Do current regulatory frameworks in the EU support innovation and security of supply in electricity and gas infrastructure?

Country Report - Estonia

March– 2019

EUROPEAN COMMISSION

Directorate-General for Energy
Directorate B — Internal Energy Market
Unit B.1 — Networks & Regional Initiatives

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Directorate-General for Energy

March 2019

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Luxembourg: Publications Office of the European Union, 2019

ISBN: 978-92-76-03993-8
Doi: 10.2833/89609

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The Estonian NRF and regulatory practices for electricity and gas have many similarities, for this reason in this summary no distinction is made between electricity and gas.

The NRF in Estonia

The two primarily pillars of legislations governing the legal framework of the electricity sector in Estonia are the Electricity Market Act[1] (the EMA) and the Grid Code[2], which sets out technical requirements. Similarly, for the gas market, the Natural Gas Act[3] (NGA) is the principal piece of legislation governing the legal framework of the gas sector in Estonia. The other key piece of legislation is the Grid Code[4], which sets out the technical requirements.

The Ministry of Economic Affairs and Communications has the overall responsibility for the energy sector, however, the Estonian Competition Authority (the ECA) acts as the regulatory body exercising state supervision over compliance with the EMA and the NGA, including the operation of the electricity and gas markets and the activities of market participants. According to law, the ECA must be independent and exercise its powers with impartiality while performing the functions imposed on it by the EMA and the NGA.

Elering AS, a state-owned company, owns and operates both electricity and gas transmission networks and is the combined electricity and gas TSO in Estonia.

Network tariffs are based on the revenue cap method. The allowed regulated revenue is the sum of justified costs and a reasonable return on the regulatory asset base (RAB).

There are no specific duties on the TSO aimed at encouraging innovation. However, the general duties of the TSO described in sections 3.1.2 indirectly supports innovation. Similarly, there are no specific powers or duties on the ECA aimed at encouraging innovation. The duty to encourage innovation is to an extent implicit in the more general duties of the ECA to ensure that it secures the efficient and economic execution of activities by licensees, including the TSO.

The TSO is, however, obliged to safeguard the security of supply on both electricity and natural gas.

The regulatory practice in Estonia

The interviewees remarked that, in general, there are no barriers at NRF level preventing TSO from investing in innovation or security of supply projects and assigned the highest rate on how the current NRF accommodates investments in innovative solutions. As regards how well the NRF embraces the business environment and investment needs, both TSO and NRA representatives expressed their full satisfaction.

Further, the national regulatory framework is considered adequate to support security of supply investments in general. An estimated 70% of all electricity and 90% of all natural gas projects are estimated to deal with security of supply.

Options for improvement

For electricity, no options for improvement were identified.

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1 Translation into English of the EMA is available from *Riigi Teataja* at: https://www.riigiteataja.ee/en/eli/521122017001/consolide.

2 The Grid Code (in Estonian only) is available from *Riigi Teataja* at: https://www.riigiteataja.ee/akt/116022016014.

3 Translation into English of the NGA is available from *Riigi Teataja* at: https://www.riigiteataja.ee/en/eli/524072017015/consolide.

4 The Grid Code (in Estonian only) is available from *Riigi Teataja* at: https://www.riigiteataja.ee/akt/129072017006.

For natural gas, stakeholders pointed out the cumbersome and difficult process they went through in the cost allocation between Finland and Estonia in connection to the Baltic Connector project.

Introducing the requirement to conduct a Social CBA would represent a first step towards a better understanding of the social benefits each interested country may derive from a particular infrastructure development.

1. INTRODUCTION

The present Country Report is a deliverable of the study “Do current regulatory frameworks in the EU support innovation and security of supply in electricity and gas infrastructure?”.

The key objective of the study is to analyse how the existing national regulatory frameworks (NRFs) in the EU guide and incentivise the electricity and gas transmission project promoters to undertake investments. The focus of the study is both on investments in new innovative technologies and investments to increase security of supply. The main objective of the study is to map how the regulatory frameworks in the MSs support such investments and how do these frameworks ensure that the necessary investments are made.

This Country Report provides an overview of both the current legal frameworks and their implementation practice related to investments in gas and electricity transmission infrastructure. As part of this analysis, selected specific infrastructure projects in electricity and gas are discussed. Based on this research, options for improvement are formulated, both relating to the implementation practice and to legal changes.

The Country Report is based on previous study deliverables and analysis. It is divided into two main sections, Section 2 which relates to electricity, and Section 3 which relates to gas. Each of these sections examines the legal framework (Section 2.12.1 for electricity and Section 3.1 for gas), including specific rights and duties of relevant parties, such as TSOs and NRAs (hereafter also referred to as stakeholders), mechanisms for the financing of investment projects and the regulatory rules regarding innovation and security of supply in particular. Having studied the legal regulatory framework, Section 2.2 for electricity and Section 3.2 for gas examine the regulatory practice in Estonia, drawing specifically on stakeholder interviews, and paying particular attention to the regulatory practice related to innovation and security of supply. The functioning of the legal framework and the regulatory practice are illustrated by selected specific projects in Estonia. Lastly, options for improvement of the regulatory practice and the regulatory framework are discussed in Section 2.3 for electricity and Section 3.3 for gas.

These options for improvement are taken from a long list of best practises that the project team has compiled based on the analysis of regulatory frameworks in all Member States. We acknowledge that we have not carried out a full analysis of all the costs and benefits of the suggested options. Therefore, some of these options are conditional and there might be reasons that we did not take into consideration not to implement them.

The focus of this report is not primarily on R&D investments and projects, but rather on “innovative” transmission infrastructure related investments. In order to define what “innovative” is in the context of this report, we have introduced the notion of “typological investments” (see Annex I and II). The goal of selecting “typological investments”, which, in our understanding, are categories of investments, was to make the discussion concrete and the investments comparable across countries. The term “typological investment” relates to technical solutions that TSOs can adopt to provide the transmission capacities needed to cover the transmission demand of grid users.

Thus, a typological investment is meant to be a type of solution that can be implemented, in principle, by any TSO in situations in which these solutions are appropriate to provide the desired benefit. Hence, typological investments are not specific to a concrete location or a particular TSO. Annex I provides a list of typological investments in the electricity sector, whereas Annex II provides the same for gas.

