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Technical Assistance for Improvement of Performance-Based Tariff Regulation of EMRA For Turkish Energy Markets Through Introducing an Enhanced Monitoring System



Task 3.4 Training

Best Practices Regarding Innovation and Recommendations for Gas Distribution Companies

4 September 2020, EMRA, Ankara





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Technical Assistance for Improvement of Performance-Based Tariff Regulation of EMRA For Turkish Energy Markets Through Introducing an Enhanced Monitoring System



Task 3.4 Training

Innovation and R&D Studies in European Gas Distribution

4 September 2020, EMRA, Ankara





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Workshop Program



AGENDA 04 September 2020 – Gas focused training

Time	Agenda item	Presenter/Moderator
10:00 – 10:30	Innovation and R&D Studies in European Gas Distribution	Dr. Ioannis Vlachos, senior NKE
10:30 – 11:00	International benchmark, best practices and regulatory approaches about incentivizing innovation (Gas Distribution)	Dr. Ioannis Vlachos, senior NKE
11:00 – 11:30	Roles, responsibilities, strategies and actions of regulated entities and public institutions in incentivizing country-specific targets (Gas Distribution)	Dr. Ioannis Vlachos, senior NKE
11:30 – 12:00	Gap Analysis and Recommendations (Gas Distribution)	Dr. Ioannis Vlachos, senior NKE





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Agenda

Session-2: Innovation and R&D Studies in European Gas Distribution

- ❖ Support Mechanisms
- ❖ Selected Projects





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Agenda

Session-3: International benchmark, best practices and regulatory approaches about incentivizing innovation (Gas Distribution)

- ❖ Different regulatory approaches on incentivizing innovation efforts
- ❖ Selected country practices (UK, Italy, France, Ireland, Finland) for regulation of distribution innovation activities
- ❖ Comparison of country regulatory practices





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Agenda

Session-4: Roles, responsibilities, strategies and actions of regulated entities and public institutions in incentivizing country-specific targets (Gas Distribution)

- ❖ Gas Smart Meter
- ❖ Flexibility Services
- ❖ Infrastructure for Natural Gas Vehicles
- ❖ Energy Efficiency Services
- ❖ Smart Gas Grids





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Agenda

Session-5: Gap Analysis and Recommendations (Gas Distribution)

- ❖ Overarching Principles
- ❖ Recommendations About Tariff Methodologies and Incentives
- ❖ Scope of Innovation Business/Master Plan
- ❖ Evaluation of R&D Project Applications and Monitoring
- ❖ Allocation of R&D Budget According to Project Types
- ❖ Priority Innovation Areas for the Turkish Gas Distribution Sector
- ❖ Other Recommendations





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Task 3.4 Training

Innovation and R&D Studies in European Gas Distribution

Gas Distribution

4 September 2020, EMRA, Ankara





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Introduction

- Gas distribution companies worldwide undergo a significant shift from their traditional role of being solely gas transporters towards the more active role of providing innovative services to their customers, as well as to foster energy market participation.
- The primary responsibility of gas Distribution System Operators (DSOs) is to distribute gas to their consumers in an efficient and safe manner. To achieve this task, the existence of secure and reliable gas networks is of primary importance.
- Especially with the introduction of biogas and biomethane production, gas DSOs are affected in several ways and thus there is the need for them to ensure the stability of the gas distribution grid.
- Gas networks are characterized by increased flexibility when compared to their electricity counterparts due to their storage potential and the predictability of peak demand. This renders the interoperability of gas and electricity networks as a key factor for increasing the efficiency of both networks, especially through power-to-gas technologies.





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Introduction

- For gas DSOs to face effectively the challenges from the undergoing transformation of the gas grids, the development of a smart gas grid equipped with technologies, such as enhanced automation systems for real-time information, monitoring and control mechanisms for gas quality and pressure, as well as other systems are needed.
- Smart gas meters, as proposed in the Third Energy Package, Directive for the Internal Gas Market, are important to provide the required visibility of the gas distribution grid and to provide energy efficiency services to the end users.
- Research and development (R&D) projects and innovation activities arise more as a necessity rather than a luxury for the gas DSOs. Therefore, promoting funds for R&D and providing regulatory incentives to support new technologies needs to be of high on the priority list of the National Regulatory Authorities (NRAs) by ensuring that sufficient investments in gas distribution network take place to meet the challenges of the current and future rules of gas DSOs.





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Innovation Funding and Mechanisms in EU





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Innovation Funding and Mechanisms in EU



➤ Horizon 2020 Framework Program

- EU Research and Innovation program was kicked off in 2014.
- The overall funding budget adds up to nearly **80 billion EURO** to be provided/granted within a time period of **7 years** for a great deal of sector and/or technology specific calls/projects.
- The motivation has the program, which has been backed up by all European political leaders and the members of the EU Parliament, is based on many drivers. It is reaching from the general objective to sustainably ensure Europe's global competitiveness in organizational, technological, environmental, reglementary respects and hence support economic growth, a healthy labor market and wealth in the EU, to underlying targets such as fostering inventions and minimize their time-to-market, facilitating cooperation between industrial, public and private sectors, as well as creating a knowledge pool to be alimented and used by all European countries.





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Innovation Funding and Mechanisms in EU



➤ Horizon Europe Framework Program

- The Horizon Europe Framework is expected to become the **successor program of Horizon 2020**.
- It is designed as a research and innovation program with an overall funding budget of **100 billion EURO**.
- The respective strategic planning process with an initial time horizon of **4 years** has been kicked-off by the European Commission as responsible stakeholder and patron of the program.
- Based on the preliminary structure of the program, the planning process will detail the first phase of the program by scheduling work programs and calls for proposals with the general objectives to widening the participation in the program as well as evolutionarily amending the European R&I system, while the initial specific focus shall be on the challenges belonging to various sectors.



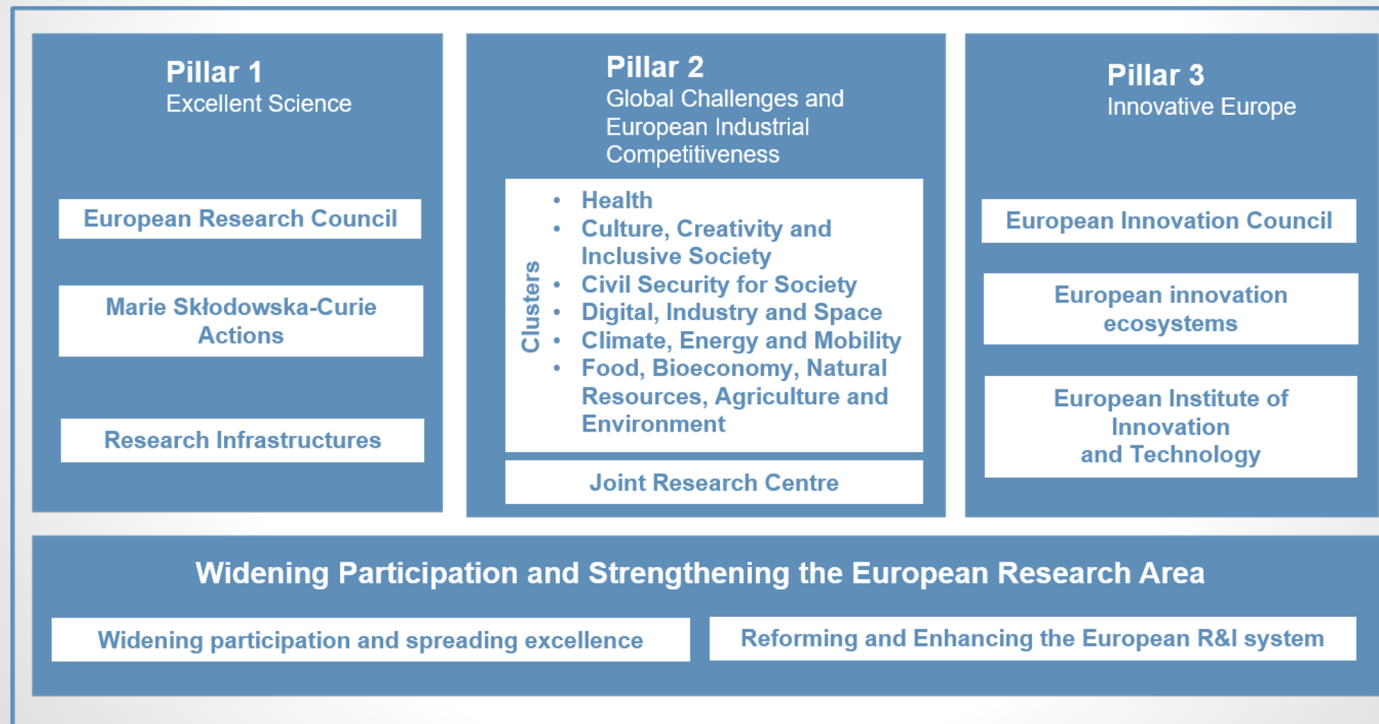


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➤ Horizon Europe Framework Program





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Innovation Funding and Mechanisms in EU

➤ Connecting Europe Facility

- Connecting Europe Facility (CEF) represents an EU funding instrument used to financially support (by granting project funding, project bonds and/or other guaranties) the evolutionary further development of interconnected European networks in the areas of **energy, transport and telecom**.
- As far as the CEF Energy is concerned, INEA is responsible for deploying the respective commercial instruments and funding as well as for efficiently managing the technical & financial implementation of its TEN-T programs/projects, which are supposed to prepare the European energy infrastructure for future requirements.
- Estimations are emanating from up to **70 billion EURO to be invested only in the gas sector**; in the years from 2014 to 2020, a budget of 5.35 billion EURO has been made available for energy related infrastructure projects, whereof an amount of approximately 4.6 billion EURO has been granted by INEA thru CEF Energy.





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Innovation Funding and Mechanisms in EU

➤ InnovFin

- In order to mitigate the respective commercial risks for involved stakeholders, the European Bank (EIB) is providing (under the umbrella of the **InnovFin** program) loans and/or respective guarantees and/or asset-related financing for innovative demonstration projects belonging to the energy sector.
- The respective financing instruments are potentially granted to small and medium sized enterprises (SME), large companies and research institutions, provided that the proposed project complies with certain pre-requisites





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Innovation Funding and Mechanisms in EU

➤ InnovFin Prerequisites

- **Scope:** Related to energy transition towards eco-friendly, resources-preserving and efficient generation, transmission and distribution systems.
- **Innovativeness:** Specific technology, process, products, services or combination of those shall be innovative or new to the market, respectively. The innovative aspect may consist of the innovative combination or innovative application of existing technologies.
- **Readiness for demonstration at scale:** Project components to be implemented shall be at pre-commercial level or early commercialization stages and the viability of their market introduction shall be assessable by ascertaining a sufficient maturity level for final demonstration at the proposed commercial scale.
- **Bankability:** Providing evidence regarding the prospects of satisfactory project performance and agreed loan repayment.
- **Commitment:** Promoters, sponsors and/or operators must be willing to substantially co-fund the project.
- **Replicability:** Potential to be replicated elsewhere with convincing market opportunities and prospects for future cost reductions.





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Innovation Funding and Mechanisms in EU

➤ European Regional Development Fund

- The European Regional Development Fund (ERDF) is a program that provides funding for R&D projects dedicated to the **implementation of the digital agenda and the energy transition process**, which are preferably supposed to be planned and implemented by regional SMEs.
- The general objective of the ERDF is to strive for a strengthening of the economic imbalances and the feeling of social cohesion throughout the EU as well as within the different regions of the member states.





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Innovation Funding and Mechanisms in EU

➤ LIFE Program

- The LIFE program with a budget of **3.4 billion EURO** expected to be allocated within the funding period 2014-2020 to activities and projects related to the EU environment and climate action created in 1992.
- An amount of **243.81 million EURO** is allocated for works on nature conservation and environmental protection, and further **413.25 million EURO** for climate action.





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Innovation Funding and Mechanisms in EU

➤ LIFE Program

- The **general objectives** of the current LIFE program can be summarized as follows:
 - Help move towards a resource-efficient, low carbon and climate resilient economy, improve the quality of the environment and halt and reverse biodiversity loss
 - Improve the development, implementation and enforcement of EU environmental and climate policy and legislation, and act as a catalyst for, and promote, the mainstreaming of environmental and climate objectives into other policies and practices
 - Support better environmental and climate governance at all levels, including better involvement of civil society, NGOs and local actors
 - Support the implementation of the 7th environmental action plan





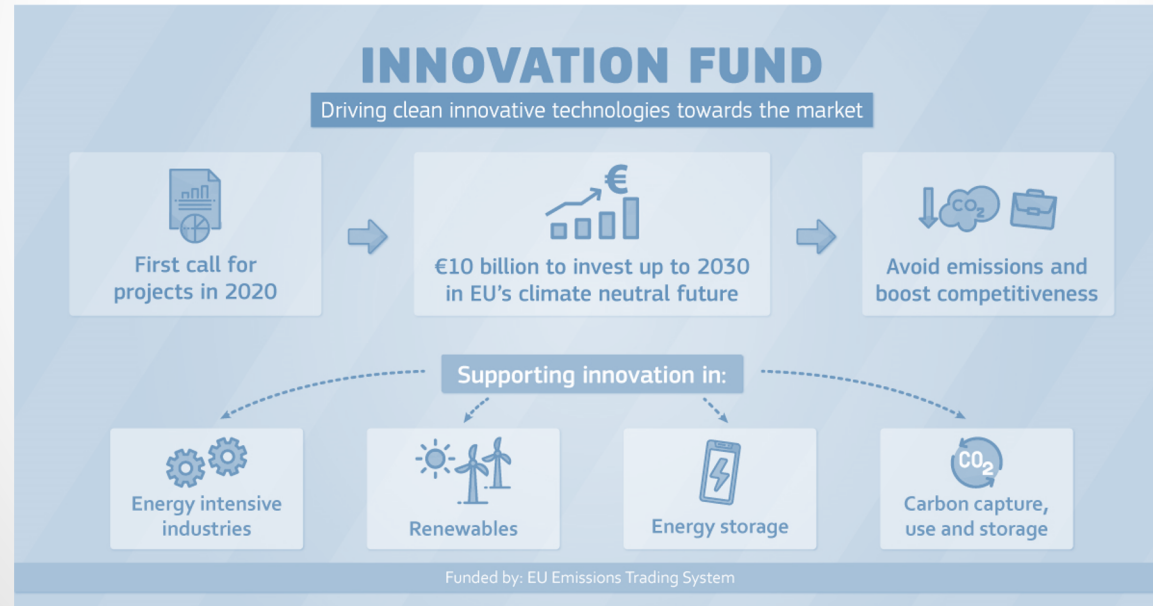
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Innovation Funding and Mechanisms in EU

➤ Innovation Fund

- The Innovation Fund is one of the world's largest funding programs for demonstration of innovative low-carbon technologies.





