The Regulatory Toolbox for Supporting Innovation
Experience of the Italian Regulatory Authority: Regulatory Experiments and Pilot regulations

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Council of European Energy Regulators
RBM WS, DS WG, EWG, GWG, CRM WG
Internal Workshop on
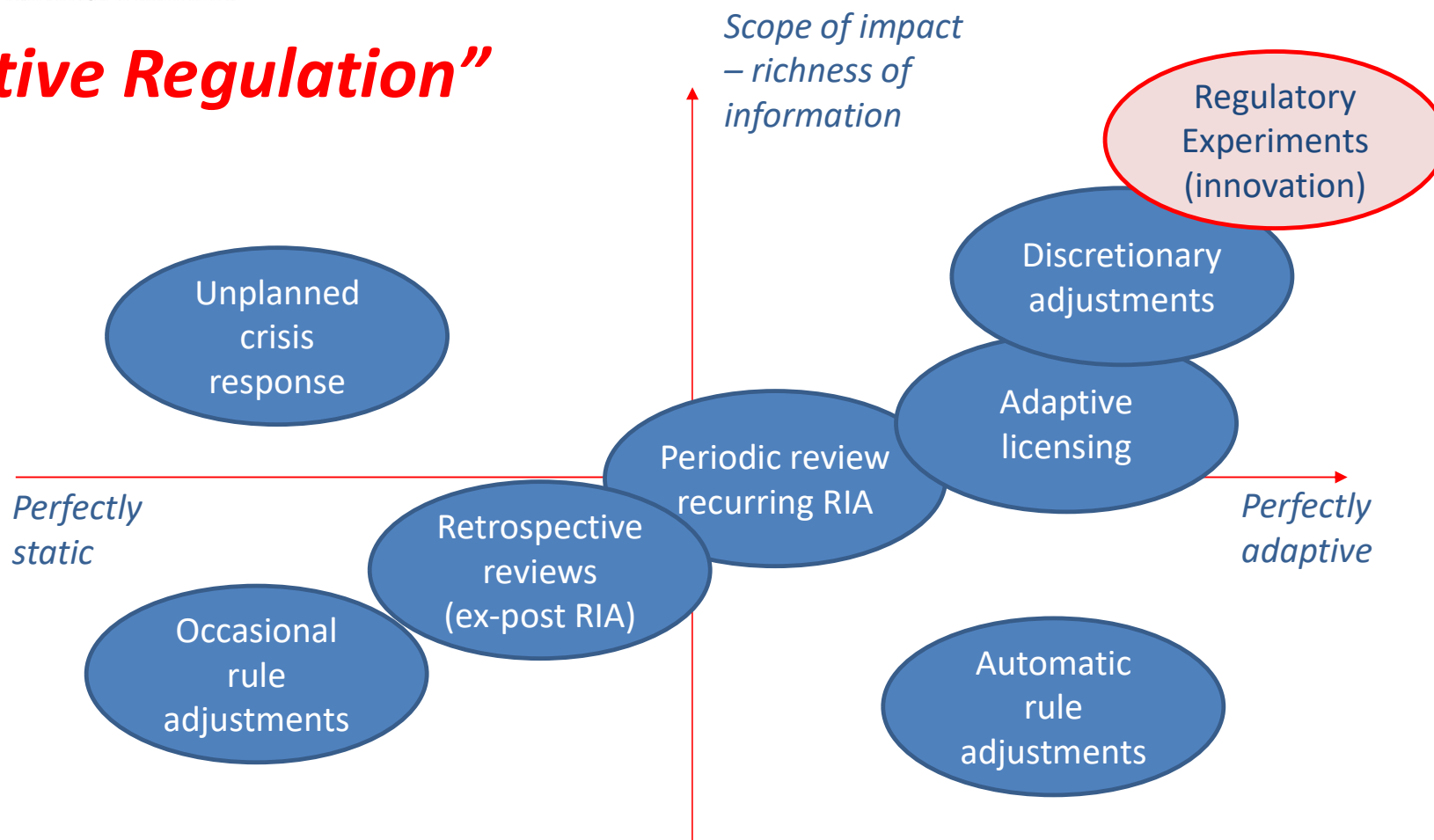**Dynamic Regulation, 25.06.21**

