



EU Renewable Hydrogen Tear Sheets

September 2023

2023, a pivotal year for renewable hydrogen in the EU

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Between February and September 2023, the EU has taken three major steps for kickstarting the hydrogen economy

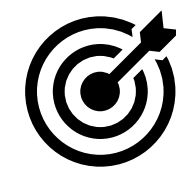


Definition

RFNBO

Definition of
"Renewable"
Hydrogen and
derivatives

Slide 3 - 5

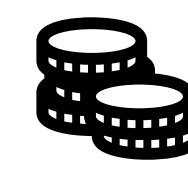


Target

RED III

Targets of
RFNBO
consumption
per sector

Slide 6



Support

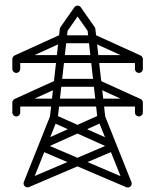
EHB

Pilot auction
launched to
subsidize
RFNBO

Slide 7 - 8

RFNBO = Renewable Fuel from Non Biological Origin = **Renewable Hydrogen + associated e-fuels**

Is the electrolyser connected to the grid?



No

Does the dedicated renewable energy plant have ...

- 1. Direct electrical connection to the electrolyser
- AND
- 2. Not more than 3 years of existence at the start date of fuel production
- AND
- 3. No grid connection

Elec from own renewable asset

Yes

Fuel = RFNBO

No

Fuel ≠ RFNBO

Yes

Is the electrolyser located in a 'bidding zone' (see annex) where we can demonstrate ...

Elec from the grid

The share of renewable production was > 90% in the previous year

Yes

Fuel = RFNBO

No

- 1. Emission intensity < 18gCO₂eq/MJ
- AND
- 2. Renewables PPA*
- AND
- 3. Temporal correlation*
- AND
- 4. Geographical correlation*



Yes

Fuel = RFNBO

No

- 1. Temporal correlation*
- AND
- 2. Geographical correlation*
- AND
- 3. Additionality*

Yes

Fuel = RFNBO

No

Fuel ≠ RFNBO

* See definition of PPA, Temporal Correlation, Geographical Correlation and Additionality in next slide

Key notions: PPA, additionality and correlation

Renewable PPA

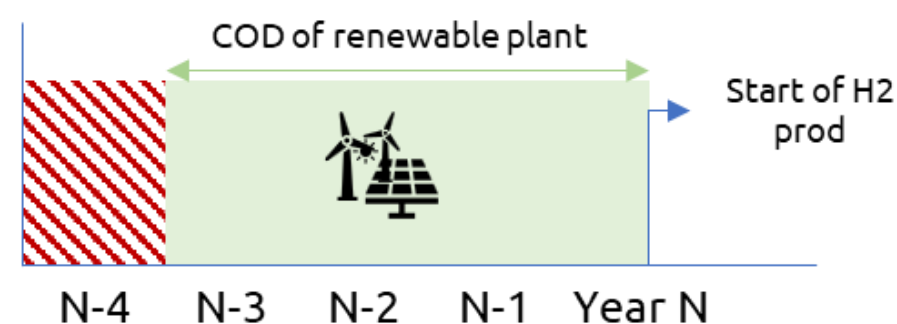
- PPA between the fuel producer and a renewables producer, for the supply of electricity through a « PPA Plant »

Temporal correlation

- Before 2030: PPA Plant has produced the required MWh on a *monthly basis*
- After 2030: PPA Plant has produced the required MWh on a *monthly basis* or Day-ahead market price < €20/MWh in that hour

Additionality

- The installation that is supplying electricity to the electrolyser (whether own installation or PPA Plant) came into operations not earlier than 3 years before start of fuel production



and

- That installation has not received State aid support

Geographical correlation

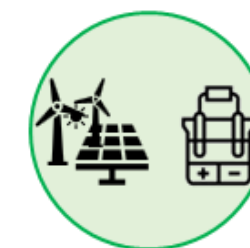
- PPA Plant in same bidding zone as the electrolyser

or

- PPA Plant in an interconnected bidding zone where electricity price > electricity price of the electrolyser bidding zone (*to participate to congestion reduction*)

or

- PPA Plant in an offshore bidding zone interconnected with electrolyser bidding zone



