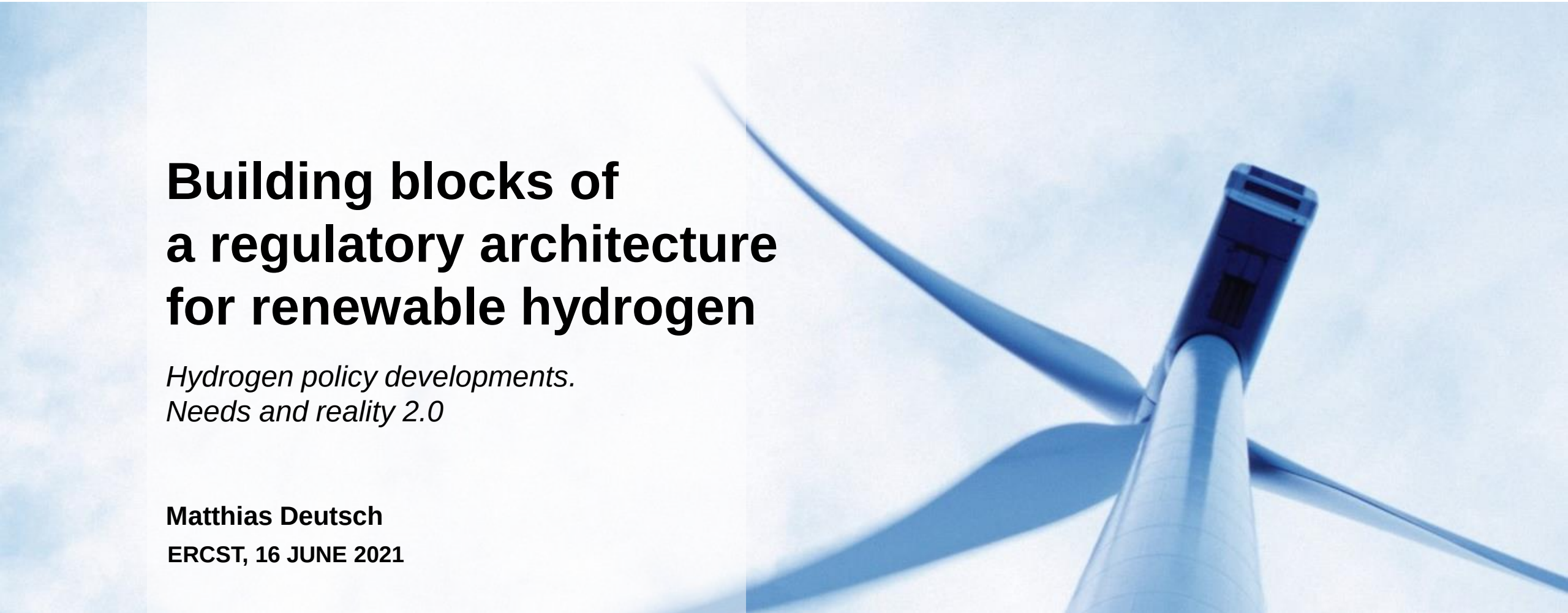
Agora Energiewende



Building blocks of a regulatory architecture for renewable hydrogen

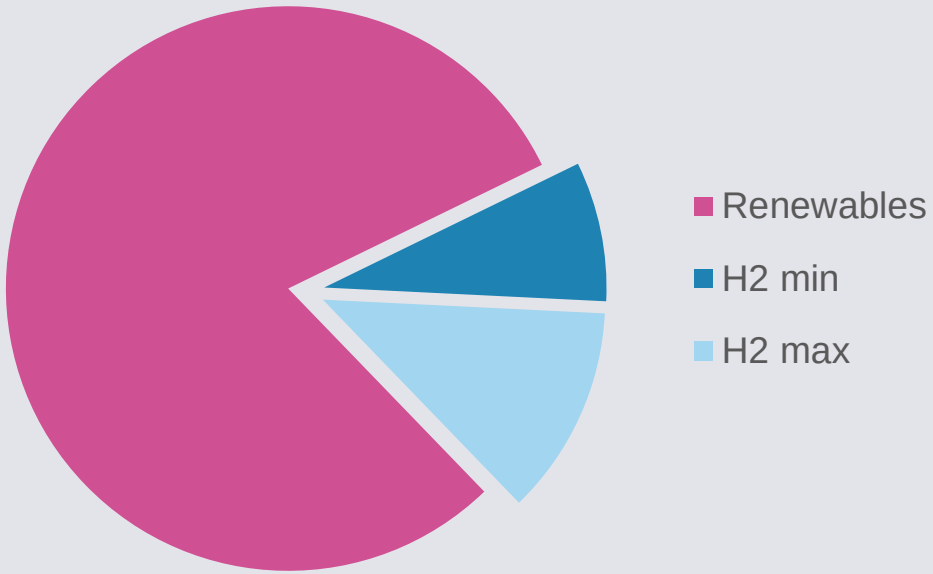
Hydrogen policy developments. Needs and reality 2.0

