

ENERGY SYSTEM
INTEGRATION & SECTOR
COUPLING: AN ENERGY
SECURITY APPROACH



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Economics Webinar Series**

May 05, 2021.



PRESENTATION SCOPE

- ✓ Relevance of **securitization**, along with its **diversification & path-dependency** narratives, for a progressively **decentralized** energy system [: **electrification + in-sourced green gases.**]
- ✓ Relevance of this energy system context for the **rule-based market approach** of the **EU's external energy policy.**



PRESENTATION OUTLINE

Literature Review: SoS in the CH4 system + SoS in the hybrid energy system.

Question No. 1: What drives argumentation about the shift from securitization to decarbonization?

Question No. 2: Do energy system integration & sector coupling leave SoS out of the picture?

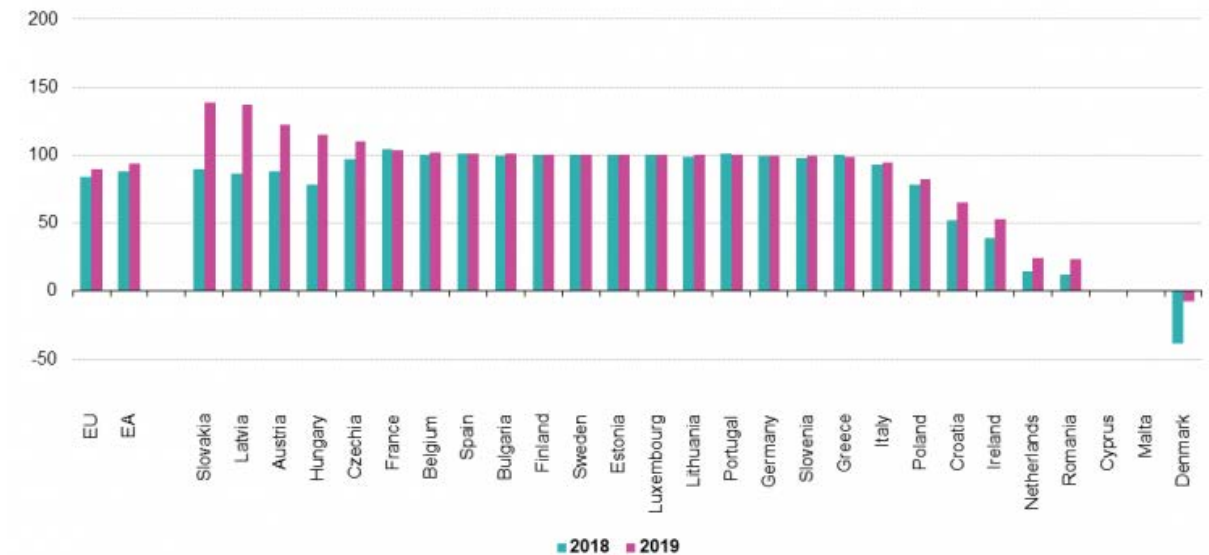
Question No. 3: How will the EU's external energy policy shape up in a system comprising electrons + clean/multicolored molecules?



LITERATURE REVIEW – SoS IN THE CH4 SYSTEM

- **Lisbon Treaty:** Link between **SoS**, **competitiveness & sustainability**.
- **Reg (EU) 2017/1938 (security of gas supply regulation):** Supply **diversification** as a tool against supply disruptions.
- **Renou-Maissant (2012):** Significant **gas market integration**, particularly in Western Europe, following the three gas directives.
- **Eurostat (2020):** Scant domestic production & **89.5% EU gas dependency** in 2019.

Natural gas import dependency, by country, 2018-2019 (%)



Source: Eurostat (online data code: nrg_cb_gasm)

eurostat

Natural gas import dependency, by country, 2018-2019 (%)

