

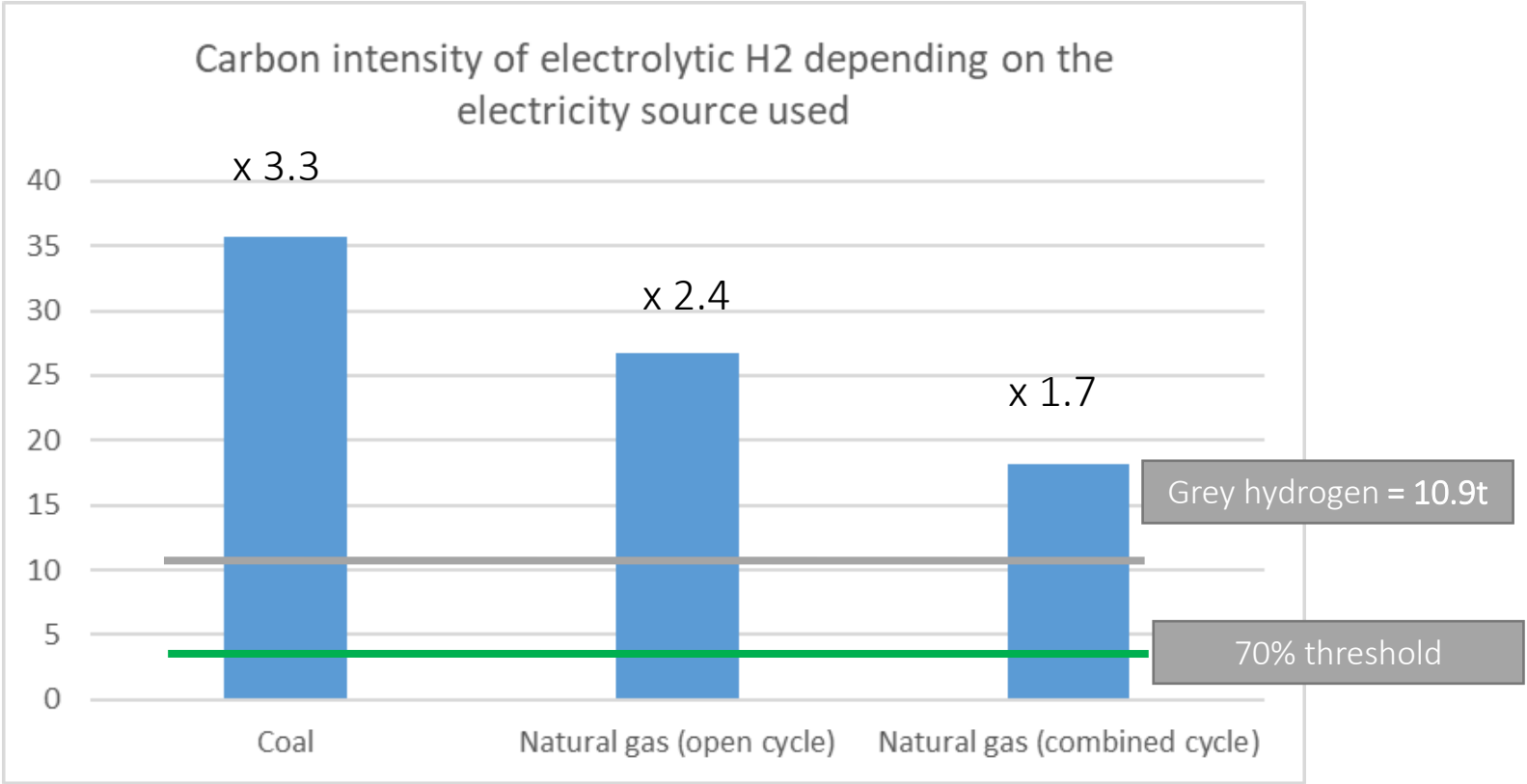


Renewable Hydrogen Delegated Acts

10/5/2023

Additionality delegated act

Reason for criteria for renewable hydrogen production



Source: Bellona (2021) based on EEA

What are the key principles?

