via guarantees or directly via loans) • **Limited applicability** as only project-financed projects can benefit from the initiative, whereas the vast majority of energy transmission infrastructure is financed on a corporate level	
Feasi-bility	• **High feasibility**, as the initiative is already being worked on by the EIB and evaluated by the EC	
Costs	• **Funding to provide (recoverable) lending and/or guarantees**	
EU support	***Funding*** • Financial support required in case of guarantees, costs for financing in case of providing direct loans ***Implementation*** • Enhancing the current EU Project Bond initiative and related coordination	

Evaluation	Advantages	Disadvantages
	• **Enhancing the rating and thus improving the availability and terms** of debt for specific projects	• **Limited applicability, as the bond is only applicable for specific project financed projects** whereas the majority of projects are financed on a corporate level

Assess-ment of stake-holders	**TSOs**	**Financing institutions**	**NRAs**	
	Not evaluated, as there is an ongoing stakeholder consultation on the EU Project Bond Initiative by the EC			
Overall assess-ment	• The EU 2020 Project Bond Initiative is only applicable for a small share of projects – those that are project-financed			

D.3.3 Help TSOs access corporate bond markets and receive a credit rating

Description

As discussed in Section B.2.1, almost a third of gas and electricity TSOs in Europe do not have their own credit rating (or a parent company performing financing functions on their behalf). The reason for this is that the credit volumes currently required by small TSOs can still be obtained from IFIs and corporate banks; corporate bonds are usually only issued for sums above EUR 300 million. However, the lack of a credit rating severely diminishes the transparency of such companies for investors as well as preventing their access to certain funding mechanisms.

Corporate bonds are a key instrument for securing large tranches of debt, and TSOs with a strong capital market orientation rely strongly on the bond market as a source of financing. For example, Italy's TSO Terna currently receives over 50% of its debt financing via corporate bonds. Given the major investment needs of TSOs in the period to 2020, the corporate bond market will doubtless be the most important source of debt financing for European TSOs.

We therefore propose that the EC helps TSOs to obtain credit ratings. Getting a credit rating typically requires a number of actions, particularly on the reporting front. However, the work done as part of this process makes it much easier for TSOs to meet the requirements for issuing bonds, as well as improving investor trust and assessments by investors. TSOs must also ensure that their organisation is fully professional, and this is a secondary goal of this measure. Smaller and recently unbundled TSOs in Eastern Europe in particular will benefit here.

The steps involved in obtaining a credit rating are outlined below, based on the process at Standard & Poor's. For corporate and government ratings, credit rating analysts begin their evaluation by assessing the business and financial risk profiles. In evaluating the financial profile of a corporation, analysts examine the company's financial statements, including its accounting practices, focusing on any unusual treatments or underlying assumptions. To further assess a corporation's overall strengths and weaknesses, a number of financial ratios are used (such as profit margins, leverage and cashflow sufficiency). This analysis can go beyond financial statements, looking for example at leases and pension liabilities that can have an impact on the company's creditworthiness. In many cases, financial risk factors that are unique to TSOs also play an important role in the financial analysis. Such a process is highly individual and takes at least a few months to complete, and in some cases over a year. After receiving a credit rating, TSOs can issue corporate bonds with the support of an investment bank.

On its own, obtaining a credit rating would not be enough to solve the funding challenges faced by some TSOs, of course. However, it would be an important first step in ensuring their access to professional international debt markets. Recently unbundled Eastern European TSOs, which lag behind their Western counterparts

(e.g. Terna, TenneT) in terms of capital market orientation, would particularly benefit from this measure.

Proposed implementation steps

To facilitate the access of TSOs to corporate bond markets and enhance their capital market readiness, TSOs could be **offered support in obtaining credit ratings.** This could be a mix of financial and technical assistance. Firstly, part of the cost involved could be covered by the EU. Secondly, technical assistance in meeting the internal preconditions (e.g. corporate financing structures and processes, reporting requirements) could be provided via financial consultants, say. This would give TSOs a strong incentive to obtain a credit rating. Restricting the offer of support to a certain timeframe would increase the incentive for TSOs to obtain the rating in the near future. Given the lead times indicated above, this extra incentive is necessary if TSOs are to be in a position to exploit corporate bond markets with respect to investments in the period to 2020.

Co-financing of credit rating processes by the EC can be made possible under the updated TEN-E framework, e.g. covering up to 30% of the TSO's total costs. To encourage TSOs to take action sooner rather than later, up to 50% could be covered by the EC if the process is completed by a certain deadline, e.g. the end of 2013. TSOs should be encouraged to apply for such support in the same way that they apply for the co-sponsoring of feasibility studies.

To ensure ongoing clarity about the creditworthiness of the industry, an agency such as ACER could be tasked with publishing an annual report on this topic.

Evaluation

Criteria	Assessment	Evaluation
Impact	• **Significant increase in access to debt** by enabling TSOs to engage in corporate bond financing. This has a significant impact on the financing capabilities of TSOs that do not at present have a direct (or indirect via their parent company) credit rating	
Feasibility	• **High –** TSOs only need to conduct a credit rating process with Standard & Poor's, Moody's or Fitch and invest the related time and costs • **No changes in legislation required**	
Costs	• Co-financing required via non-refundable contributions. Overall investment is small (approximately EUR 0.5-1.5 million per TSO receiving a credit rating). Exact costs depend on how far the TSO already meets the requirements of the rating process, e.g. its internal transparency and corporate financing structures and processes	

EU support	***Funding*** • **Co-financing support by the EU,** e.g. under the TEN-E programme ***Implementation*** • Potential **support for the credit rating process** in the form of technical assistance (via external consultants, as part of the support under the TEN-E programme)	

Evaluation	**Advantages**	**Disadvantages**
	• **Major lever enabling TSOs to access debt** (especially important in the context of decreasing EIB lending volumes and commercial bank constraints on long-term lending)	• Credit ratings **do not in themselves create full readiness** to access bond markets

Assessment of stakeholders	**TSOs**	**Financing institutions**	**NRAs**	
				
Overall assessment	• Access to corporate bond markets is a key prerequisite for TSOs to acquire large volumes of debt – an underlying credit rating is required to access these markets • All three stakeholder groups support steps in this direction			

D.4 Measures relating to challenges in specific types of projects

In addition to the measures already discussed, instruments should be considered which help mitigate **challenges related to specific types of projects, specifically interconnectors, offshore grids and security of supply projects** (for a detailed overview of these challenges, see Section C.6). These challenges are as follows:

- **Risk-adequate remuneration:** This challenge affects **interconnector projects,** which usually involve higher risks and greater effort, for which there are inadequate incentives (since all returns from congestion rents have to be reinvested or redistributed under Regulations 714/2009 and 715/2009). It also affects offshore grid connections and potentially SoS projects. The most effective way to ensure risk-adjusted returns is by offering priority premiums for such projects to compensate for their additional risk and complexity (see Section D.1.4). This measure is not discussed further here.

- **Cost allocation: Interconnector projects** with complex cost/benefit allocations face may be subject to significant delays (as in the case of the

MidCat pipeline, see Section E.8). Complex multi-country offshore grid connections may also be affected. **Cost allocation** frameworks can be improved by defining clear **cost/benefit allocation mechanisms** and providing **strong EU support,** e.g. via mediators (see Section D.4.1).

