

European perspectives on incentive regulation:

What are the benefits of a more output-based regulation?

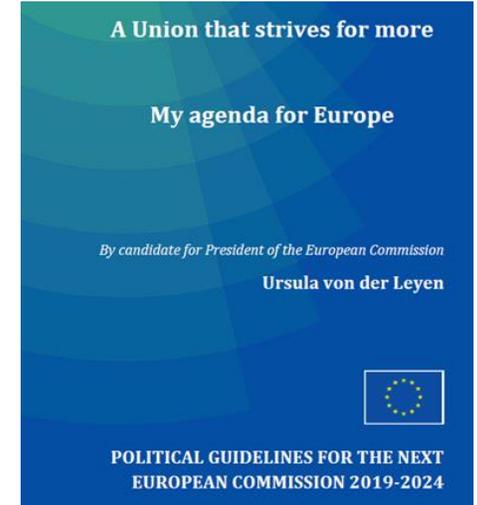
Nicolò Rossetto

Göttingen, 11 May 2023



Setting the scene (1)

- A significant transformation of energy systems is ongoing
 - Technological developments
 - Public policies (decarbonisation)
 - Changes in consumer preferences & needs
- Fit for 55, energy crisis and REPowerEU accelerated the rate of change



Framework	2020 Climate & Energy Package (2009-2020)	Clean Energy Package (2021-2030)	Green Deal (towards 2030 and 2050)
Targets	<ul style="list-style-type: none"> • 20% GHG emissions reduction; • 20% share of RES (binding at national level); • 20% energy efficiency. 	<ul style="list-style-type: none"> • at least 40% GHG emissions reduction; • 32% share of RES (binding at Union level); • 32.5% Improved energy efficiency relative to a business-as-usual scenario. 	<ul style="list-style-type: none"> • Updated GHG emission target of at least –55% by 2030, compared to 1990; • Net-zero carbon emissions by 2050; • Provisional political agreement: 42.5% share of RES with an additional 2.5% indicative top up; • Proposed 36 % energy efficiency in final energy consumption.



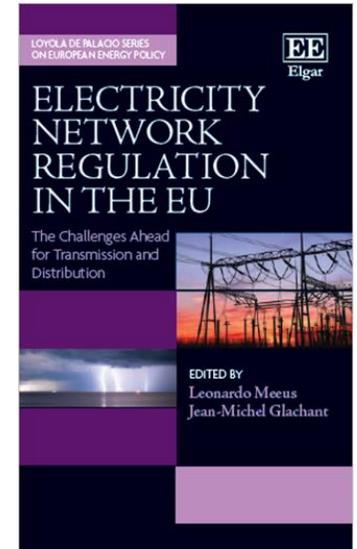
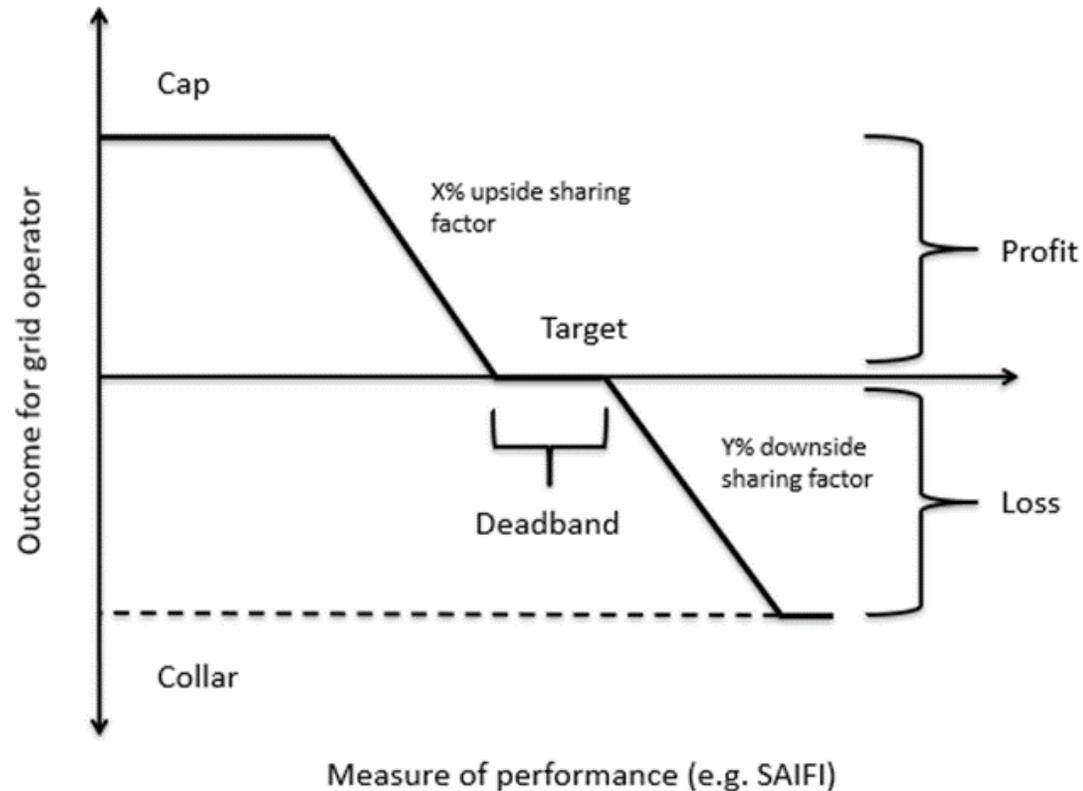
Setting the scene (2)