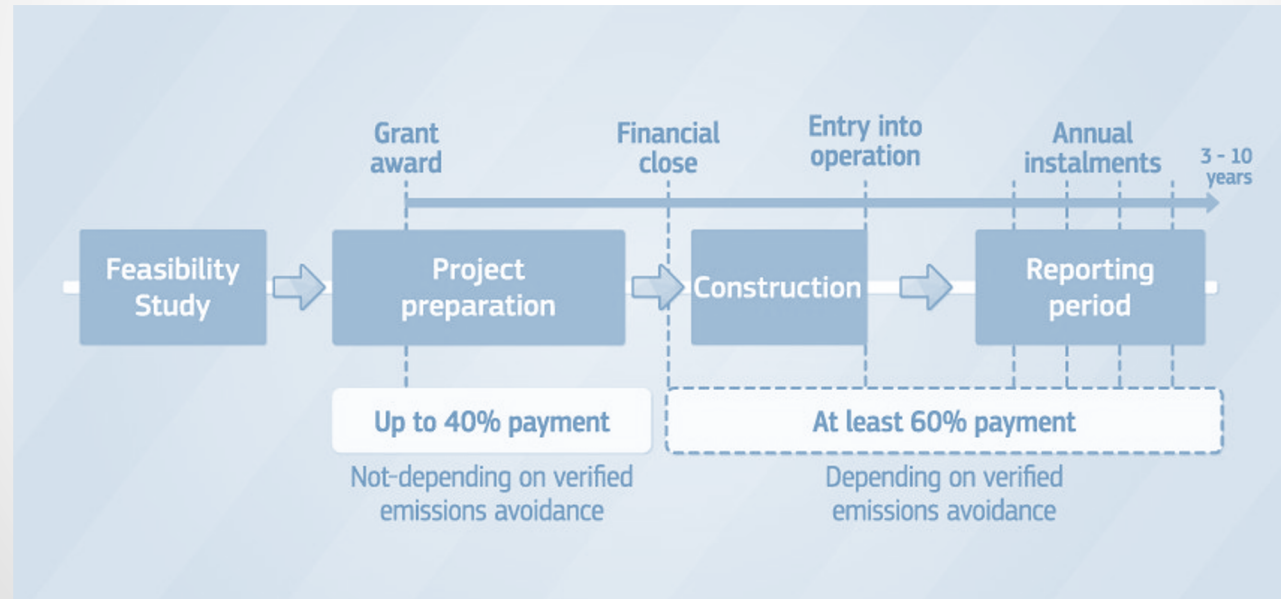
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Innovation Funding and Mechanisms in EU

➤ Innovation Fund

➤ Grant financing





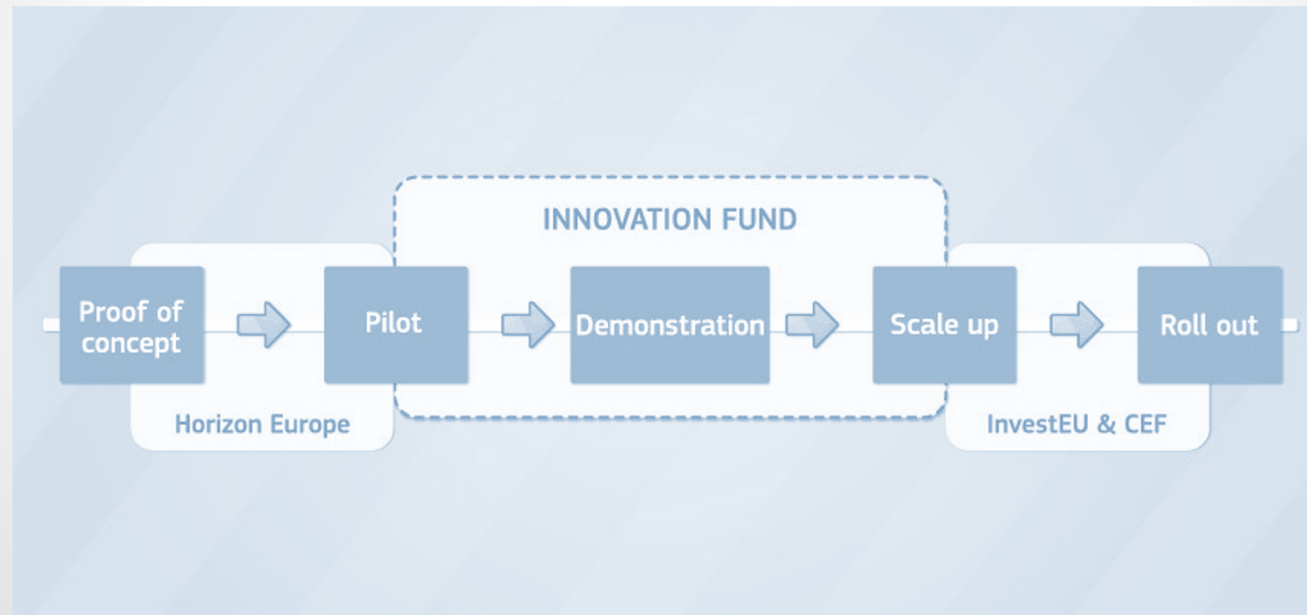
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➤ Innovation Fund

➤ Program structure





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Sample Projects





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Sample Projects

Project	Remote Monitoring Device for Flammable and Toxic Gases
Description	<p>Introduction</p> <p>The Scope of this proposal is to design, manufacture (rapid prototype) and trial the detectors in gas riser systems specific to MOBs. The outputs of the project will be a developed, tested and trialled prototype which will be assessed at the end of the project via a Project End Stage Assessment. At this time, a decision will be made to progress the project to the next stage (detailed design, manufacture and further field trials).</p> <p>Objectives</p> <p>The project seeks to prove that this concept is able, through trialling, to demonstrate that offers a viable, cost effective means of monitoring potential gas escapes from assets. Success of the project may lead to further development to a deployable and certified system which could be used on the Network and potentially mitigate the need to replace riser assets located in spatially restrictive areas.</p> <p>Expected Benefits</p> <p>The Project can be considered a success if, upon completion of work:</p> <ul style="list-style-type: none"> • The product has demonstrated capability of performing the desired task via successful field trials.





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Sample Projects

Project	SENSIT Acoustic Pipe Locator
Description	<p>Problems</p> <p>The British gas industry has, for a very long time, been unable to trace the route of polyethylene pipe (PE) networks operating at low, district, pressures (greater pressure systems were protected by the use of detectable marker tape laid along their route).</p> <p>There are many reasons for needing to know the location of PE pipe systems, the primary being that it is a requirement that mains are to be recorded accurately and correctly. But put very simply, if you can't find the PE main or service, how are you going to repair it, extend it, cut it off, work alongside another PE main (water or gas) or be able to advise other parties of their location without, what could very easily be, excavating large areas to find the pipe. Excavations, and their subsequent reinstatement, especially in carriageways, can easily account for around 40% of the total job cost.</p> <p>Objectives</p> <p>The main objectives identified for this project are to establish that utilisation of the SENSIT pipe locator will result in:</p> <ul style="list-style-type: none"> • Greater accuracy in locating underground assets • Reduced number and size of excavations, • Reduced reinstatement, • Reduced time spent on site; and • Improved customer experience.





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Sample Projects

Project	LIFE GREEN GAS NETWORK – Intelligent System to Implement Smart Functions on Gas Networks to Mitigate the Greenhouse Effect by Reducing Gas Leaks
Description	<p>Background</p> <p>To meet the EU objective of an overall 8% reduction in its greenhouse gas (GHG) emissions from 2008 to 2012 - in accordance with the Kyoto Protocol - each Member State should implement a cap-and-trade type system applied to their industrial sectors characterised by high emission levels, which overall generate 40% of GHG emissions in the EU. At the end of 2008, the EU strengthened its commitment by adopting a new strategy, which stated 3 objectives to be reached by 2020: 1) primary source consumption reduced by 20% compared with trend forecasts; 2) GHG emissions reduced by 20%; and 3) a 20% increase in energy from renewable sources for final consumption. Gas leaks are not only a waste of resources, but also an important contributor to greenhouse gas emissions. Scientific evidence has shown that losses of methane and carbon dioxide - the GHGs contained in natural gas - are directly proportional to network operating pressure. This quantity is kept constant at an over-dimensioned value with the current operating method.</p> <p>Objectives</p> <p>The LIFE GREEN GAS NETWORK project set out to show that a new management and control system to regulate pressure levels in natural gas distribution networks could reduce greenhouse gas emissions caused by gas leaks by at least 3%. This system would include a new management and control system, including new devices for measuring and regulating pressure in natural gas distribution networks. New software would manage remote communication between devices on the network and a control centre and process data in real time to optimise gas pressure in each branch of the network. The project expected to be able to maintain pressure above a minimum threshold at all times across the network and guarantee that off-peak pressure is lower than current values. Tests would compare the system's performance in pipes made of steel and of polyethylene. As well as reducing gas leaks, the new system was expected to at least match current service quality levels and demonstrate compliance with all relevant safety standards.</p>





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Sample Projects

Project	Review and Validation of the Current Gas Demand Forecasting Methodology
<p>Description</p>	<p>Problem</p> <p>National Grid’s National Transmission System (NTS) provides the year-ahead annual gas demand forecasts. These forecasts are then used to book capacity to meet the UK’s year-ahead gas demand.</p> <p>Having accurate and robust demand forecasts is critical to the business. Current annual demand forecasting processes are based on historical methodologies which have not been subject to comprehensive review and there is evidence to suggest that refinements to this process could result in significant capacity booking cost savings to consumers, through the application of appropriate mathematics, statistics, modelling and algorithms.</p> <p>Objectives</p> <p>The aim of this project is to undertake a comprehensive assessment of the methodology used for generating year-ahead gas demand forecasts. To identify enhancements and support scoping the future demand scenario and forecast requirements.</p>





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Sample Projects

Project	VOLUME Induced micro-COgenerator for high energy efficiency of gas distribution networks
Description	Overview <p>To address its growing energy needs, Europe is seeking to increase the usage of more environmentally friendly energy sources with increased efficiency. In response, the market is leaning more towards natural gas, with market penetration growing at 64% faster than any other source! However, its wider adoption is being hampered by the energy losses and energy wastage resulting in the gas depressurisation from the transportation network pressure (40-60 bar) to the local distribution network pressure (≤ 1.5 bar). The losses result in reduced efficiency in the gas networks and higher infrastructural and plant management costs – which are often passed to the final end users. There is a dire need to develop a technology that streamlines the gas distribution network, being capable to recover the energy lost during pressure drops and boosting its cost effectiveness. SINERGIA, is an Italian company specialized in the design and development of plants for the production, treatment, drying, filtration and separation of compressed air and technical gases. Leveraging 22 years of industrial experience and the closeness to the natural gas and its stakeholders, SINERGIA have developed the VOLUMICO micro-cogenerator. While providing in a single step the gas at the desired pressure to the required value of the domestic or industrial users, VOLUMICO recovers the energy loss from its expansion and pressure drop to produce additional low-cost, low-carbon electrical power to be used internally or fed to the grid. Targeting consumers – SMEs, municipal utilities, public institutions, industrial/residential districts – and gas suppliers, VOLUMICO will enable reduction in energy bills (-35%) through highly efficient energy extraction for the first ones, and reduction of infrastructure and maintenance costs (-30% of CAPEX/OPEX) for the latter. Within a 5-year period, Sinergia will generate a cumulative revenue and profit of €49.6M and almost €12.7M respectively, creating a total of 33 jobs.</p>





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Sample Projects

Project	SmartGasGrid
<p>Description</p>	<p>Overview</p> <p>Gas grids have the potential to become an energy storage device for renewable energy in the form of biomethane but, at the moment, this potential is not fully exploited due to technical limitations in what are still largely manually driven grid systems. Gas grid systems are about to undergo fundamental changes, driven by the rapid growth in renewable energy production, which creates the need for a more flexible and active gas distribution system: a "smart gas grid", with real-time, precise monitoring and controlling of gas pressure, gas quality and the gas flow. Utonomy, a British/German SME, is developing a novel, cost-effective smart grid technology that monitors and controls gas pressure, flow & gas quality by means of cloud-based, algorithm-driven hardware that can be easily installed without the need for any changes in the gas infrastructure. Utonomy has already developed a pressure management application that helps utilities reduce gas leakage to TRL 6, with the first field pilots planned for January 2018. However, during development work and in the course of discussions with future customers, Utonomy discovered that pressure management has even more commercial potential when applied to increase the grid feed-in capacity of biomethane plants. The system provides valuable data from day 1, it has an exceptionally short payback period and the increased output enabled by the innovation could result in total CO₂ mitigation of approx. 26m tonnes p.a. in the UK, France, the Netherlands and Germany. Utonomy's near-term marketing focus will be on these four countries, but the technology has significant sales potential everywhere there is a gas grid. Utonomy is targeting incremental revenues of EUR 19m from this project in 2022. The focus of this Phase 1 study will be to analyse the technical adaptations required for the optimization of renewable gas injection, build a demonstrator and evaluate go-to-market and pricing options.</p>





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Task 3.4 Training

International benchmark, best practices and regulatory approaches
about incentivizing innovation

Gas Distribution

4 September 2020, EMRA, Ankara





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International Benchmarks

- United Kingdom
- Ireland
- France
- Italy
- Finland

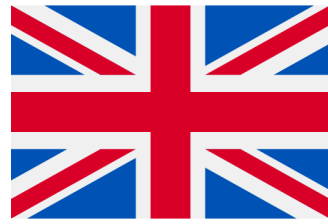




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United Kingdom





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Innovation Funding and Mechanisms in EU



➤ United Kingdom

- The UK's RIIO framework stands for **Revenue = Incentives + Innovation + Outputs** and is considered as one of the most comprehensive performance-based regulatory frameworks.
- The RIIO has been developed in such a way so that it **rewards utilities for achieving desired outcomes**.
- The primary objective of the RIIO model is to **foster the development of the electricity and gas networks in an efficient manner towards sustainable energy markets**.
- The first RIIO control for gas distribution was introduced in **2013**.



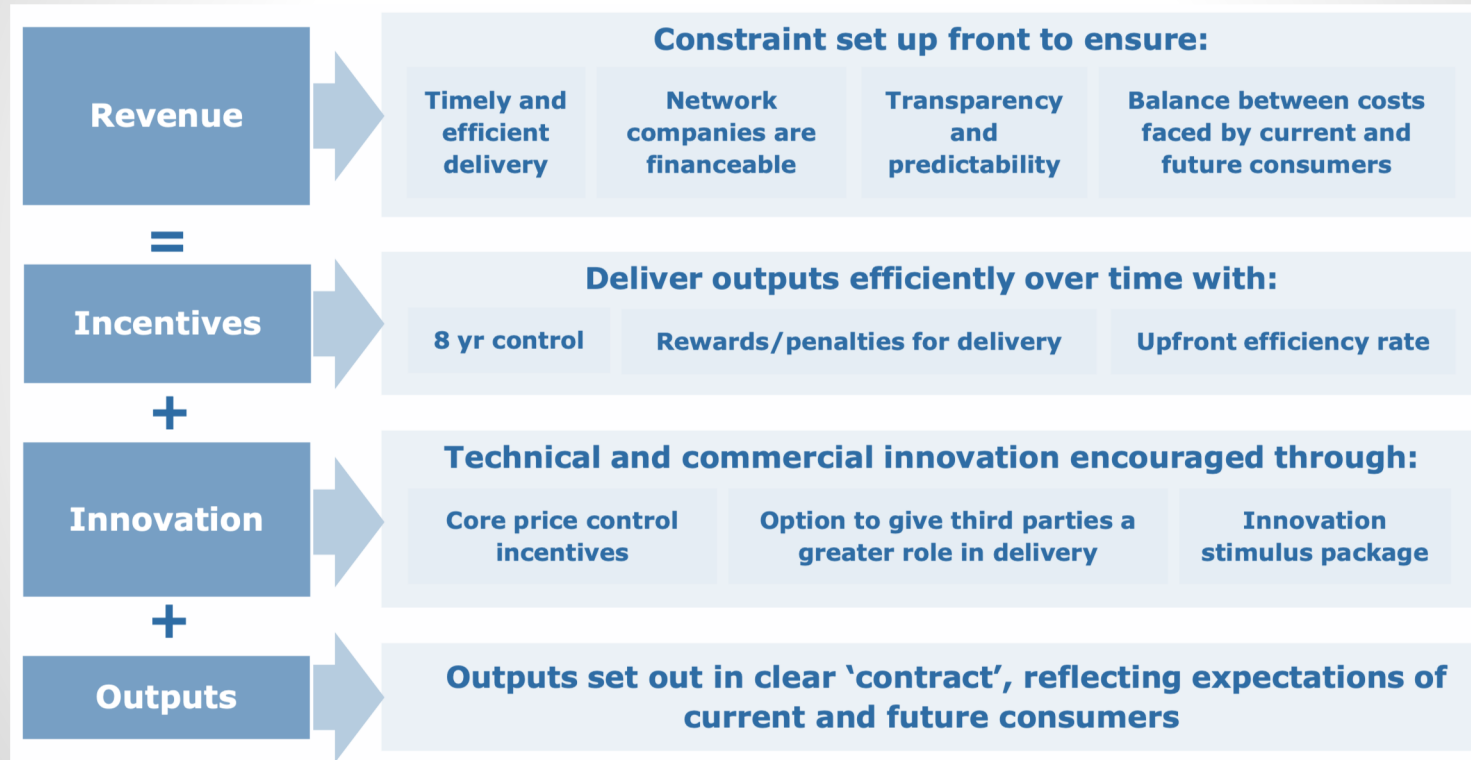


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The RIIO Model





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- The RIIO model consists of four (4) main features, selected in such a way to **encourage utilities to innovate and achieve favorable outputs**:
 - a multi-year rate plan,
 - the total expenditure (TOTEX) approach,
 - performance incentives, and
 - an innovation fund





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➤ United Kingdom

Multi-Year Rate Plan

The baseline revenues that utilities can collect are set by Ofgem over an eight-year rate period. Depending on utilities' performance against a predefined set of targets, the revenues are adjusted accordingly, while adjustment mechanisms for managing uncertainties caused by unpredictable incurred costs or events are also included. The purpose of the **multi-year rate plan is to provide incentives for utilities to undertake the long-term investments that are important for the transition from the traditional to the modern grid.** Finally, utilities are incentivized to spend prudently since for projects delivered under budget utilities are allowed to keep a portion of the cost-savings as profit, while the remaining portion is retained by the customers. In an analogous manner, in the case of cost overruns, these are also split between the utility and its customers.





