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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 4.2 – Preparation of Smart Grid Road Map and Required Methodological Tariff Approaches for Natural Gas Market – European Legislative Framework

Workshop

16th September 2020, EMRA, Ankara

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Agenda

- Introduction
- European Legislative Framework related to Gas Smart Grids and Implementation of Gas Smart Grids in Europe
- European Commission Hydrogen Strategic Plan

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Introduction

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Introduction

- Since in the European Union, about 40% of primary energy sources (PES) that is used is currently applied for the generation of electricity and electric energy offers the best opportunity to be produced by renewable energy sources like wind power, solar energy, bio fuel and hydro power, the focus of the European Union has concentrated on electric energy, which has to carry the main part of the renewable energy production by having an annual share of >30% in 2020. Accordingly, all of the member states of the European Union have set their individual targets in support of the common strategy for 2020.
- As a consequence, there is a significant difference between electricity and gas sector related to smart grid definition, in the sense that while smart grids in electricity have been defined and discusses since 2008, the gas sector lags behind.

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Introduction

- In the footsteps of the “classical” definition of electricity smart grid, we can propose as definition of the gas smart grid the following:
- “A Smart Grid is a gas network that can intelligently integrate the actions of all users connected to it—producers, storages, Shippers, TSOs, DSOs, and consumers—in order to efficiently deliver sustainable, economic and secure gas supplies
- A Smart Grid employs innovative products and services together with intelligent monitoring, control, communication and self-healing technologies to:
- Enable the network to integrate users with new requirements,
- Better facilitate the connection and operation of the producers and storages,
- Enhance the efficiency in network operations,

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Introduction

- Allow gas consumers to play a part in optimizing the operation of the system,
- Provide consumers with more information and choice in the way they secure their gas supplies,
- Improve the market functioning and consumer services,
- Significantly reduce the environmental impact of the total gas supply system,
- Deliver enhanced levels of reliability, quality and security of supply.
- Consequently, a Smart Grid supports the introduction of new applications with far-reaching impacts: delivering gas more securely, cost efficiently and reliably through advanced control automation and monitoring functions providing self-healing capabilities after faults and enabling consumers to be better informed about their gas demand and to actively participate in the gas market .

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Introduction

- It is interesting to highlight that only recently the European Regulators and gas TSOs, through their associations (CEER, ACER, ENTSOG) have started discussing the impact of decarbonizing the energy sector on gas smart grid. The main elements of discussion and preliminary conclusion are included in the next section. As it can see, the discussion focuses mainly on the new gas model and the new regulatory framework required to support this transformation.

- No functional or technical specifications are suggested neither at this level nor at the national regulatory level. In a sense, the TSOs, which are more and more interconnected at the European level, are requested in this new scenario to propose the best technical solutions or technologies to implement the new gas model, characterized by new fuels besides methane and by a stricter integration with the electricity sector.

- This aspect differentiates the intervention of the European and national regulators on gas transportation smart grids from the gas distribution side, where strict requirements are expressed by the Regulators in terms of functional/technical specifications (e.g. the smart grid characteristics) or of timing of the roll-out of the same gas meters.

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European legislative framework related to Smart Gas Grids and Implementation of Gas Smart Grid in Europe