Ultimately, these technical solutions contribute to fulfilling the objective to improve or maintain the level of security of supply. It has to be noted that the degree of innovativeness of typological investments can be quite diverse, ranging from construction of conventional assets like AC overhead lines or pipelines with conventional materials and construction methods down to novel concepts of system automation and operation based on recent R&D achievements. Innovation aims at providing the desired level of transmission capacity – determined by the objectives of security of supply (see above) – in a way that is in some way superior to the conventional way, e.g.:

i. by immediately reducing overall cost as compared to a conventional solution;
ii. by prospectively reducing overall cost in the future, subject however to a “learning curve” as to the cost level of the innovative solution;

iii. by accelerating the process of transmission capacity expansion and thus reducing social welfare loss caused by temporarily insufficient transmission capacities; or
iv. by providing improvements with respect to other criteria that are often difficult to monetarise, like environmental or public acceptance aspects.

Innovative investments, especially those whose benefits fall into category ii., iii. and iv. named above, can face certain barriers and market failures. We have identified five categories of innovative projects, which might encounter potential regulatory barriers (see also Annex III for more explanation):

a. Capital intensive projects resulting in uncertain future OPEX gains (efficiency improvements / cost reductions) are not incentivised by the regulatory framework;
b. Projects with potential significant benefits, which would benefit primarily the wider society and where the concerned TSOs are not incentivised;
c. A roll out and investment in smart grids substituting planned physical investments may provide a reduction in the regulated asset base, but might not be realised due to an increase in tariffs or regulatory disincentives;
d. Projects with few or no commercial benefits to justify the investment, but with positive social impacts;
e. Projects, which result in a lower TSO TOTEX, but bring about a shift in the CAPEX/OPEX ratio, which is not incentivised by the regulatory framework.

Our understanding of innovative investments and typological investments, and the categorisation of investment projects in relation to possible regulatory barriers are the basis for the research done in the context of the analysis of the implementation practice in this report.

2. ELECTRICITY

2.1. Legal analysis of the NRF in Estonia

2.1.1. Overview of the regulatory framework of Estonia – legal rules

The two primarily pillars of legislations governing the legal framework of the electricity sector in Estonia are the Electricity Market Act[5] (the EMA) and the Grid Code[6], which sets out technical requirements.

The EMA defines "transmission network" as a national network with a voltage of at least 110 kV together with connections that have a voltage of over 10 kV with networks of other countries and together with other electrical installations, including those operating on medium voltage, which are necessary to ensure the functioning, administration and development of the system as a whole and together with control, protection and communication systems which form a single economic entity.[7]

The Ministry of Economic Affairs and Communications has the overall responsibility for the energy sector, however, the Estonian Competition Authority (the ECA) acts as the regulatory body exercising state supervision over compliance with the EMA, including the operation of the electricity market and the activities of market participants.[8] According to law, the ECA must be independent and exercise its powers with impartiality while performing the functions imposed on it by the EMA.[9]

The ECA's primary functions include (but are not limited to)[10]: (i) licensing – issuing and revoking licences, establishing and amending the conditions thereof and monitoring compliance with the conditions of licences; (ii) price regulation – approving *ex ante* distribution and transmission network tariff (save for transmission charges for the transit of electricity but including *ex post* supervision), approving *ex ante* the TSO's methodology of calculating the prices of balancing electricity and *ex post* supervision of the TSO's prices of balancing electricity; (iii) access and contract terms – approving *ex ante* network operators' methodology of calculating connection fees (including *ex post* supervision) and the standard terms and conditions of their network agreements, including the TSO's balance agreements; (iv) unbundling and certification – verifying and certifying that the TSO complies with unbundling requirements; (v) cross-border issues – performing functions imposed on the ECA by Regulation (EC) 714/2009 and the EU legislation enacted on the basis thereof, and also Regulation (EU) 1227/2011 (REMIT); (vi) dispute resolution – resolving disputes between electricity market participants; (vii) regional cooperation – cooperating with ACER and other Member State's national regulatory authorities in order to perform its duties; (viii) general state supervision – exercising state supervision over compliance with the requirements provided in the EMA and the legislation enacted on the basis of thereof; and (ix) remedies and sanctions – imposing measures to remedy identified infringements, including imposing sanctions.

The ECA also monitors investments made in generation capacities and, having regard to considerations of security of supply, may require the TSO to hold a tender for the establishment of new generation capacities, energy storage devices or energy efficiency demand-side management measures.[11]

Licensable activities include interconnection, generation, transmission, distribution and supply. There are restrictions on the same person holding multiple different types of licences, in compliance with the Third Energy Package. The licence for the provision of network services through the transmission network is granted to one company only.[12] Under the EMA, the

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5 Translation into English of the EMA is available from *Riigi Teataja* at: https://www.riigiteataja.ee/en/eli/521122017001/consolide.

6 The Grid Code (in Estonian only) is available from *Riigi Teataja* at: https://www.riigiteataja.ee/akt/116022016014.

7 Article 3(21) of the EMA.

8 Article 93(1) of the EMA.

9 Article 93(3) of the EMA.

10 Article 93(6) of the EMA.

11 Article 4(4[1]) of the EMA.

12 Article 22(4) of the EMA.

transmission network operator is the system operator and it has the responsibility to ensure security of supply and balance of the system at any moment in time.[13] Licences are granted by the ECA, are without a term and not transferable. The ECA can also revoke licences for various reasons, including when a licence-holder is acting in breach of its licence conditions or is no longer fulfilling the prerequisites and conditions set out in the EMA.

2.1.2. Specific legal rights and duties

Role of the TSO

Elering AS, the combined electricity and gas TSO in Estonia, is a state-owned company, which owns and operates both electricity and gas transmission networks.[14]

A network operator shall develop the network within its service area so that the continued provision of network services that comply with the legislation and the conditions of the licence is ensured to all consumers, producers, line possessors and any other network operators connected to the network having regard to their justified needs, and that electrical installations which meet established requirements and belong to market participants located within the service area of the operator can be connected to the network. When developing the network, the network operator complies with the need to ensure the security of supply, to achieve efficiency and the integration of markets, having regard to the research conducted in these fields.[15]

Each distribution system operator (DSO) submits an estimate to the ECA every year of the total likely demand for usage capacity within its entire network for each of the seven years following submission of the estimate. The ECA shall promptly forward these estimates to the TSO who shall submit a written estimate to the ECA, which is as precise as possible, of the total likely demand for usage capacity in the entire transmission network for each of the seven years following submission of the estimate.[16] Together with the referred estimate, the TSO must submit a written detailed plan to the ECA on how it intends to provide network services to satisfy the likely demand for usage capacity indicated in the estimate.[17]