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➤ United Kingdom



TOTEX

The **TOTEX** approach involves the combination into one regulatory asset of both the capital expenditures (CAPEX) and the operational expenditures (OPEX). This approach allows, **based on a pre-defined ratio, a rate of return on both, while at the same time makes much less attractive to utilities to invest in CAPEX (traditionally earning a rate of return) over OPEX (traditionally passed through without a return)**. Moreover, the TOTEX approach is coupled with a revenue cap that fosters the selection of the most cost-effective solutions by the utilities, as well as the cooperation with third parties that can optimize project-related costs, thus delivering benefits for both utilities, third parties, and customers.





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➤ United Kingdom

Performance Incentives

Apart from the incentivization of utilities via the multi-year rate plan and revenue cap, Ofgem specify a set of **predefined targets** for utilities that are tied to the following **performance categories**:

- reliability and availability,
- environment,
- connections,
- customer service,
- social obligations and
- safety.





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Innovation Funding and Mechanisms in EU



➤ United Kingdom

Innovation Fund

To foster innovation activities and R&D projects, Ofgem set up an **innovation fund for new technologies and operating and commercial agreements**. Moreover, an **Innovation Rollout Mechanism (IRM)** is also introduced to reduce risks that are associated with new projects that generate environmental benefits. As parts of the innovation fund, the **Network Innovation Allowance** makes available £20 million per year for gas networks, while the **Network Innovation Competition** offers £61 million per year to fund projects in the gas and electricity sectors. Finally, an important aspect of the innovation fund is the dissemination of results and lessons learnt from innovation activities among the various stakeholders.



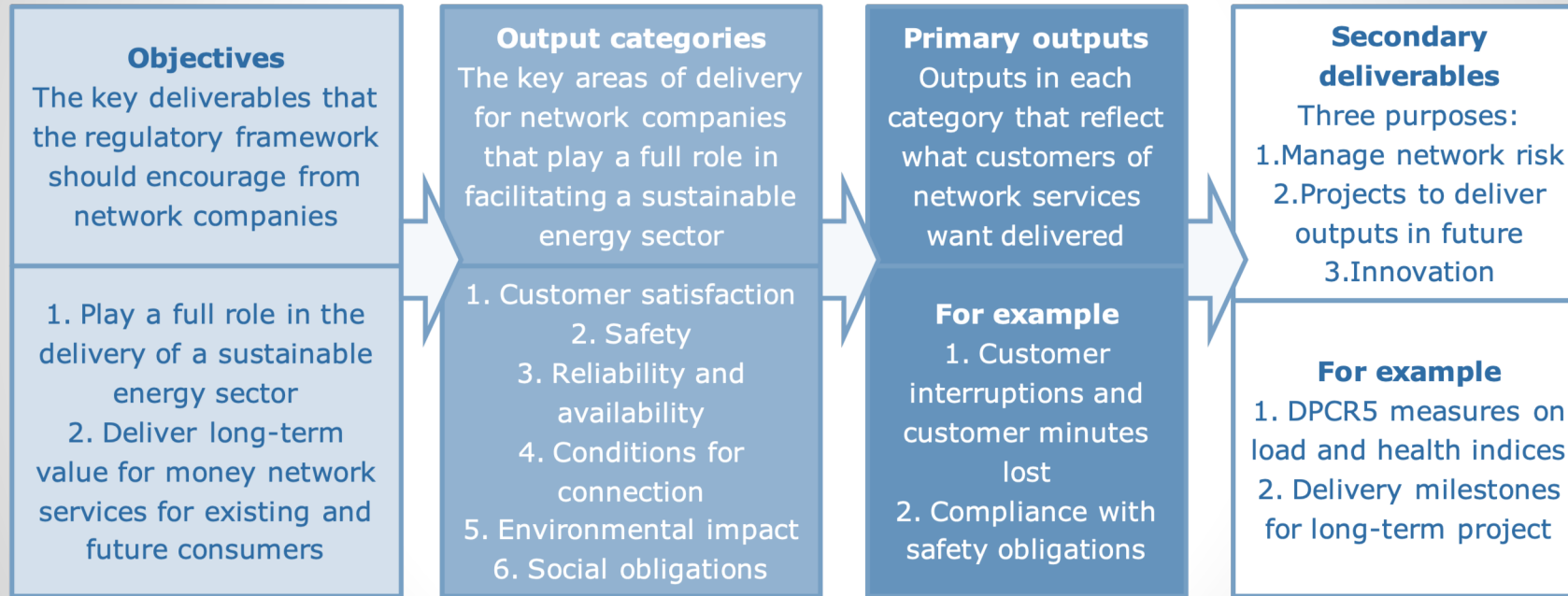


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The Framework for Setting Outputs



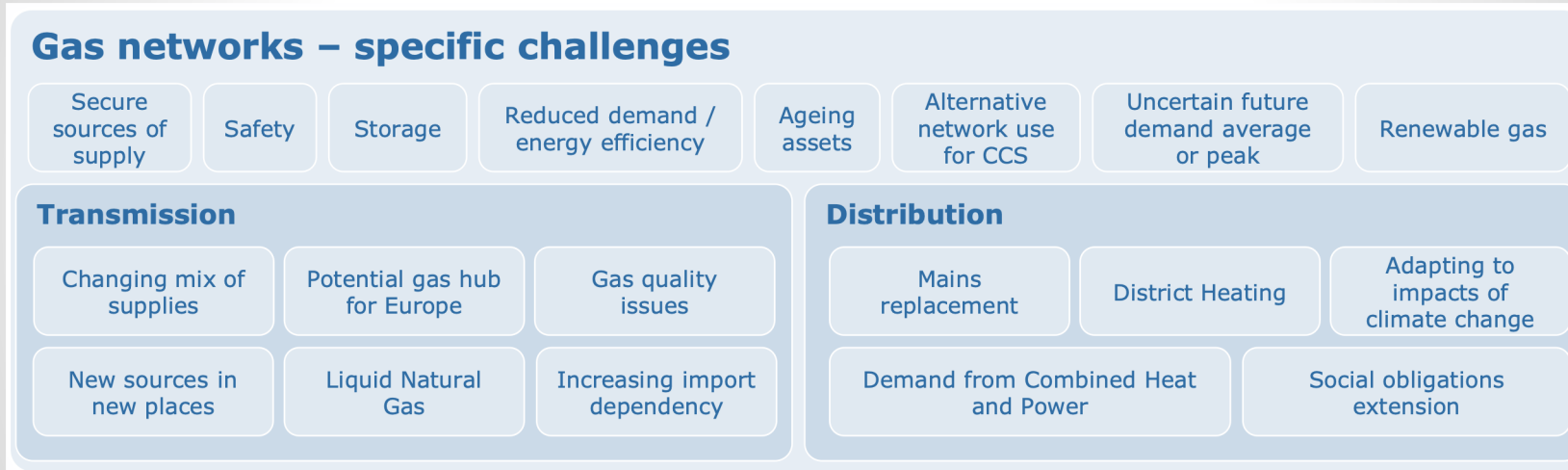


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➤ United Kingdom



Gas Networks - Specific Challenges



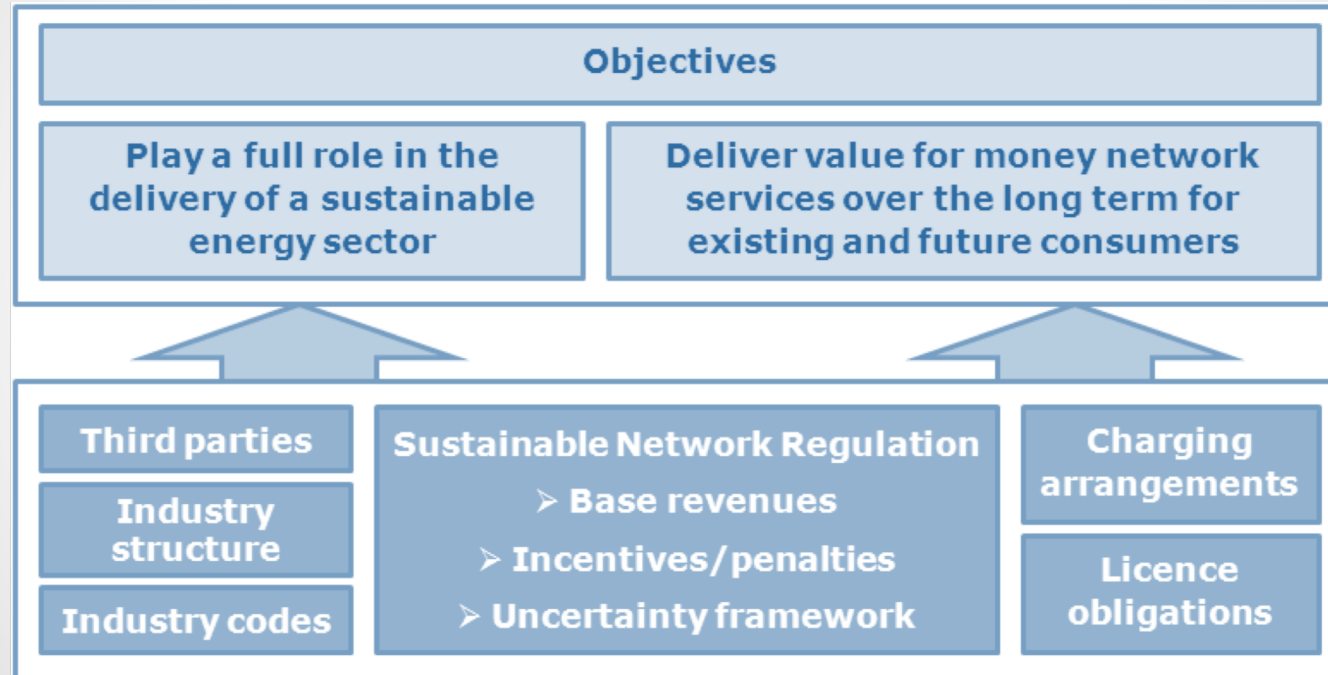


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Opportunities for Commercial Innovation Arising from Interactions Across Different Elements of the Wider Regulatory Framework





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- United Kingdom

Gas Network Innovation Competition

The gas **Network Innovation Competition (NIC)**, which is part of Ofgem’s RIIO price controls, is an **annual** opportunity for gas network companies to compete for getting funding to **develop and demonstrate new technologies, as well as operating and commercial agreements**. The requested funding will be awarded to the best innovation projects that foster the understanding of gas network operators on what needs to be done to provide environmental benefits, as well as to reduce costs and maintain security of supply as UK moves towards a low carbon economy. The available funding under the gas NIC is up to **£20 million per annum**.





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Gas Network Innovation Allowance

The **Network Innovation Alliance (NIA)**, which is also part of the RIIO-GD1 price control of Ofgem, is a **set allowance** that is received by each RIIO network licensee as part of their price control allowance.

Funding under NIA is limited and can be used for:

- funding **smaller technical, commercial, or operational projects** directly related to the licensees' network that have the potential to deliver financial benefits to the licensee and its customers; and/or
- funding the **preparation of submissions** to the Network Innovation Competition (NIC) which meet the criteria set out in the NIC Governance Document.





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Ireland





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Innovation Funding and Mechanisms in EU



➤ Ireland

➤ Innovation Funding

- For the price control period ranging from **2013-2017** an allowance of **€8 million** was available for **innovation OPEX funding**, of which €7.2 million was allocated to gas transmission and **€0.8 million to distribution**.
- The main focus areas of innovation funding were related to **CNG for the transport section**, as well as **renewable gas** and **research grants**.
- For the upcoming price control period, ranging from October 2017 until 2023, an **innovation allowance of up to €20.0 million**, approximately **1% of allowed revenue**, has been allocated.





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➤ Ireland

➤ Innovation Funding Selected Focus Areas

- CNG
- Biogas
- Research
- Business and technical services
- Program management services





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Innovation Funding and Mechanisms in EU



➤ Ireland

- This innovation funding is treated as a **pass-through** cost item and is not part of the efficiency requirement.
- Innovation funding is divided between the transmission and distribution networks in a ratio of **90:10**.
- The responsibility to determine the best possible allocation of innovation funding, fall under both Gas Networks Ireland (TSO) and the Gas Innovation Group.





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Innovation Funding and Mechanisms in EU



➤ Ireland

➤ Gas Innovation Fund

- The purpose of Gas Innovation Fund is to **encourage creativity and foster innovation** in the gas sector, by supporting solutions that meet the needs of the gas industry, thus making innovation part of the GNI and the gas industry.
- The establishment of the Innovation Fund was approved by the Commission of Regulation of Utilities (CRU) under PC3. The purpose of this fund is to **support innovation in the gas industry**. Under GNI's fourth price control (PC4) a new gas innovation fund was allowed.





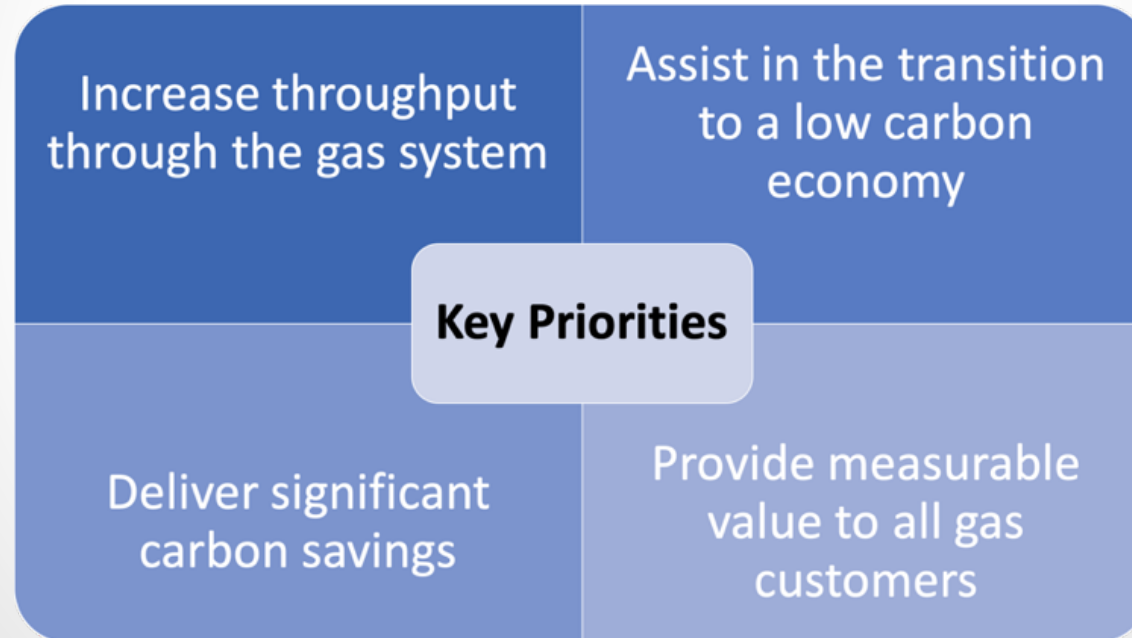
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➤ Ireland

➤ Gas Innovation Fund





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➤ Ireland

➤ Gas Innovation Fund

➤ Proposals seeking funding under the Gas Innovation Fund are **assessed** under certain criteria

➤ Relevance

➤ Maturity

➤ Impact





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Innovation Funding and Mechanisms in EU



➤ Ireland

➤ Gas Innovation Fund

- The innovation fund is **treated as OPEX**, meaning that is not included within the RAB.
- GNI are **allowed to recover outturn OPEX up to the allowed level of the innovation fund**, while in the case of **outturn OPEX being under the allowed level, this amount is not allowed to be recovered**; i.e. GNI can recover only the minimum of outturn or allowed innovation funding. This amount is not known at the end of the price control, so there will need to be an adjustment early within the PC4 price control for assessing PC3 innovation expenditure.





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France





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Innovation Funding and Mechanisms in EU



➤ France

- An incentive scheme for R&D costs has been introduced by the French Energy Regulatory Commission (Commission de regulation de l'énergie – CRE) in the current price control started in 2017. CRE uses a **revenue cap with a four-year regulatory period**. For each year, the **revenues are set ex-ante**, serving as an estimation of OPEX and a return on the RAB.
- OPEX and CAPEX are treated differently, thus forming a hybrid system in which OPEX are subject to incentive regulation while CAPEX is subject to rate of return regulation and can thus create **incentive bias**. CRE also introduced a further differentiation between network and non-network expenses.
- While network expenditures are treated as before, **for non-network expenditures OPEX and CAPEX are subject to the same incentives**.





