TYNDP 2024

The Hydrogen and Natural Gas TYNDP

Hydrogen Infrastructure Gaps Identification report

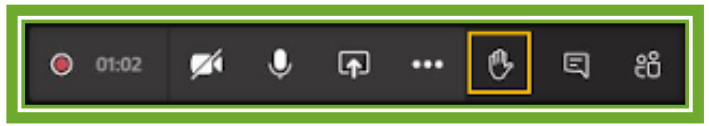
15 January 2025

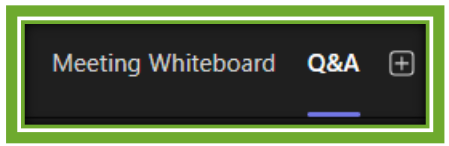
ENTSOG - System Development team
Simona Marcu, TYNDP project manager

Brussels

Hybrid event house rules & agenda

For **questions**, please **ask by raising a (virtual) hand** or write it in the Ms. Teams **Q&A section**.





The **recording** of this session as well as the **slides** will be made available.

Microphones are muted by default. Please unmute to intervene.

Thank you!

Agenda

Topic	Presenter	Time
Introduction	Simona Marcu TYNDP PM	10:05
TYNDP timeline update		10:10
PCI/PMI process update	Irina Minciuna Reis European Commission	10:25
H2IGI report	Maria Castro Subject Manager Investment Thilo von der Grün Director System Development	10:40
Coffee break		11:10
H2IGI report - continuation	Maria Castro Subject Manager Investment Thilo von der Grün Director System Development	11:30
Infrastructure report	Rafail Tsalikoglou Investment Adviser	12:15
Lunch		13:00

Each session includes Q&A → please use the **Ms. Teams Q&A section**

TYNDP acronyms


Picture courtesy of Gaz System

AGSI – Aggregated Gas Storage Inventory
ATR – Autothermal Reforming
CBAM – Cost-Benefit Analysis Methodology
CD – Curtailed Demand
CDF –2 Week Cold Dunkelflaute
CODH – Cost of Disrupted Hydrogen
DC – Disruption Case
DGM – Dual Gas Model (H_2-NG)
DHEM – Dual Hydrogen Electricity Model
GLE – Gas LNG Europe
GSE – Gas Storage Europe
HDC – Hydrogen Disruption Case
IG – Implementation Guidelines
IGI – Infrastructure Gaps Identification
IL – Infrastructure Level
LSO – LNG System Operator
NECP – National Energy and Climate Plan
NG – Natural Gas
PCI – Project of Common Interest
PMI – Project of Mutual Interest
PA – Project Assessment
PS-CBA – Project-Specific Cost-Benefit Analysis
SA – System Assessment
SCN – Scenario(s)
SMR – Steam Methane Reformer
SLID – Single Largest Infrastructure Disruption
SSO – Storage System Operator
TEN-E – Regulation (EU) 2022/869
TSO – Transmission System Operator
WGV – Working Gas Volume
WTP – Willingness To Pay

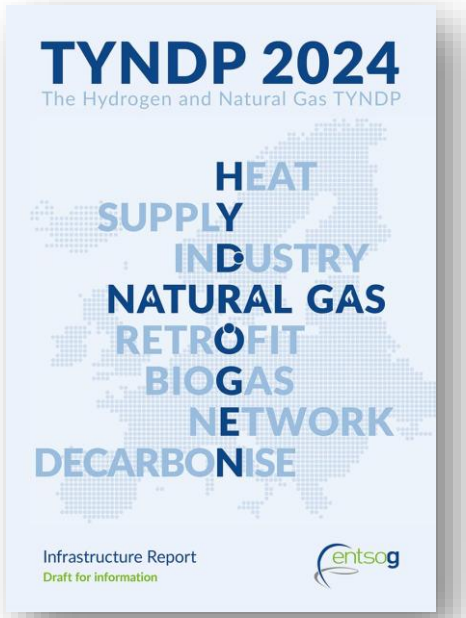

Picture courtesy of Gaz System

What is the TYNDP in practice?

The TYNDP 2024 is composed of:

- 3 main reports:

(1). Scenarios



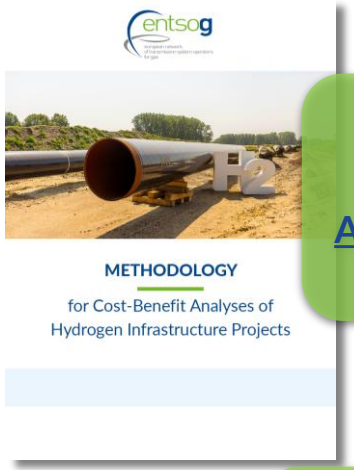
(2). Infrastructure

(3). System Assessment

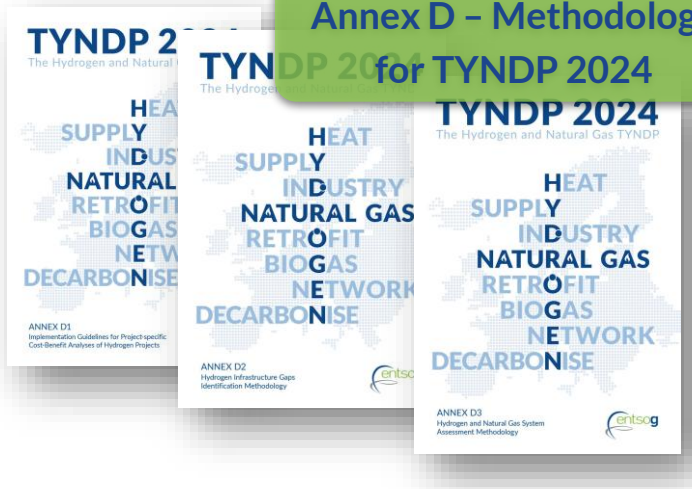
- 5 annexes:
  - **Annex A** – Project details
  - **Annex B** – Infrastructure Maps
  - **Annex C** – Topology & Capacities
  - **Annex D** – Methodologies
  - **Annex E** – Analysis tables
- Project fiches (project assessment)
- A visualization platform

The published documents can be accessed on https://tyndp2024.entsog.eu/#downloads-home

ENTSOG Draft CBA Methodology H_2



Muli-cycle methodology
Approval process ongoing

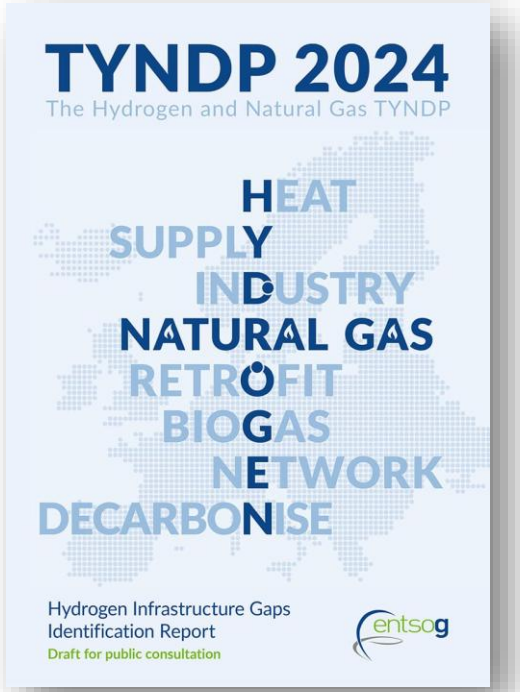


Annex D – Methodology for TYNDP 2024

Setting Guidelines and Indicators

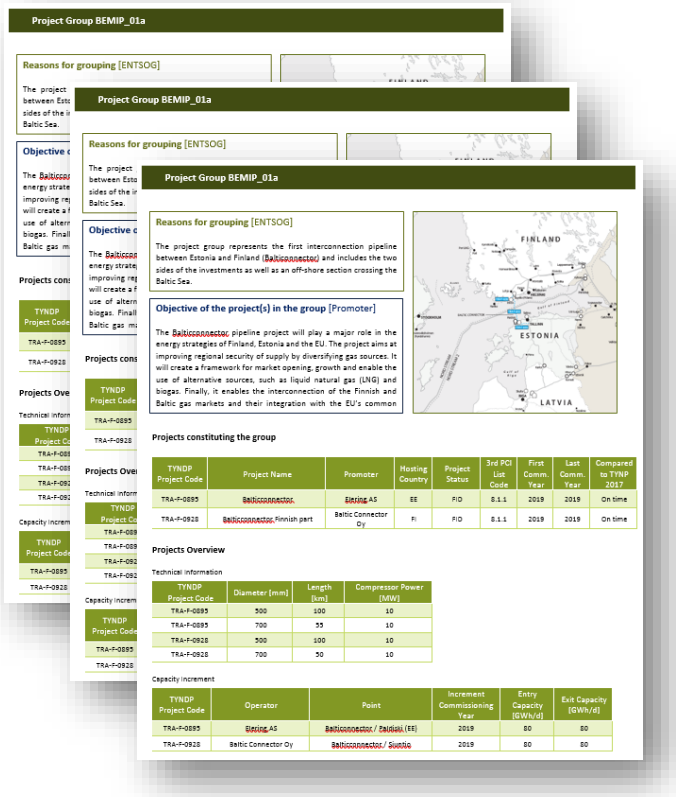
Hydrogen Infrastructure Gaps Identification report (H2IGI)

(public consultation:
18 December 2024 – 22 January 2025)



Assess Infrastructure needs

Project Assessment H_2



Assess Projects

Public consultation Questions

The only official form of stakeholder input is though the online form, that can be filled-in until **Wed, 22 January** and is available here.
It consists of 3 free-text questions:

5. What is the primary use of the H2 IGI Report for your organisation? *

Enter your answer

6. Which, if any, changes would you make to the structure of the H2 IGI Report? *

Enter your answer

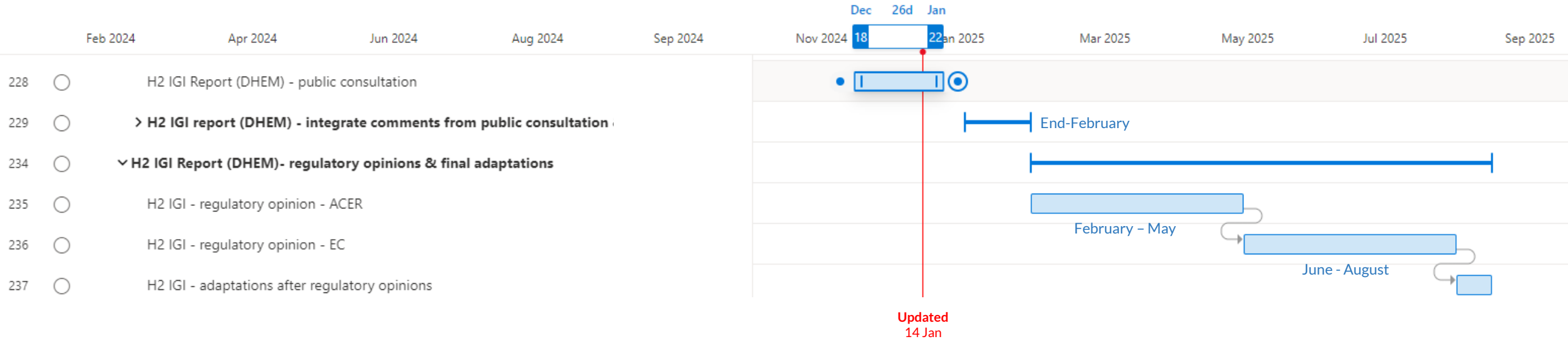
7. Do you have any remark regarding the H2 IGI Report? If yes, please specify. *

Enter your answer

The published documents can be accessed on https://tyndp2024.entsog.eu/#downloads-home

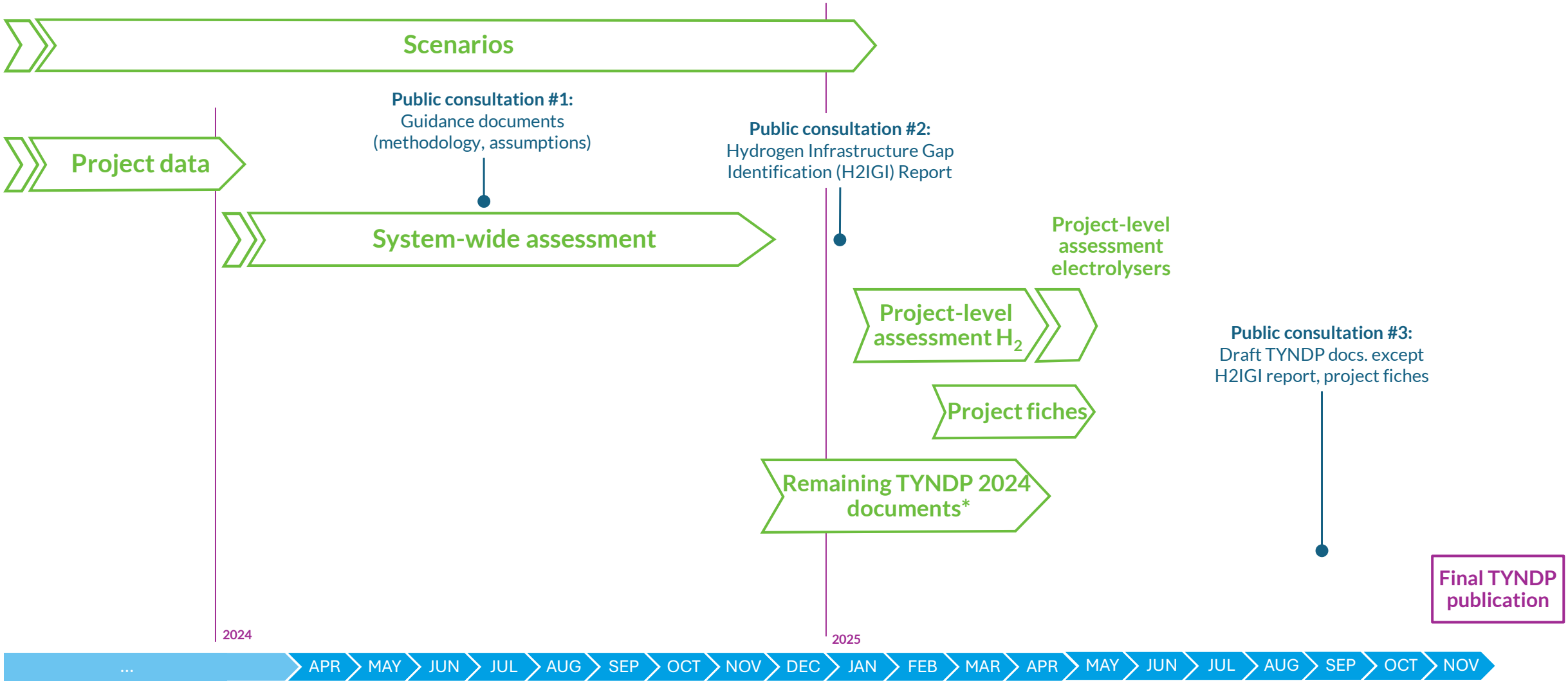
TYNDP timeline update

TYNDP 2024 H_2 IGI report timeline



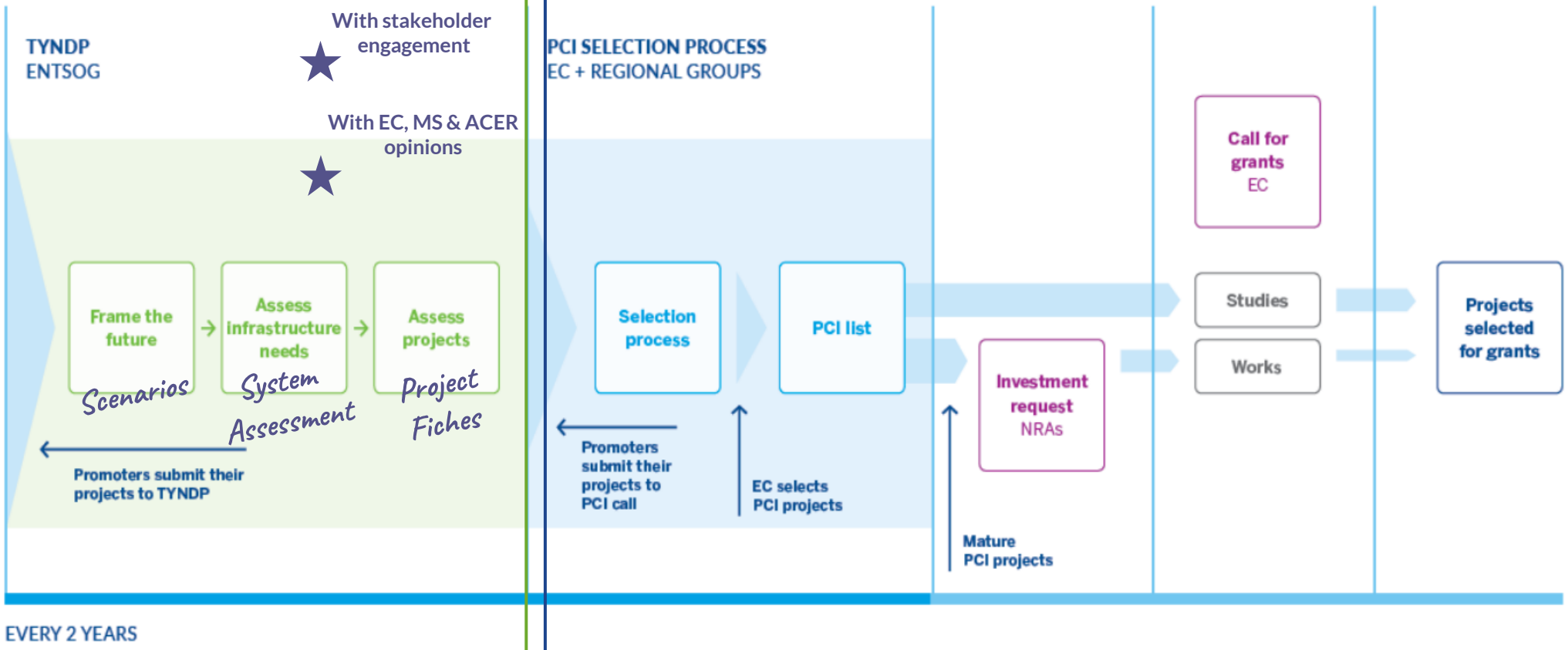
TYNDP 2024 timeline

Update January 2025



*System Assessment report, including: natural gas chapter, Supply Adequacy report, Biomethane Progress report; Gas Quality Outlook

The TYNDP process in the wider TEN-E framework



Every two years ENTSOG & ENTSO-E **plan, assess and test** the infrastructure against **possible futures**

The **EC and regional groups attribute PCI or PMI status** to a list of candidate projects, considering their **contributions to addressing the system needs** identified in the TYNDP.