**Law must be stable,
and yet it cannot stand still**

Roscoe Pound,
Dean at Harward Law School
Interpretations of Legal History, 1923

**Barrier 6. Rigid regulatory system
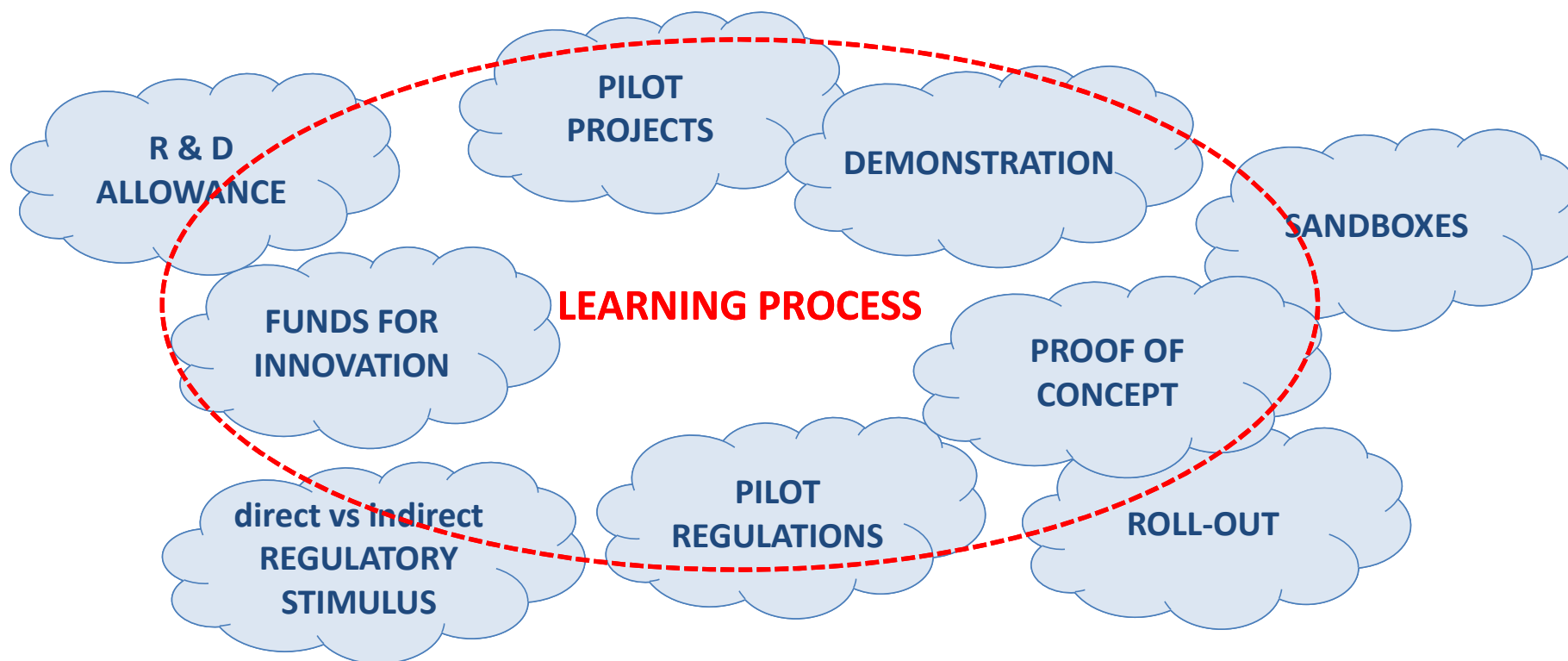hampering smart grid deployment**

ISGAN
*Policy messages on Upscaling
of smart grid solutions*, 2019
https://www.iea-isgan.org/wp-content/uploads/2019/12/ISGAN-Policy-Messages-on-Upscaling_November2019-1.pdf

"Adaptive Regulation"

Source: L. S. Bennear, J. B. Wiener, "*Adaptive Regulation: Instrument Choice for Policy Learning over Time*", draft working paper, February 2019