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Innovation Funding and Mechanisms in EU



➤ France

- CRE defines as an R&D budget all the amounts that will be used for R&D, as well as for performing the necessary innovation activities.
- Provides GRDF the means to carry out the R&D projects required for the construction of the networks of the future by guaranteeing in particular that tariff matters do not hinder R&D projects.
- GRDF has also set up a mechanism for monitoring gas-related projects, in order to provide gas market stakeholders with visibility into the innovation projects fostered and funded by GRDF.





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Innovation Funding and Mechanisms in EU



➤ France

- R&D **forecasted** expenditure presented by GRDF for smart grid projects is included in the incentive-based regulation mechanism.
- These expenses exclude R&D activities focused on increasing the number of customers connected to the gas networks and, as such, they are not taken into account in the regulation mechanism, but rather they fall within a specific incentive-based regulation.
- R&D costs related to smart grid projects that were consider in the ATRD5 tariff, represent an average €10.7 M per year over the 2016-2019 period.





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Innovation Funding and Mechanisms in EU



➤ France

- Actual R&D OPEX incurred by GRDF are **reviewed by CRE at the end of the tariff period.**
- Any **positive difference** between the forecasted and actual trajectories will be returned to the customers. For the reviewing purposes, GRDF submits to CRE a review of the previous year. This review is submitted before the end of the first quarter of each calendar year.
- Any recorded **annual differences** between the forecasted and actual trajectories need to be justified by GRDF within the annual report that is submitted to CRE.
- CRE publishes a **biannual report** with the R&D actions performed by GRDF that provides visibility into the innovation projects led by GRDF and funded under the ATRD tariff.





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Italy





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Innovation Funding and Mechanisms in EU



➤ Italy

- The Italian NRA, follows a **six-year period for gas distribution**, where **revenues are being established ex-ante with a RAB-based approach** and with deviations from forecast expenses being treated differently according to whether they are operational (incentive regulation) or capital (cost of service).
- Starting from 2020, a **TOTEX approach** will be adopted for both electricity and gas to **cope with the distortion that may be posed by the current regulatory approach**. Under the TOTEX approach CAPEX and OPEX are treated in the same way by the regulatory authority.
- The implementation of smart grid and innovation projects are **incentivized by a 2% increase in the WACC for twelve (12) years**.





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Finland





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Innovation Funding and Mechanisms in EU



➤ Finland

- The aim of incentivizing innovation is to **foster the development and use of innovative technical and operational solutions** by the network operators in their operations.
- Gas distribution network operator may incur research and development costs before the new technologies are in full use and utilizable.
- The Finnish NRA **deducts reasonable R&D costs during the calculation of realized adjusted profit for network operators**, in order to foster the active innovation and R&D efforts.
- **Acceptable R&D and innovation activities costs must be recorded as expenses in the unbundled profit and loss account** since capitalized R&D costs are not accepted to be included in the calculation of the innovation incentive.





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Innovation Funding and Mechanisms in EU



➤ Finland

- The acceptable R&D costs need to be **directly related to new knowledge creation**, as well as use of **new technologies** and the **development of products or network operation methods** for the gas distribution sector.
- The impact of the innovation incentive is **deducted** when calculating realized adjusted profit.
- The impact of the innovation incentive is calculated so that a share corresponding to a maximum of **1% of the DSO's total turnover from network operations** in the unbundled profit and loss accounts in the regulatory period are treated as reasonable research and development costs.
- The incentive is applied to **all network operators**.





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Recap of EU Countries and As-is-Status Comparison for Gas Distribution

Innovation Regulatory Feature	United Kingdom	Ireland	Italy	France	Finland	Turkey
High level description of innovation activities and regulatory framework	RIIO framework stands for Revenue = Incentives + Innovation + Outputs and is considered as one of the most comprehensive performance-based regulatory frameworks.	The main focus areas of innovation funding were related to CNG for the transport section, as well as renewable gas and research grants.	The Italian NRA, follows a six-year period for gas distribution, where revenues are being established ex-ante with a RAB-based approach and with deviations from forecast expenses being treated differently according to whether they are OPEX or CAPEX.	CRE defines as an R&D budget all the mounts that will be used for R&D, as well as for performing the necessary innovation activities.	Finnish NRA deducts reasonable R&D costs during the calculation of realised adjusted profit for network operators, in order to foster the active innovation and R&D efforts.	With a clear reference to support to innovation activities of distribution companies both in relevant legislations and the Strategic Plan of MENR, the regulations and policy in Turkey explicitly foster innovation activities of distribution companies. Furthermore, the secondary legislation is evolving as the innovation maturity of the sector is improved gradually through the support of the Regulator.
Innovation Regulatory Incentives in use	Two funding mechanisms in place for innovation projects: The Network Innovation Alliance (NIA) and the Network Innovation Competition (NIC).	For the price control period ranging from 2013-2017 an allowance of €0.8 million was available for gas distribution innovation OPEX funding.	Starting from 2020, a TOTEX approach will be adopted for both electricity and gas to cope with the distortion that may be posed by the current regulatory OPEX approach.	For each year, the revenues are set ex-ante, serving as an estimation of OPEX and a return on the RAB. OPEX and CAPEX are treated differently. OPEX are subject to incentive regulation, while CAPEX is subject to rate of return regulation and can thus create incentive bias.	Innovation incentive is calculated so that a share corresponding to a maximum of 1% of the DSO's total turnover from network operations.	Allocated R&D budget for DSOs is 1% of their OPEX.





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Recap of EU Countries and As-is-Status Comparison for Gas Distribution

Innovation Regulatory Feature	United Kingdom	Ireland	Italy	France	Finland	Turkey
Financing innovation incentives	Innovation incentives are included as part of the RIIO model.	Innovation funding is treated as a pass-through cost item and is not part of the efficiency requirement.	Under the TOTEX approach CAPEX and OPEX are treated in the same way by the regulatory authority. he implementation of smart grid and innovation projects are incentivized by a 12% increase in the WACC for twelve (12) years	CRE introduces further differentiation between network and non-network expenses. Non-network expenditures OPEX and CAPEX are subject to the same incentives.	Allowed innovation incentive is recovered from end-users through tariffs.	Innovation funding is treated as a pass-through cost item and is not part of the efficiency requirement.





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Recap of EU Countries and As-is-Status Comparison for Gas Distribution

Innovation Regulatory Feature	United Kingdom	Ireland	Italy	France	Finland	Turkey
Eligible R&D expenditures/projects	Ofgem allows for new equipment, as well as novel applications of existing equipment and new operational practices, as long as the foster and promote environmental benefits, value for customers; and creation of knowledge.	Eligible applications for funding submitted to the Gas Innovation Group will demonstrate the potential to achieve delivery of significant carbon savings; increase throughput through the gas system; assists in the transition to a low carbon economy; and provision measurable value to all gas customers.	No predefined eligible R&D expenditures.	Innovation actions and R&D projects providing to customers efficient and high-quality services.	OPEX R&D and innovation activities cost must be recorded as expenses in the unbundled profit and loss account since capitalised R&D costs are not accepted to be included in the calculation of the innovation incentive.	<p>For R&D project expenditures, DSOs apply to EMRA twice a year to get an approval of R&D Commission.</p> <p>On the other hand, expenses below are covered by R&D budget, up to 10% of the R&D budget:</p> <ul style="list-style-type: none"> Expenses in relation to the projects rejected at the application stage, In case of an R&D, Design and Incubation Centre is established by the relevant distribution company, the expenses and expenses incurred except for those covered by other legislation related to the said centre, Costs and expenses incurred to support and promote entrepreneurship activities, Incubation Centres, acceleration programs, contests and other cooperation activities with technology parks.





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Recap of EU Countries and As-is-Status Comparison for Gas Distribution

Innovation Regulatory Feature	United Kingdom	Ireland	Italy	France	Finland	Turkey
R&D expenditures approval, evaluation criteria and external experts' involvement.	Ofgem evaluates gas-related project applications for the NIA and NIC according to the following evaluation criteria. Project budget is app	The responsibility to determine the best possible allocation of innovation funding, fall under both Gas Networks Ireland (TSO) and the Gas Innovation Group. Proposals seeking funding under the Gas Innovation Fund are assessed under certain criteria, such as relevance, maturity, and impact.	Information not available.	Actual R&D OPEX incurred by GRDF are reviewed by CRE at the end of the tariff period. Any positive difference between the forecasted and actual trajectories will be returned to the customers.	Acceptable R&D costs need to be directly related to new knowledge creation, as well as use of new technologies and the development of products or network operation methods for the gas distribution sector	R&D projects are evaluated by R&D Commission of EMRA, with the rules and principles defined in "Principles and Procedures for Supporting Research, Development and Innovation Activities of Electricity and Natural Gas Distribution Companies"
Implementation, monitoring, reporting obligations and audit	For projects funded under the NIC of Ofgem, the beneficiary has to report, during the project proposal application submission project-specific financial information. A Close Down Report is also submitted for each project that has received NIC funding.	The Gas Innovation Fund requires applicants to provide a detailed budget for any proposal submitted, along with information on budget justification and other co-funding sources.	Information not available.	GRDF submits to CRE a review of the previous year. This review is submitted before the end of the first quarter of each calendar year.	R&D costs should be recorder separately in the unbundled financial statements.	For projects longer than 6 (six) months, 6 (six) months progress report is prepared by the distribution company considering the start date of the related project and submitted to the Regulator within 30 (thirty) days. Final result reports for the completed projects are submitted to the Regulator through EBIS (EMRA notification system) within 30 (thirty) days from the date of the completion of the related project.





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Recap of EU Countries and As-is-Status Comparison for Gas Distribution

Innovation Regulatory Feature	United Kingdom	Ireland	Italy	France	Finland	Turkey
Collaboration, partnership and knowledge transfer	Ofgem expect innovation activities and R&D project stakeholders to collaborate with each other on many of the projects supported by the NIA. The Learning Portal is an area on the ENA website through which external parties can access the learning generated as a result of innovative Projects.	ICRU publishes an Innovation Reporting Framework related to the Gas Innovation Fund. Gas Networks Ireland is also required to provide an annual report to the CRU for each gas year of the price control. The annual report outlines the activities of the Gas Innovation Fund for that particular time period.	There is no specific mention to collaboration with other regulated entities or third parties.	There is no specific mention to collaboration with other regulated entities or third parties. CRE publishes a biannual report with the R&D actions performed by GRDF that provides visibility into the innovation projects led by GRDF and funded under the ATRD tariff. GRDF has also set up a mechanism for monitoring gas-related projects, in order to provide gas market stakeholders with visibility into the innovation projects fostered and funded by GRDF.	There is no specific mention to collaboration with other regulated entities or third parties. Projects results are made publicly available.	DSO are encouraged to collaborate with R&D stakeholders (universities, start-ups, solution and technology providers, start-ups, consultants, etc.) DSOs are allowed to establish an R&D Centre, which provides tax incentives and regulated by Ministry of Industry and Technology.





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Technical Assistance for Improvement of Performance-Based Tariff Regulation of EMRA For Turkish Energy Markets Through Introducing an Enhanced Monitoring System



Task 3.4 Training

Roles, responsibilities, strategies and actions of regulated entities and public institutions in incentivizing country-specific targets

Gas Distribution

4 September 2020, EMRA, Ankara

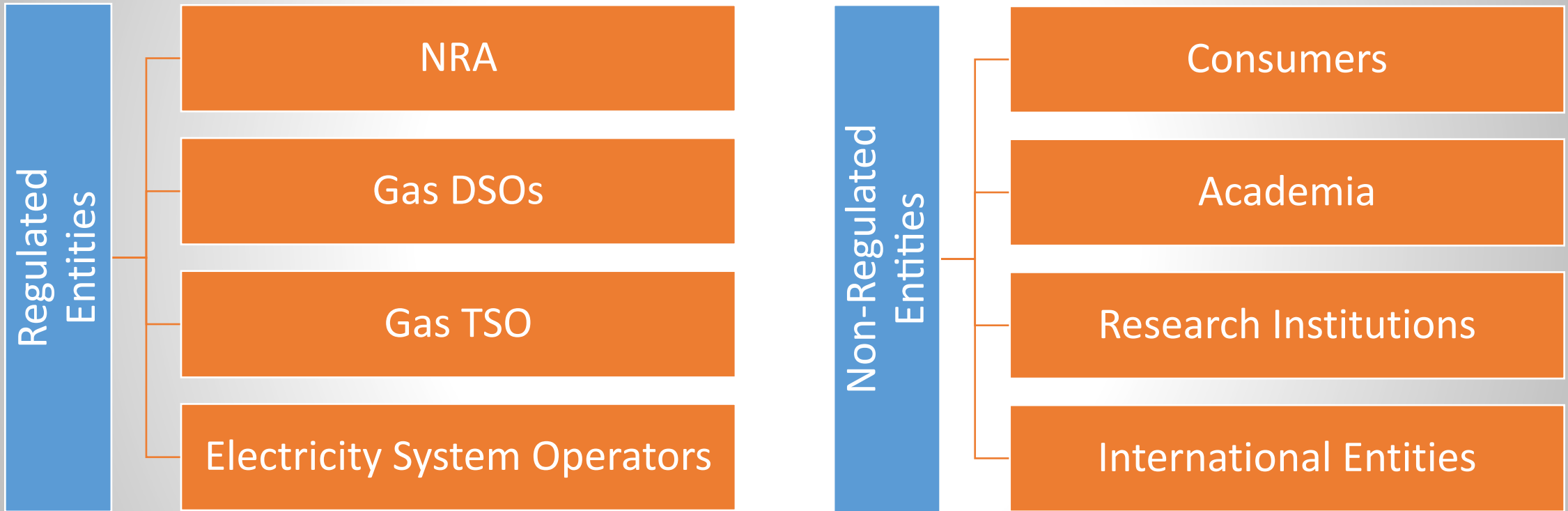




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Key Stakeholders in R&D Projects and Innovation Activities





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Future Roles and Responsibilities of Gas DSOs

Biogas

The development of biogas and biomethane production affects gas DSOs in several ways since they are the responsible entities for maintaining the stability of the gas distribution grid. Therefore, it is in their interest that the quantity and quality of the biogas used remains stable. Gas DSOs are also responsible for the connection of biogas plants to the distribution grid, a responsibility that includes extending the network and installing appropriate technologies. This represents a significant investment for gas DSOs. Regulators should ensure that gas DSOs do not bear any risk regarding the connection of biogas power plants to the grid by providing that adequate mechanisms for cost compensation are in place.

Energy Storage and Power-to-Gas

Power-to-Gas technologies are an efficient way to use the surplus in renewable energy produced at times of low demand. Power-to-Gas technologies involve the production of hydrogen from electricity in a process of electrolyzation. Subsequently, the gas produced can be transformed into methane by adding carbon monoxide and can be stored for later use, injected into the gas grid or even converted back into electricity. Power-to-Gas solves in an alternative way the problem of the storage of energy produced by renewable sources, especially taking into account the increased use of renewable energies and the volatile nature of their production. These types of technologies represent an opportunity for gas DSOs since they offer the means for ensuring the stability of both the gas and electricity grids.





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Future Roles and Responsibilities of Gas DSOs

Transportation and Gas Vehicles

Fostering the use of alternative fuels for transportation requires a significant increase in the number of gas filling stations. In the European Union, there exist approximately 3,000 CNG and 50 LNG filling stations. The majority of the CNG stations are located in Italy and Germany. The network of gas filling stations requires the gas DSO's infrastructure, thus making the gas DSO responsible for the connection of the filling stations to the distribution grid. Therefore, putting in place the required infrastructure is an important step for increasing the number of natural gas vehicles. However, the connection of the filling stations to the distribution grid should not introduce technical or financial risks and jeopardize the normal operation of the gas DSOs.

Combined Heat and Power

Some CHP plants use locally produced biogas, which do not need to be connected to the gas distribution grid. However, in some cases gas DSOs are responsible for both the gas and electricity/heating grids. Moreover, some CHP plants also use natural gas from the gas grid and therefore a connection to the gas grid is required. It is necessary to ensure legal security for DSOs regarding the increasing challenge of grid stability and the handling of priority rules for the feed-in of electricity. The Energy Efficiency Directive considers clear feed-in priority rules between green electricity and electricity generated by high-efficiency CHP.





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Future Roles and Responsibilities of Gas DSOs

Smart Gas Grids

Managing the gas distribution grid in an efficient and effective manner, the collection of precise data is of paramount importance for the gas DSO. Therefore, the roll-out of smart meters, as proposed by the Third Energy Package , Directive for the Internal Gas Market, is key to achieve the goal of the effective management of the gas grid. Another aspect that is essential for the realization of the smart gas grid is the injection into the grid of non-conventional gases such as biomethane, hydrogen or LNG and the ability of the gas DSOs to monitor and control the gas quality and pressure. Last, but not least, the use of smart tools for managing the gas distribution grid will also contribute to the safety the gas distribution networks, a top priority of the gas DSOs, in and cost-efficient way.