PCI/PMI process update

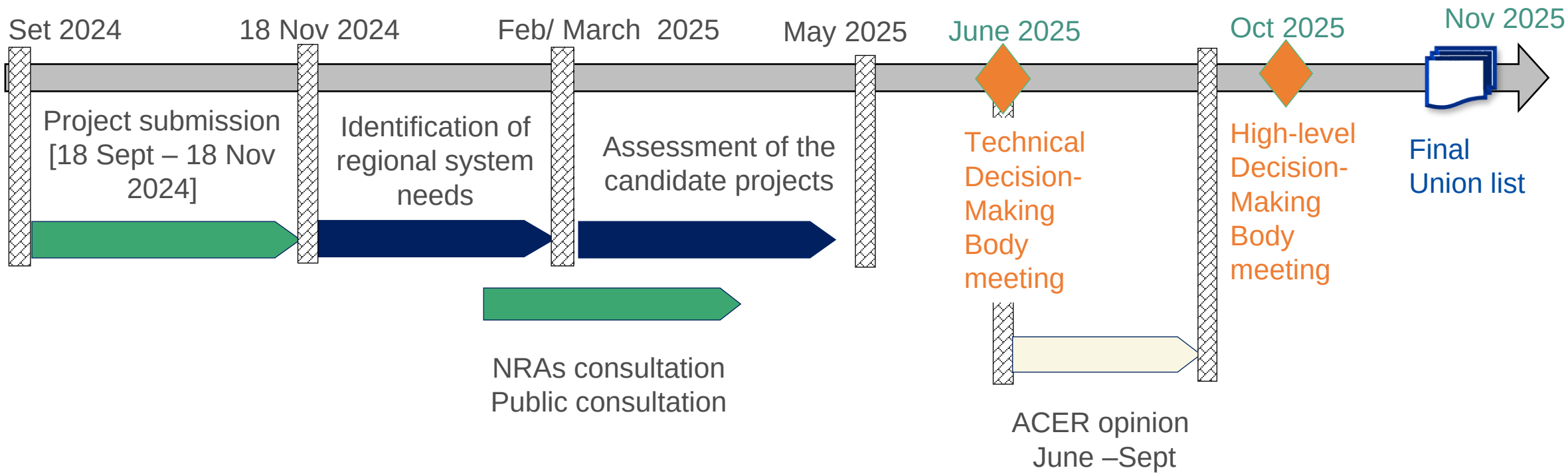
PCI/PMI process update

ENTSOG H2IGI webinar – 15 Jan 2025

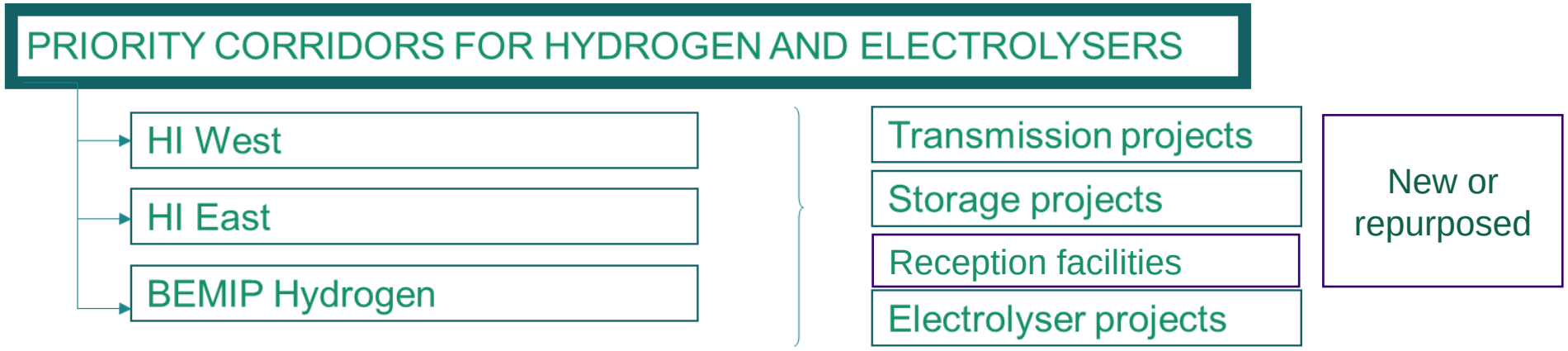
DG ENER - Irina (Minciuna) Reis

European Commission

PCI/PMI process hydrogen



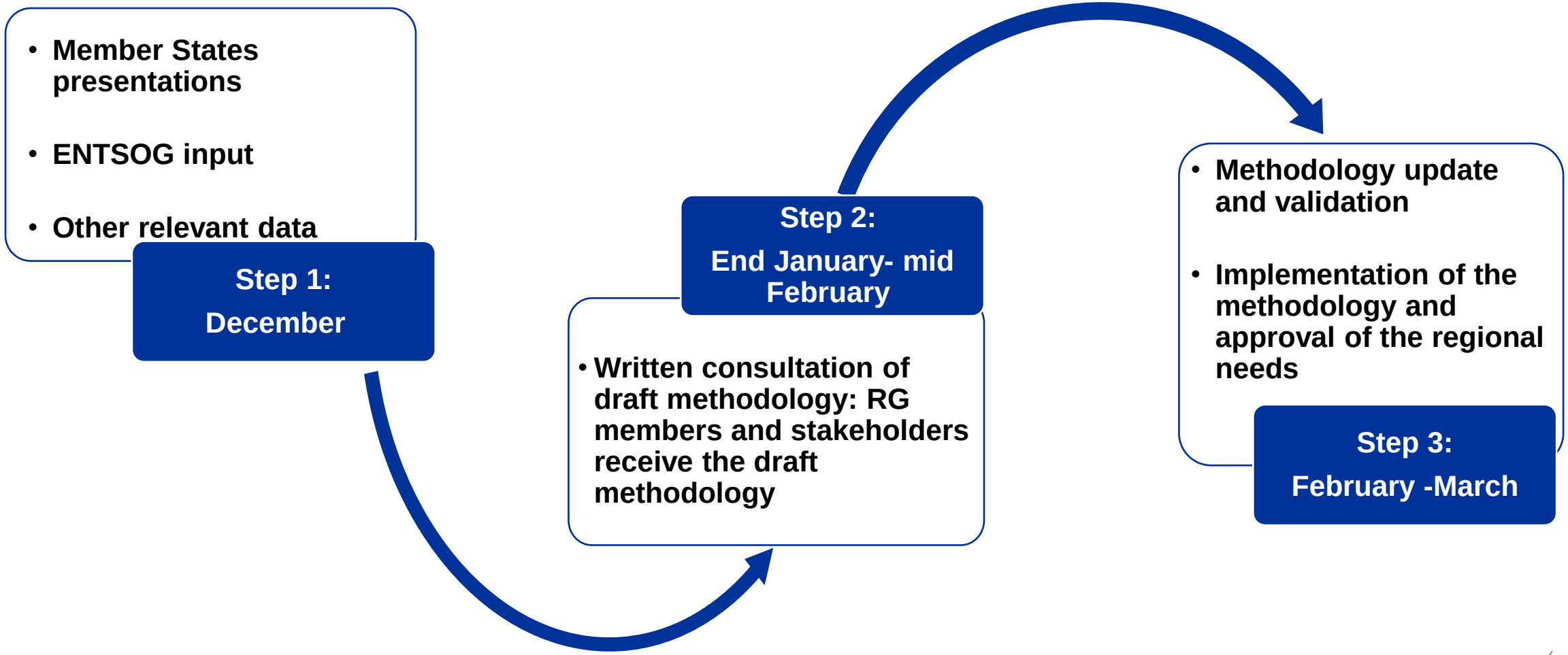
Hydrogen projects



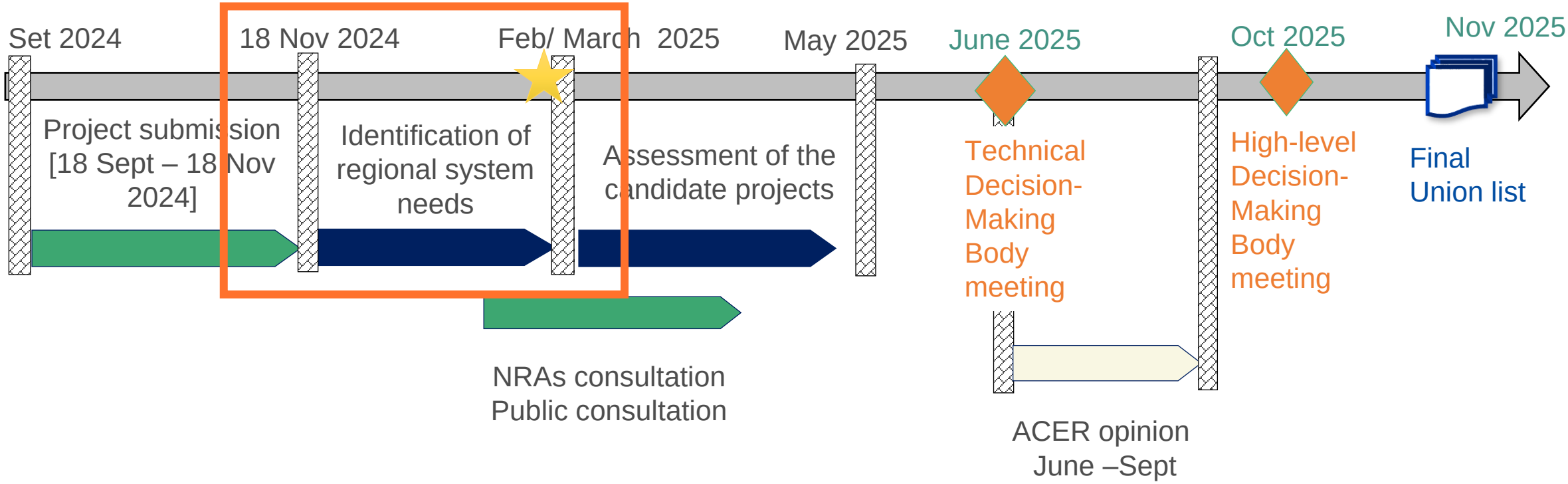
Submission window: 18 September – 18 November 2024: Call for applications: candidate energy infrastructure Projects of Common and Mutual Interest - European Commission (europa.eu)

We received 199 submissions

Process for needs identification



PCI/PMI process hydrogen



Next steps:

- End January – MSs received the draft needs methodology for 2 weeks written consultation
- End January - start of the public consultation – 3 months
- Next Regional Group meeting – second part of February/early March

H2IGI report – assumptions & modelling

Legal background

- New *Regulation on the internal markets for renewable gas, natural gas and hydrogen* and *TEN-E Regulation*: the Hydrogen TYNDP shall identify cross-border hydrogen infrastructure gaps to implement the TEN-E priority corridors for hydrogen and electrolysers on the basis of the TYNDP scenarios
- Priority corridors:

General approach of the IGI

- IGI indicators are used to identify the existence of a regional hydrogen infrastructure gap by observing the effects of such infrastructure gap:
  - IGI indicator 1 is based on hydrogen market clearing price spread
  - IGI indicator 2 is based on curtailed hydrogend demand
- For both IGI indicators, **thresholds are defined to classify if the observation is significant enough to present an infrastructure gap**
- The reason for an infrastructure gap is an infrastructure bottleneck
  - **An infrastructure bottleneck is a physical congestion of the network** that can be observed based on full utilization rates of all relevant transmission infrastructure during certain periods of time
  - An infrastructure bottleneck can in principle be solved by different projects and via different routes. Therefore, **infrastructure gaps have a regional nature**.

Added value of combining 2 IGI indicators: only IGI indicator 1 detects if cheaper sources could satisfy demand and only IGI indicator 2 helps to identify several curtailed countries « in a row ».

Scope of the IGI

Scenario

National Trends +

Models

Dual Hydrogen/Electricity Model (DHEM)

Dual Hydrogen/Natural Gas Model (DGM)

Infrastructure levels

Electricity:

NT+ scenario IL

Hydrogen:

PCI/PMI IL

Advanced IL

Natural gas:

Low IL

Time horizons

2030 → 2040

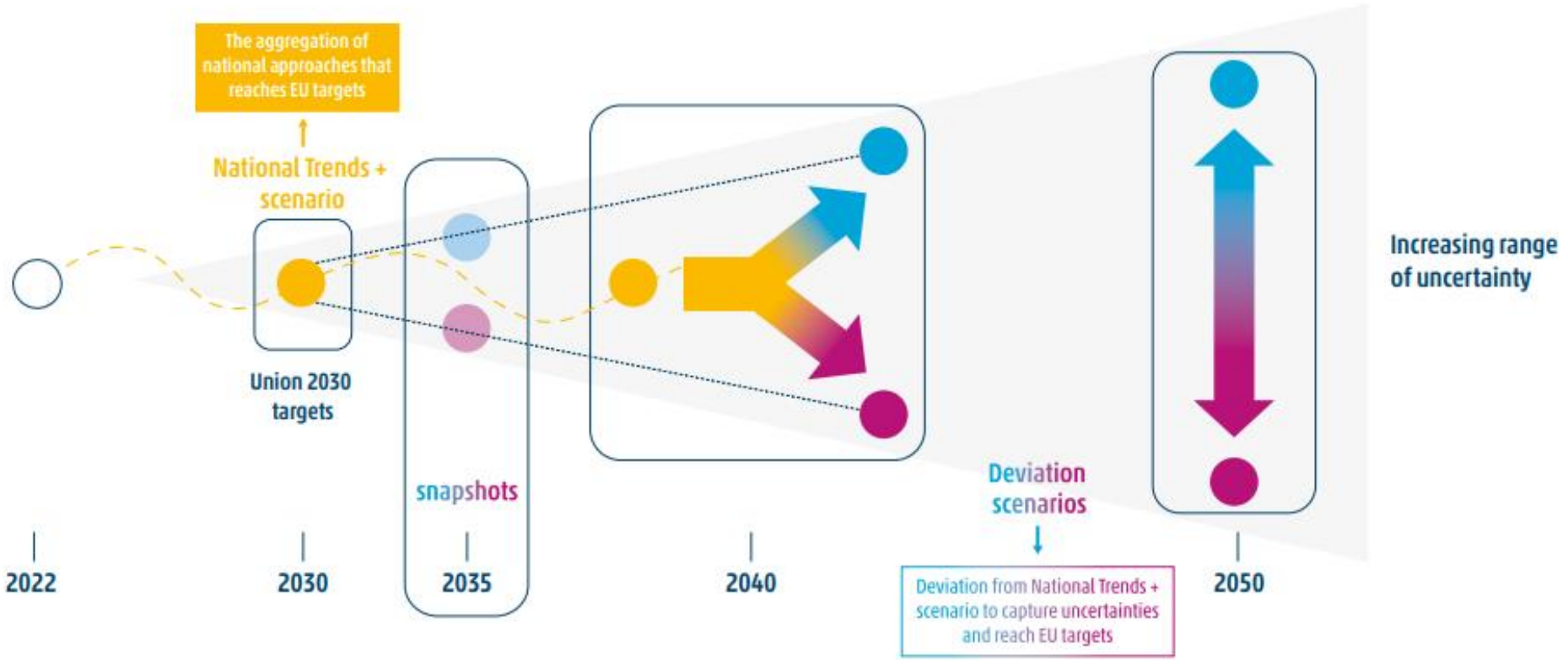
Weather years

Reference weather year (1995)

Stressful weather year (2009)

For more information: https://tyndp2024.entsog.eu/

TYNDP 2024 scenario horizon and framework



The IGI report is based on the National Trends+ (NT+) scenario.

TYNDP 2024 NT+ scenario

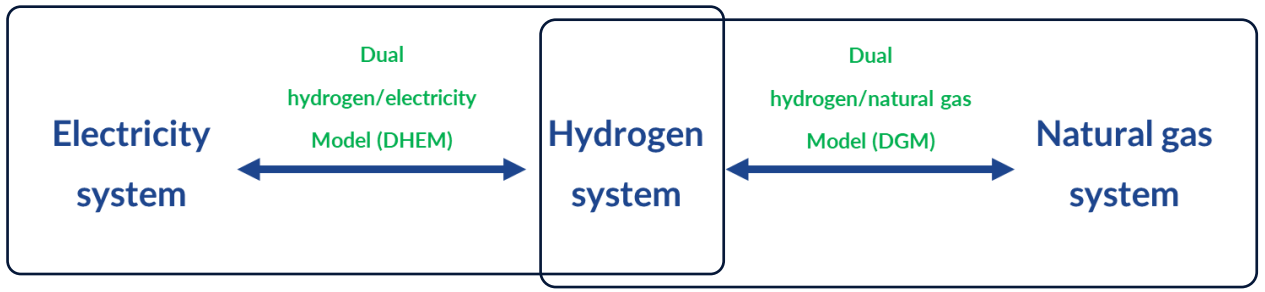
- In line with national energy and climate policies (NECPs, national long-term strategies, hydrogen strategies, etc.)
- Available for 2030 and 2040
- Dataset collection from national TSOs was finalised in 2023

Modelling in the IGI

- **Modelling of hydrogen infrastructure requires market and/or network modelling of different energy carriers such as natural gas and electricity, given the foreseen interlinkages between the energy carriers.**

How much electrolytic hydrogen can be produced?

How much gas and hydrogen is needed for power plants?



Is there sufficient natural gas available for SMR/ATR at the needed locations?