- Expectations about what energy grids must deliver are changing too
 - Decentralisation
 - Electrification
 - Phase-out of natural gas
 - Energy system integration
- Current regulatory practice is questioned: is a more output-based regulation part of the necessary change?
- Not a new concept, but knowledge and experience of it are still limited
- Purpose of today:
 - Introduce the concept
 - Highlight the role it could play within the regulatory toolkit
 - Illustrate some national experiences



What is output-based regulation? (1)

- An incentive scheme focused on outputs, also known as 'performance-based regulation'
- Regulator sets a target for a KPI and a reward/penalty mechanism for the regulated firm
- Firm can choose how to achieve the target
- Normally, supplements other regulatory tools

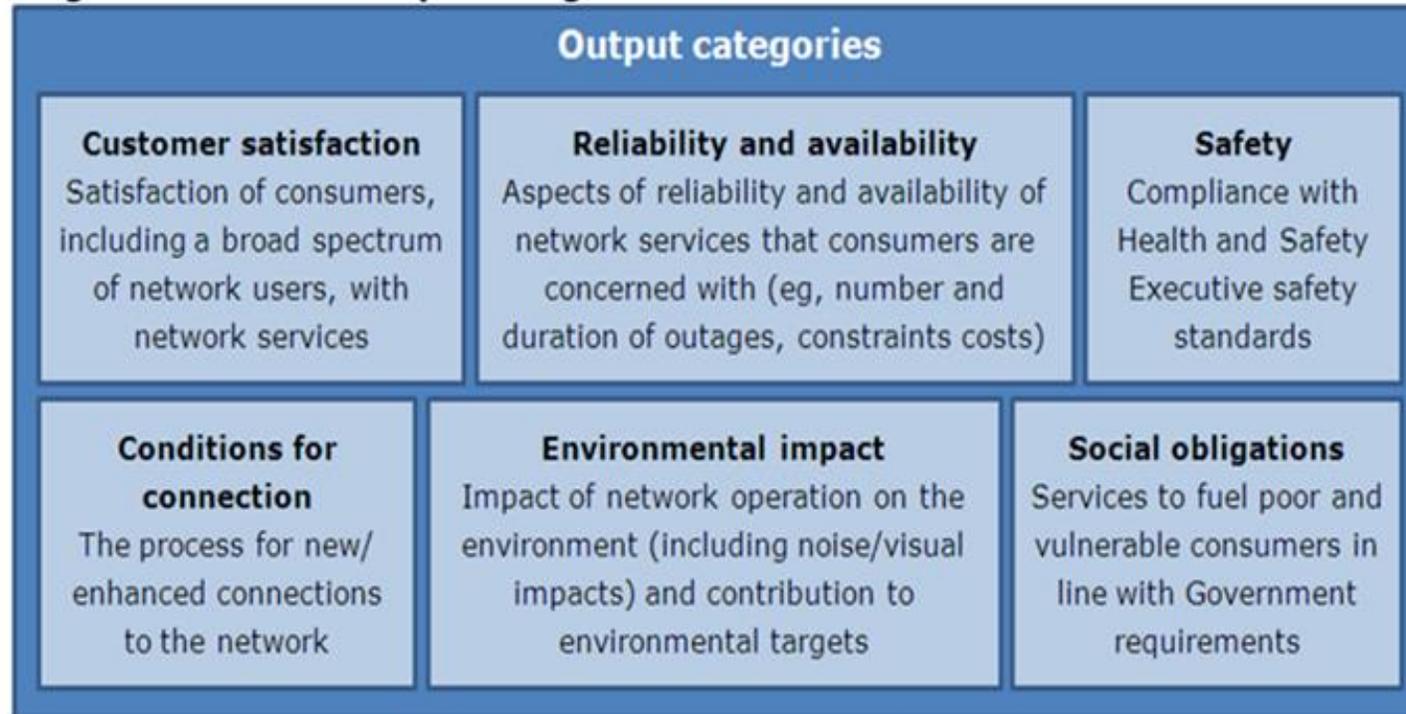


Source: Rious and Rossetto (2018), p. 12

What is output-based regulation? (2)

- The output can be basically anything for which a KPI can be defined

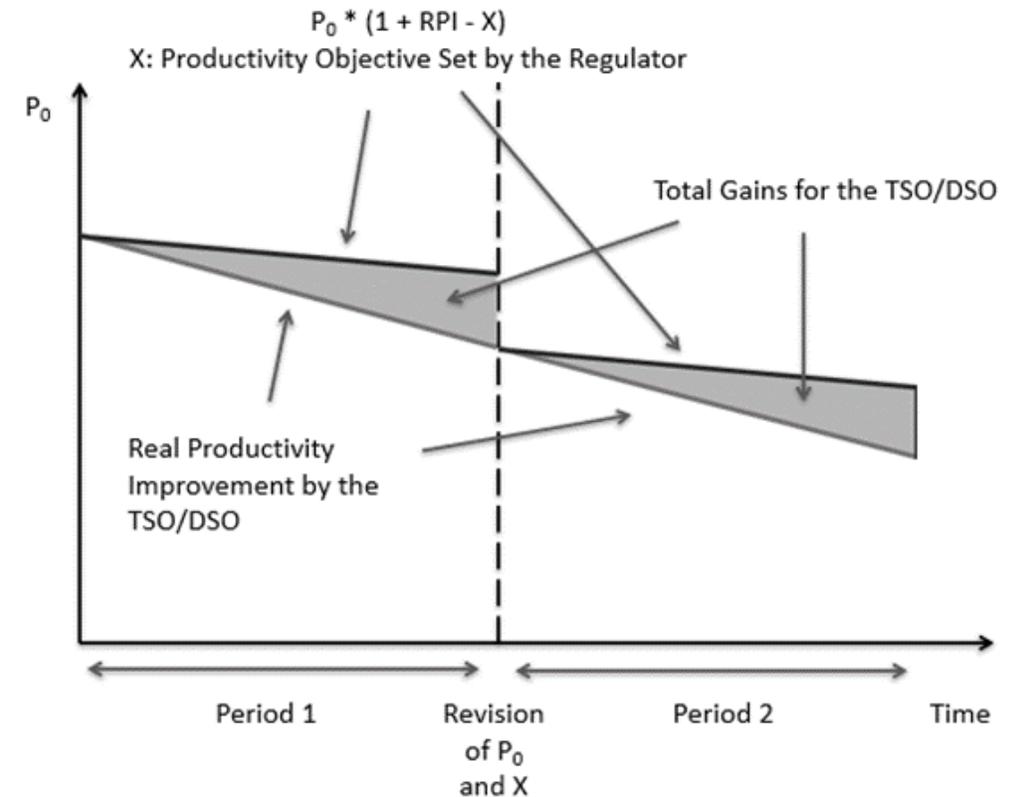
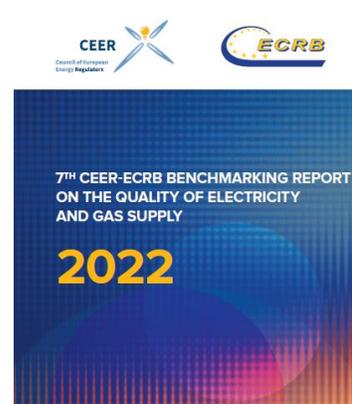
Figure 14: The six output categories