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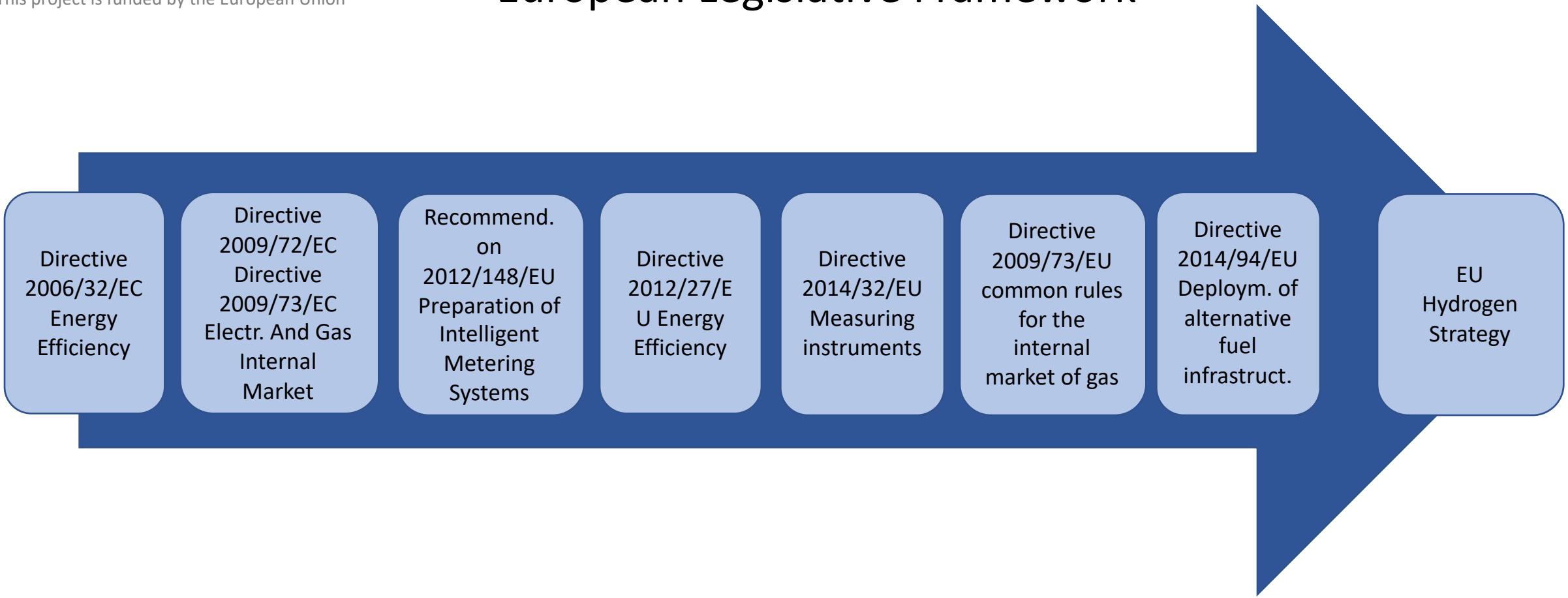
European Legislative Framework



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European Legislative Framework

- During the last decades, numerous legislative measures have foreseen and regulated the development of smart metering systems. Originally, the deployment of smart metering system was expected to help end-users understanding their actual energy consumption, creating as, a consequence, stronger incentives on the demand-side for energy efficiency. With the liberalization process of energy markets, the European Commission has also considered the smart metering system as “an effective tool to increase transparency and competition on retail markets for electricity, support self-generation and, in general, the integration of distributed energy resources, demand side flexibility and storage”.

- More recently, the booming of the digital economy and the proliferation of data led the European institutions to take measures for the protection of the personal data of European citizens. In case of non-personal data, non-discriminatory and transparent access by eligible parties is ensured through specific provision and rules, e.g. in the new Electricity Directive.

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European Legislative Framework

- Directive 2009/73/EC, concerning common rules for the internal market and part of the so-called Third Energy Package, provides in Article 3.8 that
- "In order to promote energy efficiency, Member States or, where a Member State has so provided, the regulatory authority shall strongly recommend that natural gas undertakings optimise the use of gas, for example by providing energy management services, developing innovative pricing formulas or introducing intelligent metering systems or smart grids where appropriate. "
- In Annex A of the Directive instructions on the long economic assessment of long-term costs and benefits are provided:
- "Member States shall ensure the implementation of intelligent metering systems that shall assist the active participation of consumers in the gas supply market. The implementation of those metering systems may be subject to an economic assessment of all the long-term costs and benefits to the market and the individual consumer or which form of intelligent metering is economically reasonable and cost-effective and which timeframe is feasible for their distribution. "
- Such assessment had to take place by 3 September 2012.

