



Renewable gases and gas network developments

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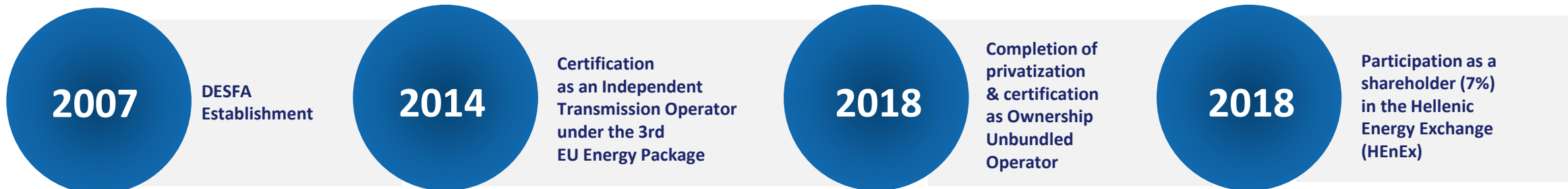
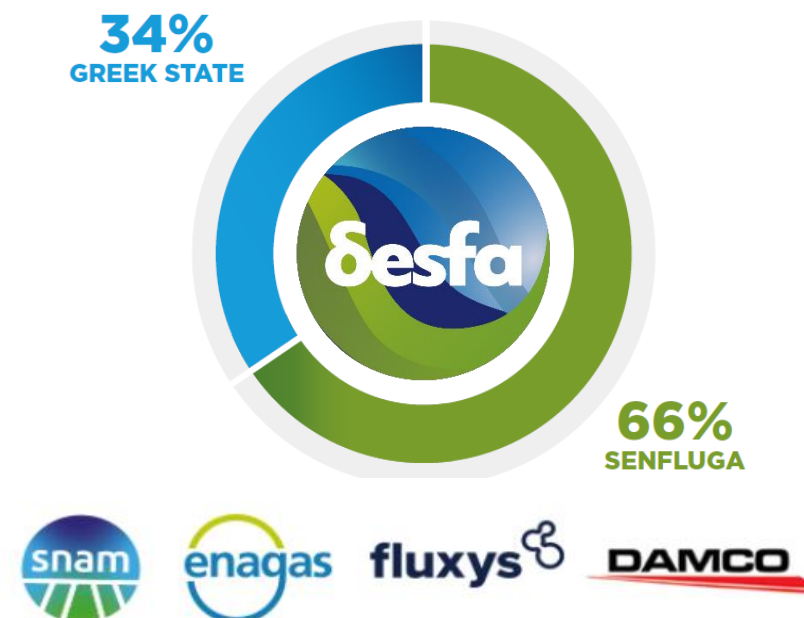
17th Gas Forum | 4 – 5 October 2022

DESFA counts 15 years of successful operation...



- Established in **March 2007**, DESFA owns & operates the **Greek Natural Gas System (NNGS)**, which consists of the **National Natural Gas Transmission System** & the **LNG Terminal in the islet of Revithoussa**
- DESFA has been certified as an **Ownership Unbundled Operator** under the **3rd EU Energy Package**, following the **completion of a privatization process on December 20th of 2018**
- DESFA operates, maintains & develops the **Greek Natural Gas System** in a **safe, reliable and economically efficient way**, offering:
 - **Regulated Third Party Access services** in a transparent and non-discriminatory way
 - **A range of non-regulated services** to a number of national & international clients

Shareholders Structure



... being in the center of the new SE Europe energy landscape

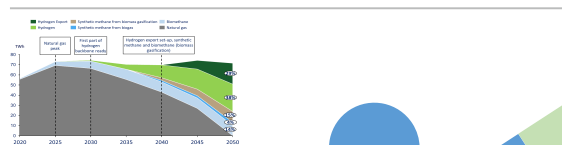


DESFA (and Greece) can play an important role for the security of supply and the energy transition in SE Europe

Working on different pieces of the Energy Transition jigsaw puzzle



Our long-term study for renewable gases



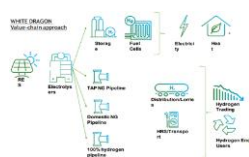
Worked for the H2 readiness of the network



Participation in the National H2 strategy committee



Submission of Project proposals (IPCEI)