The TSO shall also prepare and submit a report to the European Commission, the Ministry of Economic Affairs and Communications and the ECA, which sets out:

- estimated supply and demand of electricity during the next five years;
- the existing supply potential;
- generating installations envisaged or under construction;
- the quality and level of maintenance of networks;
- the measures to cover the estimated maximum demand (peak demand) and the measures to be implemented in the event of shortfalls of capacity;
- operational security of the network;
- a forecast of the situation in relation to the security of electricity supply for a period from five to fifteen years from the filing date of the report; and
- the investment plans of the transmission network operator and the known relevant investment plans of neighbouring countries concerning the establishment of cross-border interconnectors for the following five calendar years, taking into account the need to maintain trade secrets.[18]

The referred investment plan shall set out: (i) principles of congestion management set out in Regulation (EC) No 714/2009; (ii) existing and envisaged transmission lines; (iii) estimated patterns of generation and transmission of electricity, of cross-border exchanges in electricity and of consumption of electricity which make it possible to implement load management measures; (iv) objectives of sustainable development at regional, national and European level, including projects which are part of the priority projects set out in Annex 1 to Decision No 1229/2003/EC of the European Parliament and of the Council of laying down a series of guidelines for trans-European energy networks and repealing Decision No 1254/96/EC.[19]

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13 Articles 38(1) and 38(2) of the EMA.
14 https://elering.ee/en.
15 Article 66(1) of the EMA.
16 Articles 66(2) and 66(3) of the EMA.
17 Article 66(4) of the EMA.
18 Article 39(7) of the EMA.
19 Article 39(8) of the EMA.

Undertaking of investments

The TSO is required to carry out investment projects to deliver on its legal / regulatory duties as more fully described in the section above. Details of the applicable network tariff methodology adopted by the ECA are described in section 2.1.32.1.3.

Role of NRA regarding investment projects undertaken by the TSO

The ECA's role and duties are more generally described in section 2.1.12.1.1 above. Here we explain the ECA's role in relation to investment projects undertaken by the TSO to develop the transmission network, in particular the network tariff methodology adopted by the ECA, which sets out the mechanisms for financing investment projects. These are explained in section 2.1.3 below.

The general network tariff regulation principles are set out in the EMA. More specific rules are stipulated in the tariff regulation methodologies adopted by the ECA[20], which include detailed rules on the calculation of network tariffs. The general aim of the tariff regulation principles is to enable the network operator to cover its reasonable costs, which are necessary for the performance of its duties, and to earn a reasonable return on the regulated asset base (RAB).[21] The network tariffs need the prior approval of the ECA.[22]

Investments financed by non-refundable aid (such as EU's Connecting Europe Facility), connection charges or congestion management income are not accepted by the ECA as part of RAB.

As a result, the network operators' assets are divided between regulated assets and non-regulated assets. Typically, major cross border investments required to increase the interconnector capacity of the electricity transmission network (and thereby enhance the security of supply) are to a great extent financed by non-refundable aid (such as EU's Connecting Europe Facility). Limited to the extent not financed by non-refundable aid or congestion management income, the respective investments are included in the RAB.

In addition to the cross border investments, the TSO also makes regular investments into the regulated assets of electricity transmission network. The purpose of these investments is to replace the aging transmission equipment and to develop the transmission network to meet the needs of growing domestic consumption. Other ordinary investments (e.g. investments in IT) also form part of investments in the RAB.

The TSO includes an investment plan as part of the tariff application and the ECA investigates the proposed investments prior to approval of the tariffs.

2.1.3. Mechanism for financing of investment projects

The price-cap regulation

The regulation of the network tariffs is based on the price cap method with fixed prices. The allowed regulated revenue, which is the base of prices, is the sum of justified costs and a reasonable return on the RAB. Reasonable return is defined as operating profits (i.e. profit before interest expense and income tax) and is calculated according to the following formula: Operating profit = RAB x WACC.

RAB for each year is found as the RAB at the end of the previous year to which the sum of justified investments in the RAB during the next year are added. The network operators include an investment plan to the tariff application and the ECA investigates the proposed investments prior to approval of the tariffs. In case making an investment takes several years, each year the RAB will increase by the amount actually spent in that year. Investments financed by non-refundable aid (such as EU's Connecting Europe Facility), connection charges or congestion management income are not accepted by the ECA as part of RAB. Therefore, the TSO makes no operating profits on its non-regulated assets.

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[20] The network tariff methodologies (in Estonian) are available at the website of the ECA: http://www.konkurentsiamet.ee/index.php?id=18288.

[21] Article 71(5) of the EMA.

[22] Article 73(1) of the EMA.

WACC is calculated by the ECA based on the capital asset pricing model and disclosed in its methodology. The most important variable in this model is the market interest rate level (more specifically, the average yield of the 10-year German government bond for the last 5 years). For the purposes of the calculation of the cost of equity, the beta of similar companies is used, assuming the equity to assets ratio of 0.5. According to the ECA's methodology for WACC calculation, the current WACC applied to TSO is 4.46%. As a rule, WACC is reviewed by the ECA annually. Changes in the WACC do not trigger automatic changes in the approved network tariffs.

Approved tariffs are calculated dividing the regulated revenue by transmission volumes. The average of the last three calendar years' transmission volumes is used. If the actual transmission volumes differ from those used in the calculation of tariffs no *ex post* compensation is available to the TSO.

There is no end term to the approved tariffs. If the costs or revenues of the network operator have changed compared to a previous approval decision, the operator is entitled (or obliged) to apply for approval of new tariffs. There is no automatic (e.g. annual) correction of the tariffs. Amendment and approval of tariffs can only be initiated by network operator's application. However, if the ECA has identified that the applicable tariffs do not comply with law, it can order the network operator to submit a tariff amendment application for approval by the ECA.

The ECA approves tariffs with binding decisions, which cannot be overruled by any other governmental authority, but can only be challenged in court by interested parties within 30 days from the decision date of the ECA. The network tariffs approved by the ECA are public, however, the underlying decision of the ECA outlining for example which investment projects were included in the regulated asset base is not.

2.1.4. Regulatory rules with respect to innovation

Specific duties of the TSO aimed at encouraging innovation

There are no specific duties on the TSO aimed at encouraging innovation. Some of the general duties of the TSO described above in section 2.1.1 and 2.1.2, indirectly support innovation.

