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

Country Report - Austria

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The regulatory practice in the electricity sector in Austria

There are no provisions in the regulation explicitly facilitating innovation. The NRF is neutral regarding project categories, such as innovative or conventional, PCI or non-PCI. The regulation should ensure that the TSO operates effective and efficient. So, as long as project costs are reasonable, and the necessity and the benefit can be demonstrated, an investment will be approved by the NRA. Interviewees from both TSO and NRA have not mentioned any major barriers or indicated any improvement needs.

Generally, the NRF is also considered adequate in supporting security of supply investments, even though a bias for CAPEX was remarked by the interviewees that might set lesser incentives for investments with high OPEX shares, such as IT-tools benefitting security of supply by improved real time system operation. At the same time interviewees underline that necessary investments have always been made irrespectively of their regulatory treatment.

Options for improvement

Although the NRF seems well-designed for innovation and security of supply, using the issues drawn from the above discussion, the following options for improvement could be worth being considered:
(i) Incentives for specific OPEX-based solutions;
(ii) Statutory requirement to consider alternatives;
(iii) Statutory reference to innovation.

Option (i) could be implemented using legal powers already available to the NRA or others under the existing NRF but it is not easy to implement it well-balanced. The option has the risk to turn out to be a technology-specific incentive that does not necessarily lead to efficient decisions and may even encourage abuse. So, this risk must be carefully weighed against the effort of necessary changes to the law that are needed to implement the other options.

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The Austrian regulatory regime for Gas TSOs can be characterised as a combined model of Revenue Cap (OPEX) and Rate-of-Return (CAPEX) with a 4-year regulatory period. This model guarantees earnings above costs for the TSO in an ongoing manner if the TSO makes investments. In the current regulatory period as incentive for future investments a mark-up on the equity capital interest of 0.8 percentage points was introduced. Approved costs must be reasonable, transparent and are benchmarked for efficiency.

The regulatory practice in the gas sector in Austria

The interviewees were generally satisfied with the NRF regarding support of security of supply projects. Also, the interviewees regard the NRF generally being adequate to support innovative projects. Of course, some of the projects which have a particular case nature were approved individually within the scope of the network development plan by the NRA after consultation of the relevant stakeholders. At the same time, the interviewees see improvement needs for the development of green gas projects and seek clearer definitions of the unbundling scope as well as clearer framework for intersectoral projects (gas/electricity) in the current NRF.

Options for improvement

Although the NRF seems well-designed for innovation and security of supply, using the issues drawn from the above discussion, the following options for improvement could be worth being considered:

(i) Statutory reference to innovation.

The long-term strategic perspective on innovation mentioned in option (i) necessitates efforts and coordination between the TSO and the NRA regarding the design of this long-term perspective (e.g. the organisation of targeted stakeholder consultations, determining the scope of the innovation needed, monitoring and evaluating of how the statutory duty is translated into the long-term perspective).

Some respondents have highlighted potential hurdles created by EU unbundling regime. Whether or not such hurdles are actually caused by the unbundling regime or not requires a careful analysis that falls outside the scope of this project. In the final report we point out that for some areas, a clarification of the boundaries of the activities that TSOs are allowed to undertake would be helpful. In other cases, the recently adopted Clean Energy Package (including e.g. the market test) provides a procedure to overcome such hurdles.

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 analyses. It is divided in two main sections, Section 2 which is related to electricity, and Section 3 which is related to gas. Each of these sections examines the legal framework (Section 2.1 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 Austria, 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 Austria. 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 the 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 Austria

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

The Federal Act Providing New Rules for the Organisation of the Electricity Sector (Austrian Electricity Act),[1] is the principal piece of primary legislation governing the Legal Framework for electricity in Austria together with the Federal Act on the Regulatory Authority for Electricity and Natural Gas, (E-Control Act)[2] which specifically govern the organisation, objectives and tasks of the regulatory authority for electricity and gas, E- Control.

Due to the federal structure of Austria and the division of competences in the Austrian Constitution between the federal state and the nine provinces, the Austrian Electricity Act is in many parts only a so called "principal act" ("Grundsatzgesetz") which needs so called "Ausführungsgesetze" (Implementation Laws) of the provinces for full implementation. In theory, these implementation laws could provide more detailed regulations and could deviate between provinces. However, in most areas, the regulation in the Austrian Electricity Act is already specific enough and the implementation laws of the provinces are identical to the Austrian Electricity Act. This is the case in the areas of interest in this report. Therefore, we only quote the Austrian Electricity Act in this report.

In discharging regulatory tasks, E-Control shall take any and all appropriate measures to attain inter alia the following objectives:

- Promoting a competitive, secure and environmentally sustainable internal market in electricity within the European Community, and ensuring appropriate conditions for the effective and reliable operation of electricity and gas networks, taking into account long-term objectives;[3] developing appropriate cross-border transmission capacities to meet demand and enhancing the integration of national markets which may facilitate electricity flows across the European Community;[4] helping to achieve, in the most cost-effective way, the development of secure, reliable and efficient non-discriminatory systems that are consumer oriented, and promoting system adequacy and, in line with general energy policy objectives, energy efficiency as well as the integration of large and small-scale production of electricity and gas from renewable energy sources and distributed generation in both transmission and distribution networks;[5] ensuring that system operators and system users are granted appropriate incentives, in both the short and the long term, to increase efficiencies in system performance and foster market integration;[6]
- The (juridical) persons authorised to act as transmission system operator(s) in a certain province are defined in the respective provincial law.[7] In addition to this nomination under law, each transmission system operator requires certification under the ownership unbundling rules.[8]

Section 7 para 1 of the Austrian Electricity Act defines transmission and transmission system as follows:

"68. "transmission" means the transport of electricity through an ultra-high voltage and high-voltage interconnected grid with a view to its delivery to consumers or distributors, but not including supply;

69. "transmission system" means a high-voltage interconnected system with a voltage of 110 kV or above, serving the purpose of supraregional transport of electricity."

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1 Federal Law Gazette, (FLG) I no 110/2010, as amended.
2 FLG I no 110/2010 as amended.
3 Section 4 1. E-Control Act.
4 Section 4 3. E-Control Act.
5 Section 4 4. E-Control Act.
6 Section 4 6. E-Control Act.
7 I.e. see Section 2 no. 60, Electricity Act Vorarlberg, provincial law gazette, Vorarlberg nr. 59/2003 as amended and Section 2 para. 1 no. 73, Electricity Act Vienna, provincial law gazette nr. 46/2005.
8 Sections 24ff Austrian Electricity Act.

These definitions of transmission and transmission system include two criteria, which both have to be met: (i) 110 kV and above high voltage grid; and (ii) such grid to be used for the supraregional transport of electricity meaning the interconnection of regional distribution grids. Such distribution grids may also include high-voltage systems. Since in practice the distinction might be difficult to assess, the Austrian legislature has decided to determine and define the transmission system operatorship in the respective provincial laws.[9] Thus, the following three network operators and its legal successors, if any, are defined as transmission system operators in Austria: Austrian Power Grid AG (APG), TINETZ-Tiroler Netze GmbH (former TIWAG-Netz AG) and Vorarlberger Übertragungsnetz GmbH (former VKW-Netz AG).

Within the framework of setting the grid tariffs, the Austrian electricity grid (transmission and distribution) was divided into seven levels starting with grid level 1, which comprises the 220 kV and 380 kV grids of APG, TINETZ-Tiroler Netze GmbH and Vorarlberger Übertragungsnetz GmbH. These are followed by the 110 kV grids right down to the 400 V grids, to which most end consumers (e.g. households) are connected. The tariff for the utilisation of grid level 1 is made up of several components: Gross tariff, Net tariff (net work or net output), Loss tariff, System service tariff, Tariff for reactive power.

According to Section 23 of the Austrian Electricity Act the provincial laws foresee the establishment of a control area for each of the areas covered by the transmission system and operated by Verbund-Austrian Power Grid AG (APG), TINETZ-Tiroler Netze GmbH and Vorarlberger Übertragungsnetz GmbH. These transmission system operators are also defined as control area managers. Combining control areas by way of combined operation by one control area manager is permissible.