Preparatory for biomethane initiatives



Follow-up of Regulatory framework developments & incentives

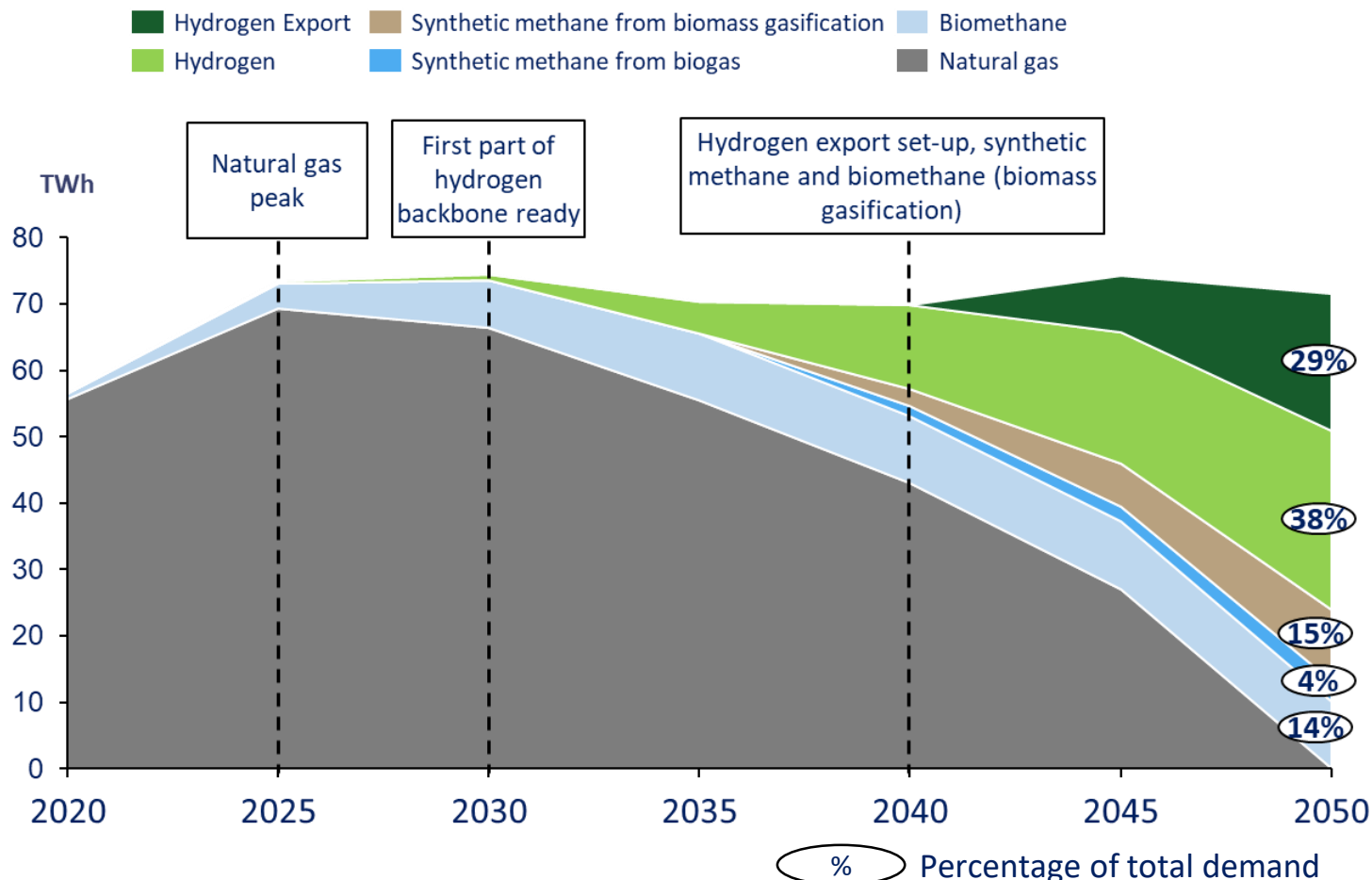


Active member of various associations & Initiatives (ENTSO, GIE, HE, EHB, GfC, ECH2A)



δESFA is committed and active in the shaping of the hydrogen future.