- **Advance capacity problems:** This challenge particularly affects **offshore grid connections** (required for the integration of future wind farms, for instance) and gas interconnector projects. **Advance capacity** challenges can be mitigated by:

  - Allowing such investments to be **included in the regulatory asset base** and "socialising" the related risks between customers (see Section D.4.2).

  - Providing **guaranteed volume bridging loans** where case projects are not regulated, securing the debt coverage where an advance capacity challenge arises and expected transmission revenues are lacking (see Section D.4.3).

  - Supporting such projects directly via **grants** to cover risks relating to the advance capacity challenge and create incentives for investments (see Section D.4.4).

- **Commercial viability:** Projects that are largely or entirely for the purpose of achieving **security of supply** (e.g. specific gas storage and reverse flow projects) face a significant challenge in terms of commercial viability. The market has no incentive to sponsor these projects. Commercial viability for security of supply projects can be ensured by including such investments in the regulatory asset base if a cost/benefit analysis shows them to be economically beneficial. If such assets are not regulated (as is typically the case for storage projects), financing can be supported by specific fund structures (see Section D.4.5).

A summary table connecting measures to projects is given in Section D.7 (Table 13).

D.4.1 Improve the cost allocation framework for cross-border projects

Description

Cost allocation for energy transmission infrastructure projects is potentially a problem for transnational projects. The problem arises where costs are incurred in countries other than those where the main benefits occur (**"commercial externalities"**) and also where benefits result from increased SoS with no direct commercial benefit (**"non-commercial externalities"**).

When a project generates **commercial externalities,** negotiations are needed to ensure that the costs are distributed according to the benefits each country experiences. In some cases, a standardised calculation model can be used for the cost/benefit allocation. For natural gas pipelines, this model is relatively straightforward – for example, open season procedures can be used to calculate the overall commercial benefits. For electric power transmission systems, however, no transparent and universally accepted model exists, according to our interviewees. The normal approach is thus to resort to **negotiations between the different parties.** This is particularly common where the new infrastructure can be separated in terms of volume flow from the rest of the network, as in the case of gas pipeline or DC electricity interconnectors.

Projects affected by **non-commercial externalities** are more complex. Calculating and allocating costs and benefits is difficult due to the non-commercial nature of the benefits (e.g. SoS), unknown future developments affecting the calculation (e.g. supply/demand developments and direct impacts on SoS) and the complex interrelationships pertaining in the electricity sector's meshed networks. It is necessary to socialise the investments and associated risks (i.e. price and utilisation risk). This could be achieved by allowing **investments to be included in the regulatory asset base of the TSO in question.**

EU support could be provided for international projects that pass a national test of eligibility. This could take the form of **support by qualified mediators/arbitrators** (e.g. via ACER) **who could coordinate and steer the necessary negotiation process** between NRAs, governments and TSOs. Direct financial involvement by the EU should be a measure of last resort, only applied in the case of projects that are required from a European perspective but whose costs cannot be socialised on a national level. Such projects should be required to meet the status of Projects of European Interest and prove that inclusion in the regulatory asset base is not feasible according to the standards of the NRA due to a lack of commercial or social justification on the national level.

Proposed implementation steps

For Projects of European Interest with commercial externalities, the EC should consider **providing support for the cost-allocation negotiation process.** This could take the form of support from EU mediators in speeding up the complex cost/allocation process.

A **CEER working group** is currently working on cost/benefit allocation mechanisms. This group should continue its work, drawing up precise guidelines indicating under what circumstances a project can be regarded as presenting insufficient commercial benefits to justify its realisation from a purely commercial perspective, but sufficient non-commercial externalities to justify its realisation for other reasons, such as SoS.

With the help of the new versions of the Ten Year Network Development Plans and the definition of Projects of European Interest, these guidelines should be used to identify which projects fall into this category. The Third Energy Package already takes some steps in this direction (e.g. coordination of the Ten Year Network Development Plans by the ENTSO with ACER oversight). Alternatively, project developers can be required to apply for recognition of such projects, demonstrating their eligibility.

For projects falling into this category, the EU should provide one of the following three options:

- A mechanism to ensure that such projects are included in the regulatory asset base and can be refinanced via regulatory remuneration, irrespective of their actual use (analogous to the measure described in D.4.2)

- A specific grant mechanism to fill the commercial viability gap retrospectively (see D.4.4)

- A purchase guarantee for the project capacity which would be needed for such projects to achieve commercial viability (in the case of gas storage or pipeline capacity, say). This purchase guarantee would need to be refinanced by a fund established by the EU and sourced from contributions by TSOs. This will lead to a marginal increase in transmission tariffs.

Evaluation

Criteria	Assessment	Evaluation
Impact	• A **significant reduction in the duration and complexity of cost/benefit allocations** thanks to clear rules for such allocations, increased support in the form of mediation and a mechanism allowing the negotiation process and development of the project to occur in parallel	
Feasi-bility	• **Medium** – clear definition of rules and mechanisms on the EU level is required (e.g. through CEER)	
Costs	• **Administrative (very low)** – personnel resources on the EU level to moderate in complicated cost-allocation cases and to define mechanisms for supporting relevant projects	
EU support	***Funding*** • **Costs arise only where direct EU support is required,** e.g. in the form of grants ***Implementation*** • **Strong moderation** is required for defining and agreeing on general cost/benefit allocation processes	

	• **Defining and implementing mechanisms** (e.g. grants, purchase guarantees for excess capacities, requirement for regulatory approval) to support the implementation of specific projects where non-commercial externalities cannot be internalised	
Evaluation	**Advantages**	**Disadvantages**
	• **Significant effect on speeding up important projects** (challenges in cost/benefit allocation are especially significant for projects with purely socio-economic benefits)	• **Defining and selecting projects that require EU support** because their non-commercial benefits cannot be internalised on a national level **is a complex process**

Assessment of stakeholders	**TSOs**	**Financing institutions**	**NRAs**	
	●	◑	◑	
Overall assessment	• Clear cost/benefit allocation processes and mechanisms (to support the implementation of specific projects where non-commercial externalities cannot be internalised) will help drive complex projects offering major socio-economic benefits from a European perspective			◑

D.4.2 Advance Capacity Instrument 1 – Inclusion of anticipatory investments in the regulatory asset base

Description

Certain types of projects face an advance capacity problem (see C 6.4). These projects need to be supported so that greater capacity can be planned, built and refinanced even though **full utilisation may only be achieved at a later point in time.** Building facilities capable of handling more capacity than exists at present is cheaper than upgrading such facilities in the future.

Such projects could be included in the TSO's regulatory asset base and the **regulator could allow them to be refinanced through regulatory remuneration.** This approach could be used for a large number of regulated projects. Projects that are not regulated (e.g. merchant interconnectors with TPA exemption) require a different instrument (see D.4.3). Furthermore, to protect consumers it must be ensured that the investment decision follows an assessment of the risks involved in providing advance capacity, taking into account the precise details of the investment and the level of uncertainty as to future capacity requirements.

Such an approach is already in place in the UK for onshore transmission projects in the electricity sector. OFGEM began consultations in 2008 on appropriate regulatory funding arrangements for anticipatory investments, with particular reference to the large-scale investments (worth a total of GDP 5 billion) put forward by the TSOs as required in order to meet the Government's 2020 renewable energy targets. The resulting **Transmission Investment Incentives** (TII) framework achieved its final status in 2010 and is being used by OFGEM to provide interim funding for this investment programme within the current regulatory period, i.e. up to 2013. Similar principles are being considered for use on a more permanent basis within the next regulatory period, i.e. from 2013 onwards.