Specific duties of the NRA aimed at encouraging innovation

There are no specific powers or duties on the ECA specifically aimed at encouraging innovation. The duty to encourage innovation is to an extent implicit in the more general duties of the ECA to ensure that it secures the efficient and economic execution of activities by licensees, including the TSO.

2.1.5. Regulatory rules with respect to security of supply

Specific duties of the TSO aiming at safeguarding security of supply

Pursuant to the EMA system, responsibility is the obligation to ensure that security of supply and balance of the system at any moment in time is taken after by the TSO.[23] In order to perform this obligation the TSO shall for example:

- ensure the security of supply of the system in accordance with the Grid Code;
- prepare an annual action plan to ensure security of supply for the following year and, if necessary, modify such plan;
- plan and manage generation in the system, the transmission of electricity in the transmission network and the consumption of electricity, taking into account the technical parameters of the system;
- ensure interoperability with neighbouring systems in real time;
- prepare and establish action plans for network operators;
- organise the restoration of electricity supply in accordance with the action plan; etc.[24]

The TSO also has the authority to issue mandatory orders to producers to increase or reduce generation and the right to issue mandatory orders to consumers to reduce consumption and the right to increase or reduce generation or consumption itself, provided that the issue of such orders or the increase or reduction of generation or consumption is necessary for technical

[23] Articles 38(1) and 38(2) of the EMA.
[24] Article 39(1) of the EMA.

reasons or in order to ensure security of supply.[25] The TSO is also entitled to restrict or interrupt the import of electricity if this is required by the technical limitations of the system or the need to ensure security of supply.[26]

When setting the network tariffs, the network operator must consider the need to ensure the security of supply, to achieve efficiency and to integrate markets as well as take into account the results of research conducted in the relevant field.[27]

Specific duties of the NRA aiming at safeguarding security of supply

The ECA may require the TSO to hold a tender for the establishment of new generation capacities, energy storage devices or energy efficiency demand-side management measures if, on the basis of the TSO's security of supply report to the European Commission, the Ministry of Economic Affairs and Communications and the ECA, the capacity reserve of generating installations of the system falls below the capacity reserve established in the Grid Code as required in order to satisfy the demand for consumption or if this is necessary for the promotion of new technologies for the purpose of environmental protection.[28]

The ECA also assesses the compliance of the TSO with the unbundling requirements.[29] The ECA monitors the compliance of the TSO with the unbundling requirements and shall initiate an assessment of compliance of the TSO if it becomes aware of circumstances which permit a citizen of a third country or a legal person incorporated and registered in a third country to acquire control over the TSO. In this case, the ECA shall require proof from the TSO that the activity of the TSO or of the person controlling the TSO does not jeopardize the security of supply of the Republic of Estonia or the European Union.[30]

The ECA may demand expropriation of the assets used in the provision of electricity transmission services if the period of validity of the licence has expired or the licence has been revoked and there is no guarantee that the activities carried out on the basis of those assets will continue to be in compliance with the EMA and it may possibly endanger the security of supply of the system.[31]

2.2. Regulatory practice

2.2.1. Overview over regulatory practice in Estonia

Information about the general regulatory framework in Estonia

As described in section 2.1.3, investments undertaken by the TSO are subject to the ECA's scrutiny for approval and only the approved projects, becoming part of the RAB, will contribute to TSO's operating profit. Being no financial mechanism devised to implement innovative projects in the current regulation, the ECA's approval might have the effect of limiting innovation. However, the collaboration of the NRA and TSO in finding the optimal financing structure for encouraging innovation and towards the enhancement of security of supply is key in the development pf the national electricity system. The importance of fostering innovation in Estonia has been demonstrated by the direct inclusion of the "data exchange platform" and "smart metering" projects in the EMA and Grid Code[32].

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25 Article 40(2) of the EMA.
26 Article 82(4) of the EMA.
27 Article 71(4) of the EMA.
28 Article 4(4[1]) of the EMA.
29 Article 26[1](1) of the EMA.
30 Articles 94[1](1) and 94[1](3) of the EMA.
31 Article 100(1)(2) of the EMA.
32 Under the Grid Code, all standard electricity meters in Estonia had to be replaced with remote-readable meters by the end of 2016. Under the EMA, the TSO must create and maintain a data exchange platform in order for the electricity market to function and to facilitate competition. The data exchange platform (so-called Data Hub) is a digital environment for information exchange in the electricity market for the purpose of changing open suppliers and transmitting metering data. Via the Data Hub web portal (available at: https://andmeladu-test.elering.ee/consumer/home) all producers and suppliers have access to their own consumption volume measurement data (remotely readable in one-hour increments). In addition, market participants can view agreement deadlines, sellers, supplier EIC codes and EIC codes for measuring points connected to a supplier. The Data Hub is administered by the TSO.

Main regulatory barriers

The interviewees remarked that, in general, there are no barriers at NRF level stopping the TSO from investing in innovation or security of supply projects and assigned the highest rate on how the current NRF accommodates investments in innovative solutions. As regards how well the NRF embraces the business environment and investment needs, the interviewees expressed their full satisfaction.

2.2.2. Regulatory practice related to innovation

Innovative projects do not even account for 30% for electricity and are focused primarily on digitalization. Innovative projects are understood as being demonstration projects and not R&D projects. The interviewees note that the TSO has to guarantee security of supply and, whether possible, secure it through innovative solutions.

Regarding innovative projects, investments in “data exchange platform” and “smart metering” projects represent the main innovative investments, which got introduced in the RAB. As such, these projects show how the current regulatory framework supports innovative projects.

Adequacy of the NRF relating to its support for innovative investments

The current regulation is deemed as adequate in supporting innovative projects and adapt easily to non-canonical projects for which a collaboration of the TSO and NRA is essential in project proposal and approval.

2.2.3. Regulatory practice related to security of supply

Security of supply projects

Around 70% of the projects are related to security of supply. An example of such a project, that shows how the regulatory regime works in practice, is “the third Estonia-Latvia interconnection” project. The project has a major importance as for the integration of the Baltic electricity market with the European grid. It is also a technical prerequisite allowing the desynchronization of the electricity systems of the Baltic countries from Russia’s electrical grid and their connection to the synchronous grid of Continental Europe.

Adequacy of the NRF relating to its support for security of supply investments

The national regulatory framework is considered adequate to support security of supply investments in general.