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Gas Smart Meters





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Gas Smart Meters

➤ Gas Smart Meter Drivers

- digitalization of the distribution grid and optimization of the network operations,
- digitalization of the retail market to foster innovation and new services by private actors,
- supporting actions for tackling fuel poverty,
- supporting energy efficiency.





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Gas Smart Meters

Among the four (4) market drivers, “digitalization of the distribution grid to allow optimization of the network operations” emerges as the most important driver, since it provides allows grid operators to optimize the operation and usage of their existing assets, thus deferring additional investments and generating indirect benefits for the consumer. In the case of gas smart meter, energy efficiency is not a key driver, except from countries where fuel poverty risk is high (e.g. Romania). Finally, even though injecting biogas in the distribution grid has become a reality in some Member States, it is not considered as a significant driver for gas smart metering rollout.





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Gas Smart Meters

- A quarter of Member States have defined implementation strategies for gas smart meters, taking into account specific legal provisions.
- The majority of these Member States have replicated the legal framework they have adopted for electricity smart meters for the implementation of gas smart meters or have adopted implementation laws dedicated to both electricity and gas smart meters.
- The delay in the adoption of a legal framework for the deployment of gas smart meters is justified by the fact that the average ratio of gas meters over electricity meters within the EU is ca. 29% and some Member States do not host any gas market (e.g. Malta).





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Gas Smart Meters

- Member States have to transpose the EU Directives into national law. The detailed rules on gas smart metering are only required to be adopted in the case that the CBA for a (wide-scale or partial) rollout of gas smart meters is positive.
- The gas DSOs are responsible for deriving the technical specifications of smart meters, while a minimum set of functionalities for gas smart meters are provided in Recommendation 2012/148/EU. Gas DSOs are also responsible for performing the required CBA.

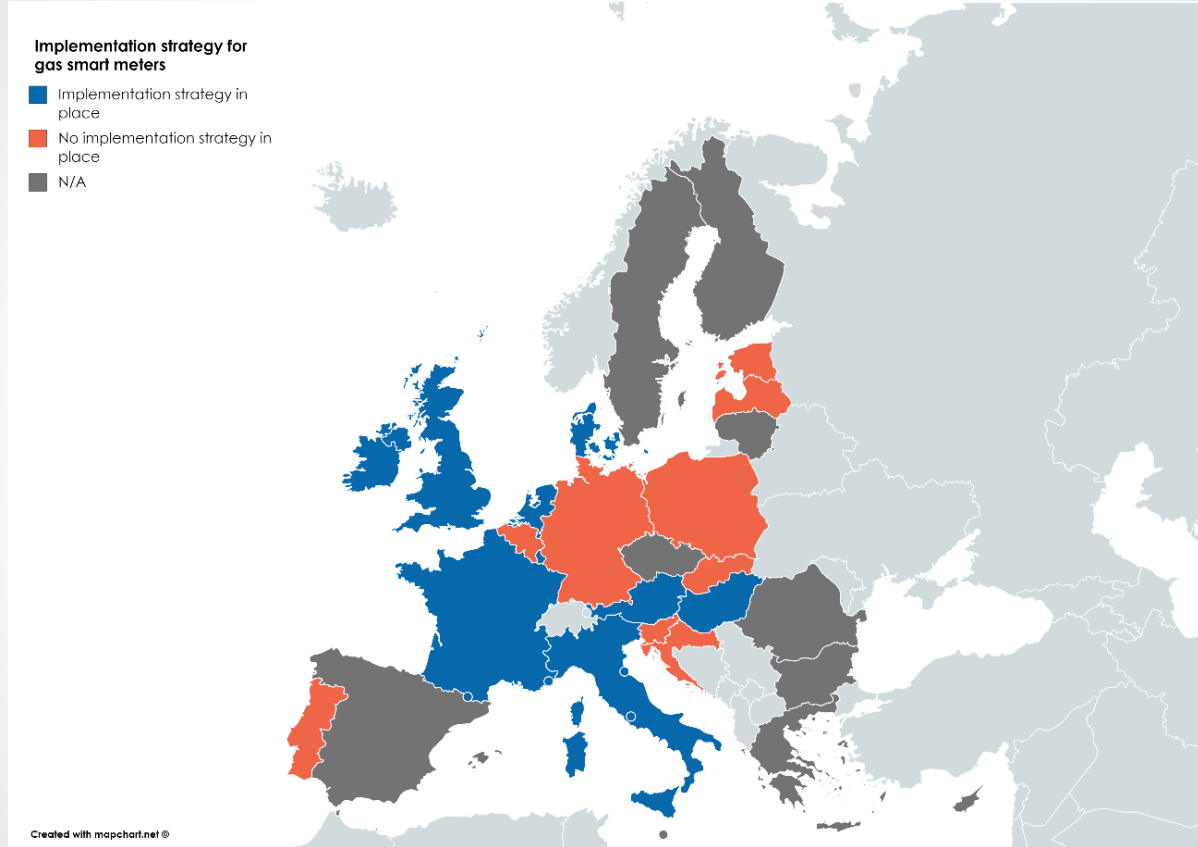




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Gas Smart Meters



Overview of Member States which have an Implementation Strategy in Place with Specific Legal Provisions for the Deployment of Gas Smart Meters (Source: European Commission)

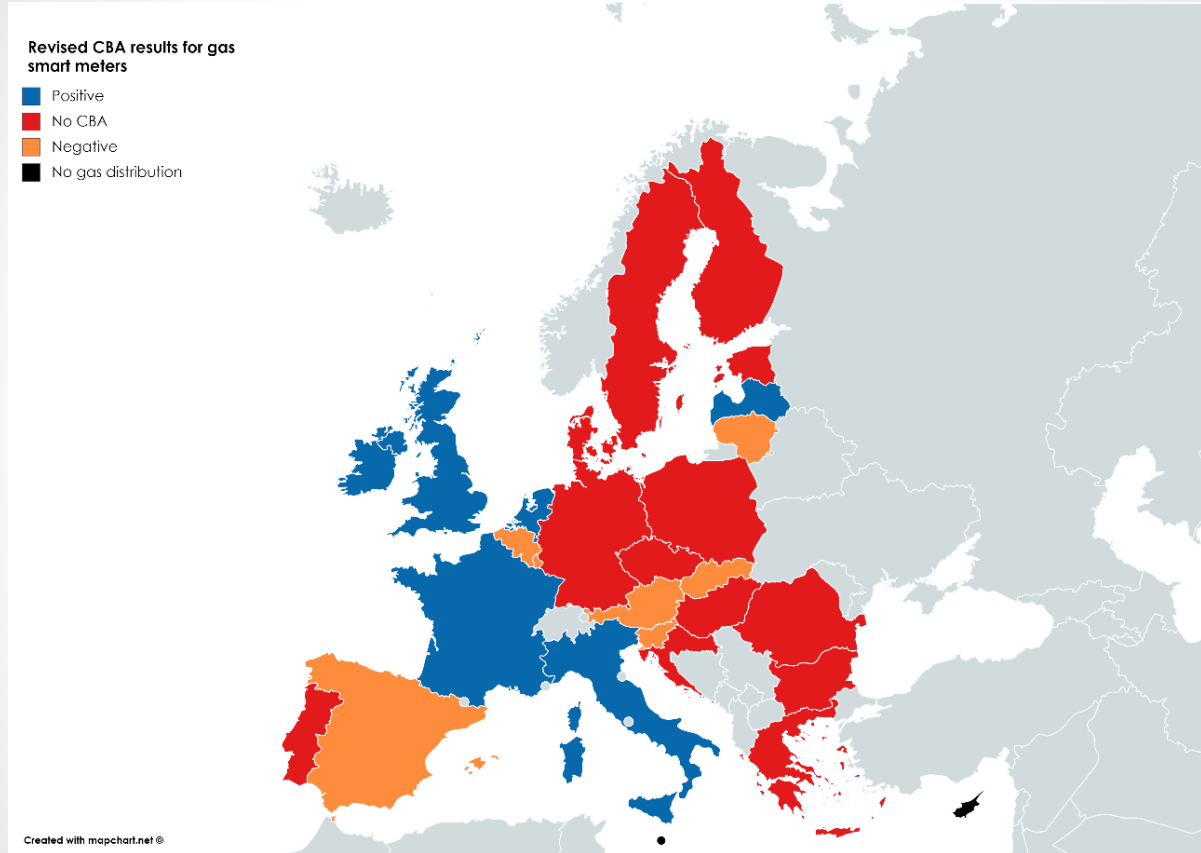




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Gas Smart Meters



Revised CBA Results, Considering a Large-Scale Rollout of Gas Smart Meters as of July 2018
(Source: European Commission)





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Gas Smart Meters

- Benefits considered in the case of gas smart meters
 - meter reading & operation savings,
 - bill reduction due to energy efficiency,
 - non-technical (administrative, including fraud) losses
 - operation & maintenance of assets,
 - reduction of CO₂ emission
 - leakage reduction,
 - increased competition in retail market,
 - outage management,
 - air pollution (particulate matters, NO_x, SO₂), and
 - other benefits not considered above.





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Flexibility Services





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Flexibility Services

Problem Definition

Assess whether current flexibility arrangements under the European Balancing Network Code are sufficient for the system with increasing penetration of renewable gasses at local level.

Solution Space

Given the above, what is the definition or specification of the services and/or technologies that could assist the gas DSO? What are the factors affecting the choice of option and the regulatory environment necessary to accommodate it?

Technologies

What is the range of known gas-based technologies or resources that might be candidates to offer flexibility services to the system, for example demand-side response; local gas-based generation like micro-CHP and fuel cells; power-to-gas plants; plants which inject hydrogen; biomethane (“green gas”); grid storage; or heat storage? What is the catalogue of potential supply? What does technological advance hold for this catalogue?

Modes of Service Acquisition

In recognition that in business-as-usual, the gas DSOs acquire a wide range of services and products (under regulatory supervision), what are the possibilities open to the gas DSOs to acquire these services for example by arms-length commercial procurement or otherwise? What are the prospects of organised liquid markets developing for these services (for example through EU-certified biogas) and what might be the “footprint” of these markets (local or regional or other)? What are the consequences or remedies open to the gas DSO in the event of non-performance by any of the service providers?





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Flexibility Services

- To meet the energy and climate goals of European Union and foster the energy transition, it is important that the **regulations and policies adapt to the new and future roles, related to flexibility, of the gas DSOs.** This can be achieved by:
 - **fostering R&D of gas technologies that provide flexibility to the energy system**, such as technologies related to biomethane, hydrogen, micro-CHP, reverse flows and others,
 - encouraging renewable and smart gas producers to become flexibility providers via **power-to-grid** and **micro- and mini-CHP solutions**, and
 - considering the **active role of gas DSOs** in managing flexibility on their grids.





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Flexibility Services

- **Power-to-Gas** technologies provide a number of benefits, some of which are listed below:
 - The transformation of electric power into hydrogen or SNG allows to use the energy at any time and locations by using the gas networks.
 - The transformed electric power into hydrogen or SNG can be stored in the gas grid and made available when and where needed.
 - The produces methane and hydrogen from power-to-gas can be used in a variety of industrial application applications leveraging the existing gas infrastructure.
 - Peaks in renewable energy production can be efficiently managed by transforming renewable energy into SNG and hydrogen, thus reducing RES curtailment.
 - Troughs in power production can also be balanced by generating electric power from power-to-gas plants.





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Flexibility Services

- **Power-to-Gas adoption barriers**
 - The evolution of the legal/regulatory framework is required to exploit the potential of power-to-gas solutions.
 - Innovation activities and R&D projects related to power-to-gas deployment should be encouraged.
 - Fees and levies for the input-electricity have to be revised for power-to-gas plants.
 - Implementation of support schemes.
 - Incentivization of producers of excess renewable intermittent electricity to avoid curtailment and use power-to-gas technologies.
 - Purchase of flexibility from power-to-gas plants should be allowed for electricity network operators. In case a capacity market is in place, the power-to-gas plant should be allowed to take part in the auction.





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Flexibility Services

➤ Micro-CHP

- Combined Heat and Power (CHP) systems produce simultaneously electricity and useful heat and can achieve energy efficiency levels of around 90%.
- According to the European Cogeneration Directive (2004/8/EC) a small-scale CHP unit is defined as the unit with an electrical capacity: micro-CHP is below 50kW and mini-CHP is below 1MW.
- The micro-CHP systems are currently powered by natural gas, biogas, biomethane, biofuels or liquefied petroleum gas (LPG).





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Flexibility Services

➤ Micro-CHP benefits

- Provide the ability for **load shifting between the electricity and the gas network** using heat storage, thus maximizing the efficient utilization of electricity and gas grids.
- Provide **fuel savings** by avoiding exhaust heat losses in many large power generation stations, thus leading to significant reductions of CO emissions (some 3 to 6 tons of CO emissions annually), as well as reductions in NO_x and CO₂.
- Micro-CHP **reduce transmission and distribution losses** of electricity from power stations to end-users.
- Allow electricity DSOs/TSOs to **avoid investments in cross border-flows**, as well as investments related to the reinforcement of the electricity grid of infrastructure.
- **Low need for additional investment in the gas network** since gas grid infrastructure is as already in place.
- Micro-CHP systems and the electricity smart meters, for both consumption and generation of electricity, and supplier services, **provide the necessary link between the gas and electricity networks**, thus providing high interoperability.





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Infrastructure for Natural Gas Vehicles





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Infrastructure for Natural Gas Vehicles

- The number of vehicles running on CNG are around **1.2 million representing 0.7% of the EU28 vehicle fleet including Switzerland**. It should be mentioned that 75% of the market corresponds to the CNG vehicles of Italy. Moreover, more than 3,000 refueling points are available, 2/3 of which in Germany and Italy, while 18 million CNG vehicles are running in the world, representing 1.2% of the world vehicle fleet.
- **Natural gas and biomethane can fuel established combustion engines**. The performance is equivalent to that of gasoline or diesel units, while they are characterized by cleaner exhaust emissions.
- Natural gas and biomethane can also be used in the LNG for fueling combustion engines in **buses and trucks, boats and ships**, the market mainly developed through **dual fuel systems**.





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Infrastructure for Natural Gas Vehicles

Country	CNG Stations	LNG/LCNG Stations	Gas Driven Vehicles
Austria	175	0	8,323
Belgium	20	3	1,033
Bulgaria	108	0	61,320
Croatia	3	0	329
Cyprus	-	0	-
Czech Republic	81	0	7,488
Denmark	7	0	104
Estonia	5	0	340
Finland	23	1	1,689
France	37	3	13,550
Germany	919	0	98,172
Greece	10	0	1,000
Hungary	5	0	5,118
Iceland	5	0	1,371
Ireland	0	0	3
Italy	1.010	2	885,300
Latvia	1	0	29
Lichtenstein	3	0	143
Lithuania	1	0	380
Luxemburg	7	0	270
Malta	0	0	-
Netherlands	133	7	7,573
Norway	17	0	667
Poland	25	0	3,600
Portugal	3	3	586
Romania	0	0	-
Slovakia	10	0	1,426
Slovenia	3	1	58
Spain	45	15	3,990
Sweden	161	11	46,715
Switzerland	134	0	11,640
United Kingdom	7	13	718
TOTAL EU+EFTA	2.953	55	1,156,678





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Energy Efficiency Services





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Energy Efficiency Services

- According to a study from the Directorate-General for Energy of the European Commission , the distribution of natural gas to residential and small industrial customers is carried out through medium to low pressure underground pipelines (distribution mains and service lines).
- **Losses can be due to natural gas emissions and gas or electricity consumption.** In the case of gas emissions, these can vary widely depending on the material of the pipeline as fugitive emissions from older networks are much higher than more recent ones. Moreover, gas or electricity own consumption can differ from one network to another, depending on situations.

