

# **Regulatory systems of EU Electricity Transmission System Operators need to be adapted to ensure that the massive grid transmission investment plans can be financed**

From: Working Group Economic Framework

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## ENTSO-E Mission Statement

### Who we are

ENTSO-E, the European Network of Transmission System Operators for Electricity, is the association for the cooperation of the European transmission system operators (TSOs). The 40 member TSOs, representing 36 countries, are responsible for the secure and coordinated operation of Europe's electricity system, the largest interconnected electrical grid in the world. In addition to its core, historical role in technical cooperation, ENTSO-E is also the common voice of TSOs.

ENTSO-E brings together the unique expertise of TSOs for the benefit of European citizens by keeping the lights on, enabling the energy transition, and promoting the completion and optimal functioning of the internal electricity market, including via the fulfilment of the mandates given to ENTSO-E based on EU legislation.

### Our mission

ENTSO-E and its members, as the European TSO community, fulfil a common mission: Ensuring the security of the inter-connected power system in all time frames at pan-European level and the optimal functioning and development of the European interconnected electricity markets, while enabling the integration of electricity generated from renewable energy sources and of emerging technologies.

### Our vision

ENTSO-E plays a central role in enabling Europe to become the first climate-neutral continent by 2050 by creating a system that is secure, sustainable and affordable, and that integrates the expected amount of renewable energy, thereby offering an essential contribution to the European Green Deal. This endeavour requires sector integration and close cooperation among all actors.

Europe is moving towards a sustainable, digitalised, integrated and electrified energy system with a combination of centralised and distributed resources. ENTSO-E acts to ensure that this energy system keeps consumers at its centre and is operated and developed with climate objectives and social welfare in mind.

ENTSO-E is committed to use its unique expertise and system-wide view – supported by a responsibility to maintain the system's security – to deliver a comprehensive roadmap of how a climate-neutral Europe looks.

### Our values

ENTSO-E acts in solidarity as a community of TSOs united by a shared responsibility.

As the professional association of independent and neutral regulated entities acting under a clear legal mandate, ENTSO-E serves the interests of society by optimising social welfare in its dimensions of safety, economy, environment, and performance.

ENTSO-E is committed to working with the highest technical rigour as well as developing sustainable and innovative responses to prepare for the future and overcoming the challenges of keeping the power system secure in a climate-neutral Europe. In all its activities, ENTSO-E acts with transparency and in a trustworthy dialogue with legislative and regulatory decision makers and stakeholders.

### Our contributions

ENTSO-E supports the cooperation among its members at European and regional levels. Over the past decades, TSOs have undertaken initiatives to increase their cooperation in network planning, operation and market integration, thereby successfully contributing to meeting EU climate and energy targets.

To carry out its legally mandated tasks, ENTSO-E's key responsibilities include the following:

- › Development and implementation of standards, network codes, platforms and tools to ensure secure system and market operation as well as integration of renewable energy;
- › Assessment of the adequacy of the system in different timeframes;
- › Coordination of the planning and development of infrastructures at the European level (Ten-Year Network Development Plans, TYNDPs);
- › Coordination of research, development and innovation activities of TSOs;
- › Development of platforms to enable the transparent sharing of data with market participants.

ENTSO-E supports its members in the implementation and monitoring of the agreed common rules.

ENTSO-E is the common voice of European TSOs and provides expert contributions and a constructive view to energy debates to support policymakers in making informed decisions.

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## INTRODUCTION

Since ENTSO-E published its papers on "European Electricity Transmission Grids and the Energy Transition: Why remuneration frameworks need to evolve" (2021)<sup>1</sup> and "Innovation Uptake through Regulation" (2022)<sup>2</sup>, several notable developments have prompted European TSOs to supplement these papers with new considerations.

The aftermath of the global Covid-19 pandemic and Russia's invasion of Ukraine have come at a high cost for EU consumers: energy prices peaked in 2022, while inflation rates have returned to a "normal" level of 2.6 % across Europe in March 2024. The developments have impacted TSO grid investments, as supply chains in turmoil increase the cost of grid components. Additionally, the skilled labor shortage causes significant delays in the delivery of TSOs investment projects. All these points put an extra strain on the financeability of the electricity transmission grid.