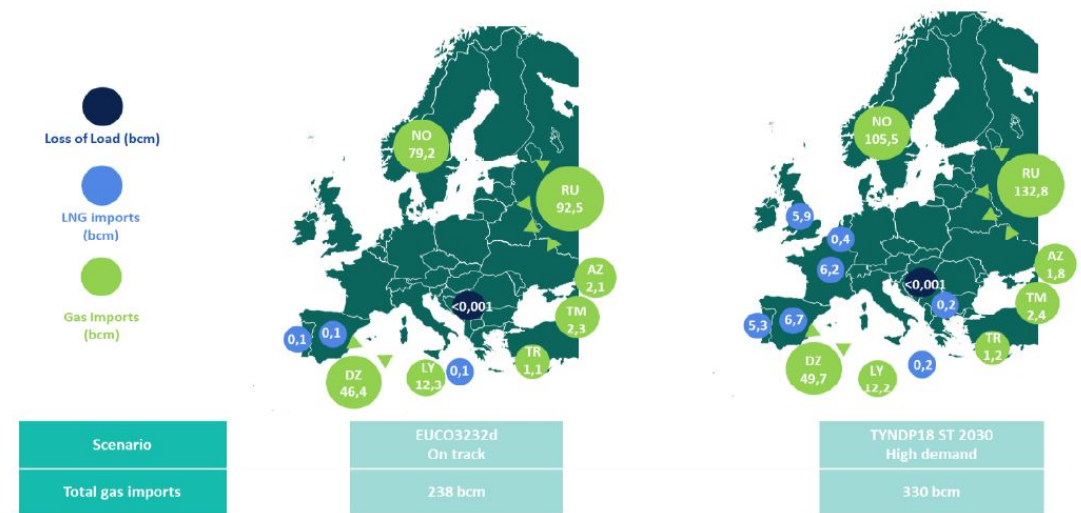
Source: [Eurostat](https://ec.europa.eu/eurostat)



LITERATURE REVIEW – SoS IN THE CH₄ SYSTEM

- **IEA (2019):** 75% of gas consumed within a **competitive & liquid EU market**, flexible for **cross-border supply redirection** thanks to **bi-directional capacity**.
- **ENTSOG (2020) & Artelys (2020):** Resilience of the EU's CH₄ system vs various **supply disruption and demand scenarios** up to 2030.
- **Seliverstov (2009):** **Security of Supply** in the EU vs **Security of Demand** in third-country suppliers + **vertical integration** vs **competitive market model**.

→ Issue of **path-dependency** (Wirl & Yegorov 2008) regarding EU reliance on fossil fuel flows from third countries.