Interconnected



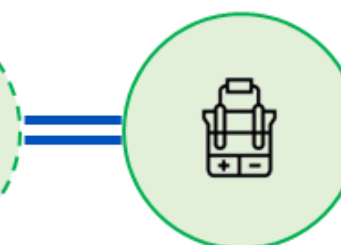
Elec Price
X/MWh

>



Elec Price
Y/MWh

Offshore





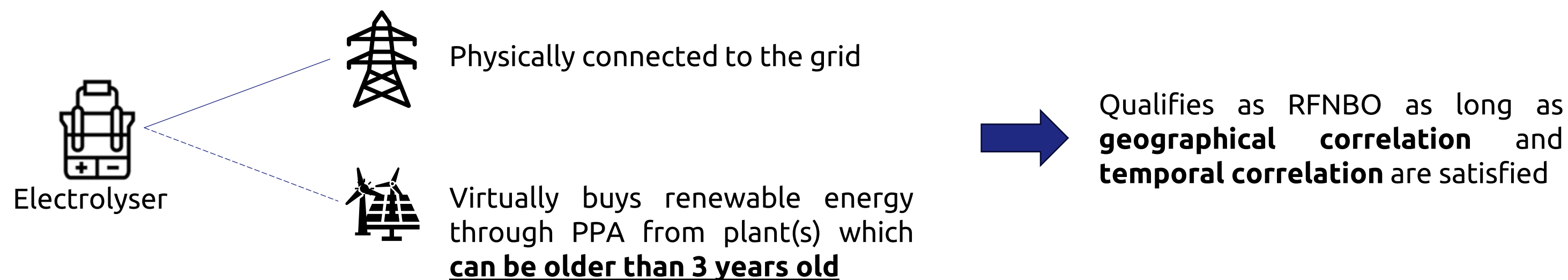
Key takeaways: the Norway-Sweden-France exceptions 5



In the European Economic Area, only the Norwegian, Swedish and French grids have a carbon intensity of $< 18\text{gCO}_2\text{e/MJ}$

So what?

The main difference with other European countries is that in the case of an electrolyser connected to those grids, there is no need to prove the **Additionality** of the renewable energy plant with which the fuel producer has signed a PPA. In simple words, there is no obligation to build new renewable capacity, to prove the RFNBO quality of the fuel, when connected to a “clean” grid.



Does nuclear-derived hydrogen qualify as an RFNBO?

Not automatically – an electrolyser connected to the French grid (which is mainly nuclear-powered) would still need to sign a PPA with a renewable energy plant for the right quantity of energy. And **nuclear** (nor biomass) does not qualify as renewable as per EU definition.

RFNBO targets: moonshot or lightweight?

Each EU Member State shall ensure (**binding targets**) that RFNBO represents ...



42% by 2030 **60% by 2035 ...**
of all H2 used in the industry

... subject to a 20% discount

33.6% by 2030 48.0% by 2035
If (i) compliance with national RE* target
(ii) H2 from fossil fuels < 23% in 2030
(iii) H2 from fossil fuels < 20% in 2035



Nearly starting from scratch
There is urgency to act

* RE: Renewable Energy



1% by 2030 ...

of all fuels used in the transport sector

Of which 1.2% in the maritime sector (non-binding)

... but, in reality, less than that

To compensate for their higher cost, the volume of
RFNBO used shall be multiplied by
2x in road // 1.5x in aviation and shipping
In the calculation of the 2030 share



Real target ~0.5%
The uptake of e-fuels is not for 2030

EU H2 Pilot Auction: a new initiative by the EHB

Auction funded by the EU Innovation Fund under the umbrella of the European Hydrogen Bank (EHB)

Objective – Reducing the cost gap between renewable and fossil hydrogen in the EU



Submission date
23 November 2023



Auction type
Fixed Subsidy



Total Budget
€ 800 million



Subsidy Limit
€ 4.5/kg of H2



Eligible Projects
RFNBO Production



Maximum bid per project
€ 266.7 million



Subsidy Period
10 years



Area of production
European Economic Area



Minimum project size
5 MW



Granting Authority
CINEA
*European Climate, Infrastructure
and Environment Executive
Agency*

Bid requirements are clear and require an advanced project maturity



Electricity sourcing strategy
> 60% of electricity needs covered by MoU/Lol, including pricing structure



Offtake strategy
> 60% of offtake covered by MoU/Lol, including pricing structure
(no restriction on offtake sectors)



Electrolyser procurement strategy
MoU/Lol with a manufacturer, including price and delivery timing

Requirements are less stringent for permitting



Permits
Credible evidence that the Project is on track to secure the environmental and grid connection permits

