

## INNOVATION INCENTIVES FOR DSOs- A MUST IN THE NEW ENERGY MARKET DEVELOPMENT

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### KEY RECOMMANDATIONS FOR EU POLICY MAKERS

- Policy makers should encourage national regulatory authorities (NRAs) to give DSOs appropriate incentives to implement the necessary innovative initiatives that support the transformation of the DSOs' business models. It is also important that NRAs monitor whether DSOs achieve scheduled goals;
- Regulators should ensure that cost reductions given to today's consumers are not at a disproportionate expense to future consumers (e.g. if innovation today isn't incentivised). Therefore, the remuneration of the expenses due to the implementation of innovative initiatives should be guaranteed.
- The implemented specific regulatory mechanisms should be predictable and stable in the outcome. They should include incentives for both CAPEX and OPEX, acknowledging the shift from a higher share of CAPEX to OPEX in the deployment of new innovative network technologies.
- Implement an (EU-wide) knowledge sharing system of Research and Development (R&D) results with additional monetary incentives if possible. Other DSOs and their customers could participate in the system and benefit from it.
- Regulators should bear in mind the degree of customer and technology readiness that could determine what design and level of incentive is best suitable for the stage of innovation needed. In general, the regulatory framework should give the DSO the freedom of choice to adopt the most efficient solution.

### INTRODUCTION

Innovation is vital to European competitiveness in the global economy. Acknowledging the need to push for new technology and business models and to move innovation forward is an important step towards a successful low-carbon energy transition. The European Commission (EC) recognizes that innovation is one of the key pillars of the Energy Union. The Energy Union Communication, adopted on 25 February 2015, dedicates

one of its five dimensions to research, innovation and competitiveness. With the objective of implementing the fifth pillar of the Energy Union strategy, the initiative "Accelerating the European energy system transformation- An integrated Strategic Energy Technology (SET) Plan" plays a key role in a new European Energy Research & Innovation (R&I) approach designed to accelerate the energy system transformation.

In the SET Plan, innovation is a broad topic and it is considered in three areas:

- Fundamental research, knowledge science, required to firmly anchor the bridge;
- Technology development;
- Product development including process, technology and prototype development.

Distribution Systems Operators (DSOs) play a key role in implementing innovative ideas to improve the functioning of electricity distribution networks with the ultimate goal of benefiting customers. Because DSOs are natural monopolies and regulated businesses, they have to develop innovative concepts under a certain regulatory framework that incentivises them.

The growth of distributed generation presents a challenge for DSOs especially as it affects their ability to maintain and upgrade their grid infrastructure. DSOs have an important role to play in the EU energy transition, as they are responsible for the deployment of smart grids and contributing to the development of smart energy systems, whilst maintaining the smooth operation of the networks. This challenging job requires increasingly innovative solutions. Together with other market parties, more focus on innovation is needed to understand how to make the best use of new technologies opportunities to maintain high levels of security of supply at the most efficient cost.

Innovation is also important due to the increasing need for investments in the ageing European distribution networks. Investments in electricity distribution networks are often long-lived and irreversible. To ensure that the required investments are done, innovation is urgent.

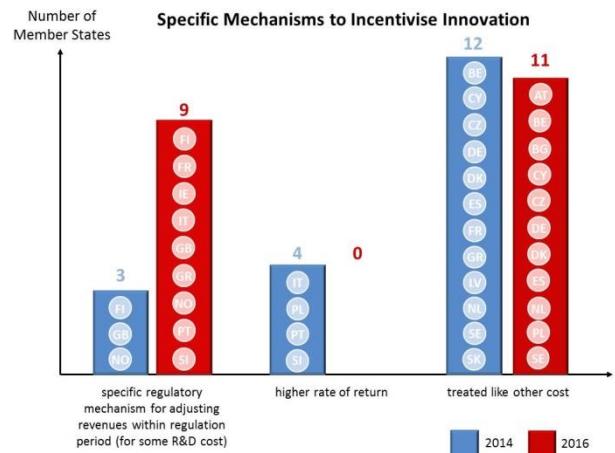
## WHAT ARE THE CHALLENGES AND BARRIERS FOR DSOs TO INNOVATE?