Each year, transmission system operators have to submit to the regulatory authority for approval a network development plan for the transmission network based on current and forecast supply and demand.[10]

Role of the NRA

According to Section 38 of the Austrian Electricity Act, the regulatory authority approves the network development plan by official decision. Such an approval may be granted subject to additional stipulations and conditions to the extent that such is necessary for meeting the objectives of the Austrian Electricity Act. In particular, the regulatory authority shall verify whether the network development plan covers the investment needs identified in the consultation to their full extent, whether the network development plan is consistent with the Union-wide network development plan pursuant to Article 8(3)(b) of Regulation (EC) No 714/2009 and whether the measures contained in the network development plan appear to be suitable to fulfil the conditions listed in Section 37 paras 2 to 6 of the Austrian Electricity Act. The regulatory authority may request the transmission system operator to adjust its network development plan at any time if such plan has already been submitted but not yet approved. Requests for adjustments to the latest approved network development plan are admissible if significant changes in the underlying situation cause the need for a reassessment.[11]

This ensures that the NRA controls the investment planning of the transmission system operators. The NRA can also enforce the fulfilment of the investment plan.

In circumstances where a transmission system operator, other than for overriding reasons beyond its control, does not execute an investment which, under the network development plan, was to be executed during the next three years, the regulatory authority shall take at least one of the following measures to ensure that the investment in question is made if such investment is still relevant on the basis of the most recent network development plan: 1. require the transmission system operator to execute the investment in question; 2. initiate a tender procedure open to any investors for the investment in question; the regulatory authority may entrust a third party with carrying out the tender procedure; 3. oblige the transmission system operator to accept a capital increase to finance the necessary investments and allow independent investors to participate in the capital.[12]

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9 See i.e. Section 2 (1) no. 67 NÖ Elektrizitätswesengesetz 2005 (NÖ ElWG 2005), Section 4 (72) Tiroler Elektrizitätsgesetz 2012 – TEG 2012.

10 Section 37 (1) Austrian Electricity Act.

11 Section 38 Austrian Electricity Act.

12 Section 39 Austrian Electricity Act.

The adequate costs of the investments in question shall be included in the calculation of the tariffs to be set by the NRA on the transmission level.[13]

Institutional or procedural constraints on the performance of those roles

As mentioned above under the Austrian Electricity Act transmission system operators have the right under law to have the acceptable costs incurred for projects included in an approved development plan reimbursed. This does not leave much opportunity for the regulatory authority to intervene when assessing the costs of the transmission system operator during the cost evaluation and tariffing process. It should however be noted that the costs in the network development plan are reviewed in great detail before being approved by the regulatory authority.

Thus, the focus of the transmission system operators and the regulatory authority in respect of reinvestments and investments is on the process of development and approval of the network development plan.

Prior to issuing the related official decision, the regulatory authority has to consult on the network development plan with organisations representing system users, the regulatory authority shall publish the results of the consultation, indicating particularly any need for investments.[14]

According to Section 48 (1) of the Austrian Electricity Act, the regulatory authority shall regularly determine the costs of the transmission system operator by official decision. Prior to taking a final decision on the allowed cost, the Wirtschaftskammer Österreich (Federal Economic Chamber), the Landwirtschaftskammer Österreich (Federal Chamber of Agriculture), the Bundesarbeiterkammer (Federal Chamber of Labour) and the Österreichischer Gewerkschaftsbund (Austrian Trade Union Federation) have the opportunity to comment. The regulatory authority shall provide information to these bodies' representatives and allow them to inspect the relating documents. Any economically sensitive information of which the representatives obtain knowledge in exercising their right to inspection shall be treated confidentially. The Federal Economic Chamber and the Federal Chamber of Labour may appeal against the decisions of the regulatory authority with the Bundesverwaltungsgericht (Federal Administrative Court) if the stipulations regarding the establishment of the costs (Sections 59 to 61 of the Austrian Electricity Act) have been violated, and in a next step to the Verwaltungsgerichtshof (Administrative Court of Appeal) pursuant to Section 133 of the Bundesverfassungsgesetz (Federal Constitutional Law).

This involvement of the representatives of the end-consumers in practice is time consuming. On the other hand, it ensures the accountability of the regulatory authority for its decisions and the involvement and acceptance of the final decision by end-consumers.

Legal deficiencies as regards the performance of those roles

Even though, the following legal deficiencies primarily concern the federal or provincial law rather than the NRF they are noted for the sake of completeness. A significant factor for the implementation of the necessary reinforcements of the transmission grid is the duration of permitting procedures. These are currently very complex (federal and provincial legislation) and hence time consuming. Moreover, additional specific factors (existing or planned routes not or insufficiently secured; diverging limit values in the area of noise and/or EMFs; no separate authorisation system for the upgrade of power lines, lack of standard public participation process) constitute further obstacles to the expedition of procedures or increase of acceptance of involved parties.

The general planning of land use is a competence of the provinces. The Austrian Electricity Act on federal level and also the provincial electricity acts provide for the planning process for the development plan of the transmission system operators. A legal linkage between these two planning processes is missing. Thus, energy infrastructure needs, in particular on transmission level, are often not taken into account in the general planning on provincial level.

[13] Section 38 (4) and Section 39 (5) of the Austrian Electricity Act.
[14] Section 38 (4) Austrian Electricity Act.

2.1.2. Specific legal rights and duties

Development of the transmission network

System operators are obliged i.a. to set up and maintain a suitable system infrastructure to ensure domestic electricity supply or the performance of obligations under public international law and to participate in measures designed to eliminate congestion and in measures designed to ensure security of supply.[15]

The network development plan to be elaborated by each transmission system operator each year shall in particular:

"1. indicate to market participants the main transmission infrastructure that needs to be built or extended over the next ten years;
2. list all the investments already decided and identify new investments which have to be executed in the next three years; and
3. provide for a time frame for all investment projects.

The network development plan shall in particular have the aim of:
1. meeting the demand for line capacity to supply consumers while considering emergency scenarios;
2. ensuring a high degree of availability of line capacity (security of supply of the infrastructure);
3. meeting the demand for line capacity to achieve a European internal market.

When elaborating the network development plan, transmission system operators shall make reasonable assumptions about the evolution of generation, supply, consumption and exchanges with other countries, taking into account investment plans for regional networks pursuant to Article 12(1) of Regulation (EC) No 714/2009 and Community-wide networks pursuant to Article 8(3)(b) of Regulation (EC) No 714/2009. The network development plan shall contain efficient measures to guarantee the adequacy of the system and ensure a high degree of availability of capacity (security of supply of the infrastructure).

In drawing up the network development plan, transmission system operators shall take into consideration technical and economic expediency, the interests of all market participants and consistency with the Community-wide network development plan. Prior to submitting the network development plan for approval, the transmission system operator shall consult all relevant market participants.

In substantiating the application for approval of the network development plan, especially in the case of competing projects for the construction, expansion, alteration or operation of systems, transmission system operators shall explain the technical and economic reasons for approving or rejecting individual projects and aim at eliminating system congestions.

All market participants shall make available within an appropriate period of time to the transmission system operator, upon its written request, any data necessary for drawing up the network development plan, including but not limited to fundamental data, consumption forecasts, changes in the system configuration, meter readings and technical and other project documents on systems planned to be constructed, expanded, altered or operated. In addition to such data, the transmission system operator may draw on other data such as are useful for the network development plan. "[16]

The network development plan needs the approval of the regulatory authority.[17]

Undertaking of investment projects

The transmission system operator concerned can be forced by the regulatory authority to undertake any investment included in the approved network development plan. For details, we refer to Section 2.1.1. regarding in particular the respective powers of the regulatory authority.[18]

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15 Section 5 Austrian Electricity Act.
16 Section 37 (2)-(7) Austrian Electricity Act.
17 Section 38 Austrian Electricity Act.
18 Section 39 Austrian Electricity Act.