Additionality

- Hydrogen production should add to the deployment of renewable energy

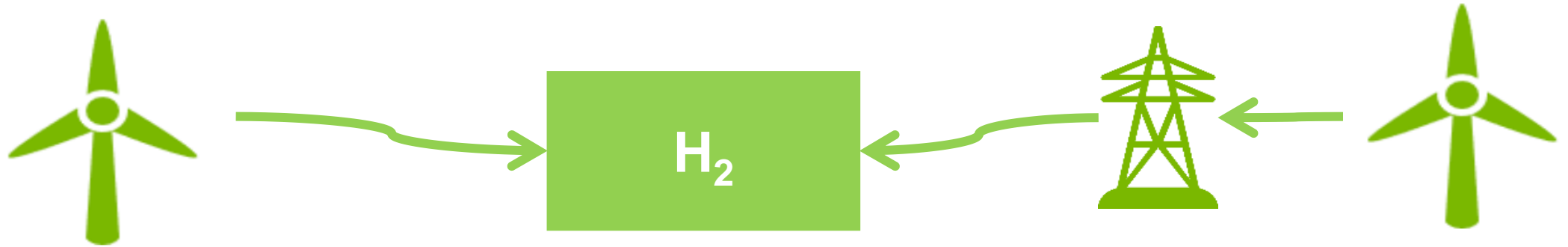
Temporal correlation

- Renewable hydrogen should be produced when renewable electricity is available

Geographic correlation

- There should be no grid congestion between the place where the renewable electricity is produced and where the renewable hydrogen is produced

How is the matter addressed in the DA?



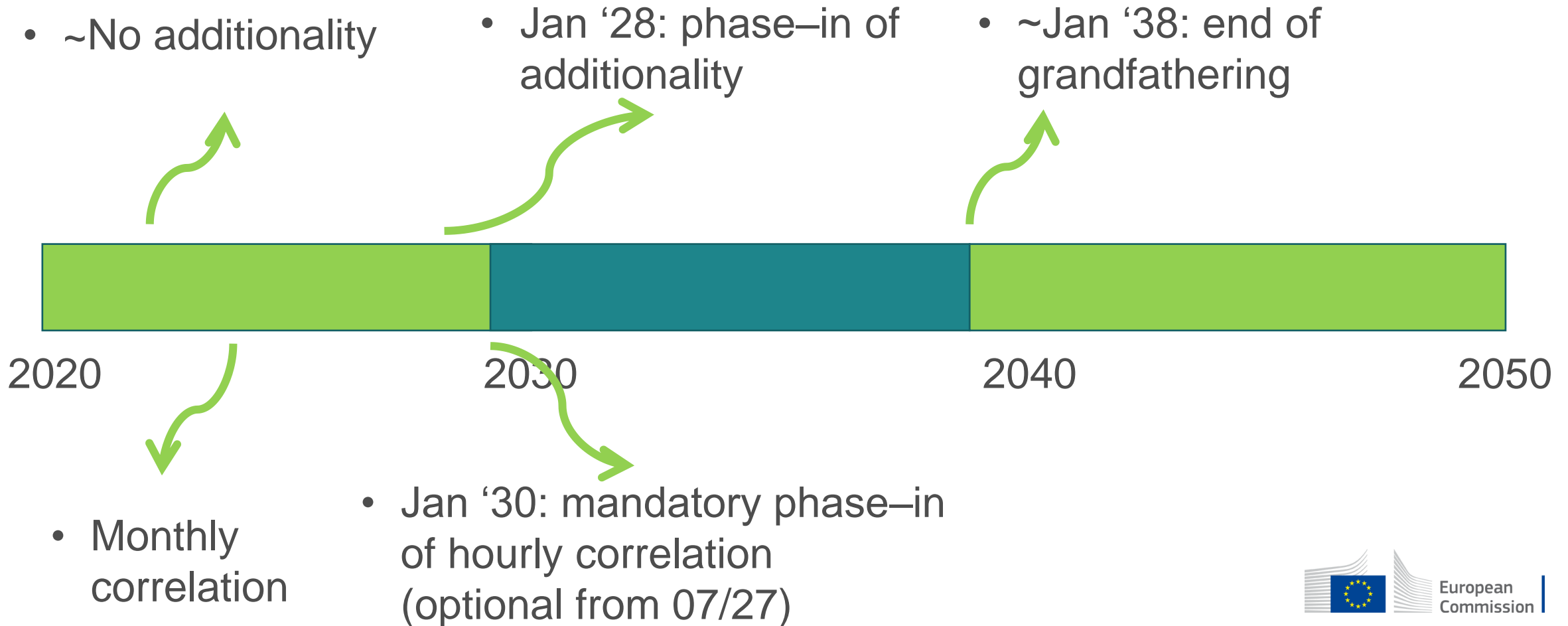
Direct connection:

- Renewable power asset should **be less than 36 months old**
- Electricity is consumed **at the hours** that the renewable power asset is producing
- Renewable power asset is located **at the site** of the hydrogen production

Sourcing via the grid:

- **Power purchase agreement** with **unsubsidised** renewable power asset
- Renewable power asset should **be less than 36 months old**
- **Hourly correlation** between hydrogen production and renewable power generation
- Located in the same **bidding zone**

How is industrial uptake ensured?



What happens to countries that have already decarbonised their electricity mix?

- Additionality no longer required if electricity mix is already largely decarbonised
- Threshold to be achieved: emission intensity < 18g CO₂/MJ
- Why this value? Hydrogen produced from such electricity achieves 70% emission savings
- But: Need to demonstrate that electricity is renewable:
 - Renewables PPA
 - Criteria of temporal and geographic correlation

Sunset clause

- Additionality no longer required if electricity mix is already largely based on renewable energy
- Threshold to be achieved: RES- E share > 90%
- Why this share? Hydrogen produced from electricity that is 90% renewable achieves 70% emission savings
- But: Need to limit full-load hours of electrolyzers. Full-load hours should not exceed the RES-E share

How will this be implemented and certified?

- Criteria apply for both for domestically produced hydrogen as well as for imports
- Certification to be conducted by voluntary schemes (international companies)
- Voluntary schemes already recognised for certification of bioenergy
- EU Member States are required to accept evidence from recognised schemes. Certification allows access to all markets

Methodology to calculate emission intensity of RFNBOs

1. Draft formula of GHG emissions

- $E = e_i + e_p + e_{td} + e_u - e_{ccs}$
- where:
- E = total emissions from the use of the fuel (gCO_{2eq} / MJ fuel)
- $e_i = e_{i\text{ elastic}} + e_{i\text{ rigid}} - e_{\text{ex-use}}$: emissions from supply of inputs (gCO_{2eq} / MJ fuel)
 - $e_{i\text{ elastic}}$ = emissions from elastic inputs (gCO_{2eq} / MJ fuel)
 - $e_{i\text{ rigid}}$ = emissions from rigid inputs (gCO_{2eq} / MJ fuel)
 - $e_{\text{ex-use}}$ = emissions from inputs' existing use or fate (gCO_{2eq} / MJ fuel)
- e_p = emissions from processing (gCO_{2eq} / MJ fuel)
- e_{td} = emissions from transport and distribution (gCO_{2eq} / MJ fuel)
- e_u = emissions from combusting the fuel in its end-use (gCO_{2eq} / MJ fuel)
- e_{ccs} = emissions savings from carbon capture and geological storage (gCO_{2eq} / MJ fuel)

2. Determining the RFNBO fraction of a fuel

- If the energy content of a fuel derives from a **mixture of renewable and non-renewable sources**, only the **fraction attributed to renewable sources** (other than biomass) is counted as **RFNBO**

given by



$$\frac{\text{renewable relevant energy input into the process}}{\text{total relevant energy input into the process}}$$

