

# Hydrogen as a Bridging Agent between Greece and Türkiye (*& between SE Europe and Türkiye*)

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# OUTLINE

- **HYDROGEN IS A NICE BUT DIFFICULT AGENT**
- **BRIDGING TECHNOLOGIES: the lignite question, decarbonization**
- **BRIDGING NETWORKS: supporting natural gas with H<sub>2</sub>, or *vice versa***
- **HOW TO PROGRESS?**

# Hydrogen is a nice but difficult agent

## NICE because H2 offers

- Decarbonization potential as it emits only water when converted to energy
- Decentralized energy strategy possibilities for multiple uses (islands)
- Circular economy potential

## DIFFICULT because H2 needs

- To be generated using various resources and technologies without greenhouse gas emissions
- To be handled with care because of the explosion and fire risks due to its physical and chemical properties
- To be transported and stored under extreme conditions of pressure and temperature

# Lignite question & Decarbonization

## Decarbonisation Policies in SE Europe

**Joint ROEC/IENE Event in Bucharest**

EC Representation in Bucharest

*March 13, 2024*

A Presentation by **Mr. Costis Stambolis**  
Chairman and Executive Director, IENE

# Lignite question



## The Realities of the Energy Scene in SE Europe

- The differentiation of the regional energy mix, which in spite of the consistent rise of RES and gas penetration, remains bound to high solid fuel consumption and sizeable oil and gas imports. The large amounts of indigenous coal and lignite deposits provide relatively cheap and easily accessible energy supplies for most countries of the region.
- There is resistance at local level to EC's determined move away from fossil fuels.
- We notice a major policy challenge, which governments and the EC will have to address. There is a huge incompatibility between stated and adopted EU goals for decarbonisation.
- Although several countries in the region appear determined to exhaust their coal/lignite deposits, they are in parallel developing renewables and other carbon free resources such as nuclear power.
- Given the financial and legal constraints in most countries, the rise of RES, especially for electricity generation, over the last five years appears impressive.
- Because of the intermittent nature of power generation from RES and undeveloped large-scale energy storage, their contribution to electricity production of the different countries appears limited.
- Given the strong market dynamics of the RES sector, the introduction of viable large-scale storage schemes in the mid-term and hydrogen in the long-term are distinct options in the years ahead.

# How to decarbonize in SE Europe



## Key Regional Energy Issues – Decarbonisation in SE Europe

Challenges and Trends Towards SE Europe's Decarbonisation:

- The **coal predicament** of SE Europe – the region's great dependence on coal-fired power generation vs GHG emission reduction targets
  - According to IENE estimates, the **share of solid fuels to power generation** is anticipated to **increase steadily** in several countries of the region (most notably in Serbia, Kosovo, Croatia, Bosnia and Herzegovina, Montenegro and Turkey) over the next 10-15 years, as they will struggle to meet increased demand.
  - **North Macedonia and Serbia are the second most coal dependent countries after Kosovo at regional level**, while proposed lignite-based/coal-fired power plants in Bosnia and Herzegovina and Serbia would not **be in line with EU climate targets**, and would downgrade the solar PV, wind, hydropower, and biomass opportunities in the region.
  - **Effective climate change policies in SE Europe have not been implemented so far**, but there is still room for change in order to avoid becoming further “locked in” to the use of fossil fuels.
  - In **SE Europe, economic development**, largely based on the **utilization of indigenous lignite/coal resources**, **will have to be reconciled with COP 28 commitments**. Therefore, the planning of clean-cut and compatible long-term energy and economic strategies becomes a real challenge.
    - A lot more analytical and assessment work (e.g. **examine CCS/CCU options**) needs to be undertaken before introducing realistic policies for decarbonisation.

# Decarbonizing by technology



## Decarbonisation and Related Technologies

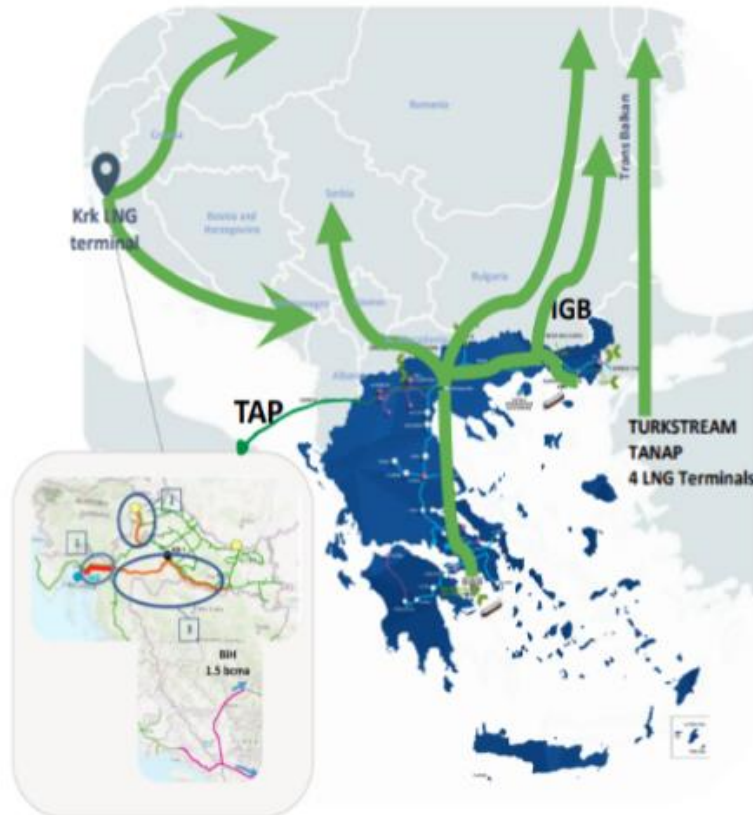
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- **Decarbonisation** in the region can be pursued in two parallel streams:
  - through **policy**, which incorporates the aforementioned energy mix issue and economic assessment through which the rate of decarbonization is determined.
    - The main question arising therefore is **how the rate of decarbonization can be related to economic development and what the investment implications are** and
  - through **technology**, whose degree of deployment depends on the policies to be implemented and could contribute significantly towards decarbonisation through, for instance, the use of **CCS/CCU** or **dual-fuel** power plants.
- There is no agreed regional roadmap towards decarbonisation, while cooperation between the countries in the region focus on energy security.
- There is an urgent need to introduce latest technologies in order to improve decarbonisation efforts, energy efficiency and upgrade operation of existing networks (e.g. CCUS, solar thermal systems, power electronics, energy storage)