Gas volume phasing until 2050 in Greece



Phased-approach highlights

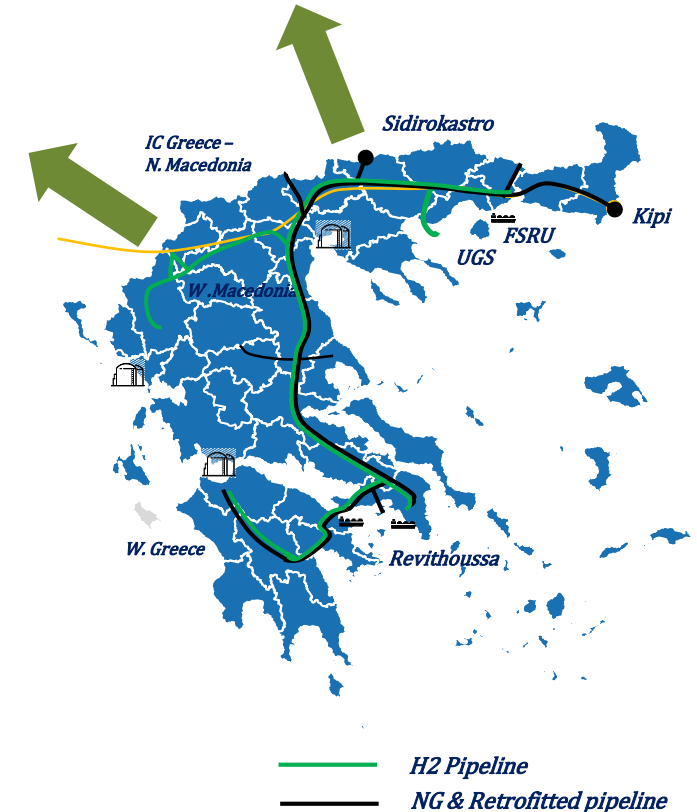
- **Natural gas peaks in 2025** and is progressively replaced by decarbonised gases
- **Biomethane is the first** decarbonised gas to be used and is expected to grow to 10% by 2030 and reach **full addressable potential by 2035**
- **Synthetic methane and methane from biomass gasification start** being used towards **2040** in limited cases where production is cheaper (e.g. curtailed RES, favourable feedstock conditions) and they progressively increase when they become **cheaper than NG (with CO2 price reaching 200€/ton)**
- Relevant volumes of **hydrogen appear from 2035** (when the H2 backbone is up and running) to **decarbonize final consumption** and **from 2040**, when the hydrogen backbone connection to the rest of Europe is in place, Greece is expected to start **exporting Hydrogen to Central Europe**

Overall energy of the gases, consumed locally and exported, is expected to remain stable over time (70TWh) with NG phase-out accelerating from 2040

δESFA'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.



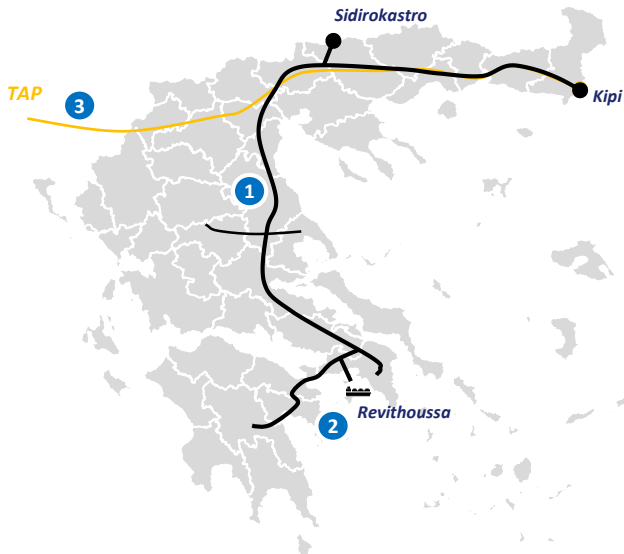
δESFA's H2 project proposal consists of blending readiness as a first step, and the development of dedicated H2 system when the market matures.