The «ordinary» incentive regulation for improving Continuity of Supply in Italy

INCENTIVE REGULATION OF CONTINUITY OF SUPPLY (2000-2019)
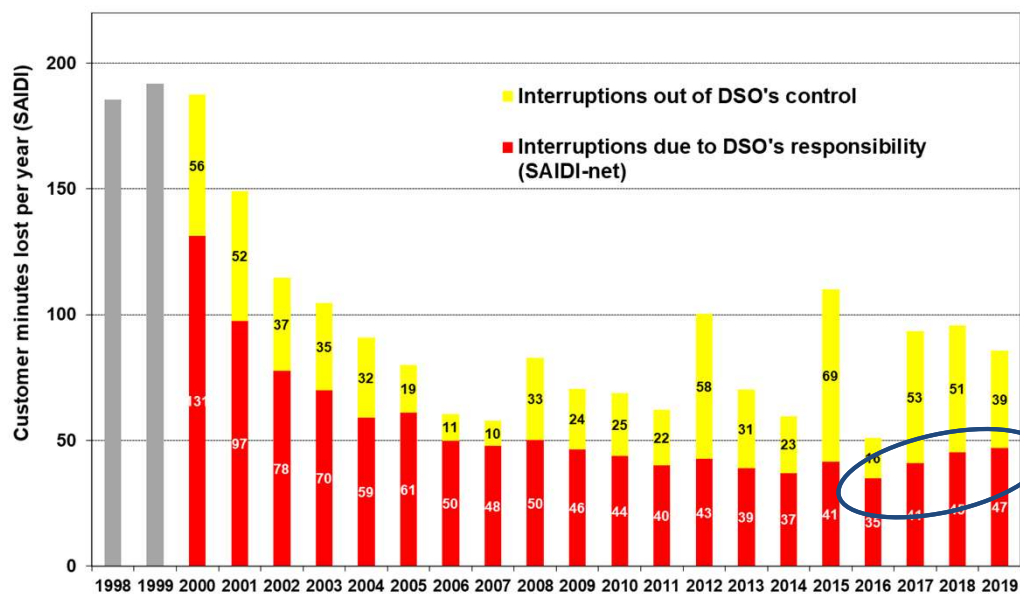
INCENTIVE REGULATION OF CONTINUITY OF SUPPLY (2008-2019)
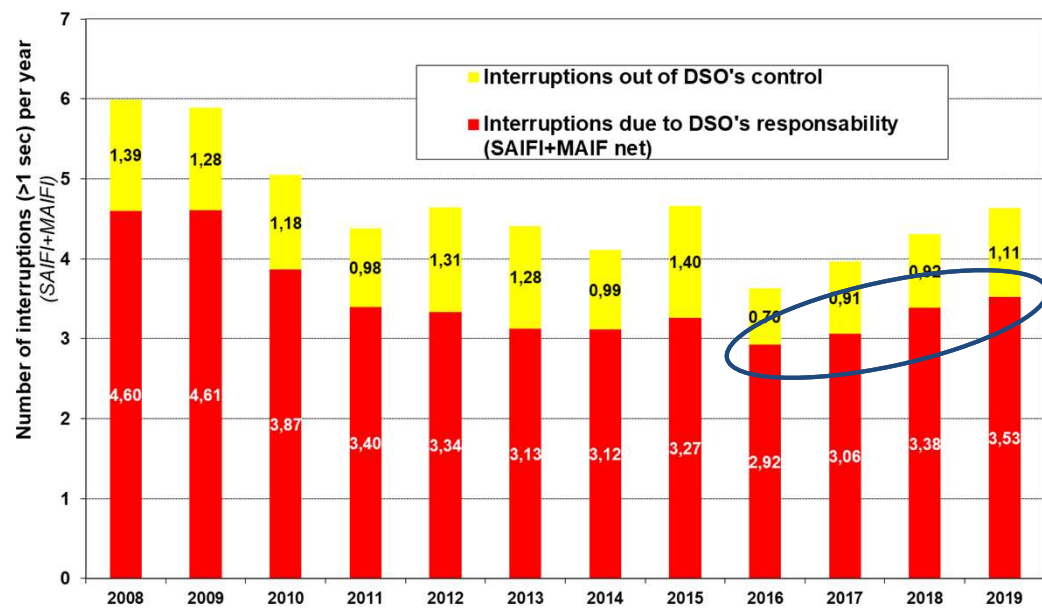
- **Huge improvement** in QoS over 4 reg.periods (2000-15)
- Recent **trend worsening** (2016-2019)

