Implemented by

Output-oriented regulation of TSO and DSO network operators

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Comprehensive Technical-Regulatory Advisory to enhance RE-based share in electricity grids of Western Balkans

SEPTEMBER 2024

Western Balkans

TABLE OF CONTENTS

1. INTRODUCTION

This report discusses the regulatory options for developing and operating transmission and distribution systems, focusing on implementing output-oriented regulation to efficiently accommodate the increasing share of vREs in the energy mix.

A range of regulatory approaches has been applied in different jurisdictions, driven by the actual conditions and problems that specific systems face, considering that no "one method fits all" solution is plausible.

However, the sharp penetration of vREs has raised similar problems for all network operators. The increased number of production sites and the massive investment required at the network level for the efficient integration of vREs have fundamentally changed the design and topology of the networks, indicating the need for modern regulatory approaches to enhance the economic efficiency of new investments.

Regulatory frameworks for transmission and distribution networks may introduce incentive schemes to stimulate operators to prepare the networks more efficiently for their new tasks, primarily related to the integration of VREs.

Discussing the design and orientation of the incentive scheme, we can roughly distinguish the incentives as either **input-oriented**, based on schemes that incentivise the inputs and additions to the networks, or **output-oriented**, where incentives depend on the improvement achieved (Output), resulting from infrastructure additions (reinforcement and expansion projects) and operational improvements.

This report summarises incentive-based regulatory schemes for networks based on information reported in 1) the CEER Status Review Report on Regulatory Frameworks for Innovation in Electricity Transmission Infrastructure, a CEER task for the Energy Infrastructure Forum 2020, and 2) the ACER Report on Investment Evaluation, Risk Assessment and Regulatory Incentives for Energy Network Project, June 2023.

2. REVIEW OF REGULATORY APPROACHES

2.1. Basic Principles

The fundamental purpose of regulation is to correct market failure and serve the public interest. As networks are developed and operated as monopolies, a key characteristic of the European systems, regulatory schemes are necessary to impose behavioural discipline on the operators, ensure a level playing field for competing participants, secure the reliable and safe operation of the systems, and provide incentives for both efficiency and innovation.

Regulatory approaches vary in how they allocate risks between network operators and ratepayers. Some approaches allocate full risks to ratepayers in return for the secure and resilient operation of the network. Other models allocate costs and risks to network operators, introducing incentives and "penalty rewards" schemes to improve the efficient development and operation of the network.

The way incentives are applied and the qualitative and quantitative criteria introduced to measure the level of achievements define the type of incentive mechanism applied, either input—or output-oriented or, in some other approaches, benefit-based regulation.

2.1.1. Regulation (EU) 2024/1747

According to the recently amended Regulation (EU) 2019/943[1], the following are applied for regulation and traif methodologies referring to networks:

- article 18(2):

"2. Tariff methodologies shall:

(a) reflect the fixed costs of transmission system operators and distribution system operators and shall consider both capital and operational expenditure to provide appropriate incentives to transmission system operators and distribution system operators over both the short and long term, including anticipatory investment, in order to increase efficiencies including energy efficiency;

(b) foster market integration, the integration of renewable energy and security of supply;

(c) support the use of flexibility services and enable the use of flexible connections;

(d) promote efficient and timely investment, including solutions to optimise the existing grid;

(e) facilitate energy storage, demand response and related research activities;

(f) contribute to the achievement of the objectives set out in the integrated national energy and climate plans, reduce the environmental impact and promote public acceptance; and

(g) facilitate innovation in the interest of consumers in areas such as digitalisation, flexibility services and interconnection, in particular, to develop the required infrastructure to reach the minimum electricity interconnection target for 2030 laid down in Article 4, point (d)(1), of Regulation (EU) 2018/1999.

3. Where appropriate, the level of the tariffs applied to producers or final customers, or both, shall provide locational investment signals at the Union level, such as incentives via tariff structure to reduce re-dispatching and power grid reinforcement costs and take into account the amount of network losses and congestion caused, and investment costs for infrastructure.';

(b) paragraph 8 is replaced by the following:

'8. Transmission and distribution tariff methodologies shall provide incentives to transmission system operators and distribution system operators for the most cost-efficient operation and development of their networks, including through the procurement of services. For that purpose, regulatory authorities shall recognise relevant costs as eligible, including costs related to anticipatory investment, shall include those costs in transmission and distribution tariffs, and shall, where appropriate, introduce performance targets in order to provide incentives to transmission system operators and distribution system operators to increase overall system efficiency in their networks, including through energy efficiency, the use of flexibility services and the development of smart grids and intelligent metering systems."

1

REGULATION (EU) 2024/1747 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 June 2024, https://eur-lex.europa.eu/legal-content/EN/AUTO/?uri=celex:32024R1747

The Regulation stresses the implementation of incentive regulation to ensure the cost-effective use of resources and capital for the transformation of the networks to integrate further VREs.

2.2. Review of Regulatory Models

Regulatory models could be roughly distinguished into two main groups:

a) Cost-base approaches, which could be assumed as the ones allocating the minimal risk to the network operators and

b) Price-based regulation pressures network operators to deliver transmission or distribution services at a set price or allowed revenue or expenditure.

Cost-based models offer remuneration based on the cost incurred, and the Regulator determines and approves revenues based on costs. These models provide maximum security for the network operator but lack efficiency incentives. In cost-based models, prices and revenues are aligned with underlying cost developments; however, they cannot ensure that the money spent on new investments maximises the system's benefits.

Cost-based models reimburse the costs incurred but do not reward operators for increased efficiency by selecting and prioritising the most needed investments or enhancing the system's overall functioning.

In contrast, price-based models, including revenue cap models, aim to control the economic burden transferred to the network user. In theory, price-based models maximise the incentives for operators to reduce costs to maximise their profit since the Regulator defines prices to determine returns. In price-based models, operational and financial risks are transferred to the operators, as the predefined prices do not reimburse higher costs for operation or development.

Alternative schemes, like the yardstick competition model, set prices and allow revenues based on comparable companies, putting pressure on the least efficient companies to improve their functioning.

2.3. Timing of investments

The timing of the investment is a critical element of any of the selected base regulatory models. If a system requires significant new investment, the value of which might even be comparable to the value of existing infrastructure, then a cost-based approach would give better signals to the operators to develop the required projects since they do not take significant risks, the necessity and efficient functioning of the project lies with the Regulator, the financing is instead secured, and the Operator has any reason to complete the project on time.

In the case of price regulation, the increased risks, the responsibilities for the well-functioning of the projects, and the concerns about the financing process might make the operators more hesitant to initiate a project, making them selective for projects with limited technical or financial challenges.

The increased penetration of vREs puts new challenges to system development, as significant network reinforcement is required to support extensive expansion and new connections to different types of energy sources, including on-site production, storage, charging, demand side, etc. The expansion and reinforcement of the system go in parallel with the digitalisation of the system as networks are required to become not only bigger and stronger but also sophisticated and digitally operated.