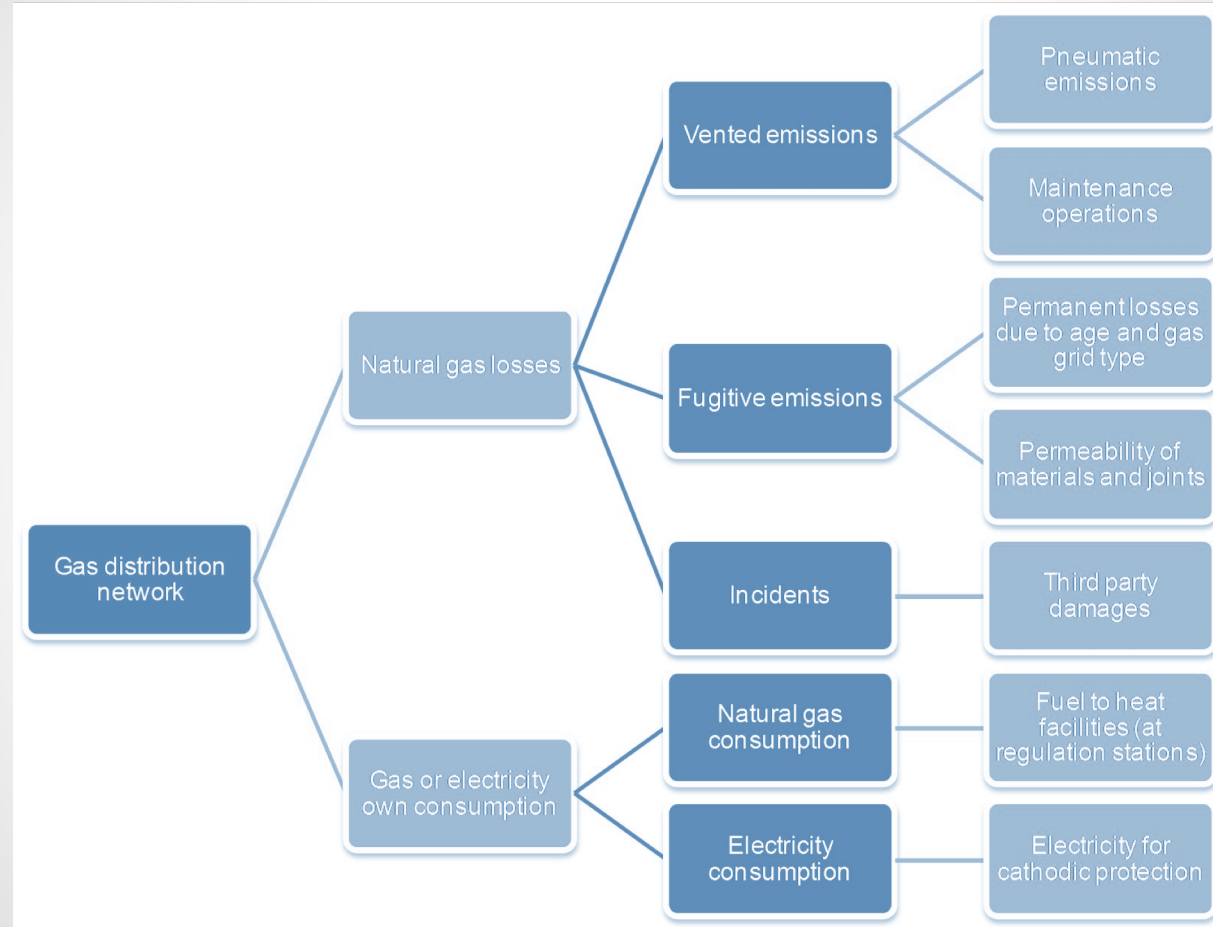




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Energy Efficiency Services



Mapping of Losses in Gas Distribution Grids





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Energy Efficiency Services

With regards to increasing the energy efficiency in gas and electricity networks, Article 15(2) of the Directive 2012/27/EU states that:

“Member States shall ensure, by 30 June 2015, that:

a) an assessment is undertaken of the energy efficiency potentials of their gas and electricity infrastructure, in particular regarding transmission, distribution, load management and interoperability, and connection to energy generating installations, including access possibilities for micro energy generators,

concrete measures and investments are identified for the introduction of cost-effective energy efficiency improvements in the network infrastructure, with a timetable for their introduction.”





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Energy Efficiency Services

- **Ofgem in UK** conducted a study among the various system operators, in order to **assess the efficiency potentials for the gas and electricity infrastructure** by collecting best practices and related information. The goal of the study was to identify concrete measure and investments that will allow system operators to introduce cost-effective energy efficiency improvements in their network infrastructure.
- In **Finland**, the proposal for the **transposed legislation** was discussed and handled in the Finnish Parliament during autumn 2014 and the legislation has come in force beginning of 2015. In May 2015, the Finnish Ministry of Employment and Economy together with the Energy Authority have launched a survey on fulfilling the requirements of Article 15(2). Authorities have also invited other stakeholders (like Finnish Energy Industries and Finnish Gas Association) to join the survey. The survey is carried out by Lappeenranta University of Technology (LUT) and ended in June 2015.
- In **Belgium**, Synergrid, the federation of electricity and gas network operators, carried out, in the context of the Article 15(2), an **assessment of the energy efficiency potentials of gas and electricity infrastructure**, together with the energy regulators (FORBEG, Forum for Regulatory Bodies).





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Energy Efficiency Services

- **Belgium - Synergrid**
 - Scope of the
 - potential for reduced grid losses and reduced energy consumption by the network operators and
 - potential to improve the efficient operation of available energy infrastructure, which in turn could allow reducing the need for investing in new infrastructure.
 - The categories of measures that will be considered are as follows:
 - investing measures by the network operators,
 - operational measures by the network operators; and
 - changing the behavior of the consumers, considering incentivizing mechanisms.
- Finally, a similar study was also carried out by the **Swedish Energy Agency** to assess the energy efficiency potential of gas and electricity grid in Sweden. One of the key outcomes of the study is that reduction of losses should not be the main driver of grid investments, as that can lead to sub-optimal solutions. On the contrary, a systems approach for energy efficiency should be adopted.





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Smart Gas Grids





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Smart Gas Grids

- To meet the European goals for energy transition, the development of smart and integrated networks is of great importance. These smart networks need to be developed following a **holistic energy system approach that includes gas, electricity, heat, transport and information technologies**. Moreover, network and gas utilization will play a major role in achieving the efficiency goals and will enable cost saving solutions for many problems encountered in the electricity networks.
- This **holistic energy system approach** requires active networks with interactive functionalities to integrate multiple energy sources and services to foster the participation and engagement of consumers in using and producing energy more efficiently. In contrast with electricity grid that require real-time responses to sudden changes in demand, peak load reduction or load control, **gas networks are inherently more flexible due to their ability to store large amounts of energy**. However, as the uncertainties related to future development of efficient and large-scale electricity storage technologies remain, **gas will increasingly become a key provider of both heating and electricity balancing services**.





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Smart Gas Grids

- The major benefits of smart gas grids are:
 - reducing greenhouse gas emissions,
 - increasing the share of renewable energy (biomethane, syngas, injection of H₂, etc.),
 - optimizing the intermittent production of renewable energy,
 - contributing to improve the security of supply,
 - improving energy efficiency by enabling the active participation of the end users,
 - creating the conditions for efficient use of energy networks, giving consumers the ability to choose the most economic energy source in real-time, and at the same time save energy,
 - avoiding costly investments in electricity grids by using gas networks and gas appliances, supporting economic development,
 - enabling consumers to become “prosumers” by using gas to lower the “peaks” in the electricity network and to reduce energy losses in the electricity transmission and distribution networks,
 - enabling synergies between gas and electricity networks through the encouragement of distributed generation, and
 - comparing with electricity, gas can be stored more cost-efficiently and the scope for local production is limited to the feed-in of alternative gases such as biogas.





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Smart Gas Grids

- In **France**, as already mentioned already, R&D forecasted expenditure presented by GRDF for smart grid projects is included in the **incentive-based regulation mechanism**. However, these expenses exclude R&D activities focused on increasing the number of customers connected to the gas networks and, as such, they are not taken into account in the regulation mechanism, but rather they fall within a specific incentive-based regulation. It should be mentioned that the R&D costs related to smart grid projects that were consider in the ATRD5 tariff, represent an average €10.7 M per year over the 2016-2019 period.
- Moreover, in **Italy**, starting from 2020, a **TOTEX approach** will be adopted for both electricity and gas to cope with the distortion that may be posed by the current regulatory approach. Under the TOTEX approach CAPEX and OPEX are treated in the same way by the regulatory authority. **The implementation of smart grid and innovation projects are incentivized by a 2% increase in the WACC for twelve (12) years.**
- A detailed analysis of smart gas distributions grids is provided as part of the deliverable “Preparation of Smart Grid Road Map and Required Methodological Tariff Approaches” of Task 4.





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Technical Assistance for Improvement of Performance-Based Tariff Regulation of EMRA For Turkish Energy Markets Through Introducing an Enhanced Monitoring System



Task 3.4 Training

Gap Analysis and Recommendations

Gas Distribution

4 September 2020, EMRA, Ankara





This project is funded by the European Union



Overarching Principles for Gas Distribution

Overarching Principles for Gas Distribution

Overarching Principle 1

The ultimate goal of innovation for gas DSOs is to **provide benefits to their consumers**. To achieve this, the objectives can be broader than cost-efficiency approach alone and can include for example: the decarbonization of the energy system and the promotion of an informed and engaged energy consumer, both of which have societal benefits and contribute strongly to the achievement of an Energy Union.

Overarching Principle 2

Innovation costs should not be simply treated as operational expenditure and its unique characteristics should be recognised. As the purpose of classical price-based regulation is not constructed with innovation in mind, special treatment may be required to foster and nourish it.

Overarching Principle 3

Gas DSOs should take a **proactive approach**, seeking to cooperate and work with other areas of industry not directly in the gas business.

Overarching Principle 4

The regulatory treatment of costs may need to be different for two distinct phases of innovation:

- **research & development** (including patents and intellectual property rights development) and
- **roll-out**.

Overarching Principle 5

A clear **categorization of R&D projects according to their TRL** should exist, that will allow budget allocation, as well as evaluation of proposals for innovation projects.





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Regulatory Targets for Gas Distribution

Regulatory Target	Effective in Turkey
RT 1	Development of technology and know-how for system operations
RT 2	Increase in the prevalence of domestic technology
RT 3	Enhancement of service quality, system performance and security
RT 4	Reduction of costs through operational efficiency and improvement of system losses
RT 5	Reaching the international quality standards in natural gas distribution system

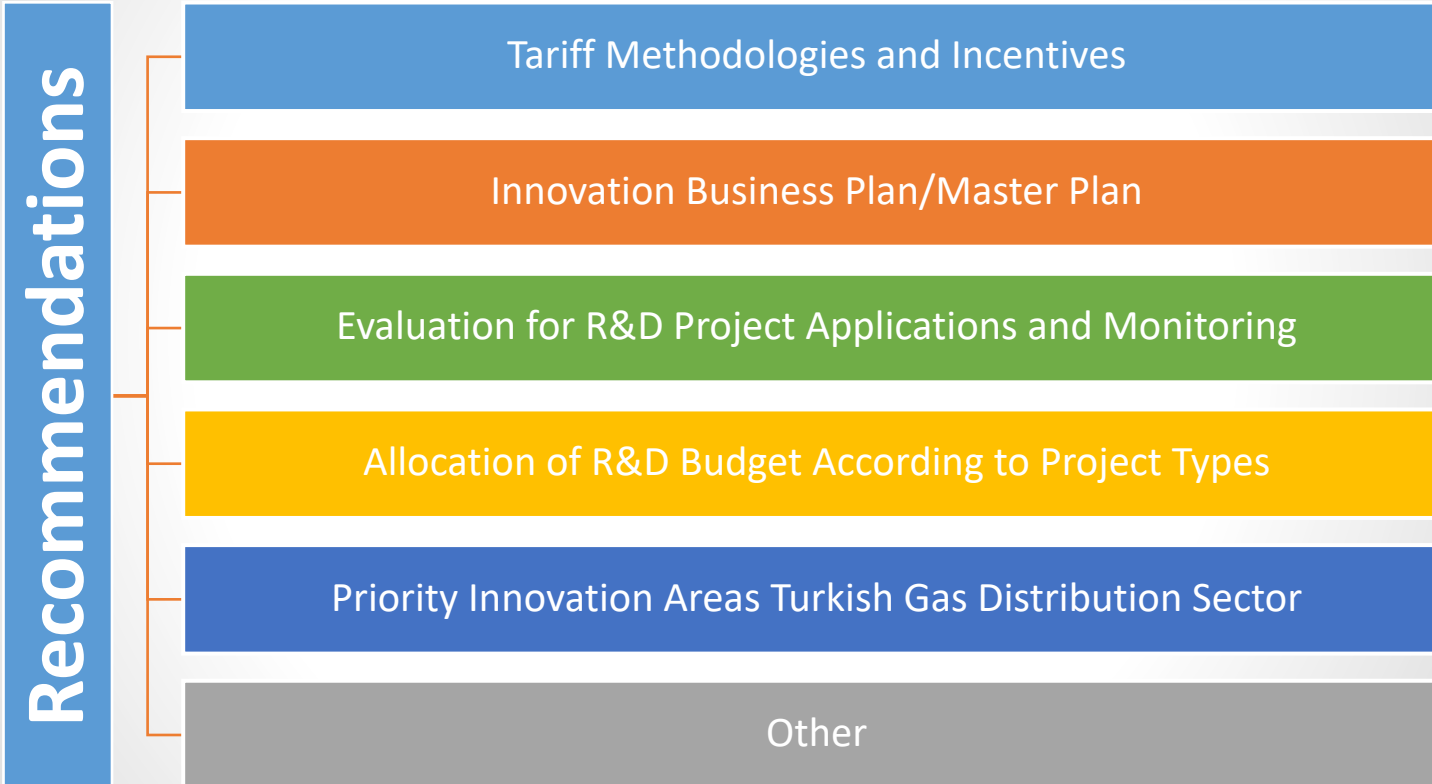




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Recommendations About Tariff Methodologies and Incentives





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Expected Tariff Burden on End-users for Recommended Framework

Tariff Methodologies and Incentives

Recommendation 1 Transparency of Costs

Gas DSOs should be fully transparent on costs that are related to innovation and R&D by providing financial information to EMRA both during the R&D project or innovation activity proposal phase, as well as after the completion of the project or the activity.

Supportive Arguments: During project proposal application submission, gas DSOs should provide to EMRA the following information that will help EMRA assess project spending upon project completion:

- forecasted total project costs,
- initial net funding required,
- beneficiary’s compulsory contribution,
- outstanding funding required,
- bid preparation costs.

A similar approach is followed for projects funded under the NIC of Ofgem in UK. The gas DSO should provide EMRA with a Project Completion Report for each project that has received funding. Among other things, the Project Completion Report should identify any unspent approved amounts and additional funding for the project, so these can be deemed to be disallowed expenditure. Financial statements related to the R&D project or innovation activity should also be presented to EMRA during interim and final project evaluation.

In Ireland, the Gas Innovation Fund requires applicants to provide a detailed budget for any proposal submitted, along with information on budget justification and other co-funding sources.

As-is Status in Turkey: EMRA receives the intermediate progress and final reports of each R&D project from DSOs, which also includes details of expenditures.





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Expected Tariff Burden on End-users for Recommended Framework

Tariff Methodologies and Incentives

Recommendation 2

Roll-out Initiatives

The gas DSOs' roll out of initiatives with demonstrable benefits must be supported by the Regulator. Systematic CBAs are recommended especially for large scale projects.

Supportive Arguments: CEER proposes that in order to facilitate an innovative environment, subsequent to a previous CBA, certain specifically pro-innovation regulatory measures might be justified. These measures might include, amongst others, providing incentives or mechanisms for innovative pilot projects.

In UK, Ofgem's innovation stimulus, apart from the NIA and NIC measures, also includes an Innovation Roll-out Mechanism (IRM). The purpose of IRM is to fund the roll-out of proven innovations which will contribute to the development of a low-carbon energy sector in UK and provision of broader environmental benefits. The IRM provides funding also to transition proven innovative technologies to business as usual (BAU) if the roll-out of these technologies cannot be funded under the TOTEX allowance of the gas DSO. During RIIO-1, there are two application windows for gas distribution companies to apply for funding. However, Ofgem does not see any compelling evidence for a need of IRM in RIIO-2, mainly due to the fact that the price control period of five (5) years in RIIO-2 raises the need for a dedicated funding mechanism for the support of roll-out. Additionally, gas DSOs will to be supported via the TOTEX incentivization mechanism to roll-out of proven innovative technologies, by retaining a share of any efficiency savings that result.

The Gas Innovation Fund in Ireland, apart from the R&D activities, provides also funding for strategic projects for the gas DSO.

As-is Status in Turkey: DSOs provide ad-hoc information about the benefits of their projects, in the R&D application forms.





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Expected Tariff Burden on End-users for Recommended Framework

Tariff Methodologies and Incentives

Recommendation 3

Tariff Methodologies and Incentives

EMRA should also allocate dedicated budget in CAPEX allowances for the deployment and roll-out of technological investments, as follows:

- **Large-scale pilot projects:** As such, we consider projects directly derived as an outcome of R&D programs and innovation activities and a dedicated 0.5% CAPEX budget should be allocated to these expenditures.
- **Smart grid and ICT investments:** A dedicated 5% CAPEX budget should be allocated to these expenditures.