- **SAIFI+MAIFI** regulation started 2 periods after SAIDI
- Both long and short interruptions included (*> 1 sec.*)

Effects of the «ordinary» incentive regulation (2000-19)

Regulatory Period	SAIDI		SAIFI+MAIFI		TOTAL NET	€/cust/y
	Rewards	Penalties	Rewards	Penalties		
2000-2003	424,0	-72,4			351,6	2,4
2004-2007	569,8	-23,8			546,0	3,8
2008-2011	237,4	-92,4	271,6	-104,6	312,0	2,2
2012-2015	194,1	-66,3	184,6	-115,6	196,9	1,4
Total	**1.425,3**	**-255,0**	**456,2**	**-220,1**	**1.406,4**	**2,4**
2016-2019	60,2	-115,6	149,1	-210,7	-117,0	-0,8

- Very good effect in 2000-15 (*avg: AWARD +2,40 €/cust/y*)
- Serious criticalities in 2016-19 (*avg: PENALTY -0,80 €/cust/y*)

Searching for Critical Zones

DSO	n° zones	n° cust.
E-distribuzione	105	12.381.810
Areti (RM)	1	1.308.899
Unareti (MI-BS)	1	885.125
Total	**107**	**14.575.834**

X-axis

$\frac{SAIFI+MAIFI\ actual}{SAIFI+MAIFI\ std}$

Y-axis

$\frac{SAIDI\ actual}{SAIDI\ std}$

Durata/Livello obiettivo

Numero/Livello obiettivo

- Nord
- Centro
- Sud

- *White area:* already very good; *Green area:* likely to be good in 4 years
- *Yellow area:* almost empty (automation); *Red area:* most critical zones

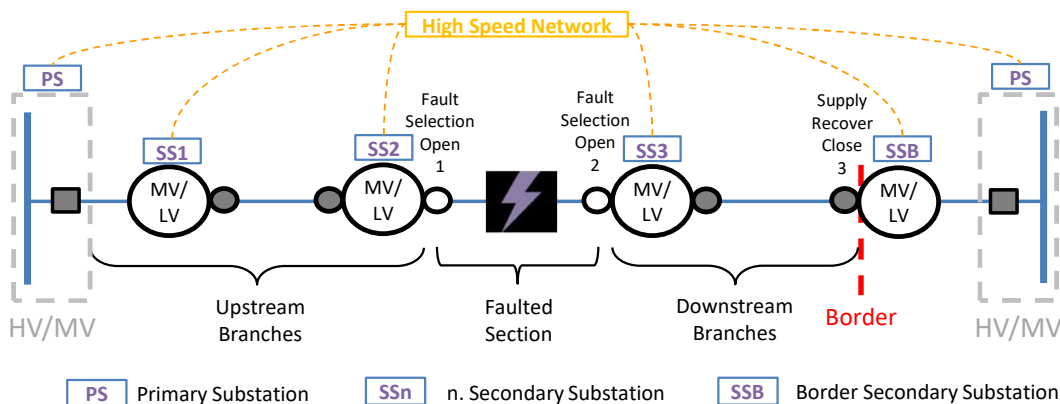# A *large-scale tool:* Regulatory Experiments

MAIN IDEA

- DSO may avoid the ordinary regulation if they're able to propose an own scheme that ensures the same target at the end of regulatory period, including waives (derogations) to ordinary regulation

- The reg.exp. lasts 4 years: ordinary regulation is temporarily disabled but if the DSO own scheme proves to be unsuccessful in reaching the 4th year target set by the Authority, penalties apply

FEATURES and MAIN RULES

- DSOs can apply for Reg.exp/s only in critical areas

- Reg.Exp/s include trials of innovative solutions of network management

- DSOs can apply for derogation of current regulation, subject to regulator's approval, provided that two conditions are respected:

  1. no infringement of the consumer protection and
  2. no discrimination between network users

- transparency and reporting system to highlight and disseminate results and effects of granted derogations (learning for next periods)

