Support of smart solutions and cooperation among stakeholders

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Outline

- How to support smart grids deployment?
- Regulation of outputs
  - Direct requirements
  - Performance-based incentive regulation
- Identification of outputs
  - Effects and benefits of smart grids
  - Potential performance indicators
- Regulators supporting research and innovation
- Regulators supporting cooperation among stakeholders, with a focus on standardisation

Regulation of outputs (1)

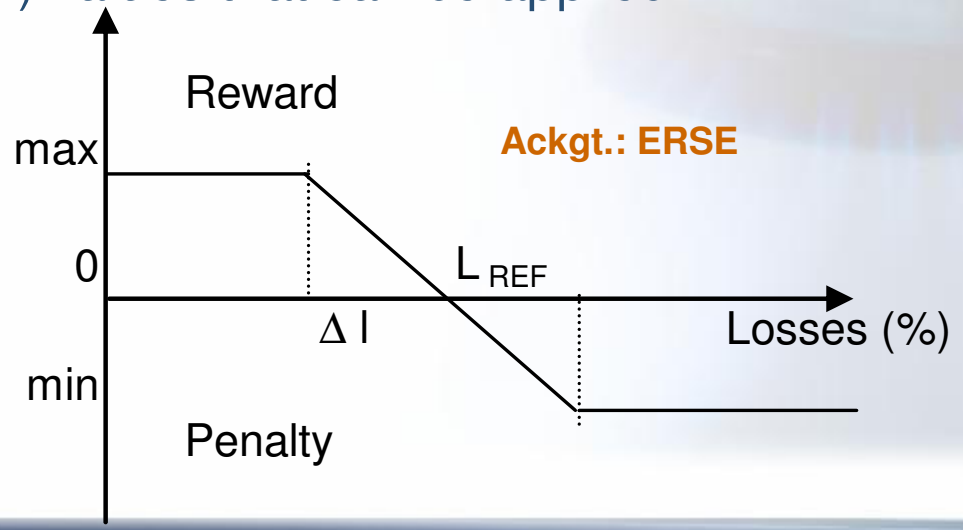
- A key principle of good regulation is to concentrate on outputs of the regulated entity and the effects of a given activity or service
- Regulation of outputs can be done by:
  - direct regulation, i.e. minimum requirements for certain parameters, and/or
  - performance-based incentive regulation providing financial rewards and penalties related to some parameters, and/or
  - benchmarking and comparative publication of company-specific performance results

Regulation of outputs (2)

- Regulation of outputs, either by incentives or by minimum requirements, requires sound definitions of performance targets and indicators
- It is very important to make possible to observe, quantify and verify the regulated performance indicators, by clear and transparent measurement rules
- Performance targets must be strictly related to the pursued objectives and should therefore be cleansed of external effects outside the control of network operators
- Indicators must be benchmarked at national or international level before their adoption
- Best indicators to be considered vary from country to country