2.2.4. Illustrative specific projects

The following project is an example of an approved security of supply project, and thus it illustrates how the regulatory framework works in practise.

The third Estonia-Latvia interconnection

Description and aim

The third 330 kV Estonia-Latvia electric power transmission line from Harku, Estonia, to Riga, Latvia is a strategic infrastructure project that ensures a better electricity supply security and more effective functioning of the electricity market in the Baltic countries and also between the Baltic countries, Nordic countries and other EU countries. It will remove a bottleneck at the Estonia-Latvia border, increasing transmission capacity by up to 600 MW. It is also a technical prerequisite allowing the desynchronization of the electricity systems of the Baltic countries from Russia’s electrical grid and their connection to the synchronous grid of Continental Europe.

Approval process

The approval process, according to the NRA, did not offer any hindrances and proceeded in a smoothly.

More information regarding the Data Hub is available from the TSO’s website - https://elering.ee/en/data-exchange#tab2.

Financial mechanisms

The planned total cost of the project is 172 million euros. The project is co-financed by the European Union's Connecting Europe Facility. The European Commission decided to finance the construction of the Estonia-Latvia electric power transmission line with 112 million euros. The sum covers 65% of the total cost. The remainder of the investment cost is financed by the TSO from congestion management income. Accordingly, the referred investment project will not have an impact on the network tariffs.[33]

2.3. Options for improvement

Based on the interviews held with the NRA and electricity TSO, and the practical application of the NRF to projects financing, we do not envision any improvement.

2.3.1. Options to improve regulatory practice

(see above).

2.3.2. National law mechanism(s) for implementing options

(see above).

2.3.3. Impact assessment

(see above).

[33] https://www.elering.ee/en/third-estonia-latvia-interconnection.

3. GAS

3.1. Legal analysis of the NRF in Estonia

3.1.1. Overview of the regulatory framework of Estonia – legal rules

The Natural Gas Act[34] (NGA) is the principal piece of legislation governing the legal framework of the gas sector in Estonia. The other key piece of legislation is the Grid Code[35], which sets out the technical requirements.

The NGA defines "gas transmission network" as an operational assembly which is necessary for the transmission of gas and for the creation of connections with the networks of other countries or for the transit of gas, and which consists of gas pipelines the operating pressure of which exceeds 16 bar and of any facilities connected to those pipelines in a fixed manner, as well as of the control, protection, communication and metering systems necessary for the operation, maintenance and development of the transmission system.[36]

The Ministry of Economic Affairs and Communications has overall responsibility for the energy sector, however, the Estonian Competition Authority (the ECA) acts as the regulatory body exercising state supervision over compliance with the NGA, including the operation of the gas market and the activities of market participants.[37] According to law, the ECA must be independent and exercise its powers with impartiality while performing the functions imposed on it by the NGA.[38]

Elering AS, a state-owned company, owns and operates both electricity and gas transmission networks and is the combined electricity and gas TSO in Estonia[39].

3.1.2. Specific legal rights and duties

Role of TSO

The TSO shall prepare, after consultations with the market participants, a ten-year network development plan and submit it to the ECA.[40] When preparing the network development plan, the TSO must take into account the existing and estimated future demand, investment plans for regional and Europe-wide networks as well as investment plans for LNG terminals.[41] The network development plan must contain measures in order to guarantee the adequacy of the system and the security of supply for the next ten years and include details on:

- building or upgrading principal transmission infrastructure;
- technical parameters of the planned investment projects; and
- time frame for the investment projects.[42] The TSO shall submit to the ECA annual reports on compliance with the network development plan and possible changes to the network development plan.[43]

Undertaking of investments

The TSO is required to carry out investment projects to deliver on its legal / regulatory duties. Details of the applicable network tariff methodology adopted by the ECA are described in section3.1.3.

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34 Translation into English of the NGA is available from *Riigi Teataja* at: https://www.riigiteataja.ee/en/eli/524072017015/consolide.
35 The Grid Code (in Estonian only) is available from *Riigi Teataja* at: https://www.riigiteataja.ee/akt/129072017006.
36 Article 2(16) of the NGA.
37 Article 37(1) of the NGA.
38 Article 37(1) of the NGA.
39 https://elering.ee/en.
40 Article 21^2(1) of the NGA.
41 Article 21^2(2) of the NGA.
42 Article 21^2(3) of the NGA.
43 Article 21^2(4) of the NGA.

Role of NRA regarding investment projects undertaken by the TSO

The ECA's primary functions include (but are not limited to)[44]: (i) licensing – issuing and revoking licences, establishing and amending the conditions thereof and monitoring compliance with the conditions of licences; (ii) price regulation – approving *ex ante* distribution and transmission network tariff, approving *ex ante* the TSO's methodology of calculating the prices of balancing gas and *ex post* supervision of the TSO's prices of balancing gas; (iii) access and contract terms – approving *ex ante* network operators' methodology of calculating connection fees (including *ex post* supervision) and the standard terms and conditions of their network agreements, including the TSO's balance agreements; (iv) unbundling and certification – verifying and certifying that the TSO complies with unbundling requirements; (v) cross-border issues – performing functions imposed on the ECA by Regulation (EC) 715/2009 and the EU legislation enacted on the basis thereof, and also Regulation (EU) 1227/2011 (REMIT); (vi) dispute resolution – resolving disputes between gas market participants; (vii) regional cooperation – cooperating with ACER and other Member State's national regulatory authorities in order to perform its duties; (viii) general state supervision – exercising state supervision over compliance with the requirements provided in the NGA and the legislation enacted on the basis of thereof; and (ix) remedies and sanctions – imposing measures to remedy identified infringements, including imposing sanctions.

Licensable activities include transmission, distribution, import, operation of a LNG terminal and provision of gas storage services.[45] There are restrictions on the same person holding multiple different types of licences, in compliance with the Third Energy Package. The licence for the provision of network services through the transmission network is granted to one company only.46 Under the NGA, the transmission network operator is the system operator and it has the responsibility to ensure security of supply and balance of the system at any moment in time.47 Licences are granted by the ECA, are without a term and not transferable. The ECA can also revoke licences for various reasons, including when a licence-holder is acting in breach of its licence conditions or is no longer fulfilling the prerequisites and conditions set out in the NGA.