Source: Ofgem (2010), p. 33

Why are we interested in output-based regulation? (1)

- Initial interest due to a dissatisfaction with some side effects of input-based incentive regulation (RPI-X)
- Need to set explicit targets on quality of service to counterbalance an incentive to inefficiently cut costs
- Positive results obtained in the years after liberalisation (e.g., GB and Italy)

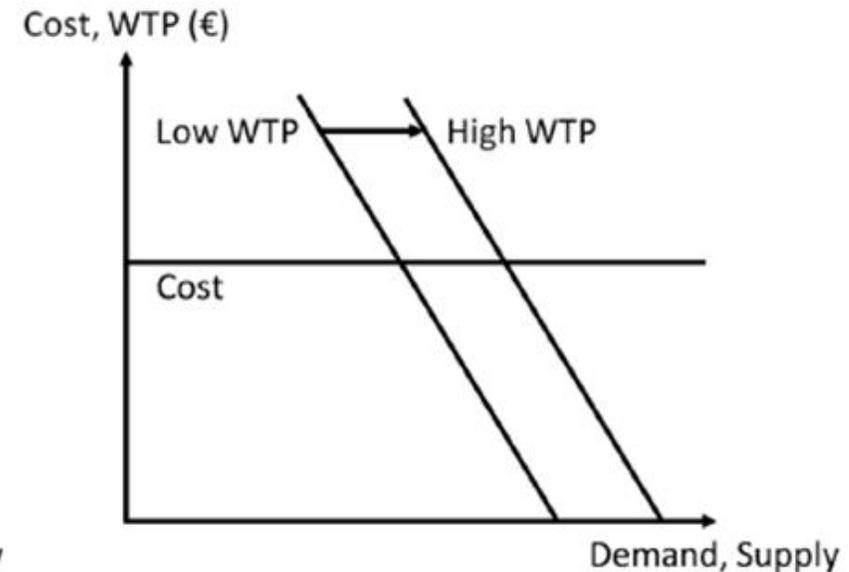
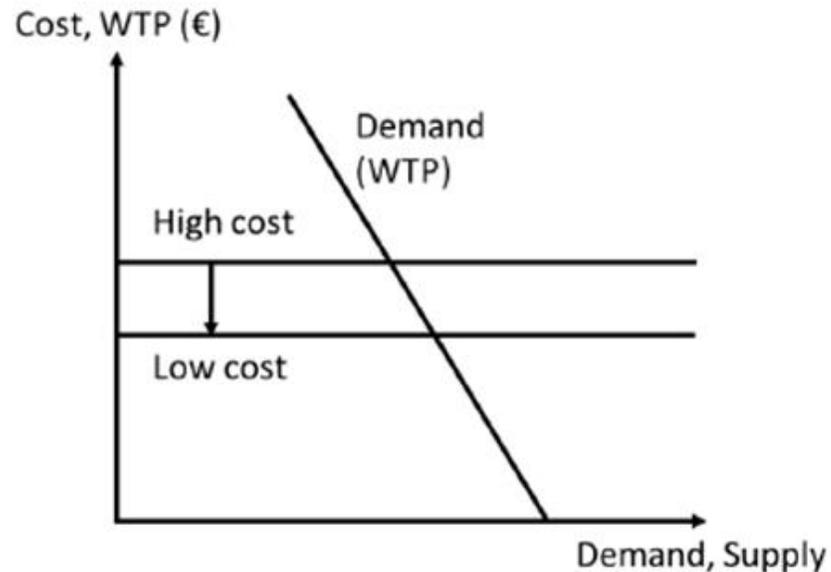