According to Section 38 (4) of the Natural Electricity Act, any appropriate expenses associated with the realisation of measures included in the network development plan shall be included in the allowed costs when setting the system charges. Thus, the transmission system operator has security as to the remuneration of such investments.

Confirmation of any specific duties aimed at encouraging innovation

Other than the general obligation and duty of transmission system operators to operate the transmission system in an efficient and effective way, no specific duties aimed at encouraging innovation are in place for electricity transmission system operators.

2.1.3. Mechanism for financing of investment projects

Investment projects of TSOs are financed through network tariffs. The network tariffs are set by the regulatory authority on the basis of the allowed costs established by the regulatory authority in accordance with the following rules:

Section 59 of the Austrian Electricity Act states as follows:

"*(1) The allowed costs from which the system charges are derived shall reflect actual costs and shall be determined for each grid level separately. Costs, which are reasonable in their origin and amount, shall be allowed. Due consideration shall be given to system security, security of supply that integrates quality criteria, market integration and energy efficiency. The allowed costs may be determined based on the average costs of a comparable, rationally operated enterprise. Appropriate allowances for investments shall be made, based on the historical cost and cost of capital involved. Extraordinary expenditure or revenues may be spread over several years. The costs arising from the efficient implementation of new technologies shall be included in the system charges appropriately, while respecting the principles described and exploiting synergies. International transactions and contracts for the transport of energy pursuant to section 113 para. 1 shall be considered when establishing the allowed cost;*

(2) To establish the allowed cost, targets relative to the companies' efficiency potential shall be set. The costs identified shall be adjusted for general targets that reflect the overall productivity trend and for the system operator inflation rate. Individual targets may be set based on the efficiency of each system operator. […] The targets shall incentivise transmission and distribution system operators to increase efficiency and execute the necessary investments in an appropriate manner.

Section 60 of the Austrian Electricity Act states as follows:

"(1) The cost of capital shall comprise the reasonable cost of interest on debt and equity, taking capital market conditions and income tax expense into account; […]

(2) The cost of capital shall be determined by multiplying the reasonable rate of return by the regulatory asset base; […]

(3) The rate of return shall be derived from the weighted average cost of capital for a normal capital structure and the income tax burden. […] A market risk premium for equity and debt, the capital market conditions and a risk-free interest rate shall be considered. The latter may be derived from a multi-year average.

There is only one type of financing mechanism in place. As described earlier all reasonable costs plus a reasonable return are considered in the calculation of the tariffs to be paid by network users.

In the network development plan all kind of reinvestments and new investments are assessed by the transmission system operators after consultation with market participants and approved by the regulatory authority.

2.1.4. Regulatory rules with respect to innovation

There are no explicit features in place on the transmission level designed to incentivise investment in innovation or innovative projects other than the provision in Section 59 (1) of the Austrian Electricity Act which provides, that costs, arising from the efficient implementation of

new technologies, shall be included in the system charges appropriately, while respecting the principles described and exploiting synergies.

Specific duties of the NRA aimed at encouraging innovation

Proof of the costs calculated by transmission system operators are to be furnished to the regulatory authority and substantiated by providing all underlying documentation. These costs must be reasonable, transparent and correspond to those of an efficient and structurally comparable system operator. The regulatory authority usually checks these requirements in detail in the approval procedure.

According to Section 59 (1) of the Austrian Electricity Act, costs arising from the efficient implementation of new technologies shall be included in the system charges appropriately, while respecting the principles described and exploiting synergies. When setting individual targets, both an overall company assessment and, where factual comparability is given, an assessment of individual processes is admissible for the regulatory authority in accordance with Section 59 (2) of the Austrian Electricity Act. This gives the regulatory authority the power to set targets regarding innovation since under law the targets shall incentivise transmission and distribution system operators to increase efficiency and execute the necessary investments in an appropriate manner.

However, there are no explicit powers and duties of the NRA aimed at encouraging innovation other than by reference to efficiency and the above referred to provision in respect of costs.

2.1.5. Regulatory rules with respect to security of supply

Specific duties of the TSO aimed at safeguarding security of supply

Transmission system operators are obliged *inter alia* to set up and maintain a suitable system infrastructure to ensure domestic electricity supply or the performance of obligations under public international law and to participate in measures designed to eliminate congestion and in measures designed to ensure security of supply.[19]

In emergency situations, according to the Energy Intervention Powers Act 2012[20] the competent minister may enact by order intervention measures to safeguard supplies of electricity in order to: 1. avert imminent or overcome actual disruptions of Austrian energy supplies insofar as these: a) do not represent seasonal shortages; and b) cannot be averted or overcome at all, in a timely manner or at reasonable cost by means of market-based measures; or 2. take emergency measures pursuant to decisions by the governing bodies of international organisations where this is necessary to fulfil obligations under international law.[21]

Such orders may also be directed to transmission system operators who would have to adhere to these orders.

Specific duties of the NRA aimed at safeguarding security of supply

E-Control has the duty of preparation and coordination of the measures to be taken in case of emergency situations in accordance with Section 27 of the Energy Intervention Powers Act 2012. This includes involvement in drafting a preventive action plan and an emergency plan and the risk assessment and monitoring of electricity supply security. E-Control is empowered to require by order the reporting of historical, current and projected data at periodic intervals. The results of the monitoring activities may be used for long-term planning and the preparation of a report on the findings of its monitoring of supply security. E-Control may require drills every two years under the assumption of a crisis situation.

Key to the safeguarding of security of supply is the right of E-Control to request changes to the network development plan of the transmission system operators, to enforce the execution of any project included therein and to approve the appropriate costs and rate of return according to the cost calculation and tariff mechanism laid down in the Austrian Electricity Act (see in detail Section 2.1.3 above).

[19] Section 5 Austrian Electricity Act.
[20] FLG I nr 41/2013.
[21] Sections 14ff Energy Intervention Powers Act 2012.

2.2. Regulatory practice

2.2.1. Overview over regulatory practice in Austria

Main regulatory barriers

Interviewees from both the TSO as well as the NRA were generally satisfied with the NRF in Austria and regard the current incentives as mostly adequate and sufficient:

- The Austrian regulatory regime for Electricity TSOs can be characterised as kind of a cost+-system with a 1-year regulatory period. Within the system CAPEX are ex ante approved (approval of planned values with ex-post adjustment with actual values) whereas OPEX are approved based on historical values (previous year). Additionally, OPEX will be adjusted according to an individual productivity factor, derived from the European benchmarking study;
- According to the interviewees, the annual adjustment and the cost+-system allow quick reactions to changes and cover reasonable cost.

As no major complaints were mentioned by the interviewees, the current regulatory system seems to set sufficient incentives for investments in innovation and security of supply.

This does not preclude that the following potential issue might become relevant in the future:

- Some interviewees see a rising number of projects emerging in the field of markets (e.g. control reserve, NC/GL implementation, bidding zone review) that are generating effort needs as well as creating new tasks. Both increase OPEX (mainly for additional personnel) but the NRF does not incentivise activities increasing OPEX.

Possible improvement of the NRF

Taking into account the above-mentioned possible improvement needs, the following improvements to the NRF could be worth considering in the future:

- Find a way to stimulate participation in fields of activity with high OPEX ratios, provided that quantifiable (socio)-economic benefit is proven.

2.2.2. Regulatory practice related to innovation

Innovative projects

In the NRF, there is no definition or mentioning of innovation other than in Section 59(1) of the Austrian Electricity Act (see Section 2.1.4 second paragraph above). The interviewees state that innovation is incentivised as long as a reasonable relationship between monetary expenditure and economic/technical benefits exists. This reasonable relationship is necessary with respect to efficiency.

Examples of 'innovative' projects, which are being conducted or planned, encompass:

- Phase-shifting transformers;
- Overhead line material with higher current carrying capacity;
- Thermal rating of overhead lines.

According to the interviewees, the annual adjustment and the cost+-system allow quick reactions to change and cover reasonable cost, so there are no major complaints about the approval of cost for innovative technologies. This underlines the adequacy of the current regime.