Matthias Deutsch

ERCST, 16 JUNE 2021

Climate-neutral energy systems: Hydrogen supplies the last 8 to 20 % and needs to be made green

Share in final energy demand according to major global scenarios

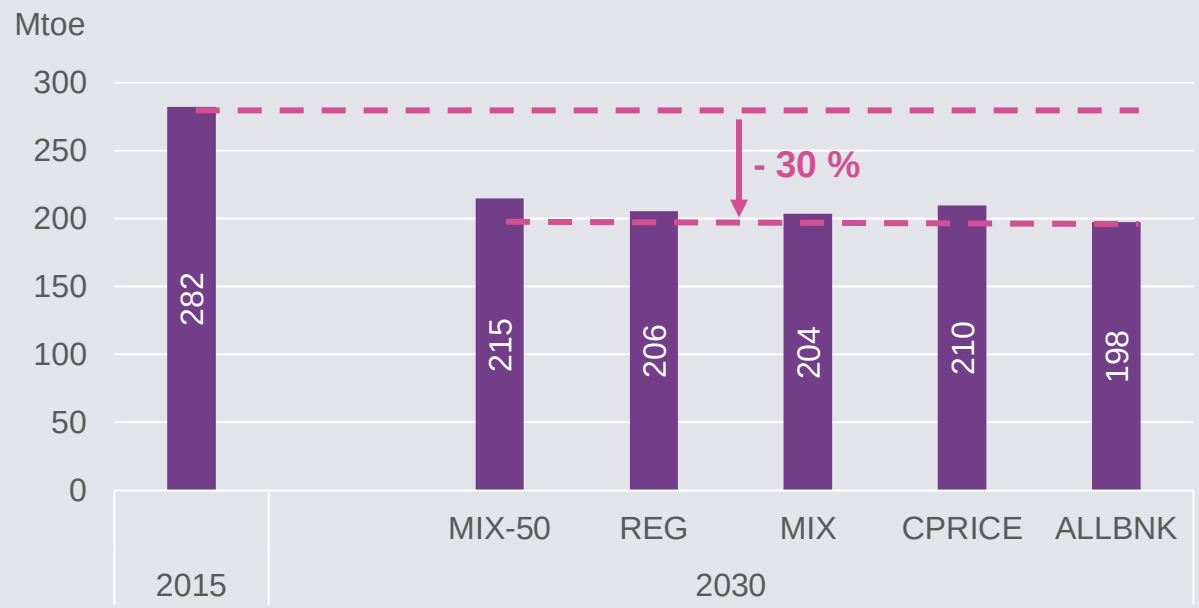


Agora Energiewende based on JRC, IRENA, BNEF, IEA

- Hydrogen and decarbonised gases supply **niches**; if they supply beyond those, cost-effectiveness declines (cost of supply 1.5-5 times higher than for natural gas)
- A commitment to hydrogen is a **commitment to additional renewables** upscaling in a context of 99 % fossil fuel based hydrogen.
- EU‘s 40 GW **electrolyser ambition** = 80-120 GW additional solar and wind by 2030

Climate-neutral energy systems: No more unabated gas in 2050.

EU natural gas gross inland consumption



COM (2020): Climate Target Plan Impact Assessment

- **Climate neutrality** by latest 2050 and 55% reduction by 2030 commit Europe to ending use of (unabated) fossil gas. The indicative EU GHG-budget (2030-2050) will quantify remaining emissions from gas use.
- The EU gas market is a ***shrinking*** market (-30% by 2030). The Q4 gas package is a **transition package**.
- **Key issues**: priority uses for remaining fossil/renewable gas? Cost-efficient alternatives to fossil gas? Implications for infrastructure and public support?

Hydrogen demand: Which applications really need green molecules to become climate-neutral?