Gas network phased expansion



Current state: dedicated to Natural Gas

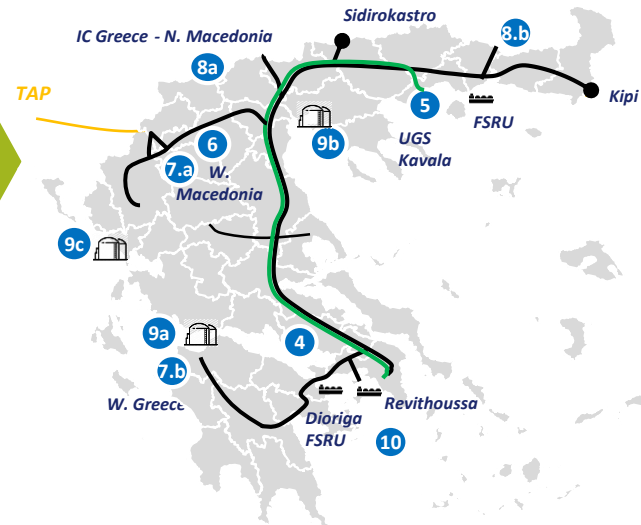
- 1 NG pipeline to serve power gen. and final consumption
- 2 LNG terminal active in Revithoussa
- 3 TAP connection for NG with other European networks



100% H2 Ready Pipeline: 0 km

Expansion of NG + H2 line

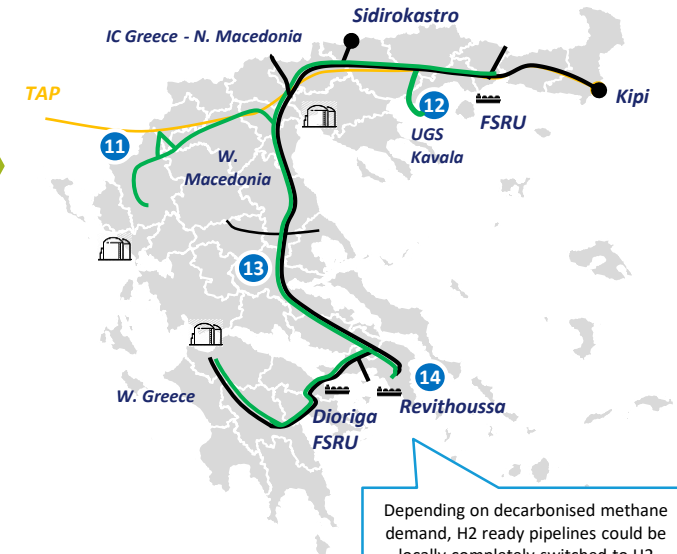
- 4 H2 pipeline for industrial sites and final consumers
- 5 UGS for Methane potentially convertible to H2
- 6 Injection of H2 from W.Macedonia
- 7 W. Macedonia (a) and W. Greece (b) NG branch (H2 ready)²
- 8 NG exit points in N. Macedonia (a) and IGB (b)
- 9 LNG Depot in Patras (a), Thessaloniki (b)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

— Methane pipeline — 100% H2 ready pipeline — Independent system

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

* 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.

Our project as part of the EHB initiative



To deliver the 2030 hydrogen demand targets set by the RePowerEU plan, five large-scale pipeline corridors are envisaged.