These challenges come at a time when TSOs' investments are accelerating – the industry having invested more than €10 billion in 2021. In 2022 the investments increased by approx. 50 % compared to the previous year. The Off-shore Network Development Plans (ONDP) published by ENTSO-E in January 2024, highlight an investment need for off-shore grid assets by 2050 of approximately € 400 billion alone.<sup>3</sup> In total, ENTSO-E communicates investments of at least 834 b€ into transmission grid by 2050.

The expected high scale investments will require additional capital (debt and equity) to avoid facing a financing gap which could result in the inability to make the necessary investments. Due to risk-free rates being fixed at artificially low levels in some TSOs' remunerations schemes, not all TSOs were able to build up additional equity or raise debt to the necessary scale and extent needed, in the last years.

In its recently published EU Action Plan for Grids, the European Commission came to the conclusion that "Transmission and distribution network tariffs should be regularly updated, with an efficient consideration of both OPEX and CAPEX, to account for the changing energy system towards decarbonization...". Under the perspectives outlined in the EU Action Plan for Grids, the EC 2040 climate target communication etc. - National Regulatory Authorities shall support TSOs by sending strong signals through their regulatory decisions.

To this end, ENTSO-E would like to share the following recommendations for a forward looking and sustainable regulatory model to facilitate growing TSO investments.

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<sup>1</sup> [LINK: ENTSO-E: European Electricity Transmission Grids and the Energy Transition \(entsoe.eu\)](#)

<sup>2</sup> [LINK: ENTSO-E Position Paper on Innovation uptake through Regulation \(entsoe.eu\)](#)

<sup>3</sup> [Offshore Network Development Plans \(entsoe.eu\)](#)

# FINANCING TSO GRID INVESTMENTS

## Context

**TSOs need to raise debt and equity at an unprecedented scale for the needed grid investments. Regulatory frameworks must provide adequate risk-return profiles to ensure that TSOs remain or become attractive to long-term investors and maintain investment-grade ratings.**

TSOs' large-scale investment plans that are necessary for the energy transition require broad, sustainable, and timely access to financial resources (both for equity and debt). This requires a stable yet forward-looking regulatory framework.

When rates-growth in financial markets is not promptly reflected in regulatory frameworks, it becomes difficult - if at all possible – for TSOs to raise the necessary financial resources on time and efficiently while maintaining credit ratings allowing favourable debt financing (and thus low costs for grid users).

With specific reference to equity, TSOs raise it either through the retention of profits or through a direct contribution by their respective shareholders (state, state owned companies, stock market). In either case, the equity remuneration must be sufficiently high both to remunerate existing shareholders but also to attract additional ones as needed. In 2023 a very first slight increase in average rate of returns could be observed, but the increase is far away from the extent of the decline visible between 2014-20224.

A TSO intending to invest for example 30 billion € in offshore assets<sup>5</sup>, would be required to raise 9 billion € of additional equity<sup>6</sup>. An analysis of TSOs financial data shows that injections of fresh equity on this scale have not been observed in recent years. Additionally, the competition for equity will become fiercer in the future since e.g. offshore wind parks generation will offer a better rate of return to investors.

The inability of TSOs to raise the necessary additional capital would pose a risk to society that TSOs planned investments would be suspended or even abandoned – thus undermining the energy transition.

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<sup>4</sup> *ENTSO-E: Regulatory Factsheet 2023*

<sup>5</sup> [TenneT Launches Massive HVDC Cable Tender for 2 GW Offshore Platforms | Offshore Wind](#)

<sup>6</sup> *Under the assumption of having all cash-flows from operations already used for usual investments and the intention to keep an equity share of 30 %.*

## Recommended Action Points

### Review of regulatory decisions

- NRAs should review regulatory return decisions (WACCs or ROE) taken prior to the steep increase of risk-free-rates starting in 2022. They should acknowledge that an equity remuneration reflecting the capital market evolution is essential to retain current investors and to attract additional ones and consider this circumstance in their decisions. To enable sufficient and cost-efficient financing, regulatory frameworks need to ensure that TSOs can keep investment-grade ratings.

