Smart Grids Regulation as a Corporate Governance Paradox

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Smart Grid Regulation as a Corporate Governance Paradox

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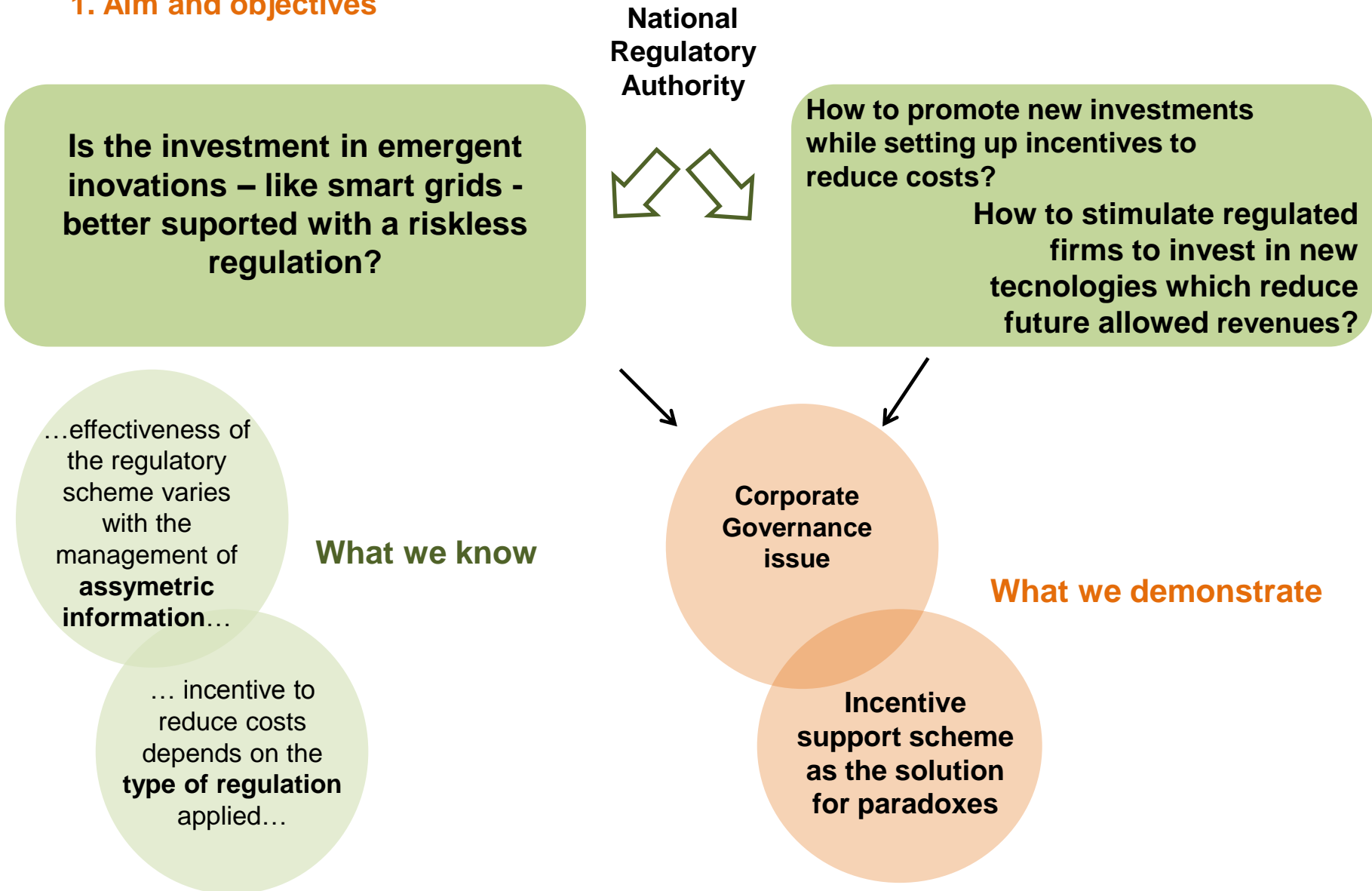**Smart Grid Regulation as a Corporate Governance Paradox**

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Aim and objectives

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1. Aim and objectives

National Regulatory Authority

Is the investment in emergent inovations – like smart grids - better suported with a riskless regulation?

How to promote new investments while setting up incentives to reduce costs?

How to stimulate regulated firms to invest in new tecnologies which reduce future allowed revenues?