Regulatory experiments: actual experience

TRIALS OF INNOVATION

- Fault selection at Medium Voltage level on a logical basis: high speed, always-on communications on LTE mobile, or optical fiber, in secondary substations are required (tested in-field with pilot projects at small scale)

- Remote control at Low Voltage level (esp. for towns and cities)

Italy: 330 zones, 37 Million customers	E-distribuz. (ENEL group)	Areti
Number of zones involved	60	3
Total n. of cust. involved	8.1 M	1.6 M
Urban density n.cust.involv.	3.1 M	1.3 M
Interm.density n.cust.involv.	4.3 M	0.2 M
Rural density n.cust.involv.	0.7 M	0.1 M

Logical Fault Selection (MV)

(remote control at Medium Voltage level is fully governed by a logical controller that enables completing manoeuvres in a few seconds, even less than 1 sec)

| PS | Primary Substation | | SSn | n. Secondary Substation | | SSB | Border Secondary Substation |

Smart Street Box (LV)

(remote control at Low Voltage level in case of counterfeedable LV lines)

Regulatory experiments for DSOs (sources, in Italian only):

- Overall regulation: www.arera.it/allegati/docs/15/646-15alla_tige.pdf (see "Scheda 9" and art.27bis)
- E-distribuzione www.arera.it/allegati/docs/20/021-20dieu_all.pdf
- Areti www.arera.it/allegati/docs/20/020-20dieu_all.pdf

Regulatory tools for innovation

	REGULATORY EXPERIMENTS	SANDBOXES	PILOT PROJECTS	PILOT REGULATIONS
Main actors involved	DSOs only	Retail supplier & third parties (DSO enabling)	DSOs or TSO only	All interested players (including DSO)
Innovation	Yes	Yes	Yes	Yes
Waivers and derogations	Yes	Yes	Yes	Ex-ante framework
Scale	Large	Small	Small	Large
Approval	Yes	Yes	Yes	No

What a «pilot regulation» is?

A REGULATORY FRAMEWORK

- Pilot Regulation is an **ex-ante regulatory framework** defining a provisional regime to cope with a novel issue

- It can stay aside the "old regulatory regime" for a transitional phase

- There is **no case-by-case approval** of each single instance (ex-post controls)

- It requires continouos oversight and learning

Examples of Pilot regulations in Italy	Period	Learning effect
HEAT PUMPS (non-progressive tariffs)	2014-18	Introducing capacity-based network tariffs
FLEXIBILITY SERVICES (dispatching & aggregation)	2018-22	Introducing DERs' participation to balancing market
RENEWAL OF OLD UPRIGHTS (distribution within buildings)	2020-23	Recovery of oldest (and risky) situations
COLLECTIVE SELF-CONSUMPTION (jointly active renewable consumers)	2020-22	Introducing «1:N» virtual model holding freedom of choice
EV RECHARGE (capacity modulation through smart meters at home)	2021-23	Introducing first smart charging practices

A case of Pilot Regulation: widening participation to ancillary service market in Italy

DISPATCHING	CURRENT REGULATION	PILOT REGULATION (ARERA decisions 300/17, 422/18, 153/20, 70/21)
Minimum size	10 MW	1 MW aggregated (to be lowered to 0.2 MW)
Admitted sources for generation unit	only thermal and large hydro	also RES-NP
Admitted demand units	only very large customers	any active demand unit (also MV-LV)
Remuneration for ancillary services	Market, Pay as bid [€/MWh]	Additional remuneration [€/MW/year] (auctions)
Control device	Obligations (refresh 4 seconds)	Same obligations, but at aggregated level

TSO — G
TSO — BSP
DSO
DG
DR
BSP
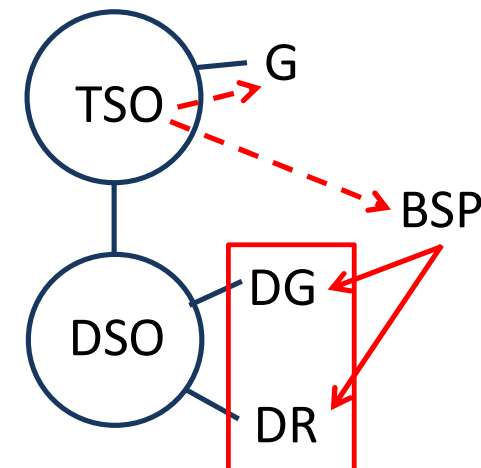
Virtual Dispatchable Unit
[in Italian: UVAM]