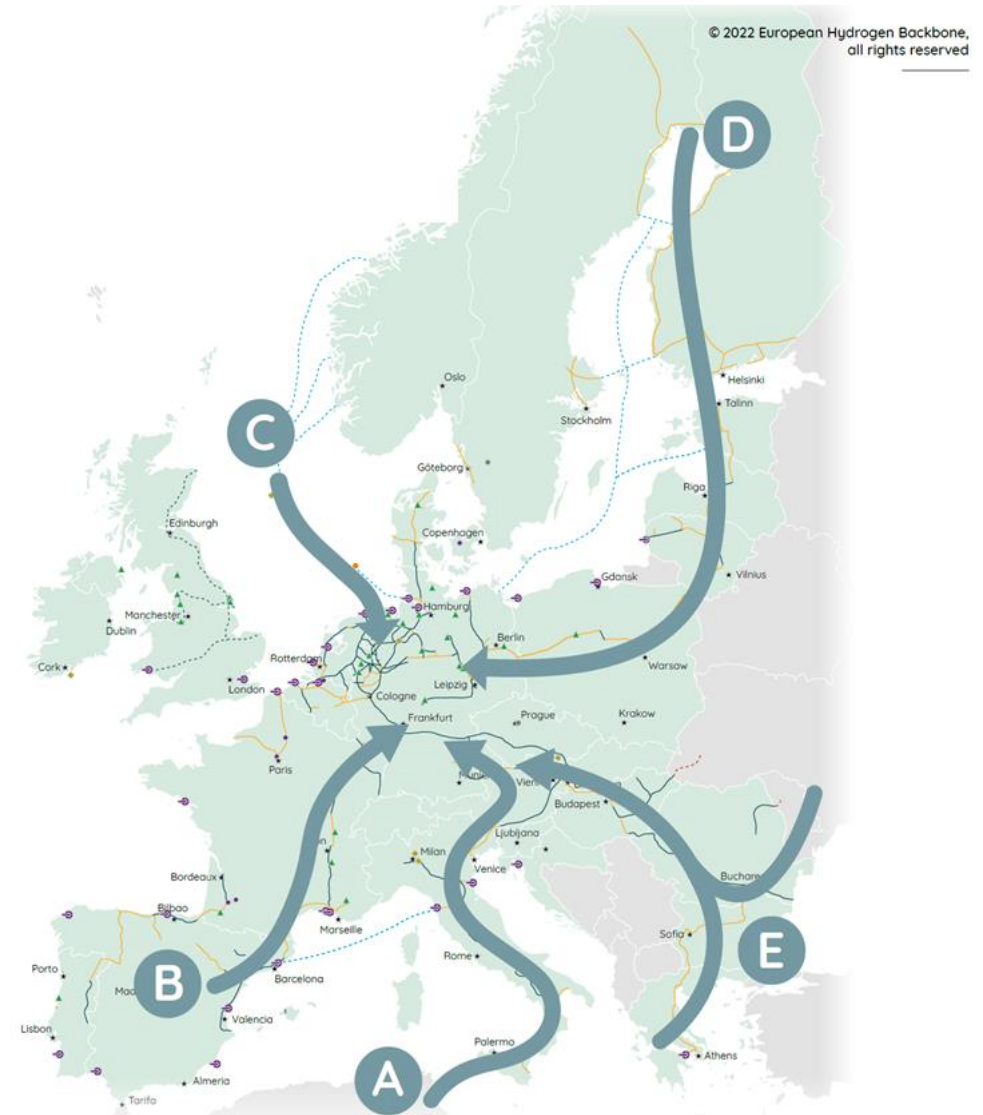
The corridors will initially connect local supply and demand in different parts of Europe, before expanding and connecting Europe with neighboring regions with export potential.

Certainty about the deployment of this infrastructure will enable market actors to develop supply and demand more rapidly.

The five hydrogen supply corridors are:

- Corridor A: **North Africa & Southern Europe**
- Corridor B: **Southwest Europe & North Africa**
- Corridor C: **North Sea**
- Corridor D: **Nordic and Baltic regions**
- Corridor E: **East and South-East Europe**

These five corridors span across both domestic and import supply markets, consistent with the three import corridors identified by the RePowerEU plan, including a corridor via the **Mediterranean** (Corridors A and B), via the **North Sea** (Corridor C) and via **Ukraine** (Corridor E).