…effectiveness of the regulatory scheme varies with the management of **assymetric information**…

What we know

… incentive to reduce costs depends on the **type of regulation** applied…

Corporate Governance issue

What we demonstrate

Incentive support scheme as the solution for paradoxes

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The nature of Smart grids Investments

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2. The nature of Smart Grids Investments

Definition:

• Smart grids (SG) are electricity networks which intelligently connect the decisions and actions of different actors – producers, consumers and those that play both roles – in order to supply power services in an economically efficient, sustainable, high quality and safe way (European Commission, 2011).

Benefits (Clastres, 2011; Meeus et al., 2010) :

• **Consumers** –improved quality of supply and potential lower electricity bills (dynamic tariffs and demand respond procedures), a better integration of microgeneration units, electric vehicles and storage devices.

• **Network operators (DSO)** - lower level of network losses and a better quality/reliability of supply .

• **System operator** - a more easy and less costly balance service.

• **Electricity retailers** - improve electricity purchase procedures and avoid penalties related to imbalances.

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2. The nature of Smart Grids Investments

Benefits (cont.):

• **Generators –** improve the economic performance of the generating entities and reduce the risks inherent to the investment on a power plant of large capacity.

• **Regulator –** anticipate the need of investments in the infrastructure, take advantage of the development of competition.

• **Society -** high quality service in terms of less frequent and shorter interruptions, integration of a major quantity of endogenous and renewable energy sources.

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2. The nature of Smart Grids Investments

• **The benefits with its implementation only come into play once the entire system is in place and actors participate actively in the new grid** (European Commission, 2012a).

• **But** these technologies are not mature and they are still <u>surrounded by technical and market uncertainties</u> that slow the rhythm of diffusion.

• The investment in SG has **externalities** and **public benefits** for the electrical system which may not be possible to grasp without some kind of external support (BNetzA, 2011).

• Adittionaly, is important to underline that the concept of "Smart" or, simply, the innovative character of the investment in the grids is not always straightforward.

This may be the main challenge for the regulator in practice!

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The Regulation of Smart grids investments: a simple model

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3. The regulation of Smart grid investments: a simple model

- Regulation must ensure an effective support to Smart grids **without creating** economic rents

- In theory, there are **two different types of regulatory schemes** to deal with **asymmetric information**: **cost plus** and **price cap regulation**

The regulatory framework can **influence** the adoption of new technologies by the TSO/DSO: the **level**, and the **type of investments**

➢ cost plus regulation (adverse selection issue) may lead the regulated firm to overinvest (Averch and Johnson, 1962) since firm's decision is no longer motivated by its long run marginal cost, but rather by the allowed return on investment

➢ a pure incentive regulation (moral hazard issue) promotes investments towards cost (OPEX) reduction (Carrington et al 2002, Guthrie, 2006).

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3. The regulation of Smart grid investments: a simple model

Measures that **reduce uncertainties** are normally prescribed to **support emergent innovations**, but the immaterial and cost reduction nature of SG makes the choice of the regulation more **tricky.**

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3. The regulation of Smart grid investments: a simple model

Guthrie (2006):

- **Impact of regulatory schemes** on the firm's decision to make irreversible investments that can decrease operating expenditure (OPEX): shown that the effectiveness of pure cost plus and pure incentive regulations depends on the ability of the regulatory scheme to reflect costs.

taking into account its impact on OPEX and CAPEX…

… this knowledge can be used to define **a regulatory scheme able to keep the interest of the regulated companies in developing SG**.

3. The regulation of Smart grid investments: a simple model

SG investment may have a wider impact on costs, allowing to avoid some substitution investments or to extend the assets' economical life. The present value of an investment of this kind, when the first price review has occurred in period T is:

$$-I_{SG} + \sum_{t=1}^{T} \frac{\Delta C}{(1+r)^t} + \sum_{t=1}^{T} \frac{\Delta I_C}{(1+r)^t} + \sum_{t=T+1}^{\infty} \frac{r\gamma(I_{SG}-\Delta I_C)+(1-\alpha)\Delta C}{(1+r)^t} =$$

$$-I_{SG} + \frac{\Delta C}{r}\left(1 - \frac{\alpha}{(1+r)^T}\right) + \frac{\Delta I_C}{r}\left(1 - \frac{1}{(1+r)^T}\right) + \frac{\gamma}{(1+r)^T}(I_{SG}-\Delta I_C)$$

Where:

T is the next time review period.

α is the proportion of the cost savings that is transferred to consumers after T.

γ is the proportion of the investment expenditure that is accrued on the firm's RAB after T.

ΔC is the cost decrease.

r is the firm's cost of capital.