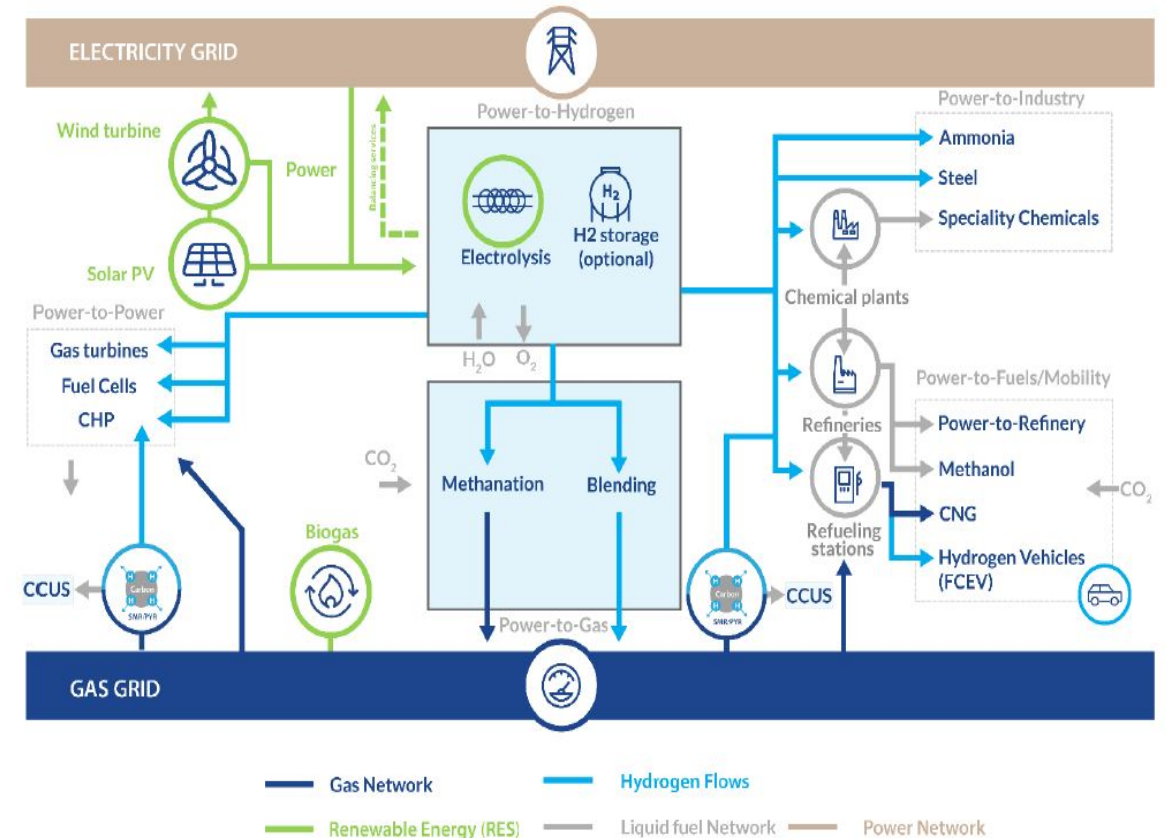


Sufficiency of the EU's existing gas infrastructure to meet gas demand in both an on-track and high-demand scenario in 2030, under normal market conditions. Source: [Artelys](#)



LITERATURE REVIEW – SoS IN THE HYBRID ENERGY SYSTEM

- **EC H2 Strategy:** Role of **infrastructure** (cyclical or seasonal storage, e.g. salt caverns) as enabler of **SoS**, **flexible operation of electrolyzers & cross-border trade** in an open, competitive and liquid market.
- **ACER Bridge Beyond 2025:** SoS benefits from a **technology-neutral, level-playing field** between different conversion & storage facilities.
- **ENTSOG 2050 Roadmap:** SoS + resilience from **infrastructure synergies & efficiencies** between electricity & gas – **regulatory sandboxes** to kick-start innovation.
- **Liakopoulou (2021): GOOs + CBAM** as “**security valves** safeguarding **sustainability** of imports of green gases from third countries.



Hybrid Energy System building on increasingly decarbonized electricity & gas.
Source: [ENTSOG, 32nd Madrid Forum](#)



Q1: WHAT DRIVES ARGUMENTATION ABOUT THE TRANSITION FROM SECURITIZATION TO DECARBONIZATION?

- **Energy system decentralization** due to the **localized/sectoral** feature of biogas/biomethane & H2 technologies (see **localized/small-scale** production of biogas/biomethane & **industrial H2 clusters**).
- **Limited access** of many countries to **reservoirs & places to store CO2** regarding H2 deployment with **CCS**.
- The range of **pending regulatory and national governance issues**.
- The **uncertainty** over the **decline in unabated gas demand** & **uncertainty** over the **future market shares** of the different green gases.
- The **intra-EU pluralism of views** about the **optimum speed of the energy transition** combined with the **uneven gas market integration** in geographical zones like **SEE & CEE** (less developed & resilient transmission system than in Western Europe + coal-gas substitution at least by 2030).



Q2: DO ENERGY SYSTEM INTEGRATION & SECTOR COUPLING LEAVE SoS OUT OF THE PICTURE?

NO!

- Calling on the EC to elaborate and operationalize its **H2 Strategy**, the Council sees an **opportunity** to enhance the **EU's energy security** by lessening import dependency and by diversifying import options.
- This ties in with Hydrogen Europe's **2X40GW initiative** (also identified in the **H2 Strategy** under the “**Eastern & Southern Neighborhood**” umbrella.)
- **Diverse H2 import-corridors** from third countries **abundant in RES**, such as offshore wind in the North and solar PV in the South, facilitate **energy system integration**.
- **A single EU market in green gases**, supported by **cross-border trade & scaled-up imports**, would reduce **interstate price spreads**, considering **varying costs of production of green gases & RES development**.



Brussels, 11 December 2020
(OR. en)

13976/20

ENER 492
RECH 517
IND 266
CLIMA 348

OUTCOME OF PROCEEDINGS

From:	General Secretariat of the Council
On:	11 December 2020
To:	Delegations
No. prev. doc.:	13714/20 +COR1
Subject:	Council Conclusions "Towards a hydrogen market for Europe"

Delegations will find in the Annex the Council Conclusions "Towards a hydrogen market for Europe", approved by written procedure by the Council of the European Union on 11 December 2020.