The prospect of Biomethane



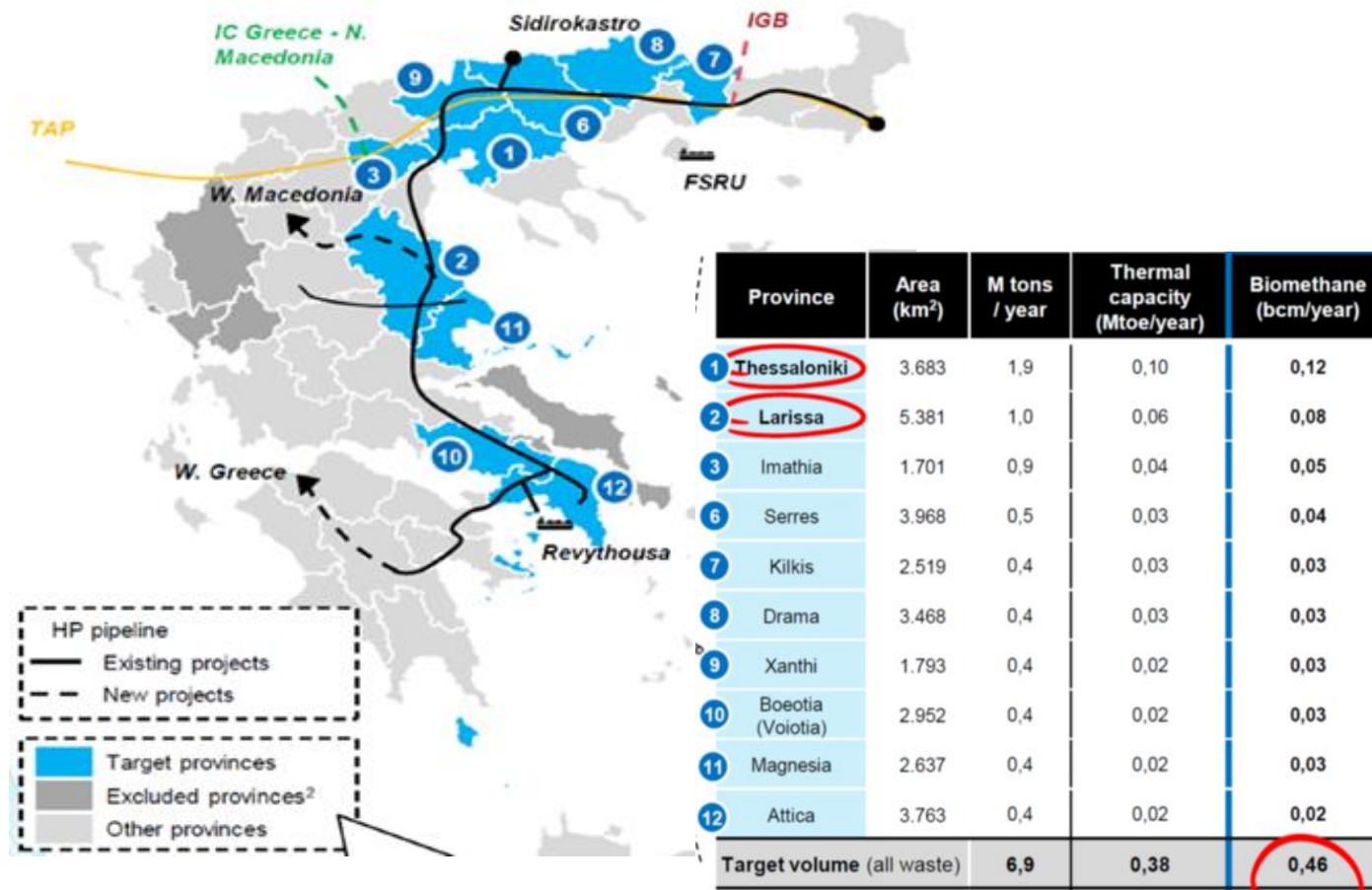
Biomethane is:

- **Renewable**; it is produced from agricultural, agro-industrial biomass, waste water & organic urban waste
- **Sustainable**; it is "carbon neutral" and significantly reduces emissions from the agricultural sector
- **Flexible** for all energy uses
- **Completely similar to natural gas** (it is called 'renewable natural gas'). It can exploit the existing transport and storage infrastructures

Opportunities:

- **Desfa** can tap a biomethane production potential in regions **close** to our infrastructure
- **Desfa** shall build upon existing know-how to speed up its entrance into the biomethane production
- Biomethane can be used for **Desfa's** consumption requirements, e.g. at existing and the new Compressor Stations

Biomethane capacity in Greece



Biomethane could play a complementary role to hydrogen also for Greece

Regulatory issues – the new “Gas Package” (I/II)



**Role of natural gas TSOs
in hydrogen networks
(horizontal unbundling)**
(vertical unbundling)



Legal and organizational unbundling may unnecessarily increase costs and complexity, undermining the crucial role gas TSOs can play in the development of H2 networks

**Unbundling between
hydrogen supply and
infrastructure activities**
(vertical unbundling)



Legislation should allow participation of the gas TSOs in the conversion of power into hydrogen in order to kick-start and accelerate the development of the hydrogen market

**Financing the hydrogen
network**



EC’s proposal on financing H2 infrastructure through subsidies from natural gas during the transition phase is very welcome, but more flexibility and clarity are needed

**Establishment of new
entities**



Proposed establishment of new entities should be reconsidered to avoid inefficient allocation of responsibilities and redundancies

Regulatory issues – the new “Gas Package” (II/II)



Blending at Interconnections points



Blending threshold at 5% at Interconnection Points (IP) is an important tool to promote hydrogen development and avoid market fragmentation

Proposal for zero tariffs for renewable and low carbon gases at interconnection points



The proposal risks fragmenting the gas market. Integration of Guarantees of Origin and Proof of Sustainability systems will promote renewable gases more efficiently

On the definition of low-carbon gases



EC's proposal on the definition of low carbon-gases is very welcome, but more clarity is needed

desfa