ISG is the amount invested in SG technology.

ΔIC is the reduction of conventional investment due to the SG investment.

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3. The regulation of Smart grid investments: a simple model

Looking at this formula according to the **types of regulatory schemes**:

$$\Delta C + \Delta I_C + \left(\frac{r\gamma(I_{SG} - \Delta I_C) - (\alpha\Delta C + \Delta I_C)}{(1+r)^T} \right) \geq r I_{SG}$$

The firm will only invest in SG if…

Situation 1:

- A pure cost plus regulation , T=0 and $\alpha = \gamma = 1$ ⟹ $\Delta I_C \leq 0$

… **it does not** lead to a diminution in the conventional investments.

Situation 2:

- A pure price cap regulation, $T = +\infty$ and $\alpha = \gamma = 0$

$$\frac{\Delta C + \Delta I_C}{r} - I_{SG} \geq 0$$

… the perpetual rent of the avoided costs **is greather** than the initial investment.

Situation 3:

- Hybrid regulation , T=0; $\alpha = 0$ and $\gamma = 1$ ⟹ $r\Delta I_C \leq \Delta C$

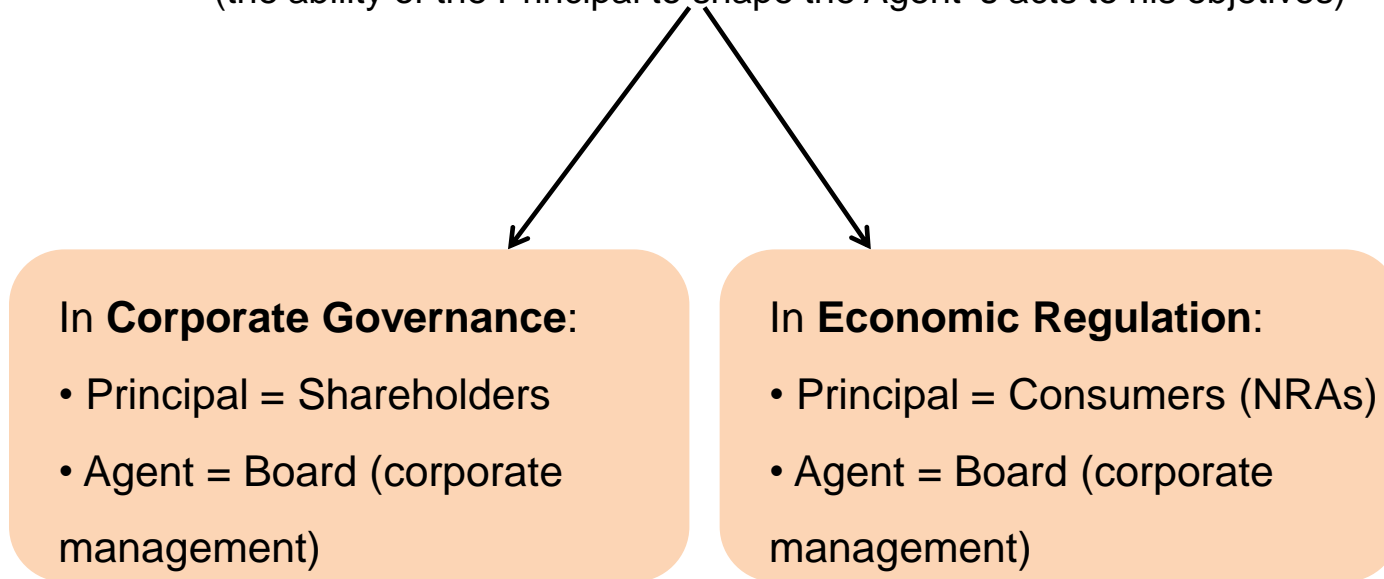… the reduction in OPEX **is greater** than the decrease in CAPEX.

Smart grids promotion and corporate governance

4. Smart grids promotion and corporate governance

Principal - Agent Problem

(the ability of the Principal to shape the Agent 's acts to his objetives)

In **Corporate Governance**:

• Principal = Shareholders

• Agent = Board (corporate management)

In **Economic Regulation**:

• Principal = Consumers (NRAs)

• Agent = Board (corporate management)

Problems arise when there are different **interests** and in the presence of **asymmetric information** between the **Principal** and the **Agent**.

Note that the regulator of a natural monopoly **cannot replace** a Board of a company; it can only **influence** their decisions through the design of the regulated framework.