### Regular reassessment of risk-free rates

- Regular reevaluation of risk-free rates and market premiums should be considered as long the investment and interest rate situation call for it to avoid deterring the injection of the needed capital.

### Regulatory frameworks and cashflows

- Regulatory regimes must also provide the necessary cash flows and cover the debt financing costs for new but especially also for old investments.

### Stable remuneration methodologies

- In general, TSOs need stable and predictable remuneration methodologies, consistent with the long-term nature of their investments and of the related essential funding sources. Such methodologies must also correctly reflect market conditions, including inflation, and activity-specific risks.

## COST RECOVERY

### Context

**Regulatory regimes should provide reasonable and realistic opportunities for the recovery of TSOs investments and costs.**

Not only private households and businesses are affected by inflation and high energy prices – TSOs investments and operational expenditures are also affected by the high-cost increases. Inflation adjustments, especially for operational costs, are an important part in the regulatory systems of TSOs. In several countries, NRAs have applied rather simplistic measures for cost indexations to the disadvantage of TSOs. While this regulatory procedure allows tariff payers to pay less in the short run, it hinders TSOs' ability to recover their costs adequately.

TSOs face a rapidly **increasing number of legally mandated tasks** in their day-to-day operations to meet national and European policy objectives like Maritime Spatial Plans, ONDPs, Flexibility Assessments etc. Therefore, additional personnel need to be hired for the implementation of the numerous additional tasks apart from the grid investments. Skilled labor is currently a scarce resource, for which TSOs have to compete with the private sector. Cost recovery is in general needed to mitigate possible disadvantages and thus delays in the green energy transition.

Starting in 2024, TSOs' are obliged to apply, implement, and report on **Environmental, Social, Governance principles** (ESG) to secure favorable debt financing. This will significantly influence the operations within TSOs significantly but will also require additional resources which need to be adequately recognized and recovered through regulation.

## Regulatory efficiency tools

**Regulatory efficiency tools must focus on the future and shall not calculate efficiency solely based on historic expenses. Sustainable behavior must be rewarded.**

TSOs should not be penalised ex-post in case an anticipatory investment answering an identified need is underutilized. NRAs consider efficiency measures like benchmarks as a useful tool to compare and identify (in)efficiencies between TSOs. However, the regulatory benchmark study commissioned by the regulators determine efficiency scores **based on investments made decades ago** (thus also including former **anticipatory investment** decisions). Furthermore, **operational expenses which are necessary for the energy transition** (innovation, digitalisation, cyber-security etc.) need to be well reflected and should not downgrade TSOs efficiency scores. Benchmarks must take differences between specific characteristics of TSOs, such as grid topologies, economic, demographic, and legal context, market conditions, country-specific tasks and price levels into consideration and reflect them accordingly. Differences in the way TSOs address system needs are not only substantial, but also structural.

TSOs consider tariff affordability for today's tariff payers to be crucial, especially considering the challenges that the energy transition brings. However, backward-looking benchmarking exercises are not suitable to assess future challenges which TSOs will have to address. New and alternative efficiency tools need to be explored and discussed between TSOs and regulators.

## Cost Sharing

**Cost sharing is expected to play a bigger role in the years to come, but existing cost-sharing mechanisms for new infrastructure need major improvements. European funding through CEF should remain an additional option for de-risking high priority cross-border projects.**

Cost sharing mechanisms between Member States are expected to become more important over the next years due to the massive investments needs, especially for new offshore network infrastructure. The existing cost sharing mechanism (CBCA) was first defined in the original 2013 TEN-E regulation and provides guidance to TSOs and NRAs to agree on common indicators, scenarios, and evaluation metrics for PCIs. It has since been supplemented by a new, yet to be



implemented scheme: Sea-basin Cross Border Cost Sharing (CBCS) – defined in the new 2022 TEN-E regulation, which will provide guidance to Member States concerning offshore investments at large.