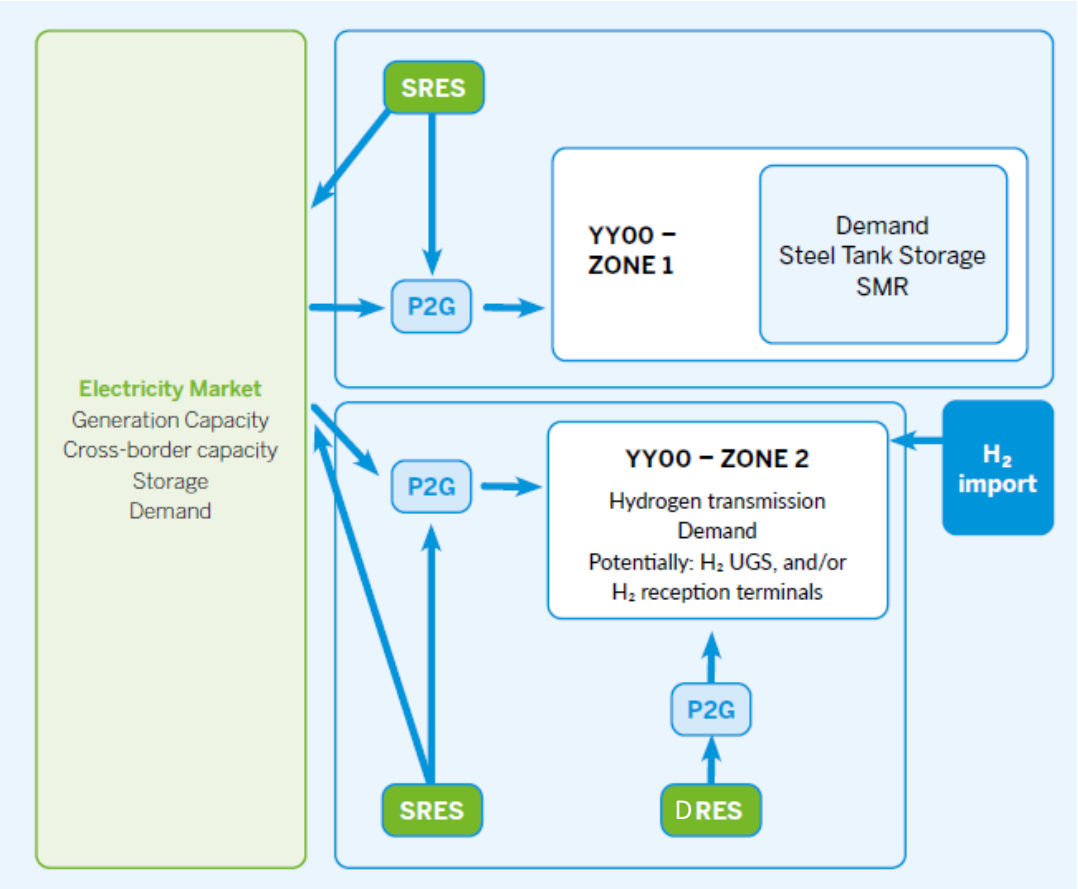
- **Simulations' objective is to minimise the overall cost of the systems**

All market assumptions considered in the DHEM are defined in the TYNDP 2024 Annex D1 (based on the NT+ scenario)

All additional information needed for the IGI is defined in the TYNDP 2024 Annex D2

The draft TYNDP 2024 IGI report is only based on the DHEM. In the meantime, additional assessments have shown that the use of the DGM will not change the relevant results provided by the DHEM.

Dual hydrogen/electricity modelling in the IGI



DRES: dedicated Renewables for electrolysers; SRES: shared Renewables with the electricity market

Electricity and Hydrogen systems and represented through interlinked topology

- **Hydrogen Zone 1**

  Hydrogen supply, demand and storage that can be linked without requiring connection to the main hydrogen transmission infrastructure

- **Hydrogen Zone 2**

  Represents the main hydrogen transmission infrastructure

Installed electrolyser and SMR capacities

Inelastic hydrogen demand

Hydrogen-based power plant capacities

All information about the electricity system

Sourced from TYNDP 2024 NT+ scenario

Difference between TYNDP 2024 NT+ scenario and IGI model caused by consideration of inputs from project promoters, i.e., **updated hydrogen import, transport, and storage infrastructure**

Dual hydrogen/electricity modelling in the IGI

Merit Order of hydrogen supply sources

- **2030**

1: Electrolysis from renewables

2: Electrolysis from nuclear

3: Imports from North Africa (only in Advanced hydrogen infrastructure level)

4: SMR with CCS

5: SMR without CCS (limited to local consumption in Zone 1)

6: Imports via terminals

- **2040**

1: Electrolysis from renewables

2: Electrolysis from nuclear

3: Imports from North Africa

4: SMR with CCS

5: Imports from Norway

6: Imports from Ukraine

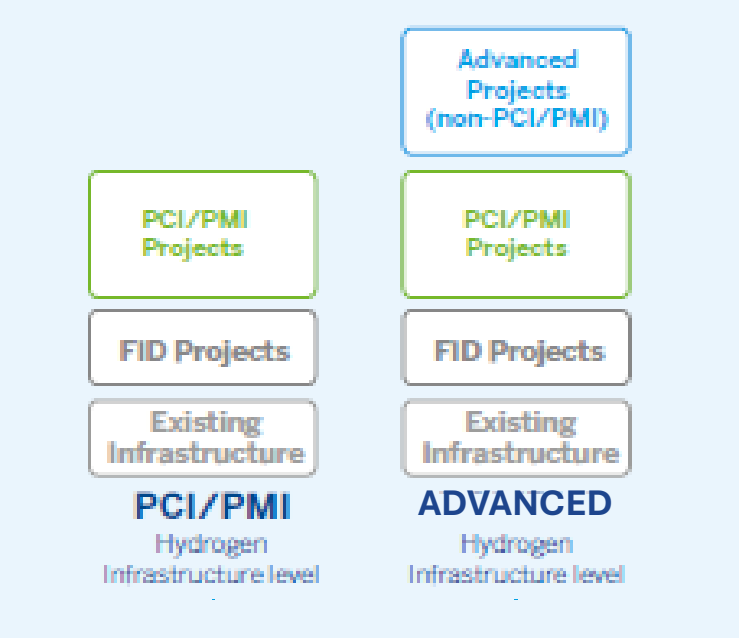
7: SMR without CCS (limited to local consumption in Zone 1)

8: Imports via terminals

Supply prices from storages depend on the availability of other supply sources

Reference infrastructure in the IGI

- **Two hydrogen infrastructure levels are assessed in the IGI report**
  - **PCI/PMI hydrogen infrastructure level: containing (existing) hydrogen infrastructure, FID(*) projects and projects part of the 6th PCI/PMI list under hydrogen infrastructure category.**
  - **ADVANCED hydrogen infrastructure level: containing PCI/PMI hydrogen infrastructure level and Advanced(**) projects.**



(*) FID status based on TYNDP 2024 project collection

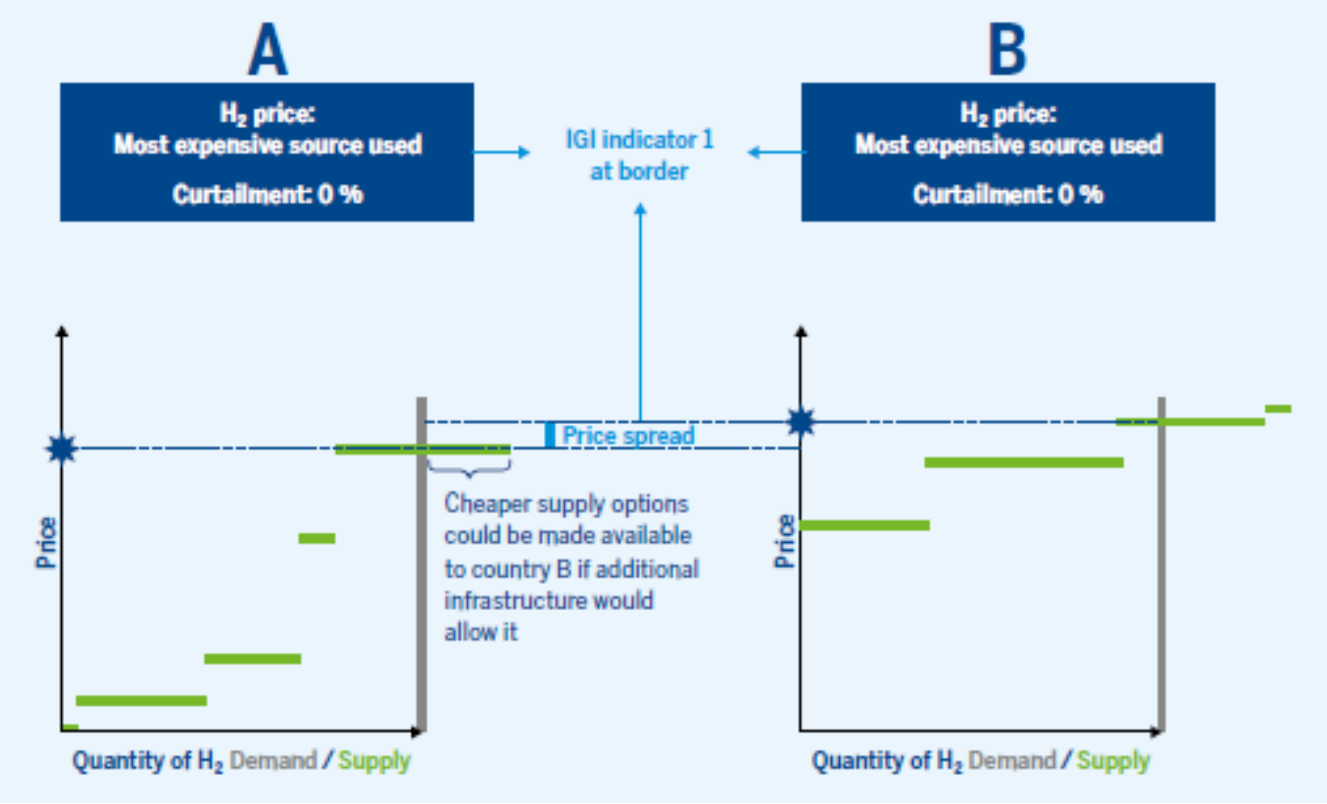
(**) Advanced status based on TYNDP 2024 project collection

The level of price conversion and demand satisfaction identified in the IGI is achieved thanks to the projects considered in the hydrogen infrastructure levels

IGI Indicator 1: Hydrogen Market clearing price spreads

- IGI indicator 1 aims at identifying hydrogen infrastructure gaps by assessing Zone 2 nodes of different countries based on differences in hydrogen market clearing prices between these nodes.

Example 1:



IGI Indicator 1: Hydrogen Market clearing price spreads

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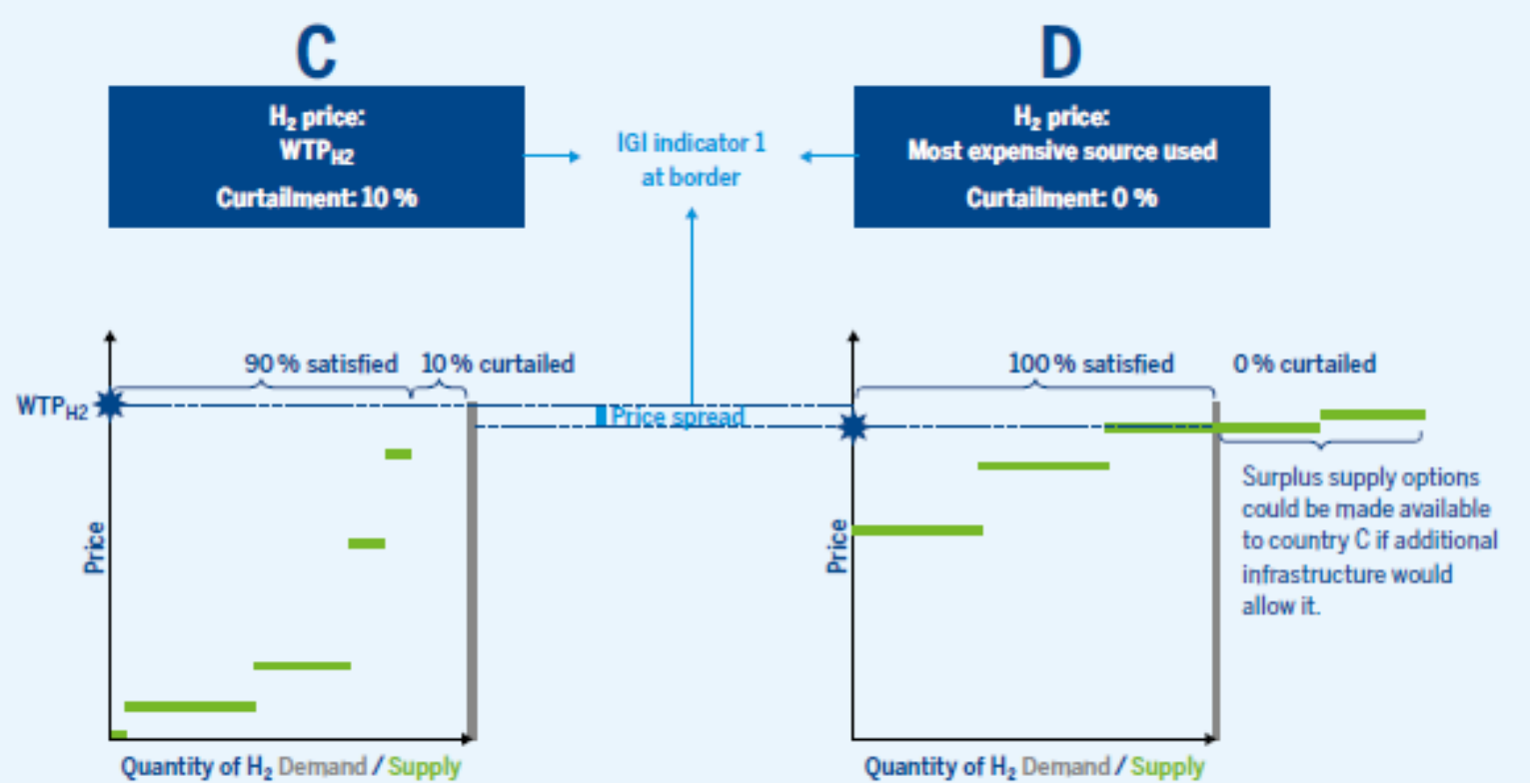
Example 2:



IGI Indicator 1: Hydrogen Market clearing price spreads

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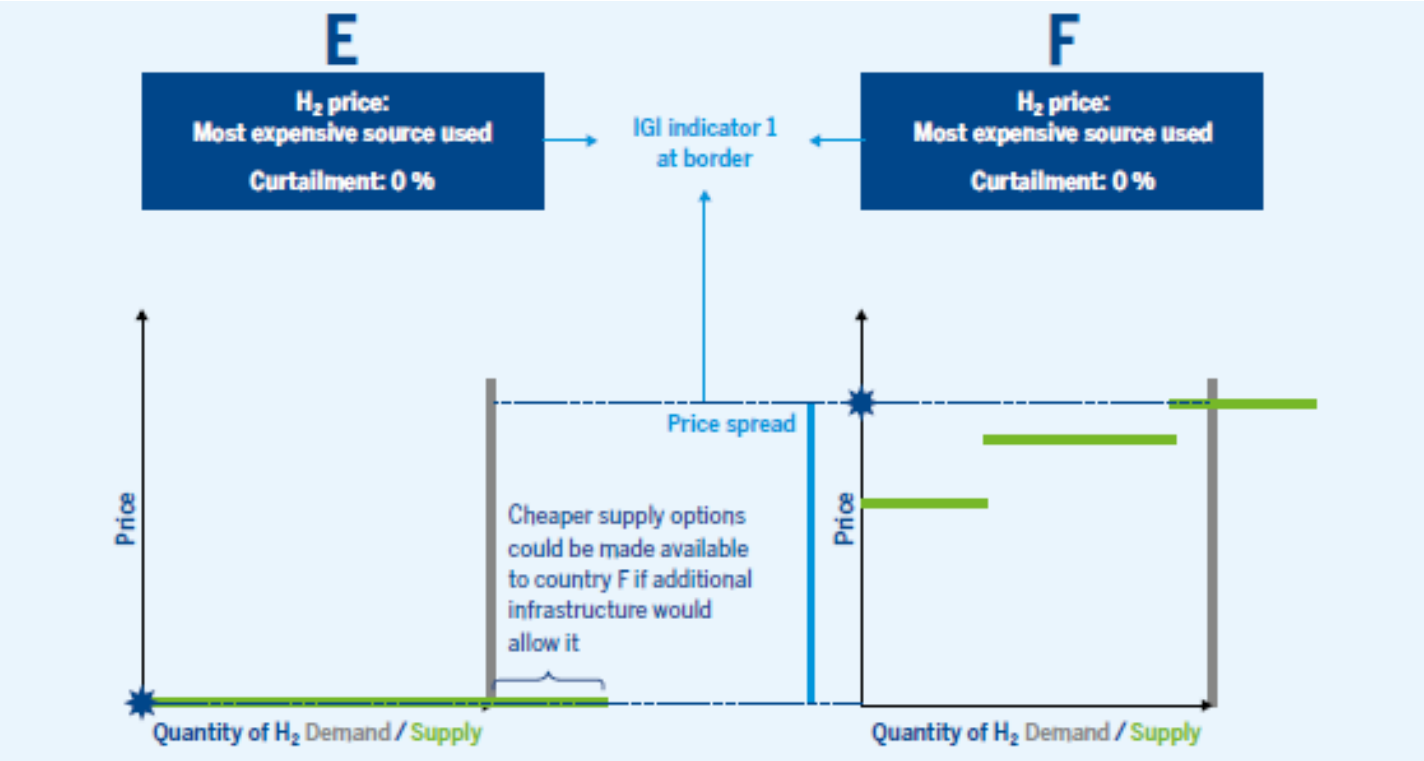
Example 3:



IGI Indicator 2: Hydrogen Demand Curtailment Rate

Indicator 2.1

- IGI indicator 2.1 aims at identifying infrastructure gaps by measuring the hydrogen demand curtailments of individual nodes during the reference weather year (1995), and without infrastructure or source disruptions.
- Threshold: A yearly average hydrogen demand curtailment rate of more than 0%.

Indicator 2.2

- IGI indicator 2.2 aims at identifying infrastructure gaps by measuring the hydrogen demand curtailments of individual nodes during the stressful weather year (2009), and without infrastructure and source disruptions.
- Threshold: A yearly average hydrogen demand curtailment rate of more than 3%.

Hydrogen Demand Curtailment can be caused by structural undersupply of Europe with hydrogen as well as missing internal infrastructure like pipelines and storages

Comparison of hydrogen infrastructure levels

Is an infrastructure gap of the PCI/PMI IL mitigated or solved in the Advanced IL?

If yes: direct effect of the additional (advanced, non-PCI/PMI) projects. Which bottleneck was addressed by which additional project?

