



Energy Transition till 2030

"The role of infrastructure in enabling the development the H2 value chain"

Kleopatra Avraam, Strategic Planning Senior Manager

13/09/2022

Climate-change challenge



EU moves ambitiously towards a decarbonized future, with energy in the forefront...

EU energy policy - three pillars



Paris Agreement (2015)

Global framework to address climate change by limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C



European Green Deal (2020)

An action plan and a legally binding target of “Net Zero” GHG emissions by 2050, opting to make Europe the first climate neutral continent in the world

What does it mean for the energy sector:

Transformation of energy markets to enable the “net zero” target and ensure that objectives can be realized in a **non-disruptive** and **cost-effective** manner

“Fit for 55” (2021)

- A new target for 2030: Net reduction of GHG emission by 55% compared to 1990 levels
- A series of **legislative proposals** to deliver this target

What does it mean for the energy sector:

A new energy market architecture in terms of governance, operation, development, financing...
It will particularly affect the gas market and gas TSOs...

However, different decarbonization pathways are possible...



DESFA supports and promotes a balanced role for gas and electricity in the future

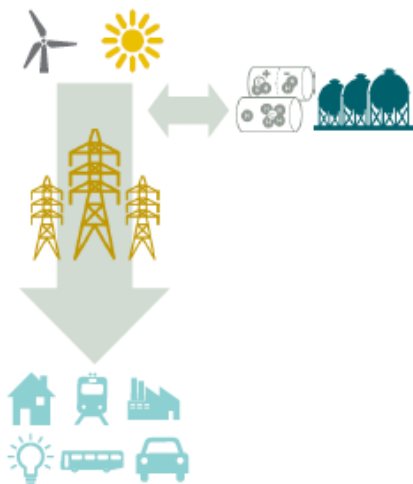
Electricity only



- End applications primarily directly electrified (e.g. electric vehicles, HP, direct heating)
- No gas-based end applications

▪ No Power-to-Gas

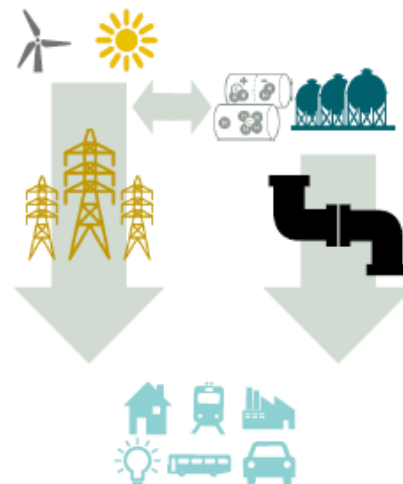
Electricity and gas storage



- Possibility of "Power-to-Gas-to-Power" for seasonal storage

▪ Electricity networks alone combine power generation and end energy use

Electricity and green gas



- End applications partly directly electrified, partly based on green gas

▪ "Power-to-Gas" operation for the production of green gas

▪ (Existing) gas infrastructure parallel to the power grid

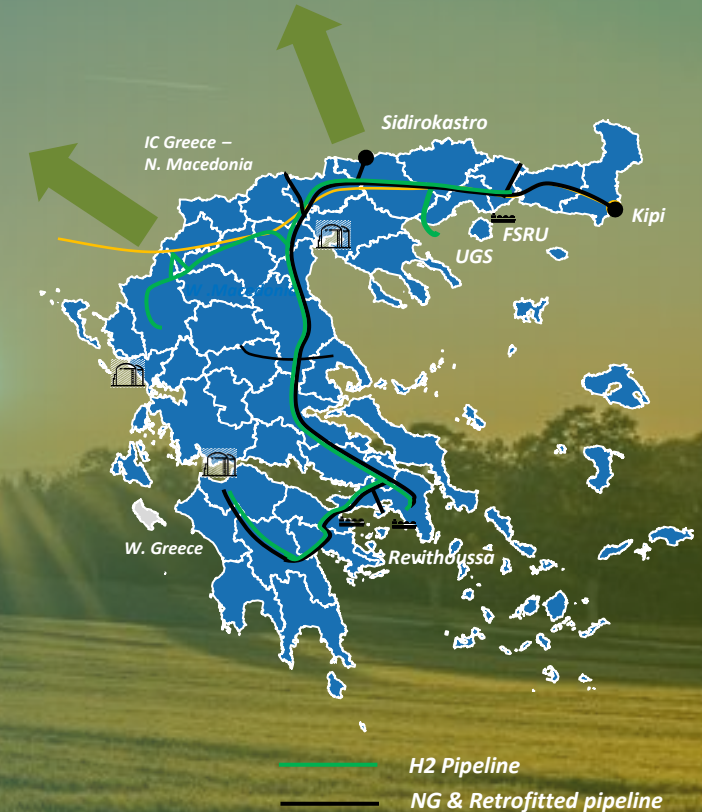
DESFA's view and strategic perspective:

- Decarbonization of the electricity supply is a key element towards a carbon-free system
- However, **molecules will still be needed** for different parts of the value chain
- The **gas sector can provide greater energy efficiency** and renewable integration (through the flexibility of storage), delivering on low-carbon technologies such as hydrogen, renewable gas and –potentially– carbon capture and storage
- Continued **usage of existing gas infrastructure is to the benefit of the society**

DESFA's H2 project proposal



- **Phase 1: Preparation of existing infrastructure to receive and transport the first produced quantities of hydrogen - as a blend with natural gas - following the system's H2 readiness assessment study (to be finalized within Q3 2022)**
- **Phase 2: Construction of a regional, open-access, high-pressure 100% hydrogen-ready network along Greece, in parallel with the existing system, connecting supply with demand throughout the country, which, through its interconnections, will start the SE part of the European Hydrogen Backbone.**
- The early development of a **hydrogen pipeline system can foster the realization of the national long-term vision for a prosperous, modern, competitive and climate neutral economy**
- We have already established **partnerships with various H2 projects, both on hydrogen production in the country and hydrogen infrastructure development** by other EU TSOs, TAP, Bulgatransgaz, Snam and North Macedonia NER amongst the more relevant.



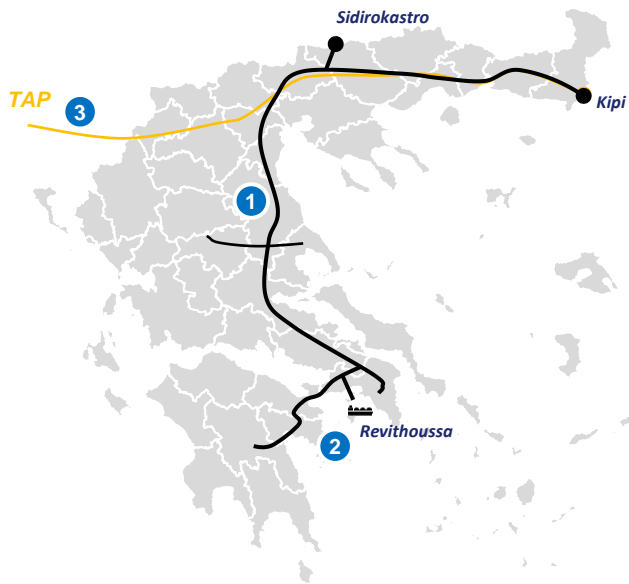
DESFA's hydrogen network is expected to expand in parallel to the current methane network proving a complete dual system