To date, CBCA agreements or decisions for electricity transmission projects have not delivered on the original intentions. Among the issues that have been raised over the years is the treatment of (uncertain) benefits. Benefits calculated through CBCA and thus the resulting ex-ante payments heavily depend on the scenarios and other chosen assumptions. With rapidly changing electricity systems and markets, isolating the causal effects and addressing them adequately in the scenarios are subject to lengthy discussions with uncertain outcome. Considering the increasing number of projects and therefore the costs/benefits to be shared, this will inevitably put pressure on TSO balance sheets, hampering their ability to recover costs and their access to the financial instruments necessary for future national investments and cost sharing obligations.

To address these issues, which will only be further exacerbated by the unprecedented scale of new investments, European policymakers should carefully consider alternative cost-sharing mechanisms that will be transparent, fair, understandable, and simple. It should also be considered to reinforce the current Connecting Europe Facility for Energy (CEF) or creating new complementary funds especially to cover the share of benefit that cannot be easily attributed to a specific country. The assignment of CEF Energy funding should prioritise the energy infrastructure projects that are most efficient in decarbonizing the energy system.

## Recommended Action Points

### Simple cost-sharing mechanisms

- Policymakers should ensure that the application of **cost sharing mechanisms** does not create additional and unnecessary financial risks. Alternative and simpler mechanisms for the fair and transparent distribution of costs related to major off-shore grid investments (with EU-wide benefits) should be considered to avoid overly complex negotiations leading to possible deadlocks.

### EU funding and remuneration

- In the present period of high grid investments, TSOs should have access to **additional EU funding supports** (such as ETS fundings) and need a specific remuneration for grants (e.g. CEF) as they also bear the operational risks of the grant's share of the investment. As an alternative, a WACC adder on the equity remuneration on the subsidised investment would be a possibility.

### Ex-post risk for underutilized investments

- As TSOs across Europe are called to heavily invest into the green transition and the societal welfare **risk of underinvesting** is often worse than that of overinvesting, regulation should

reflect this by reducing the ex-post risk borne by TSOs for underutilised (anticipatory) investments and by adapting the regulatory frameworks accordingly.

### Efficiency tools

- The use of **efficiency tools** like a cost benchmark is not suitable for TSOs heavily engaged in the extraordinary effort of the energy transition. This should also apply for the forward-looking (i.e. anticipatory) investments, whose risk of being considered inefficient in the future should not be borne by TSOs unless they are found to be specifically at fault).

### Reimbursement for additional costs

- Regulators should fully acknowledge that new tasks assigned to TSOs require additional effort to be made and which come at an extra cost (e.g. additional personnel). These costs need to be reimbursed through tariffs.

### Engagement in green procurement

- Additionally, for TSOs to gear up for Net Zero operation, emerging business practices and more sustainable strategies need to be facilitated.<sup>7</sup> NRAs should incentivize TSOs e.g. to investigate the procurement of green goods (incl. losses) and other forms of sustainable grid equipment. The recognition of the extra-cost of green products through the regulatory system provides a positive signal to TSOs and gives certainty. Same is valid for the costs of “security and resilience” in the present troubled geopolitical context.

## ACCELERATING INCENTIVES

### Context

#### **Providing appropriate incentives on a higher scale and speed is necessary.**

While the implementation of digital and innovative solutions has become a regular task accompanying grid investments, TSOs experience that the remuneration for these tasks in terms of incentives could still be improved. Even though TSOs are more than ever engaged in classical grid investments, TSOs still see an advantage in setting incentives for new challenges (e.g. Vertical Market Integration). In its Report on Investment Evaluation of 2023, ACER still refers to its 2014 Recommendation on incentives for projects of common interest and on a common methodology for risk evaluation (ACER recommendation No 03/2014) which TSOs believe is not keeping up with the developments in legislation. The ITRE proposal 2023/0077 (COD) foresees an amendment of Article 18, EU Regulation 2019/943 with various new tasks that should be incentivised for TSOs for example

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<sup>7</sup> ENTSO-E Position paper (2023): [Netz-Zero Industry Act](#)

anticipatory investments. TSOs recommend considering the 10 criteria for a smart incentive design in its 2021 paper on financing TSO investments<sup>8</sup>.