In that sense, the timing of the projects is critical to achieving this so-called **"efficient coordination",** where developments of reinforcement and expansion projects are synchronised efficiently with digitalisation projects and with vREs projects, stressing the interdependence between network expansion and vREs projects. The efficient integration of vREs refers to connecting new installations to the networks and ensuring efficient interaction with the system, minimising congestion, dispatching, curtailments, and balancing actions and costs.

2.4. Network Development in modern times

Electricity Networks are the foundation of energy systems, playing a key role in the energy transition by enabling the use of renewable energy sources (RES).

Network Operators confront two significant challenges when integrating RES into electric grids:

a) Network inadequacy is reflected by the lack of physical capacity to balance supply and demand in locations with the best resources, including the inability to connect new energy resources to the grid.
b) As the share of RES increases, operational issues may arise, especially at the distribution level system. The lack of real-time network management could lead to network instability, which may affect high-reliability standards and cause voltage instabilities, frequency inconsistency, and harmonic distortion of the power system.

Power networks were not initially designed for such a fast-paced energy system; their tools and processes were developed within a different development framework., especially in mature systems (meaning that they have achieved 100% electrification); most of the investments in the grids were referring to maintenance and marginal improvements, and not significant developments and expansions (similar to the post-war electrification era).

2.5. Concerns for Network Operators

The key challenges that Network Operators face across planning, connection, and operations and exploring coordinated solutions to benefit from the rapidly increasing need for RES are related to the way the new investment will be combined, which requires a completely new approach to planning and implementing, a new culture regarding new projects.

Network Operators may need to rethink their status quo and tools across their planning, connection, operation, and coordination approaches to support RES integration into grids.

Grid reinforcement aims to address network constraints in terms of limitation on the number of new connections or operational constraints related to difficulties in coordinating balancing actions, managing curtailments, and re-dispatching and solving congestion connections. In that sense, Network Operators' efforts focus on three derived goals:

- Reduction of congestion costs (primarily TSO)
    - System costs: Redispatch cost in general
    - CO_2-reduction: RES curtailment
- Reduction of connection times (primarily DSO)
    - Opportunity costs of not being able to use the network or still operating the network with low-capacity factors, continuing the old-fashioned one-way power flow management, from production to consumption
    - CO_2-reduction: delayed RES production

- Increasing network or system stability and reliability (primarily TSO)
    - Grid reinforcement reduces network outages and enhances regional trade

The goal above is mainly focused on increasing the benefits (by reducing the costs) of the network users and not the network operators themselves, meaning that these goals aim to reduce external costs. External costs are the costs for network users if network access is constrained. They should be distinguished from internal costs, which are the costs for the network operator. However, as these external costs may not affect the remuneration of the network operators, the operators won't have any incentive to put any effort into the system for the benefit of the users unless specific regulatory measures are taken.

2.6. Criteria for the regulatory model

As said, regulatory approaches are evaluated based on the actual conditions at the network level. Based on that, we can roughly distinguish the regulatory model to implement as either efficiency-oriented or investment-oriented.

In mature systems, which have already received significant investments and have only limited (marginal) needs for improvements/expansions, the regulatory approach needs to focus on efficiency improvements, putting pressure on operators to use existing infrastructure more efficiently.

In many other cases, especially in ageing networks that still operate in an old-fashioned process, following the traditional single flow of power and information from large-scale generating units to consumption areas, usually cities or industrial sites, significant transformation is needed. These conditions signal the need for an investment-oriented methodology to facilitate the new investments required to reinforce, expand, and modernise the networks.

As a result of the European policies regarding the penetration of vREs in all European jurisdictions, the need for further, large-scale investments in networks to allow the efficient integration of vREs is urgent. Because of the need for massive new investments, the regulatory approach needs to facilitate new investors and simultaneously maximise the long-term efficiency of these investments, balancing efficiently between the actual investment cost and the external benefits for network users of network expansion.

To evaluate the regulatory approach to be applied, some key criteria might be used and are summarised as follows:

1. Effectiveness improvement, or whether new investments have met their goals, i.e., reducing congestions or curtailment, evaluating whether the proper projects have been efficiently selected and, as a result, have proven their value.
2. Increasing overall economic efficiency, which is measured based on comparing the costs of the new investment with the benefits that users of the system enjoy (easy connection to the grid, increasing economic activity, reducing risks, etc.), which measures not only the effectiveness of the projects (as in one) but evaluates the overall performance of the system, measuring how efficiently new investment and operational advancements of the network benefited the users (the new investment might have solved the problem but in higher costs when compared with alternative options, i.e., operational improvements).
3. Affordability, corresponding to the actual cost to be paid by the users, if the efficiency gains in the operation and use of the system offset the cost of the new investment, and if the overall benefits for the users (including monetary and external costs) are higher compared to the cost incurred.

4. Implementation readiness, which mainly focuses on the ability of the network Operators to deliver on time the projects planned
5. Sustainability criteria: if the new projects support the development of sustainable energy systems (e.g., facilitate the integration of vREs).

3. RISKS AND INCENTIVES

In 2014, ACER published their report on recommendations for incentives for projects of common interest and on a standard methodology for risk evaluation.[2]

In 2023, ACER commissioned consultancy work on benefit-based incentive regulation to promote efficiency in addressing system needs and overcome the CAPEX bias. The first report[3] of this study presents the main principles of benefit sharing, provides an overview of the experience of different European countries in this area, and outlines a proposal for an incentive-based regulatory scheme.

The following subchapters briefly present the type of risks and proposed incentives.

3.1.1. Cost Overruns

Consumers expect to bear the investment risk for all projects included in the Ten-Year-Network-Development-Plan (TYNDP) and similar plans for distribution system development. The ex-ante scrutiny of the Network Operators' investment decisions by the Regulator is necessary.

A vital element of this approval is that the overall projected cost is lower than the expected benefit, i.e., security of supply, quality of service, market development and connection request.

The risk of cost overruns refers to cases where the final actual cost of the investment is higher than the projected costs. Different types of cost overruns might be identified:

- Overruns during the construction period. These overruns may occur due to technical difficulties, remedies to parties involved in the construction process (land use permits and buyouts, changes of construction design as a result of administrative, legal or any other actions), to the need to employ different technologies than anticipated
- Overruns during the operation of the project, as a result of higher maintenance costs

3.1.2. Time Overruns

Time Overrun risk relates to possible delays in the development and construction of a project, which can result in either increased construction costs or inefficient coordination with other

---

[2]RECOMMENDATION OF THE AGENCY FOR THE COOPERATION OF ENERGY REGULATORS No 03/2014,https://www.acer.europa.eu/sites/default/files/documents/Recommendations/ACER%20Recommendation%2003-2014.pdf

[3] Benefit-based incentive regulation to promote efficiency and innovation in addressing system needs, https://acer.europa.eu/sites/default/files/documents/Publications/ACER_Report_Risks_Incentives.pdf

projects. For example, generating capacity cannot start its commercial operation without being connected to the network.

Projects included in the development plans of the transmission or distribution systems are expected to be constructed according to the preliminary schedule included in the plan; nevertheless, it might be well expected that their development might be constrained by the permitting process, technical and construction matters, availability of equipment, etc.