Gas network phased expansion

Current state: dedicated to Natural Gas

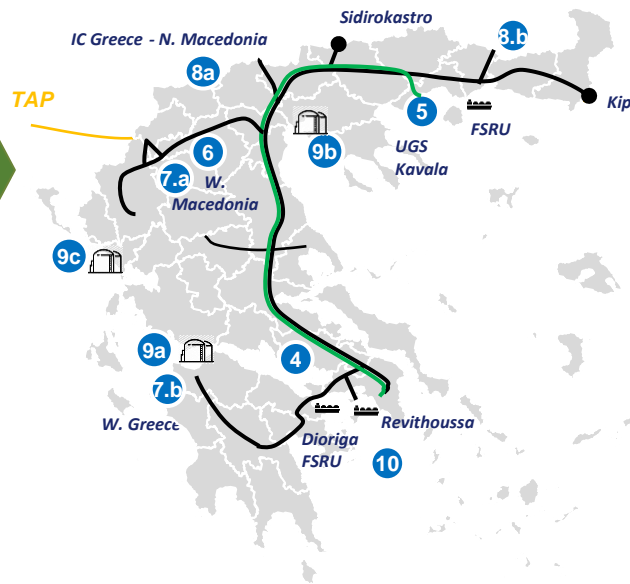
- 1 NG pipeline to serve power gen. and final consumption
- 2 LNG terminal active in Revithoussa
- 3 TAP connection for NG with other European networks



100% H2 Ready Pipeline: 0 km

Expansion of NG + H2 line

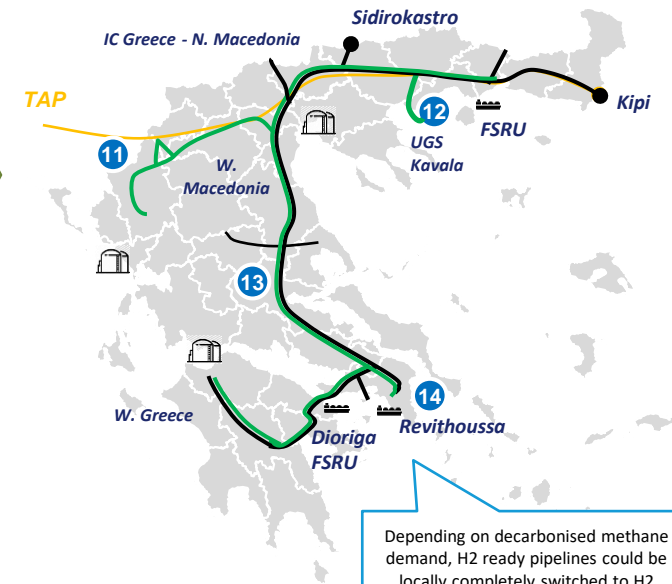
- 4 H2 pipeline for industrial sites and final consumers
- 5 UGS for Methane potentially convertible to H2
- 6 Injection of H2 from W.Macedonia
- 7 W. Macedonia (a) and W. Greece (b) NG branch (H2 ready)²
- 8 NG exit points in N. Macedonia (a) and IGB (b)
- 9 LNG Depot in Patras (a), Thessaloniki (b) and Igoumenitsa (c)
- 10 FSRU in Dioriga



Phase 1: Utilisation of the new system with NG
Phase 2: Utilization of the new system for pure H2*
 100% H2 Ready Pipeline: 600 km

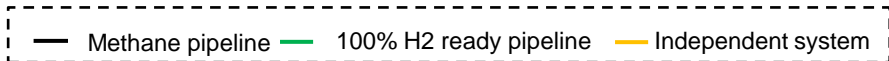
Final state: dual system in parallel

- 11 Connection for Hydrogen Export through TAP repurposing
- 12 Connection to UGS for H2 seasonal system balance
- 13 Completion of Hydrogen network
- 14 Revithoussa LNG Terminal switched from gasification to liquefaction plant



100% H2 Ready Pipeline: 2,000 km

Depending on decarbonised methane demand, H2 ready pipelines could be locally completely switched to H2



* Phase 2 will begin when H2 market becomes mature enough and relevant H2 volumes are available for transportation. In the meantime, the NG network will be ready to accept H2 blends.