Q2: DO ENERGY SYSTEM INTEGRATION & SECTOR COUPLING LEAVE SoS OUT OF THE PICTURE?

THREE CATEGORIES OF EXTERNAL SUPPLIERS TO THE EU

CATEGORY 1

Key quantitatively & strategically gas suppliers to Europe.

→ Regional concentration of pipeline trade in green gases via retrofitted CH₄ infra.



CATEGORY 2

Traditional oil & gas transit states to the EU.

→ From transit states to exporters of biomethane and/or H₂ (see European H₂ Backbone).



CATEGORY 3

Newly emergent suppliers.

→ North Africa, incl., but not limited to Algeria, for green H₂ & Mediterranean H₂ hubs (e.g. Morocco) + shipping partners (e.g. Australia).





Q3: HOW WILL THE EU'S EXTERNAL ENERGY POLICY SHAPE UP IN AN ELECTRONS/CLEAN MOLECULES SYSTEM?

➤ SCENARIO 1

- If the EU assumes **technological leadership** in the production of renewable energy & green gases, it becomes **largely self-sufficient & less prone to supply disruptions**.
- **Geopolitical competition** will focus on **production**, rather than **access** to energy (e.g. with China over electrolyzer manufacturing, or the US over innovation and affordability of green H2 production).
- **Path-dependencies** may solely concern **imports of vital minerals and metals** required for battery manufacturing.



Q3: HOW WILL THE EU'S EXTERNAL ENERGY POLICY SHAPE UP IN AN ELECTRONICS/CLEAN MOLECULES SYSTEM?

➤ SCENARIO 2

- Insofar as **third-country imports of biogas/biomethane & H2** remain on the table, the "**security of supply**" vs "**security of demand**" conundrum persists.
- For this reason, the **post-Lisbon guiding principles** improving the **security of the EU's external energy supplies** are of value:
 - ✓ Import **diversification** by product and country;
 - ✓ Promotion of **transparency & enhanced governance** in the energy sector through **partnerships with third countries** to create **predictability** for **bi- & multi-lateral investment and trade**.



Q3: HOW WILL THE EU'S EXTERNAL ENERGY POLICY SHAPE UP IN AN ELECTRONICS/CLEAN MOLECULES SYSTEM?

- Thus, the EU will likely keep on acting according to its **rule-based market approach** (Council 2011) → extension of the **energy acquis** to third-country energy partners.
- This approach encapsulates the EU's profile in the international relations system as **market power**, trying to shape the energy regulatory space beyond its borders, & **normative power**, interrelating energy diplomacy with normative aims, incl. the fight against climate change.
- The EU can be a **norm- and standard-setter on ESI**, for instance, through the proposed **benchmark for euro-denominated transactions in H2**, which would consolidate the **role of the euro in sustainable energy trade**.



COUNCIL OF
THE EUROPEAN UNION



Council conclusions on strengthening the external dimension of the EU energy policy

*3127th TRANSPORT, TELECOMMUNICATIONS and ENERGY Council meeting
(Energy items)*

Brussels, 24 November 2011



Q3: HOW WILL THE EU'S EXTERNAL ENERGY POLICY SHAPE UP IN AN ELECTRONS/CLEAN MOLECULES SYSTEM?

- Preliminarily, given the ongoing technological development of green gases and the sketchy mapping of coalitions the EU can presently form with external suppliers, of value would be **soft law instruments** (e.g. MoUs) & **hybrid governance formats**, involving the Energy Commissioner, the High-Representative flanked by the Council Presidency (e.g. EU-US Energy Council).
- In the medium-to-long term formal procedure of **Article 218 TFEU** could be followed, in which case the **European Parliament** would also be involved and the **ethical dimension of the EU's external action** would be considered.
- Given M-S' **Treaty-based freedom of choice on their energy supply**, incl. extra-EU imports & associated infra, applicability on dedicated or repurposed infrastructure for green gases of **Decision (EU) 2017/684**, enabling the **EC** to assess the impact of M-S' IGAs with third countries on the internal energy market and the Union's supply security?

THANK YOU



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