A key principle of the TII framework is that is does not fund the entire project at the outset. Rather, it facilitates an incremental approach whereby a given large-scale project may be reviewed at different points in time as it progresses. At each review, a decision is taken on whether to fund a particular component of the overall project, taking into account the prevailing case for the project as a whole and a detailed project assessment of the specific works requiring funding. This approach also enables OFGEM to focus its attention in each review on those works in most urgent need of funding, and it minimises the risks for consumers by requiring detailed regulatory scrutiny.

The TII framework is designed to provide appropriate incentives for TSOs to anticipate future demand and invest efficiently to meet this demand, while protecting consumers from inefficient investments. The **incentive** takes the form of allowing advance funding and **remuneration** of the following:

- **Pre-construction costs** for eligible investments: Pre-construction cost remuneration drives projects forward in an early stage of their development. All projects submitted by the TSOs for consideration for such financing were accepted by OFGEM. The goal is to bring the projects to a stage where a more informed investment decision can be made.

- **Construction costs** for eligible investments: Projects are submitted by the TSOs when they are sufficiently far progressed that construction works can start in the near future. Projects that pass the evaluation (see criteria below) and have sufficient justification to be considered for construction funding receive a remuneration of related costs, subject to detailed project assessment of the planned works.

By providing a clear framework for remuneration for the pre-construction and construction phase of projects, there is an incentive for TSOs to realise projects.

Proposed implementation steps

Projects' eligibility for inclusion in the regulatory asset base even before construction begins needs to be **evaluated on a case-by case basis.** This evaluation can draw on similar assessment criteria to those used by OFGEM:

- **Investment need** (certainty of need): The investment need has to be clearly demonstrated, even if it only materialises in the future.

- **Scope** (appropriateness of scope): The scope of an investment must be appropriate, in the sense that it responds efficiently to the need identified.

- **Timing** (certainty of timing): The timing of an investment must be appropriate, in the sense of there being a satisfactory case for the need, and the scope of such an investment being appropriate.

- **Planning consents** (deliverability): There must be a consideration of the detailed programme of work, including pre-construction activities, procurement and construction work. Furthermore, the investment needs to be deliverable from a permitting point of view.

- **Technical readiness** (design): The project must be sufficiently advanced in its technical planning (e.g. elaboration of design, implementation plans). This is especially relevant for determining eligibility for the remuneration of construction costs.

- **Efficient costs:** The proposed costs must be reasonable compared to industry benchmark prices for labour and equipment.

The UK system only applies to onshore investments. Extending it to cover offshore investments is vital to ensure that such investments are delivered in a timely and efficient way. Careful assessment of investment proposals is also essential in order to avoid stranded investments and the resulting costs for consumers.

For implementation, the EC could require national regulatory regimes to be adapted appropriately. It would need to ensure the following:

- TSOs can **submit projects** with an inherent advance capacity challenge **for approval by the NRA.** Such projects need to demonstrate to what extent the availability of the complementary asset or demand (e.g. generation capacity for electricity and available gas volumes for natural gas) is not fully ensured at the expected time of completion of the transmission asset. To reduce complexity, TSOs should have to apply for recognition of specific projects.

- If the projects meet the evaluation criteria (see above), they should then be **included in the regulatory asset base of the TSO in question.** An according

mechanism needs to be implemented on a national level by the NRA. This should be a mandatory part of the EU regulation. The exact procedural details of the application and selection process at the NRA should be left to the national NRAs in order to ensure that there is enough flexibility to reflect the specific situation in different countries (e.g. particular requirements for combined grid solutions to connect future offshore wind farms in countries that are part of the NSCOGI).

- To ensure that **Projects of European Interest** are covered by this measure, the EU should require NRAs to include these projects in the regulatory asset base where they meet certain eligibility criteria with respect to the advance capacity problem. These criteria should be defined on an EU level (based on the criteria used by OFGEM, for example).

Evaluation

Criteria	Assessment	Evaluation
Impact	• **Significant impact on fostering anticipatory investments and reducing the advance capacity challenge.** This measure provides a strong lever at a limited cost – the NRA socialises the advance capacity risk in the short term with the goal of supporting a more cost-efficient solution in the long term. Ultimately the customer benefits from this process, provided the anticipated need materialises. However, the arrangements should also include appropriate protection for customers	
Feasi-bility	• **Considerable adaptations to national regulation are required**. The EU must issue a regulation enforcing implementation of the measure (except where NRAs are already developing such frameworks, as in the UK).	
Costs	• **Administrative (very low)** – personnel resources on an EU/NRA level to define and implement regulatory consideration of anticipatory investments	
EU support	***Funding*** • **No costs implied** ***Implementation*** • **Strong moderation** is required to initiate the process of defining and implementing regulatory consideration of anticipatory investments • **An EU regulation is required to enforce the implementation** of this measure by NRAs	

Evaluation	Advantages	Disadvantages
	• **Most effective measure to solve the advance capacity problem** and speed up **investments** connecting **offshore wind farms;** also relevant for the NSOCGI • **No additional costs in the long run, where projects are selected carefully** to avoid stranded investments • **Especially suitable for a large number of smaller projects** (with a predominantly national focus) that are part of the regulatory asset base	• **Major implementation challenges as adaptation of national law is required**

Assessment of stakeholders	TSOs	Financing institutions	NRAs	
				
Overall assessment	• Allowing anticipatory investments to be included in the regulatory asset base significantly mitigates the advance capacity challenge and strengthens the investment framework for such projects, without implying major costs (provided the framework provides appropriate protection for consumers from the risk of anticipatory investment) • This measure is considered highly important by both TSOs and financing institutions as a way of enabling investment in such projects			

D.4.3 Advance Capacity Instrument 2 – Guaranteed volume bridging loans

Description

One approach to mitigating the advance capacity challenge specifically **for non-regulated projects would be to guarantee** payments to investors if the transmission facility is not used to the full right from the start. This may occur where facilities are built with higher capacities in order to accommodate future transmission volumes. Such a guarantee would need to be given in the investment decision phase.

This instrument would provide direct financial support in the form of a loan – a **"guaranteed volume bridging loan"** – in cases where the planned capacities and related remuneration do not materialise on completion of the project. The loan would

thus cover the risk of a **stranded investment.** It would remain in effect until sufficient utilisation of the asset was achieved, with repayment starting as soon as the investment broke even. For projects facing severe advance capacity challenges, the loan would enhance the bankability of the project, i.e. ensure that the required financing volumes are provided at a lower financing cost.

Proposed implementation steps

Guaranteed volume bridging loans have to be carefully designed as they harbour significant risks for the institution providing them. The following should be ensured:

- **Clear definition of eligible projects:** It needs to be clearly defined what types of projects are eligible for loans. Eligibility should be limited to Projects of European Interest that are run as separate project companies outside the regulatory asset base. This ensures that the risks involved in granting loans only apply to a few selected projects; for regulated projects, the NRA should mitigate the advance capacity challenge by socialising the risks on a national level (see D.4.2).

- **An institution such as** the **EIB should manage the instrument, as** only such an institution has the required financial and managerial capabilities to handle such an instrument on the EU level. If the EIB is chosen, its shareholders would need to approve its management role and the availability of funds.

- **The EU should act as guarantor of the instrument:** As with EU project bonds, the EU should provide guarantees in case of default on the loan.