3.1.3. Mechanism for financing of investment projects

The general network tariff regulation principles are set out in the NGA together with main principles of tariff regulation methodology.[48] More specific rules are stipulated in the tariff regulation methodologies adopted by the ECA[49], which include detailed rules on the calculation of network tariffs. The general aim of tariff regulation principles is to enable the network operator to cover its reasonable costs, which are necessary for the performance of its duties, and to earn a reasonable return on the regulated asset base (RAB).[50] The network tariffs need the prior approval of the ECA.[51]

The regulation of network tariffs is based on the price cap method with fixed prices. The allowed regulated revenue, which is the base of prices, is the sum of justified costs and a reasonable return on the RAB. Reasonable return is defined as operating profits (i.e. profit before interest expense and income tax) and is calculated according to the following formula: Operating profit = RAB x WACC.

RAB for each year is found as the RAB at the end of the previous year to which the sum of justified investments in the RAB during the next year are added. The network operators include an investment plan to the tariff application and the ECA investigates the proposed investments prior to approval of the tariffs. In case making an investment takes several years, each year the RAB will increase by the amount actually spent in that year. Investments financed by non-refundable aid (such as EU's Connecting Europe Facility) or connection charges are not accepted by the ECA as part of RAB. Therefore, the TSO makes no operating profits on its non-regulated assets.

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44 Article 37(3) of the NGA.
45 Article 27(1) of the NGA.
46 Article 30^1(2) of the NGA.
47 Articles 14 and 15(1) of the NGA.
48 Articles 23 and 23^2 of the NGA.
49 The network tariff methodologies (in Estonian) are available at the website of the ECA: http://www.konkurentsiamet.ee/index.php?id=18315.
50 Articles 23(2) and 23(3) of the NGA.
51 Article 23(4) of the NGA.

WACC is calculated by the ECA based on the capital asset pricing model and disclosed in its methodology. The most important variable in this model is the market interest rate level (more specifically, the average yield of the 10-year German government bond for the last 5 years). For the purposes of the calculation of the cost of equity, the beta of similar companies is used, assuming the equity to assets ratio of 0.5. According to the ECA's methodology for WACC calculation, the current WACC applied to the gas TSO is 4.51%. As a rule, WACC is reviewed by the ECA annually. Changes in the WACC do not trigger automatic changes in the approved network tariffs.

Approved tariffs are calculated dividing the regulated revenue by the transmission volumes. The average of the last three calendar years' transmission volumes is used. If the actual transmission volumes differ from those used in the calculation of tariffs no *ex post* compensation is available to the TSO.

There is no end term to the approved tariffs. If the costs or revenues of the network operator have changed compared to a previous approval decision, the operator is entitled (or obliged) to apply for approval of new tariffs. There is no automatic (e.g. annual) correction of the tariffs. Amendment and approval of tariffs can only be initiated by network operator's application. However, if the ECA has identified that the applicable tariffs do not comply with law, it can order the network operator to submit a tariff amendment application for approval by the ECA.

The ECA approves tariffs with binding decisions, which cannot be overruled by any other governmental authority, but can only be challenged in court by interested parties within 30 days from the decision date of the ECA. The network tariffs approved by the ECA are public, however, the underlying decision of the ECA outlining for example which investment projects were included in the regulated asset base is not.

3.1.4. Regulatory rules with respect to innovation

Specific duties of the TSO aimed at encouraging innovation

There are no specific duties on the TSO aimed at encouraging innovation. Some of the general duties of the TSO described in sections 3.1.2 indirectly support innovation.

Specific duties of the NRA aimed at encouraging innovation

There are no specific powers or duties on the ECA aimed at encouraging innovation. The duty to encourage innovation is to an extent implicit in the more general duties of the ECA to ensure that it secures the efficient and economic execution of activities by licensees, including the TSO.

3.1.5. Regulatory rules with respect to security of supply

Specific duties of the TSO aiming at safeguarding security of supply

Pursuant to the NGA system responsibility is the obligation to ensure security of supply and balance of the system at any moment in time and this is the obligation of the TSO.[52] In order to perform this obligation the TSO shall for example:

- ensure the security of supply of the system;
- plan and supervise the supply of gas in the system, the distribution of gas in the network, and the consumption of gas, taking into account the technical limitations of the system;
- comply with the requirements of the Regulation (EC) 715/2009 with respect to capacity allocation, congestion management, balancing, capacity trade, transparency and record keeping;
- cooperate within the European Network of Transmission System Operators for Gas both at regional and EU level in order to ensure an efficient functioning of the market;
- submit to the ECA investment plan to implement the measures required for ensuring the infrastructure standard provided in Article 5 of Regulation (EU) No 2017/1938 or demonstrate with relevant market measures that the infrastructure standard has been met;
- ensure cooperation with the gas systems of neighbouring states; etc.53

[52] Article 14 of the NGA.
[53] Article 16(1) of the NGA.

The TSO must submit information to the ECA required by the latter for the preparation of reports on security of supply.[54]

If the TSO has reliable information that an event may take place which could, to a significant extent, adversely affect the supply situation or that a supply disruption has already taken place, the TSO shall notify the Ministry of Economic Affairs and Communications and the ECA of the event or the disruption and of the market measures implemented by the TSO.[55]

The TSO also has the authority to issue mandatory orders to market participants to limit or suspend the consumption of gas by customers if this is required to mitigate the effects of a supply disruption. Such an order by the TSO must be based on contracts concluded with the consumers or on a respective resolution of the Government.[56]

The TSO must maintain gas stock to ensure the availability of gas for in case of supply disruptions. For each calendar month, gas stock must be maintained in a quantity that ensures the supply of gas to protected customers. The TSO may store the gas stock in another Member State.[57]

Specific duties of the NRA aiming at safeguarding security of supply

Under the NGA the ECA exercises supervision over ensuring the security of supply for protected customers. The ECA prepares and publishes an annual report on the situation of security of supply.[58] The ECA submits a preventive action plan for reducing the risks affecting the security of gas supply specified in Regulation (EU) No 2017/1938 and the plan for coping with supply disruptions to the Ministry of Economic Affairs and Communications.[59]

Upon receipt of notice from the TSO regarding possible supply disruptions, the ECA together with the Ministry of Economic Affairs and Communications analyses the information received from the TSO and the market measures implemented by the TSO. If the analysis reveals that for the purpose of ensuring the security of supply it is necessary to implement any of the measures of compulsory reduction of gas demand, the Ministry of Economic Affairs and Communications makes the proposal to the Government to allow the implementation of such measures in order to eliminate the supply disruption or to alleviate the effects of such a disruption.[60] The ECA shall promptly inform the European Commission of any such event and of the measures implemented to resolve the situation.[61]