An infrastructure gap was solved:
Additional project(s) addressing bottleneck(s) are one possible solution to solve the infrastructure gap

An infrastructure gap was only mitigated:
Additional project(s) addressing bottleneck(s) are helping but are not sufficient to fully solve the infrastructure gap

Coffee break

H2IGI report – results & analysis

H2IGI report – 2030 PCI/PMI IL

PCI-PMI infrastructure level in 2030

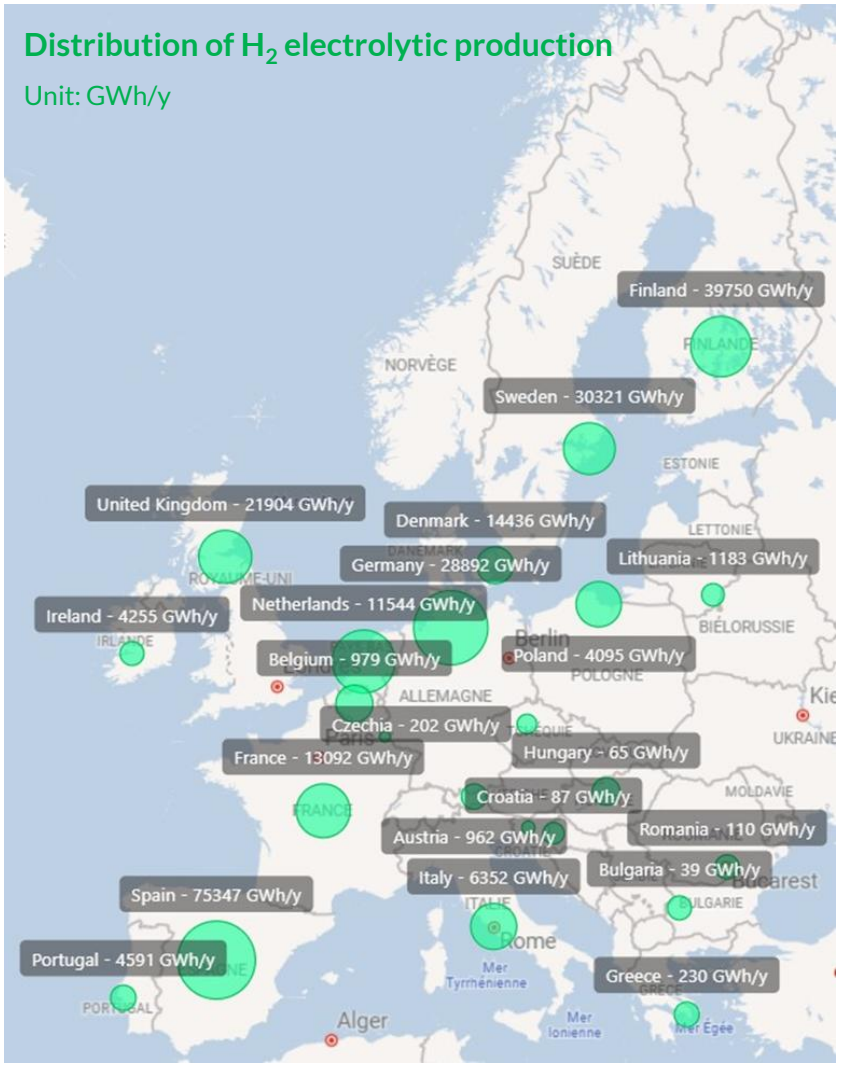
Yearly hydrogen supply-demand balance	PCI/PMI IL
H_2 produced via electrolysis	310
H_2 produced using natural gas	229
H_2 shipped imports	29
H_2 pipeline imports	0
Curtailed H_2 demand	52
H_2 demand for power production	2
Total H_2 demand	620

Unit: TWh/y

- ✓ PCI/PMI infrastructure level does not foresee pipeline imports in 2030
- ✓ In-country production and intra-EU imports are the main sources to satisfy hydrogen demand

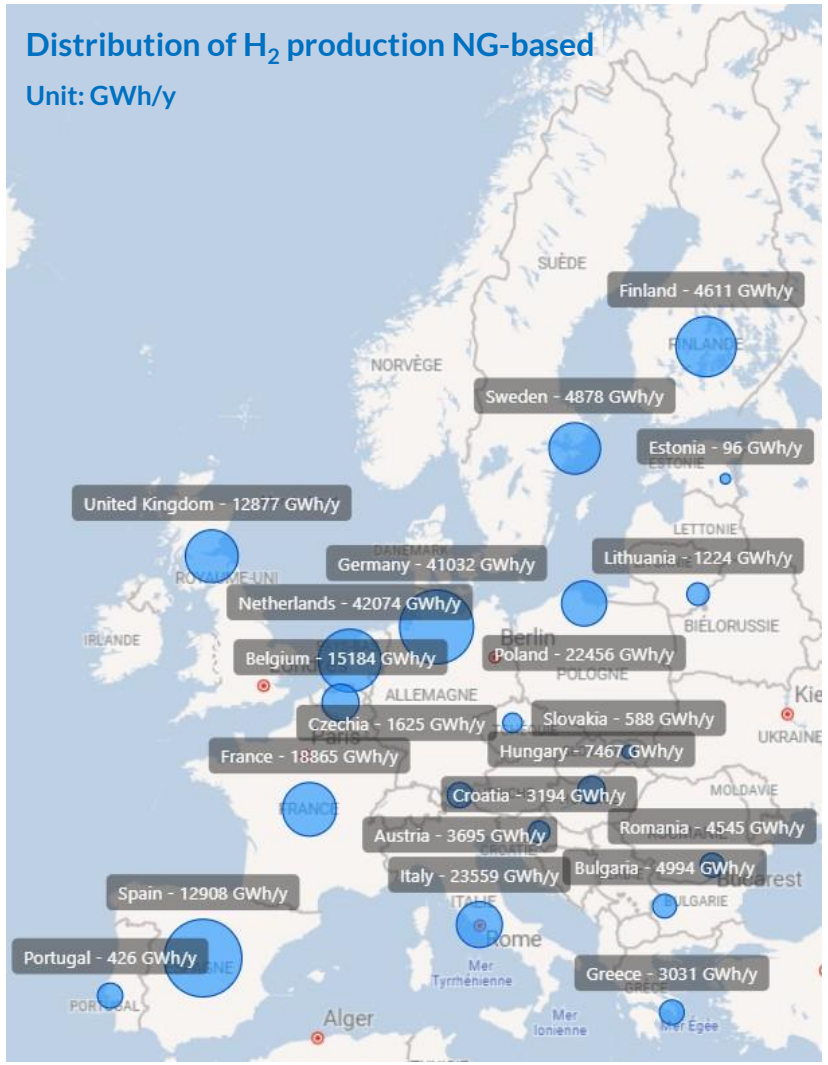
Distribution of H_2 electrolytic production

Unit: GWh/y



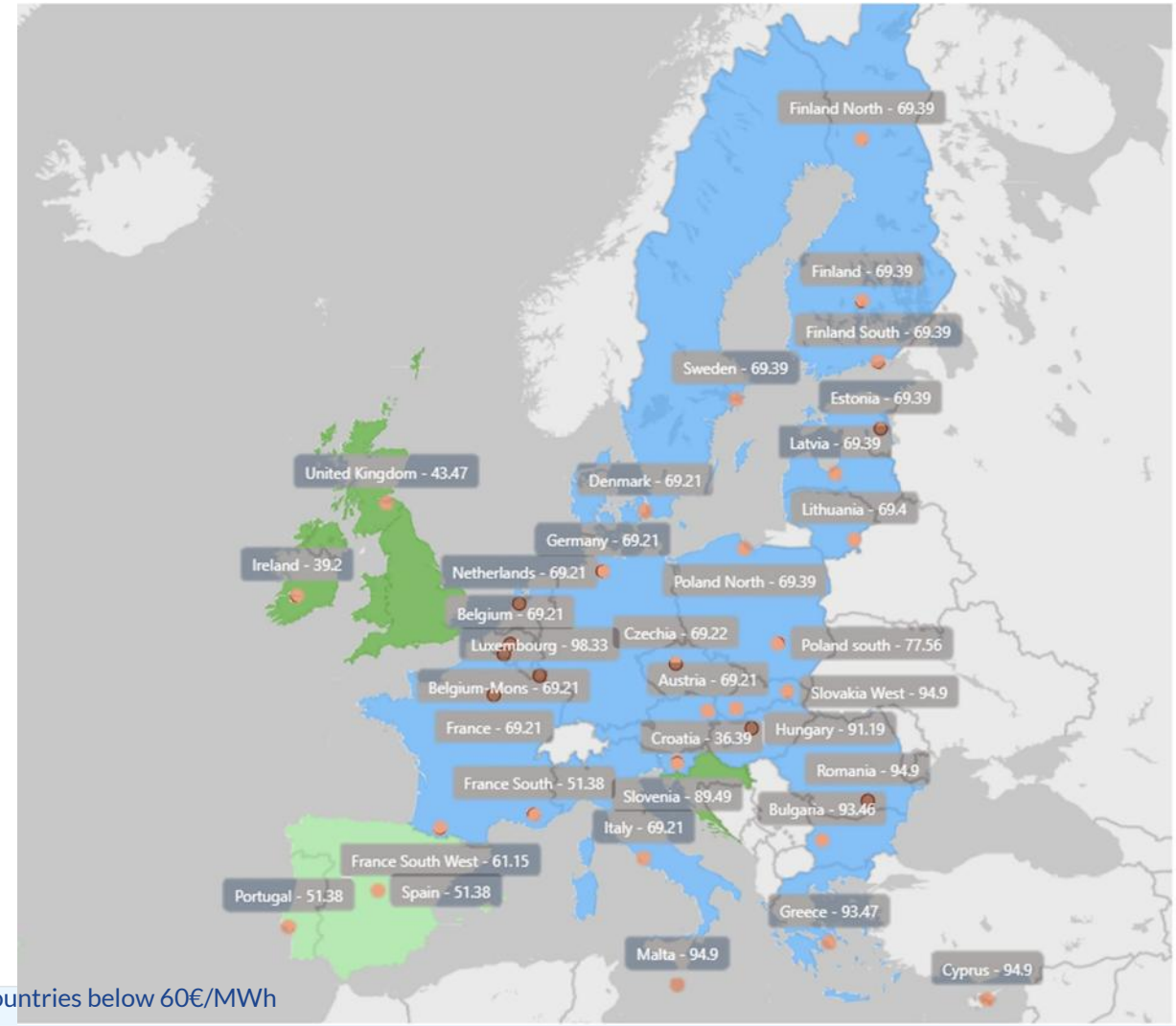
Distribution of H_2 production NG-based

Unit: GWh/y



H2IGI report – 2030 PCI/PMI IL

Market clearing price per node



Countries below 60€/MWh

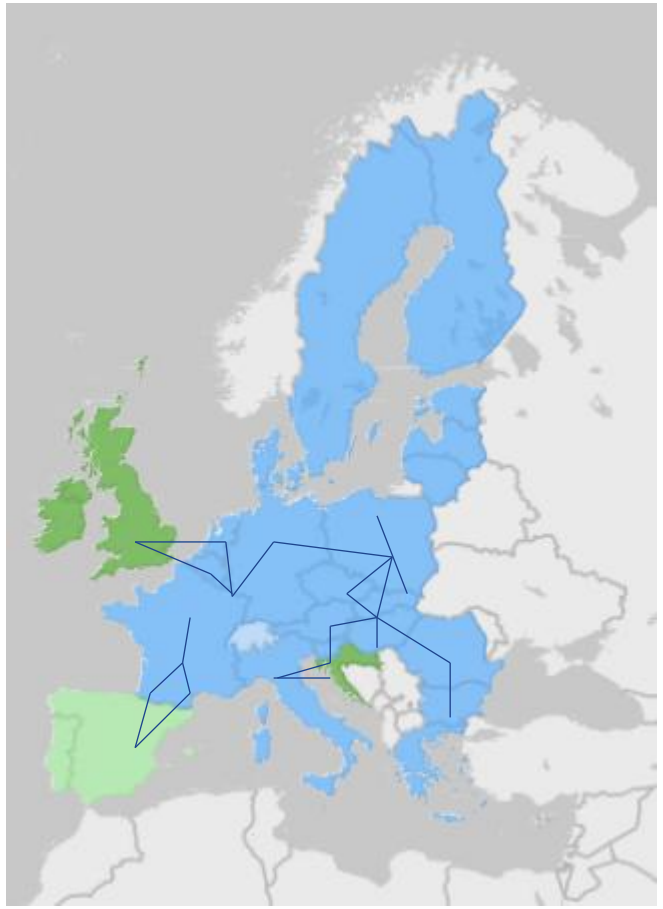
Countries above 60€/MWh

Price correlations in the PCI/PMI IL in 2030:

1. PT, ES and FR_{South}: high electrolytic production in Iberian Peninsula and connection between these countries
2. $FR_{South\ West}$: local undersupply and isolated region
3. BE, NL, DK, DE, CZ, AT and IT: well interconnected countries
4. SE, FI, EE, LV and LT: high electrolytic production and well interconnected countries
5. HR, IE, UK, and PL_{South}: isolated countries without price correlation with average prices < 80 €/MWh
6. GR and BG: jointly isolated countries
7. SI, HU, RO, LU, CY, MT: isolated countries without price correlation with average prices > 80 €/MWh

H2IGI report – IGI indicator 1 for 2030 PCI/PMI IL

IGI indicator 1: PCI/PMI 2030 IL



- Lines on the map show borders at which at least one of the thresholds was reached. For this, a bottleneck must exist in the hydrogen infrastructure level that is restricting the cross-border flows often enough to trigger a threshold.
- Threshold 1: Average yearly hydrogen market clearing price spread above 4€/MWh
- Threshold 2: At least 40 days with hydrogen market clearing price spread above 20€/MWh

Countries below 60€/MWh

Countries above 60€/MWh

H2IGI report – 2030 ADV IL

Advanced infrastructure level in 2030

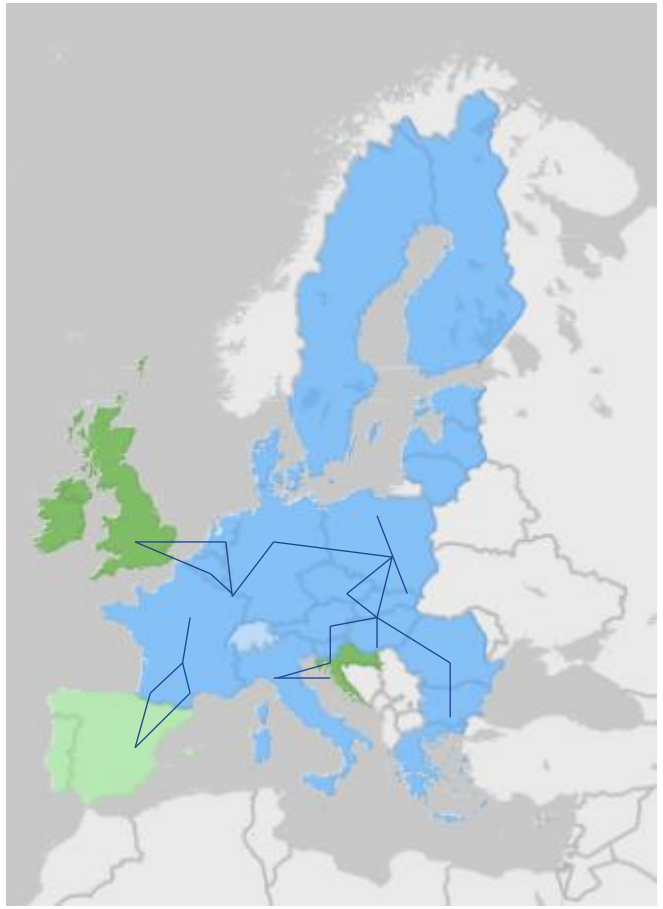
Yearly hydrogen supply-demand balance	Advanced IL
H_2 produced via electrolysis	304
H_2 produced using natural gas	224
H_2 shipped imports	24
H_2 pipeline imports	42
Curtailed H_2 demand	27
H_2 demand for power production	2
Total H_2 demand	620

Unit: TWh/y

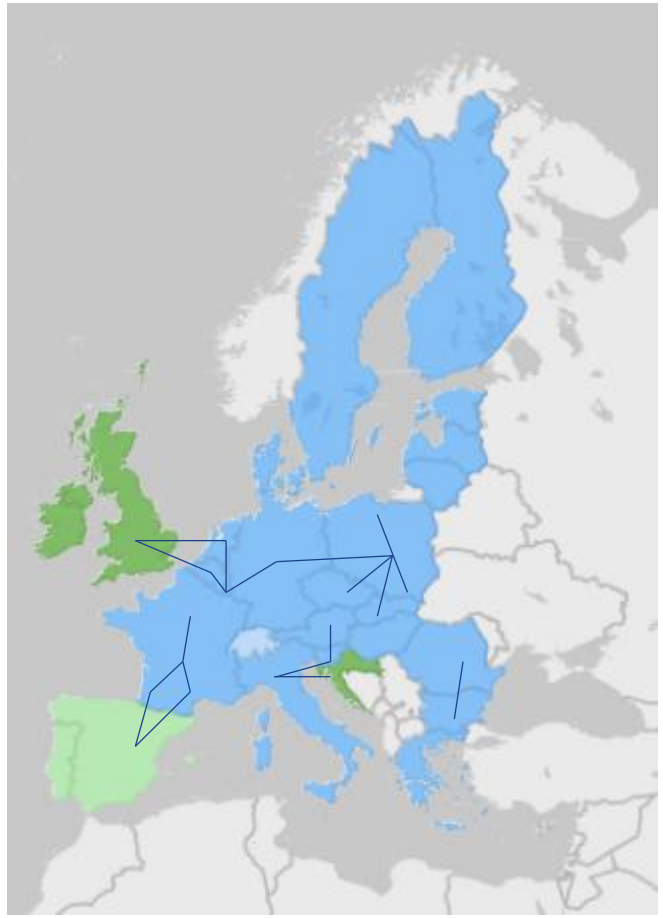
- ✓ Non-PCI advanced projects are considered in the advanced infrastructure level
- ✓ Advanced infrastructure level considers pipeline imports from North Africa
- ✓ Significant reduction of demand curtailment
- ✓ Electrolytic production and natural-gas based production follow similar distribution in both assessed infrastructure levels

H2IGI report – IGI indicator 1 for 2030 ADV IL

IGI indicator 1: PCI/PMI IL in 2030



IGI indicator 1: ADV IL in 2030



- Most of the price spreads identified by IGI indicator 1 still prevail in the advanced infrastructure level as identified bottlenecks still remains However, in the advanced IL, the following countries showed higher convergence:
  - SK border with CZ and AT
  - HU borders with RO, SK, and AT

