

# EU certification frameworks Sustainability criteria for green hydrogen

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# Guidehouse is a leading global provider of public and commercial sector consultancy, with broad capabilities in management, technology, and risk

## About Guidehouse

- Guidehouse was formed out of the former PWC US Public Sector practice and consultancy Guidehouse
  - The company has more than 12,000 professionals in over 50 locations globally
- 1** We help clients address complex challenges and navigate significant regulatory pressures focusing on transformational change, business resiliency, and technology-driven innovation

## Global Practices



Defense



Healthcare



Energy, Sustainability, & Infrastructure



National Security

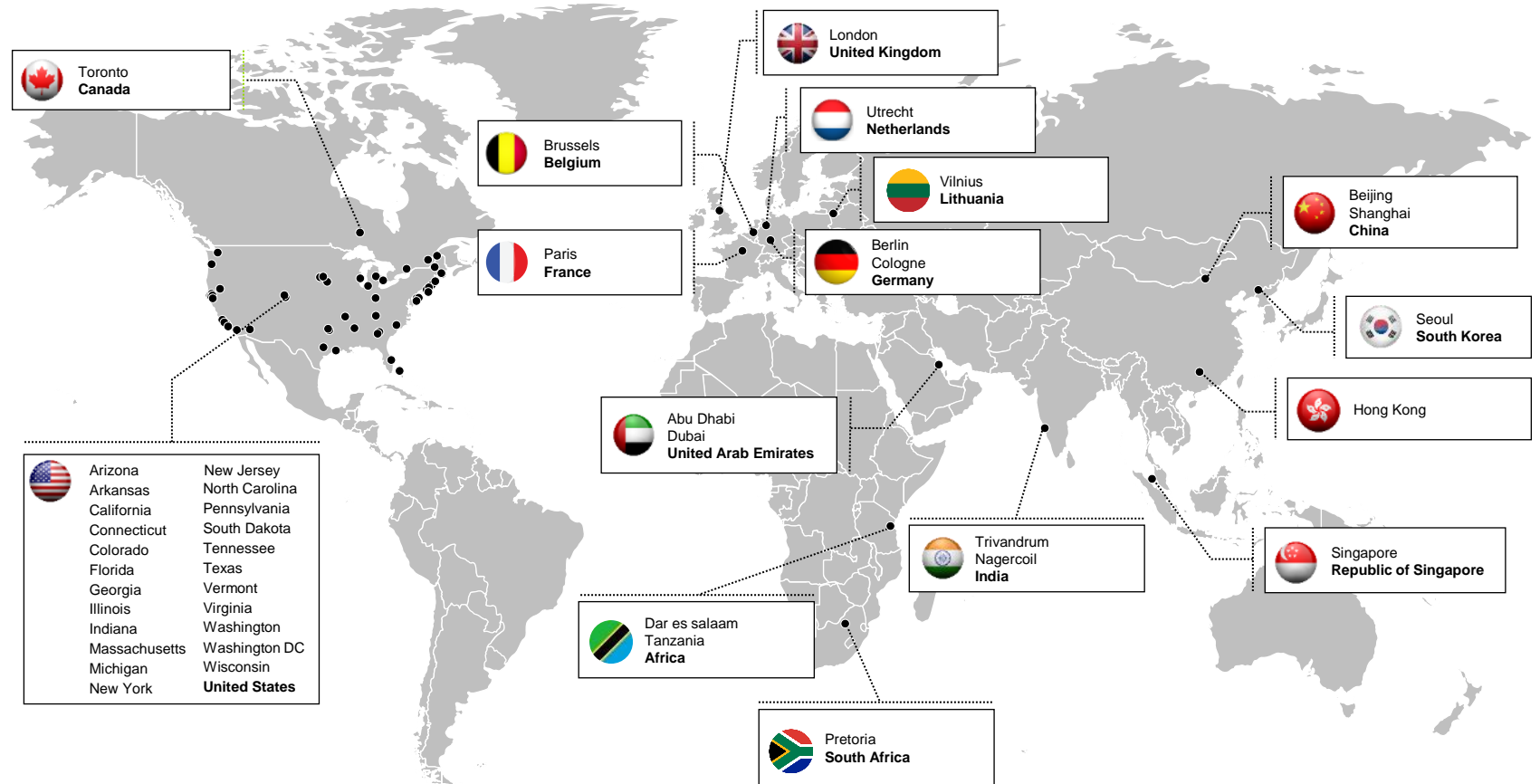


Financial Services



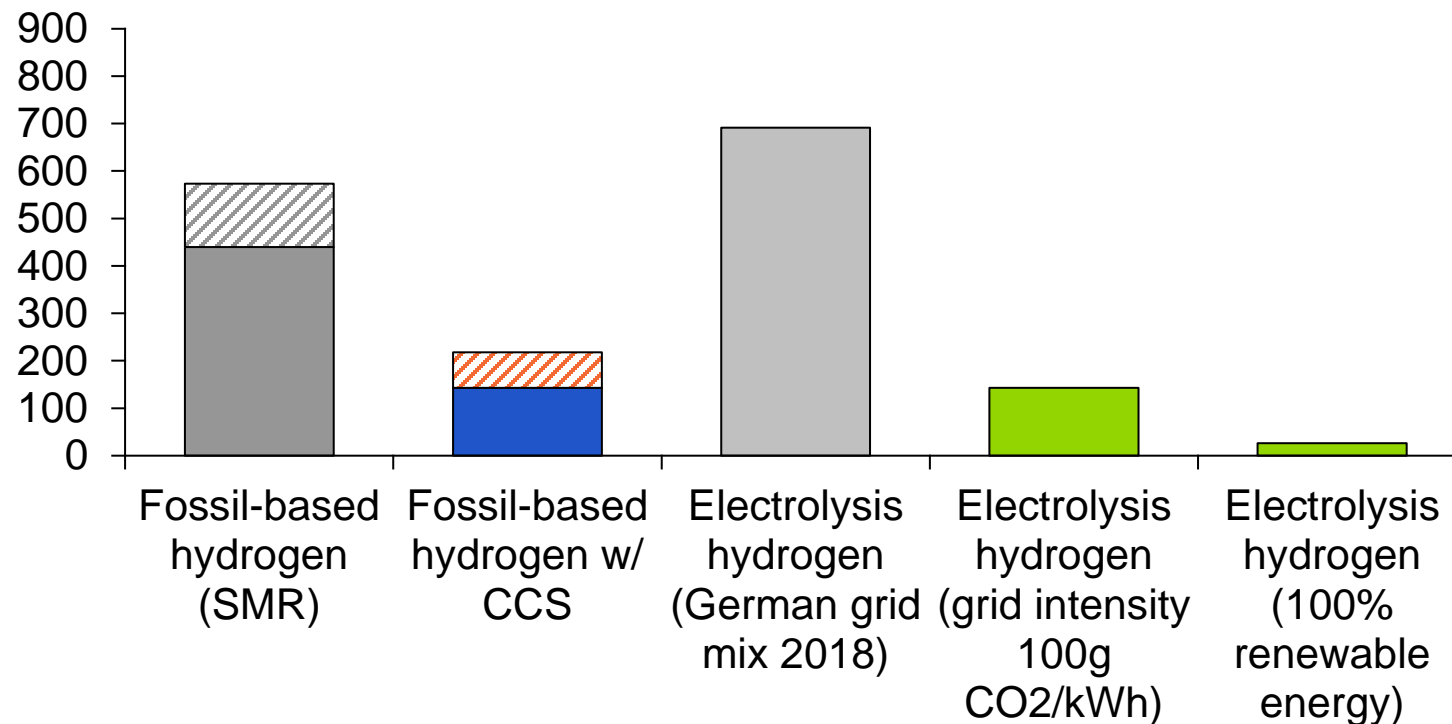
State & Local Government

## Guidehouse's global coverage



# Why do we need green hydrogen sustainability criteria?

GHG emission intensity by hydrogen production technology (gCO<sub>2eq</sub>/MWh H<sub>2</sub>)











Sources: EC 2020, ÖkoInstitut 2019, Greenpeace Energy 2020, CertifHy 2019

- 1 Switch to electrolysis is not enough
- 2 Need to avoid additional CO<sub>2</sub> emissions through hydrogen production
- 3 Energy (electricity and heat) and carbon source are the largest sustainability risks for hydrogen-based fuels

# Several “green hydrogen” standards are in place or development

Consolidation into a single EU standard?