## Risk-compensation

### **Incentives should be used to compensate for additional risks for specific assets**

Some specific investments (i.e. offshore connections or interconnections, innovative assets) will carry higher risks than traditional assets. The risks can be of technical (HVDC, offshore, innovative assets), reputational, or legal nature. In case TSOs will face penalties for late commissioning or unavailability of offshore transmission assets, such new risks will have to be covered or compensated for by regulation.

## Treatment of grants

### **TSOs should not be disincentivised for including grants in their financing structure**

Regulatory frameworks should be revised as to not penalize TSOs which include grants (including CEF) and other capital contributions in their financing structure. Where part of the investment is covered by third parties who do not bear any operational risk (such as European grants, CEF funds, connection assets fully or partly paid by grid users/generators), incentives could be used to compensate for the operational risks which wouldn't be remunerated as usually by a return on investments. Additionally, TSOs should receive an incentive on OPEX for said investments, thus rewarding the provision of services (system operation and maintenance).

## Incentive = carrot only

### **Performance incentives need to act as a carrot only**

As the experience with the regulatory benchmark shows, a comparison across countries can lead to rather inconclusive results. Additionally, ACER provided a very first view on potential KPIs. TSOs believe that the measurement of their performance should not focus only on cost-efficiency in general but rather on the outputs (e.g. successful implementation of a project). Additionally, the performance incentives should be of a more forward-looking nature and should only be used as carrot, not as a stick.

ENTSO-E believes the best way forward to effectively implement this change in regulatory mindset is of policymakers to introduce a Net Zero mandate in the Regulators' main responsibilities.

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<sup>8</sup> [eepublicdownloads.entsoe.eu/clean-documents/mc-documents/210414\\_Financeability.pdf](https://publicdownloads.entsoe.eu/clean-documents/mc-documents/210414_Financeability.pdf)

## Recommended Action Points

### Enhanced incentives (speed and scale)

- Providing incentives on a higher scale and speed is necessary – also referring to the ACER incentive report 2023<sup>9</sup>, which is a welcome step to kickstart more advanced discussions on incentive design.

### WACC adders

- WACC adders should be used as an incentive to compensate for additional risks on specific assets.

### Performance measurements

- Performance measurements should function as a “carrot” for TSOs to make the right decisions, not as a burden stifling new investments, especially in innovation and digitalization.

### Ensure fair TSO remuneration for operational risks

- In countries where grid connection costs are borne by especially generators (e.g. deep connection regimes), particular care should be given to the remuneration of the operational risk borne by TSOs. It must be ensured that the TSO has still the opportunity to receive a remuneration.

## REGULATORY BEST PRACTICE

### Socio-Economic Welfare –the positive effects of TSO investments for consumers

European TSOs contribute to the completion of the internal energy market while ensuring a continuously high level of European security of power supply and facilitating the clean energy transition beyond EU borders. Grid investments contribute to less curtailment of renewable energy production, a more efficient use of the pan-European energy mix and less CO<sub>2</sub> emissions. As an example, the TYNDP 2022 system needs study identified a needed increase in the cross-border network capacity by 64 GW to minimise system costs by 2030. This capacity increase is represented through annual investments of about 2.4 billion euro. The yearly increase in socioeconomic welfare of the mentioned investment volumes account to 4.8 billion Euro. In a longer term, addressing system needs translate into 9 billion euro/year of savings in 2040.<sup>10</sup>

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<sup>9</sup> [https://acer.europa.eu/Publications/ACER\\_Report\\_Risks\\_Incentives.pdf](https://acer.europa.eu/Publications/ACER_Report_Risks_Incentives.pdf)

<sup>10</sup> [Entso-e \(2023\) TYNDP 2022 System Needs Study Opportunities for a more efficient European power system in 2030 and 2040](#)

In times of an insecure economic context (aftermath of the pandemic, wars, high inflation...) TSOs investments also act as an anchor for stability, create green jobs and stimulate the European economy which has currently lost momentum. The implementation of the TYNDP 2022 project portfolio results in 240 billion Euros of mobilized production, 1.6 million additional jobs, an increase of 100 billion Euros of the EU GDP and of tax revenues up to 45 billion Euros<sup>11</sup>. Additionally, investing in the grid infrastructure enables other industries to make further investments into the green energy transition.