Handling the current energy crisis, with a view to the future: DESFA's RePowerEU proposal for the – 100% hydrogen ready – network expansion



Project Proposal: Upgrade of the National Natural Gas Transmission System (NNGTS)

- Upgrade of the NNGTS through parallel sections of pipelines, the upgrade of existing Compressor Station and new CSs, in order to increase imports for all the Balkan countries through Greece existing and planned LNG import terminals and TAP.
- The project has been included in the list of ENTSOE's TYNDP 2022 projects as 100% H2 ready



Projects' Benefits

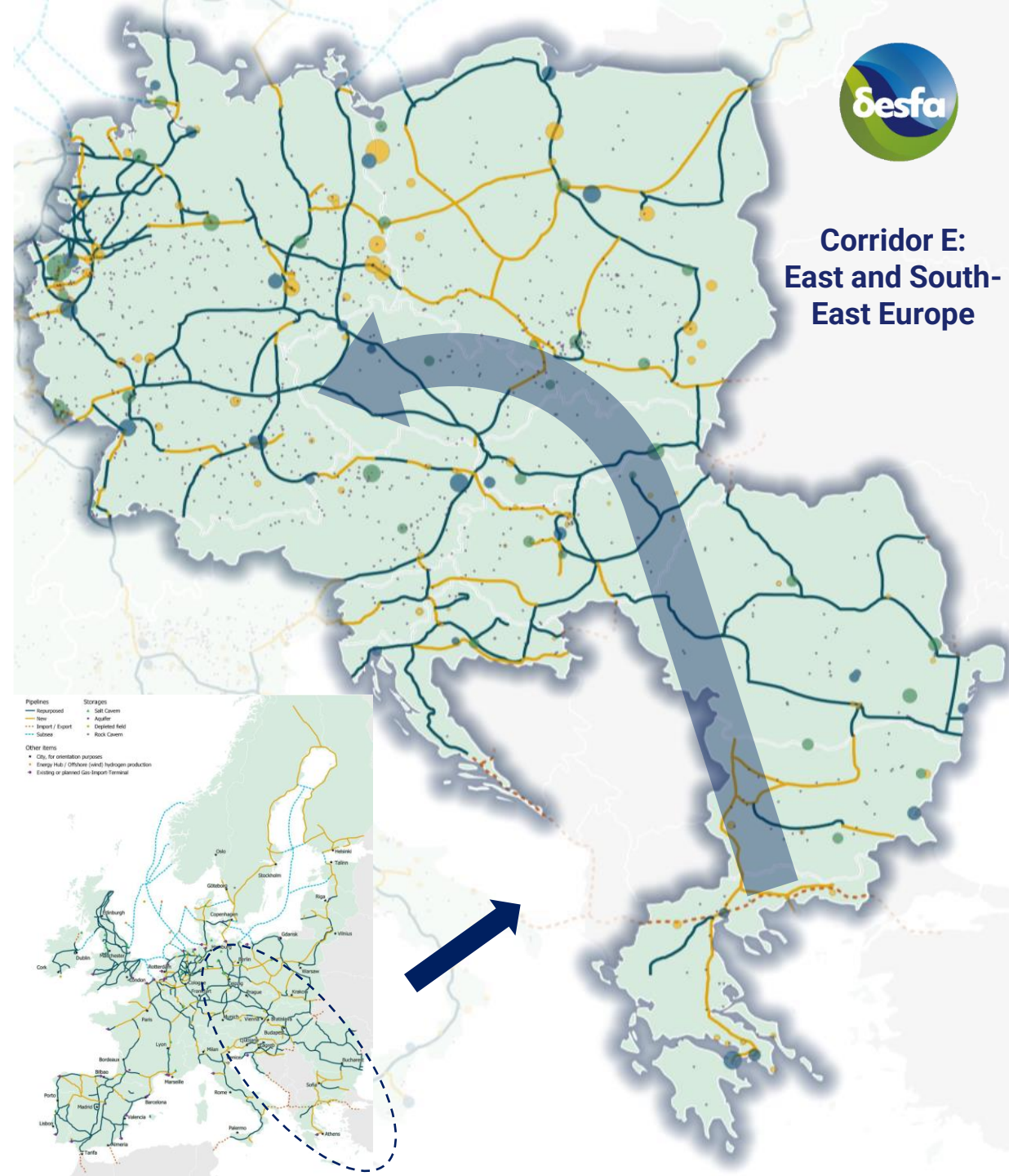
- 1 Enables transportation of anticipated increased natural gas flows through the Greek Gas System & neighboring countries, currently restricted due to the existing technical constraints of the system.
- 2 Enhanced security of gas supply and diversifying the entry routes to Greece and the whole SEE region - increased capability of the Greek gas System to receive gas quantities from the Eastern entry points.
- 3 The parallel pipeline is fully aligned with the RePower EU initiative and will prepare the grounds for the renewable gases' era and the long-distance H2 transportation (within Greece and abroad) connecting H2 demand and supply valleys.
- 4 Following the above, the proposed infrastructure will be able to be amortized both through its utilization with NG (1st phase) and Hydrogen (2nd Phase)

