



# Complying with European sustainability criteria for renewable hydrogen - Problems and recommendations for Indian GH<sub>2</sub> projects

11.04.2023

Key results of short study:  
„Compatibility gaps between European sustainability criteria for renewable hydrogen production and Indian electricity system“

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# Sustainability criteria for the production of renewable hydrogen cause uncertainties in Indian projects aiming to export to the EU



- › The European Union plans to produce 10 Mio. t of renewable hydrogen within its member states and import 10 Mio. t from third countries in 2030 <sup>a</sup>
- › To have a common understanding of what ‘renewable’ hydrogen means, the Renewable Energy Directive (2018/2001) (RED II) supplemented with a much discussed delegated act (DA) sets out rules for the production of renewable hydrogen <sup>b</sup>



- › The EU imposes these rules to renewable hydrogen produced **inside the territory of the EU and outside**, making them essential to third countries who want to export renewable hydrogen to the EU
- › Because third countries’ electricity system and market design can vary from that of the EU, this study points out **compatibility issues** between the rules set in the DA and the Indian electricity system, focussing on geographical correlation and the **concept of bidding zones**

<sup>a</sup> | [REPowerEU Plan \(European Commission 2022\)](#)

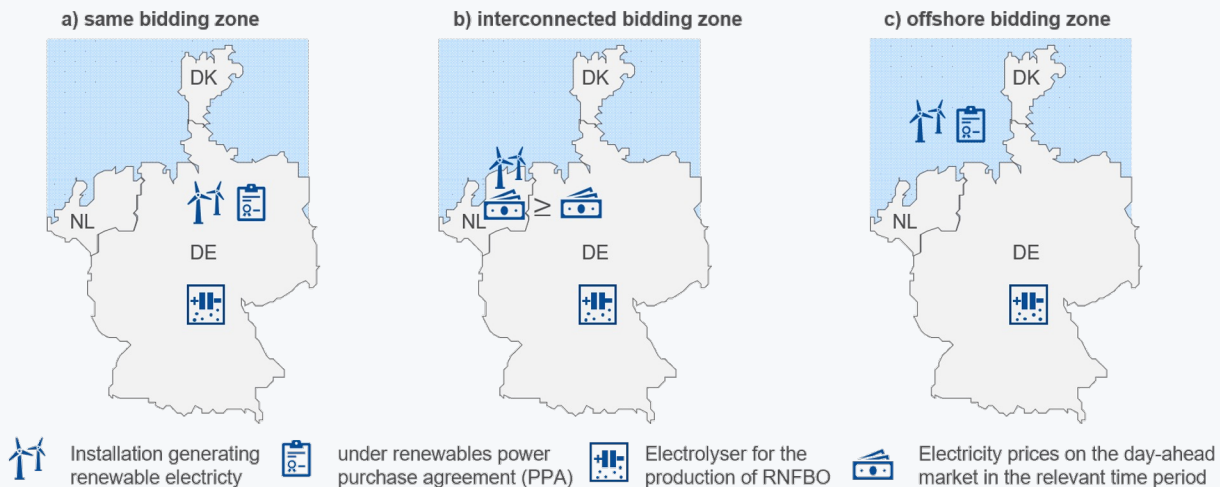
<sup>b</sup> | [Delegated Regulation supplementing Directive \(EU\) 2018/2001 \(European Commission 2023\)](#)

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# Geographical correlation (as in the DA) is met if one of the following three conditions relating to location of the electrolyser is fulfilled <sup>a</sup>



**i** Generally, hydrogen can be considered as renewable if the electrolyser is located in a bidding zone where electricity emission factors or renewable energy share have reached certain thresholds <sup>a</sup>

The requirements on geographical correlation are closely linked to the concept of bidding zones

<sup>a</sup> | Article 4 & 7 delegated Regulation supplementing Directive (EU) 2018/2001 (European Commission 2023)

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# Bidding zones reflect structural congestion in the European grid and are therefore incorporated in the DA

- › The European Regulation 2019/943 defines bidding zones as “[...] the largest geographical area within which market participants are able to exchange energy without capacity allocation.”<sup>a</sup>
- › In case of hydrogen, the concept of bidding zones is applied to avoid that electrolyzers may actually depend on fossil-based generation and possibly result in curtailment of renewable electricity production
- › The European Commission allows hydrogen producers in third countries without bidding zones to rely on **equivalent concepts**, if the objective of the delegated act is maintained and the most similar concept existing in the third country is used for implementation<sup>b</sup>