Energy networks are the backbone of the EU internal energy market and key to enable the green transition, as recognised by the Grid Action Plan published by the European Commission in November 2023. As stated by Kadri Simson, Commissioner for Energy: *“Europe will only ensure its energy security and deliver on its climate ambitions if our power infrastructure expands and evolves to be fit for a decarbonised energy system. Grids need to be an enabler, not a bottleneck in the clean energy transition. That way we can integrate the vast amounts of renewables, electric vehicles, heat pumps and electrolysers that are needed to decarbonise our economy.”* The Grid action plan also recognizes that “providing appropriate regulatory incentives starts by establishing a supportive regulatory framework that brings investment certainty”.

When TSOs make investment decisions they always take a very long-term perspective, serving not only today’s needs but also considering the requirements of the energy system in the next decades. Investing in elements with a life span of 50 years and more means that many future generations will benefit from today’s investments.

As pointed out before in the paper, TSOs have been facing shortage of skilled labour, high inflation, disrupted supply chains and other challenges. These additional risks and challenges need to be recognized by regulatory schemes. A well-designed regulatory system is characterized by general principles such as simplicity, stability and predictability. Additionally, it should leave room for improvements for changes in jurisdiction, economic and technological environment as well as considering changes in political targets.

### **Remuneration and cost-recovery (CAPEX and OPEX)**

In general, TSOs need stable and predictable remuneration methodologies, consistent with the long-term nature of their investments and of the related essential funding sources. Such methodologies must also correctly reflect market conditions, including inflation, and activity-specific risks.<sup>12</sup> Regulatory authorities should periodically review whether the chosen methodologies lead to the intended results, especially in times of high investment needs and accentuated market dynamics such as the current ones. While some regulatory regimes have been adequate in providing the predictability in remuneration that the TSOs business model requires, others have resulted in significant annual deviations in TSO results, in some cases even leading to negative annual results.

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<sup>11</sup> [Entso-e \(2024\) How does electricity infrastructure create jobs and contribute to Europe’s economy?](#)

<sup>12</sup> For more information on the TSO remuneration refer to the ENTSO-E position [paper](#) “European Electricity Transmission Grids and the Energy Transition – Why remuneration frameworks need to evolve” of 2021.

The following Case studies aim to present regulatory measures which are seen as helpful by (individual) TSOs.

## Regulatory Best Practices

### Ex-ante consideration of future investments

#### APG Case study on ex-ante consideration of future investments

The Austrian regulatory method considers depreciation and financing costs for planned investments ex-ante. This means in practical terms that e.g. in the tariff of the year 2023 not only RAB x WACC for assets by the end of 2021 are considered. Additionally also the prospective book values of new assets for planned investments of the year 2022 and 2023 are part of the RAB (financing and depreciation costs). This facilitates the financing of new grid infrastructure in times of strong growth.

### Redefining the risk-free interest rate calculation mechanism

#### Elia Case study on NRA redefining the risk-free interest rate calculation mechanism to increase the Return of Equity

The Covid-19 crisis and the Russian invasion of Ukraine have shown that the evolution of interest rates can be relatively unpredictable over several years, both upward and downward. Therefore, in March 2024 the Belgian Regulatory Authority (CREG) has adjusted the risk-free interest rate for the tariff period 2024-2027. Contrary to the fixed risk-free interest rate for the whole tariff period, as earlier approved in June 2022. The CREG decided the risk-free interest rate should be able to evolve annually depending on the evolution of interest rates observed on the market.

The potential evolution of the risk-free interest rate is based on the rent of the Belgium Average Long-term Government Bond on 10 year (10-year OLO). The mechanism takes into account a guaranteed minimum if the 10 year-OLO rent would be lower than the fixed-risk free rent as earlier proposed by CREG in 2022. In case the 10 year-OLO rent is higher than a certain percentage, a different pass through on the increase of the risk-free rent for investments in service before January 1, 2022 and after is foreseen.