Adequacy of the NRF relating to its support for innovative investments

The provisions in the regulation explicitly facilitating innovation mentioned above require that costs incurred have to comply with the overall requirements for the approval of costs. The NRF is neutral regarding project categories, such as innovative or conventional, PCI or non-PCI. This is because due to the scientifically well-founded informational asymmetry between a TSO and the regulatory authority, the TSO knows best which technology to use in order to minimise costs. The regulation should ensure that the TSO operates effective and efficient. So, as long as project costs are reasonable, and the necessity and the benefit can be demonstrated, an investment will be approved by the NRA. Interviewees from both TSO and NRA have not mentioned any major barriers or indicated any improvement needs.

2.2.3. Regulatory practice related to security of supply

Security of supply projects

The interviewees see security of supply on a system level and remarked that basically any investment supports the continuity of security of supply.

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

Generally, the NRF is considered adequate in supporting security of supply investments. Still, a bias for CAPEX was remarked by the interviewees (see above) that might set lesser incentives for investments with high OPEX shares, such as IT-tools benefitting security of supply by improved real time system operation. At the same time, interviewees underline that necessary investments have always been made irrespectively of their regulatory treatment. However, this underlines the general adequacy of the current regime.

2.2.4. Illustrative specific projects

"The projects described in the APG Network Development Plan 2017 include:

- New transmission line projects extending over approx. 220 km;
- Conversion of 100 km of transmission lines to a higher voltage level;
- Reinforcement and reconstruction of 400 km of existing transmission lines;
- Construction and expansion of numerous substations with approximately 140 switchbays at voltage levels of 380/220/110 kV;
- Construction of approximately 30 transformers with a total capacity of approx. 10,500 MVA;
- Extensive line coordination and optimisation measures are being implemented within the framework of major projects, e.g. the 380-kV Salzburg line (construction of new lines over approximately 128 km), leading to the removal of approx. 400 km old, low-capacity lines;
- Furthermore, extensive reinforcement measures of substations and lines are planned."[22]

In the following, we describe few PCI and TYNDP projects more detailed that are examples of successful innovative or security of supply projects and hence illustrate how the regulatory regime works in practice.

"380 kV Ring" – security of supply project[23]

This project reinforces the interconnection capacity between Austria and Germany. The national investments comprised are a precondition to achieve the full benefit of the cross-border investments and are vital for the Austrian security of supply (e.g. part of the Austrian 380-kV-Security Ring). It supports the interaction of RES in Northern Europe (mainly in Germany) and in the eastern part of Austria with the pump storages in the Austrian Alps and therewith facilitates their utilisation.

The project consists of four investments which together ensure a homogenous distribution of the reinforcement benefits on the Austrian – German border and the transmission of RES from Northern Europe (mainly in Germany) to the DE-AT border and its adequate connection of the hydro storage power plants in the west of Austria.

The PCI 3.1.1 / investment 212 ensures the transmission of high RES amounts mainly coming from the northern parts of Germany to the DE-AT border and therefore helps to strengthen the connection capacity at the DE-AT border to ensure the connection to the hydro power plants in Austria. The permitting process on Austrian side of the project is already completed. The coordinated start of the construction phase is planned as soon as the permitting process in Germany is completed.

The PCI 3.1.2 / investment 216 is part of the Austrian 380-kV ring and therefore a major basis for a secure and efficient connection of existing generation and demand areas as well as a prerequisite for further connection of hydro storage power plants in the west/south part of Austria as well as for realization of further powerful interconnectors. The permitting process is currently ongoing in the second level of jurisdiction.

[22] See APG web-site: https://www.apg.at/en/grid/grid%20expansion/Netzentwicklungsplan.
[23] Source: current TNDP https://www.entsoe.eu/publications/tyndp/tyndp.

PCI 3.1.1 and 3.1.2 are complemented by investment items 689 "Vöhringen (DE) – Westtirol (AT)" and 219 "Westtirol – Zell/Ziller". These projects will also increase the cross-border transmission capacity between Germany and Austria.

Compared to a separate assessment of these projects, additional benefits of the common cluster can be identified.

For this border, no specific capacity analysis has been done in TYNDP16. According to the CBA results of the latest project on this border (P198), the benefit SEW provided by a standard 1 GW capacity increase can be assessed between 20M€ and 50M€ in the 2030 visions except in Vision 2 where it is lower.

The project was not treated differently (regulatory/financial) from other regulated investments and the approval process according to the NDP is said to perform well. Project delay is mainly caused by a difficult permitting process. Currently the Austrian government discusses a new concept for smoother permitting processes for large infrastructure projects. The outcome could facilitate future permitting processes.

Further TYNDP projects:
1. Salzburg-line (St.Peter - Tauern):
   a. Innovation: GIS stations in St. Peter, Pongau and specially designed poles;
   b. Security of supply: gap closure 380kV ring, connection of generation (RES, pumped storage) to the transmission system, increase of operational safety.
2. Reschenpass-line:
   a. Innovation: 220kV-undergroundcable, GIS stations, phaseshifter transformer;
   b. Security of supply: increase of cross border capacity to Italy.
3. Technical upgrades of lines Westtirol – Zell/Ziller and Lienz – Obersielach:
   a. Innovation: special conductors and conductor coating;
   b. Security of supply: due to the voltage increase growth of transmission capacity and n-1-security.

Further projects:
4. General refurbishments / replacement of lines and stations including innovative solutions in existing assets:
   a. Innovation:
      - Usage of high temperature low sag conductors (Ernsthofen-Weißenbach, Malta-Lienz);
      - Thermal Rating (Dynamic Rating) (Dürnrohr-CZ, St Peter-DE).
   b. Security of supply:
      - Increase of transmission capacity;
      - increase of operational safety.

Any of the above listed TYNDP and further projects were approved within the regular regulatory regime and no exemptions were needed.

2.3. Options for improvement

2.3.1. Options to improve regulatory practice

The above discussion shows that the NRF is well-designed and functional for both security of supply and innovative projects. Interviewees from both the TSO as well as the NRA were generally satisfied with the NRF in Austria and regard the current incentives as mostly adequate and sufficient. The interviewees underlined that the annual adjustment and the cost+-system allow quick reactions to change and cover all reasonable cost.

A little concern that might become relevant in the future is related to the sentiment that projects resulting in increased OPEX but having wider societal benefits are not as strongly incentivized as CAPEX-based solutions. Therefore, we regard the following improvement options being worth to be considered if deemed necessary:

(i) Incentives for specific OPEX-based solutions

Generally, the NRF is considered adequate in supporting investments in security of supply and innovative technologies. Currently, there are no indications that the implementation practices provide inadequate incentives to ensure security of supply. Also, a number of innovative

technologies are being frequently used in recent projects. However, respondents point out there might be a bias towards CAPEX-solutions. If this bias develops a significant distortion for the choice of solutions that becomes economically relevant, specific incentives could be introduced for these kinds of OPEX-based solutions, which have been identified as advantageous or necessary. It should however be noted that a possible existing bias towards CAPEX must not automatically be counteracted by monetary incentives for OPEX as this will probably lead to other distortions. Therefore, non-monetary incentives should be favoured.

(ii) Statutory requirement to consider alternatives

If deemed necessary, a more general approach to foster OPEX-based solutions in the long-term, i.e. beyond a single regulatory period, would be the introduction of an obligation to consider OPEX-related innovative options in the network development plan. The TSO would then have to provide OPEX-based options as alternatives to CAPEX-based projects outlined in the network development plan in order to generate knowledge about different options to consider. This approach necessitates that a framework is developed determining when OPEX-based solutions should be favoured over CAPEX-based solutions. This could be achieved, inter alia, by ex-ante cost benefit analyses. This approach could be coupled with specific incentives (like option (i)) for the TSO to invest in OPEX solutions to counteract the CAPEX bias.

(iii) Statutory reference to innovation

There are no statutory powers or duties aiming at encouraging innovation. However, as all stakeholders consider the current NRF adequate in supporting investments in innovative technologies, no immediate improvements seem to be necessary. Nevertheless, it should be ensured that innovative projects are still encouraged and supported in the next regulatory period. This long-term strategic perspective could be shaped by governmental policies, statutory duties or could be included in the TYNDP.