The implementation of the development plan and respect for the approved timetable are also related to the commitment of the Operator to deliver the projects. Its commitment should be motivated with incentives (positive or negative), which can be either financial, e.g. offering a premium in the WACC for specific projects if constructed on time or mitigating risks by including some of the construction costs in the asset base before the commercial operation of the project, only if the agreed timetable develops construction.

Different types of time overruns might be identified:

- Overruns due to constraints out of the Operator's control (e.g. permitting).
- Overruns due to pure preparation of the project, lack of expertise and consultation with interest parties.

3.1.3. Risk of stranded assets – volume risk

Volume risk is a significant source of uncertainty for the operators of distribution and transmission systems but also for developers of projects, as project decisions for the development of the transmission of the distribution system are not aligned with binding decisions for generation capacity development, as the promoters of the projects are fully separated. Network Development Plans are prepared based on the projections of the system's requirements, where reinforcement measures and expansions are designed to respond to changing demands, ensuring reliable electricity transmission and distribution at all times.

Due to the transformation ition of the energy system, a new challenge is the increasing amounts of electricity from renewable energy sources that need to be delivered reliably to consumers across ever larger transmission paths and from areas of high RES potential. Nevertheless, as decisions for transmission and distribution investments are not synchronised with investments in generating capacity, a risk for developing fully utilised network projects exists.

Volume risk refers to:

a) to the overall network, as the volumes of electricity expected to flow through the network are not achieved and

b) specific network project linked to specific elements of the system i.e. generating capacity, where due to lack of coordination, the network project remains subtilised, becoming a stranded asset, unable to recover its costs.

Regulators across Europe provide volume risk mitigation mechanisms, especially as far as the overall system is concerned. The annual allowance is calculated as the fair remuneration for the network operator, as a payment for its overall costs, operational and capital.

Nevertheless, the allowance is allocated to the use-of-system tariffs, in most cases having a commodity component, being dependant on the actual electricity flows throughout the system. Suppose, for any reason, actual electricity flows are lower than the volumes assumed during the approval of the tariffs. In that case, the actual income is expected to be lower than the projected, and fair compensation for the Operator is not collected. In such cases, a correction element is included in the formula for calculating the annual revenue to offset any deficit or surplus achieved compared to the expected recovery from the consumers.

Nevertheless, project-specific volume risks require a significantly different approach, compared to how volume risk is treated for the overall portfolio. Depending on the view of the Regulator of the optimal future development of the infrastructure of the networks, a special list of eligible projects to receive some volume risk protection might be developed. Projects that are expected to positively impact the system's future development (i.e., anticipatory investments) are considered eligible to be included in the regulatory asset base and to receive remuneration, even if their utilisation remains low. In general terms, including assets in the regulatory assets base ensures that it is eligible to receive remuneration, independently of how the asset will be used. In that sense, the Regulator should decide, based on specific criteria, the type of projects that can be included in the regulatory asset base and be eligible for remuneration.

3.1.4. Risk of efficient cost

A critical matter for controlling and eventually improving the efficiency of the overall portfolio of assets of a network operator is the ability to identify the efficiency improvements achieved by adding new investments to evaluate if the expected benefits are offsetting the costs incurred. This is always a complex matter to evaluate, as costs incurred are usually measured in monetary terms, while the benefits are also evaluated in qualitative terms, as positive (or even negative) externalities are difficult to quantify. In that sense, the evaluation if the costs incurred are at the efficient level includes the comparison of the cost incurred against the benchmark costs of similar projects, but further analyse a) the efficiency in CAPEX costs (e.g. Equipment, land cost, construction cost, etc.) and b) financial costs (funding and debt structure, grace periods, interest rate, terms and conditions, guaranteed etc.).

The procurement cost of the equipment might be straightforward to compare, as overnight expenses are directly comparable to those of other, similar projects worldwide; all other costs are project-specific.

The Regulator faces the challenge of assessing the efficiency of the cost incurred, as these costs will be included in the asset base and must be paid by the consumers through their use of system charges.

Efficiency risk, therefore, refers to the difficulty of the Regulator in accurately assessing how efficiently the project is developed, taking into account the overall benefits that this project brought to the overall system in the short and the long run. The risk should be considered as two-sided: a) either valuing very high the efficiency achievements of the projects, accepting a higher cost as being at the efficient level, resulting in higher charges for the consumers, or b) increasing significantly the requirement of efficiency, not recognising special conditions, resulting the project not being able to recover its costs.

In cases of the overall portfolio of assets, operational efficiency, referring to how well the network company is managing its resources, is evaluated against other similar businesses, either at the national level (i.e. in terms of the salary level, other OPEX) or at the international level, through a benchmarking process.

3.1.5. Risk of liquidity

Risk of liquidity refers to the consideration that the Operator faces difficulties in continuing to finance the development of a project, either because the size of the project requires heavy funding, disproportionate to the ability of the company to finance projects of such size, or due to significant extension of the construction period, not allowing the Operator to continue to finance a project with no return

Nevertheless, there are no arrangements for developing large-scale projects, requiring funding capabilities not possible to be given based on the Operator's cash flow, supported by the consumers' payments of the network charges.

4. INCENTIVES

4.1. Inventory of Incentives

Incentive mechanisms are intended to incentivise investments in network infrastructure by excluding non-controllable exposure to risks related to the infrastructure's development, construction and operation. These mechanisms come under two broad groupings:

1. Mechanisms to mitigate systemic risks affecting the overall infrastructure portfolio related to the institutional settings and the investment financial conditions. The measures for mitigating systemic risks are related to controlling the risk of the network operator company (corporate risk), compared to the overall investment conditions of the country, implemented through the definition of the beta factor or the country risk in the calculation of the Weighted Average Cost of Capital (WACC), applied for setting the annual allowance for the networks. The design of the regulatory approach applied for calculating the allowed revenues of the network company may include overall incentive mechanics, either in the form of financial or monetary rewards (e.g. profit, sharing arrangements on the achievement of specific targets in incentive base regulation) or in the form of reducing the exposure to different types of risks (e.g. applying a cost-plus approach, where all costs incurred are finally compensated through the charges applied).

2. Mechanisms to mitigate project-specific risks that could not be managed by the mechanisms applied for the risk management of the overall investment portfolio, as the number and diversity of the projects undertaken by the Network Operators may not allow the implementation of "one method for all projects" for the efficient risk management of each one of these projects. For project-specific risks, specially designed incentives may apply to incentivise the development and construction of the project, either by a) reducing project-specific risks or b) introducing a profit-sharing mechanism and offering (monetary) rewards to Network Operators.