For investments commissioned before January 1, 2022, the increase in the 10-year OLO will be for 50% passed on through an increase of the risk-free rate, because these investments have benefited from a fixed risk-free interest rate in the tariff period 2019-2023 while the 10-year OLO rate was negative in 2020 and 2021. For investments commissioned as of January 1, 2022, any increase in the 10-year OLO is passed on in full through a similar increase of the risk-free rent.

This mechanism will lead to an increase of the return on equity (ROE) and helps Elia ensuring the required capital increase for new investments remains competitive even in the event of large,

additional increases in the 10-year OLO and promotes the implementation of new investments in grid infrastructure to facilitate the energy transition.<sup>13</sup>

## Incentives on extension of lifetime of fully depreciated assets

### REE Case study on incentives on extension of lifetime of fully depreciated assets

Incentives on extension of lifetime lead to savings for the whole system as it prevents the replacement of well-maintained assets. As a fully depreciated asset has a book value equal to 0, TSOs need adequate incentives to extend lifetime of assets, ideally based on the saved costs for the electricity system.

The remuneration regime in Spain contemplates that improvement actions on facilities that have exceeded or are close to exceeding their regulatory lifetime and on which renovation is carried out will be remunerated as a new investment. Renovation and improvement actions should be included in the NDP and authorised by NRA.

Furthermore, facilities on which renovation and improvement actions have not been carried out but continue in service at the end of their regulatory lifetime will receive additional remuneration for O&M, known as REVU, based on a coefficient that will vary depending on the years elapsed from the end of the regulatory useful life:

$$REVUn = \mu_n * ROMn$$

Being ROMn the standard remuneration for a non-depreciated asset in year n, and  $\mu_n$ :

- Up to 5 years:  $\mu_n = 0.3$
- Between 6 and 10 years:  $\mu_n = 0.3+0.01*(n-5)$
- Between 11 and 15 years:  $\mu_n = 0.35+0.02*(n-10)$
- More than 15 years:  $\mu_n = 0.45+0.03*(n-15)$

REVUn cannot be greater than ROMn remuneration ( $\mu_n \leq 1$ )

## Reimbursement of costs related to ENTSO-E and European initiatives

### German TSOs Case Study reimbursement of costs related to ENTSO-E and European initiatives

The national and European legal and regulatory framework has evolved over the last decades and along with it, the compliance requirements for transmission system operators. Due to the creation of a single internal energy market in Europe, the tasks of transmission system operators are

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<sup>13</sup> [Arrêté portant modification de l'arrêté \(Z\)1109/11 fixant la méthodologie tarifaire pour le réseau de transport d'électricité et pour les réseaux d'électricité ayant une fonction de transport pour la période régulatoire 2024-2027 | CREG : Commission de Régulation de l'Électricité et du Gaz](#)

constantly growing and evolving. This is accompanied by increasing costs, related to both staff and material.

The German regulatory framework provides a mechanism for a “procedural regulation” of costs incurred in connection with the participation in European initiatives. It regulates the reimbursement of costs with regard to the activities and cooperation of transmission system operators in regional cross-border and European initiatives.

These European initiatives contribute to the creation of the internal electricity market and its system security. A European legal obligation or mandate for German TSOs to contribute to these European initiatives is a precondition in order to make the related costs acknowledgeable by the NRA. Provided that the review by the NRA shows that the expenditures on TSO side are permissible and efficient, the costs are fully refinanced via the grid fees within the framework of a plan/actual approach.

## **Removal of investment caps**

### **TSOs Case Study on unlimited investment volumes**

Imposed limits on investments by some European regulations/policy maker may become a barrier for reaching the necessarily high level of investments stemming from the ambitious goals set on European level. Besides Spain and France, no European TSO reports about imposed investment limits. E.g. in Spain, annual investments for the transmission network put into service may not exceed 0.065 % of the Spanish gross domestic product for the respective year.