Supportive Arguments: CEER proposes that in order to facilitate an innovative environment, subsequent to a previous CBA, certain specifically pro-innovation regulatory measures might be justified. These measures might include, amongst others, providing incentives or mechanisms for innovative pilot projects.

As-is Status in Turkey: Incentivization schemes for pilot projects are already defined in the draft legislation for electricity distribution (0.5% of the network CAPEX). Therefore, by analogy, we recommend a similar mechanism to be applied as well for gas distribution. The recommended percentage for this type of projects would be 2% of the network investments, mainly to encourage large-scale pilot projects.

On the other hand, as far smart grid and ICT investments are concerned, dedicated CAPEX allocation is already in place for electricity distribution companies (5% of the network CAPEX). A similar revenue regulation is suggested for gas distribution, as well.





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Expected Tariff Burden on End-users for Recommended Framework

Tariff Methodologies and Incentives

Recommendation 4 Incentivizing Strategic Large-Scale Demo Projects via recognizing them as CAPEX

Additional premium might be added to CAPEX in case gas DSO makes expenses for strategic large-scale demonstration/ pilot implementation projects. EMRA may select a few projects for each tariff project that will receive the incentive.

Supportive Arguments: Incentivizing large-scale innovation projects is considered an important aspect for promoting innovation in the gas distribution sector. Moreover, CEER proposes that in order to facilitate an innovative environment, subsequent to a previous CBA, certain specifically pro-innovation regulatory measures might be justified. These measures might include, amongst others, providing incentives or mechanisms for innovative pilot projects.

The Italian regulatory authority, ARERA selected eight smart grids pilot projects and incentivized them with an increase of 2% WACC remuneration for 12 years.

As-is Status in Turkey: Does not exist as of today.





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Expected Tariff Burden on End-users for Recommended Framework

Tariff Methodologies and Incentives

Recommendation 5 Innovation Maturity Assessment

EMRA is recommended to identify the maturity of the innovation activities of gas DSOs (2 assessment practices in each Tariff Period) through evaluation of defined metrics and characteristics such as:

- utilization of the R&D budget,
- successful completion of the R&D project (as a ratio),
- actual operation/implementation of the R&D/innovation projects,
- number of patents filed/pending/awarded/rejected,
- national/international cooperation developed for the R&D activities,
- R&D export and revenues,
- resolution and reality of the 5 and 10-years innovation planning,
- establishment of an R&D centre,
- competencies for R&D, technology and know-how,
- number of new products/services released for DSO usage
- number of new products released for commercialization
- dedicated R&D division and staff, and
- digitalization level of the DSO processes.

Innovation maturity levels might be included within the context of performance component (or quality factor, if applied for gas distribution sector in the next tariff period) item of the revenue requirement.

Supportive Arguments: It is important for EMRA to evaluate and assess the maturity of ongoing R&D projects and innovation activities for gas DSOs during project implementation. Especially for roll-out projects and/or strategic large-scale demonstration projects, evaluation should be performed based on specific criteria and metrics. Apart from purely financial and economic criteria, according to CEER, criteria related to the outcomes of the projects measuring regulatory aims such as efficiency and/or reliability should also be applied.

As-is Status in Turkey: Such a methodology is not applied.





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Expected Tariff Burden on End-users for Recommended Framework

Tariff Methodologies and Incentives

Recommendation 6 Innovation Ecosystem Development and Incubation Activities

In order to establish an active and effective start-up ecosystem in the gas distribution sector, regulations might pave the way (limited to at most 10% of the R&D budget) for gas DSOs to invest in start-ups. To this extent:

- Gas DSOs might submit their “business plans” to EMRA regarding incubation activities such as target products and services, responsibility limits, investment/partnership calendar, company valuation methodology etc.
- Definition of the evaluation criteria and minimum content (e.g. export potential, sustainability) of the business plan, which is requested from DSOs for development of the ecosystem and incubation activities
- Revenue sharing model of 50% (DSO)-50% (tariff) might be applied for the incomes directly received from the innovation activities and investment to start-ups or selling products/know-how.
- In case of know-how export via these efforts, revenue sharing might be revised (tariff: 30%, DSO: 70%)

Supportive Arguments: Fostering the innovation ecosystem development and the related incubation activities for R&D focusing on smartening gas distribution networks, is an important step to establish an active and effective start-up ecosystem. In the European Union, the support of start-up companies is fostered by the various R&D funding mechanisms, such as the Horizon 2020 framework program and others. Recently, and in order to help build a strong European ecosystem where start-ups can thrive, Start-up Europe empowered seven (7) projects, funded under Horizon 2020, that are connecting local ecosystems across Europe, along different technological areas.

As-is Status in Turkey: After initiation of Task 3.2 activities, the revised R&D rules and procedures (dated March 26th, 2020) for DSOs allowed the stated collaborations with start-ups.





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Expected Tariff Burden on End-users for Recommended Framework

Tariff Methodologies and Incentives

Recommendation 7 Research and Development Budget Allocation

The total R&D budget might be revised as 2% of the specific OPEX instead of 1%.

Supportive Arguments: In many cases, depending on the individual situation of the gas DSOs, there is a particular need for higher R&D budget, especially for strategic innovative projects. In such cases, according to CEER, regulation on innovation should be related to the whole system, thus an increase in R&D specific OPEX is recommended.

As-is Status in Turkey: Allocated R&D budget for gas DSOs is 1% of their OPEX.





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Recommendations About Tariff Methodologies and Incentives

Innovation Business Plan/Master Plan

Recommendation 8 Innovation Master Plan

Gas DSOs could document their 5 and 10-years innovation and R&D plans and submit them to EMRA.

Supportive Arguments: For the gas distribution price control RIIO-GD1 Ofgem is requesting gas DSOs to submit their business plan, also including their plans for innovation, describing, among others:

- the innovation stimulus,
- the direct innovation funding; and
- the revenue adjustment mechanism for rolling out innovative solutions.

The innovation strategy plan discusses the innovation already deployed, the 5 to 10 years proposed innovation plan, as well as the related funding requirements.

As-is Status in Turkey: Gas DSOs are not required to prepare such a planning for innovation activities.





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Innovation Master Plan

Section 1

Background

This section provides background information about the gas DSO and outlines briefly its innovation strategy, by providing a high-level description of the structure and the contents of the “Innovation Master Plan”. The subsections of this section are listed below:

1.1. Introduction to DSO

1.2. Overview of Innovation Strategy

Section 2

Introduction

This section outlines the gas DSOs vision on innovation, as well as the framework for stakeholder involvement along with the governance and the regulatory framework. Subsection **Innovation Process** briefly presents the rationale for innovation for the gas distribution companies, as well as the approach towards achieving the desired level of innovation within these companies. A general overview of involving all the necessary stakeholders in this innovation process is presented briefly in subsection **Stakeholder Involvement** of the document. Finally, an overview of the governance and the regulatory framework related to innovation is outlined in subsection **Assessment of Effective Regulatory Framework for Innovation**, where the regulation schemes related to innovation and R&D might be discussed and briefly presented.

The subsections of this section are listed below:

2.1. Innovation Process

2.2. Stakeholder Involvement

2.3. Assessment of Effective Regulatory Framework for Innovation





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Innovation Master Plan

Section 3

Innovation for EMRA

The subsections of this section are listed below:

- 3.1. Scope of Innovation
- 3.2. Stages of Innovation
- 3.3. Innovation Objectives
- 3.4. Funding the Innovation
- 3.5. Approach to Innovation
- 3.6. Selecting and Prioritizing Ideas
- 3.7. Developing Plans for Innovation
- 3.8. Stakeholder Engagement for Innovation
- 3.9. Collaboration Between the DSO and TSO





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Innovation Master Plan

Section 4

Innovation Progress

This section describes the current status and future view of innovation and R&D for gas distribution companies.

Subsection **Innovation Performance to Date** provides an overview of the completed projects so far related to innovation and R&D activities in the gas distribution sector. The analysis can also include statistical figures on the type and number of the completed projects, as well as information related to their progress.

Finally, subsection **Future Innovations** sets out potential future project areas that the gas DSO considers important for the gas distribution sector.

The subsections of this section are listed below:

4.1. Innovation Performance to Date

4.2. Future Innovations





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Innovation Master Plan

Section 5

Governance Arrangements

This section described the governance framework for innovation and R&D activities in the gas distribution sector.

Subsection **Research Partners and Supplier Arrangements** sets out the framework for the collaboration with universities, research establishments, and manufacturers, as well as the arrangements needed with the various suppliers both in Turkey and across the world.

Risk management related issues are tackled in subsection **Managing Risk and Future Uncertainty**. It is suggested that the gas DSO should ensure that new technologies for the gas distribution sector either fit into existing policies and standards or the gas DSO should develop new policies and standards as a part of the innovation process.

In subsection **Tracking Benefits** the evaluation of past and ongoing projects in the gas distribution sector should take place. This will allow the gas DSO to monitor efficiently the progress of the ongoing progress and assess shall the benefits delivered are in line with those predicted at the time of approval. Smaller projects should be reported annually in the gas DSO's innovation summary report, while major projects should report progress including benefits delivery as part of their regular reporting regime. The different types of project should follow the categorizations proposed in the Recommendations of this document.

Subsection **Keeping Strategy Up to Date** focuses on the process of updating the "Innovation Master Plan" on an annual plan and should also include provision of taking into account new Government incentives or international funding mechanism that could support the innovation and R&D in the gas distribution sector. Moreover, the annually updated "Innovation Master Plan" needs to also take into consideration new technological advancements, as well as external factors that may influence the gas DSO's innovation strategy. Last, but not least, lessons learnt from past projects in the area of gas distribution need to be taken into account.

The subsections of this section are listed below:

- 5.1. Research Partners and Supplier Arrangements
- 5.2. Managing Risk and Future Uncertainty
- 5.3. Tracking Benefits
- 5.4. Keeping the Strategy Up to Date





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Innovation Master Plan

Section 6

Delivering Benefits from Innovation

This section summarizes the benefits delivered from projects supported by the gas DSO.





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Recommendations About Tariff Methodologies and Incentives

Evaluation for R&D Project Applications and Monitoring

Recommendation 9 Innovation Project Assessment Criteria

Detailed evaluation criteria based on scoring can be implemented for evaluation of project applications. It is also recommended to provide solid feedbacks to DSOs about causes of the rejection.

Supportive Arguments: Evaluation of innovation projects under certain criteria, such as relevance, maturity and impact, will allow EMRA to prioritize R&D budget allocation. In UK, Ofgem evaluates gas-related project applications for the NIC according to the following evaluation criteria:

- acceleration of the development of a low carbon energy sector and/or delivers environmental benefits whilst having the potential to deliver net financial benefits to future and/or existing customers,
- provision of value for money to gas customers,
- knowledge generation that can be shared amongst all relevant Network Licensees,
- innovation (i.e. not business as usual) and unproven business case where the innovation risk warrants a limited development and/or demonstration project to demonstrate its effectiveness,
- involvement of other project partners and external funding,
- relevance and timing and
- demonstration of a robust methodology and that the project is ready to implement.

In Ireland, proposals seeking funding under the Gas Innovation Fund are assessed under certain criteria, such as relevance, maturity and impact.

As-is Status in Turkey: There is not a robust and comprehensive assessment methodology that is announced to public.





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Recommendations About Tariff Methodologies and Incentives

Evaluation for R&D Project Applications and Monitoring

Recommendation 10 Evaluation of Project Applications

EMRA might get support from external bodies (e.g. academia, independent subject matter experts) for monitoring of the R&D projects and for provision of feedback in annual basis.

Supportive Arguments: The Regulator must define clear criteria for what will be included in the project evaluations. The challenge is to make those criteria both good enough to promote relevant innovations and easy enough to apply in practice. This is the usual balance between accuracy and simplicity that Regulators often face. The Regulators can choose to do all evaluation of a project themselves or try to leave the evaluations to some external bodies to reduce their own burden of work.

In several EU countries, the decision that whether the project is considered as an R&D project or not, is delegated to a third party and R&D projects are approved by an external body, e.g. Norwegian Research Council (NFR).

In UK, Ofgem evaluates gas-related project application for the NIC according to the evaluation criteria.

In Ireland, projects requesting funding under the Gas Innovation Fund are evaluated based on the criteria stipulated also in other recommendations.

As-is Status in Turkey: Project applications are evaluated by R&D Commission under EMRA.





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Recommendations About Tariff Methodologies and Incentives

Evaluation for R&D Project Applications and Monitoring

Recommendation 11 Innovation Project Assessment Criteria

Detailed evaluation criteria based on scoring should be implemented for evaluation of project applications. It is also recommended to provide solid feedbacks to gas DSOs about causes of the rejection.

Supportive Arguments: The European Commission, for the evaluation of innovation activities and R&D projects under the Horizon 2020 framework program, has a set of clearly defined evaluation criteria that cover the following aspect of the submitted project proposals:

- Excellence,
- Impact and
- Quality and efficiency of the implementation.

In UK, Ofgem sets a number of evaluation criteria for project proposals submitted under the NIC:

- acceleration of the development of a low carbon energy sector and/or delivers environmental benefits whilst having the potential to deliver net financial benefits to future and/or existing customers,
- provision of value for money to gas customers,
- knowledge generation that can be shared amongst all relevant Network Licensees,
- innovation (i.e. not business as usual) and unproven business case where the innovation risk warrants a limited development and/or demonstration project to demonstrate its effectiveness,
- involvement of other project partners and external funding,
- relevance and timing; and
- demonstration of a robust methodology and that the project is ready to implement.

Similarly, for the project submitted under NIA, the following requirements apply:

- Has the potential to develop learning that can be applied by Relevant Network Licensees,
- Has the potential to deliver net financial benefits to network Customers,
- Is innovative (i.e. not business as usual) and has an unproven business case where the risk warrants a limited Research, Development or Demonstration Project to demonstrate its effectiveness; and
- Does not lead to unnecessary duplication.

Moreover, Ofgem also publishes on their website the list of projects not awarded with funding under the NIC, along with any non-confidential document submitted by the project stakeholders.

In Ireland, projects requesting funding under the Gas Innovation Fund are evaluated based on the criteria stipulated in Recommendation 19.

As-is Status in Turkey: The impact ratios of different criteria for the evaluation of R&D applications are not published publicly, or do not exist.





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Innovation Project Assessment Criteria

No	Criteria	Criterion Type	TRL 1-5	TRL 6-7	TRL 8-9
1	Consistence with the topics and criteria of the Call	Knock-out	✓	✓	✓
2	Consistence of the project category and content of the application	Knock-out	✓	✓	✓
3	Project expenditures should not overlap with CAPEX and other OPEX	Knock-out	✓	✓	✓
4	R&D Quality, Innovation and Impact	Score	55%	45%	30%
4.1	Clear project objectives and targets	Score	5%	2.5%	5%
4.2	Clearly defined success criteria and Key Performance Indicators	Score	N/A	5%	5%
4.3	R&D characteristics	Score	15%	7.5%	5%
4.4	Innovative aspect	Score	15%	7.5%	5%
4.5	Innovation potential	Score	20%	10%	N/A
4.6	Operational dissemination potential	Score	N/A	12.5%	10%





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Innovation Project Assessment Criteria

No	Criteria	Criterion Type	TRL 1-5	TRL 6-7	TRL 8-9
5	Quality of the Proposal Application	Score	20%	25%	35%
5.1	Clearly defined Project Plan	Score	4%	4%	5%
5.2	Clearly defined Method Statement	Score	4%	4%	5%
5.3	Clearly defined Project Management and Quality Plan	Score	5%	5%	5%
5.4	Clearly defined budget	Score	3%	5%	10%
5.5	Clearly defined Dissemination Plan	Score	N/A	5%	10%
5.6	Clearly defined Human Resource Plan	Score	4	2%	N/A





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Innovation Project Assessment Criteria

No	Criteria	Criterion Type	TRL 1-5	TRL 6-7	TRL 8-9
6	Benefits and Achievements	Score	25%	30%	35%
6.1	Quantitative improvement of Quality of Service/customer satisfaction	Score	8%	N/A	N/A
6.2	Qualitative improvement of Quality of Service/customer satisfaction	Score	N/A	10%	5%
6.3	Sectoral and national achievements (qualitative)	Score	5%	5%	5%
6.4	Sectoral and societal cost-benefit assessment (basic quantitative)	Score	7%	10%	N/A
6.5	Sectoral and societal cost-benefit analysis (extended qualitative)	Score	N/A	N/A	12.5%
6.6	Support new business and market models	Score	5%	5%	12.5%





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Innovation Project Assessment Criteria

No	Criteria	Criterion Type	TRL 1-5	TRL 6-7	TRL 8-9
7	Other Criteria				
7.1	Cooperation with the academia	Weight	1.02	1.02	1.02
7.2	Cooperation with start-up companies	Weight	1.03	1.03	1.03
7.3	Proof-of-Concept/Prototype development studies	Weight	1.05	N/A	N/A
7.4	Cooperation with other gas DSOs	Weight	1.02	1.03	1.05
7.5	Cooperation with BOTAŞ	Weight	1.02	1.02	1.05
7.6	Harmonization of other infrastructures (e.g. electricity, water, telecoms, etc.)	Weight	1.03	1.03	1.05
7.7	Improvement of effectiveness of existing systems	Weight	1.05	1.05	1.02





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Recommendations About Tariff Methodologies and Incentives

Evaluation for R&D Project Applications and Monitoring

Recommendation 12 Evaluation of Project Results and Impact

Categories of impact for innovation activities and R&D projects.