A list of different types of incentives, either for the mitigation of systemic risks or to provide incentives on a project-specific basis, are summarised in the following table:

Table 4-1: List of Incentives applied for promoting investments in Networks

Incentives	Description
Corporate Risks	
Beta factor, used in the calculation of the WACC	The beta factor measures the activity's risk concerning the network company's overall investment portfolio concerning other comparable types

for the rate of return calculation	of investments (i.e., construction investment, infrastructure investment). The beta factor refers specifically to the (network) company, and it would be unlikely for the Regulator to define a different beta for a specific project within the overall portfolio of investments. Theoretically, the beta factor provides for the covariance between the evolution of the share price of the company and the general stock market price index, assuming a stock market with adequate liquidity in terms of the number of participating companies and volumes transacted. As Network operators enjoy a regulated regime, guaranteeing their cost recovery and a fair return, the beta factor that should be used is well below unity, as revenues are clearly defined and secured.
Country risk	Country risk refers to the uncertainty inherent in investing within a country, providing a measure of the yield difference between locally issued government bonds and a benchmark bond used for risk pricing. Assuming that the risks of a regulated company are similar to the risks of a government bond, country risks should be considered as a measure of the cost of capital for financing network investments. Nevertheless, it should be considered that during periods of expensive funding (high-yield bonds), the planning of the investments of the network operator may be modified, funding only necessary maintenance investments and delaying the (expensive) funding of new infrastructure projects to be recovered in the future through the network charges paid by consumers.
Efficiency factor	The efficiency factor measures the productivity level of the regulated company compared to the country's overall economy. The efficiency factor should nevertheless offset the benefits of the company operating in a fully regulated environment, directly impacting its productivity.
Favorable Debt/Equity ratio when WACC is calculated	Companies operating in a regulated environment may achieve better interest rates to pay for debt finance compared to other industries and, definitely, lower than the cost of equity finance. Network Companies seek to gear projects with as much debt finance as possible to achieve an overall lower WACC. The Regulator, when calculating the WACC for the allowed revenue, may introduce a more favourable "regulatory" Debt/Equity ratio (i.e. increasing equity share) compared to the actual debt/equity, providing the opportunity to network companies to receive a more attractive rate of return, allowing the network companies to benefit from the lower interest rate in the debt market. Nevertheless, the Regulator may set a maximum "regulatory" debt/equity ratio to limit the exposure of the network company to debt financing, protecting the company's financial stability in volatile (global) financial markets.
Risk management through the regulatory methodology applied	
Cost plus methodology	A cost-plus methodology recognises all costs incurred, including operational expenses, depreciation and investment expenses for the development of the projects included in the Network Development Plan. Implementing a cost-plus methodology provides for recovering costs incurred within an almost risk-free environment for project development. As the Operator knows that all costs related to the project will be reimbursed, business decisions for new projects are taken swiftly. Applying a cost-plus approach may increase the risk of overinvestment, as guaranteed payments allow the Network Operator to make "no-cost" business decisions for projects, having secured that all costs will be recovered. In a cost-plus regulatory environment, the key elements are a) the preparation of the development plan and the selection of projects based on their necessity, usefulness and effectiveness and b) the costs of execution of the project and the risks for cost or time overruns. The

	Regulator bears the burden of controlling the expenditure incurred in the projects in the development plan. Furthermore, the Regulator bears the burden of correctly estimating the cost of capital, which in this case is greater than the actual cost. The Operator is incentivised to increase returns to shareholders by increasing its investments. At the same time, if it is lower, then the Operator would be reluctant to start the construction or, in case of multiple projects, will prioritise and construct the projects with the higher profit margin. Only mature projects, expansions of existing projects or similar are maximising the profit margin, as technical, technological and permitting processes are not expected to bring any delays and costs, while new, green fields and innovative projects will be considered as projects of low priority, as the regulated rate of return is not adequate to cover the uncertainties around these projects. Summarising, the key element of a cost-plus methodology is to incentivise the development of new investments by mitigating the risk of recovery of investment costs, including them in the regulated asset base, and compensating through the charges to the consumers.
Incentive Regulation	The key concept of the incentive regulation is the opportunity given to the network operator to keep additional profits as a result of improving efficiency in both the development and operation phase, as being allowed to keep the difference between its actual earnings and costs and the regulated cost of capital and OPEX, decided at the beginning of the regulatory period and assuming higher operational and capital costs. The Operator can keep at least a share of the efficiency gains for some time (i.e. during the multiyear regulatory period) before adjusting overall price levels. In general terms, incentive regulation provides mostly financial benefits to the Operator (improving profits). In the cases of state-owned operators, the prospects of additional profits and financial benefits may not be an incentive for improved performance. In such a case, the Regulator must either identify other rewards that the (state-owned) Operator finds attractive and design an incentive scheme around those rewards or apply a cost-plus approach to control and monitor operational and investment costs as much as possible. Moreover, the Regulator must determine how much reward is needed to induce the Operator to improve performance and to know whether the additional efficiency gained is worth the additional reward allowed. Smaller incentives should be offered for easily achieved efficiency improvements, compared to other improvements that are much more difficult to achieve. As an example, in the case of anticipatory measures (the treatment of which is disused further below), it is expected that these measures will gradually bring more efficiency to the system, exploiting the front-loaded expenditures for anticipatory investments, and in that sense, improved efficiency is a result of increasing the utilisation of infrastructure and not improvements in operation. In such a case, if specific incentives are provided for anticipatory investments, efficiency gains from their gradually increasing utilisation should not be further rewarded.
Project-specific incentives – monetary rewards	
Premiums – increased WACC	By including a premium within the WACC, which is applied to the overall portfolio, new investments are encouraged, offering a monetary reward to project promoters. Premiums are supposed to be awarded to specific projects and applied during a clearly defined period.

	The rationale for promoting this type of incentive is to prioritise specific projects, expected to benefit the overall system by increasing its efficiency, much higher than the costs of constructing and operating this project, even including the premia. The network operator needs to be incentivised to develop and deliver on time the specific projects, introducing efficiencies in the overall electrical system. A key issue is the setting of the eligibility criteria for the projects to receive a premium on return, as well as the level of the premium to be selected. In general, a linear relation between the premium and the additional efficiency improvement achieved compared to the average anticipated. Premium incentives may be combined with the achievement of different types of targets, i.e. the development of a specific project to be completed within a specified period of time or the completion of a specific investment plan within the agreed times. The key element of this incentive mechanism is the competency of the Regulator to decide if the extra cost to be paid by the consumers as a result of the higher return of a specific project is fully offset by the benefits that consumers or other network users enjoy.
Anticipatory Investments	Regulators may apply specific rules concerning the treatment of anticipatory investments, preventing the development of projects with a myopic view, which will prove to be inadequate to serve the system's needs in the future, with the danger of becoming obsolete, as reasonable assumptions on future technological improvement or expansions required have not been considered. Anticipatory investments mainly refer to taking advantage and benefit from economies of scale or technological input, either by promoting front loaded investment plans or promoting innovation, as the specific investments go beyond the current conditions' needs. Anticipatory investments are mainly focused on improving the efficient coordination between different projects, i.e. the expected gradual development of RES may require the development of the network in a forward-looking manner, installing transmission and distribution capacity to serve future and not current needs. Similarly, the development of a smart metering system requires the development of the supporting with the view that this software should be capable of serving all network users, consumers and suppliers and not in a way reflecting current conditions, where similar capabilities might look unnecessary. Anticipatory investments are a key issue regarding the efficient coordination of the projects, especially the coordination between generating and transmission /distribution capacity projects. The Regulator needs to develop a very clear approach for Anticipatory Investments, the criteria for including these investments in the regulated asset base, and the impact these projects will have on the transmission or the distribution charges, improving the clarity and certainly required for all network users. Including the projects in the asset base eligible for receiving compensation is the critical decision of the Regulator, especially when a cost-plus methodology is applied for the annual allowance.
Adjusted Depreciation periods	Adjusting the depreciation period is a method for the regulatory treatment of the useful life of an asset, affecting both the depreciation and the return calculated over the remaining value of the asset. Adjusted Depreciation period methods are mostly logistical and used for accounting and income tax purposes that allow greater deductions in the