Countries below 60€/MWh

Countries above 60€/MWh

H2IGI report – IGI indicator 1

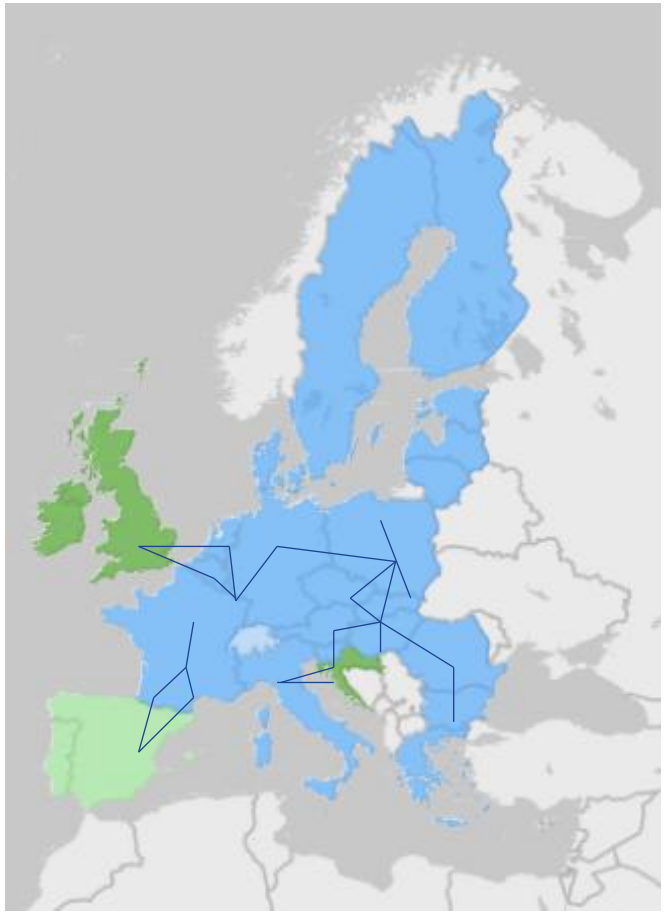
Yearly hydrogen supply-demand balance	PCI/PMI IL 2030	PCI/PMI IL 2040
H_2 produced via electrolysis	310	1074
H_2 produced using natural gas	229	162
H_2 shipped imports	29	83
H_2 pipeline imports	0	316
Curtailed H_2 demand	52	294
H_2 demand for power production	2	77
Total H_2 demand	620	1929

Unit: TWh/y

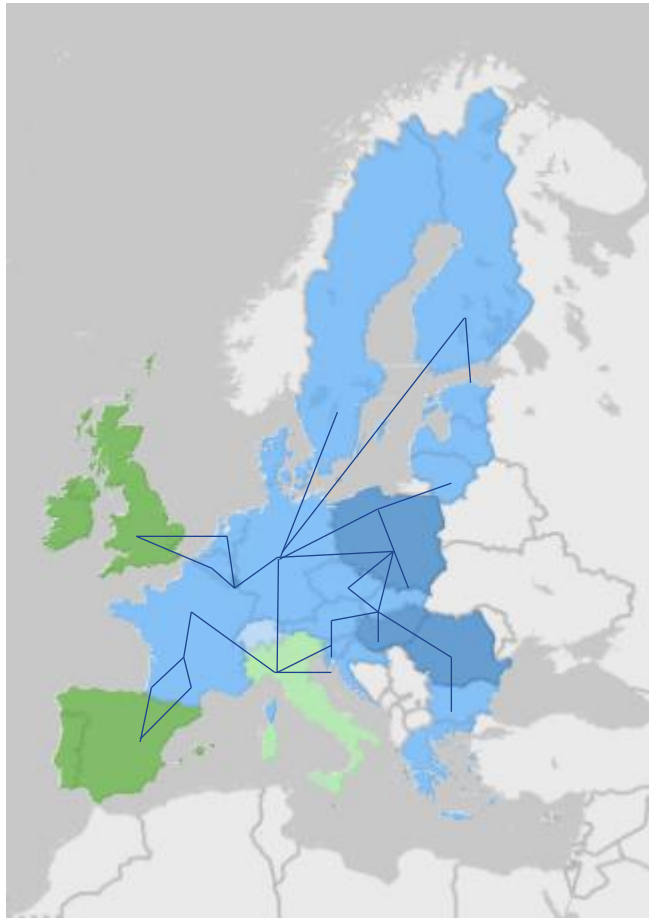
- Sharp increase of hydrogen demand in 2040
- Significant increase of electrolytic production
- Consideration of pipeline imports in 2040 (NA, NO and UA), as well as increase of imports via ship
- Reduction of natural-gas based production in 2040
- Higher curtailment than in 2030

IGI Indicator 1: Hydrogen Market clearing price spreads

IGI indicator 1: PCI/PMI IL in 2030



IGI indicator 1: PCI/PMI IL in 2040

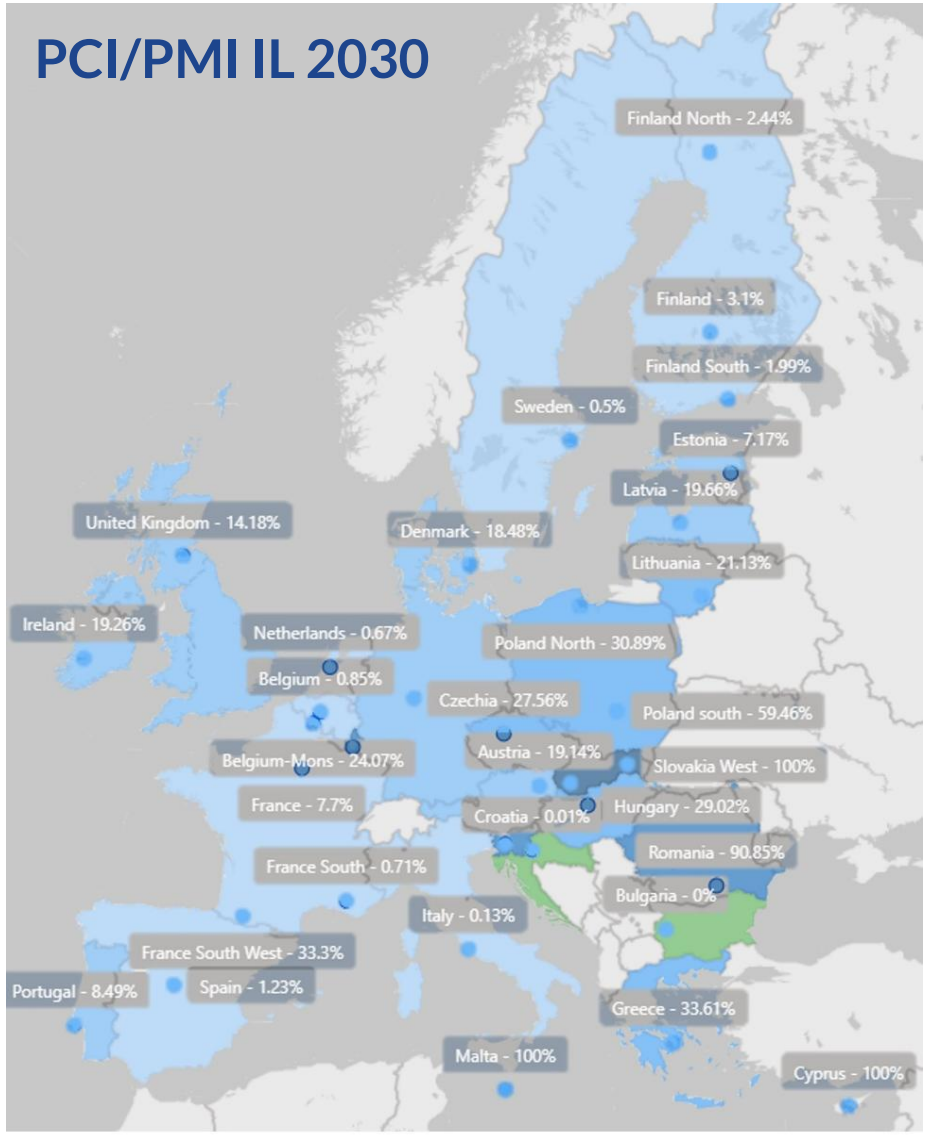


Countries below 60€/MWh

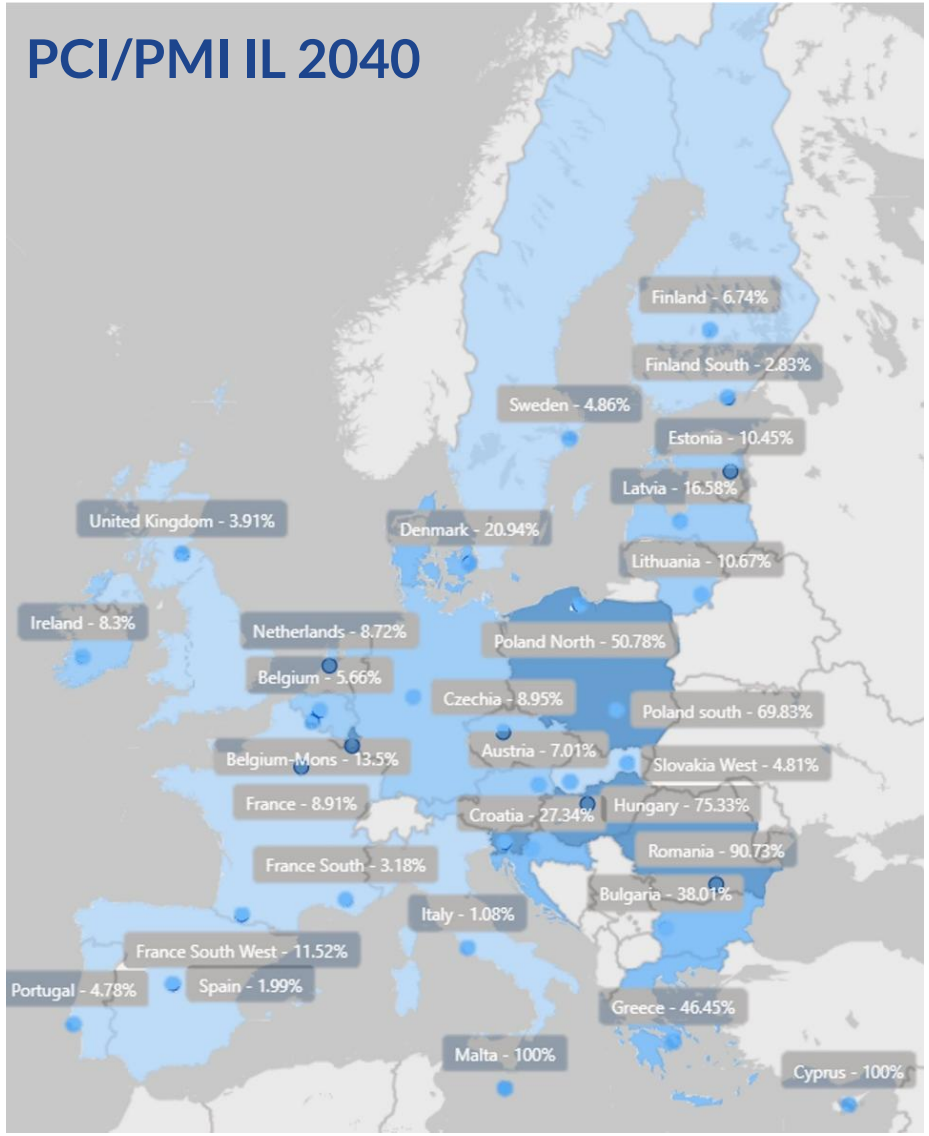
Countries above 60€/MWh

IGI Indicator 2.1: Hydrogen Demand Curtailment Rate

PCI/PMI IL 2030

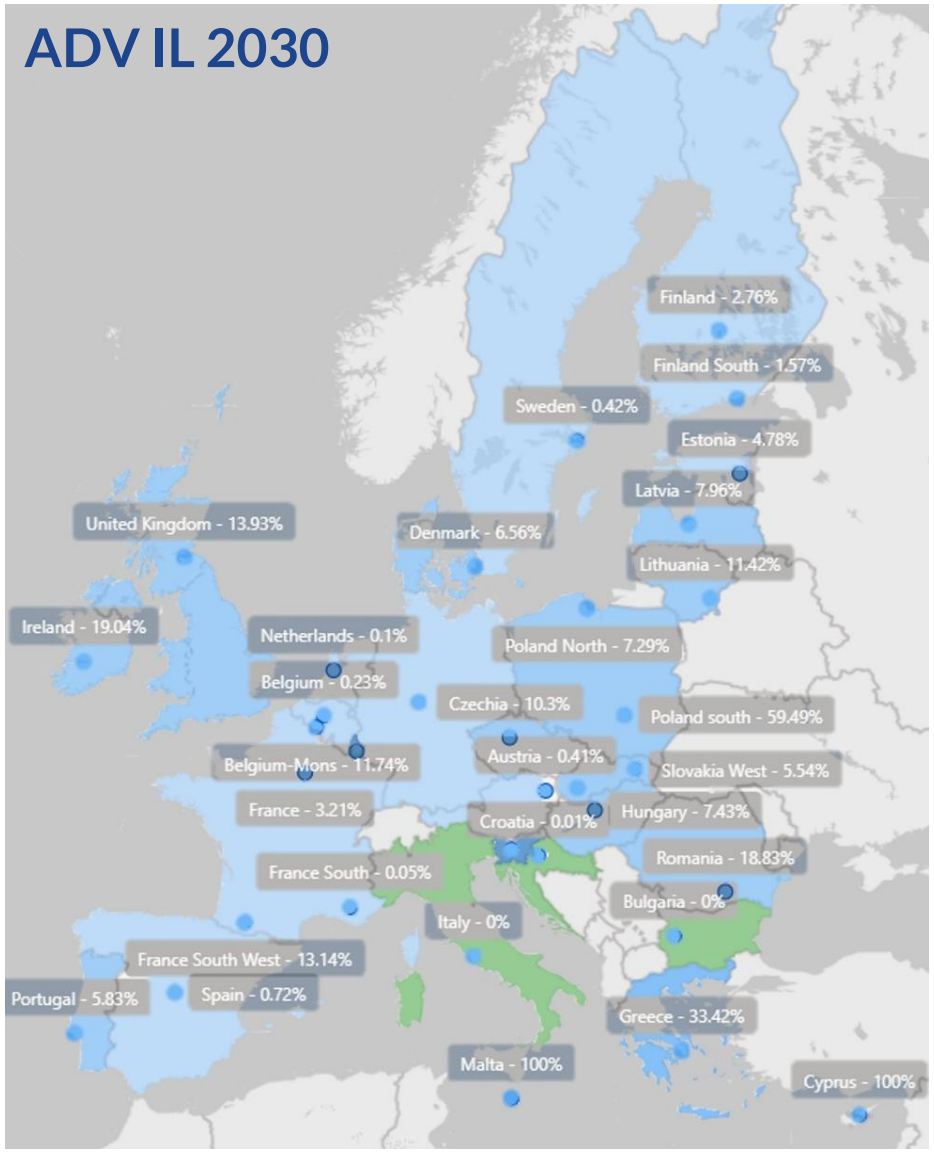


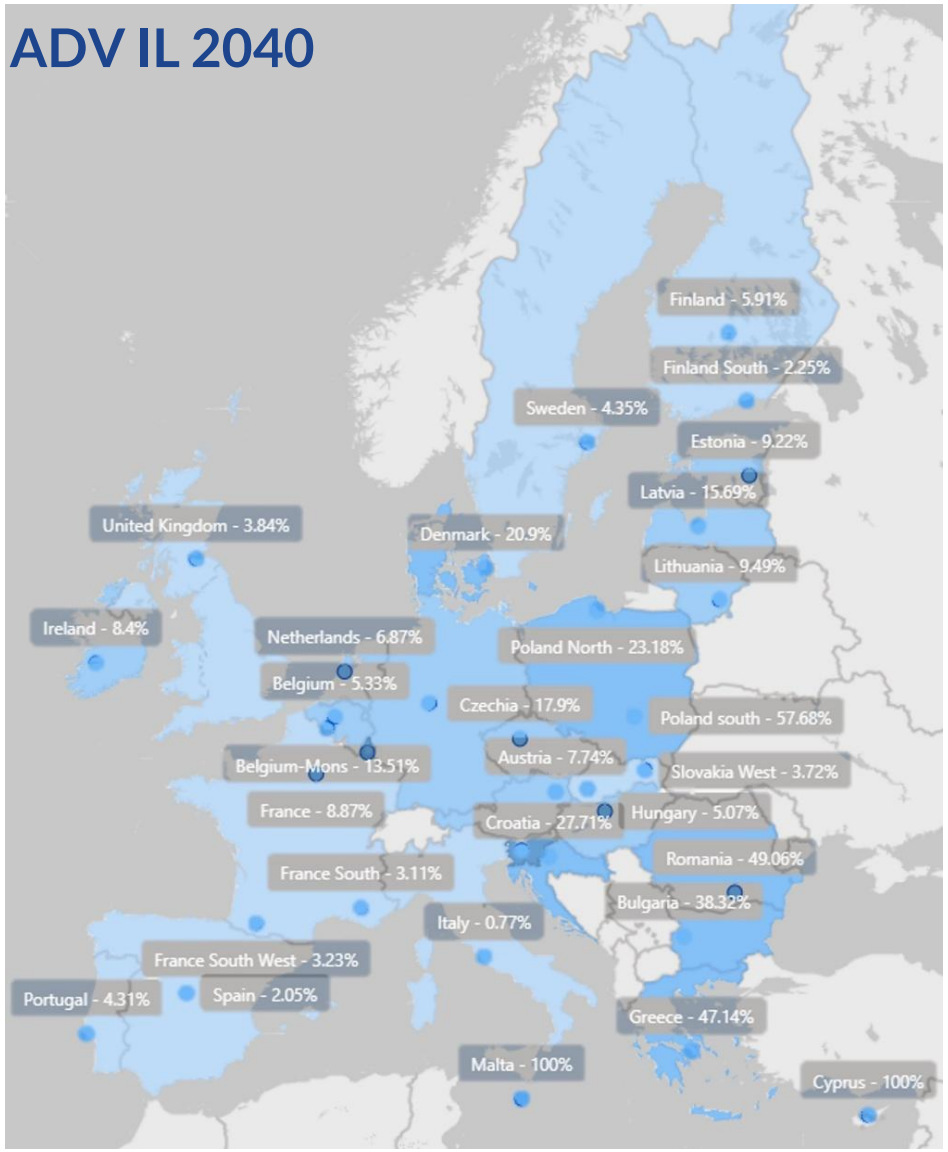
PCI/PMI IL 2040



- 0% demand curtailment
- >0% - 5% demand curtailment
- >5% - 20% demand curtailment
- >20% - 50% demand curtailment
- >50% - 99% demand curtailment
- 100% demand curtailment