DSOs face many challenges ahead of the maturity of smart grids, when large scale distributed generation would be integrated, with high numbers of electric vehicles (EVs) connected to the grid, and many prosumers interacting in the market. DSOs will still need to keep on optimising network operation, regulating the voltage and the power flows and reducing technical power losses. More active grids will also require a more advanced monitoring and management of the grid, for which innovation technologies are needed. New technologies not only give the opportunity to new players (aggregators, Energy Service Companies) to enter the market and to offer new products (shift load, energy efficiency), but also empower customers encouraging them to be active (enabling flexibility and demand response).

### Are DSOs already allowed to innovate in some Member States?

Historically, national regulatory authorities (NRAs) have not funded DSOs to take risks. In fact, they were financed to do the opposite in order to keep borrowing costs low. How to encourage innovation in network design and operation, in anticipation of the incoming challenges, is still an open question in distribution regulation and currently only few Member States are designing regulatory schemes to incentivise innovation. These regulatory schemes become even more important as a means of managing revenues and removing barriers to adoption of the required technology alternatives.

EURELECTRIC conducted a survey amongst experts on incentives for innovation within each national regulatory framework. It should be noted that the deployment of smart meters is not included as innovation in this survey. Figure 1 shows which Member States have already implemented specific incentives for innovation in the economic regulation. It also outlines the changes in the national regulatory frameworks from 2014 to 2016 by comparing the results of the recent survey with the results from another one conducted in 2014. Each circle stands for the regulatory framework of a specific Member State.



**Figure 1:** Number of Member States with or without a specific mechanism to incentivise innovation

**Source:** EURELECTRIC, July 2016

In 2016, more than half of the Member States questioned for this survey (11 out of 20) have not introduced an incentive mechanism for expenditures for R&D and/or pilot projects. Those costs are treated like any other costs. Meanwhile, nine Member States have already introduced incentives for R&D and pilot projects within their regulatory frameworks:

- From 2017 onwards, the approved budget for R&D and pilot projects will be added to the annual allowed revenues in Greece;
- In Norway, expenditures for R&D and pilot projects are added to the allowed revenues (max. 0.3% of regulated asset base);
- The Slovenian regulatory framework acknowledges 3% of the book value for smart grid investments;
- In the current French regulatory period, R&D and pilot projects' operating costs are covered by a specific part of the distribution network tariff. These costs are excluded from efficiency requirements;
- In Great Britain, DSOs can recover money for pilot projects through an innovation stimulus under the RIIO model and are incentivised to roll out innovative projects through the regulatory framework re RIIO.

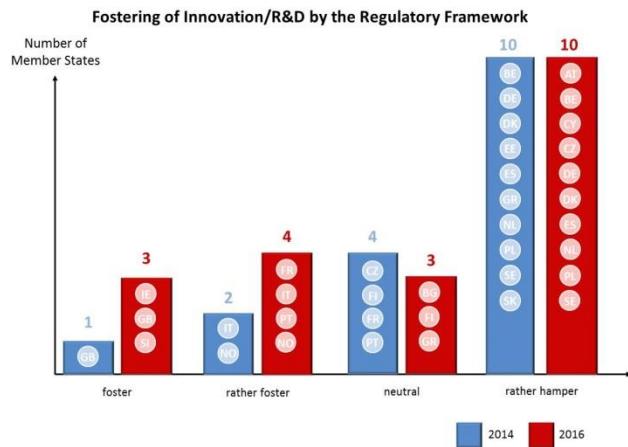
In contrast to 2014, in 2016 there is no regulatory framework which sets incentives for R&D or pilot projects by establishing a higher rate of return (RoR). This is not necessarily needed to encourage innovation, as shown in GB with RIIO where Ofgem grants with extra TOTEX the innovative initiatives. However, in Portugal, the DSO will receive the minimum between a higher regulatory RoR and 50% of the system benefits.

The extra rate is 0.25% in the first year and rises 0.1% each year, until it reaches 0.75% in the sixth year. Hence, projects should allow for an OPEX reduction, which will be accounted as part of the system benefits; otherwise the DSO may receive a lower incentive.

### An increasing number of Member States – all in all 9 – have introduced R&D incentives in their regulatory framework.

Since 2014, six Member States – France, Greece, Ireland, Italy, Portugal and Slovenia – have implemented a new specific regulatory mechanism to promote R&D and/or pilot projects.

EURELECTRIC Members have been asked to categorise the level of fostering innovation within their own regulatory frameworks. Figure 2 also shows the comparison with the results of the 2014 survey.