	earlier years of the life of an asset. By changing the depreciation period, the Regulator is affecting the spreading of the depreciation cost over a longer or shorter period than the actual or accounting life of the asset. Companies may utilise this strategy also for taxation purposes, e.g., deprecation over a shorter period will postpone higher tax liabilities due to lower income during this shorter period. Adjusted Depreciation periods are mainly used for reducing the risk of the transition in energy systems introducing an accelerating pace of technological change. Investors need to be protected from the technological development foreseen and ensure that specific projects, with characteristics of becoming stranded before the end of the asset's economic life, are susceptible to technological obsolescence. On the other hand, increasing the depreciation period for regulatory purposes, compared to the one used for accounting purposes, may provide some benefits over a longer period, increasing the net income available (lower depreciation – return over a longer period), probably the preferred option for public companies.
Profit sharing	An incentive inherent in the incentive regulation is a profit-sharing agreement, which allows the Operator to keep some of the efficiency profits achieved by introducing specific assets in the asset base.
Longer Regulatory periods	If incentive regulation methodologies are applied, the period between revisions of price control may provide a strong incentive for the company to develop and implement an investment plan under a stable regulatory framework, being able to predict with accuracy income and cash flow within the regulatory period, reducing risks and allow companies to the benefit of their investment within the price period. In countries where incentive regulations methodologies are applied for long periods (i.e. UK), discussions for extending the regulatory period to up to 8 years are on the table, while in most cases, 3 to 4 years is the Regulatory period in most countries implementing incentive regulation.
Early recognition of costs	A common approach for the Regulator is to include a project in the asset base and pay compensations only when the project is commissioned and its commercial operation has started.

4.2. Incentives per type of risk

To mitigate project specific risks, different types of incentives may apply. Incentives may have the form of (monetary) rewards or in the form of tolls for reducing the risks, and indirectly reducing the costs of operations and investment. The way incentives are applied is not uniform, as it depends on the actual conditions of the energy market and the efficient unbundling of the operators from interests related to the generation and supply of energy, the regulatory methodology applied for price controls, the ownership structure of the network company, the investment cycle and forward-looking needs for investments aligned with the transformation of the energy system of the country.

4.2.1. Incentives in case of cost overruns

Once the project is included in the development plan, which is approved by the Regulator, accepting the justification for the need of the project and the potential benefits for system operation, and as long as the costs for the capital expense were incurred efficiently, the risk of cost overruns quite often is fully reimbursed. During the project's development, any additional costs incurred due to unforeseen events beyond the control of the project developers and reasonably not have been budgeted ex-ante should be considered when the opening value of the asset base is calculated.

Nevertheless, the justification for the additional construction cost should be thoroughly assessed before these costs are included in the asset base, and the final customers will bear a higher cost due to inaccurate estimates of the project's development cost.

By using the cost forecast of the project, as indicated in the development plan, and not the actual cost, when the remuneration is calculated, the Regulator incentivises the Operator to take all measures to reduce the possibility for cost overruns.

Nevertheless, in such a case, the Operator would promote only projects with very limited risk of cost overruns, e.g. expansion on existing projects, use of mature technology, and avoiding either green field of innovative projects. Considering that modernisation and innovations re key characteristics of the future development of the networks for vRE integration, including the development of new types of projects related to the transition of the energy system (i.e. penetration or RES), it would be reasonable to continue to apply a cost plus approach, where possible cost overruns are included in the asset base, under the assumption of implementing rigorous cost control measures, including careful and detailed selection of the projects, including extensive consultation with key actors, to quantify expected benefits and realistic budgets.

4.2.2. Incentives for time overruns

The methodology for tariff regulation provides that only after the project becomes operational is it included in the asset base and starts receiving compensation. This approach protects final consumers from paying higher tariffs for compensation projects that have not yet been included in the asset base and offers benefits to the system users; nevertheless, it provides no incentives to the project promoter to be engaged in long-term, large-scale projects that probably require significant time for their development. In that sense, the TSO might not prefer to develop a project of significant size to avoid a long period of cash out for the development and construction of the project, without any of these expenditures to receive some early payments, offering some better financing conditions.

Of course, many financial schemes may apply, for example, a grace period on loan (pay only interest during the construction period) or specially developed bridge financing schemes, allowing the company to manage the cash out during the construction period.

The inclusion of an asset in the asset base only after its commercial operation provides a significant (dis)incentive to the project developer to prepare carefully the development and construction plan, show diligence in the licensing and permitting process, as well as procurement equipment, to complete on a timely manner the project, to avoid any time overruns, deteriorating its cashflow.

Nevertheless, as a rule, no remuneration during the construction period may develop negative incentives for large-scale projects requiring a multiyear period to completion; it might be considered that in this type of project, some remuneration might be provided before the completion of the projects, and some time overruns, which are beyond the control of the project developer to be compensated, in order such large scale, and probably technically completed projects to be developed. This rule of including an asset before the commissioning of the project should apply in the case of capital-intensive projects, their scale being too large when compared to the overall asset base of the network operator. Nevertheless, these additional rewards should lead to lower per-unit charges for transmission services for the consumer, compared to the possible increase resulting from additional costs entering the asset base.

The Operator should manage the risk of time overruns, and for that reason, the Operator is expected to propose only mature projects, in terms of permitting or construction complexities, using mature technology and remain reluctant to propose innovative green field projects.

Different incentives may apply to mitigate risks of time overruns, but also incentivise the Operator to take responsibility for preparing and executing the projects timely:

1. Under time constraints, include a premium in the WACC for specific projects. Incentivise the Operator with a higher remuneration for the specific project if it is completed on time (and probably within budget). This incentive might not impact public companies, not focused on monetary rewards.
2. As time overruns might be a result of exogenous operator conditions, a more effective incentive for the Operator to include part of the construction cost in the asset base receiving remuneration before the commissioning of the project, mitigating the risk of cash flow deterioration, having a positive effect the interest rate of the load for the specific project.

4.2.3. Incentives for stranded assets

Applying a cost-plus methodology for price regulation, with the correction factor, provides full mitigation of the volume risks, as assets included in the asset base are reimbursed, even if volumes expected to use the project are not confirmed. Nevertheless, final customers might be at higher risk, as projects that are not providing benefits to the system, either in terms of more efficient operation or in terms of increased flows of energy, will be asked to pay higher tariffs to allow the cost recovery of the cost of low utilised assets.