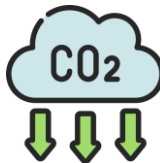
Commitments to be taken from winning bidders are reasonable



Minimum annual production
> 30% of annual bid volume



Start of H2 production
Max 5 years after subsidy agreement



CO2 reduction
70% GHG savings on produced H2



Completion bank guarantee
4% of the maximum subsidy amount

Commitments subject to penalties, backed by

ISSUES arise, but they could be solved in future rounds



Low subsidy amount
~18,000 tH2 per annum
Eligible in this auction round

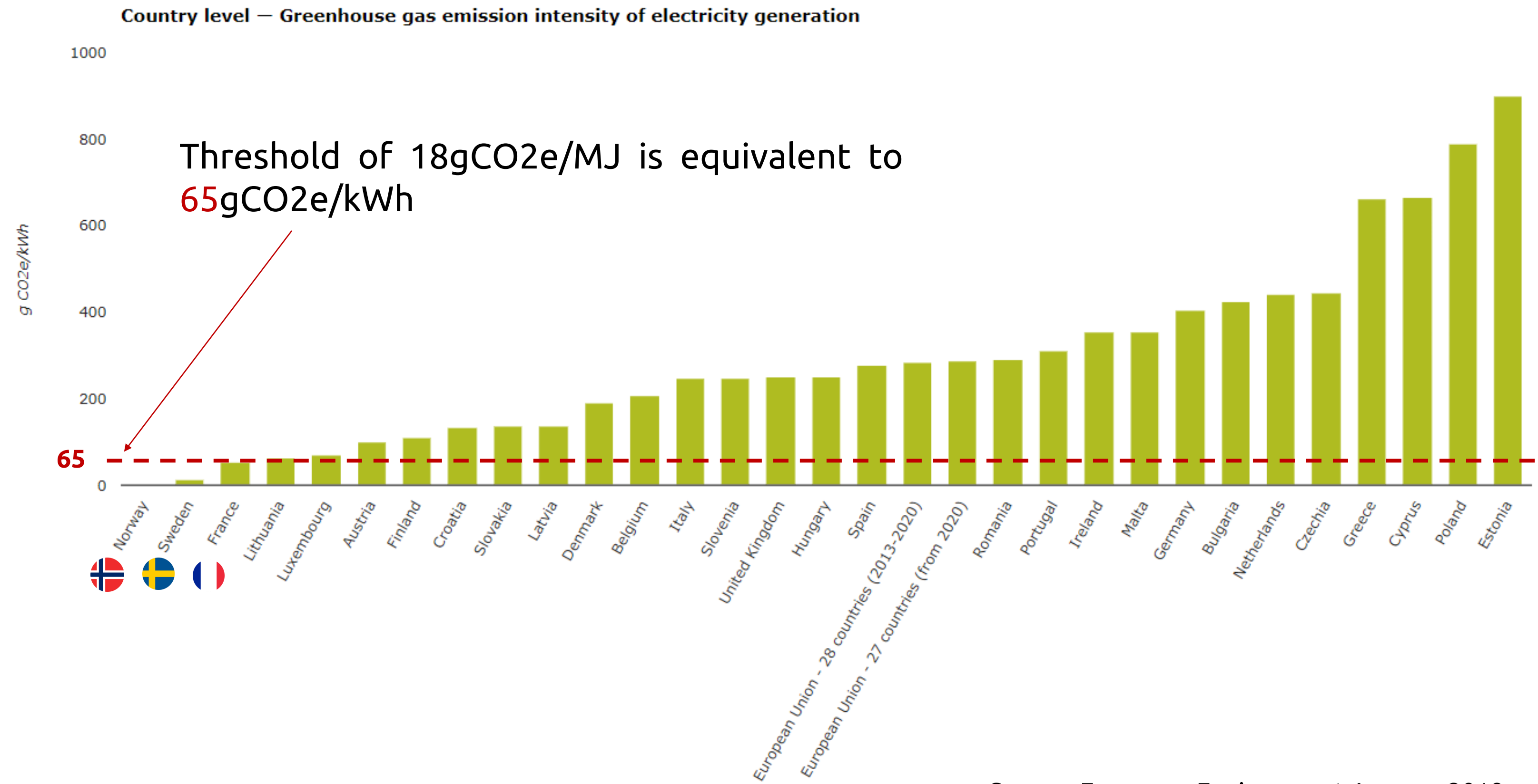
Only 0.2% of EU's RFNBO production target by 2030



