



The geopolitics of hydrogen and implications for Europe

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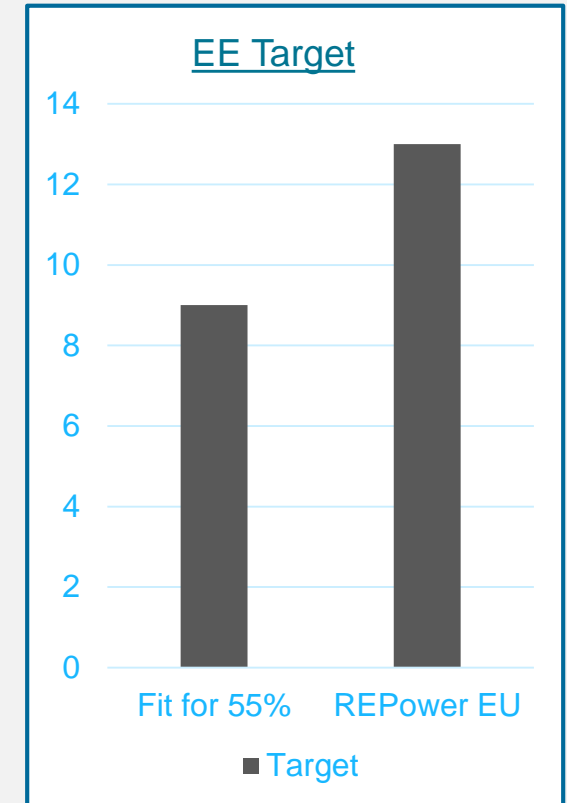
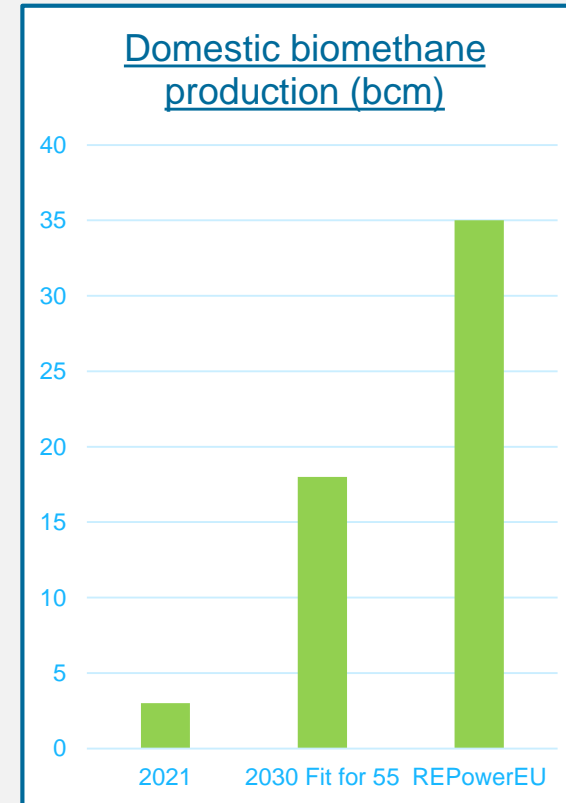
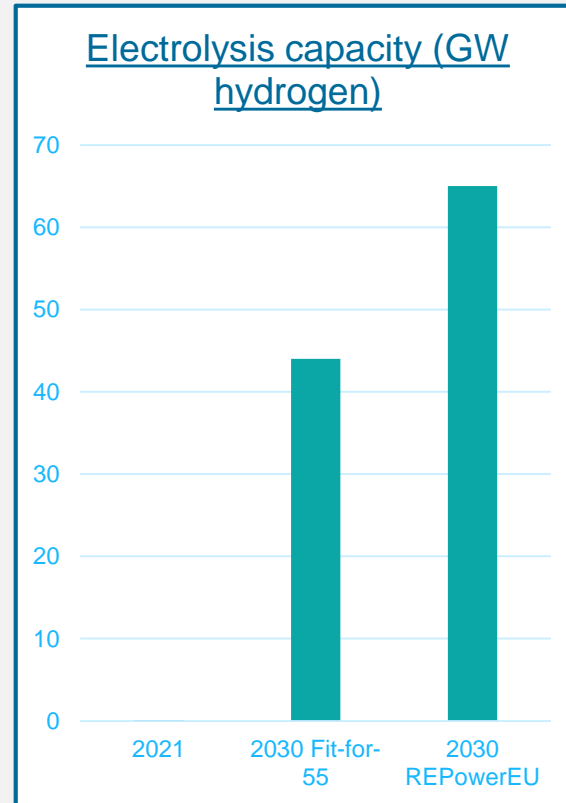
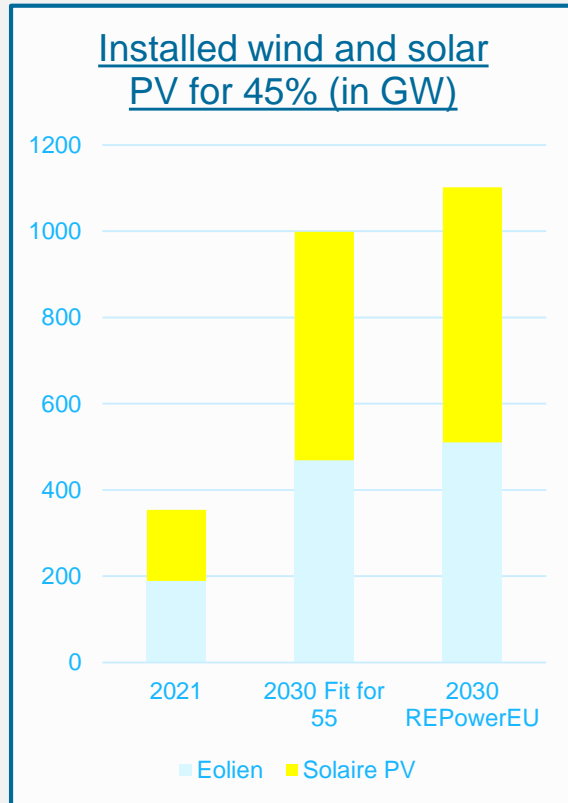