Why are we interested in output-based regulation? (2)

- More recently, attention to value creation has expanded
 - Network costs increasing
 - Need to innovate
 - Need to have a whole-system approach & capture externalities
 - Need to develop new tasks and business models
- Output-based regulation can incentivise activities requiring cost increases and upfront expenses and capturing external benefits
- A flexible tool allowing the regulated firm to find its way to meet competitive challenges and changing demands of customers
- Complement to price/revenue cap

Why are we interested in output-based regulation? (3)

A shift in the cost curve versus a shift in the demand curve

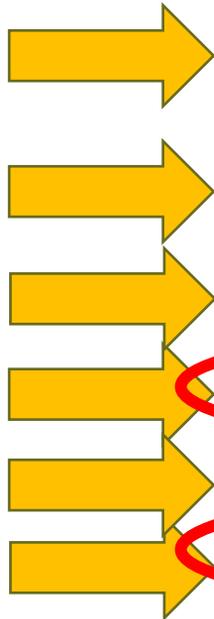


WTP = willingness to pay.

Source: Brunekreeft et al. (2020), p. 26

Why are we interested in output-based regulation? (4)

Main common goals of DSO regulation	
	Ensuring a level-playing field: acting in a non-discriminatory manner to all parties, including non-discriminatory network access, and acting as neutral market facilitators, for example in buying flexibility services from the market.
	Promoting cost efficiency: promoting cost efficiency in the absence of competitive pressure. DSOs perform their core tasks in a way which meets the reasonable expectations of network users and other stakeholders in the most efficient and economical way.
	Ensuring financial viability: ensuring that DSOs have sufficient financial means to operate efficiently based on a cost of capital which reflects national circumstances and their regulated status.
	Improving quality of service: ensuring that DSOs offer the right services, including secure and timely data management when applicable, with a service quality level that is satisfactory for network users and contributes to security of supply for the whole system.
	Facilitating innovation: promoting a regulatory environment that removes barriers to the pursuit of innovative approaches by DSOs and which have the potential to bring savings or benefits to consumers, without foreclosing competition in new activities.
	Ensuring security of supply: promoting security of supply (including resilience of networks to extreme climate events) and safety in service operations.
	Facilitating the improvement of sustainability, including the promotion of energy efficiency: regulation should facilitate the improvement of sustainability across the energy system and promote the reduction of energy losses along the grid.
	Introducing a holistic view: ensuring a coordinated whole system approach.
	Ensuring that DSOs safeguard customer privacy, ensuring secure data management and non-discriminatory access to data, considering the growing need for higher levels of cybersecurity.



Incentives Schemes for Regulating
Distribution System Operators,
including for innovation
A CEER Conclusions Paper