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European Legislative Framework

- Subject to that assessment, Member States or any competent authority they designate, shall prepare a timetable for the implementation of intelligent metering systems.
- The Member States or any competent authority they designate, shall ensure the interoperability of those metering systems to be implemented within their territories and shall have due regard to the use of appropriate standards and best practice and the importance of the development of the internal market in natural gas. “
- The definition of smart metering has been provided by the Commission Recommendation 2012/148/EU on the preparation for the roll-out of smart metering systems:
- *“‘smart metering system’ means an electronic system that can measure energy consumption, adding more information than a conventional meter, and can transmit and receive data using a form of electronic communication. “*

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European Legislative Framework

Besides, the Recommendation

- Provides guidance to Member States on the design of smart metering systems to ensure the protection of personal data, also recommending a data protection impact assessment,
- Provides guidelines on the methodology for the economic assessment of the roll-out of smart metering,
- Lists a set of common minimum functional requirement for smart metering systems (for electricity).
- In particular, Article 31 of the Recommendation defines the elements of the economic assessment:
  - Tailoring to local conditions,
  - Cost-benefit analysis (cba),
  - Sensitivity analysis,
  - Performance assessment, externalities and social impact.

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European Legislative Framework

- In the case of electricity, the Annex provide also a non-exhaustive list of costs to be considered for the rollout of smart metering systems (OPEX, CAPEX, reliability and environmental costs, other costs), as well as a non-exhaustive list of formulae for the quantification of benefits.
- This non-exhaustive list can also be extended to the gas sector.

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European Legislative Framework

- Directive 2009/28/CE established a common framework for the promotion of energy from renewable sources, with specific dispositions for biofuels.
- In particular,
  - Member States shall assess the need to extend existing gas network infrastructure to facilitate the integration of gas from renewable energy sources (Art.10); and
  - Where relevant, Member States shall require transmission system operators and distribution system operators in their territory to publish technical rules …. in particular regarding network connection rules that include gas quality, gas odorization and gas pressure requirements. Member States shall also require transmission and distribution system operators to publish the connection tariffs to connect renewable gas sources based on transparent and non- discriminatory criteria. (Art.11).

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European Legislative Framework

- Directive 2009/73/EC established common rules for the transmission, distribution, supply and storage of natural gas, laying down the rules relating to the organization and functioning of the natural gas sector, access to the market, the criteria and procedures applicable to the granting of authorizations for transmission, distribution, supply and storage of natural gas and the operation of systems. The rules established by this Directive for natural gas, including LNG, shall also apply in a non-discriminatory way to biogas and gas from biomass or other types of gas in so far as such gases can technically and safely be injected into, and transported through, the natural gas system.
- Based on the consultation of stakeholders and national experts, Directive 2014/94/EU has identified
  - electricity,
  - hydrogen,
  - biofuels,
  - natural gas, and
  - liquefied petroleum gas (LPG),

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European Legislative Framework

- As currently the principal alternative fuels with a potential for long-term oil substitution, also in light of their possible simultaneous and combined use by means of, for instance, dual-fuel technology systems.
- The Directive required the Member States to adopt development plans for such alternative fuels and promote the development of infrastructures in order to assure an adequate network of recharge and supply points for the public.

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European Commission Hydrogen Strategy

- In July 2020, the European Commission has unveiled its hydrogen strategy as for a climate neutral Europe. The Commission recognizes that Europe is highly competitive in clean hydrogen technologies manufacturing and is well positioned to benefit from a global development of clean hydrogen as an energy carrier. Cumulative investments in renewable hydrogen in Europe could be up to EUR 180-470 billion by 2050, and in the range of €3-18 billion for low-carbon fossil-based hydrogen.

- Combined with EU's leadership in renewables technologies, the emergence of a hydrogen value chain serving a multitude of industrial sectors and other end uses could employ up to 1 million people, directly or indirectly. Analysts estimate that clean hydrogen could meet 24% of energy world demand by 2050, with annual sales in the range of €630 billion.