2.3.2. National law mechanism(s) for implementing options

We consider that, with the exception of the following, the above-mentioned changes could be implemented using legal powers already available to the NRA or others under the existing NRF.

As regards option (ii) (statutory authorisation to consider alternatives), we understand that the legal mechanism for implementing this option would involve the modification of Section 37 of the Austrian Electricity Act, which provides detailed requirements of the content of the TYNDP, and of Section 59 of the Austrian Electricity Act in governing the approval of costs of a TSO.

Turning to option (iii) (statutory reference to innovation), we expect that this could be implemented by including such an obligation in Section 37 of the Austrian Electricity Act, which governs the content of the TYNDP, and by including such an obligation in Section 38 of the Austrian Electricity Act respectively.[24]

[24] New legislation can be initiated by Government bill by the federal government or motions by members of the Parliament (either as an initiative motion or as a motion of a committee), or legislative proposals by the Federal Council or one third of the Federal Council, or legislative proposals by citizens (petitions for a referendum). The content of each legislative proposal must be a proposal for the enactment of a specific law. Some federal laws stipulate that the proposed law must be evaluated by certain institutions before it is submitted to the Parliament. As a rule, however, most legislative proposals are sent for review, although this is not required by law. At the end of the evaluation period, the content of the proposed law is either amended or retained - depending on the outcome of the evaluation procedure - and submitted to the Parliament. The procedure in the Parliament is divided into three readings and one committee meeting. The third reading includes the vote on the law. In principle, the third reading takes place after the second reading, unless the Parliament decides otherwise. If the bill receives the required majority, the Parliament passes a bill. At least one third of the members must be present to vote in the Parliament, and a simple majority of the votes cast is enough to pass a bill. If the vote concerns a constitutional law, at least half of the members must be present, and a two-thirds majority must approve the proposed law. After a vote in the Parliament, the bill must be submitted to the Federal Council without delay. The Federal Council may decide not to object, or allow the opposition period to elapse, or lodge a reasoned objection. If the Federal Council has raised an objection, the bill must be returned to the Parliament. However, the Parliament can vote again on the same legislative resolution (insistence resolution), which requires the presence of half of the members of the Parliament. In some cases, the Federal Council has no right to participate at all, for example with regard to the Rules of Procedure of the Parliament. The Federal President shall certify that the Federal Act has come into being in accordance with the Constitution. The Prime Minister submits the Federal Act for certification. The Federal President certifies the Federal Act. After certification by the Federal President, the Prime Minister countersigns. The Federal Acts shall be published by the Prime Minister in the Federal Law

2.3.3. Impact assessment

Option (i) is not easy to be implemented well-balanced. The option has the risk to turn out to be a technology-specific incentive that does not necessarily lead to efficient decisions and may even encourage abuse. Also, innovative and socially beneficial OPEX solutions to be favoured by the regulation need to be defined. Such projects would need to be redefined for each regulatory period, possibly in cooperation with the TSO and maybe including a stakeholder consultation in order to ensure technology neutrality. Therefore, depending on the specific implementation the effort for the NRA and the TSO can be high. Additionally, adequate incentives for efficiency must be set to avoid unintended cost increase.

The long-term strategic perspective on innovation mentioned in option (iii) necessitates efforts and coordination between the TSO and the NRA regarding the design of this long-term perspective (e.g. the organisation of stakeholder consultations, determining the scope of the innovation needed, monitoring and evaluating of how the statutory duty is translated into the long-term perspective).

We have not encountered any specific examples of projects that have been cancelled due to the regulatory framework. For this reason, we do not expect that any of the suggested changes will result in considerable changes to investment levels. Yet, if the perceived risk of innovative projects is lowered and a long-term strategic perspective on innovation could be attained, the share of innovative projects is expected to increase. Moreover, if implemented well, options (i) and (ii) could result in a shift from primarily CAPEX investments to more OPEX investments.

Gazette. Unless expressly provided otherwise, they shall enter into force at the end of the day of their promulgation and shall apply to the entire territory of the Federal Republic.

3. GAS

3.1. Legal analysis of the NRF in Austria

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

The Austrian Natural Gas Act 2011[25] is the principal piece of primary legislation governing the Legal Framework for gas in Austria together with the Federal Act on the Regulatory Authority for Electricity and Natural Gas, (E-Control Act) [26], which specifically govern the organisation, objectives and tasks of the regulatory authority for electricity and gas, E- Control. In discharging regulatory tasks, the national regulator, E-Control shall take any and all appropriate measures to attain inter alia the following objectives:

- Promoting a competitive, secure and environmentally sustainable internal market in natural gas within the European Community, and ensuring appropriate conditions for the effective and reliable operation of electricity and gas networks, taking into account long-term objectives;[27] developing appropriate cross-border transmission capacities to meet demand and enhancing the integration of national markets which may facilitate natural gas flows across the European Community;[28] helping to achieve, in the most cost-effective way, the development of secure, reliable and efficient non-discriminatory systems that are consumer oriented, and promoting system adequacy and, in line with general energy policy objectives, energy efficiency as well as the integration of large and small-scale production of electricity and gas from renewable energy sources and distributed generation in both transmission and distribution networks;[29] ensuring that system operators and system users are granted appropriate incentives, in both the short and the long term, to increase efficiencies in system performance and foster market integration;[30]
- Carrying out the function of a gas transmission system operator requires, as well as certification under the ownership unbundling rules, a licence to be granted by the regulatory authority. The licence is to be granted, provided i.a. that the applicant can be expected to be in a position to perform the function of transporting natural gas through a system and undertakes the responsibility for operation, maintenance and, where necessary, expansion of the system.[31] In the event that a transmission system operator fails to carry out its duties under the Natural Gas Act, the regulatory authority shall order it to remove the obstacles in question within a reasonable period;[32]
- To achieve efficient network access as well as harmonised rules for all market participants and to attain the aims of the Natural Gas Act, which includes the creation of the infrastructure necessary to ensure the secure gas supply of the member states of the Union the regulatory authority[33], may, heeding i.a. the requirement of safe and reliable system operation, issue ordinances with separate rules for each market area, respecting the network codes adopted in accordance with Article 6 of Regulation (EC) No 715/2009 and the guidelines pursuant to Article 23 of Regulation (EC) No 715/2009;[34]
- Transmission, transmission system and transmission system operator are defined in Section 7 (1) of the Natural Gas Act as follows:

"18. "transmission" means the transport of natural gas through a network which mainly contains high-pressure pipelines, other than an upstream pipeline network and other than the part of high pressure pipelines primarily used in the context of local distribution of natural gas, with a view to its delivery to customers, but not including supply;

19. "transmission line" means a natural gas line for the purpose of transmission;

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25 Austrian Federal Law Gazette (FLG) I no 107/2011 as amended.
26 FLG I no 110/2010 as amended.
27 Section 4 1. E-Control Act.
28 Section 4 3. E-Control Act.
29 Section 4 4. E-Control Act.
30 Section 4 6. E-Control Act.
31 Sections 43ff Natural Gas Act.
32 Section 57 Natural Gas Act, Section 24 (2) E-Control Act.
33 Section 4 Natural Gas Act.
34 Section 41 Natural Gas Act.

> *20. "transmission system operator" means a natural or legal person or a registered partnership that carries out the function of transmission and is responsible for operating, ensuring the maintenance of, and, if necessary, developing the transmission network in a given area and, where applicable, its interconnections with other networks, and for ensuring the long-term ability of the system to meet reasonable demands for the transport of gas".*

The distinction between transmission and distribution pipelines is not the operating pressure or dimension of the pipelines but the purpose. A transmission pipeline is not used for the local distribution of gas to end-consumers. Since the distinction might be difficult in specific cases, the transmission pipelines are listed in Annex 2 to the Natural Gas Act.