Bidding zones in Europe

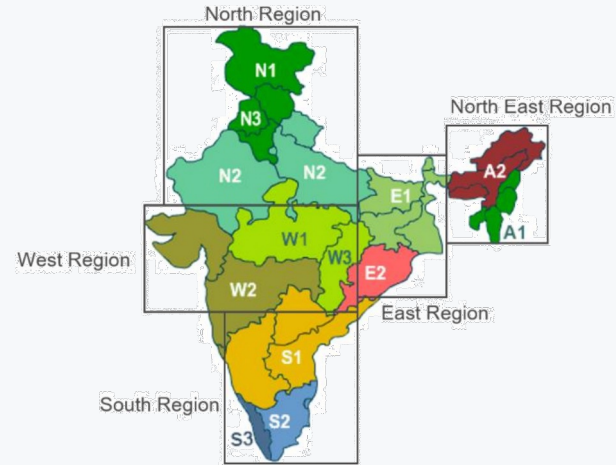
Using the concept of bidding zones in European sustainability criteria is reasonable. However, this concept might be unnecessary restrictive for countries outside the European Union

a | [High-level approach to identify alternative bidding zone configurations for the bidding zone review \(ACER 2021\)](#) p. 6

b | [Delegated Regulation supplementing Directive \(EU\) 2018/2001 \(European Commission 2023\)](#)

# Electricity exchange between Indian bidding areas is possible nearly without capacity allocation and market splits

- › After accomplishing the “one nation – one grid – one frequency” goal in 2013 there were still constraints in freely exchanging electricity due to congestions in the transmission network <sup>a</sup>
- › This led to market splitting and different market prices in different regions, which today is still represented by so called bidding areas <sup>a</sup>
- › With a governmental initiative in 2014 India has become one of the largest synchronous interconnected electricity grids in the world, in which electricity can almost\* freely be exchanged, resulting in a single price across different grid areas <sup>a</sup>



Day Ahead bidding areas in India

India has an interconnected electricity grid with sufficient inter and intra state transmission capacities making it one comprehensive bidding zone by EU definition

<sup>a</sup> | [Transmission Overview \(Ministry of Power 2023\)](#)  
<sup>\*</sup> Roughly 0.06 % of electricity cannot be cleared in Power Exchanges



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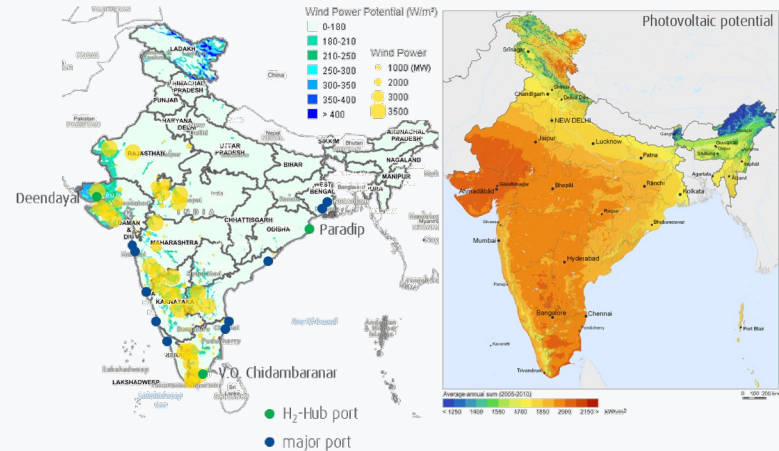
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# Maximising operating hours of the electrolyser by sourcing electricity from different technologies lowers production costs of H<sub>2</sub>

- › Levelized costs of renewable hydrogen from a well-balanced electricity procurement portfolio of wind power and solar can be up to 25% cheaper (1.3 €/kg) than a portfolio of only solar power <sup>a</sup>
- › Using existing harbour infrastructure, a well balanced renewable energy portfolio and innovative market designs means a strong advantage in hydrogen production for India
- › Applying current EU rules on geographical correlation, this advantage might be reduced, since the electrolyser must be built in a bidding zone close enough to the bidding zone of the installation generating renewable electricity

Wind & photovoltaic power potential and major ports in India <sup>b</sup>



Considering India as one bidding zone could lead to significant cost reduction of renewable H<sub>2</sub>

<sup>a</sup> | [Grünstromkriterien für RED II \(Frontier 2021\)](#) p. 34  
<sup>b</sup> | [Ports Wing \(Ministry of Ports, Shipping and Waterways 2023\)](#), [Maritime India Vision 2030 \(Ministry of Ports, Shipping and Waterways 2021\)](#) p. 41, [Energy map of India \(Government of India 2021\)](#), [Emerging trend in the Indian solar power sector \(pv magazine India 2021\)](#)

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# The country of India can be considered as one bidding zone. Recognised schemes can demonstrate this in compliance with the DA

- › India has established a well-connected electricity network with sufficient interconnections between bidding areas and renewable electricity only markets to guarantee renewable origin as well as the possibility to use renewable PPAs between market participants located in different Indian bidding areas without causing congestions
  - › India would therefore qualify as one coherent bidding zone by EU definition
- › The EU commission allows renewable hydrogen producers to make use of national schemes or international voluntary schemes recognised by the Commission pursuant to Article 30(4) of Directive (EU) 2018/2001 to demonstrate compliance with the criteria set out in the DA <sup>a</sup>
  - › If such recognised voluntary scheme approves with the concept of India being regarded as one bidding zone, associated investment risks would be resolved

A first show case, in which a recognised scheme certifies a hydrogen production project as renewable by RED II - and considers India as one bidding zone - should be promoted

a | [Delegated Regulation supplementing Directive \(EU\) 2018/2001 \(European Commission 2023\)](#) paragraph 3

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