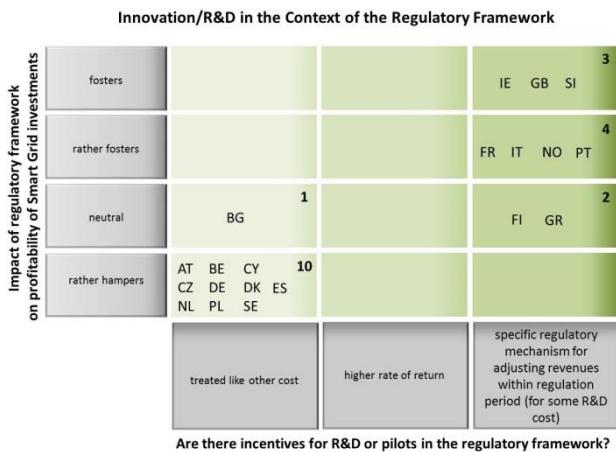
**Figure 2:** Categorisation of regulatory frameworks concerning the level of fostering innovation  
**Source:** EURELECTRIC, July 2016

In the majority of Member States (13 out of 20), the regulatory framework is either neutral or still hampers innovation/R&D. Only seven out of 20 countries have a regulatory framework that fosters or rather fosters innovation/R&D.

In 2016, four DSOs (from France, Ireland, Portugal and Slovenia) considered that their regulatory frameworks fosters or rather fosters innovation/R&D. Greece has recently implemented a new specific mechanism to promote innovation, therefore it has not been properly evaluated yet and is categorised as neutral. In Denmark, the regulatory framework rather hampers

innovation/R&D; however, in some cases Smart Grid costs may be subtracted from the cost base for the benchmarking.

The combination of the outcomes of Figures 1 and 2, results into the graph below. The horizontal axis shows whether there is a specific mechanism within the regulatory framework. The vertical axis displays the evaluation of the regulatory framework according to the profitability of smart grid investments.



**Figure 3:** Innovation/R&D in the context of the regulatory framework  
**Source:** EURELECTRIC, July 2016

In 2016, no Member State has an incentive mechanism for R&D or pilots guaranteeing a higher rate of return.

Italy, Great Britain and Slovenia have specific regulatory mechanisms that significantly foster innovation/R&D.

If a specific mechanism has been implemented, there is a positive impact on investments/costs for innovation/R&D in most cases. However, if the regulatory framework treats costs for innovation/R&D like any other costs, the system rather hampers innovation.

Regulation that efficiently incentivises DSOs to engage in active system management has to consider the changing OPEX and CAPEX structures to find the optimal balance between using distributed generation and building new infrastructure, and how to incentivise DSOs to be innovative and find solutions (e.g. for ICT, data handling, but also system services) in-house or by outsourcing.

Due to the increasing importance of operational expenditures, the survey has also covered the question

whether there are any incentives for OPEX related to innovation.

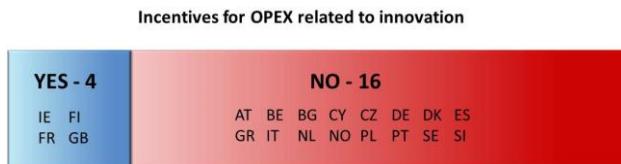


Figure 4: Incentives for OPEX related to innovation  
Source: EURELECTRIC, July 2016

***The vast majority of Member States have no mechanism that also takes OPEX into account.***

DSOs should try out innovative ideas in particular areas in which they could be more efficient. Regulatory mechanisms should facilitate this process and avoid an undue bias towards CAPEX. Traditional forms of regulation would give rate or return on CAPEX, but regulators should look at new ways of incentivising DSOs.

Only four out of 20 Member States (Finland, France, Ireland and Great Britain) have an incentive mechanism for smart grid related OPEX:

- In Finland, there are only incentives for OPEX. CAPEX for R&D and pilot projects are treated as any other costs. OPEX incentives for R&D are approved if they do not exceed 1% of the allowed revenues.
- In France, costs for R&D and pilot projects are covered within the distribution network tariff. These costs are excluded from the benchmarking.
- In Ireland, the regulator can provide OPEX allowances for R&D projects. Separately, there is also an “Innovation OPEX Fund” for projects. If they succeed, they would strategically innovate and change how the DSO operates.
- The RIIO model in the UK does not differentiate between CAPEX and OPEX. OPEX for funded pilot projects will be recognised in the allowed revenues as well.