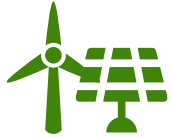
	Name	Body	Legal status
<input type="checkbox"/>	 RED II Delegated Acts	European Commission	Binding for RFNBO used in transport sector*
<input type="checkbox"/>	 Taxonomy	European Commission	Binding for “sustainable investment”
<input checked="" type="checkbox"/>	 CertifHy	FCH JU	Voluntary certification
<input checked="" type="checkbox"/>	 CMS 70	TÜV SÜD	Voluntary certification
<input type="checkbox"/>	 EEG Ordinance	German government	Binding to be exempt from the EEG levy
<input checked="" type="checkbox"/>	 SDE++ criteria	Dutch government	Binding to be eligible for gov. funding
<input checked="" type="checkbox"/>	 AFHYPAC standard	AFHYPAC	
<input checked="" type="checkbox"/>	 Low carbon fuels standard	State of California	Binding for fuel suppliers’ emission targets

- In place
- In development

\*renewable fuels of non-biological origin (RFNBO). RED II revision proposed to expand this to all end use sectors.

# RED II foresees different delegated acts on RFNBOs

Two delegated acts deal with renewable share and GHG footprint



## Art. 27 (3): RFNBO renewable energy content

“By 31 December 2021, the Commission shall adopt a delegated act [...] establishing a Union methodology setting out detailed rules by which economic operators are to comply with the requirements laid down in the fifth and sixth subparagraphs of this paragraph [to count electricity used for RFNBO production as fully renewable]”

## Needed for Art. 25 (1):

“In order to mainstream the use of renewable energy in the transport sector, each Member State shall set an obligation on fuel suppliers to ensure that the share of **renewable energy** within the final consumption of energy **in the transport sector is at least 14 % by 2030** (minimum share)”



## Art. 28 (5): RFNBO greenhouse gas emissions

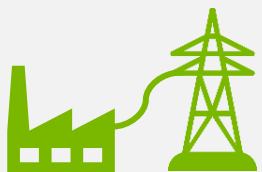
“By 31 December 2021, the Commission shall adopt delegated acts [...] specifying the methodology for assessing greenhouse gas emissions savings from [RFNBOs] and [RCFs]”

## Needed for Art. 25 (2):

“The **greenhouse gas emissions savings** from the use of [RFNBOs] shall be **at least 70 %** from 1 January 2021.”

# Electricity sourcing: RED II differentiates three cases of H<sub>2</sub> production

Delegated Act not adopted yet



## Case 1 Average grid electricity

Renewable share of grid mix  
= renewable share of H<sub>2</sub>

⚠ Can only be applied in countries with very low power system emissions – otherwise, GHG threshold not met



## Case 2 Direct connection

100% renewable H<sub>2</sub>

But:

- Renewable generation must be new

➡ Should be possible to apply in most countries globally



## Case 3 Renewable grid electricity

100% renewable H<sub>2</sub>

But: Need to fulfil

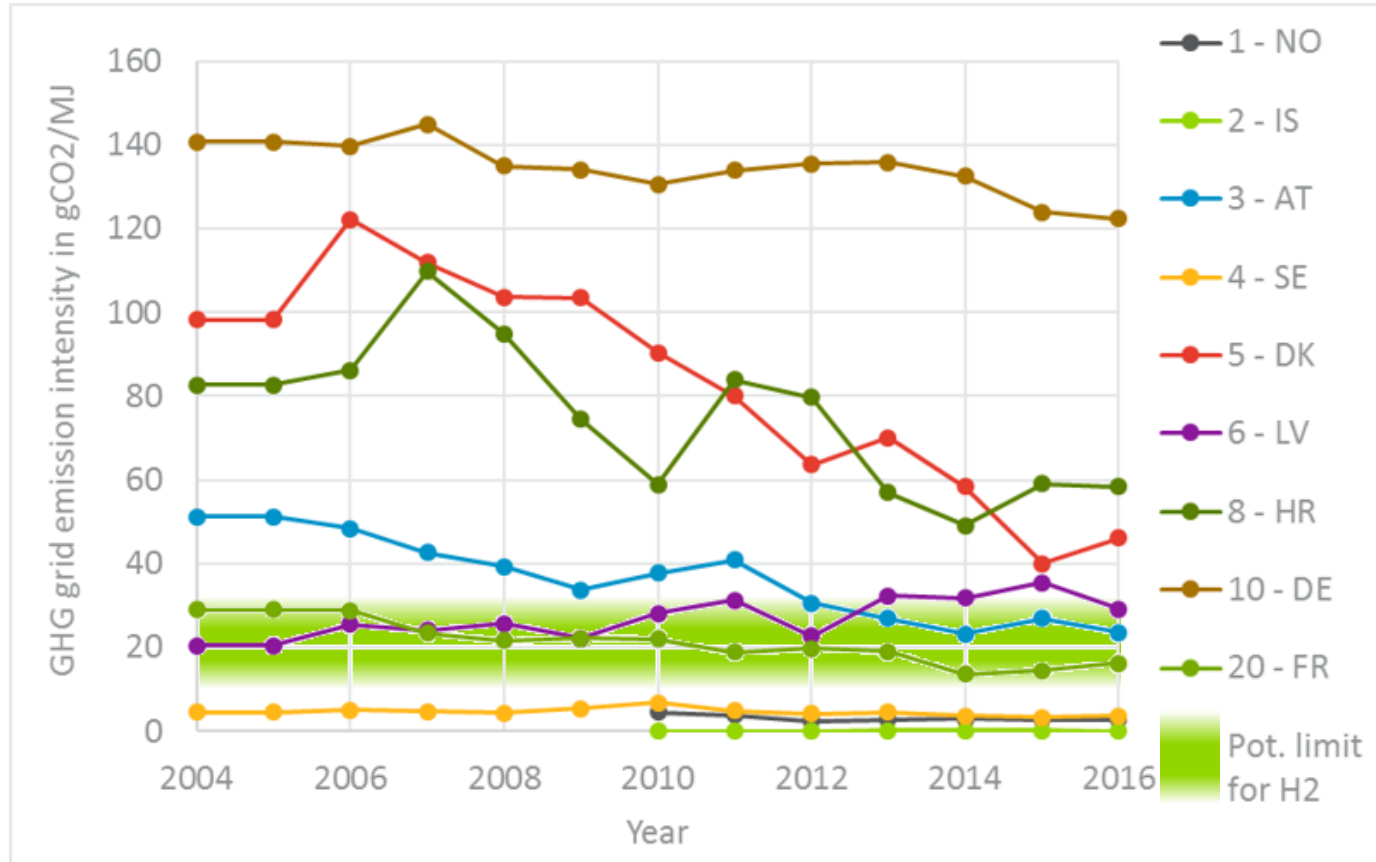
- Additionality
- Temporal correlation
- Geographical correlation

❓ Generally possible, but may require liberalized power market



# Case 1: Average grid electricity

## GHG emission savings need to be considered



Grid emission factors for selected countries.

The legend also gives the rank of countries in terms of RES-E share for the year 2018.

Source: EEA, enerdata (Norway, Iceland)

The threshold for hydrogen as RFNBO is indicated as an illustrative reference. The actual threshold depends the fossil comparator, the 70% savings and the actual plant efficiency. Note that a separate delegated act is being developed which explicitly deals with GHG emission savings. This figure serves only as an indicative reference.