IGI Indicator 2.1: Hydrogen Demand Curtailment Rate





- 0% demand curtailment
- >0% - 5% demand curtailment
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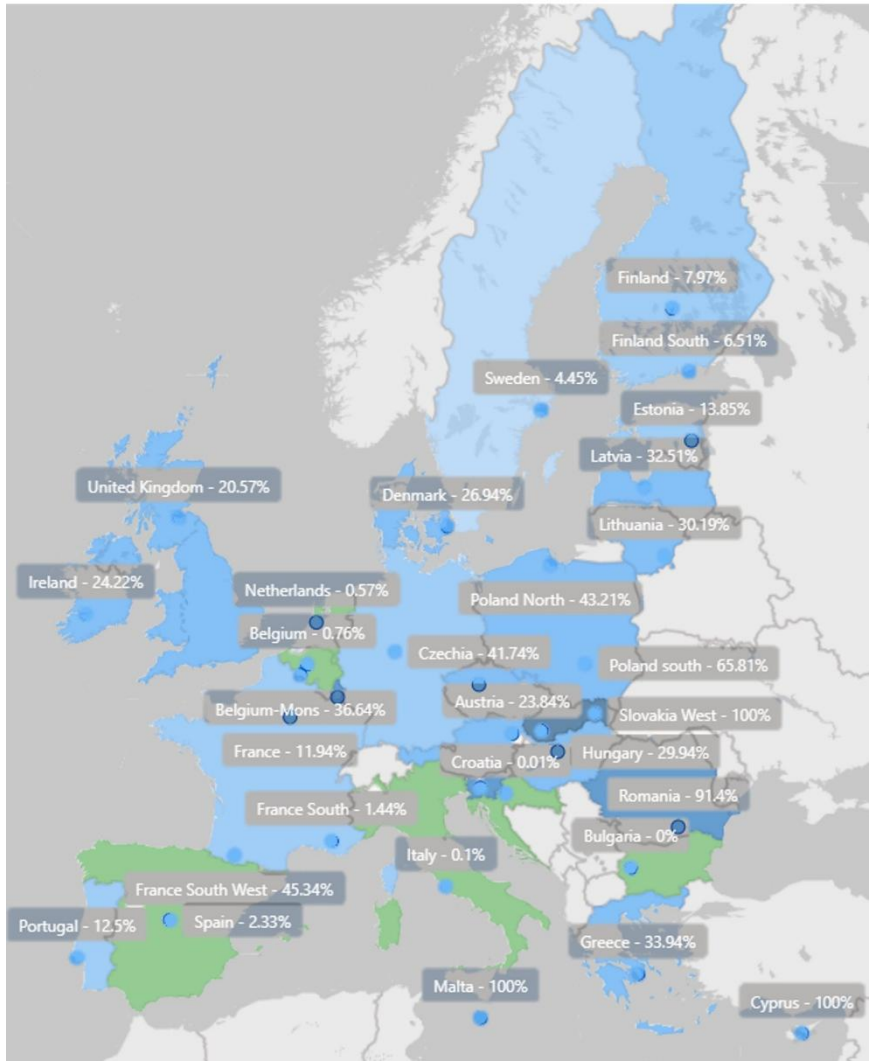
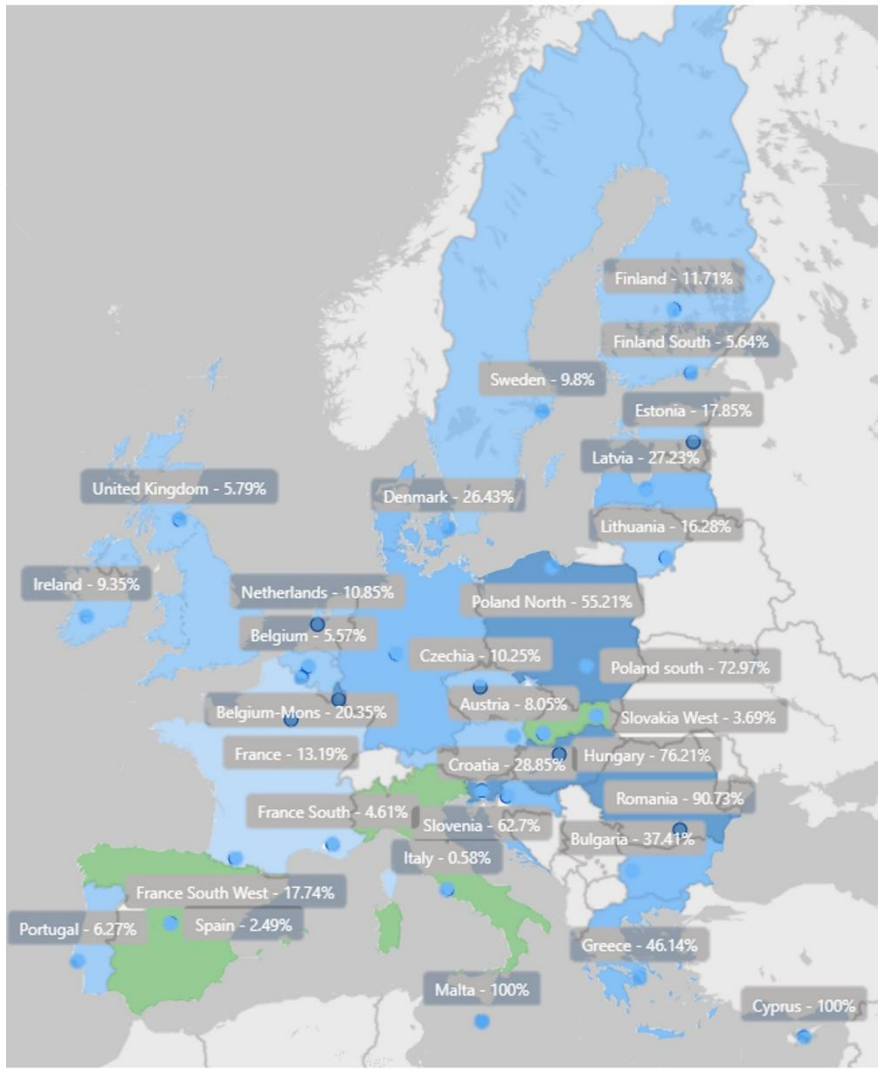
- >20% - 50% demand curtailment
- >50% - 99% demand curtailment
- 100% demand curtailment

IGI Indicator 2.2: Hydrogen Demand Curtailment Rate under stressful weather year

PCI/PMI IL 2030



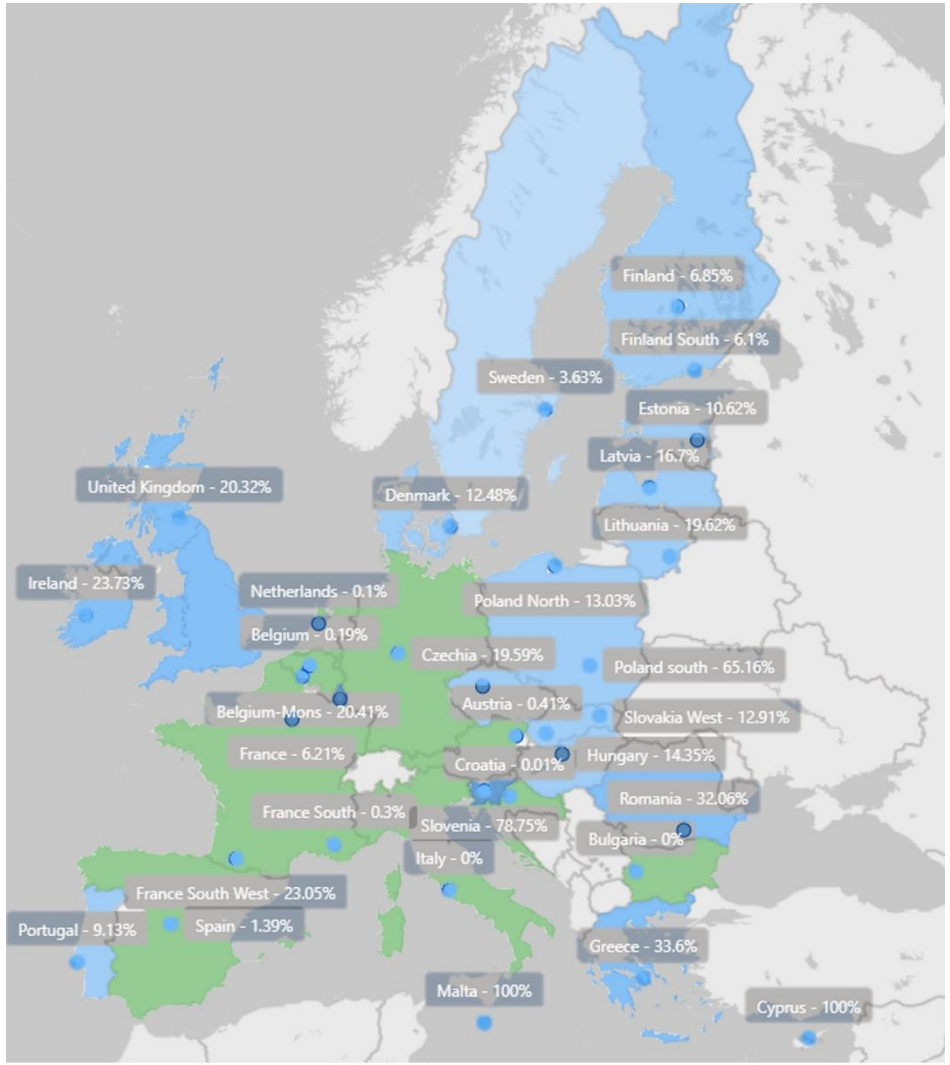
PCI/PMI IL 2040



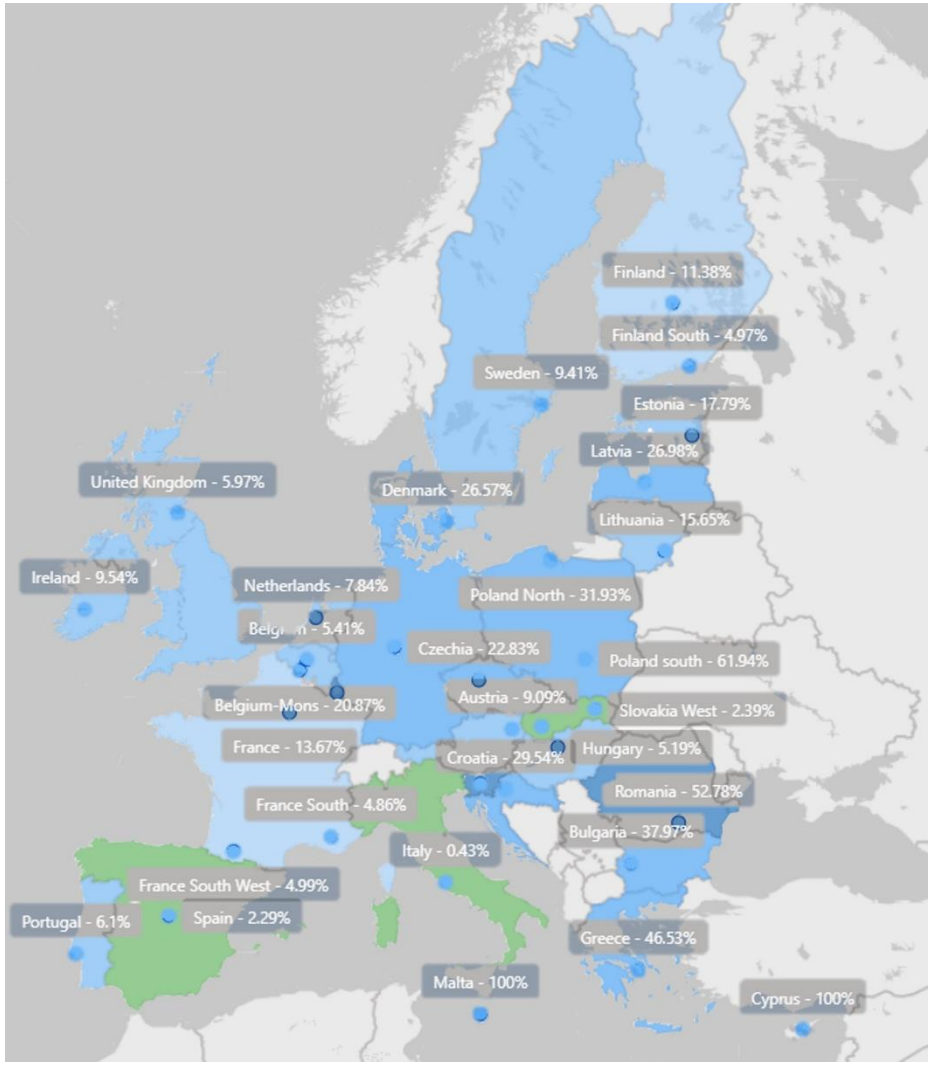
- <=3% demand curtailment
- >3% - 5% demand curtailment
- >5% - 20% demand curtailment
- >20% - 50% demand curtailment
- >50% - 99% demand curtailment
- 100% demand curtailment

IGI Indicator 2.2: Hydrogen Demand Curtailment Rate under stressful weather year

ADV IL 2030



ADV IL 2040



- <=3% demand curtailment
- >3% - 5% demand curtailment
- >5% - 20% demand curtailment
- >20% - 50% demand curtailment
- >50% - 99% demand curtailment
- 100% demand curtailment

H2IGI report - Projects

Identified projects that contributed to the mitigation of identified infrastructure gaps::

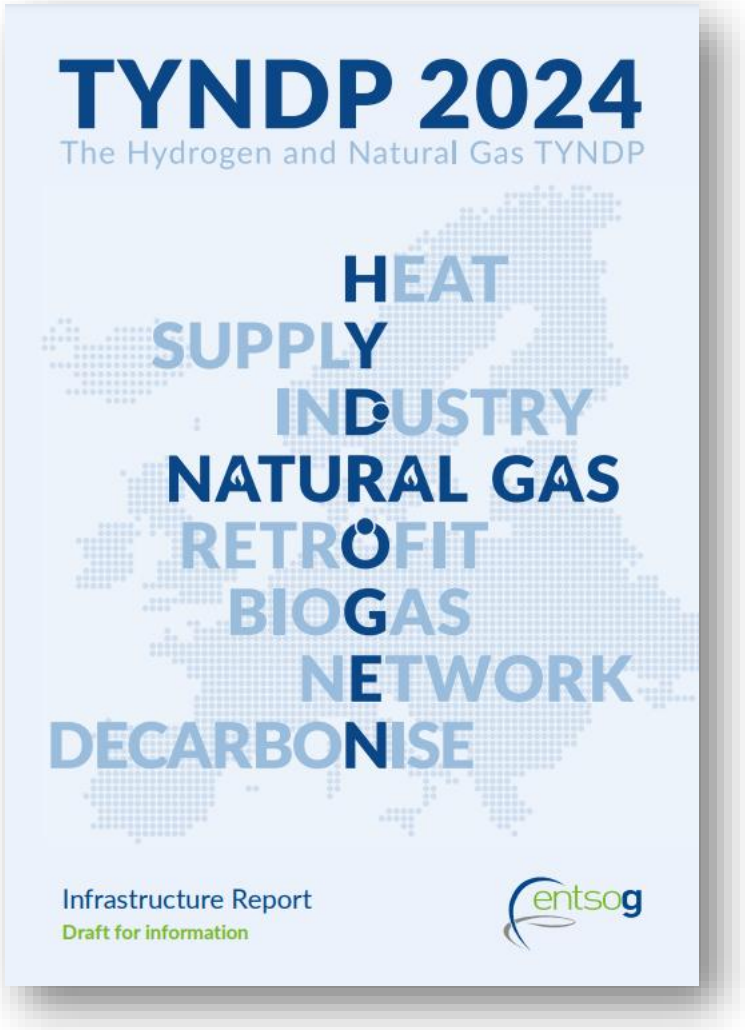
- ✓ PCI/PMI Infrastructure level
- ✓ Pipeline imports:
  - ✓ North African hydrogen corridor to Italy
- ✓ Intra-EU connections:
  - ✓ Austria to Slovakia (Slovak Hydrogen backbone)
  - ✓ Netherlands to Germany (H2Coastlink, IP Elten/Zeevenar-Cologne, Hyperlink and H2ercules Network North-West)
  - ✓ Germany to Poland (Pomeranian green hydrogen cluster)
  - ✓ Slovakia to Hungary (HU/SK hydrogen corridor)
  - ✓ Hungary to Romania (HU/RO hydrogen corridor)
- ✓ Import terminals
  - ✓ New Ammonia terminal in Gdansk and Hydrogen Highway-Northern Section
  - ✓ Increase terminal capacity in the Netherlands (Eemshaven H2)
- ✓ Hydrogen storages
  - ✓ Germany (RWE H2 Storage Gronau-Epe, UST Hydrogen Storage Krummhörn, RWE H2 Storage Xanten, EWE Hydrogen Storage Huntorf, EWE Hydrogen Storage Jemgum, RWE H2 Storage Staßfurt, EWE Hydrogen Storage Huntorf)
  - ✓ South-West France (HySow storage)

Infrastructure report

Introduction

"As one of the main ENTSOG TYNDP documents, the Infrastructure Report presents investment projects that aim to bring the European energy system in line with the Union's energy and climate goals."