In that sense, it should be considered to provide some additional incentives to the project promoter to intensify its effort to increase the utilisation of the asset, coordinate efficiently the development of the projects with other projects with a multiplier effect and mobilise actors, relevant to the project, to materialise the benefits expected. These special incentives might have the form of increased return on the investment or other monetary rewards (or payments), securing the engagement of the developer to further exploit in an efficient manner the available assets.

A special case of projects exposed to volume risks concerns anticipatory investments, which, as already said, are investments developed before the need for the asset's services exists, referring to the need to take advantage of economies of scale and develop network infrastructure with a forward-looking approach. Nevertheless, anticipatory investment should not be considered as being exposed to volume risk, as this type of investment is expected to be fully utilised in the future, and the demand for its services is expected to grow. Nevertheless, if this anticipated demand for services is not developed as expected, anticipatory investment may become a stranded asset even in the longer term. In such a case, an accelerated depreciation approach might be applied among the rules for treating anticipatory investment, allowing a front-loaded investment cost recovery.

4.2.4. Incentives for efficiently incurred cost

Benchmarking and similar measures should be promoted to allow the identification of efficiently incurred costs. Nevertheless, a benchmarking methodology should consider the nature and the special features of the project to its technological characteristics and the importance of its role in the efficient coordination of the activities for the development of other system-connected infrastructure (i.e. generating arising capacity, RES capacity, storage) to be captured in the benchmarking method to be developed. Historic values and experience might not provide proper benchmarks, as transforming both the transmission and distribution systems towards decarbonised, decentralised and digitalised systems requires new technologies and significant changes in network companies' business models and future roles.

4.2.5. Incentives for liquidity risks

As expenditures before the commissioning of the project are not reimbursed, liquidity risk might be significant for the project developer, resulting in an aversion of the promoter to large-scale, long-to-build projects, requiring significant cash input to support their developments. Especially in the case that the development cost for these projects is relatively large compared to the size and value of the TSO or the DSO, then liquidity risk might become a major barrier to promoting large-scale projects.

Option for reducing the risk may come from the financing industry, providing loans with a grace period during the construction period, but from a regulatory point of view, the inclusion of efficiently incurred expenditures before the commissioning of the project, but when the cost incurred, should be considered. In such a case, special arrangements may apply. For example, the remuneration during the construction period might be offset by applying a decreased rate of return for this specific project for the remuneration during the construction period to be offset by decreasing the payments after the commissioning of the project for a set period required. Incentives for systematic risks

Systematic risks should be managed within the calculation of the weighted average cost of capital by applying the proper country risk and beta factors, capturing the overall market conditions that can impact the projects for the transmission and distribution systems. Nevertheless, as other types of incentives and risk mitigation measures may apply is should be avoided for the same type of risk more than one risk-mitigation measure to apply.

4.2.6. System expansion for supporting penetration of RES

Traditionally, Transmission systems have been developed, in their geographical dimension, to connect production locations, related to the availability of the relevant resources (e.g. lignite fields, water availability) to the consumption locations, mainly big cities or industrial sites. The penetration of RES requires the expansion of the transmission system towards the area where the RES potential is exploitable (mainly this refers to wind farms) while, as the penetration of wind and solar generation at large scale requires balancing services to reduce congestions, adequate transmission capacity is needed to support the required balancing actions.

From the regulatory point of view, this type of project, i.e. the expansion and reinforcement of the system to allow the connection of RES capacity to the system, faces the following difficulties and risks:

a) These projects might be costly, as the transmission system might be required to expand to remote areas with limited electrical infrastructure. That means the developer might face risks related to cost overruns, time overruns and liquidity, as the assets re remunerated only after their commissioning.

b) Volume risks related to the lack of coordination with the construction of the RES capacity, which is supposed to be connected to these

4.2.7. Smart Metering infrastructure in the distribution system

At the distribution level, several new challenges, such as the rapid integration of distributed energy resources and the growing electrification of mobility, will need to be met by a more intelligent and communicative electricity network, the so-called smart grids. Smart grids require a fundamental transformation of the electricity industry's operating model to enable a more efficient allocation of energy resources (to meet energy demand) while ensuring the active participation of consumers (and "prosumers") in energy markets. However, transitioning from the current centralised, top-down model will require considerable investment, especially in the distribution system. Since DSOs are regulated entities that have to cover their costs through regulated revenues, the Regulator is expected to have an important role in setting up a framework that fosters investment in SG development.

In recent years, many regulators (such as Ofgem in the UK) are modifying their regulatory interventions to become more innovation-friendly, and to ensure that new forms of investment are reflected in the regulated tariffs.

Several TSOs and DSOs have already developed dedicated incentive mechanisms to stimulate innovation within the transmission and distribution system.

The case of TERNA, the Italian TSO, includes the option that selected energy storage projects are promoted by receiving a premium of 2% in their WACC for 12 years. All innovation projects in Italy receive a premium of 2% for 12 years. ELES, the TSO in Slovenia, also apply a 2% premium in the case of Smart Grids. These incentive mechanisms either focus on the penetration of smart meter technologies as a part of the distribution system development or promote the commercial arrangements between consumers and their suppliers. They are designed to support innovation initiatives that Distribution System Operators are unlikely to undertake without these incentives. As the expected relevant efficiencies would primarily benefit the consumers and their suppliers, as the continuous flow of information concerning the consumption characteristics would allow the offering of personalised and improved supply services, the DSOs might unenthusiastically respond to such challenges. The DSO needs to invest both in IT equipment and human capital to upgrade its competences and expertise to serve the requirements of new business and technological environment, foreseeing the full digitalisation of the distribution system, affecting the status quo and the cloture of the company, requiring a completely different business approach to be applied.

The first category of measurers includes frameworks with particular incentive mechanisms for innovative initiatives, and the second includes frameworks where innovation-related investments are treated like other costs. In the first category, the two variants of incentive mechanisms that various regulators have developed to support smart grid investments, and more specifically for pilot projects, are: a) the provision of higher rates of return (i.e., adding an extra or bonus component to the regulatory weighted average cost of capital or WACC), and (2) the adjustment of revenues (i.e., providing an extra allowance or specific rewards due to performance targets).

Nevertheless, most EU countries treat innovative initiatives like any other cost; i.e., there is no specific compensation for the risks involved in adopting new technologies and processes, not differentiating the WACC offered.

In other countries, NRAs adjust the revenues by providing an extra allowance in the case of technologically innovative initiatives, by implementing a special levy, and by outsizing the use-of-system tariff methodology in the form of a public service obligation, applied to all customers to finance the development of Smart Grids. In some cases, an incentive innovation factor (multiplier) is applied when the allowed allowance is calculated; nevertheless, this type of incentive cap can only be applied when incentive-based mechanisms are applied and not in a cost-plus approach.

5. ADVANCED REGULATORY APPROACHES

As discussed in Chapter 2, there are two main groups of regulatory models: cost and price models.