Austria is divided in three market areas which pipeline networks are not physically connected to each other. Market area east comprises seven provinces; market area Tyrol comprises the gas network in the province of Tyrol and the market area Vorarlberg comprises the gas network in the province Vorarlberg. Transmission pipelines used in part for the domestic Austrian market but mainly for the transit of natural gas through Austria in multiple directions between Slovakia, Hungary, Slovenia, Italy and Germany exist only in the market area east. The transmission systems are operated by two transmission system operators: Gas Connect Austria GmbH (GCA) and Trans Austria Gasleitung GmbH (TAG).

On transmission level, the Natural Gas Act foresees that certain coordinating and operative functions are provided by special system operators as one stop shop. These are the market area manager[35] (AGGM Austrian Gas Grid Managing AG-AGGM) and the operator of the virtual trading hub[36] (Central European Gas Hub GmbH-CEGH).

3.1.2. Specific legal rights and duties

Transmission system operators have some generally worded obligations in respect of the maintenance of security of supply including the obligation to set up and maintain gas infrastructure that is suitable for domestic natural gas supply, to create the infrastructure necessary to ensure the secure gas supply of the member states of the Union and to strive to render their services in a safe, environmentally sound and efficient manner, at reasonable cost, and in line with the principles of a competitive natural gas market[37]. As per the definition of "transmission system operator" an entity carrying out this function is responsible for operating, ensuring the maintenance of, and, if necessary, developing the transmission network in a given area and, where applicable, its interconnections with other networks, and for ensuring the long-term ability of the system to meet reasonable demands for the transmission of gas.[38]

Transmission system operators have *inter alia* the task and duty to operate, maintain **and expand as needed** the facilities operated by them safely, reliably and efficiently in accordance with the technical rules;[39] to expand capacity so as to cover demand in accordance with the approved long-term plan of the distribution system operator[40] and to establish each year a network development plan or collaborate in the establishment of the coordinated network development plan and to submit this plan to the regulatory authority, E-Control, for its approval.[41] On a regional level, transmission system operators are obliged to collaborate with other transmission system operators to establish a regional security of supply assessment and outlook[42] and to collaborate with other transmission system operators and exchange data with them to establish a regional network development plan.[43]

As to the development and content of the Network Development Plan, the Austrian Gas Act provides for specific obligations as follows:

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35 See definition of duties and responsibilities of the market area manager in Sections 12ff Natural Gas Act.
36 See definition of duties and responsibilities of the operator of the virtual trading point in Sections 68 Natural Gas Act.
37 Sections 4 and 5 Natural Gas Act.
38 Section 7 (1) 20 Natural Gas Act.
39 Section 62 (1) 1. Natural Gas Act.
40 Section 62 (1) 19. Natural Gas Act.
41 Section 62 (1) 20. Natural Gas Act.
42 Section 62 (1) 26. Natural Gas Act.
43 Section 62 (1) 27. Natural Gas Act.

"Section 63 Austrian Gas Act (excerpt):

(3) The network development plan shall in particular:
1. indicate to market participants the main infrastructure that needs to be built or expanded over the next ten years;
2. list all the investments already decided and identify new investments which have to be executed in the next ten years; and
3. provide for a time frame for all investment projects.

(4) The network development plan shall in particular have the aim of:
1. meeting the demand for pipeline capacity to supply consumers while considering emergency scenarios;
2. ensuring a high degree of availability of pipeline capacity (security of supply of the infrastructure);
3. covering transport needs; and
4. complying with the obligation to meet the infrastructure standard according to Article 6 of Regulation (EU) No 994/2010 in the market area.

(5) When elaborating the network development plan, reasonable assumptions about the evolution of production, supply, consumption and exchanges with other countries shall be made, taking into account investment plans for regional networks pursuant to Article 1(1) of Regulation (EC) No 715/2009 and Union-wide networks pursuant to Article 8(3)(b) of Regulation (EC) No 715/2009, as well as investment plans for storage and LNG regasification facilities. The network development plan shall contain efficient measures to guarantee the adequacy of the system and ensure a high degree of availability of capacity (security of supply of the infrastructure).

(6) In drawing up the network development plan, technical and economic expediency, the interests of all market participants and consistency with the Union-wide network development.

The Network Development Plan needs the approval of the regulatory authority.[44] Prior to submitting the network development plan for approval, the market area manager shall consult such plan with all relevant market participants and publish the results of the consultation.

Undertaking of investments

According to Section 64 of the Austrian Gas Act, the regulatory authority approves the network development plan by official decision. Such approval may be granted subject to additional stipulations and conditions to the extent that such is necessary for meeting the objectives of the Natural Gas Act. In particular, the regulatory authority shall verify whether the network development plan covers the investment needs identified in the consultation to their full extent, whether the network development plan is consistent with the Union-wide network development plan pursuant to Article 8(3)(b) of Regulation (EC) No 715/2009 and whether the measures contained in the network development plan appear to be suitable to fulfil the conditions listed in Section 63 paras 3 to 6 Austrian Gas Act (see above). The regulatory authority may request the transmission system operator to adjust its network development plan at any time if such plan has already been submitted but not yet approved. Requests for adjustments to the latest approved network development plan are admissible if significant changes in the underlying situation cause the need for a reassessment.

This ensures that the NRA controls the investment planning of the transmission system operators. The NRA can also enforce the fulfilment of the investment plan:

In circumstances where a transmission system operator, other than for overriding reasons beyond its control, does not execute an investment which, under the network development plan, was to be executed during the next three years, the regulatory authority shall take at least one of the following measures to ensure that the investment in question is made if such investment is still relevant on the basis of the most recent network development plan: 1. require the transmission system operator to execute the investment in question; 2. initiate a tender procedure open to any investors for the investment in question; the regulatory authority

[44] Section 64 Austrian Gas Act.

may entrust a third party with carrying out the tender procedure; 3. oblige the transmission system operator to accept a capital increase to finance the necessary investments and allow independent investors to participate in the capital.[45]

The adequate costs of the investments in question shall be included in the calculation of the tariffs to be set by the NRA on the transmission level.[46]

3.1.3. Mechanism for financing of investment projects

Investment projects of transmission system operators are financed via the cost approved and the tariffs set by the NRA. Transmission-level system utilisation charges are set separately to reflect the contracted capacity per entry/exit point in the market area's transmission network on the one hand and that per internal interconnection point into the distribution network on the other; the former charge is payable by injecting/withdrawing parties, the latter by the distribution area manager. These rates for transmission system operators are calculated, applying a methodology, which is subject to approval by the regulatory authority by official decision and must comply with the requisites of Article 13 of Regulation (EC) No 715/2009. The regulatory authority's official decision shall also state the cost and volume to be used in calculating the rates. Transmission system operators shall be incentivised to increase efficiency and execute the necessary investments in an appropriate manner.[47]

Costs of investments are taken into account by calculating the cost of capital comprising the reasonable cost of interest on debt and equity, taking capital market conditions and income tax expense into account multiplied by the regulatory asset base. A rate of return shall be derived from the weighted average cost of capital for a normal capital structure and the income tax burden. The normal capital structure reflects overall industry aspects as well as significant factors for individual companies, which undercut the equity capital share by more than 10%. A market risk premium for equity and debt, the capital market conditions and a risk-free interest rate is also taken into account. The regulatory asset base is established drawing on the balance sheet of the transmission system operator.[48] Amendments by the Regulatory Authority are necessary according to the implemented methodology.

In detail, the cost establishment and rate calculation are laid down in a method established by each transmission system operator and approved by the NRA according to Section 82 of the Natural Gas Act.[49] The method applies for a four-year regulatory period. The method takes account of the capacity investments planned for the next four years, which are covered, by the approved coordinated network development plan. After four years, the regulatory authority checks for deviations between planned investments and investments that were actually carried out in the previous period. Any such deviations in terms of capital costs are revised and taken into consideration when recalculating the costs.

According to Section 82 para. 1 in conjunction with Section 80 para. 3 of the Natural Gas Act, the reasonable rate of return for calculating the cost of capital is derived from the weighted average cost of capital (WACC) for a normal capital structure and the income tax burden. A ratio of 40 to 60 between equity and debt is considered a normal capital structure. The normal capital structure must reflect overall industry aspects as well as significant factors of individual companies, which undercut the equity or debt capital shares by more than 10%. The capital structure applied is derived from the book values and must be substantiated by the transmission system operator.