## **Inflation adjustments**

### **Case study on inflation adjustments**

National Regulatory Authorities often use some variant of Consumer Price Index (CPI) for inflation adjustments of TSO costs which flow into the regulatory revenues. Experience from many TSOs shows that the actual price development of materials and services needed for TSOs investment and operational costs may be very different from the development of the CPI thus resulting in a partial cost-recovery only of the actual TSO costs. An opportunity that should be explored is the establishment of a specific (sector) index which reflects the price developments within the TSO business (investments, O&M) better. The adapted and more cost-reflective index may prove to be more suitable thus reducing TSOs financing costs until the actual costs are considered by regulators in tariff calculation.

## **Working Capital**

### **Statnett and Elering Case studies on Working Capital**

In the Norwegian regulatory system, an allowance for capital costs related to working capital is performed by adding 1% to the book value of the fixed asset base (grid assets and other fixed



infrastructure related to the TSO grid). In principle, the system gives incentives towards efficiency as the allowance is not based on actual working capital. The question is, however, how this norm of 1% is set and if 1% is an appropriate level. The regulator is currently doing an evaluation of this system.

In Estonia, the component for working capital is being calculated as 5 % of the arithmetical average of last three years regulated turnover. In need, additional extra analysis will be carried out i.e. the NRA always have a discretion if they have a doubt.

## Incentives

### Terna Case studies on incentives

An incentive system for the delivery of projects designed to increase transmission capacity between market areas<sup>14</sup>. This involves recognition of an incentive, capped at €150 million, in proportion to the ratio between capacity delivered by 2023 and the target capacity (Resolution 567/2019/R/eel), plus an additional bonus in the event of the deployment of transport capacity using efficient solutions, including those that are capital light. The mechanism also envisages that the award may be reduced by the regulator if the ratio between the average transmission capacity made available for the day ahead market and winter peak transmission capacity is significantly below historical levels of this ratio, in one or more of the three years following the entry into service of the investment that made available the additional transmission capacity. Such mechanism has been extended also for 2024 and it will be applied also for 2025-27 with some amendments, with related parameters still to be defined (Resolution 55/2024/R/eel).

An incentive mechanism, with a three-year duration (2022-2024), aimed at rewarding the efficiency of dispatching activities and, as a result, reducing MSD (Italian Ancillary Services Market – MSD) costs and the cost relating to the shortfall in wind production and essential plants (Resolution 597/2021/R/eel and Resolution 132/2022/R/eel). The incentive is calculated annually based on Terna's performance, assessed by comparing effective dispatching costs in the incentive year with costs in the year in question, suitably adjusted to take into account commodity price movements and other corrective factors (the bonus awarded to Terna is equal to 12% of the total saving obtained over a three-year period).

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<sup>14</sup> Period 2019-2023

## LIST OF ACRONYMS/ABBREVIATIONS

*[Position papers might contain many acronyms/abbreviations that would make it difficult for the reader to fully understand the content. It is not an obligation, but you may want to include a list of all the acronyms/abbreviations encountered in the paper. Make sure that the first time you mention one of them in the text you also mention its full name. e.g.: Demand Side Response (DSR)]*

Example:

Header 1	Header 2
ACER	The European Union Agency for the Cooperation of Energy Regulators
CAPEX	Capital Expenditures
CBCA	Cross Border Cost Allocation
CBCS	Cross Border Cost Sharing
CEF	Connecting Europe Facility for Energy
CPI	Consumer Price Index
CREG	Commission for Electricity and Gas Regulation
MSD	Italian Ancillary Services Market
ENTSO-E	European Network for Transmission System Operators for Electricity
ESG	Environmental, Social, Governance principles
EU	European Union
GDP	Gross Domestic Product
ITRE	The Committee on Industry, Research and Industry
NRA	National Regulatory Authority
OLO	Obligations Linéaires Ordinaires (Linear Ordinary Bonds)
O&M	Operation and Maintenance
ONDP	Offshore Net Development Plan
OPEX	Operational Expenditures
ROE	Return On Equity
TEN-E	Trans-European Networks for Energy
TYNDP	Ten Year Net Development Plan
WACC	Weighted Average Cost of Capital

Table 1