The ECA also exercises supervision over creation and maintenance of the gas stock by the TSO.[62]

The ECA assesses the compliance of the TSO with the unbundling requirements.[63] Investment screening rules have been established in respect of acquisition of the gas transmission network. A company that wishes to acquire the gas transmission network applies, before acquisition of that network, for an assessment of its conformity to the internal security of the state. The application is submitted to the Ministry of the Interior Affairs.[64] The Ministry of the Interior Affairs assesses potential dangers of the acquisition of the gas transmission network to the internal security of the state on the basis of the principles of internal security policy of the Republic of Estonia.[65] Any transaction regarding the acquisition of the gas transmission network with a person who has failed to pass the scrutiny test specified above is void.[66]

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54 Article 16(4) of the NGA.
55 Article 26^2(1) of the NGA.
56 Article 17(2) of the NGA.
57 Article 26^4 of the NGA.
58 Article 26^2(7) of the NGA.
59 Article 26^3(1) of the NGA.
60 Article 26^2(2) of the NGA.
61 Article 26^2(4) of the NGA.
62 Article 26^4(5) of the NGA.
63 Article 29^3(2) of the NGA.
64 Article 29^2(1) of the NGA.
65 Article 29^2(2) of the NGA. The basic principles of internal security policy of the Republic of Estonia are available in Estonian from *Riigi Teataja* at: https://www.riigiteataja.ee/akt/13314462. Detailed principles and policy documents on internal security are not publicly available.
66 Article 29^2(6) of the NGA.

The ECA may demand expropriation of the assets used in the provision of gas transmission services if the period of validity of the licence has expired or the licence has been revoked and there is no guarantee that the activities carried out on the basis of those assets will continue to be in compliance with the NGA and it may possibly endanger the security of supply of the system.[67]

3.2. Regulatory practice

3.2.1. Overview over regulatory practice in Estonia

Main regulatory barriers

No regulatory barrier was mentioned by the interviewees.

3.2.2. Regulatory practice related to innovation

Innovative projects

No innovative project was mentioned in the interview with the NRA.

Adequacy of the NRF relating to its support for innovative investments

In general, the interviewees believe that the current NRF is adequate to shore up investments in innovation.

3.2.3. Regulatory practice related to security of supply

Security of supply projects

Around 90% of the projects are related to security of supply and encompass cross-border investments. An example of a security of supply driven project, that shows how the regulatory regime works in practice, is Baltic Connector (a PCI project, connecting Estonia and Finland).

Adequacy of the NRF relating to its support for security of supply investments

The NRF is considered adequate to support security of supply investments in general.

3.2.4. Illustrative specific projects

The following project is an example of an approved security of supply project, and thus it illustrates how the regulatory framework works in practise.

Balticconnector

The Balticconnector aims at interconnecting the Finnish and Estonian natural gas transmission networks with the view to improving the energy security of the Baltic-Finnish region.

This infrastructure has a twofold function. From one hand, it ensures a more coherent and diverse natural gas transmission network in the Baltic Sea region; on the other, it will guarantee the security of natural gas supply for the north-eastern Member States of the EU.

In connection with the Balticconnector, the Estonian-Latvian gas interconnection will also be enhanced in order to allow for bi-directional gas flow between Estonian and Latvian gas transmission systems (as required by the EU Regulation 2017/1938) and increase the cross-border transmission capacity.

Approval process

The cross-border cost allocation decision between the Estonian and Finish government complicated the unravelling of the project and prolonged the approval time.

[67] Article 40(1)(2) of the NGA.

Financial mechanisms

Co-financed by the European Union's Connecting Europe Facility, the planned total cost of the project is 285 million euros. The European Commission decided to finance the construction of the Balticconnector and the enhancement of the Estonian-Latvian gas interconnection with 206 million euros (accounting for 75% of the total cost of the Balticconnector and 50% of the total cost of the enhancement of Estonian-Latvian gas interconnection) [68]. The remainder of the investment cost will be financed through the transmission network tariffs.[69]

3.3. Options for improvement

3.3.1. Options to improve regulatory practice

The above discussion shows that the NRF works reasonably well for security of supply and especially interconnection projects, which are important for Estonia. Yet, cost allocation for cross boarder projects may be ameliorated.

(i) Introduction of a social CBA

The stakeholder pointed out the cumbersome and difficult process they went through in the cost allocation between Finland and Estonia in connection to the Baltic connector project.

Introducing the requirement to conduct a Social CBA in projects would represent a first step towards a better understanding of the social benefits each interested country may derive from a particular infrastructure development. Also, such an analysis, representing an attempt to adequately quantify the incurred costs, would ameliorate the negation process over determining a more well-balanced cost splitting between countries.

There is no new interconnection projects foreseen after Balticconnector commissioning.

3.3.2. National law mechanism(s) for implementing options

We consider that the above-mentioned option could be implemented using legal powers already available to the NRA or others under the existing NRF.

3.3.3. Impact assessment

A negative side effect of option (i) could, at first sight, be the introduction of delays in the implementation of investment projects due to the introduction of an additional analysis in the approval process.

Despite difficult to predict with certainty, the devoted time so spent might be recouped in a likely smoother negation phase in cost allocation between, in which consensus reaching exacerbates and prolongs the approval time of investments.

[68] https://www.elering.ee/en/balticconnector.

[69] Estonian Gas Transmission Network Development Plan 2018-2017 by Elering, the TSO, which is available in Estonian at: https://elering.ee/sites/default/files/attachments/Eesti%20gaasi%C3%BClekandev%C3%B5rgu%20arengukava%202018-2027.pdf.

ANNEX I: TYPOLOGICAL INVESTMENTS – ELECTRICITY

Generally, the term typological investment relates to technical solutions that TSOs can adopt to provide the transmission capacities needed to cover the transmission demand of grid users. Thus, a typological investment is meant to be a type of solution that can be implemented, in principle, by any TSO in situations in which these solutions are appropriate to provide the desired benefit. Hence, typological investments are not specific to a concrete location or a particular TSO. In the following, we have listed a selection of typological investments for the electricity transmission sector, that are differentiated in 7 categories that can be considered innovative as compared to conventional solutions. For each of these categories we have provided a number of examples of solutions, based on our existing knowledge, a literature review and interviews. The list might not be completely comprehensive, but should give an idea of our understanding of the different types of typological investments, we are interested in.