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19 February 2018

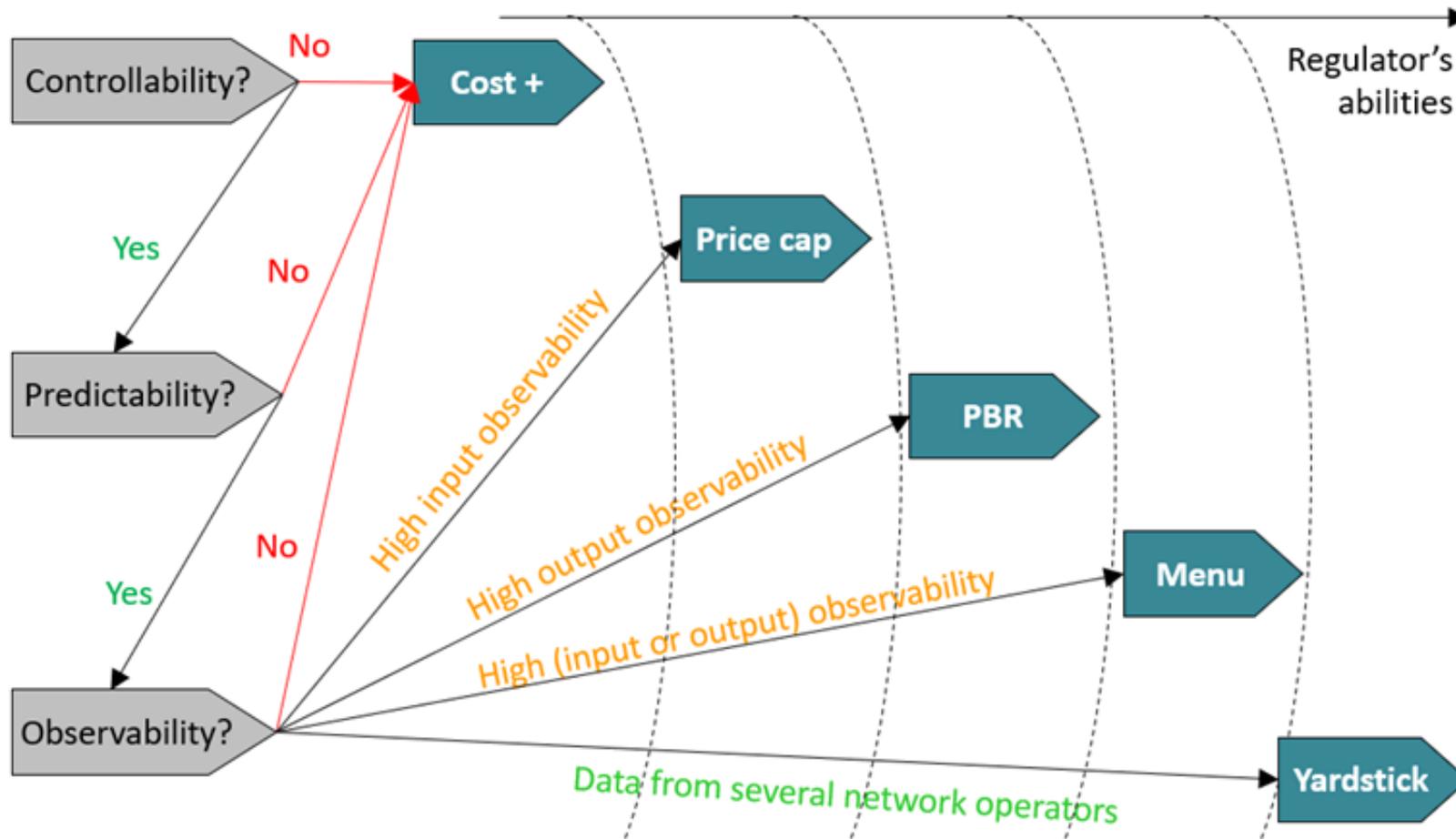
When does it make sense to apply output-based regulation? (1)

- No panacea for energy network regulation
- Network firms as a set of different tasks with their specific characteristics (which depends also on the features of the energy system within which they are performed)
 - System operation
 - Grid maintenance
 - Customer relationship management
 - Grid expansion
 - Integration of RES
 - Internal market completion
- Resource-bounded regulators (limited staff, skills, administrative power, etc.)
- Choice of the most suitable regulatory tool depends on an alignment between a task's characteristics and the regulator's resources

} New(er) tasks



When does it make sense to apply output-based regulation? (2)



Source: Rious and Rossetto (2018), p. 47, available at: <https://cadmus.eui.eu/handle/1814/53285>