- **A strict application and evaluation process:** Project companies should apply to the EIB for loans. The EIB would then carry out a detailed case-by-case evaluation of the investment plan and associated risks for the EU. This is to ensure that projects only receive a loan if it would significantly influence the investment decision or enable the provision of additional capacities to accommodate future demand. Furthermore, there needs to be clarity about the magnitude of the risks involved for the EU. For example, such risks could relate to the requirement to provide significant payments over long time periods if some of the planned input capacity does not materialise, with the danger of default on the loan.

- **Limitation and diversification of risks:** Firstly, to keep risks to a minimum, loans should be limited in volume and time. The evaluation during the application process should determine how long and what level of funds will be provided. There should be predefined limits that cannot be exceeded, otherwise the project would be considered too risky in the first place. Secondly, the risks should be distributed between key stakeholders. In the case of transnational pipelines, say, the countries involved should bear part of the default risk in proportion to their

share of the expected benefits. This could be based on a calculation of transmission fees in transit countries or revenues from natural gas exports through the pipeline, for instance. Since the stakeholders stand to benefit from the project, they may be expected to bear part of the risk. The EU would also bear a certain proportion of the risk through the EIB and its shareholders; the exact amount would need to be evaluated in the detailed design of the instruments with the approval of shareholders.

Evaluation

Criteria	Assessment	Evaluation
Impact	• **Significant impact on mitigating the advance capacity challenge for a defined set of projects** (those falling outside regulatory asset base and with project financing)	
Feasi-bility	• **Need to create a guaranteed volume bridging loan instrument with EU support** (via the EIB or EBRD). This involves limiting and sharing risks and providing the required funds	
Costs	• **Administrative costs and costs for potential loan defaults** – costs are threefold: personnel resources on the EU level to define and implement the measure; recoverable loans; and the costs of potential loan defaults	
EU support	***Financing*** • **No direct costs arise** except in the case of defaults ***Implementation*** • **Strong moderation** is required to initiate the creation of such an instrument and to implement it (potentially via the EIB, with additional EC funding)	

Evaluation	Advantages	Disadvantages
	• **Significant lever for solving the advance capacity challenge** for individual projects • **Implementation would be fast and easy** as no changes to the regulatory regime would be required • **No additional costs would emerge in the long run as loans** would be repaid from transmission revenues	• **Limited focus, as the instrument only applies to projects outside the regulatory environment** and with project financing. The instrument would not reduce the risk of projects not being accepted into the regulatory asset base (e.g. due to a lack of related generating capacities) • **High risks** relating to the volume and duration of financial commitments

Assessment of stakeholders	TSOs	Financing institutions	NRAs	
	Not evaluated	Not evaluated	Not evaluated	
Overall assessment	• Guaranteed volume bridging loans can solve the advance capacity challenge for Projects of European Interest outside the regulatory asset base and with project financing			

D.4.4 Advance Capacity Instrument 3 – Financial support in the form of grants

Description

A third measure to mitigate the advance capacity challenge is to offer financial support in the form of **grants**. Such an instrument has already been established in the shape of the EEPR, which supports specific projects by financing a share of the additional costs resulting from a future-oriented upgrade of projects (e.g. an upgrade of the COBRA cable so that it will be possible to connect future offshore wind farms). A grant specifically designed to finance such upgrades significantly reduces the risks to the TSO and hence positively influences investment decisions. However, grants are costly. This instrument should therefore only be used as **short-term bridging solution** until more cost-efficient measures can be put in place (see, for example, D.4.2 and D.4.3).

Proposed implementation steps

- The application of grants to mitigate the advance capacity challenge should be **limited to Projects of European Interest** that need to be driven forward as a matter of priority.

- The **EEPR Programme could be continued and used as a vehicle** for selecting projects and providing grants. A management system and process is already in place. This would enable the timely and cost-efficient implementation of the measure. The level of funding and period over which it is available should be fixed in advance. The overall volume could be based, for example, on an assessment of which Projects of European Interest would potentially require such support and to what extent grants would be needed to create incentives for investments (this would require a separate study). The timeframe for the programme should be limited on the basis of the time required to implement more cost-efficient measures for solving the advance capacity challenge, say (see D.4.2 and D.4.3).

- Companies should have to apply to the EU for grants. Projects should be selected according to set criteria. These criteria should be aligned with those outlined in D.4.2. for the inclusion of projects in the regulatory asset base by NRAs, and be publicly available.

- An important preliminary step is to define the overall volume of grants. This will limit the total EU contribution. One option would be to make a fixed share of certain types of projects eligible, e.g. 20% of advance capacity-related offshore projects requiring urgent implementation. Within this share, a fixed level of co-financing could be applied – 50%, say. With a potential financing requirement of EUR 15-20 billion for the offshore transmission grid, this would mean a total co-financing volume by the EU of EUR 1.5 to 3 billion. A detailed study would be needed to determine the precise share and related overall funding volume.

Evaluation

Criteria	Assessment	Evaluation
Impact	• **Major impact on improving business cases with advance capacity challenges,** but in the form of direct financial subsidies with little leverage of funds	
Feasi-bility	• **The existing EEPR scheme can be continued** and used to make grants to specific projects facing advance capacity challenges	
Costs	• **Co-financing via non-refundable contributions** (moderate to high) – depending on co-financing approaches, up to50% of funds would be non-refundable	
EU support	***Financing*** • **Direct subsidies from the EU and high costs** ***Implementation*** • **Strong moderation** is required to initiate the creation of such an instrument and to implement it e.g. via the EIB	
Evalua-tion	**Advantages** • **Effective incentive for advance capacity investments** • **Implementation is fast and easy** as no change in the regulatory regime is required	**Disadvantages** • **Costly measure** – grants in the form of non-remunerable financial support are the most costly option for supporting individual projects

Assess-ment of stake-holders	TSOs	Financing institutions	NRAs	
	Not evaluated	Not evaluated	Not evaluated	
Overall assess-ment	• Grants can positively influence investment decisions for projects facing an advance capacity challenge and provide a good short-term solution until other measures can be put in			

	place, such as regulatory remuneration of anticipatory investments	

D.4.5 Measures for financing security of supply (SoS) projects or commercially non-viable projects in the natural gas segment

Description

Security of supply (SoS) projects often lack commercial viability. They provide additional flexibility for coping with extreme supply or demand situations which only occur on rare occasions, for example following the loss of a certain supply source or a specific transport route. SoS projects also provide more free capacity and relieve congestion, improving gas-to-gas competition at wholesale level. Consequently, SoS measures and market development projects should be combined to a certain extent.

The minimum level of SoS required by all EU Member States is defined for the natural gas segment in Regulation 994/2010 (replacing Directive 2004/67/EC). The SoS challenge is not a significant issue in the electricity segment due to the inherent SoS in meshed grids and the greater flexibility of electricity flows.[18] This measure therefore concentrates on the natural gas segment. Market players such as TSOs and gas storage operators need to ensure sufficient capacity for secure gas supply under the following conditions:

- Extreme temperatures over a seven-day peak period occurring with a statistical probability of once every 20 years
- Any period of at least 30 days of exceptionally high gas demand occurring with a statistical probability of once every 20 years
- For a period of at least 30 days in case of disruption of the single largest gas infrastructure facility under average winter conditions

Furthermore, Member States need to ensure that "necessary measures are taken so that by 3 December 2014 at the latest, in the event of a disruption of the single largest gas infrastructure, the capacity of the remaining infrastructure […] is able […] to satisfy total gas demand of the calculated area during a day of exceptionally high gas demand occurring with a statistical probability of once in 20 years."[19]

To implement the SoS requirements, it is necessary to define concrete projects correlated to market development. These projects need to be remunerated by

[18] For electricity, the focus is on reporting requirements for SoS as detailed in Directive 2005/89/EC, relating to Article 4 of Directive 2003/54/EC.
[19] Article 6, Regulation 994/2010.

socialising the investment costs, as they would not be covered on a commercial basis. Appropriate cost allocation must therefore take place.