- Cost Models offer limited incentives for the operators, as they tend to go through the cost of investments; however, they are considered a more investment-oriented model appropriate for systems that require large-scale investment, and the new operators need a clear long-term investment path for delivering the anticipated projects.
- Price Models incentivise operators to invest smartly and operate the systems efficiently. However, this might not be the proper approach in systems with massive reinforcement needs, where delays in delivering projects might significantly distort the efficient coordination between the projects of interested parties (vREs investors) and the network investments.

In modern regulatory schemes, a combination of different regulatory approaches is implemented. The base regulatory model, such as a cost or price base, is applied and supplemented by complementary mechanisms, providing incentives (monetary, operational, etc.) on specific aspects of system development and operation.

Regulatory incentives may focus almost exclusively on using inputs (operational and capital expenditures). However, the current concerns for network innovation and sustainability are being addressed instead, with incentives that focus on output measures of companies' performance (network reliability, environmental impact, ability to connect dispersed generation, etc.).

The best-known example in this regard is the regulatory scheme announced in 2010 and adopted by Ofgem in 2013, the Revenue, Innovation, Incentives and Output (RIIO) model (Ofgem[4]), the Italian regulatory authority (and other regulatory agencies), and others are also moving in this direction.

Output-based regulation has an important advantage: leaving the decision on how to use the resources to the regulated firm minimises inefficiencies in the use of inputs. On the other hand, it forces the regulated firm to increase expenditures to meet the additional goals set by the Regulator (in contrast with the cost efficiency objective).

Moreover, Output-based regulation presents implementation complexities and requires adequate regulatory powers, budget, and skills. In Italy, output-based incentives have been applied to quality indicators for over a decade, together with incentives aimed at productive efficiency.

The base regulatory model can be a combination of cost and price models, with specific elements that can be applied to support the direction we envisage the system needs to be developed.

[4] Handbook for implementing the RIIO model, Ofgem, 2010, https://www.ofgem.gov.uk/sites/default/files/docs/2010/10/riio_handbook_0.pdf

Key elements of the base regulation, either cost or price-based, include:

1. TOTEX approach, which treats similarly capex and opex expenditures, in order to allow the operators to combine capital expenditure with operational improvement effectively make efficient combinations. TOTEX approach may increase the degrees of freedom for the operators to make the best sharing of the allowed revenue between CAPEX and OPEX. However, the Regulator needs to ensure that the decision by the operator does not harm the good financial standing of the Network operator in the long term, which also depends on the level of assets and in-house developments used (e.g., IT systems).
2. Forward-looking investment (expense) budget, in the form of anticipatory design including also project-based forward-looking budgets for qualifying projects

5.1. Output Oriented elements

We present and discuss some Output Oriented regulation elements.

5.1.1. Dealing with CAPEX bias

In a TOTEX approach, all expenditures, whether for capital expenditures (CAPEX) or operational measures (OPEX), are treated equally, forming the TOTEX. In practice, however, regulation sometimes treats OPEX and CAPEX asymmetrically, such that smart OPEX-heavy solutions are riskier and less worthwhile for grid operators, preferring to invest in CAPEX, which sometimes receives a more attractive remuneration. This is referred to as an OPEX-CAPEX-incentive-bias (CAPEX-bias).

5.1.2. Comparing congestion or curtailment costs with reinforcement expenditures

Congestion and curtailment costs are both, in a broader sense, dispatch costs or, in more recent terminology, flexibility costs. These expenses are directly related to grid reinforcement; expect to reduce these expenses. This involves a trade-off as more costs for grid reinforcement imply lower flexibility costs and vice versa. Flexibility expenses and grid reinforcement should be subject to similar regulatory incentives to ensure that the network operator makes the right investment decisions.

5.1.3. Bonus/malus for connection time (DSO) and/or construction time (TSO)

These incentives relate to results achieved by the Operators, either associated with the connection of new sources or the on-time construction of reinforcement projects:

- A DSO-oriented incentive mechanism for timely connection is not constrained only to RES but also to other facilities; it may introduce a mechanism giving RES priority.
- A TSO-oriented incentive mechanism to promote the timely construction of grid reinforcement projects.

5.1.4. System Development Plan (SDP)

Coordination of system and network development has gained attention in recent years. The primary interest here is that better coordination improves network usage, reducing the need for grid reinforcement, especially when anticipatory designs are implemented.

5.2. RIIO model

The RIIO model[4] - Setting revenue using Incentives to deliver Innovation and Outputs is designed to encourage energy network companies to:

- play a full role in the delivery of a sustainable energy sector; and
- deliver value-for-money network services for existing and future consumers.

In addition to the implementation of a TOTEX-based approach to the calculation of allowed costs, RIIO departs from the classical input-based regulation towards a more output-based regulation, where the remuneration of the network companies is linked, to a more significant extent than in the past, to the achievement of certain output ctaegories, including customer satisfaction, reliability and availability, safety, connection terms, environmental impact, and social performance, to which benefits for the system and network users are associated.[5]

As described in the Handbook, the regulatory framework incorporates three elements which are designed to meet the objectives of RIIO regulation:

- an upfront (ex-ante) price control that sets the outputs that network companies are required to deliver and the revenue they can earn for providing these outputs efficiently;
- the option to give third parties a more significant role in the delivery of material and separable projects; and
- A time-limited innovation stimulus for electricity and gas networks is open to network companies and non-network parties.

Under the RIIO model the price control includes details of the primary outputs network companies are expected to deliver and sets revenue for efficient delivery of these outputs. This revenue commitment comprises three elements:

- Base revenue to cover expected efficient costs (including financing costs) of delivering outputs and long-term value for money, including allowances for maintenance of, and investment in, capital assets and taxation;
- Adjustments to reflect company performance in delivering outputs efficiently and innovating to expose efficiencies during the control period; and
- Adjustments made during the control period for specified uncertainties that are considered to be outside the company's control but will have a significant impact on costs of delivery (e.g. compensation for changes in general price inflation in the economy) and changes to financial parameters that are updated during the period (e.g. annual adjustment to the cost of debt, pension adjustments).

---

5 https://www.acer.europa.eu/sites/default/files/documents/en/Electricity/Infrastructure_and_network%20development/Infrastructure/Documents/Benefit_based_regulation_2023.pdf

Outputs are at the heart of the RIIO model. Base revenues and incentives in the framework are linked to the delivery of the outputs. Outputs are set for the eight-year price control period, with an expectation that they will remain in place over the long term. Network companies have a clear role in determining the best way to deliver outputs at long-term value for money. A review of the output requirements takes place mid-way through the price control period, to reflect any changes in what network companies are required to deliver. Companies are accountable for delivering outputs and are incentivised through rewards for delivery and penalties for nondelivery.