Need for green molecules, in addition to green electrons

Green molecules needed?	Industry	Transport	Power sector	Buildings
Uncontroversial	• Reaction agents (DRI steel) • Feedstock (ammonia, chemicals)	• Long-haul aviation • Maritime shipping	• Long-term storage for variable renewable energy back-up	• District heating (residual heat load *)
Controversial	• High-temperature heat	• Trucks and buses ** • Short-haul aviation and shipping	• Absolute size of need given other flexibility and storage options	
Bad idea	• Low-temperature heat	• Cars • Light-duty vehicles		• Individual buildings

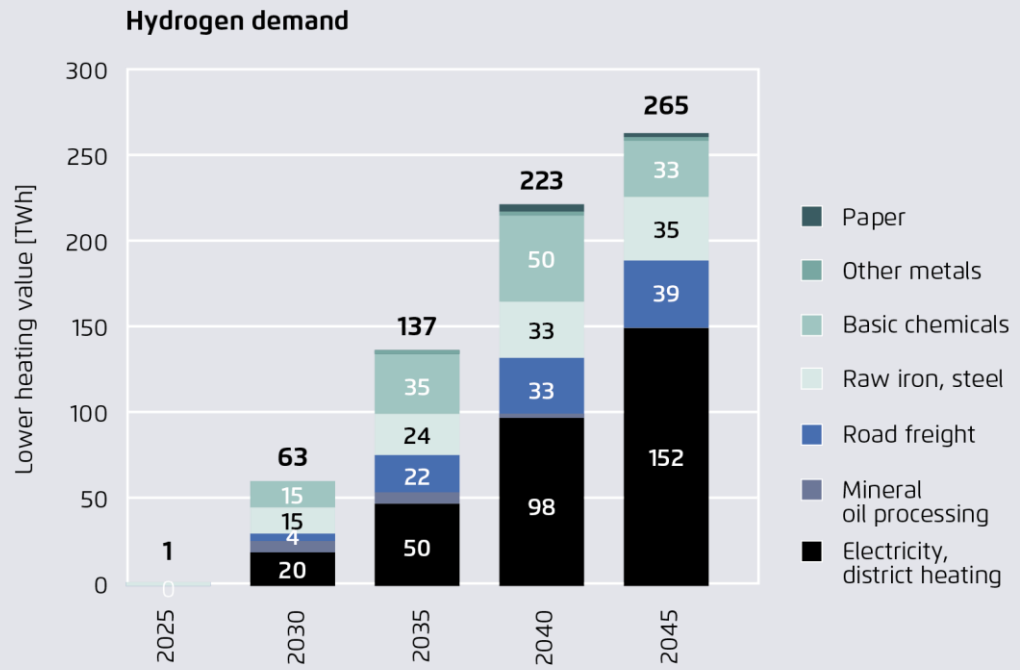
* After using renewable energy, ambient and waste heat as much as possible. Especially relevant for large existing district heating systems with high flow temperatures. Note that according to the UNFCCC Common Reporting Format, district heating is classified as being part of the power sector.

** Series production currently more advanced on electric than on hydrogen for heavy duty vehicles and busses. Hydrogen heavy duty to be deployed at this point in time only in locations with synergies (ports, industry clusters).

Strategies for climate neutrality

Hydrogen – for safeguarding security of supply in the energy system and to create a climate neutral industry

Demand for CO_2-free H_2 in Germany



Towards a climate-neutral Germany by 2045

Prognos/Öko-Institut/Wuppertal Institut 2021; Note: Hydrogen only. In addition, Germany will need 158 TWh of Power-to-Liquid by 2045.

Renewable H_2 is more expensive than fossil-based H_2 and needs policy support. Even at a price of 100-200 €/t CO_2, the ETS alone will not incentivize renewable H_2 production sufficiently.