Low carbon technologies: no easy ride amidst soaring fossil fuel import costs

Risk estimate in Europe for a selection of key value chain segments of low carbon technologies

	Mining industry	Raw material refining	Battery Recycling	Wind	Solar	Nuclear	EVs gigafactory	CCUS	Large Hydrogen electrolyzers
Total development time, including permitting and construction	> 8-10 y	2-4 y	2-4 y	5-8 y	2-4y	12-30 y	2-4 y	5+	4+
Economic & regulatory risks	High	Low to medium	Medium	Low	Low	Medium	Medium	Medium	Medium
Technological risk	Low-Medium	Medium	Medium	Medium	Low	Medium	Medium-high	Medium	Medium-High
Financial challenges	Growing	Medium	Medium	Growing	Low but growing	Strong	Medium -Strong	Strong	Strong
Supply chain risks for developers	Low	Medium	Medium	Medium but growing	Medium but growing	Medium	Growing	Medium	Growing & insufficiently considered
Operational risks	Medium to high	Medium	Low to medium	Growing	Low	Low but growing	Medium	Medium	Potentially major
Sustainability of full life circle	Very challenging	Very challenging	Satisfying	Medium, Improving	Medium, Improving	Satisfying	Needs improvement	Uncertain	Medium
Public acceptance	Low	Low	No issue	Medium	Strong	Medium	Medium	Medium	Uncertain
Availability of skills	Medium	Low	Low	Medium but growing shortages	Medium	Challenging	Medium	Medium	Medium

Green Deal & REPowerEU: 2035 is the new 2030? Or still too ambitious?



- 320 GW solar PV by 2025 and 600 GW by 2030
- Solar & wind to displace 21 bcm of natural gas
- Proposal for more ambitious rules on permitting

- 20 Mt of H2 and ammonia, domestic and imports, out of which 8 Mt of additional H2 / Ammonia imports to replace 27 bcm of natural gas

- Accelerated biomethane uptake to save 17 bcm of gas imports

- FF55 implementation to reduce NG consumption by 30% (100bcm) by 2030. Short-term 5% demand reduction to save 13 bcm