# Hydrogen comes in



Greece Has Emerged as an Important Source of LNG For Europe But is Facing Stiff Competition in the Potential Supply Routes For Gas in SE Europe



## CROATIA

- ✓ Closer to the main lines that bring gas to Central Europe & Ukraine
- ✓ Has a newly built FSRU - Krk LNG
- ✓ The Croatian government is financially supporting the de-bottlenecking of the national network to accommodate transit flows
- Challenges related to expansion of transit capacity

## Greece

- ✓ Very well placed, with one large LNG import Terminal
- ✓ One FSRU under construction and a 2<sup>nd</sup> in planning phase
- ✓ Two connections to Bulgaria which grant access to Trans Balkan pipeline
- Congested national gas network & large investments needed for the upgrade for LNG Transit
- No "free money" any longer for natural gas but only for H<sub>2</sub>

## Turkey

- ✓ Most diversified gas supply portfolio in the region & Important transit country, largest connection to the Transbalkan pipeline
- ✓ 4 LNG Terminals in operation and a 5<sup>th</sup> in planning phase
- ✓ Large consumer with modern Energy Exchange in operation
- ✓ EU is hoping for gas from Turkey;
- Large domestic needs, especially in the European part of the country
- National grid needs reinforcement for exports to EU
- Non EU member with protectionism for national champions – no TPA
- Ambiguous relations with Russia on gas issues



# How to harmonize the lignite question with decarbonization

- Decarbonization does not only concern the power sector
- Renewables can handle the power sector problem
- The problem is what to do with hard to decarbonize sectors: the process industry, civil aviation, SAF, e-fuels, fertilizer's...
- They all need synthetic gas ( $H_2+CO$ ),  $H_2$  and  $CO_2$
- Lignite gasification could be the bridging technology

# Gasification of Turkish lignites (but also SE Europe lignites) to synthetic gas and to hydrogen with water gas shift and carbon capture



Shall we forget them  
or  
valorize them



The only option to valorize the Turkish (and SE EU) lignites in a «bankable» way is to gasify them with carbon capture

in order to move from a badly burning fuel to new products with higher values for various markets/uses



# We know how to do that: circulating fluidized bed gasification with carbon capture technology (OPTIMASH project)

## OPTIMASH

Optimizing gasification of high-ash content coals for electricity generation

Funded under: EU FP7-ENERGY

Coordinated by I. Gökalp

2011-2016

# Supporting natural gas with H<sub>2</sub>, or *vice versa*

What are the possible cohabitation approaches between natural gas and H<sub>2</sub>?

- **SAF approach: producing synthetic natural gas (CO<sub>2</sub>+H<sub>2</sub> to CH<sub>4</sub>)**  
keep all infrastructure unchanged
- ***tabula rasa* approach: pure H<sub>2</sub>**  
develop dedicated infrastructures for the H<sub>2</sub> logistics and energy conversion
- **cohabitation by blending: for the logistics and conversion**  
the gas quality question: who will blend, at which rate?

# Natural Gas Infrastructure in Greece, 2023



# Natural Gas Infrastructure in Türkiye, 2021



**Bridging networks:**  
to valorize the Black Sea and Trakya natural gas and wind electricity  
to produce H2 and to export natural gas + H2 blends to SE Europe



# How to progress1

- **Establish a SE Europe Lignite Gasification Task Force (taking inspiration from the Indian National Coal Gasification Mission)**

## National Coal Gasification Mission

adani

### 100 MT Coal Gasification Target by 2030

- Indian government aims for 100 million ton (MT) coal gasification by 2030, with investments worth over Rs. 4 trillion.
- In order to encourage the use of clean sources of fuel, the government has provided a concession of 20% on revenue share under commercial coal block auctions.
- A Steering Committee has been constituted regarding Surface Coal Gasification under the chairmanship of Dr. V.K. Saraswat and members from the Ministry of Coal.
- CIL has also planned to set up at least 3 gasification plants (besides Dankuni) on BOO basis through global tendering and has signed an MoU with GAIL for marketing synthetic natural gas.



# How to progress2

Establish a SE Europe **Hydrogen in Natural Gas Task Force** to

- Propose a **road map for hydrogen production targets in Trakya Türkiye**
- Settle the gas quality question, especially the **H2 blending rate question**
- Develop jointly the **necessary technologies to use the new gas**

**Thank you for listening**