- **Outputs** are what is directly produced or supplied through the EU intervention. They often relate to the expected deliverables of the intervention. Outputs generally occur within the short to medium term.
- **Results** capture more direct, short to medium term changes in a situation.
- **Impact** broadly defines the wider societal, economic or environmental cumulative changes over a longer period of time.
- **Indicators** are defined as the measurement of an objective to be met, a resource mobilized, an effect obtained or a context variable.
- **Output indicators** relate to the specific deliverables of the intervention.
- **Result indicators** represent the immediate effects of the measure concerned and look at its direct addressees.
- **Impact indicators** represent what the successful outcome should be in terms of impact on the economy/society beyond those directly affected by the intervention.

Supportive Arguments: The evaluation of the project impact in a systematic and effective manner will provide EMRA with the ability to assess R&D spending over the years. To evaluate the results and the impact from innovation activities an R&D projects, gas and electricity networks operators in UK jointly prepared, under the Energy Networks Association (ENA), a benefit tracking methodology that delivers a wide range of benefits to network customers and wider stakeholders. This has been designed to increase transparency on the benefits of network innovation projects. The benefit tracking methodology involved annual and biannual reporting. The annual reporting includes the ENA innovation balancing scorecard that captures different measures and deliverable, as well as the innovation benefits table that contain information on project-specific CBA, benefits (e.g. financial, environmental, customer, safety, etc.), project TRL, stakeholders involved and other information. Moreover, the annual report includes, whenever possible, the specific annual innovation summary reports, the individual project completion reports, as well as the annual industry report. The bi-annual reporting reports on the gas network innovation strategies.

The purpose of the benefits reporting framework under ENA, is to:

- enable consistent and transparent measurement of innovation costs and benefits delivered across Great Britain,
- demonstrate progress against innovation strategies, both individual network and sector-wide,
- report on innovation that has been transferred to Business as Usual (BAU), both within the network working on a project and how it has been adopted across other networks where relevant and to
- ensure mechanisms are clear so that Ofgem can incorporate these into the relevant RII0-2 innovation governance documents.

As-is Status in Turkey: DSO are obliged to submit project completion reports to EMRA, however there is not a systematic approach to track the results/outputs/success of the R&D projects.





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Recommendations About Tariff Methodologies and Incentives

Allocation of R&D Budget According to Project Types

Recommendation 13 TRL-related Project Categories

R&D and innovation projects for gas distribution companies could be categorized in terms of technology readiness level. The recommended categories are as follows:

- TRL 1-5: Support for basic scientific studies, prototypes and Proof-of-Concept studies,
- TRL 5-8: Standard and/or conventional R&D and innovation projects (solutions, implementations, and technologies in trial phase)
- TRL 8-9: Large scale demonstrations and pilot implementation projects (completed and ready to be implemented solutions and technologies)

Supportive Arguments: Technology Readiness Level categorization will allow EMRA to evaluate the maturity of projects in a systematic and efficient manner. In UK within the scope of innovation stimulus package, two different incentive is defined. Among these, the NIA is to fund small-scale Research, Development, and Demonstration Projects, and can cover all types of innovation, including commercial, technological and operational. On the other hand, NIC is focused on funding larger scale and more complex, innovative projects, therefore, funding is awarded through an annual competitive process.

The Gas Innovation Fund in Ireland requires applicants to provide detailed information on the TRL of the proposed innovation project for any proposal submitted⁴².

As-is Status in Turkey: Such definitions do not exist as of today.





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EU Technology Readiness Levels

European Union Technology Readiness Levels Definition	
TRL 1	Basic principles observed
TRL 2	Technology concept formulated
TRL 3	Experimental proof of concept
TRL 4	Technology validated in lab
TRL 5	Technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)
TRL 6	Technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
TRL 7	System prototype demonstration in operational environment
TRL 8	System complete and qualified
TRL 9	Actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies or in space)





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Recommendations About Tariff Methodologies and Incentives

Allocation of R&D Budget According to Project Types

Recommendation 14 Budget-Related Project Categories

R&D and innovation projects for gas distribution companies can be categorized in terms of their budget. The recommended categories are as follows:

- **Small-scale R&D and Innovation Projects (budget less than 300.000 TL):** It is recommended that small scale projects do not need to get approval from EMRA R&D commission, or an agile and simpler process might be applied. Regulatory monitoring and gas DSO reporting are still to be applied for these projects as well.
- **Medium-scale R&D and Innovation Projects (budget between 300.000 and 2.000.000 TL):** Execution of existing conventional process.
- **Large-scale Innovation and Pilot Demonstration Projects (budget greater than 2.000.000 TL):** The following characteristics may apply:
 - Comprehensive CBA might be requested from the gas DSOs.
 - Promotion of large-scale pilot implementation and demonstration studies.
 - Single project application for each year.
 - Competition should be executed amongst the applicants (call topics, evaluation criteria and number of projects and/or budget) for each application period.
 - KPIs should be defined to measure the success of the project.
 - Encouraging joint application of gas DSOs.
 - Certain percentage of the budget allocation can be linked with the realization of project objectives.

Supportive Arguments: Budget-related project categorization will allow EMRA to prioritize R&D spending based on the size and impact of the R&D projects and innovation activities. A different categorization of projects can be made based in their budget. According to Article 100 (Major projects) of Regulation (EU) No 1303/2013, a major project is an investment operation comprising *“a series of works, activities or services intended to accomplish an indivisible task of a precise economic and technical nature which has clearly identified goals and for which the total eligible cost exceeds EUR 50 million.”*

As-is Status in Turkey: Does not exist as of today.





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Recommendations About Tariff Methodologies and Incentives

Allocation of R&D Budget According to Project Types

Recommendation 15 Research and Development Budget Allocation

R&D budget of the gas distribution companies could be allotted according to the TRL and project type.

Supportive Arguments: Project categorization based on project maturity will allow EMRA to prioritize R&D spending for R&D projects and innovation activities.

Maturity assessment of innovation activities and R&D projects is also performed by the European Commission for the funding framework programs and mechanisms by means of TRL.

In UK, Ofgem also measure the maturity of the innovation and R&D activities based on the TRL of the projects and technologies. For project funded under the NIC, only projects with TRL between 4 and 8 will be eligible for funding from the NIC, while for project submitted for funding under NIA such a requirement does not exist.

As-is Status in Turkey: Does not exist as of today.





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Research and Development Budget Allocation

R&D Project Type	TRL 1-5	TRL 5-8	TRL 8-9	TOTAL
Small-scale	10%	10%	-	20%
Mid-scale	10%	10%	10%	30%
Large-scale	-	10%	30%	45%
TOTAL	20%	30%	40%	90%

Expenses and expenditures are covered by R&D budget, up to 10% of the R&D budget of the DSO for the effective tariff period:

- Expenses in relation to the projects rejected at the application stage
- In case an R&D, Design and Incubation Center is established by the relevant distribution company, the expenses and expenses incurred except for those covered by other legislation related to the said center
- Costs and expenses incurred to support and promote entrepreneurship activities, Incubation Centers, acceleration programs, contests and other cooperation activities with technology parks.





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Recommendations About Tariff Methodologies and Incentives

Priority Innovation Areas Turkish Gas Distribution Sector

Recommendation 16 Priority Areas and Calls for Applications

For each R&D project application period, priority areas for gas distribution companies can be defined and declared considering the Technology Readiness Level (TRL).

Supportive Arguments: The priority areas for EMRA should focus on achieving the following goals:

- Increase throughput through the gas system,
- Assist in the transition to a low carbon economy,
- Deliver significant carbon savings and
- Provide measurable value to all gas customers.

These goals should also be considered from a whole-system view, which also takes into account the welfare of customers, as proposed by CEER.

As-is Status in Turkey: The recent change (March 2020) in the secondary legislation provides EMRA the power to identify the call topics: “The priority topics for R&D studies and the limitation for the number of projects may be determined by the Commission and could be announced on the website of EMRA and at the electronic platform at latest, within 3 months before the project application period.





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Priority Areas for Gas Distribution

Future of Gas	
Integration of gas and electricity networks	Medium-term
Enabled consumers and markets	Medium-term
LNG/CNG transport infrastructure	Long-term
Gas demand forecasting	Short-term
Micro- and mini-CHP integration in gas distribution networks	Short-term
Power-to-gas solutions	Short-term
Renewable gases	Short-term
Natural gas regasification	Medium-term
Natural gas hydration	Long-term
Safety and Emergency	
Gas composition and safety management	Short-term
Protecting against third-party interference damage	Medium-term
Improved warning systems	Medium-term
Virtual reality used for network and above-ground installation design	Long-term
Reduction of gas leakage	Short-term
Detection of flammable and toxic gases	Short-term
New management and control systems for pressure level regulation in gas distribution networks	Medium-term
Realtime gas pressure optimization	Long-term





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Priority Areas for Gas Distribution

Reliability and Maintenance	
Asset management	Short-term
Asset integrity	Medium-term
Operational improvement	Short-term
Remote monitoring and control	Medium-term
Distributed information acquisition and decision making	Long-term
Predictive maintenance of gas distribution networks	Medium-term
Distribution Mains Replacement	
Robotics and digitalization	Long-term
Alternatives to replacement	Medium-term
New materials	Long-term
Pipe fracture detection and monitoring	Medium-term





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Priority Areas for Gas Distribution

Security	
Cybersecurity	Short-term
Site and asset security	Medium-term
Incident management	Medium-term
ICT systems intrusion detection	Medium-term
Smart Gas Meters	
Integration of electricity and gas smart meters	Short-term
Connectivity via 5G mobile networks	Short-term
Internet-of-Things	Medium-term
Enterprise Service Bus architecture for IT and OT systems integration	Long-term
Provision of flexibility to the electricity system	Long-term
Outage Management System (OMS)	Medium-term
Demand management and load shifting	Long-term





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Recommendations About Tariff Methodologies and Incentives

Other Recommendations

Recommendation 17 Public Access to Innovation Process

The results of the funded innovation projects can be publicly available to promote transparency. Rejected projects might also be published with DSOs' permission.

Supportive Arguments: EMRA should foster dissemination activities of the project's results, impact and lessons learnt.

Ofgem expect innovation activities and R&D project stakeholders to collaborate with each other on many of the projects supported by the NIA. Moreover, the facilitation of knowledge transfer is of paramount importance of the NIC, mainly due to the fact that customers are funding the relevant work and it is a requirement of the NIC that the learning generated be disseminated as effectively as possible. This way, project stakeholder, and therefore all customers, are able to benefit from the NIC projects and innovation activities. This facilitation is fostered through the Learning Portal. The Learning Portal is an area on the ENA website through which external parties can access the learning generated as a result of innovative Projects.

In Ireland, CRU publishes an Innovation Reporting Framework related to the Gas Innovation Fund. Gas Networks Ireland is also required to provide an annual report to the CRU for each gas year of the price control. The annual report outlines the activities of the Gas Innovation Fund for that particular time period.

As-is Status in Turkey: GAZBIR/ELDER provide information on R&D projects in dedicated website (<https://www.argebilgi.info/>). The provided information can be more structured, and EMRA may identify the minimum requirements for dissemination of project outcomes.

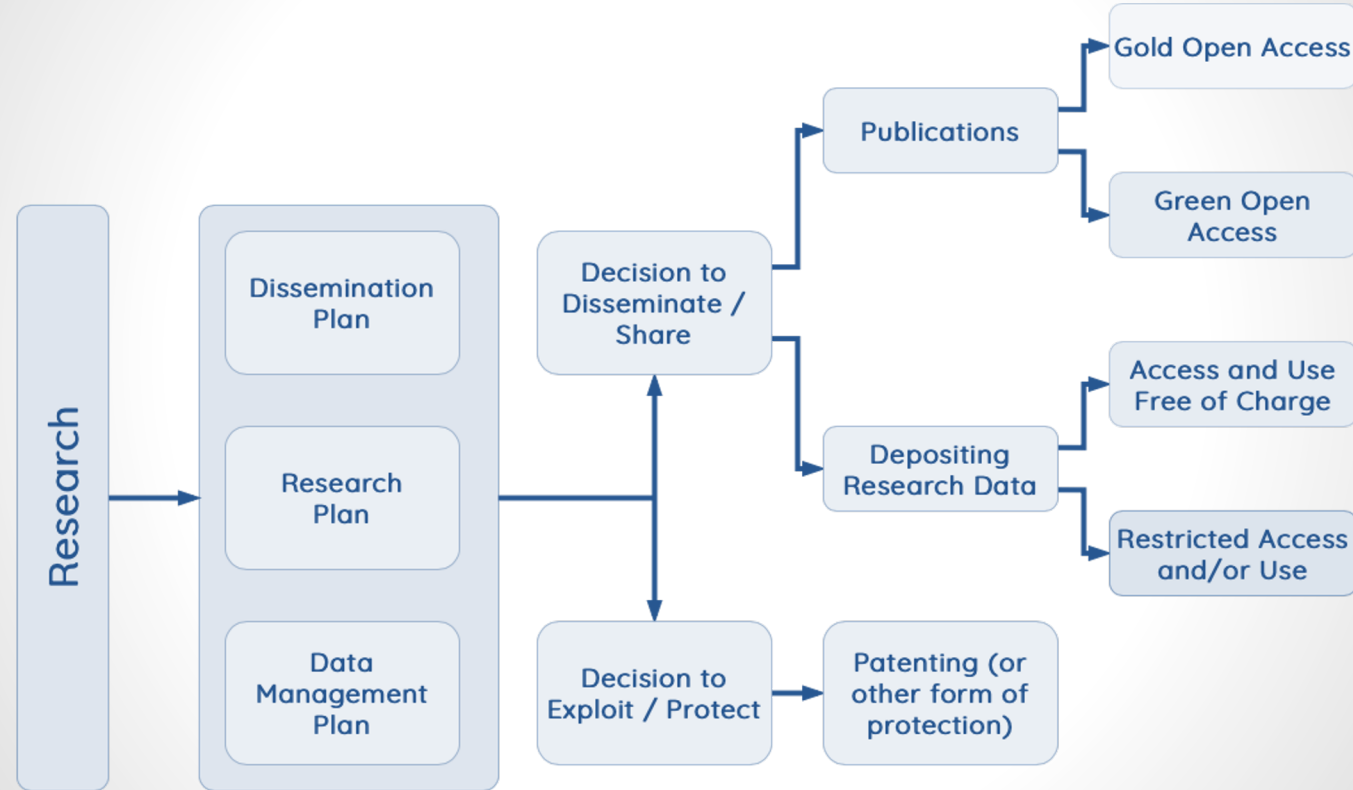




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Public Access to Innovation Process



Open Access Under the Horizon 2020 Framework Program





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Recommendations About Tariff Methodologies and Incentives

Other Recommendations

Recommendation 18 Communication and Dissemination of Innovation Activities

EMRA should request and push GAZBIR (association of gas DSOs) to disseminate the R&D projects after removal of sensitive information. Gas DSOs should communicate the benefits of their innovation programs to increase their social acceptance from consumer’s perspective and to have greater collaboration from other gas DSOs.

Supportive Arguments: In Turkey, R&D activities are funded from revenue cap and should be disseminated. Also, gas DSOs should disseminate results and lessons-learnt from R&D projects and innovation activities to all regulated entities, both for electricity and gas, to foster cooperation and potential synergies.

In UK, Ofgem expect innovation activities and R&D project stakeholders to collaborate with each other on many of the projects supported by the NIA. Moreover, the facilitation of knowledge transfer is of paramount importance of the NIC, mainly due to the fact that customers are funding the relevant work and it is a requirement of the NIC that the learning generated be disseminated as effectively as possible. This way, project stakeholder, and therefore all customers, are able to benefit from the NIC projects and innovation activities. This facilitation is fostered through the Learning Portal. The Learning Portal is an area on the ENA website through which external parties can access the learning generated as a result of innovative Projects.

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Technical Assistance for Improvement of Performance-Based Tariff Regulation of EMRA For Turkish Energy Markets Through Introducing an Enhanced Monitoring System



Thank You / Teşekkürler

4 September 2020, EMRA, Ankara