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European Commission Hydrogen Strategy

- However, today renewable and low-carbon hydrogen are not yet cost competitive compared to fossil-based hydrogen. To harness all the opportunities associated with hydrogen, the European Union needs a strategic approach. EU industry is rising to the challenge and has developed an ambitious plan to reach 240 GW of electrolysers by 2030. Almost all Member States have included plans for clean hydrogen in their National Energy and Climate Plans, 26 have signed up to the “Hydrogen Initiative”, and 14 Member States have included hydrogen in the context of their alternative fuels infrastructure national policy frameworks . Some have already adopted national strategies or are in the process of adopting one.
- However, deploying hydrogen in Europe faces important challenges that neither the private sector nor Member States can address alone. Driving hydrogen development past the tipping point needs critical mass in investment, an enabling regulatory framework, new lead markets, sustained research and innovation into breakthrough technologies and for bringing new solutions to the market, a large-scale infrastructure network that only the EU and the single market can offer, and cooperation with our third country partners.

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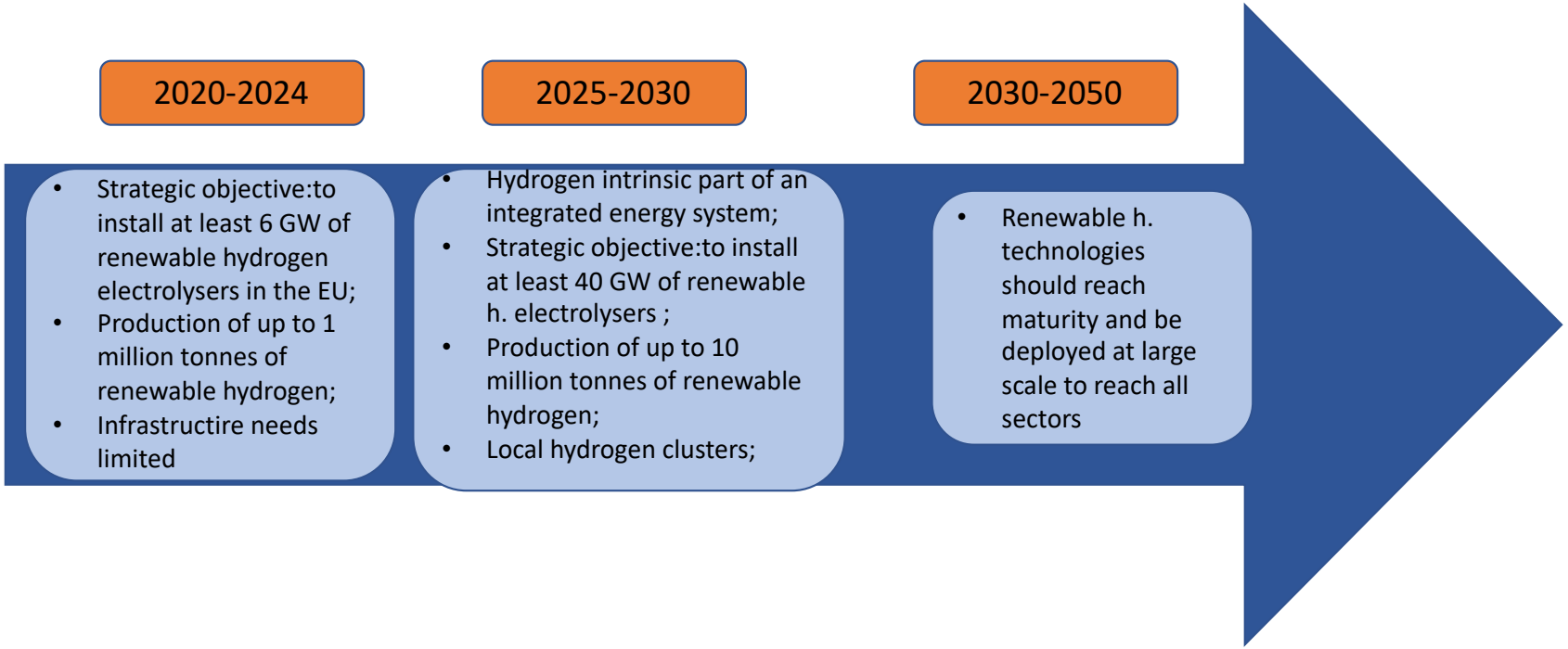
European Commission Hydrogen Strategy