Analogous approach applies to determine the share of recycled carbon fuels

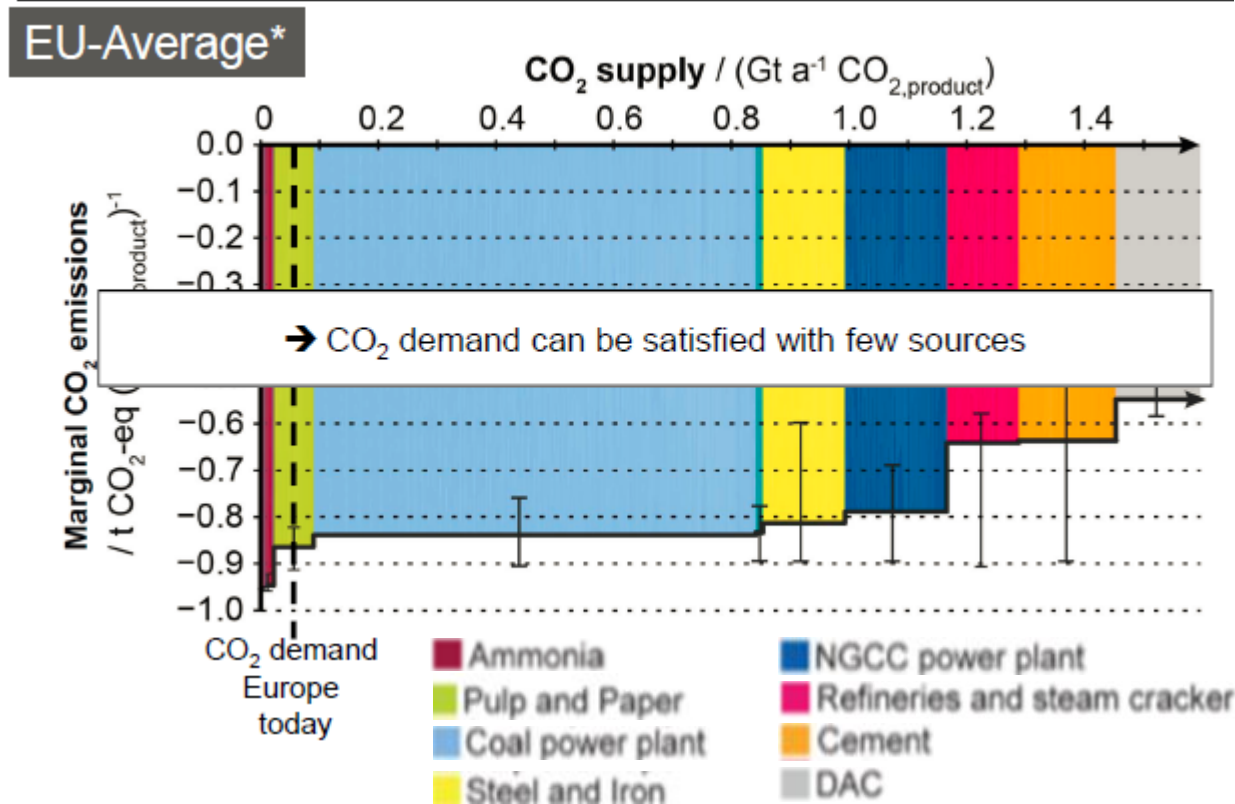
3. Co-processing

Input 1	Input 1
Input 2	Input 2
Input 3	Input 3
H2 qualifying as RFNBO	Fossil H2

4. Source of CO₂

- Currently more concentrated-CO₂ is available than the market can use and CO₂ that is not used is released to the atmosphere
- Hence, the use of CO₂ captured from the air does not lead to higher emission savings than the use of fossil-based processes
- But: In the long term (after 2035/2040) it is necessary to shift to a sustainable source of carbon i.e. carbon captured from the air or biogenic carbon; and
- Emissions must be subject to an effective carbon pricing system to provide the right incentive for the transition.