Proposed implementation steps

The first step, already taken by the EU, was to **define a binding minimum level of SoS for all EU Member States** (achieved by Regulation 994/2010, replacing Directive 2004/67/EC). **Member States can apply higher levels of SoS** on a national basis if so desired.

Member States then need to **select projects for reaching the required level of SoS.** This will involve a mix of different projects – gas storage, pipelines, reverse flow and LNG projects. This selection process is currently ongoing on a national level. Discussions are also needed on a regional level between Member States to find a common approach, particularly with regard to investments with a cross-border component or affecting more than one country. Projects in one country can impact on other countries in the overall network, for example an LNG terminal in one country may improve SoS for its neighbour. The proposed approach would also make it possible to take into account projects serving the development of the gas market.

The **financing** of such projects needs to be **defined based on the regulatory treatment** of the facilities in question. Infrastructure that is subject to regulation (e.g. pipelines that do not have a TPA exemption, or reverse flow projects that clearly serve national SoS) needs to be included in the regulatory asset base of the country or TSO in question. In this way, the costs are directly socialised and allocated to end users. Such an approach is outlined in Regulation 994/2010 (replacing Directive 2004/67/EC). An adequate cost allocation procedure has to be ensured for cases where the benefits of SoS projects occur fully or partly in other countries.

Infrastructure which is not usually remunerated on a regulated basis (e.g. LNG terminals or gas storage projects) needs a different approach. Where investments in such projects are required to ensure that SoS targets are met, a fund could be set up on a national level requiring financial contributions from all storage and/or LNG terminal operators. This fund could raise enough money to pay for the additional capacity provided by SoS projects. Ultimately, the costs of this extra capacity would be passed on, fully or partly, to the end consumer via shippers and traders.

Another approach would be to establish EU grants for specific challenges. An example is where a new pipeline would enhance SoS in two countries but require investment in a transit country that would not benefit from it. Here, grants could be used to support the investment in the transit country. The implementation of this measure could follow the steps outlined in Section D.4.4. Strict case-by case evaluation is required in advance to determine the extent to which such grants would influence or even jeopardise the investment cases of other projects financed via market mechanisms.

Evaluation

Criteria	Assessment	Evaluation
Impact	• **Strong impact on enhancing SoS –** related costs would be fully socialised	
Feasi-bility	• **Substantial changes to national regulation would be required,** defining higher SoS levels and creating incentives. This creates additional challenges with regard to implementation	
Costs	• **Administrative (very low)** – personnel resources on an EU level to define and implement regulatory consideration of SoS projects and to create a fund for supporting non-regulated projects	
EU support	***Funding*** • **No costs involved** ***Implementation*** • **Strong moderation** is required to initiate the creation of such an instrument and its implementation on a national basis	

Evaluation	Advantages	Disadvantages
	• **An effective method of increasing SoS**	• **Major challenges to implementation, as significant adaptations to national regulation** would be required

Assessment of stakeholders	TSOs	Financing institutions	NRAs	
				
Overall assessment	• Socialising the costs of such SoS projects (e.g. via inclusion in the regulatory asset base) would solve the viability challenge of such investments			

D.5 Measures aimed at increasing transparency and comparability

A key issue mentioned by financing institutions in this study was the lack of transparency regarding factors influencing investment decisions. In general, there is limited transparency about the detailed **investment volumes** of TSOs on an individual TSO level (the Ten Year Network Development Plans will only provide regional and project-related data) and the progress and challenges related to investments. This reduces the possibility of timely intervention to mitigate such challenges. This issue could be addressed by a specific study (see D.5.1).

Secondly, **regulatory mechanisms and remuneration** are difficult to understand and compare between countries. This area also merits more detailed investigation (see D.5.2).

Thirdly, no **assessment of investor-friendliness in terms of the stability of regulatory remuneration over time** is available on a comparative basis. Yet this is a key area that investors need to understand before committing to such investments (see D.5.3).

Finally, there is still a **lack of transparency about the current level of SoS** in Member States. It is also unclear what levels of SoS are required or desired by individual Member States and which projects would improve SoS in the most cost-efficient manner (see D.5.4).

D.5.1 Detailed assessment study of TSO investment patterns

Various studies of the current and future investment needs of the energy transmission sector were performed in 2010/2011. Unfortunately, they lack coherent, systematic data. Neither the top-down analysis performed by the EC as input for the Communication on **"Energy infrastructure priorities for 2020 and beyond – A blueprint for an integrated European energy network"** (COM (2010) 677), nor the analysis performed by CEER for the EC workshops on financing conditions, based on a survey of European NRAs, nor the bottom-up analysis presented in this study (see B.1) is fully satisfactory in terms of its reliability, coverage and precision. Additionally, the Ten Year Network Development Plans of the ENTSOs have a regional, project-related focus and do not provide detailed indications of what investment levels will be required.

A **separate, dedicated study** is required to create a detailed database on past and future investments by European TSOs. This would also create a solid basis for discussing investment gaps. Furthermore, it could be extended into a **continuous monitoring system** charting the ongoing progress of investments. This would give the EC a clear overview of the potential challenges relating to investments and financing – in effect, an early warning system – and make it possible for the EC to take action where necessary.

Action has already been taken in this direction by requiring TSOs to submit an annual update of their national ten-year-network development plan, informing NRAs of their planned investments (Article 22 of Directives 2009/72/EC and 2009/73/EC of the Third Energy Package).[20] This is a good first step towards establishing a continuous

[20] This must include a detailed description of the main transmission infrastructure that needs to be built or upgraded over the next ten years, information about all investments that have already been decided on and new investments which are to be executed in the next three years, and a timeframe for all investment projects.

monitoring process. However, the focus must also be on monitoring the progress of individual projects and potential challenges. This information should be combined at an EU level to create a clear overview of planned investment volumes and the progress of investments – including a challenge-based perspective which ensures that mitigating action can be taken in a timely manner where severe challenges arise.

Criteria	Assessment		Evaluation
Impact	• **Transparency** about **investments and their progress, as an early warning system for potential challenges** to financing and investment. However, there is no direct positive effect on investments and financing		
Evaluation	**Advantages**	**Disadvantages**	
	• **Important basis** for **obtaining an accurate view** of the size of the investment gap and the countries/projects involved, as a basis for providing focused support	• **Increased effort required** for the ongoing monitoring of planned and existing investments and related challenges	
Overall assessment [21]	• Continuous monitoring is very important as it enables the EU to react early to potential challenges		

D.5.2 Detailed benchmarking study of the investor-friendliness of different regulatory regimes

Currently, the very different regulatory systems in Europe make it difficult for debt and equity financing institutions to assess the various markets. To facilitate this assessment and create an independent comparative basis, we propose commissioning a **detailed benchmarking study of all 27 Member States.** One option would be to have a **rating agency** perform this study from an investor's perspective. The study could also serve as a starting point for harmonising regulatory frameworks in Europe in the medium to long term.