Smart Grids Regulation as a Corporate Governance Paradox

4. Smart grids promotion and corporate governance

• The separation between management and financing, i.e., the gap between ownership and control, arises agency's problem in terms of adverse selection and moral hazard (Shleifer and Vishny, 1997).

• The regulator **must ensure** that activities with externalities to the entire sector, such as innovation and the adoption of new technologies, **receive attention** by the management of the firm.

• The adoption of innovations may be regarded as a **sign of good Corporate Governance practice**.

• A more active promotion of efficient investments should not be confounded with an interference in the companies' management (La Porta et al., 2000), but **a stronger governance position**.

Smart Grids Regulation as a Corporate Governance Paradox

4. Smart grids promotion and corporate governance

• **A stronger shareholder right** rises the value of the company while lowering the cost of capital (Gompers et al., 2003). In the case of a regulated natural monopoly, the decrease in the capital cost will spread to the entire sector.

An effective regulation scheme which promotes innovation is also a contribution for the economic efficiency of the energy sector.

• **The regulator can be viewed as a stakeholder with special privileges** since the framework under which the regulated firm operates is designed by him. This is particularly the case when he promotes the choice of efficient projects like SG.

• The regulator has a large set of regulatory mechanisms at its disposal to stimulate the natural monopoly company to invest in new technologies.

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4. Smart grids promotion and corporate governance

• Heine sustains (2013) that the efficacy of any incentive mechanism deeply depends on the straightforwardness and comprehensibility of incentives .

• It can be difficult for both regulator and firm to understand the challenges encountered with implementation of the new technology.

•Therefore, there is **no optimal solution** that can be applied to promote SG.

The observation of the **regulated firm's reaction** to the policies is required!

The Portuguese case

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5. The Portuguese Case

The Portuguese methodology was presented to the stakeholders in 2012 as part of a set of regulatory scheme to the next regulatory period (2012-2014) :

❖ a **cost plus regulation** applied on **CAPEX**, with investments on SG benefiting of **higher remuneration** than conventional investments;

$WACC_{smart\ grids} = WACC_{conventional} +$ "extra"

✓ "extra" = 150 basis points

Note: applied only when the investment is considered as "innovation".

❖ an **incentive regulation** applied on **OPEX**, where the efficiency target rises with the penetration of SG;

$OPEX_{t+1} = OPEX_t * (1 - X\%)$

✓ **X**% = Efficiency target **+** Efficiency due to SG investments

❖ a **close monitoring** of the process

Regulatory periods of 3 years with the obligation of providing information every year;

Reinforcement of quality standards and reward/penalties scheme associated to it .

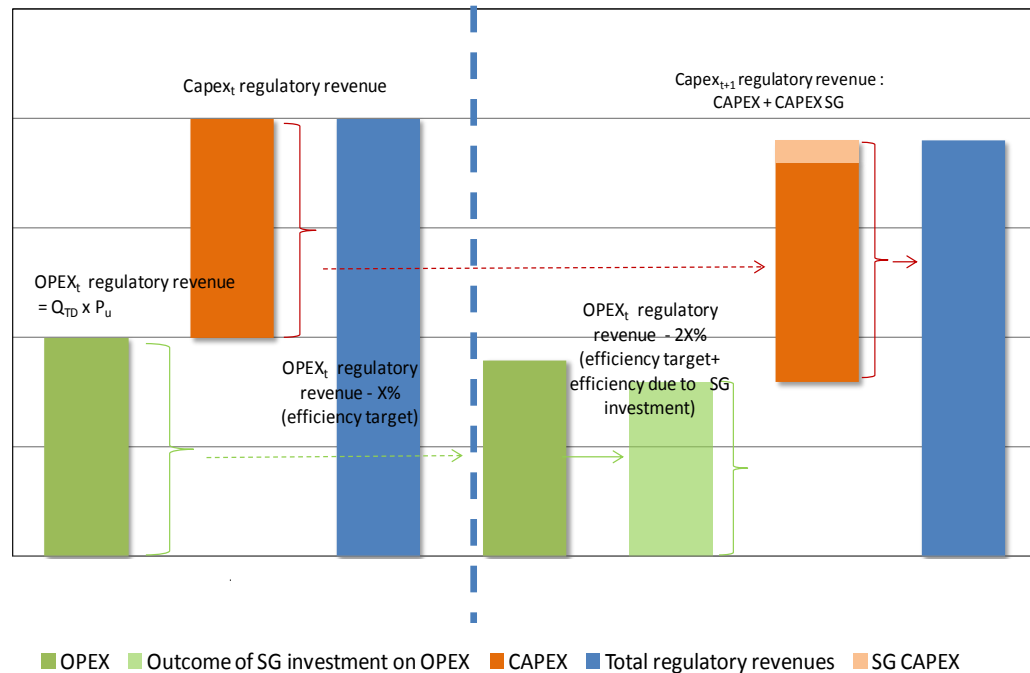# Smart Grids Regulation as a Corporate Governance Paradox

5. The Portuguese Case

The incentive scheme for Smart grids investment in Portugal

SG investments acceptance into the RAB

A case by case analysis

Important!
The concept is not always simple to define.