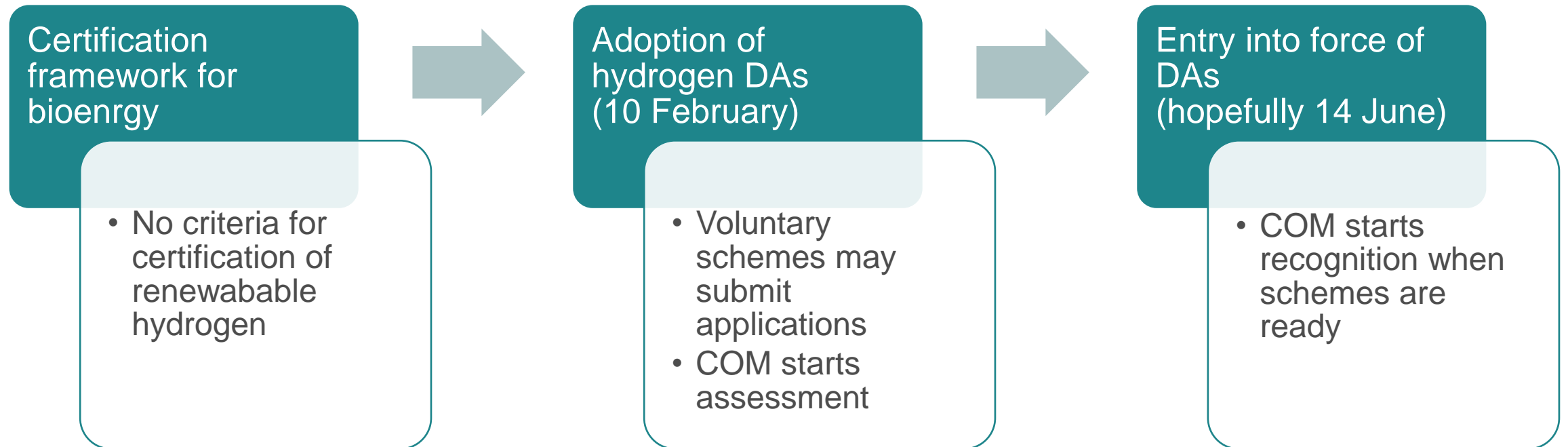
Environmental-merit-order curve for CO₂ supply



Reference: N. von der Assen, L.J. Müller, A. Steingrube, P. Voll, A. Bardow, Environ. Sci. Technol., 2016, 50 (3), pp 1093–1101

Process

When will the voluntary schemes be recognised?



Thank you

Additionality Delegated act: Overview of the compliance options

Decarbonised systems

1. Option: High share of RES-E

Compliance with the criteria on additionality, temporal and geographic correlation is assumed where the share of RES electricity is greater than 90%, max number of full load hours is limited in line with the RES share

2. Option: PPA + Low carbon electricity mix

Compliance with the criteria on additionality is presumed if the electricity mix is largely decarbonised, need to comply with temporal and geographic correlation

Curtailment

3. Option: System integration

Compliance with the criteria on additionality and temporal and geographic correlation is assumed if H2 production avoids curtailment of res electricity generation

Not yet decarbonised systems

4. Option: PPA + the following criteria

Additionality:

New RES-E generation capacity not older than 36 months
No net support for RES-E generation
Grandfathering: Requirements do not apply for installations entering operation before 1 January 2028.
Grandfathering until 2038



Temporal correlation:

Monthly matching until 1 January 2030 followed by hourly matching. MS may apply hourly matching as of July 2027; *or* onsite storage (electrolyser or RES installation); *or* low electricity price (<20€/MWh or 1/3 of the ETS price)



Geographical correlation:

Same bidding zone *or* Interconnected bidding zone if price in zone where H2 is produced is equal or lower.
MS may set stricter rules

Rigid and Elastic Inputs

- **Rigid** when the supply of these inputs cannot be expanded to meet increased demand
- **Elastic** when the supply expands with increasing demand

Let's start with an example...

Rigid/Elastic Inputs and GHG emissions calculation

GHG emissions calculation