Our project as part of the EHB initiative

- ✓ To deliver the 2030 hydrogen demand targets set by the **REPowerEU plan**, **5 large scale pipeline corridors are envisaged by the European Hydrogen Backbone (EHB) initiative**.
- ✓ **EHB members signed a pledge** to the European Commission to establish hydrogen supply corridors by 2030 at the **European Hydrogen Backbone Day event** which took place in **June 2022 in Brussels**.
- ✓ **East and South-East Europe corridor** with **Greece** as an essential part of it, leveraging **vast land availability and high-capacity factors for solar & wind**, would connect **high hydrogen supply potential regions with off takers in Central Europe and southern Germany**, where the demand is expected to be significant by 2030. The corridor would be set up by **2030, covering 10,000 km of large scale hydrogen pipelines** across all countries of the corridor, of which approximately 60% will be repurposed pipelines
- ✓ The buildout of this corridor by 2030 requires **national governments to take clear and concrete actions across**. This includes actions associated with infrastructure development and planning, the development of **cross-national initiatives** and securing access to **early funding and long term, low-cost financing**.



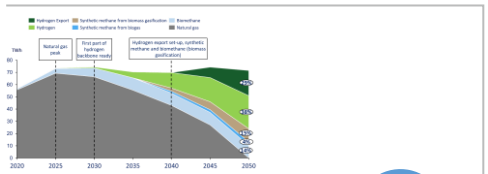
**Corridor E:
East and South-
East Europe**



DESFA is actively participating in the shaping of the hydrogen market in Greece and EU



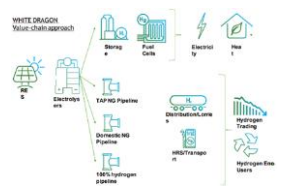
1 Our long-term study for renewable gases and the **ongoing H2 Master Plan study**



2 Worked for the **H2 readiness of our network**



3 Submission of various **Project Proposals** (IPCEI's, CEF)



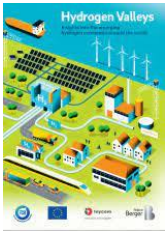
4 Follow-up of **Regulatory framework developments & incentives**



5 Participation in the **National H2 strategy committee**



6 Ongoing Discussions with stakeholders regarding the development of H2 pilot projects



7 Internal & external communication (incl. the organization of the 1st Hydrogen Conference in Greece)



8 Active member of various associations & Initiatives (ENTSOG, GIE, HE, EHB, GfC, ECH2A)



DESFA is actively involved in the development of the National Energy and Climate Plan



DESFA's view on the key points for the development of the NECP is summarized in the following topics:

NECP key points for consideration & targets set-up

- NECP shall have to include clear & measurable targets, parameters for consideration related to the development of the renewable gases in the energy market in order to accelerate their penetration