Without SG investments | **With SG investments**

Capex$_t$ regulatory revenue

Capex$_{t+1}$ regulatory revenue :
CAPEX + CAPEX SG

OPEX$_t$ regulatory revenue
= Q$_{TD}$ x P$_u$

OPEX$_t$ regulatory revenue - X%
(efficiency target)

OPEX$_t$ regulatory revenue - 2X%
(efficiency target+ efficiency due to SG investment)

■ OPEX ■ Outcome of SG investment on OPEX ■ CAPEX ■ Total regulatory revenues ■ SG CAPEX

Main findings

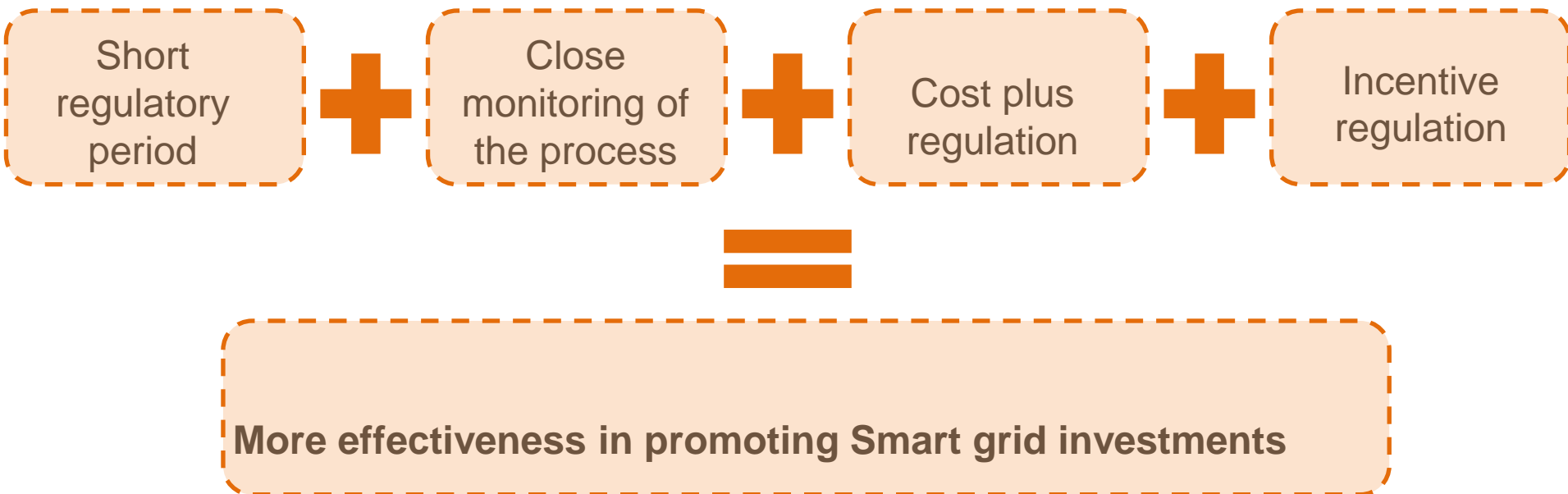**Smart Grids Regulation as a Corporate Governance Paradox**

6. Main findings

- Difficulty to stimulate regulated firms to **invest in new technologies that can reduce future allowed revenues**.

- Not always an easy task to define an innovative investment and separate these two types of investment: conventional and SG.

- The regulator plays an important role: needs to guarantee that the gains due to SG investments are fairly distributed between all the stakeholders, namely consumers and companies.

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Flexible regulatory scheme

Short regulatory period	➕	Close monitoring of the process	➕	Cost plus regulation	➕	Incentive regulation

=

More effectiveness in promoting Smart grid investments

A practical example of this model is the <u>Portuguese case</u> for the investment on Smart grids:

❖ Nevertheless there are points that need to be improved at the next regulatory period (2015-2017), example:

✓ in terms of communication between stakeholders

✓ in terms of efficiency targets imposed

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Thank you for your attention.

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