Subsidy mechanics
Fixed subsidy for 10 year
No indexation

Payments every 6 months
Not matching with opex

Annex – Grid Carbon Intensity

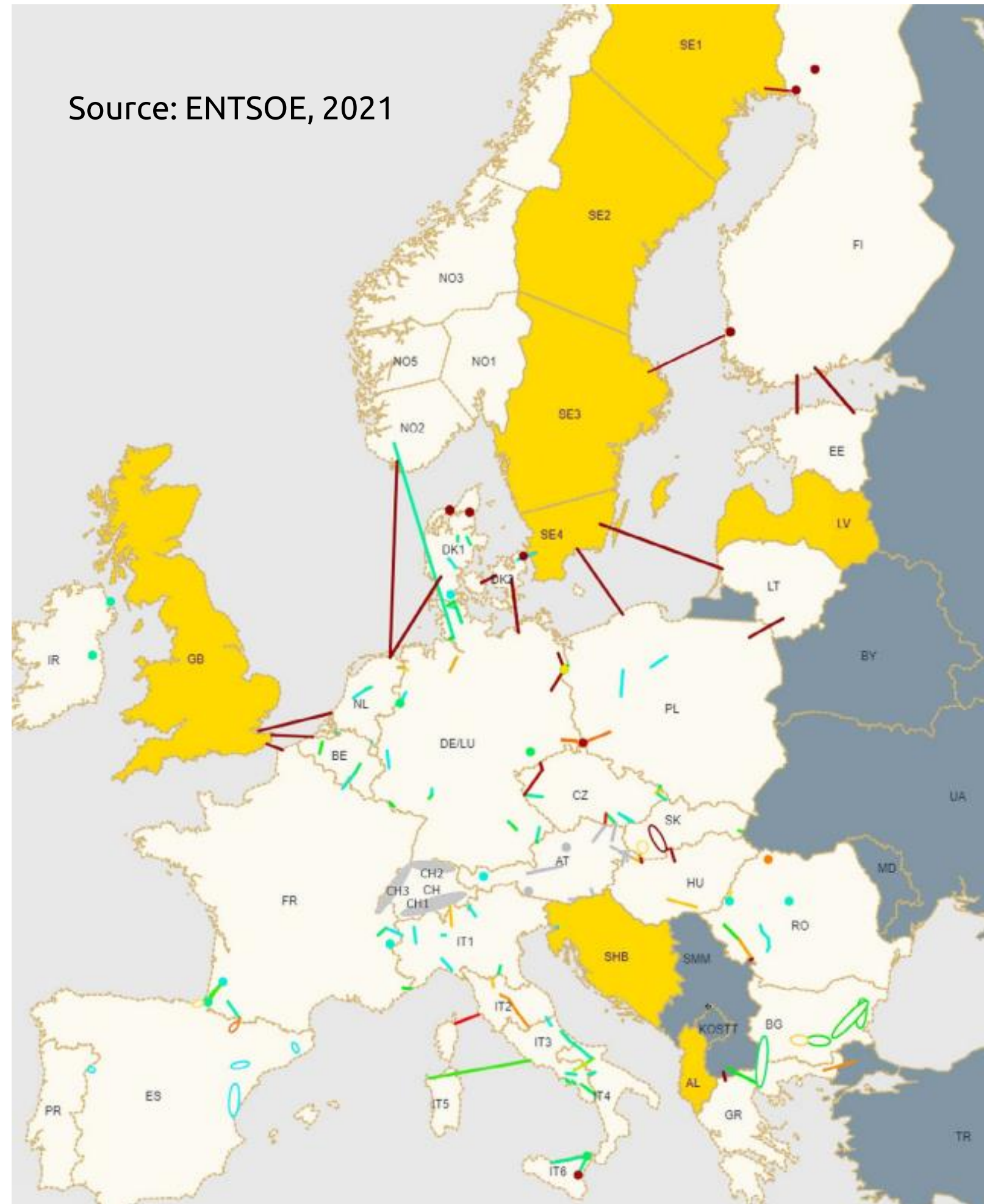


Source: European Environment Agency, 2019

Annex – ‘Bidding Zones’

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Source: ENTSOE, 2021



Note

Official definition of bidding zones is defined in REGULATION (EU) 2019/943 OF THE EUROPEAN PARLIAMENT