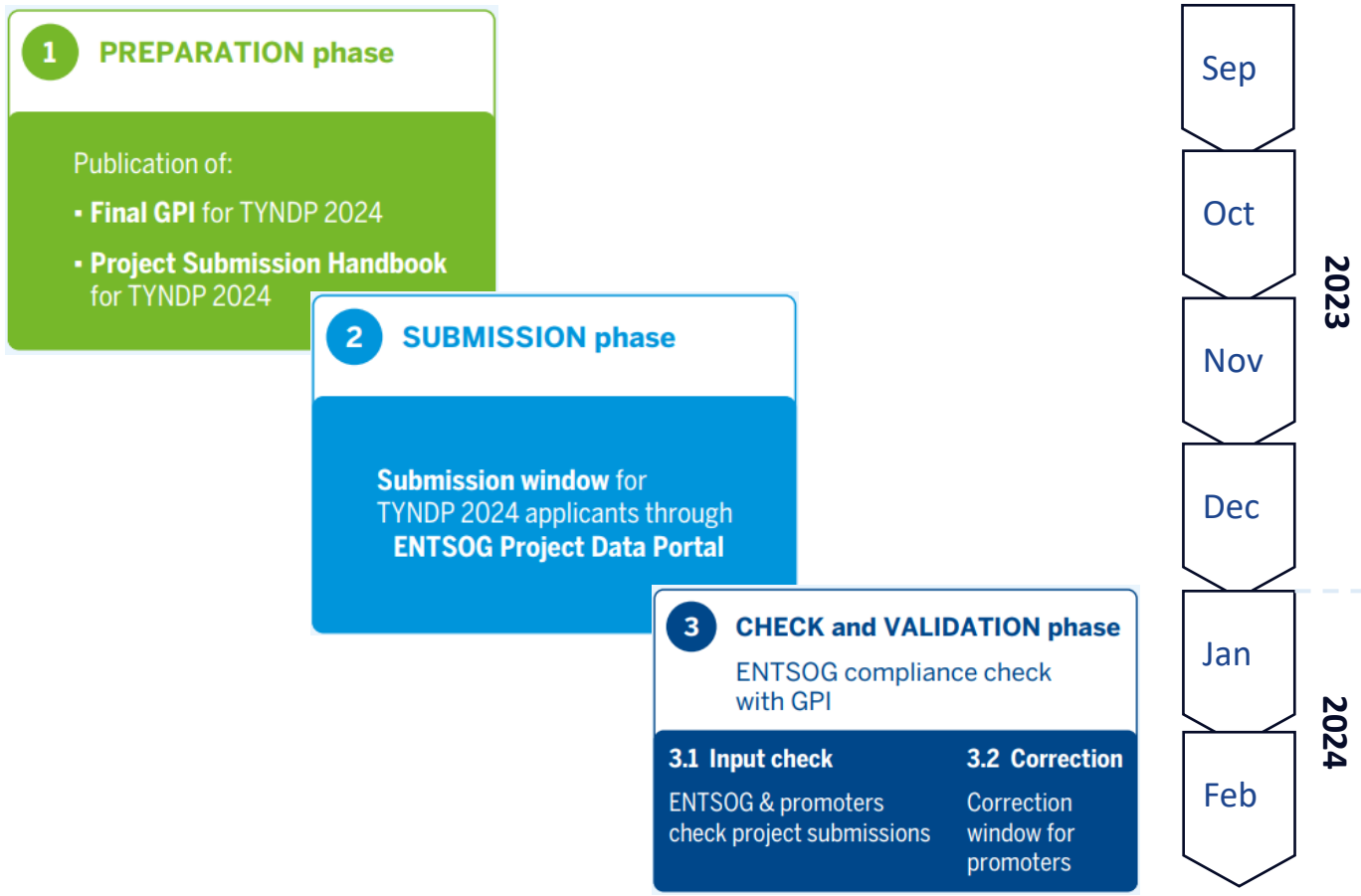
- Apart from the natural gas categories, **this Infrastructure report focus on hydrogen projects** that are now presented under more granular subcategories, as hydrogen transmission, reception facilities, storage, electrolysers and mobility projects, but also other categories, such as biomethane and CO_2 infrastructure.



Phases and timeline of the TYNDP 2024 Project collection

- Projects were submitted through the ENTSOG Project Data Portal, to ensure transparency and equal treatment to project promoters by adherence to specific administrative and technical criteria defined in ENTSOG's TYNDP 2024 Guidelines for Project Inclusion (GPI).

- To facilitate the submission process, ENTSOG provided comprehensive guidelines, informative workshop and support to project promoters.



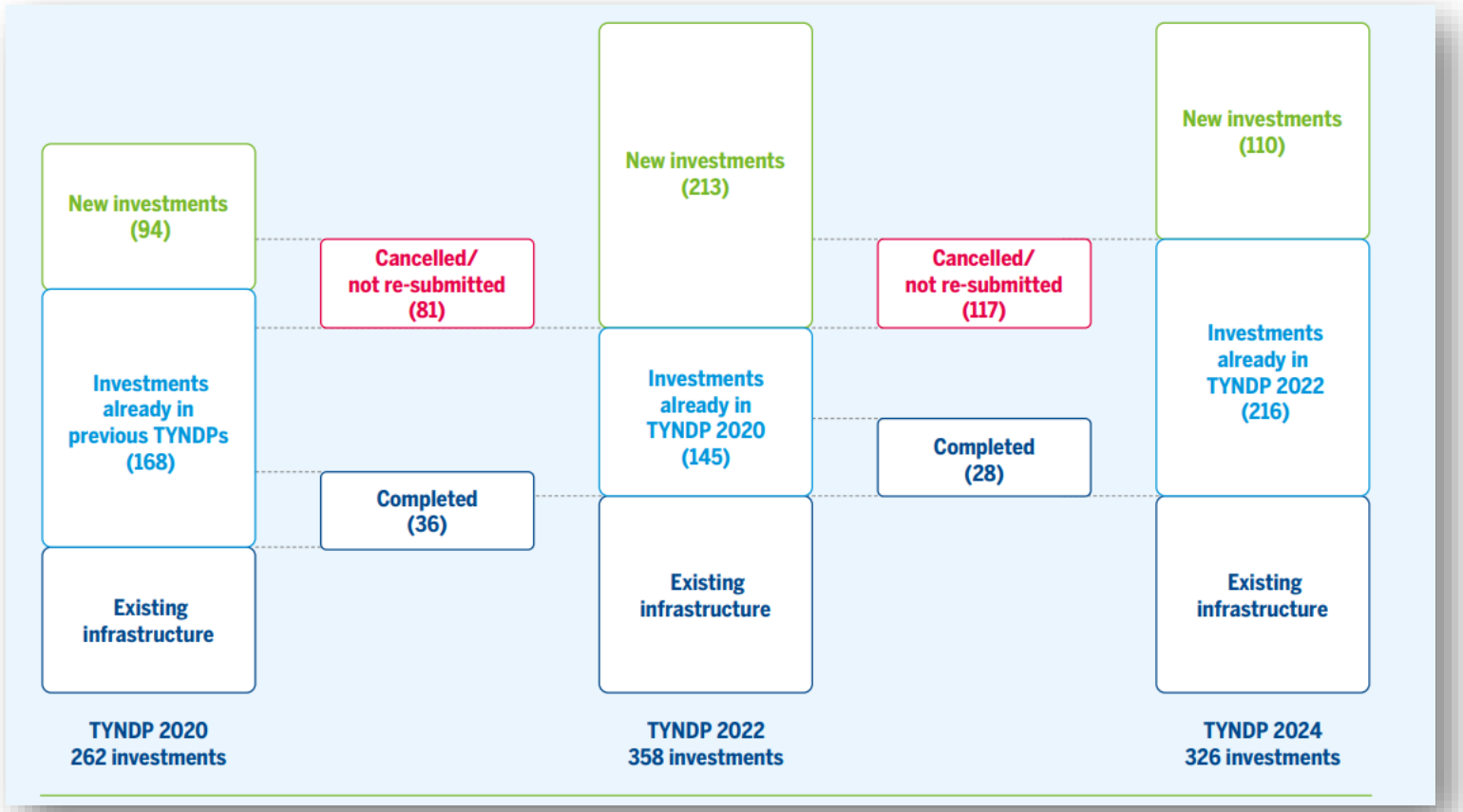
Infrastructure Report key numbers

326 investments in total:
- 110 new
- 216 from TYNDP 2022

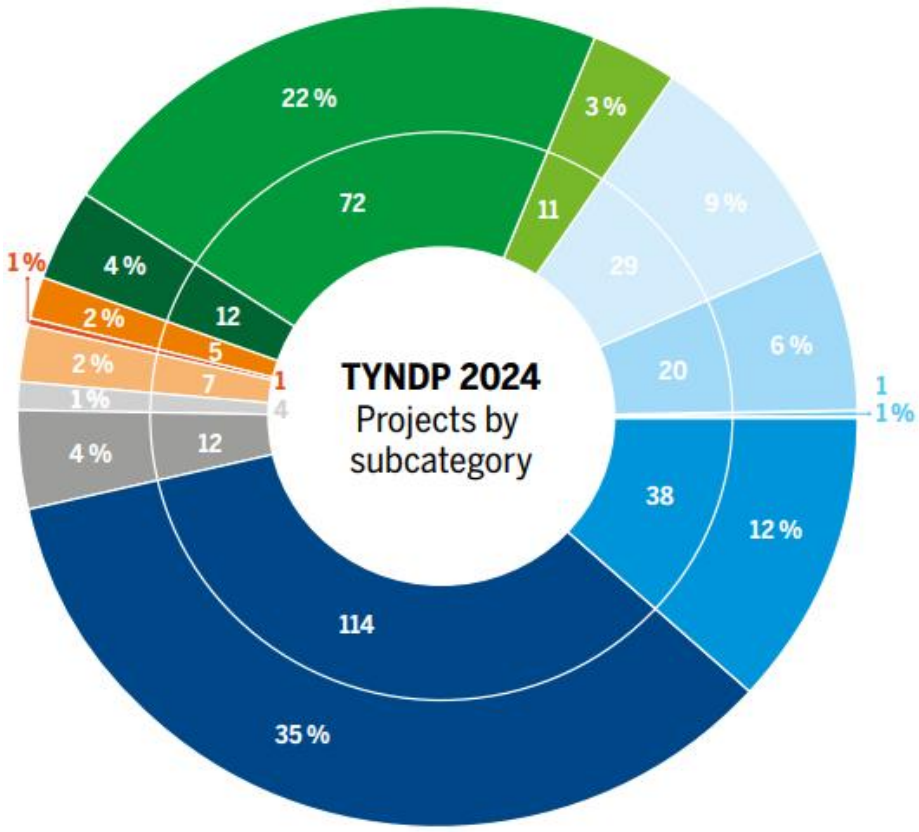
Over 90 promoters, including TSOs and third-party promoters, contributed.

23 projects that are expected to be commissioned by 2025 were submitted.

Comparison between TYNDP 2020, TYNDP 2022 and TYNDP 2024



Total number of investments by subcategory in TYNDP 2024



Hydrogen
H2E H2L H2M H2S H2T

Natural Gas
UGS TRA LNG

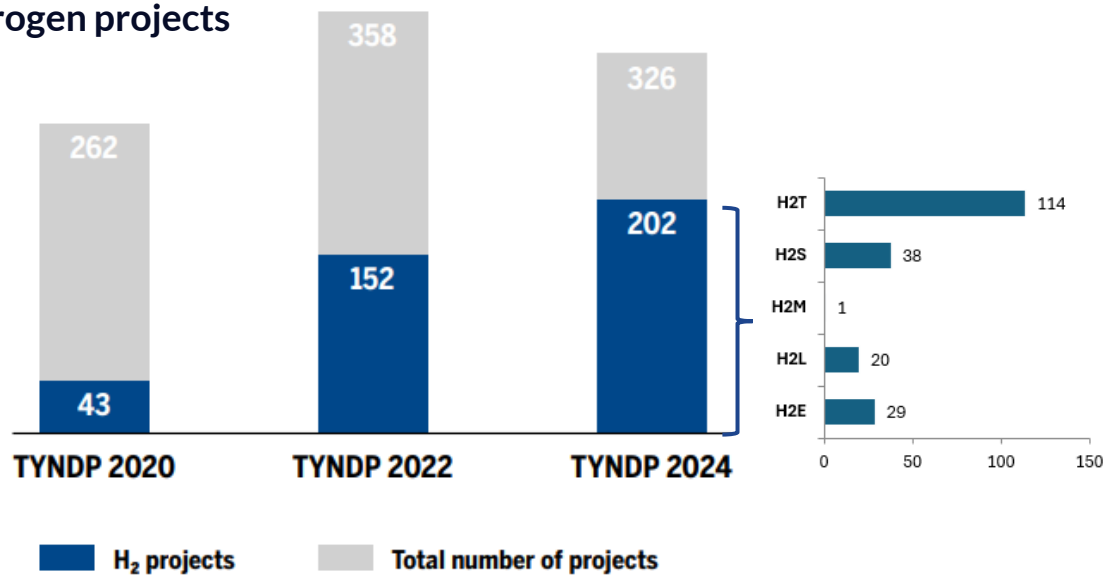
Smart Gas Grid
RET BIO SYN

Other
CO_2 OTH

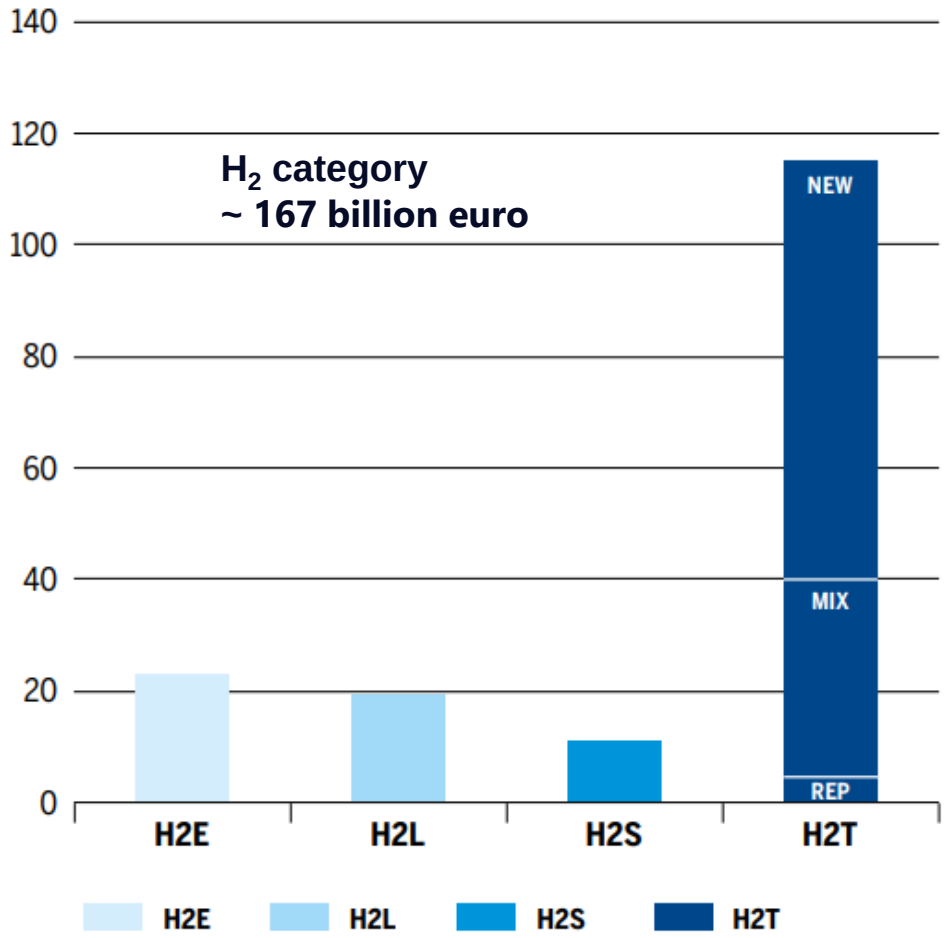
- **202 Hydrogen investments**
- **95 Natural gas investments**
- **29 SGG and Other investments**

Promoters' submissions for Hydrogen to TYNDP 2024

Evolution of total amount of projects and hydrogen projects



Overview of total capital expenditures by hydrogen subcategory (billion Euro)

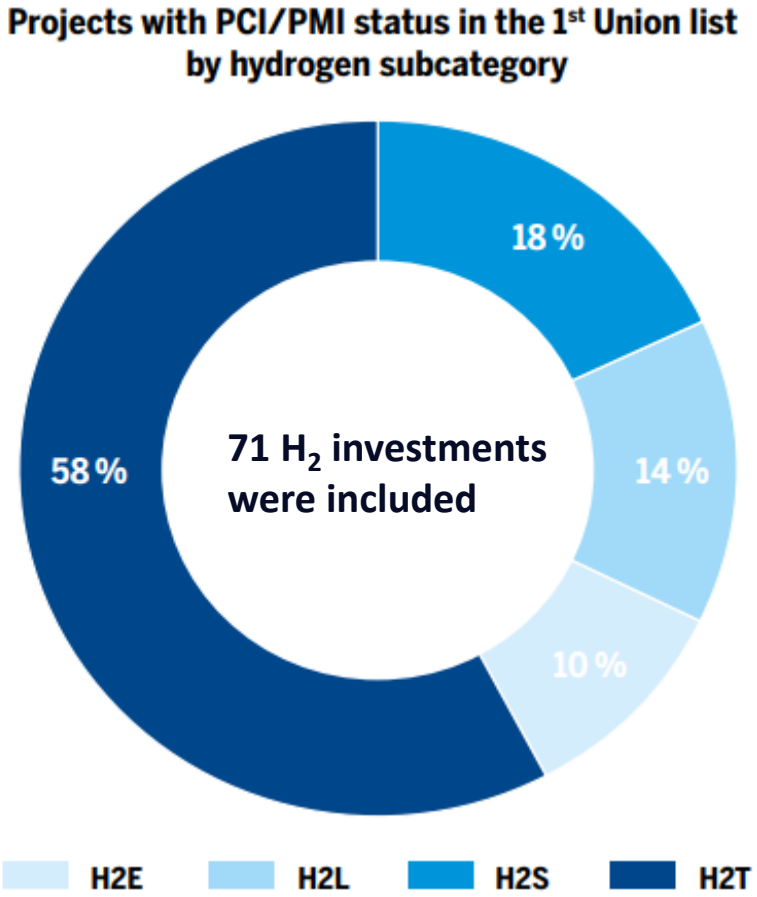


- **62% of the total investments in TYNDP 2024** are listed under the Hydrogen subcategories, compared to 40% in the previous TYNDP.
- **Maturity status**: 4 FID, 88 Advanced, 110 Less-Advanced.
- 74% of Hydrogen projects **are expected to be commissioned by 2029.**

Hydrogen NDP inclusion and PCI/PMI status

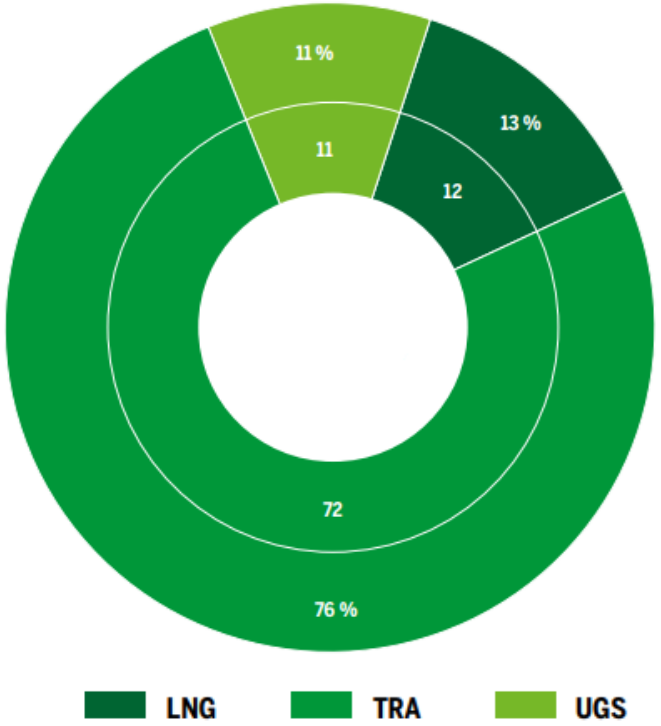
- 67 (33 %) Hydrogen investments were included in the NDPs. The subcategory with the highest number of included projects was H2T (49), followed by H2S (11), H2E (4) and H2L (3).
- Germany included 24 Hydrogen investments in the respective NDP, followed by Italy with 6 investments.