When does it make sense to apply output-based regulation? (3)

- The need to ensure a 'regulatory alignment' suggests that output-based regulation should be used when
 - The task is controllable and predictable
 - The output of the task is observable
 - The regulator is sufficiently sophisticated and well-endowed
- The regulator must
 - Identify the relevant output and the associated performance target
 - Define the appropriate financial incentive to reach it
- Various challenges exist
 - Set robust KPIs (to avoid 'mark the marker' behaviours) and monitoring processes
 - Avoid under/over-incentive
- Benefit for society from improvement vs value left to the firm after deducting efficient effort



Is output-based regulation a good approach for innovation? (1)

- Revival in RD&D needed in the energy sector to deal with the ongoing transformation
- Energy networks with no such a brilliant track-record after liberalisation
- Several tools adopted by regulators to promote innovation
- Is output-based regulation the way forward?

Energy Network Innovation for Green Transition: Economic Issues and Regulatory Options

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ABSTRACT

In this age of multiple economic challenges and stimulus packages, is it a good time to heavily invest in tomorrow's energy networks and research infrastructure? The academic literature widely acknowledges that innovation is key to decarbonising the energy sector and fostering sustainable development. However, R&D and innovation have not been strongly promoted following the liberalisation of the energy sector. Is this a case of business, regulatory, or policy failure, or are there other factors involved? In this paper, we suggest reasons for the slow uptake of new technologies in energy networks and discuss some remedies for the European context, where innovation in the area of energy networks is crucial for the implementation of the Green Transition. The solutions to address this shortfall need to be considered in an overarching manner. The specific points raised are with reference to incentive regulation, the establishment of competitive funding models like Ofgem's Low Carbon Network Fund, and a large European collaborative research hub.

Keywords: Energy Network Infrastructure; European Green Deal; Innovation; Research and Development.

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Regulatory mechanisms to stimulate innovation

Issue	Costs for innovation are incurred upfront while benefits are uncertain and only materialise on the longer term (short-term thinking and risk-aversion)				Innovation benefits can go beyond grid cost reduction (externalities)
Tool	Input-based regulation				
(they can be combined)	RAB-based approach	WACC-based approach	Cost-pass through	Competition for funding	Output-based regulation
Explanation	Include R&D and innovation spending in regulatory asset base	Increasing the return on investment to compensate for the risk	Spending on R&D and innovation is a current expenditure	Tender for grants of an innovation fund	Improving outputs can foster innovation as a mean to gain rewards
Example	In GB, it is applied to infrastructure projects and discussed for new nuclear projects	In Italy, some smart grid projects receive additional WACC	In Norway DSO R&D expenditures are added to the allowed revenues	In GB, there is an annual Electricity Network Innovation Competition (NIC)	Automation in smart grids (e.g., meter readings and control) can have an effect on quality-of-service incentives

Source: Own elaboration based on Meeus et al. (2012), Bauknecht (2011), CEER (2017) and Newbery et al. (2019)

Is output-based regulation a good approach for innovation? (2)

- Promotion of innovation as an uncertain activity
 - Controllable to some extent
 - Predictable to a limited extent
 - Partially observable (how can we measure innovation?)
- Output-based regulation does not seem to be the first best...
- However, innovation is many things
 - Basic research & piloting vs introduction of innovation & mass deployment
- Cost pass-through and competitive innovation funding to foster less mature innovations
- Extra-remuneration and output-based regulation to foster more mature (i.e., less risky) innovations

Article

Innovation in regulated electricity networks: Incentivising tasks with highly uncertain outcomes

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What do the British experience tell us? (1)

- With RIIO 1, outputs at the core of a 8 year-long regulatory period
- Participation of consumers & stakeholders in the definition of outputs and targets
- Network companies invited to consult consumers and propose alternative outputs
- Financial incentives for outputs not prescribed by law or benefiting from reputational incentives
 - Reliability
 - Customer satisfaction
 - Environmental impact of SF6
- Rewards/penalties could increase/decrease allowed rate of return by 100 b.p. (≈15%)