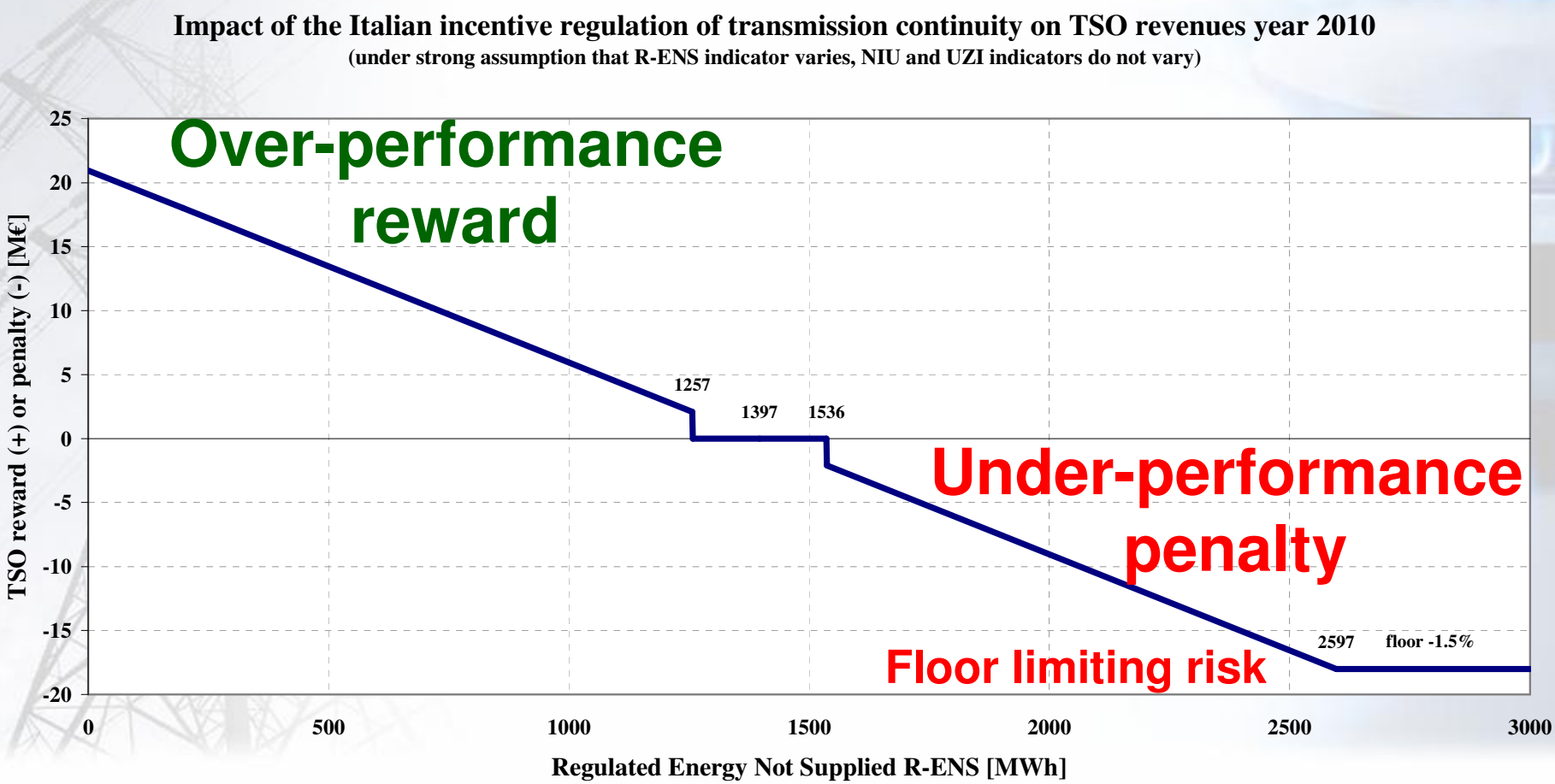
Regulation of outputs (3)

- How performance-based incentive regulation works (example)
- The Portuguese Tariffs Code includes a reward-penalty mechanism for power losses reduction in distribution grids, which allows the HV/MV distribution operator to improve its revenues with an additional amount that depends on the loss performance related to a pre-defined reference
- The mechanism defines annual reference value for power losses (L_{REF}), an unitary valorisation for power losses (slope), a "cap" (ΔL) imposing the max reward (and min penalty floor) values that can be applied



Regulation of outputs (4)

- Performance-based incentive regulation of continuity (example)



Identification (1): smart grids effects and benefits

- First step: identification of effects and benefits which can be achieved by electricity networks of the future

1) Increased sustainability
2) Adequate capacity of transmission and distribution grids for "collecting" and bringing electricity to consumers
3) Uniform grid connection and access for all kind of grid users
4) Higher security and quality of supply
5) Enhanced efficiency and better service in electricity supply and grid operation
6) Effective support of trans-national electricity markets by load-flow control to alleviate loop-flows and increased interconnection capacities
7) Coordinated grid development through common European, regional and local grid planning to optimise transmission grid infrastructure

Identification (2): potential performance indicators

- Second step: identification of metrics to evaluate development paths towards networks of the future

Benefit	Potential performance indicators
(1) Increased sustainability	Quantified reduction of carbon emissions
(2) Adequate capacity of transmission and distribution grids for "collecting" and bringing electricity to consumers	Hosting capacity for distributed energy resources ('DER hosting capacity') in distribution grids Allowable maximum injection of power without congestion risks in transmission networks Energy not withdrawn from renewable sources due to congestion and/or security risks
(3) Uniform grid connection and access for all kind of grid users	Benefit (3) could be partly assessed by: - first connection charges for generators, prosumers and customers - grid tariffs for generators, prosumers and customers - methods adopted to calculate charges and tariffs - time to connect a new user
(4) Higher security and quality of supply	Ratio of reliably available generation capacity and peak demand Share of electrical energy produced by renewable sources Duration and frequency of interruptions per customer Voltage quality performance of electricity grids (e.g. voltage dips, voltage and frequency deviations)