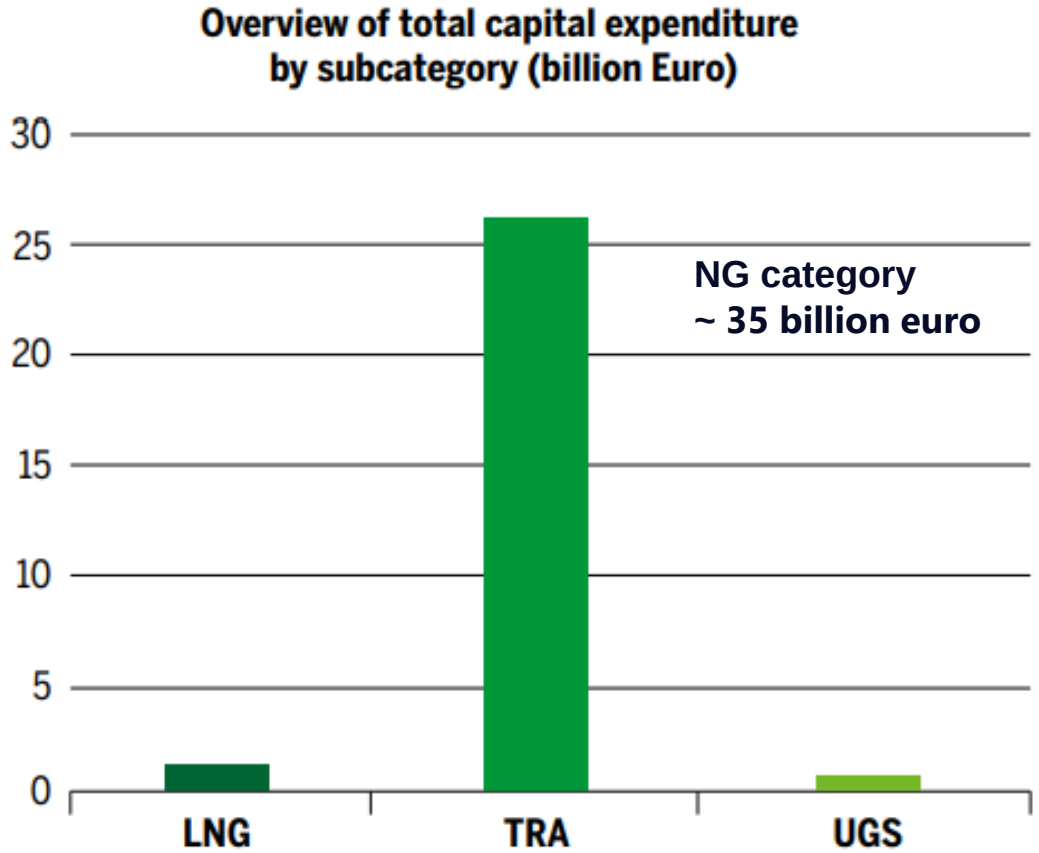
"In TYNDP 2022, the inclusion rate of hydrogen TYNDP projects in the NDPs was 17 % compared to 33% from the current version. This shows that the level of consistency between TYNDP and NDPs increased between the two TYNDP cycles."



Promoters' submissions for Natural Gas to TYNDP 2024

TYNDP 2024 NG investments





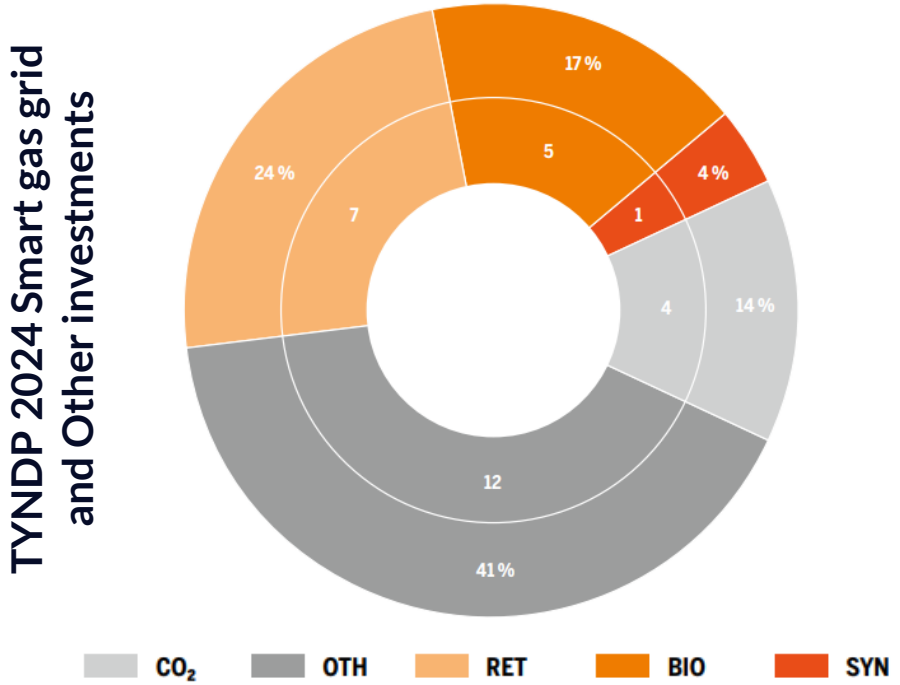
- **17 new and 78 existing projects** were submitted under the Natural Gas category.
- **Maturity status:** 29 FID, 23 Advanced and 43 Less-Advanced.
- ~ 80 % of Natural Gas projects **will be commissioned in the next five years.**

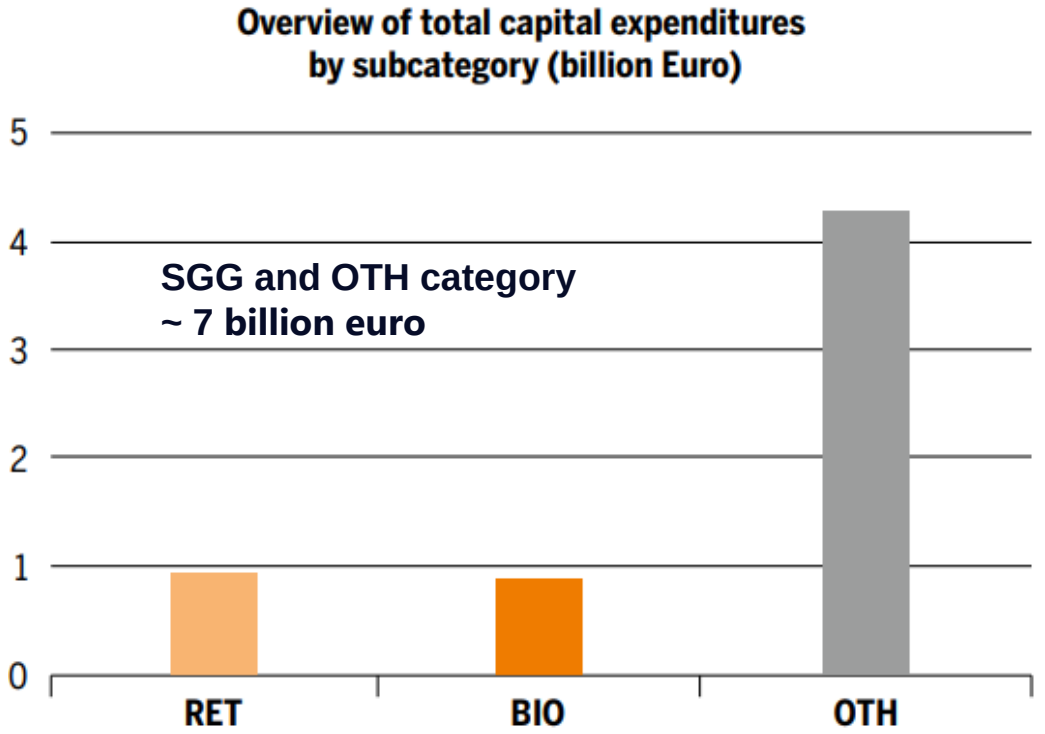
Natural Gas NDP inclusion and PCI/PMI status

- 84 (88 %) Natural gas investments were included in the NDPs. The subcategory with the highest number of included projects was TRA (66), followed by UGS (10) and LNG (8).
- Italy included 16 Natural Gas investments in the respective NDP, followed by Romania with 13.

"Although, as a general rule, natural gas projects are ineligible for PCI and PMI status, the EastMed Pipeline (TRA-A-330) retained its PCI status as a unique exception, alongside the project connecting Malta to the European gas network (TRA-N-31)."

Promoters' submissions for Smart Gas Grid and Other to TYNDP 2024

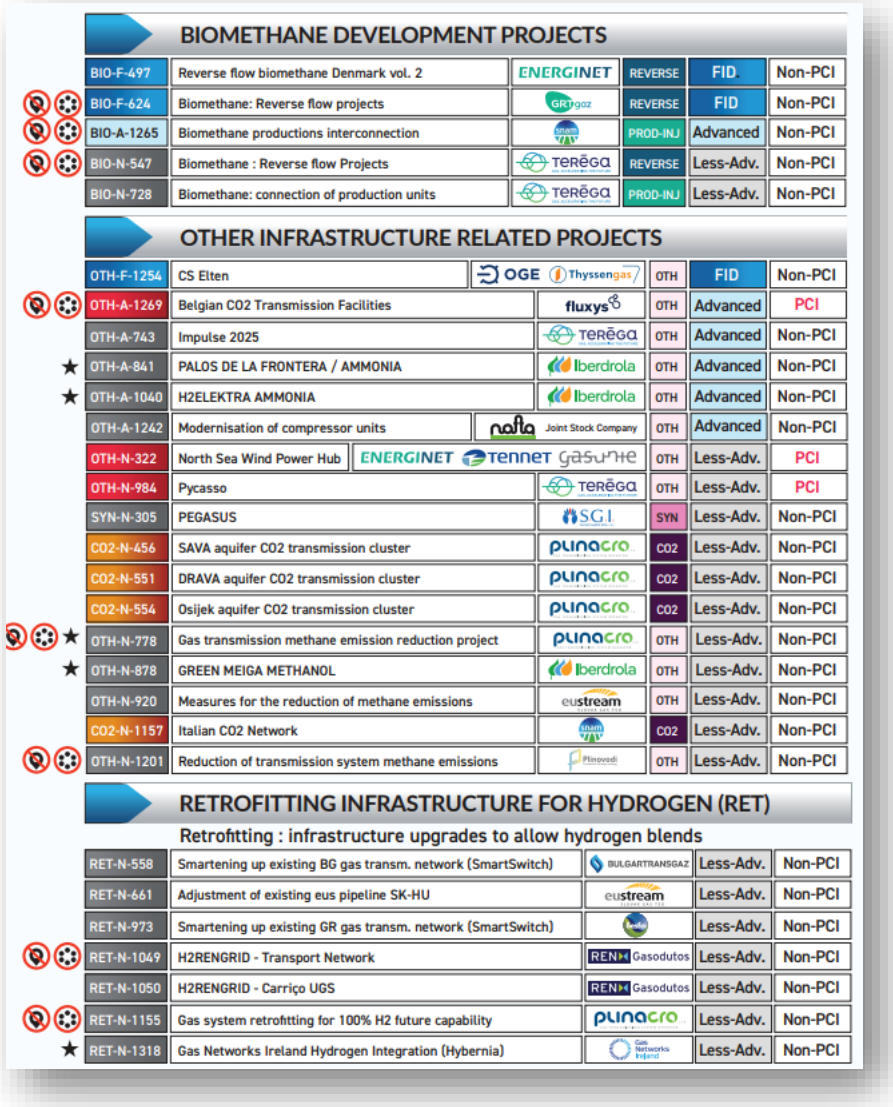




- **5 new and 24 existing projects** were submitted under the Smart Gas Grid and Other categories.
- **Maturity status:** 3 FID, 6 Advanced and 20 Less-Advanced.
- ~ 72 % of Smart Gas Grid and Other projects **will be commissioned in the next six years.**

Smart Gas Grid and Other NDP inclusion

- 15 (51 %) Smart Gas Grid and Other investments were included in the NDPs. The subcategory with the highest number of included projects was OTH (6), followed by RET (5), BIO (3) and CO2 (1).
- Slovakia included 3 Smart Gas Grid and Other investments in the respective NDP, while the rest of the countries between 1 and 2.



BIOMETHANE DEVELOPMENT PROJECTS

	BIO-F-497	Reverse flow biomethane Denmark vol. 2	ENERGINET	REVERSE	FID	Non-PCI
	BIO-F-624	Biomethane: Reverse flow projects	Gasunie	REVERSE	FID	Non-PCI
	BIO-A-1265	Biomethane productions interconnection		PROD-INJ	Advanced	Non-PCI
	BIO-N-547	Biomethane : Reverse flow Projects	TEREGA	REVERSE	Less-Adv.	Non-PCI
	BIO-N-728	Biomethane: connection of production units	TEREGA	PROD-INJ	Less-Adv.	Non-PCI

OTHER INFRASTRUCTURE RELATED PROJECTS

	OTH-F-1254	CS Elten	OGE Thyssengas	OTH	FID	Non-PCI
	OTH-A-1269	Belgian CO2 Transmission Facilities	fluxys	OTH	Advanced	PCI
	OTH-A-743	Impulse 2025	TEREGA	OTH	Advanced	Non-PCI
★	OTH-A-841	PALOS DE LA FRONTERA / AMMONIA	Iberdrola	OTH	Advanced	Non-PCI
★	OTH-A-1040	H2ELEKTRA AMMONIA	Iberdrola	OTH	Advanced	Non-PCI
	OTH-A-1242	Modernisation of compressor units	nafta Joint Stock Company	OTH	Advanced	Non-PCI
	OTH-N-322	North Sea Wind Power Hub	ENERGINET TenneT Gasunie	OTH	Less-Adv.	PCI
	OTH-N-984	Pycasso	TEREGA	OTH	Less-Adv.	PCI
	SYN-N-305	PEGASUS	SGI	SYN	Less-Adv.	Non-PCI
	CO2-N-456	SAVA aquifer CO2 transmission cluster	plinacro	CO2	Less-Adv.	Non-PCI
	CO2-N-551	DRAVA aquifer CO2 transmission cluster	plinacro	CO2	Less-Adv.	Non-PCI
	CO2-N-554	Osijek aquifer CO2 transmission cluster	plinacro	CO2	Less-Adv.	Non-PCI
★	OTH-N-778	Gas transmission methane emission reduction project	plinacro	OTH	Less-Adv.	Non-PCI
★	OTH-N-878	GREEN MEIGA METHANOL	Iberdrola	OTH	Less-Adv.	Non-PCI
	OTH-N-920	Measures for the reduction of methane emissions	eustream	OTH	Less-Adv.	Non-PCI
	CO2-N-1157	Italian CO2 Network		CO2	Less-Adv.	Non-PCI
	OTH-N-1201	Reduction of transmission system methane emissions	Plinovodi	OTH	Less-Adv.	Non-PCI

RETROFITTING INFRASTRUCTURE FOR HYDROGEN (RET)

Retrofitting : infrastructure upgrades to allow hydrogen blends

	RET-N-558	Smartening up existing BG gas transm. network (SmartSwitch)	BULGARTRANSGAZ	Less-Adv.	Non-PCI
	RET-N-661	Adjustment of existing eus pipeline SK-HU	eustream	Less-Adv.	Non-PCI
	RET-N-973	Smartening up existing GR gas transm. network (SmartSwitch)		Less-Adv.	Non-PCI
	RET-N-1049	H2RENGRID - Transport Network	REN Gasodutos	Less-Adv.	Non-PCI
	RET-N-1050	H2RENGRID - Carriço UGS	REN Gasodutos	Less-Adv.	Non-PCI
	RET-N-1155	Gas system retrofitting for 100% H2 future capability	plinacro	Less-Adv.	Non-PCI
★	RET-N-1318	Gas Networks Ireland Hydrogen Integration (Hybernia)	Gas Networks Ireland	Less-Adv.	Non-PCI

TYNDP 2024 Annex B maps

All
2024
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010

ENTSOG TEN-YEAR NETWORK DEVELOPMENT PLAN 2024

– TYNDP 2024 website	18 Dec 2024
– Public consultation on draft Hydrogen Infrastructure Gaps Identification (H2 IGI) report	18 Dec 2024
↳ Draft Hydrogen Infrastructure Gaps Identification report	18 Dec 2024
↳ Support materials	18 Dec 2024
– TYNDP 2024 H2 IGI map – PCI (no H2E)	18 Dec 2024
– TYNDP 2024 H2 IGI map – PCI, ADV (no H2E)	18 Dec 2024
– TYNDP 2024 Infrastructure report	18 Dec 2024
– TYNDP 2024 Annex A - Projects	18 Dec 2024
– TYNDP 2024 Annex B - Map: H2 transmission (H2T)	18 Dec 2024
– TYNDP 2024 Annex B - Map: storage (H2S), terminals (H2L), electrolysers (H2E), mobility (H2M)	18 Dec 2024
– TYNDP 2024 Annex B - Map: natural gas transmission (TRA), storage (UGS), terminals (LNG)	18 Dec 2024
– TYNDP 2024 Annex B - Map: Other (BIO, RET, OTH, CO2, SYN)	18 Dec 2024
– TYNDP 2024 Annex C1 - Capacities CH4	18 Dec 2024
– TYNDP 2024 Annex C2 - Capacities H2	18 Dec 2024
– TYNDP 2024 Annex D1 - Implementation Guidelines	18 Dec 2024
– TYNDP 2024 Annex D2 - Infrastructure Gaps Identification methodology	18 Dec 2024
– TYNDP 2024 Annex D3 - System Assessment methodology	18 Dec 2024
– Public consultation report - Annex D	18 Dec 2024

https://www.entsog.eu/tyndp#entsog-ten-year-network-development-plan-2024

Thank you for your attention