BSP   Balancing Service Provider
G   Traditional, large generation
DG   Distributed generation/storage
DR   Demand Response (incl.storage)
TSO   Transmission System Operator
DSO   Distribution System Operator

A proposal for a regulatory tool-kit for innovation *(under discussion in DS wg)*

	GRID OPERATORS ONLY	GRID AND MARKET OPERATORS JOINTLY
LARGE SCALE	**REGULATORY EXPERIMENTS**	**PILOT REGULATIONS**
SMALL SCALE	**PILOT PROJECTS**	**REGULATORY SANDBOXES**

Source, with modifications: A. Guerrini, L. Lo Schiavo, C. Poletti
"Innovazione e regolazione" [Innovation and regulation] working paper, 2020

Policy Messages from the ISGAN
Regulatory Sandbox 2.0 Project (June 2021)

Message #1: There is no one-size-fits-all model for experimenting; policy makers, together with regulatory bodies, can deploy different types of experiments to suit their needs.

❖ There is no off-the-shelf model for experimenting, but rather a toolbox of different experiment types. This can be further refined, based on the best practice already available.

❖ At one end of the spectrum are sandbox programs and sandbox support services that help innovators to deliver their trials and bring to market new products, services, methodologies and business models. Sandbox programs may have different objectives e.g. emphasizing more innovation than regulatory aspects. Policy learning is important, but its role depends on the goal of the program. Policy learning tends to be less formal, with less accountability to the results of the experiments themselves.

❖ At the other end of the spectrum are regulatory experiments that are specifically designed to explore new solutions for evolving regulatory frameworks in a consistent manner with system transformation. Policy learning is a key driver of the experiment, with greater accountability to the results of the experiments.

https://www.iea-isgan.org/wp-content/uploads/2021/06/Policy-Messages-from-the-ISGANRegulatory-Sandbox-2.0-Project.pdf

ARERA — Autorità di Regolazione per Energia Reti e Ambiente

R-1: to ensure, as appropriate, **a long-term stable regulatory framework** and reasonable rate of return for cost-efficient grid investments;

R-2: to consider and further analyse decoupling between grid operators' profits and volumes of electricity they deliver taking into account the **introduction of performance indicators and performance-based incentive regulation**;

R-3: to pursue **regulation of outputs as a mechanism to ensure value** for money paid by network users and to investigate metrics for the quantification of the most important output effects and benefits at national level;

R-4: to promote **mechanisms favouring an improved awareness of consumers** about their electricity use and market opportunities through actions of suppliers and other market participants and an improved engagement of network operators with their network users;

R-5: to **encourage the deployment of smart grid solutions**, where they are a cost-efficient alternative for existing solutions, and as a first step in this direction, to find ways of incentivising network companies to **pursue innovative solutions where this can be considered beneficial from the viewpoint of society**;

R-6: to evaluate the **breakdown of costs and benefits of possible demonstration projects for each network stakeholder** and to take decisions or give advice to decision-makers based on societal cost-benefit assessment which take into account costs and benefits for each stakeholder and for society as a whole;

R-7: to ensure **dissemination of the results and lessons learned** from the demonstration projects in case they are (co-)financed by additional grid tariffs or from public funds to all interested parties, including other network operators, market participants, etc.;

R-8: to participate in 'smart grids' discussions and cooperation activities among stakeholders and especially to consider an **active cooperation with European and national standardisation organisations, grid operators and manufacturers, for example on open protocols and standards** for information management and data exchange, in order to achieve interoperability of smart grid devices and systems;

R-9: to clarify the **difference between regulated grid activities and market opportunities for new services under a competitive regime** (e.g. aggregation of resources, EV recharging) and to carefully monitor the possible presence of cross subsidies between network activities by TSOs or DSOs and market-based activities;

R-10: to continue their **exchange of expertise at European level, in order to learn as soon as possible from best regulatory practices**.

Thank you for your kind attention!

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