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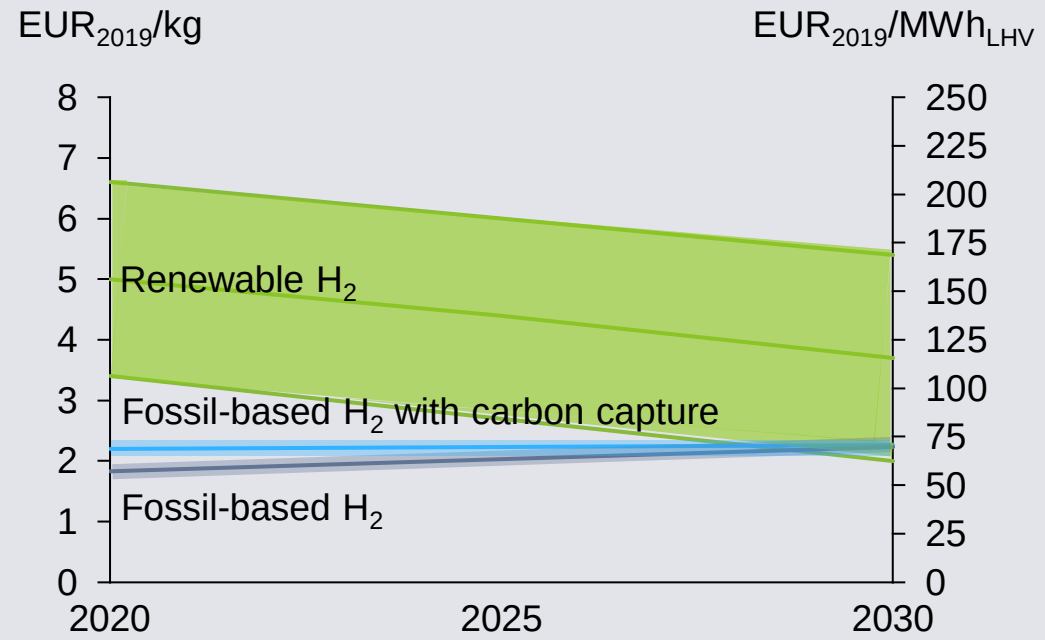
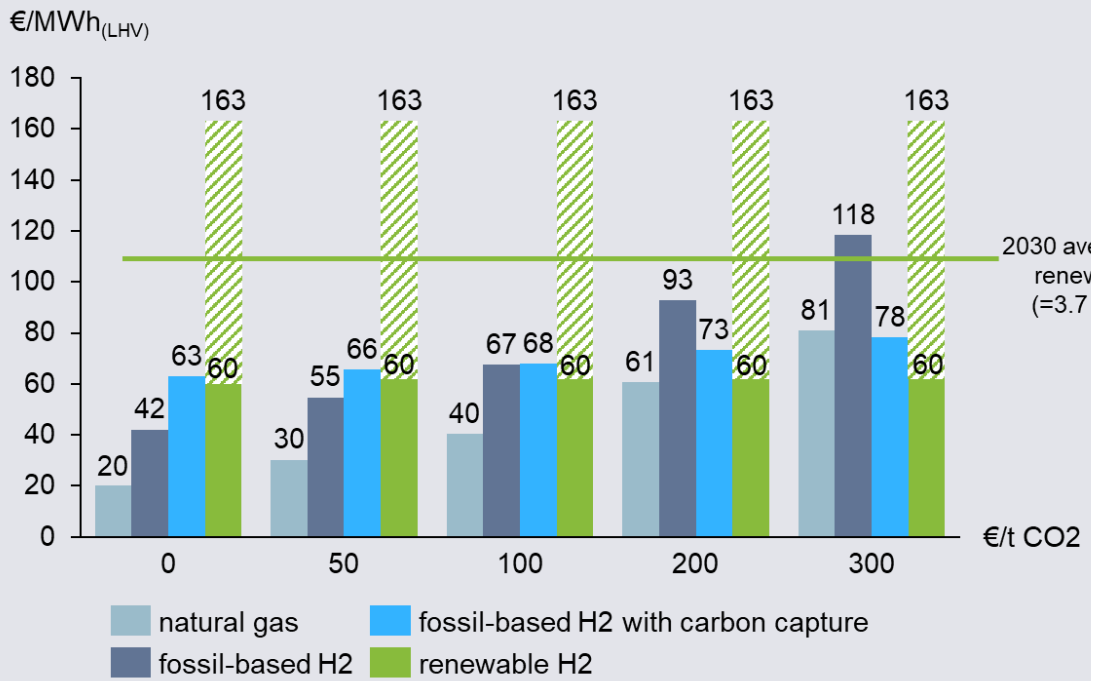
Cost of hydrogen over time



Guidehouse (forthcoming),
assuming CO_2 prices of 50 €/t (2020) and 100 €/t (2030)