Different interest rates are applied to the equity and to the debt share of capital.

The method guarantees earnings above costs for the transmission system operator in an ongoing manner only if the transmission system operator makes investments. Operating costs are not taken into account to determine the rate of return of the transmission system operator. This is an incentive for the transmission system operator to make the appropriate investments.

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45 Section 65 Austrian Gas Act.
46 Section 64 (4) and Section 65 (5) Austrian Gas Act.
47 Section 82 Natural Gas Act.
48 Section 80 Natural Gas Act.
49 See latest methods published in anonymous form on the web-site of E-Control (German) https://www.e-control.at/documents/20903/388512/Methode+2017-2020+Fernleitungsnetzbetreiber+Gas_TSO_20161212.pdf/e5fa1729-efc0-ab06-06a3-2dd7088ed7c8 ("Method").

In addition, in the currently applicable approved method for the calculation of the costs of the transmission system operators for the regulatory period from 2017 to 2020 explicitly as incentive for future investments a mark-up on the equity capital interest of 0.8 percentage points was introduced.[50]

The costs resulting from the application of such methods are finally checked against the average of published transmission charges for comparable transmission services through comparable pipeline systems in the European Union and approved if they do not significantly exceed this average. This should guarantee that the transmission system operator works as efficiently as other European gas transmission businesses taken together.

3.1.4. Regulatory rules with respect to innovation

Specific duties of the TSO aimed at encouraging innovation

Other than the general obligation and duty of transmission system operators to operate the transmission system in an efficient and effective way and to comply with the construction and operation licences issued for the transmission lines, no specific duties aimed at encouraging innovation are in place for gas transmission system operators.

Specific duties of the NRA aimed at encouraging innovation

Proof of the costs calculated by the transmission system operators by applying the approved methods are to be furnished to the regulatory authority and substantiated by providing all underlying documentation.[51] These costs must be reasonable, transparent and correspond to those of an efficient and structurally comparable system operator. The regulatory authority usually checks these requirements in detail in the approval procedure.

However, there are no explicit powers and duties of the NRA aimed at encouraging innovation other than by reference to efficiency.

3.1.5. Regulatory rules with respect to security of supply

Specific duties of the NRA aiming at safeguarding security of supply

E-Control, the Austrian NRA, is the body executing all the powers and duties assigned to the NRA in the directly applicable Regulation (EU) 2017/1938 of 25 October 2017 concerning measures to safeguard the security of gas supply.

In addition, E-Control has the duty of preparation and coordination of the measures to be taken in case of emergency situations in accordance with Section 27 of the Energy Intervention Powers Act 2012. This includes involvement in drafting a preventive action plan and an emergency plan and the risk assessment and monitoring of gas supply security. E-Control is empowered to require by order the reporting of historical, current and projected data at periodic intervals. The results of the monitoring activities under subsection 2 may be used for long-term planning and the preparation of a report on the findings of its monitoring of supply security under Section 28(3) of the E-Control Act. E-Control may require drills every two years under the assumption of a crisis situation.

Key to the safeguarding of security of supply is the right of E-Control to request changes to the network development plan of the transmission system operators, to enforce the execution of any project included therein (see Section 3.1.2.) and to approve the appropriate costs and rate of return according to the general guidelines of the Austrian Gas Act and the approved methods for the calculation of the costs of the transmission system operators (see Section 3.1.33.1.3 above).

Specific duties of the Ministry aiming at safeguarding security of supply

In emergency situations, according to the Energy Intervention Powers Act 2012[52] the competent minister may enact by order intervention measures to safeguard supplies of natural gas in order

[50] Method, Article II.4.
[51] Section 82 Austrian Gas Act.
[52] FLG I nr 41/2013.

to: 1. avert imminent or overcome actual disruptions of Austrian energy supplies insofar as these: a) do not represent seasonal shortages; and b) cannot be averted or overcome at all, in a timely manner or at reasonable cost by means of market-based measures; or 2. take emergency measures pursuant to decisions by the governing bodies of international organisations where this is necessary to fulfil obligations under international law.[53]

Such orders may be directed to transmission system operators who would have to adhere to these orders.

3.1.6. Institutional or procedural constraints on the performance of the TSO's role

As mentioned above under the Austrian Gas Act transmission system operators have the right under law that the acceptable costs incurred for projects included in an approved coordinated development plan are reimbursed. This does not leave much opportunity for the regulatory authority to intervene when assessing the costs of the transmission system operator during the cost evaluation and tariffing process. It should however be noted that the costs in the network development plan are reviewed in great detail before being approved by the regulatory authority.

Thus, the focus of the transmission system operators and of the regulatory authority in respect of reinvestments and investments lies on the process of the development and approval of the coordinated network development plan.

Prior to issuing the related official decision, the regulatory authority shall consult on the network development plan with the organisations representing the interests of system users. The regulatory authority shall publish the results of the consultation, indicating any need for investments.[54]

According to Section 69 (2) and (3) of the Austrian Gas Act, the regulatory authority shall, either upon application of the transmission system operator or regularly ex officio, approve the methodologies submitted by the transmission system operator pursuant to Section 82 by official decision. Such approval shall be granted for a limited time. Prior to taking a final decision on the allowed cost, the Wirtschaftskammer Österreich (Federal Economic Chamber), the Landwirtschaftskammer Österreich (Federal Chamber of Agriculture), the Bundesarbeiterkammer (Federal Chamber of Labour) and the Österreichischer Gewerkschaftsbund (Austrian Trade Union Federation) have the opportunity to comment. The regulatory authority shall provide information to these bodies' representatives and allow them to inspect the relating documents. Any economically sensitive information of which the representatives obtain knowledge in exercising their right to inspection shall be treated confidentially. The Federal Economic Chamber and the Federal Chamber of Labour may appeal against the decisions of the regulatory authority with the Bundesverwaltungsgericht (Federal Administrative Court) if the stipulations regarding the establishment of the costs (Sections 73 to 82 of the Austrian Gas Act) have been violated, and in a next step to the Verwaltungsgerichtshof (Administrative Court of Appeal) pursuant to Section 133 of the Bundesverfassungsgesetz (Federal Constitutional Law).

This involvement of the representatives of the end consumers in practice is time consuming. On the other hand, it ensures the accountability of the regulatory authority for its decisions and the involvement and acceptance of the final decision by end consumers.

Even though the following issue does not have its source in the NRF, we will note it for the sake of completeness. The general planning of land use is a competence of the provinces. The Austrian Gas Act and the planning process under the coordinated development plan is a federal competence. There is missing a legal linkage between these two planning processes. Thus, energy infrastructure needs, in particular on transmission level are often not taken into account in the general planning at provincial level.

[53] Sections 26ff Energy Intervention Powers Act 2012.
[54] Section 64 (4) Austrian Gas Act.

3.2. Regulatory practice

3.2.1. Overview over regulatory practice in Austria

The Austrian regulatory regime for Gas TSOs can be characterised as a combined model of Revenue Cap (OPEX) and Rate-of-Return (CAPEX) with a 4-year regulatory period. This model guarantees earnings above costs for the TSO in an ongoing manner if the TSO makes investments. In the current regulatory period as incentive for future investments, a mark-up on the equity capital interest of 0.8 percentage points was introduced. Approved costs must be reasonable, transparent and are benchmarked for efficiency.

Main regulatory barriers

The interviewees were generally satisfied with the NRF regarding support of security of supply projects and regard the current incentives as mostly adequate and sufficient. In addition, the stakeholders state that the NRF is generally adequate to support the innovative projects (see 3.2.2 below). However, some interviewees claim the NRF not being able to support technologies enhancing the energy transition (PtG, green gas, sector coupling etc.). Also, some stakeholders see a certain risk of under-recovery of investments due to a capacity booking risk as the return of an investment is subject to possible decrease of a predefined capacity amount.