Category	Examples of solutions
New transmission lines based on innovative technology or change of technology of existing lines	• New HVDC lines (→allow to control the power flow; less expansive for long distance transport; undergrounding less complex); • Replacement of HVAC by HVDC lines (→less complex and less expensive; more compact design); • Underground cables or GIL (→ more expensive than OHL but can help improving public acceptance and accelerate the authorisation process); • Design of overhead line poles (→can help improving public acceptance and accelerate the authorisation process); • Replacement of conventional overhead line conductors by high-temperature conductors (→more expensive than conventional ones but can allow to provide additional capacity at a lower cost level and more quickly than by building completely new lines).
Introduction of dynamic capacity rating with the aim of utilising existing transmission lines or transformers at higher levels	Spectrum of technological options ranging from a differentiation of rating levels according to fixed time intervals (e.g. seasonal or time-of-day) down to online monitoring of equipment temperature and adaptation of capacity rating in real-time operation.
Installation of power flow control components in order to better adapt power flow patterns to capacities and topology of the existing grid.	• Phase-shifting transformers; • Semiconductor-based FACTS elements (including HVDC converters).
Investment into components contributing to ancillary services provision (reactive power / voltage control, short-circuit power, momentary power reserves and black-start capability)	• Purely phase-shifting generators (→offer operational flexibility and can serve to improve cost efficiency); • FACTS elements (→ see above).
New or extended power system control and automation technology with the aim to lower the risk of disturbances threatening security of supply	• Improvements in observability and controllability based on conventional sensor and actor devices; • Wide-area measurement systems (aiming at synchronously measuring power phasor angles at the grid nodes to improve observability); • Real-time dynamic security assessment tools (aiming at observing stability phenomena beyond static voltage/current measurements).

Category	Examples of solutions
Partial automation of system operation processes aiming at better utilisation of existing grid capacities	Automatic switching of network devices (in connection with adaptive protection schemes) or of generation-side or demand-side flexibilities in case of grid component outages in order to reduce the demand for (n-1) capacity reserves.
Improvement of approaches to curative congestion management providing the possibility to operate systems closer to their technical limits and/or to improve security of supply	• Generation-side flexibilities (especially renewables); • Demand-side flexibilities (DSM/DR); • Storage components; and • Technologies coupling the electricity sector with other sectors (gas, heat, traffic).

ANNEX II: TYPOLOGICAL INVESTMENTS – GAS

Typological investments are meant to be those type of investments whose aim is to promote innovation in the gas transmission systems while ensuring or enhancing the level of security of supply of a region. Hence, by definition, they can be implemented independent of a specific TSO and location.

In the following table, we offer a resume of the typological investments for the gas transmission system we have deemed as innovative compared to "conventional" solutions.

The investments are broken down into four categories each accompanied by examples that emphasise their importance and impact on the gas system.

Category	Examples of solutions
Increased need for flexibility for market development and security of supply.	• (Power-to-gas) Usage of excess pipeline capacity as "energy" storage of excess wind or solar energy by utilizing electrolysis (an efficient utilization of the excess of electricity produced by non-programmable sources of energy); • Increase withdrawal and injection capacity in storages by incentivising investments supporting flexibility (support of gas market liquidity and security of supply level); • Allowance of higher pressure in selected pipeline/routes (increase of flexibility of the supply side).
Incentivise and facilitate upgrade of biogas to the transmission system.	• Investments in upgrade of biogas to transmission system (support of gas market liquidity and security of supply).
Digitalisation of operations, through e.g. drone inspections and artificial intelligence (AI), resulting in a safer and cost-efficient operation.	• Drone inspections and AI in combination with modern SCADA systems can serve as input to reliability based operation and maintenance (lower maintenance cost and reduction of unforeseen/unplanned shutdowns).
In order to support security of supply and add liquidity to the gas market, there is a need to build interconnectors in Europe.	• More reverse flow systems could be considered to increase flexibility in the supply routes (reduction of dependency and power of trading of the large gas suppliers); • Enhancement of available gas supply in situation of supply crisis; • possibility of arbitrage a price convergence between markets to support the development of the internal market.

ANNEX III: POTENTIAL REGULATORY BARRIERS FOR PROJECTS

Regardless of the character of a project (e.g. projects enhancing security of supply or applying innovative technologies, which this questionnaire is focussing on) there might be potential regulatory barriers for implementing projects in general but maybe also barriers for special kind of projects. To give you an impression what kind of barriers we have in mind, we have listed some examples of such barriers in the following. It should be noted that there might be different or even more or less barriers in the regulatory framework of your country.

Type	Description / Explanation
Higher TSO CAPEX but lower expected OPEX within the TSO	the investment upfront is more costly, but has a potential of lowering the operational costs in the future. However, because of its innovative and more risky character the lower OPEX is not guaranteed. If not allowed to put the costs in case of a failure in the tariffs, TSO would not invest in innovative solution.
Higher TSO CAPEX, but benefits go to the wider society, instead of the TSO	This is a situation where higher investment, including in new technologies, is needed on the part of a TSO but benefits in terms of RES integration, RES curtailment or CO2 avoidance benefit other players in the society, while the TSO is only faced with the cost increase. Projects in regulatory frameworks, which do not distribute adequately the benefits to the TSO that bears the costs and takes the risk, are less likely to happen. This could also apply to cross-border investments involving several TSOs.
Investments in smart grid elements /technology aimed at replacing planned grid investments	Investments in smart grids and other smart elements that actually reduce the need of physical construction of lines for example due to a better interactive/intelligent grid management of balancing tools (battery storage) may provide a reduction in the regulated asset base, however with a slight increase of tariffs, might not be realised.
Investments in security of supply – projects without commercial benefits	Projects that ensure security of supply will in some cases never bring enough commercial benefits such as a pipeline would be going to be used only in case of emergency. If the security of supply (e.g. diversification of the sources for gas) is not put into tariffs, a TSO is most likely not willing to invest.
Lower TSO TOTEX but shift in the CAPEX/OPEX ratio	In some member states CAPEX and OPEX are treated differently in the regulatory regimes. Depending on the incentives set by doing so, technical solutions/projects with higher CAPEX might be preferred by the TSOs even if they result in higher total costs.

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MJ-03-19-368-EN-N

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doi: 10.2833/89609