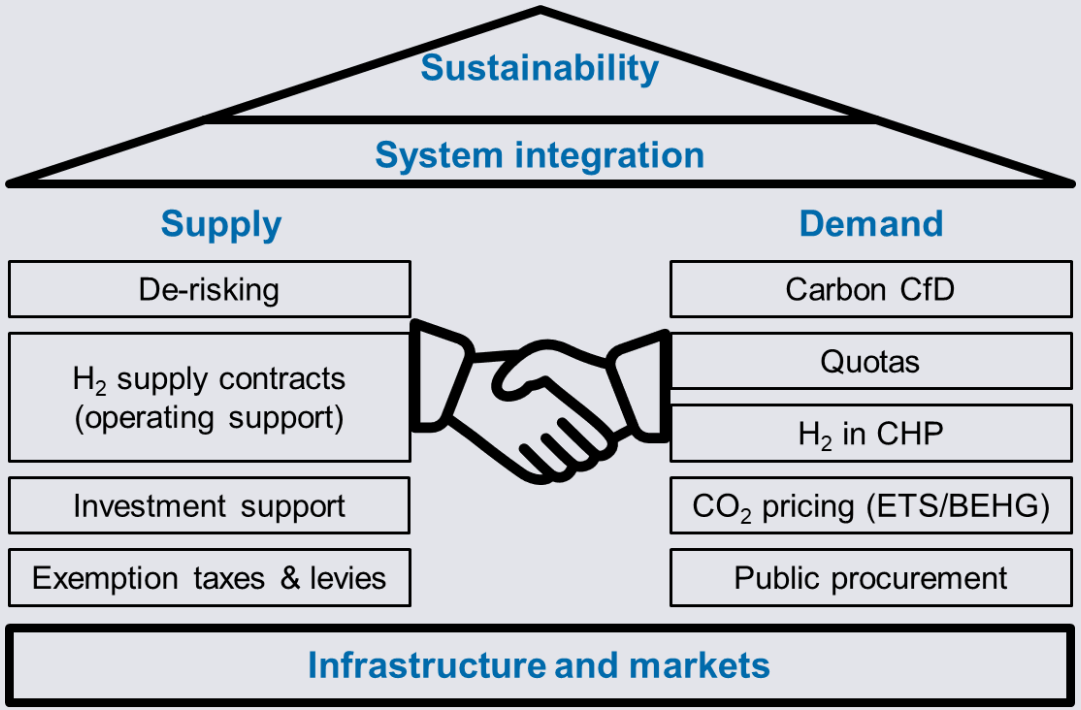
Cost of hydrogen over price of CO_2



Guidehouse (forthcoming)

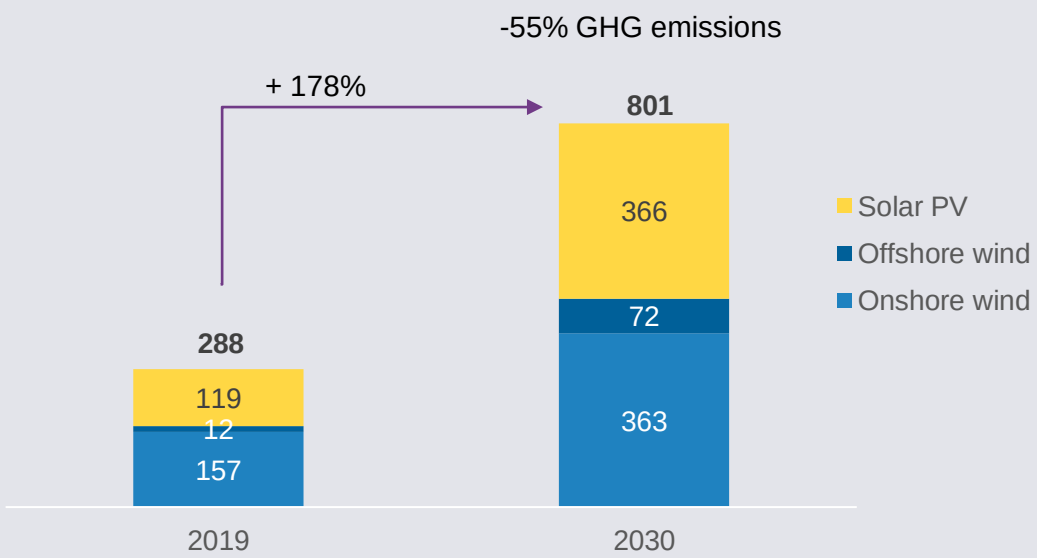
Renewable hydrogen needs a regulatory architecture – and massive renewable energy deployment

Building blocks for a regulatory architecture



Guidehouse (forthcoming)

Renewable energy needs, even without much additional hydrogen



Commission Impact Assessment, Wind Europe (2020), Solar Power Europe (2019)

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Thank you for your attention!