What do the British experience tell us? (2)

- RIIO 1 revealed how difficult is to manage a complex regulatory tool
 - Interdependencies and interactions make assessment of net effects difficult
 - Not easy to provide efficient incentives
 - Dealing with information asymmetry can be very expensive
 - Targeted incentives can reduce overall efficiency and become obsolete
 - Loss of transparency
- Adoption of RIIO 2 highlights a few changes:
 - Regulatory period reduced to 5 years
 - Adjustment of various remuneration mechanisms
 - Output categories consolidated to three

Incentive Regulation of Electricity and Gas Networks in the UK: From RIIO-1 to RIIO-2

Tooraj Jamasb*

ABSTRACT

The regulatory and operating context of energy networks is dynamic and constantly evolving. Achieving a multitude of economic, environmental, social and policy objectives is a challenging task for the sector regulators. In 2010, the UK energy regulator Ofgem replaced its approach to energy network price control and incentive regulation with a Revenue-Incentive-Innovation-Output (RIIO-1) model. This paper reviews the incentive areas that influence the performance of the next version of the model (RIIO-2). Guided by the principles of regulatory economics and evidence in the literature, we discuss key aspects and incentive properties of the regulation model under revision by the regulator. The lessons of experience from the RIIO models are also relevant for regulators in other countries and can inform their design of incentive regulation of energy networks.

Keywords: Energy networks, Incentive regulation, Rate of return, Cost of capital, Benefit sharing, Menu of options

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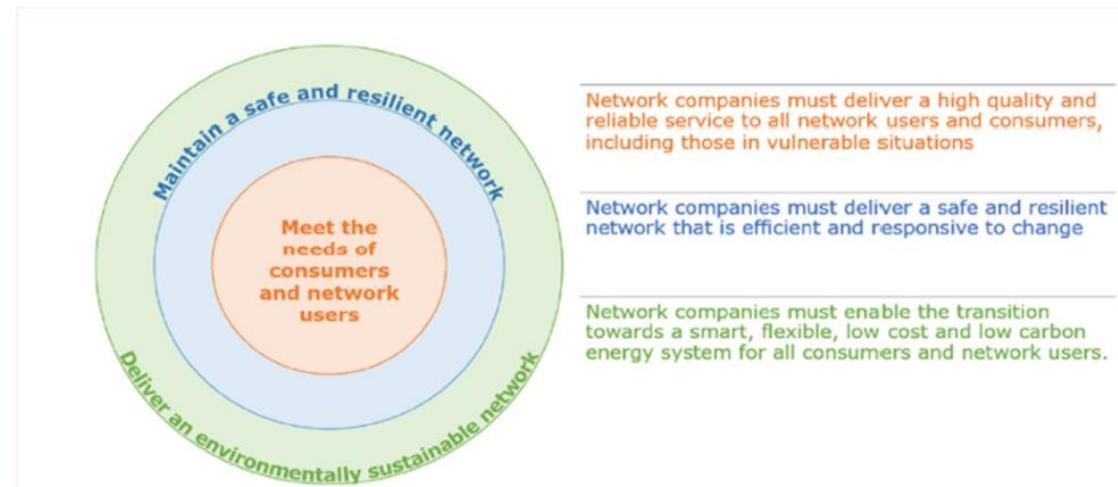


Figure 9: Output categories in RIIO-2



Concluding remarks

- Current transformation of the energy sector calls for a more output-based network regulation
- Output-based regulation shifts the focus from asset sweating to value creation and is compatible with the massive anticipated investments in energy networks
- Not a black check for energy networks (incentive to control costs once the output is set)
- However, it requires sophisticated regulators and is best suited only for the regulation of some tasks
- Robust KPIs and monitoring process must be established
- Risk of ‘outputs’ sprawling’ and excessive complexity
- Not a new concept but experience (beyond quality of service) is mostly recent
- More research is needed, comparing national experiences to discover best practices



Thank you for your attention!

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