Criteria	Assessment	Evaluation
Impact	• **Transparency** about **regulatory regimes would form a basis for increased engagement in the sector by investors.** The current lack of transparency about **regulatory approaches and stability** is a hurdle for investors interested in the market	

[21] Stakeholders were not asked to comment specifically on transparency measures mainly relevant for the EC, so a limited overall assessment is given for the measures in Section D.5.

Evaluation	**Advantages**	**Disadvantages**
	• **Important means** of reducing the lack of transparency and perceived risk for investors	• **Transparency would expose states with less favourable investment conditions.** This would have a short-term effect on investments but a **positive effect** on **efforts to increase investor-friendliness**
Overall assessment	• This is an important and cost-efficient measure providing transparency for financing institutions, with the intention of attracting more debt and equity financing institutions	

D.5.3 Detailed benchmarking study of returns

As discussed above, there is **limited transparency about actual return structures** for transmission infrastructure projects in Europe. No calculation framework exists that is comparable between countries. To create interest and lower the entry hurdles for new types of investors, we propose commissioning a **publicly available comparative study of return structures** in all 27 EU Member States. Such a study would also show regulators where there is room for improvement with regard to return structures.

Criteria	**Assessment**	**Evaluation**
Impact	• **Transparency** about **regulatory regimes would form a basis for increased engagement in the sector by investors**. The current lack of transparency about **returns** is a hurdle for investors interested in the market	

Evaluation	**Advantages**	**Disadvantages**
	• **Important means** of reducing the lack of transparency and perceived risk for investors	• **Transparency would expose states with less favourable investment conditions.** This would have a short-term effect on investments but a **positive effect** on **efforts to increase investor-friendliness**
Overall assessment	• This is an important and cost-efficient measure providing transparency for investors, with the intention of attracting more equity investments	

D.5.4 Study of the required and reasonable levels of security of supply (SoS), including a breakdown for related projects

Concrete national target levels for SoS are set for the natural gas sector under Regulation 994/2010. Projects aimed at reaching these goals are currently being defined and assessed by Member States. However, transparency needs to be improved over the existing levels of SoS in specific Member States and current plans for reaching the targets. This can be achieved by commissioning a detailed study of this area. Increased transparency would then make it easier to discuss national and regional approaches in a European context – an LNG terminal in one country may improve SoS for its neighbour, for example. Such transparency would make it possible to design projects in a cost-efficient way on a European level.[22]

The study should provide **transparency about current SoS levels.** It should also evaluate **which projects would help meet the SoS levels defined under Regulation 994/2010.** It could do this by putting together all the plans currently underway on a national and regional level and evaluating individual planning processes in a European context. It should do this on both a project and a European level, as SoS investments in one country can influence SoS in other countries. By identifying which **key European projects improve SoS** in a cost-efficient way, the study would provide a solid basis for steering investments efficiently.

<table>
<tr><th>Criteria</th><th colspan="2">Assessment</th><th>Evaluation</th></tr>
<tr><td>Impact</td><td colspan="2">• This measure would provide a solid basis for identifying which key European projects would enhance SoS under Regulation 994/2010 in the most cost-efficient way. Implementation would involve the EU enforcing investment in specific projects, e.g. via a regulation</td><td>  </td></tr>
<tr><td rowspan="2">Evaluation</td><td>Advantages</td><td>Disadvantages</td><td rowspan="2"></td></tr>
<tr><td>• A solid basis for investment decisions about SoS projects in an interconnected European natural gas network</td><td></td></tr>
<tr><td>Overall assessment</td><td colspan="2">• This measure provides a solid basis for transparency about the current level of SoS and which projects would help reach the targets outlined in Regulation 994/2010 in the most cost-efficient way</td><td>  </td></tr>
</table>

[22] Such transparency needs to go beyond the "examination of issues relating to system capacity levels and security of supply of natural gas in the Community" in the annual progress reports required by the EC under Directive 2009/73/EC.

D.6 Summary of solutions to challenges

The following table presents the overall assessments of the measures described in Sections D.1 to D.5 in condensed form. This forms the basis for the recommendations presented in Section E.

MEASURES		OVERALL ASSESSMENT
1	Improve the regulatory environment for the financing of energy infrastructure investments	
1.1	Harmonise regulatory regimes in the EU in terms of core aspects relating to financing conditions	
1.2	Create longer-term stability for investment cases	
1.3	Provide regulatory remuneration during the construction phase of projects	
1.4	Make investments more attractive by introducing priority premiums	
2	Facilitate equity financing	
2.1	Direct public co-sponsoring via grants to reduce the required equity financing volumes	
2.2	Publicly supported equity financing (Marguerite Fund)	
2.3	Set up an EU-supported Transmission Infrastructure Fund (TIF)	
2.4	Create frameworks for increased equity participation/privatisation of TSOs	
2.5	Support industry consolidation	
3	Enhance debt financing conditions	
3.1	Allow more funding at preferable conditions (EIB)	
3.2	EU 2020 Project Bond Initiative	
3.3	Help TSOs access corporate bond markets and receive a credit rating	
4	Measures relating to challenges in specific types of projects	
4.1	Improve the cost allocation framework for cross-border projects	
4.2	Advance Capacity Instrument 1 – Inclusion of anticipatory investments in the regulated asset base	
4.3	Advance Capacity Instrument 2 – Guaranteed volume bridging loans	
4.4	Advance Capacity Instrument 3 – Financial support in the form of grants	
4.5	Measures for financing security of supply (SoS) projects or commercially non-viable projects in the natural gas segment	
5	Measures aimed at increasing transparency and capacity	
5.1	Detailed assessment study of TSO investment patterns	
5.2	Detailed benchmarking study of the investor-friendliness of different regulatory regimes	
5.3	Detailed benchmarking study of returns	
5.4	Study of the required and reasonable levels of security of supply (SoS), including a breakdown for related projects	

Table 12: Overall assessments of measures

D.7 Applicability and coherence of the proposed measures

Applicability of measures

Table 13 presents an overview of measures and their applicability. It covers the following **aspects:**

- **Applicability (project type):** Which types of projects does the measure apply to? This examination includes all the major types of projects described in this study: domestic projects, interconnector projects (cross-border), combined grid solutions (offshore), security of supply projects (natural gas transmission, storage, reverse flow, LNG), and projects using innovative technology (HVDC VSC offshore, etc.).

- **Regulatory setting:** Does the measure apply to regulated or non-regulated projects?

- **Financing approach:** Does the measure apply to projects with project financing or corporate financing?

- **Focus:** Does the measure have a regulatory focus (e.g. inclusion of the asset in the regulatory basis) or a financing focus (e.g. creation of grants)?

- **Level of implementation:** Should the measure be implemented on an EU level (e.g. in the case of direct sponsoring via grants), a national level (e.g. adaptations to national regulation) or the level of the TSO (e.g. credit ratings)?