Hydrogen Roadmap for Europe

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European Commission Hydrogen Strategy

- The priority for the EU is to develop renewable hydrogen, produced using mainly wind and solar energy. Renewable hydrogen is the most compatible option with the EU's climate neutrality and zero pollution goal in the long term and the most coherent with an integrated energy system. The choice for renewable hydrogen builds on European industrial strength in electrolyser production, will create new jobs and economic growth within the EU and support a cost-effective integrated energy system. On the way to 2050, renewable hydrogen should progressively be deployed at large scale alongside the roll-out of new renewable power generation, as technology matures and the costs of its production technologies decrease. This process must be initiated now.
- In the short and medium term, however, other forms of low-carbon hydrogen are needed, primarily to rapidly reduce emissions from existing hydrogen production and support the parallel and future uptake of renewable hydrogen.
- The hydrogen ecosystem in Europe is likely to develop through a gradual trajectory, at different speeds across sectors and possibly across regions and requiring different policy solutions.

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European Commission Hydrogen Strategy

- To support these investments and the emergence of a whole hydrogen eco-system, the Commission kick-starts today the European Clean Hydrogen Alliance – announced in the Commission's New Industrial Strategy. The Alliance will play a crucial role in facilitating and implementing the actions of this Strategy and supporting investments to scale up production and demand for renewable and low-carbon hydrogen. It is strongly anchored in the hydrogen industrial value chain from production via transmission to mobility, industry, energy, and heating applications, and supports the related skills and labour market adjustments where needed. It will bring together the industry, national, regional and local public authorities and the civil society. Through interlinked, sector-based CEO round tables and a policy-makers' platform, the Alliance will provide a broad forum to coordinate investment by all stakeholders and engage civil society.
- The key deliverable of the Alliance will be to identify and build up a clear pipeline of viable investment projects. This will facilitate coordinated investments and policies along the hydrogen value chain, and cooperation across private and public stakeholders across the EU, providing public support where appropriate and crowding in private investment. It will also give visibility to these projects and allow them to find appropriate support where necessary. At this point, already 1.5-2.3 GW of new renewable hydrogen production projects are under construction or announced, and an additional 22 GW of electrolyser projects are envisaged and would require further elaboration and confirmation.

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European Commission Hydrogen Strategy

- The Commission will also follow up on the recommendations identified in a report by the Strategic Forum for Important Projects of Common European Interest (IPCEI) to promote well-coordinated or joint investments and actions across several Member States aimed at supporting a hydrogen supply chain. The cooperation initiated within the hydrogen ecosystem in the Strategic Forum will contribute to a swift uptake of activity in the Clean Hydrogen Alliance. In turn, the Alliance will simultaneously facilitate cooperation in a range of large investment projects, including IPCEI projects, along the hydrogen value chain. The specific IPCEI instrument enables State aid to address market failures for large cross-border integrated projects for hydrogen and fuels derived from hydrogen that significantly contribute to achieve climate goals.
- Additionally, as part of the new recovery instrument Next Generation EU, the InvestEU programme will see its capacities more than doubled. It will continue to support the deployment of hydrogen, in particular by incentivising private investment, with a strong leverage effect, through its original four policy windows and the new Strategic Investment Window.

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European Commission Hydrogen Strategy

- The investments in electrolysers are estimated in a range between 24 and 42 billion Euro, from now to 2030. In addition, over the same period 220-340 billion Euro would be required to scale up and directly connect 80-120 GW of solar and wind energy production capacity to the electrolysers to provide the necessary electricity.
- Other required investments:
  - 11 billion to retrofit half of the existing plants with carbon capture and storage
  - 65 billion for hydrogen transport, distribution and storage fuelling stations
- Finally, adapting end-use sectors to hydrogen consumption and hydrogen-based fuels will also require significant investments. For instance, it takes some €160-200 million to convert a typical EU steel installation coming to end-of-life to hydrogen. In the road transport sector, rolling out an additional 400 small-scale hydrogen refuelling stations (compared to 100 today) could require investments of €850-1000 million.

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Thank You / Teşekkürler

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