Questions or comments? Feel free to contact me:

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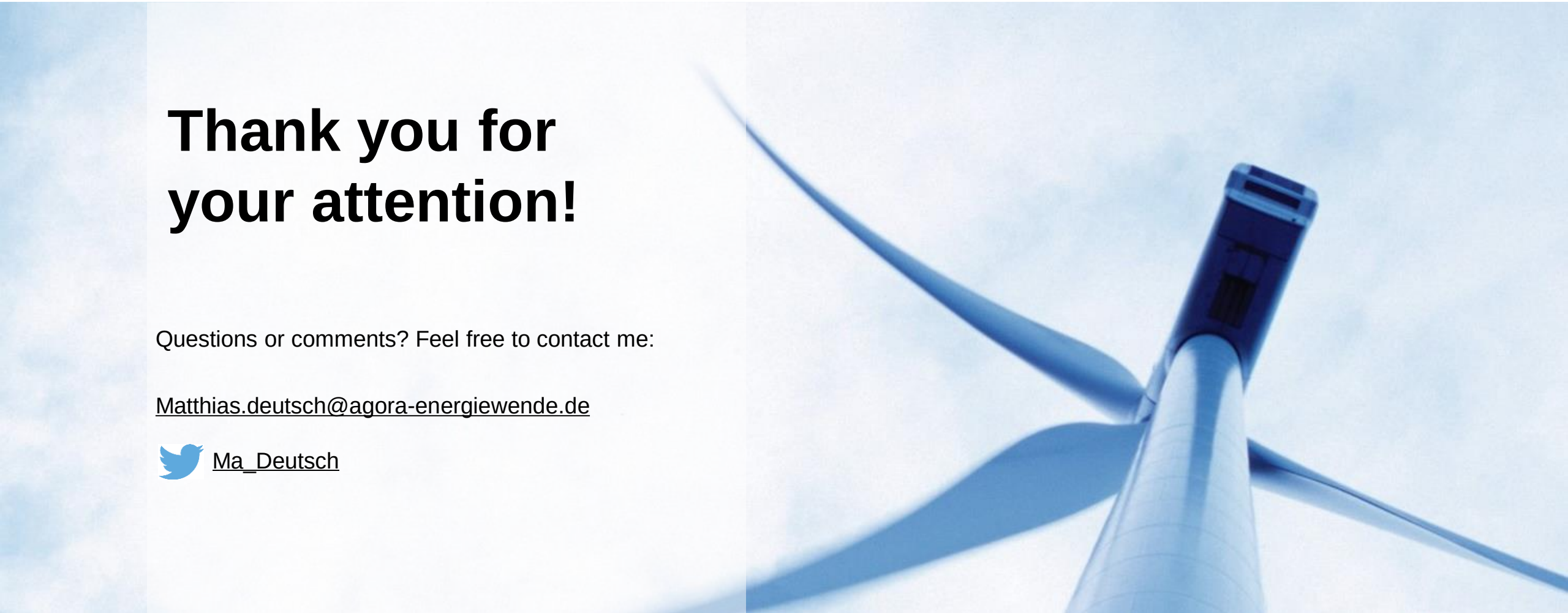
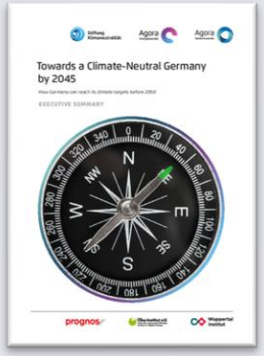


Guidehouse analysis (forthcoming), commissioned by Agora Energiewende

- Webinar: 08 July 2021

- Registration will open by end of June at https://www.agora-energiewende.de/en/events/

Publications on climate-neutrality, hydrogen and industry

No-regret hydrogen: Charting early steps for H_2 infrastructure in Europe	Towards a climate-neutral Germany by 2045	Breakthrough Strategies for Climate-Neutral Industry in Europe	A Clean Industry Package for the EU	The Future Cost of Electricity-Based Synthetic Fuels
				
> full study	> summary (EN) > full study (2050 DE)	> summary > full study	> full study	> full study > PtG/PtL calculator
> data appendix > webinar	> data appendix (2050 DE)	> webinars	> slide deck > webinar	> slide deck > webinar