Measure	Applicability: project type					Regulatory setting		Financing approach		Focus		Level of implementation		
	Normal domestic projects	Interconnector projects (cross-border)	Combined grid solutions (offshore)	Security of supply; projects (natural gas - transmission, storage, reverse flow, LNG)	Projects using innovative technology; (e.g. HVDC VSC offshore)	Regulated projects	Non-regulated projects	Corporate finance	Project finance	Financing	Regulatory	EU	National (NRA)	TSO
1 Improve the regulatory environment														
1.1 Harmonise regulatory regimes in the EU in terms of core aspects relating to financing conditions	x	x	x	x	x	x		x	x		x	x	x	
1.2 Create longer-term stability for investment cases	x	x	x	x	x	x		x	x		x	x	x	
1.3 Provide regulatory remuneration during the construction phase of projects	x	x	x	x	x	x		x	x		x	x	x	
1.4 Make investments more attractive by introducing priority premiums	x	x	x	x	x	x		x	x	x		x	x	
2 Facilitate equity financing														
2.1 Direct public co-sponsoring via grants	x	x	x	x	x	x	x	x	x	x		x		
2.2 Publicly supported equity financing (Marguerite Fund)	x	x	x	x	x	x	x		x	x		x		
2.3 Set up an EU-supported Transmission Infrastructure Fund (TIF)	x	x	x	x	x	x	x	x	x	x		x		
2.4 Create frameworks for increased equity participation/privatisation of TSOs	x	x	x	x	x	x	x	x		x		x	x	x
2.5 Support industry consolidation	x	x	x	x	x	x	x	x	x	x		x		
3 Enhance debt financing conditions														
3.1 Allow more funding at preferable conditions (EIB)	x	x	x	x	x	x	x	x	x	x		x		
3.2 EU 2020 Project Bond Initiative		x	x	x	x	x	x		x	x		x		
3.3 Help TSOs access corporate bond markets and receive a credit rating	x	x	x	x	x	x	x	x	(1)	x		x		
4 Measures relating to challenges in specific project types														
4.1 Improve the cost allocation framework for cross-border projects		x	x	(2)	(2)	x		x	x		x	x	x	
4.2 Advance Capacity Instrument 1 – Inclusion of anticipatory investments in the regulated asset base	(3)	(3)	(3)		(3)	x		x	x		x		x	
4.3 Advance Capacity Instrument 2 – Guaranteed volume bridging loans	(3)	(3)	(3)		(3)		x		x	x		x		
4.4 Advance Capacity Instrument 3 – Financial support in the form of grants	(3)	(3)	(3)		(3)	x	x	x	x	x		x		
4.5 Measures for financing security of supply (SoS) projects or commercially non-viable projects in the natural gas segment				x		x	x	x	x	x	x	x	x	

(1) Measure also supports project finance where TSOs channel funds to the project company (2) Applies to cross-border projects (3) Applies to projects facing an advance capacity challenge

Table 13: Overview of measures

Our evaluation shows that although the measures are **directed towards specific challenges** (relating to regulations, equity and debt financing, specific types of projects), they are generally **broadly applicable.** Most of them apply to all types of projects: regulated and non-regulated projects, projects with corporate financing and projects with project financing, etc.

There is also a broad mix of measures to be implemented on the EU, national (i.e. NRA) and TSO level. Thus although measures are assigned to the stakeholder best situated to implementing them, all stakeholders are involved.

Coherence of measures

For maximum effect, various measures should be implemented in combination:

- **Measures with a focus on regulatory adaptations:** Measures with a regulatory focus (D.1.1, D.1.2, D.1.3, D.4.2 and D.4.5) should be implemented in combination so that the momentum for change created in national regulatory regimes is exploited to the full. Measures should be initiated on the EU level with the participation of NRAs (moderated by ACER, say). The implementation timeframe should be medium to long term, as adaptations of regulatory regimes require thorough preparation and close coordination. Moreover, changes can only be implemented in the following regulatory period, and these periods usually last three to five years. There is no specific order in which these measures should be implemented.

- **Measures with a focus on capital market readiness:** The goal of these measures is to bring TSOs closer to the capital market and improve their access to external equity. The measures include creating frameworks for increased equity participation (D.2.4), getting credit ratings for TSOs that lack them (D.3.3) and establishing a Transmission Infrastructure Fund (TIF, see D.2.3). The credit rating process (D.3.3) should be implemented in the short term. It requires TSOs to achieve internal transparency and is an important step in changing the internal conditions at TSOs, as well as their mindset. The establishment of the TIF should be coordinated with measures for increased equity participation (D.2.4). Removing institutional barriers to allow for more equity participation will have a mid-term focus due to the political decision-making processes involved, and the creation of the TIF should be aligned with this. Furthermore, it is vital to create transparency about the regulatory regimes under which the TIF's targets will apply, as private investors (e.g. pension funds) need to know the returns and risks involved in investing in the TIF. This transparency should be achieved by conducting various studies in the short term (see D.5.1, D.5.2, D.5.3). As soon as these measures are implemented, industry consolidation should be stimulated in the medium to long term (see D.2.5) to make full use of the momentum created.

- **Project-specific measures:** Advance capacity tools (D.4.2, D.4.3, D.4.4) should be combined so that all different project settings are covered. Including

anticipatory investments in the regulatory asset base (D.4.2) applies to all regulated projects, while guaranteed volume bridging loans (D.4.3) focus on non-regulated projects. Both measures require some preparation and can be implemented in the medium term. Grants for individual projects (D.4.4) should be used as short-term support for selected projects until such time as D.4.2 and D.4.3 are in place.

- **Studies to increase transparency:** The various studies to increase transparency should be combined: studies on TSO investment patterns (D.5.1), the benchmarking study on the investor-friendliness of regulatory regimes (D.5.2), the benchmarking study on regulatory returns (D.5.3) and the study on the required, reasonable level of SoS (D.5.4). This will ensure that overlapping areas (e.g. regulatory returns and investor-friendliness) are covered as efficiently as possible. The studies should be conducted as soon as possible as they create the basis for defining and implementing other measures. Thus, for example, the study on regulatory regimes provides transparency for investors in the TIF, the study on SoS forms a basis for related regulatory adaptation, etc.

Combining the measures in "packages", as described above, will ensure that their implementation is as effective as possible.

E. Recommendations

In the previous section, we looked at a wide variety of measures aimed at improving the financing of energy infrastructure in Europe. These measures differ significantly in their scope, potential impact, ease of implementation and cost. In developing our recommendations – presented in this section – we apply the following **principles:**

- Select measures with the highest overall rating (see Section D.7)
- Select measures which allow strong leverage of public resources
- Select a good mix of short-term and longer-term measures

Based on these principles, we make the **recommendations** discussed below.

1. Improve investment conditions, especially for potentially difficult types of projects

The overall feedback from TSOs and financing institutions was clear: today, securing funds for planned projects is not a problem. However, investment volumes need to grow significantly in the coming decade (see Section B). In the future, TSOs will need to exploit sources of debt and equity to the full in order to finance these projects. Investments in transmission infrastructure must be seen as attractive – both on a corporate level, where operators often compete for funding of projects with other parts of the same organisation, and on the financing markets, where different types of infrastructure and different regions are in competition with each other.

Given the large volume of future investment required, the investment opportunities need to be made as attractive as possible. For this reason, we recommend introducing a **priority premium** (see D.1.4). This would send out a clear signal to the market, emphasising the EC's commitment to the development of infrastructure. The priority premium should apply to high-priority Projects of European Interest, especially those which might otherwise not be carried out or which are affected by advance capacity or security of supply (SoS) issues (see D.4).