Identification (3): potential performance indicators

Benefit	Potential performance indicators
(5) Enhanced efficiency and better service in electricity supply and grid operation	Level of losses in transmission and in distribution networks (absolute or percentage) Ratio between minimum and maximum electricity demand within a defined time period (e.g. one day, one week) Demand side participation in electricity markets and in energy efficiency measures Availability of network components (related to planned and unplanned maintenance) and its impact on network performances Actual availability of network capacity with respect to its standard value (e.g. net transfer capacity in transmission grids, DER hosting capacity in distribution grids)
(6) Effective support of trans-national electricity markets by load-flow control to alleviate loop-flows and increased interconnection capacities	Ratio between interconnection capacity of one country/region and its electricity demand Exploitation of interconnection capacity (ratio between mono-directional energy transfers and net transfer capacity), particularly related to maximisation of capacity according to the Regulation on electricity cross-border exchanges and the congestion management guidelines Congestion rents across interconnections
(7) Coordinated grid development through common European, regional and local grid planning to optimise transmission grid infrastructure	Benefit (7) could be partly assessed by: - impact of congestion on outcomes and prices of national/regional markets - societal benefit/cost ratio of a proposed infrastructure investment - overall welfare increase, i.e. always running the cheapest generators to supply the actual demand → this is also an indicator for benefit (6) above.

Performance indicators and cost benefit analyses

- Performance indicators are needed to perform
  - preliminary cost-benefit analyses before carrying out demonstration projects
  - most important, final cost-benefit assessments after the demonstration phase in order to evaluate the opportunity for full scale roll-out of the tested solutions

- Depending of the regulatory framework, regulators will critically assess incentivisation of network companies to pursue **value for money** of innovative solutions to the benefit of consumers

Outline: how to support smart grids deployment?

- Regulation of outputs
  - Direct requirements
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- Identification of outputs
  - Effects and benefits of smart grids
  - Potential performance indicators

BUT THIS IS NOT ENOUGH!!

→Regulators supporting research and innovation

→Regulators supporting cooperation among stakeholders, with a focus on standardisation

Research and innovation (1)

- Regulators should further support the increasing efforts and international cooperation in research and development in the field of electricity grids and smart solutions and promote their effectiveness

- EERs consider it important to distinguish between:
  - R&D, usually funded by national or EU public sources
  - grid-specific demonstration or deployment (roll-out), where **measurable benefits to identifiable users** can warrant the inclusion of costs in regulated tariffs

Research and innovation (2)

- Regulators, acting as observers in R&D activities, should favour an approach targeted:
  - to define performance indicators for specific smart solutions
  - to identify their costs and **benefits to customers**
- R&D activities in smart grids with non-proprietary solutions, for example using public protocols, could extend the benefits of these projects to all firms and customers

- Regulators should support the **link** between research & development projects and demonstration & initial deployment of selected promising solutions

Research and innovation (3) Funding of demo projects

- It will remain up to each NRA to evaluate the benefits and the costs of the possible lighthouse or demonstration projects, **according to national priorities** and in coherence with the applicable national regulation systems

- In case demonstration projects will be recovered by grid tariffs paid by network users, ERGEG recommends to NRAs to ensure dissemination of the results and lessons learned from the demonstration projects to all interested parties

Cooperation among stakeholders (1)

- The electricity supply sector will make a major contribution to achieving the 20-20-20 targets of the European energy policy and the engagement and support of all stakeholders will be essential
- ERGEG position paper expressed the aim to initiate a dialogue with all stakeholders of the European electricity power systems and markets, in order to assist regulators in understanding **how smart grids can benefit network users**
- Role for regulators is to **facilitate** 'smart grids' discussions, definition of common views, and cooperation among all stakeholders

Cooperation among stakeholders (2)

- EERs are participating actively, and will continue to do so, in various platforms and groups at EU-level that are working towards defining roadmaps, harmonising standards and otherwise moving forward with the incorporation of smarter solutions for grids and meters
  - EC Set Plan European Industrial Initiative on Electricity Grids
  - EC Standardisation Mandate M/441 on smart meters
  - EC Task Force on Smart Grids
  - European SmartGrids Forum
- Such cooperation should be especially devoted:
  - to agreeing which smart grid concepts will provide clear and greater net benefits (= benefits minus possible additional costs) to customers
  - to identifying the possible presence of regulatory barriers to such smart grid concepts and to finding the best solutions to eliminate them

Cooperation (3) in the field of standardisation

- EERs stated their willingness to cooperate with European standardisation bodies, in order
  - to promote open protocols and standard models for information management and data exchange,
  - to achieve interoperability of smart grid devices
  - to avoid standards being a barrier to the development of more efficient electricity grids
- EERs and some NRAs are already active in cooperation with European and national standardisation bodies
  - CEER cooperates with CENELEC and its stakeholders in order to improve the European standards, based on a Memorandum of Understanding signed in January 2009
  - CEER members actively participate at CENELEC TC8X from 2006
  - CEER participates in the Smart Metering Coordination Group established by CEN, CENELEC and ETSI

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