A partial or complete absence of R&D costs recognition of during the regulatory period can hamper innovation. Moreover, R&D programs can put a strain on efficiency requirements. There is also a matter of social acceptability of such expenses: consumers may not accept the tariff increases, which can derive from high R&D investments. Regulators need to find appropriate solutions, such as the use of specific mechanisms or the allocation of subsidies. Eventually, the delay between investments and their long-term recovery through tariffs

can cause significant financing issues for DSOs. Their ability to advance cash for such investments depends on the regulatory and contract stability, and on the capital remuneration level. Regulators should make sure that cost reductions given to today's consumers don't happen at a disproportionate expense of future consumers.

## CONCLUSIONS AND RECOMMANDATIONS

After reviewing the current situation in 20 Member States, we may conclude the following:

- There is an increasing need for innovation by European DSOs to contribute to long-term efficiency of European networks.
- Smart grids will create benefits for end-users (increase renewable hosting capacity, EV, etc.), however the major investment has to be financed by DSOs.
- DSOs are responsible for the deployment of smart grids, contributing to the development of smart energy systems. This task requires increasingly innovative solutions, which should be stimulated by regulatory frameworks.
- The implementation of innovation incentives should target the reduction of financial risk for DSOs while increasing their participation in pilot projects and innovative programs. All categories included in the SET Plan should be incentivised, although it could be done via different incentive schemes.
- Depending on the type of innovative solutions, funding could be through allowed revenue and/or direct public funding. The results of the funded innovation projects should be publicly available to promote transparency.
- In addition to financial support, and since much of the needed innovation will take the form of setting up new market roles and business processes, NRAs and governments should take an active stance towards creating the conditions for DSOs to experiment in unchartered territory. This should be done even if it requires temporarily and/or locally overriding the prevailing regulation to enable pilots with duly approval of the regulatory authority.
- In 2016, nine EU Member States had already introduced incentives for R&D and pilot projects within their regulatory frameworks, five of which have been implemented in the past two years. In contrast to 2014, no regulatory framework sets explicit higher in 2016 for R&D or pilot projects.

- If a specific mechanism has been implemented, there is a positive impact on investments/costs for innovation/R&D in most cases. However, if the regulatory framework treats costs for innovation/R&D like any other costs, the system rather hampers innovation because usually dso's, as regulated entities, tend not to risk and continue business as usual.
- Seven out of 20 Member States have a regulatory framework that fosters or rather fosters innovation and R&D. This is an improvement from 2014, when only three countries had regulatory frameworks which included innovation incentives, but there is still a lot to be done in the rest of the Member States.

The vast majority of Member States have no mechanism that also takes OPEX into account. Only four out of 20 Member States (Finland, France, Ireland and Great Britain) have an incentive mechanism for smart grid related OPEX.

France, Italy, Norway and the uUK are setting concrete examples on specific schemes that fund R&D and/or innovation for DSOs. They propose different approaches to remunerate R&D or innovation investments, but they all seem to be designed to trigger the adjustment to incorporate new technologies.

## HOW CAN REGULATORS HELP DSOs TO INNOVATE?

Innovation investments for smart grids have several characteristics in common:

- They are hard to predict before the establishment of a regulatory period;
- They can lead to technological deadlocks and stranded assets for DSOs;
- They depend highly on the regulatory scheme, which is constantly evolving;
- A lot of R&D and innovative projects have to be conducted – only a few of these technologies will lead to commercial introduction on the market;

Regulators should also bear in mind that the degree of customer and technology readiness could determine what design of incentive is best suitable for the stage of innovation needed.

### Stage 1: R&D- Share of DSO turnover :

A suitable model would be a compensation based on a percentage of the total revenue, allowing the DSOs to

decide how to invest/spend it.

### Stage 2: Piloting:

- Immediate costs compensation. The incentive could handle the costs without efficiency requirements as uncontrollable cost (which in the Swedish regulation is a pass through item) and investments could be valued in the regulatory asset base (RAB) after repurchasing value. The risk of lost capital compensation with early phase-outs of new technology could be handled by treating the scrapping costs as uncontrollable costs.
- Qualification criteria. Clear and simple criteria defined by the authority before the beginning of the project (e.g. Decrease grid losses, enable better integration of RES). It would be advisable to limit the required reporting to encourage also innovation for the smaller DSOs.

### Stage 3: Introduction:

- Immediate costs compensation.
- Investments – evaluated by “procurement value”.

### Stage 4: Commercial:

- Costs compensated in coming regulatory periods.
- Investments – included in ordinary regulation.
- Benefits from innovative investments should remain (at least partially) with the DSOs.