2. Enhance the capital market readiness of TSOs and facilitate private investment

Given the large investment volumes required for future energy transmission projects and the limited amount of support available in the form of grants, preferable lending conditions or other means, it is **important to create a framework for commercial investment on the debt and equity side.** The key lever for meeting the 2020 goals for infrastructure will be addressing the large cash pools available in global finance (i.e. the bond markets) and from institutional investors such as pension funds. This is

essential if the industry is to meet the financing requirement for Projects of European Interest of EUR 20 billion a year.

We propose two measures for making such cash pools more accessible to the energy transmission industry. With the Marguerite Fund, the IFIs have taken a step in the right direction. Yet this measure alone will not be enough to deal with the financing challenges faced by the industry in the coming years. It would also require a large amount of the IFIs' money to be invested. A structure such as the proposed **Transmission Infrastructure Fund** (TIF, Section D.2.3) could therefore help create larger volumes of funding and enable better leverage of public funds.

On the debt side, the most important instrument is access to the corporate bond markets. Yet many TSOs in Europe cannot access these markets at the moment because they lack their own credit rating. The EC should therefore **help TSOs receive a credit rating and thus support their to access corporate bond markets** (D.3.3).

3. Remove institutional barriers

As described in Section B.3.2, many Eastern European TSOs in particular are still fully or majority state-owned. This can create problems when significant amounts of new equity are needed – from the current owners or new shareholders – especially in times of restricted public budgets. A similar problem arises where decisions about funding are not ultimately taken by the TSO but by a parent company whose strategic objectives go beyond those of the transmission business.

To address these institutional barriers, we recommend that the EC makes efforts to allow more private sector capital into the industry, for example via privatisation. This would involve true ownership unbundling of TSOs and allowing TSOs to achieve sufficient scale by means of M&A and industry consolidation (see D.2.4 and D.2.5).

4. Provide support for specific types of projects

For specific types of projects, we recommend two measures aimed at mitigating the **advance capacity challenge:**

- **Include anticipatory investments in the regulatory asset base** (see D.4.2): The most effective way to deal with the risks faced by anticipatory investments is to allow such projects to be included in the regulatory asset base. This is the more cost-efficient solution in the long term (e.g. comparing the cost of single radial connections to wind farms with the cost of a smaller number of cables in a meshed grid); consumers bear the risk in the short term but benefit in the long run. This measure is a broad approach to tackling the advance capacity problem.

- **Provide financial support in the form of grants** (see D.4.4): Direct grants can provide short-term support for anticipatory investments. This measure involves taking on some of the risk and aiding a favourable investment decision for such projects.

5. Further develop the TEN-E programme

In general, the support provided by the TEN-E programme is considered useful and adequate by TSOs and industry experts. However, given the financial and investment challenges in the period to 2020, the TEN-E programme should be adapted to specifically support the measures suggested here. This would involve taking the following steps:

- **Increase transparency:** The TEN-E programme should retain responsibility for managing Projects of European Interest but it should do so more actively. It should also work to improve transparency about the financing and investment framework of European TSOs relating to these projects. It could do this by commissioning additional studies as described in Section D.5: a detailed assessment of TSO investment patterns, a comprehensive benchmarking study of regulatory regimes in terms of their investor-friendliness and a benchmarking study of returns.

- **Support and coordinate procedures:** We recommend that the EC takes a more active role in the development process of Projects of European Interest. In particular, we propose that the EC provides professional mediation in negotiations about complex multi-country projects and their cost allocation processes (see D.4.1)

- **Take over the administration of financial support instruments:** The TEN-E programme should continue to provide financial support for feasibility studies. In addition, it should take over the administration of specific support instruments, such as grants for certain types of projects (see D.4.4 and D.4.5).

Appendix

Appendix A – Credit ratings of TSOs

Rating system

Investment Grade		Rating
Highest Grade		
S&P	The issuer's capacity to meet its financial commitment on the obligation is extremely strong	AAA
Moody's	These obligations are judged to be of the highest quality, with minimal credit risk	Aaa
Fitch	Highest credit quality; denotes the lowest expectation of credit risk. Exceptionally strong capacity for payment of financial commitments.	AAA
High Grade		
S&P	The issuer's capacity to meet its financial commitment on the obligation is very strong, differing from highest-rated obligations only to a small degree.	AA+ AA AA-
Moody's	The obligations are judged to be of high quality and are subject to very low credit risk.	Aa1 Aa2 Aa3
Fitch	Very high credit quality; denotes expectations of a very low credit risk. Very strong capacity for payment of financial commitments.	AA+ AA AA-
Upper Medium Grade		
S&P	The issuer has strong capacity to meet its financial commitments. However, it is more susceptible to the adverse effects of changes in circumstances and economic conditions than higher-rated obligators.	A+ A A-
Moody's	Obligations rated "A" are considered upper-medium grade and are subject to low credit risk.	A1 A2 A3
Fitch	High credit quality; denotes expectations of low credit rsik. Strong capacity for payment of financial commitments.	A+ A A-
Lower Medium Grade		
S&P	Exhibits adequate protection parameters. Adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of issuer to meet its financial commitments.	BBB+ BBB BBB-
Moody's	These obligations are subject to moderate credit risk. They are considered medium-grade and as such may possess certain speculative characteristics.	Baa1 Baa2 Baa3
Fitch	Good credit quality; denotes that there are currently expectations of low credit risk. The capacity for payment of financial commitments is considered adequate but adverse changes in circumstances and economic conditions are more likely to impair this capacity.	BBB+ BBB BBB-
Below Investment Grade		**Rating**
Speculative Grade		
S&P	Less vulnerable to nonpayment than other speculative issues, however, the issuer faces major ongoing uncertainties or exposure to adverse business, financial or economic conditions which could lead to inadequate capacity to meet its financial commitment.	BB+ BB BB-
Moody's	These obligations are judged to have speculative elements and are subject to substantial credit risk.	Ba1 Ba2 Ba3
Fitch	Speculative. There is a possibility of credit risk developing, particularly as a result of adverse economic or market changes	BB+ BB BB-

Table 15: Credit rating systematic (Source: S&P, Moody's, Fitch)

Appendix B – List of abbreviations

List of abbreviations	
ACER	Agency for the Cooperation of Energy Regulators
Capex	Capital Expenditure
CEER	Council of European Energy Regulators
CFO pre-W/C	Cashflow from Operations before Working Capital adjustments
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EEPR	European Energy Programme for Recovery
EESII	EU Energy Security and Infrastructure Instrument
EIB	European Investment Bank
EL	Electricity
EU	European Union
FCF	Free Cashflow
FERC	Federal Energy Regulatory Commission
FFO	Funds From Operations
HVDC	High Voltage Direct Current
IFI	International Financing Institution
IPP	Independent Power Producer
KfW	Kreditanstalt für Wiederaufbau
LNG	Liquified Natural Gas
M&A	Mergers and Acquistions
NG	Natural Gas
NRA	National Regulatory Authority
NSCOGI	North Sea Countries' Offshore Grid Initiative
PEI	Project of European Interest
RAB	Regulated Asset Base
RCF	Residual Cash Flow
ROA	Return on Assets
ROE	Return on Equity
S&P	Standard&Poor's
SoS	Security of Supply
SPV	Special Purpose Vehicle
TEN-E	Trans-European Networks for Energy
TPA	Third Party Access
TSO	Transmission System Operator / Transit System Operator
VBL	Volume Bridging Loan
VSC	Voltage Source Converter
WACC	Weighted Average Cost of Capital