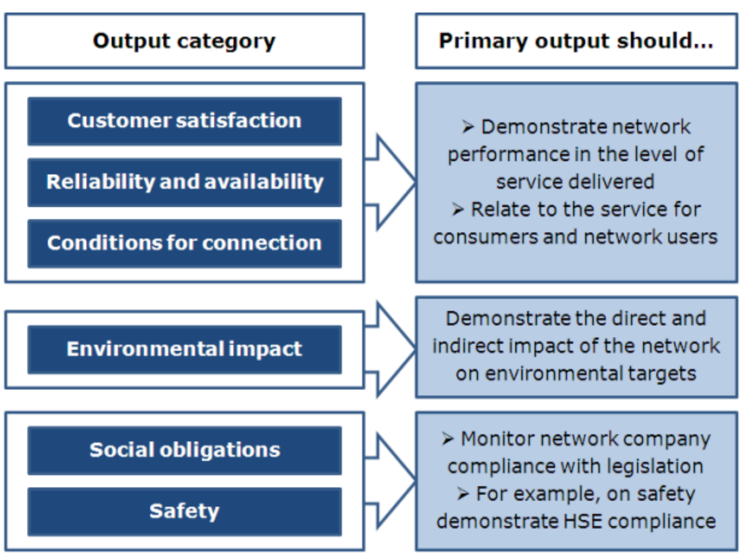
Network companies are expected to deliver outputs in one of the six output categories shown in the Figure below. These categories reflect the broad role that energy network companies play in delivering the objectives of the RIIO model. Output categories are at the centre of the price control review and drive the setting of the price control itself.

Output categories

Customer satisfaction Satisfaction of consumers, including a broad spectrum of network users, with network services	**Reliability and availability** Aspects of reliability and availability of network services that consumers are concerned with (eg, number and duration of outages, constraints costs)	**Safety** Compliance with Health and Safety Executive safety standards
Conditions for connection The process for new/ enhanced connections to the network	**Environmental impact** Impact of network operation on the environment (including noise/visual impacts) and contribution to environmental targets	**Social obligations** Services to fuel poor and vulnerable consumers in line with Government requirements

At the price control review, a set of primary outputs is developed for each output category to enable the Regulator, network companies, and stakeholders to clearly understand what is being delivered in each area.

The Figure below illustrates how the primary outputs are derived from relevant output categories. Three of the categories include primary outputs directly related to the 'experience' of network service consumers. The environmental impact category includes outputs related to the impact of network companies and the provision of network services on the wider environment. Primary outputs in the social obligations and safety categories include those mandated by the government.



As far as possible, primary outputs adhere to the following principles:

- material: the primary outputs should make a significant contribution toward the objectives of Sustainable Network Regulation;
- controllable: the network company should have full or a sufficient degree of control over performance against the primary outputs, with the strength of any incentive taking account of the degree of controllability;
- measurable: it should be possible to meaningfully measure the primary outputs using quantitative or qualitative methods;
- comparable: it should be possible to measure the primary outputs meaningfully over time and across network companies in a sector by normalising the levels of performance that they are incentivised to achieve;
- applicable: it should be possible to use the primary outputs to set penalties and rewards as part of the process of determining revenue allowances;
- compatible with the promotion of competition: the primary outputs should facilitate competition in upstream and downstream markets, e.g. for independent gas transporters and independent distribution network operators as well as developing retail models such as energy service companies (ESCOs); and
- legally compliant: the primary outputs should be compatible with existing legal obligations that are within our remit and the remit of other government bodies.

6. OVERVIEW OR REGULATORY STATUS IN THE WB REGION

Representatives of Bosnia and Herzegovina (FBiH) and Serbia shared information about their countries' regulatory status and discussed the possibility of introducing output-oriented incentives for DSOs and TSOs.

Bosnia and Herzegovina

A representative of Bosnia and Herzegovina briefed participants on the main elements of the FBiH's regulatory framework.

A required revenue method is applied; however, no incentive schemes are applied. A scheme for implementing a quality regulation is under discussion. Currently, the main discussion focuses on restructuring the tariffs, specifically making them more capacity-based and reducing the part of the tariff based on volume charges.

This approach is related to fears of possible reductions in the overall volumes of energy flown on the transmission systems due to local generation and consumption. These concerns signal the need for more efficient project planning in the short and long run to avoid, on the one hand, the possibility of standing assets not being used efficiently and, on the other hand, ensure the overall development of the systems for future demands, as further integration of RES and electrification is expected.

Digitalisation is significantly delayed, not allowing active participation in system operation. The lack of accurate and updated information makes planning challenging.

Serbia

The Serbian representatives described the basic elements of the tariff methodology applied in Serbia, which is a cost-based approach to approving justified expenditures. Currently, no incentive scheme is applied.

The 2023-2032 plan for the distribution system operator is approved, with a main focus on expanding the system and integrating RES. Discussions are also being held on introducing quality of supply regulation concerning supply continuation and voltage control mechanisms.

Concerning the TSO, the key priorities are related to

a) Improving the reliability of the system
b) Extend the lifetime of equipment
c) Maintain ageing infrastructure
d) Integration of RES and storage

A 10-year development plan is prepared and updated every two years. The new NECP was submitted in July 2024, so the Developnet plan needs to be updated to support it.

The legal framework and competencies for the Regulator to introduce incentive mechanisms for the efficient development of the grid also need to be developed.

7. SWOT ANALYSIS

A SWOT analysis is a strategy commonly used in strategic program planning. It provides a simple framework to scan both the internal and external environment. The SWOT analysis provides information that helps match the resources and capabilities to the environment in which it operates. It also acts as a filter to reduce the information generated to a manageable number of key issues.

SWOT analysis comprises four categories: strengths, weaknesses, opportunities, and threats. Strengths and weaknesses are internal, while opportunities and threats are external factors, often beyond the entity's control, but that impact and/or influence considered activities. The following matrix presents the components of the SWOT analysis.

SWOT Matrix	**Advantages**	**Challenges**
Internal factors	Strengths	Weaknesses
External factors	Opportunities	Threats

A critical question that guides the SWOT analysis is: What are the regulatory options in the WB to incentivize TSOs/DSOs to invest in network expansion and accommodate larger shares of vRE into the energy mix?

The SWOT analysis aims to generate ideas/solutions for developing a conducive regulatory framework for output-oriented regulation in the WB.

Strengths

- Alignment with EU legislation
- Increased investments in vRE and larger shares of RE in the energy mix
- Emissions reduction
- Increased network stability

Weaknesses

- Legal and regulatory framework
- Awareness of the new regulatory models and capacities to implement them

Opportunities

- Introduction of new regulatory approaches
- Facilitation of innovations (in TSOs/DSOs)
- Increase in efficiency
- Increased revenues of TSOs/DSOs
- Reduction of network outages and enhancement of regional trade
- Better performance of TSOs/DSOs

Threats

- Independence of National Regulatory Authorities in decision-making
- Increase of network costs/network charges
- Myths and misperceptions of TSOs/DSOs about larger shares of grid-connected vRE

Based on participants' reflections, the RWG participatory event produced helpful information as the foundation, focus, and rationale for proposed regulatory solutions. Identified regulatory solutions include:

1. Creation of legal and regulatory frameworks for the introduction of output-oriented incentives for TSOs/DSOs
2. Increasing awareness and capacities of Nationa Regulatory Authorities related to new regulatory models
3. Increase of enforcement powers and independence of National Regulatory Authorities.