# Electricity sourcing: RED II differentiates three cases of H<sub>2</sub> production

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- Geographical correlation

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# Case 2: Direct connection

## Working principles of case 2

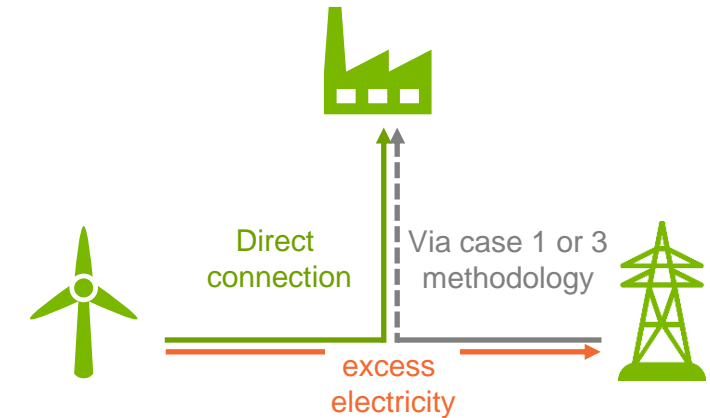
- **Isolated direct connection**

- Electricity either consumed by the RFNBO facility or curtailed



- **Direct connection plus grid connection**

- Excess electricity can be exported to the grid
- Strict temporal correlation
- Applying case 3 methodology always possible



- **“Fast track”** to claim full renewability: Should require less administrative burden than case 3

# Electricity sourcing: RED II differentiates three cases of H<sub>2</sub> production

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## Case 2 Direct connection

100% renewable H<sub>2</sub>

But:

- Renewable generation must be new

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## Case 3 Renewable grid electricity

100% renewable H<sub>2</sub>

But: Need to fulfil

- Additionality
- Temporal correlation
- Geographical correlation

❓ Generally possible, but concrete design complicated



Case 1



Case 2

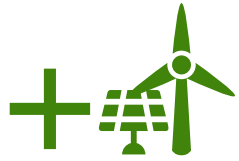


Case 3

# Case 3: Renewable grid electricity

## Criteria for renewable electricity from the grid (Case 3)

## Definitions



**Additionality of electricity**

*“the fuel producer is adding to the renewable deployment or to the financing of renewable energy”*



**Temporal correlation RE- & H2-production**

*“temporal...correlation between the electricity production unit with which the producer has a bilateral renewables power purchase agreement and the fuel production”*



**Geographical correlation**

*“geographical correlation between the electricity production unit with which the producer has a bilateral renewables power purchase agreement and the fuel production”*



Case 1



Case 2

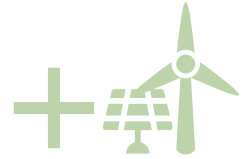
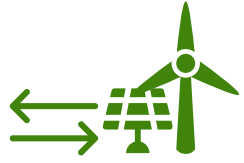


Case 3

# Sourcing of renewable electricity

## Why are there other requirements than simple sourcing?

Standalone GOs and/or PPAs would not necessarily ensure that electricity sourced by RFNBOs is 100% renewable in the REDII sense and from the energy systems perspective



**No additionality**



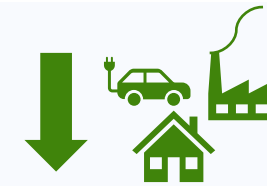
Renewable production

-



RFNBO electricity consumption

=



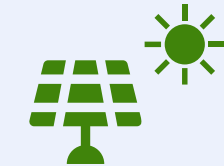
Renewable electricity consumption

+



Fossil electricity generation

**No temporal correlation**



Renewable production

X



RFNBO electricity consumption



Fossil electricity generation

**No geographical correlation**



Renewable production

X



Electricity transmission

=



RFNBO electricity consumption



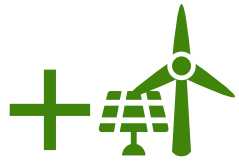
Local fossil electricity generation



# Case 3: Renewable grid electricity

## Criteria for renewable electricity from the grid (Case 3)

## Possible ways to implement



**Additionality of electricity**

- PPA with new RE plant (not subsidized)
- PPA with old RE plant (even subsidized) if PPA extends efficient RE plant lifetime



**Temporal correlation RE- & H2-production**

- 15 minute, hourly, daily, monthly or yearly matching between production of RE and consumption
- System matching based on predefined criteria (high RES-share, low grid GHG emission factor)



**Geographical correlation**

- Same bidding zone, neighboring bidding zone if no structural or current grid congestion

# Green H2 imports to EU will have to meet criteria on renewable **electricity input** and **GHG emission intensity**



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**Thank you!**