Possible improvement of the NRF

From the interviews, the consultants derived the following improvement options to the NRF that could be worth considering:

- Stronger incentives for innovations are considered important for the energy transition, e.g. related to the integration of gas with different qualities in the current system, such as biogas, green gas, hydrogen;
- Projects such as compressor improvements should not be subject to risk of capacity booking and a potential under-recovery should be reconciled on a regular basis, e.g. yearly.

It should however be noted that if implemented, consumers would have to pay for these incentives. Therefore, further monetarised benefits without ex ante cost benefit analyses are not expedient.

3.2.2. Regulatory practice related to innovation

Innovative projects and adequacy of the NRF relating to its support for these projects

In general, the interviewees note to do few projects they regard as being innovative, e.g. introduction of a capacity booking system of the physically not connected markets of Austria and Czech Republic, the corridor projects ROHUAT and HUSKAT or a waste heat recovery project. The interviewees have the opinion that the NRF is generally adequate to support these projects but also state that some of the projects have a particular case nature and were approved individually within the scope of the network development plan by the NRA after consultation of the relevant stakeholders. At the same time, some interviewees see improvement needs for the development of green gas projects and seek clearer definitions of the unbundling scope as well as clearer framework for intersectoral projects (gas/electricity) in the current NRF.

3.2.3. Regulatory practice related to security of supply

Security of supply projects and adequacy of the NRF relating to its support for these projects

The regulation regarding security of supply is seen as being adequate to generally guarantee sustainable continuity of security of supply. Especially looking at the large corridor projects interviewees make the remark that reliability and compliance with existing rules for gas transmission is an important step that should be taken before new rules are created.

3.2.4. Illustrative specific projects

We had only limited response from the stakeholders, so we can describe specific projects to a limited extent only. Nevertheless, the following project is an example of a successful security of supply project and hence illustrate how the regulatory regime works in practice.

Murfeld / TAG Reverse Flow (TRA-N-954 market integration/security of supply)[55]

The objective of the planning project TAG Reverse Flow is to create a reverse flow on the TAG pipeline system with three project variations:

1a Reverse Flow by upgrading existing entry DZK capacity to entry FZK capacity[56] at the IP Arnoldstein/Tarvisio and additionally by allowing potential entry FZK capacity at the IP Ceršak/Murfeld. Physical interconnection capacity via an exit from the TAG pipeline system to the Gas Connect Austria subsystem PVS-AZ1.

1b Reverse Flow by upgrading existing entry DZK capacity to entry FZK capacity at the IP Arnoldstein/Tarvisio. Physical interconnection between the TAG pipeline system to the Gas Connect Austria subsystem PVS-AZ1. Further, the project shall also enable a physical connection at the IP Baumgarten at the Austrian/Slovakian boarder by upgrading existing backhaul capacity

1c This variation of the project is a combination of project variation 1a and 1b.

The planning project was triggered by an obligation arising out of the decree of the Austrian regulatory authority, E-Control related to the Coordinated Network Development Plan 2016-2025, whereas a reverse flow of the TAG pipeline system shall be assessed by also taking into consideration potential entry FZK capacity at the IP Ceršak/Murfeld. As a consequence, TAG GmbH also assesses an upgrade of existing entry DZK capacity to entry FZK capacity at the IP Arnoldstein/Tarvisio and, correspondingly, an upgrade of existing backhaul capacity in its projects variations.

The project was not treated differently (regulatory/financial) from other regulated investments and the approval process according to the NDP is said to perform well.

3.3. Options for improvement

3.3.1. Options to improve regulatory practice

The above discussion shows that the NRF is well-designed and functional for both security of supply and innovative projects. Therefore, the regulatory framework in Austria generally appears to be well-targeted, adequate and sufficient with respect to incentives for innovation and security of supply. Nevertheless, some interviewees lack of a mandate for and seek stronger incentives for innovations considered important for the energy transition. However, it should be noted that monetarized incentives must not be in any case be expedient as they could harm customers and the business location of Austria.

(i) Statutory reference to innovation

There are no statutory powers or duties aiming at encouraging innovation. However, as all stakeholders consider the current NRF adequate in supporting investments in innovative technologies, no immediate improvements seem to be necessary. Nevertheless, it should be ensured that innovative projects are still encouraged and supported in the next regulatory period. Therefore, a statutory reference to innovation could be included into the regulatory framework. This would also reduce uncertainty regarding the mandate of implementing specific types of innovation. This long-term strategic perspective could be shaped by governmental policies, statutory duties or could be included in the TYNDP.

Some respondents have highlighted potential hurdles created by EU unbundling regime. Whether or not such hurdles are actually caused by the unbundling regime or not requires a careful analysis that falls outside the scope of this project. In the final report we point out that for some areas, a clarification of the boundaries of the activities that TSOs are allowed to undertake would be helpful. In other cases, the recently adopted Clean Energy Package (including e.g. the market test) provides a procedure to overcome such hurdles.

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[55] Source: current TNYDP Gas https://www.entsog.eu/publications/tyndp.

[56] Freely allocable Capacity (FZK);
“freely allocable capacity” means capacity that enables firm transports in the entire market area and gives access to the virtual trading point; Dynamically allocable Capacity (DZK);
“dynamically allocable capacity” means capacity that can only be offered on a firm basis in combination with certain entry/exit points and functions as interruptible capacity in combination with all other entry/exit points and the virtual trading point.

3.3.2. National law mechanism(s) for implementing options

As regards option (i) (statutory reference to innovation), we expect that this could be implemented by including such a requirement in Section 63 of the Austrian Gas Act in governing the content of the TYNDP and in Section 82 Austrian Gas Act in governing the principle guidelines for the development of the tariff methodology for the TSOs.[57]

3.3.3. Impact assessment

The long-term strategic perspective on innovation mentioned in option (i) necessitates efforts and coordination between the TSO and the NRA regarding the design of this long-term perspective (e.g. the organisation of stakeholder consultations, determining the scope of the innovation needed, monitoring and evaluating of how the statutory duty is translated into the long-term perspective).

We have not encountered any specific examples of projects that have been cancelled due to the regulatory framework. For this reason, we do not expect that any of the suggested changes will result in considerable changes to investment levels. Yet, if the perceived risk of innovative projects is lowered and a long-term strategic perspective on innovation could be attained, the share of innovative projects is expected to increase.

[57] New legislation can be initiated by Government bill by the federal government or motions by members of the Parliament (either as an initiative motion or as a motion of a committee), or legislative proposals by the Federal Council or one third of the Federal Council, or legislative proposals by citizens (petitions for a referendum). The content of each legislative proposal must be a proposal for the enactment of a specific law. Some federal laws stipulate that the proposed law must be evaluated by certain institutions before it is submitted to the Parliament. As a rule, however, most legislative proposals are sent for review, although this is not required by law. At the end of the evaluation period, the content of the proposed law is either amended or retained - depending on the outcome of the evaluation procedure - and submitted to the Parliament. The procedure in the Parliament is divided into three readings and one committee meeting. The third reading includes the vote on the law. In principle, the third reading takes place after the second reading, unless the Parliament decides otherwise. If the bill receives the required majority, the Parliament passes a bill. At least one third of the members must be present to vote in the Parliament, and a simple majority of the votes cast is enough to pass a bill. If the vote concerns a constitutional law, at least half of the members must be present, and a two-thirds majority must approve the proposed law. After a vote in the Parliament, the bill must be submitted to the Federal Council without delay. The Federal Council may decide not to object, or allow the opposition period to elapse, or lodge a reasoned objection. If the Federal Council has raised an objection, the bill must be returned to the Parliament. However, the Parliament can vote again on the same legislative resolution (insistence resolution), which requires the presence of half of the members of the Parliament. In some cases, the Federal Council has no right to participate at all, for example with regard to the Rules of Procedure of the Parliament. The Federal President shall certify that the Federal Act has come into being in accordance with the Constitution. The Prime Minister submits the Federal Act for certification. The Federal President certifies the Federal Act. After certification by the Federal President, the Prime Minister countersigns. The Federal Acts shall be published by the Prime Minister in the Federal Law Gazette. Unless expressly provided otherwise, they shall enter into force at the end of the day of their promulgation and shall apply to the entire territory of the Federal Republic.

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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