Design & introduction of incentives

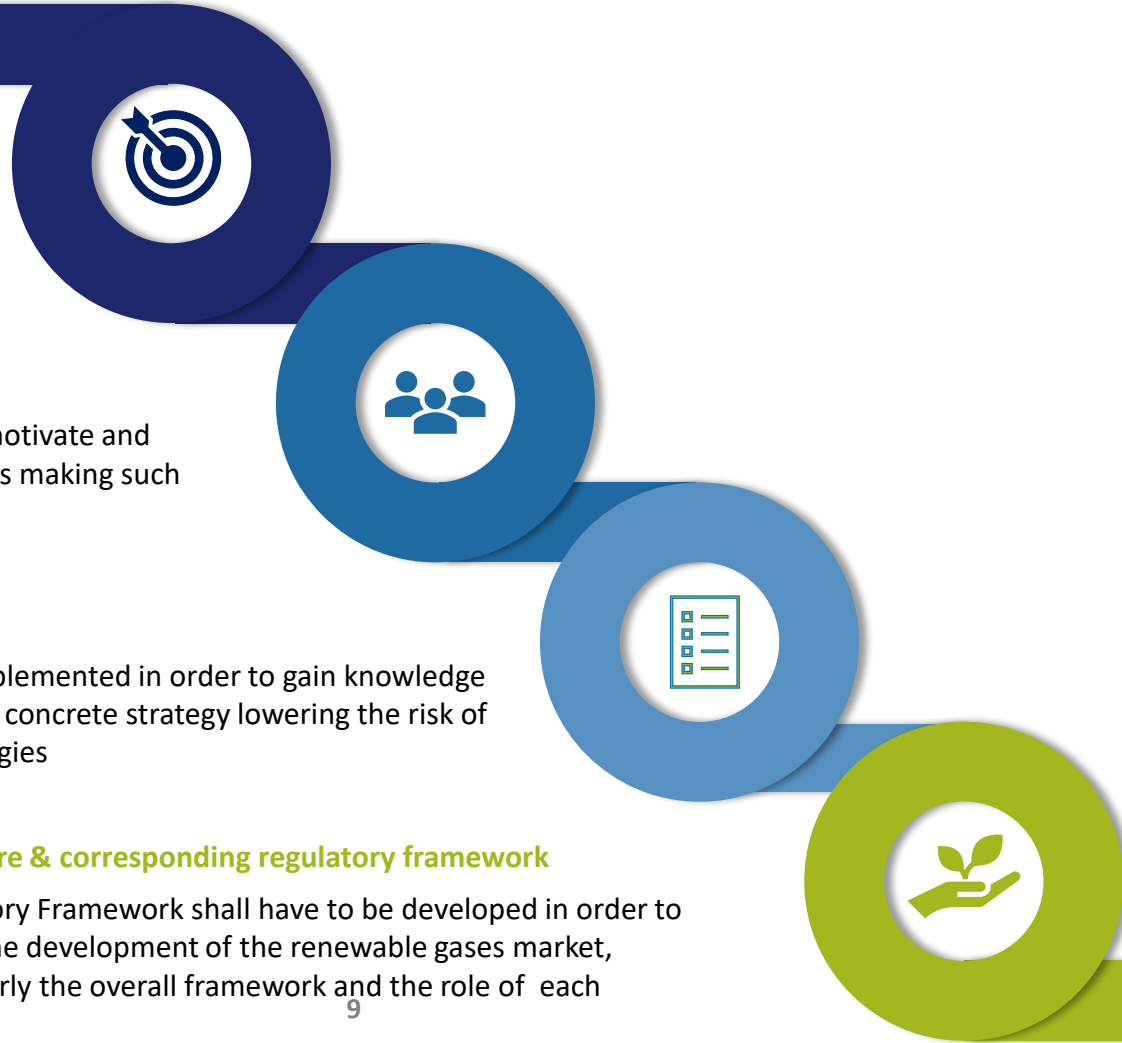
- Incentives shall have to be introduced in order to motivate and accelerate investments in clean energy technologies making such investments less risky and most cost competitive

First pilot small scale projects

- Pilot projects need to be implemented in order to gain knowledge and proceed with forming a concrete strategy lowering the risk of implementing new technologies

Market structure & corresponding regulatory framework

- The Regulatory Framework shall have to be developed in order to accelerate the development of the renewable gases market, defining clearly the overall framework and the role of each stakeholder





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Thank you

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