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"Austria in EU Hydrogen market" workshop

Opening remarks – "6x/4x/2x" – Erik Rakhou, BCG and co-author "Touching Hydrogen Future"

19 JUNE 2023, VIENNA (VIRTUAL)

Overview presentation

Introduction

6x Global promises

4x European challenges

EU progress on targets

EU policy environment

So what for a Hydrogen path for roll-out - 2 suggestions

Your BCG Team in the room today

Erik Rakhou
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Member of global BCG team for energy transition / H2

Focus on the nexus of energy transition strategies, regulation and policy

Distinct 20+ years experience in both commercial and policy roles, in many different geographies

Welcome to connect via Linked-in or at Rakhou.Erik@bcg.com / the book "Touching Hydrogen Future" available via www.europeangasmarket.eu

6 x Promises of global Hydrogen market

- **Supply potential** – 3 digit GW+ projects announced worldwide
- **Governmental support** rising – IRA, Fitfor55 targets, EU Hydrogen bank
- **Green premia** becoming available
- **Commercial funding** getting ready
- **Technologies** supporting the Hydrogen market adoption advancing
- **First Giga-projects** progressing

4 x European challenges

- Competitive **access to Renewable power** – and for blue Hydrogen natural gas access - an issue

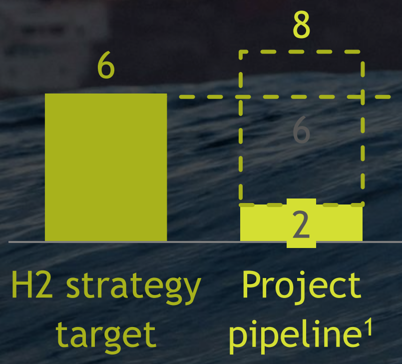
- Material **infrastructure development** yet to start

- **Investability** yet to show in Europe at "RePower EU"-needed scale, with few exceptions

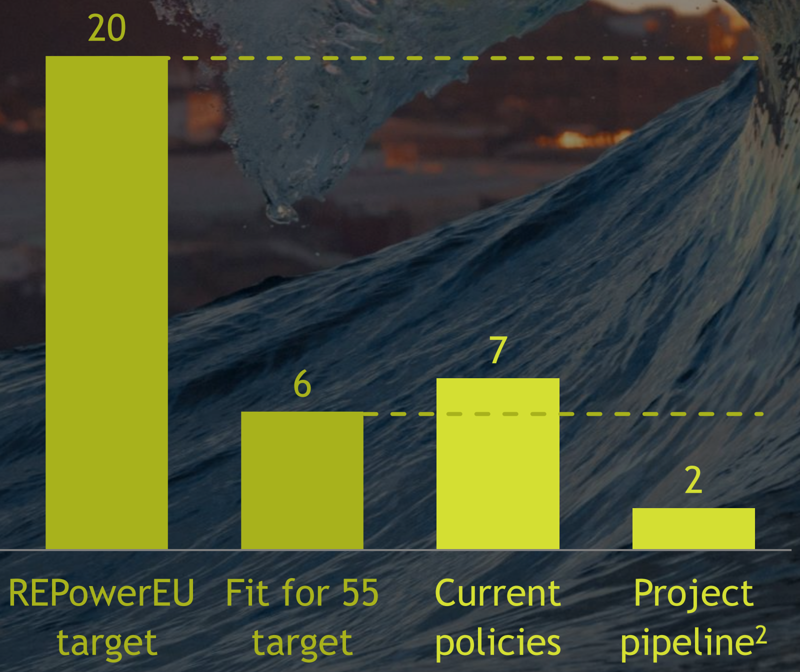
- **EU rules** to be finalized

Key EU H_2 goals are *WIP*

2024 electrolyser target
GW



2030 H_2 demand target
Mt H_2-equivalents



The EU H_2 regulatory environment is taking shape. Key regulations like quotas for H_2 use, criteria for green H_2 and CBAM have been agreed on.

Under this policy trajectory, key targets will be missed. Current developments are far from 2020 H_2 strategy or REPowerEU targets. Climate targets can still be reached as policies are on track for Fit for 55 targets.

Companies need to adapt their strategies accordingly. H_2 suppliers should assume realistic demand and build projects with sufficient regulatory certainty. Other projects may be more dependent on pending policies like the H_2 bank or specifics of H_2 use quotas – here companies need to watch closely.

1. Only includes green H_2 projects in feasibility/FEED/FID 2. Only includes low-carbon H_2 projects in FID stage (i.e., 9% of total announced low-carbon H_2 production capacity by 2030) | Source: European Commission; GlobalData; BCG H_2 demand model; BCG analysis

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The EU H_2 regulatory environment is taking shape

EU production

Production subsidies at national level ≈
Netherlands SDE++; Germany H2Global (first delivery of ~0.1Mt H_2-derivatives imports[1] in 2024)

EU H_2 bank - 1st tender Q423
Max. 3 projects, delivering 0,2% to 0,4% of RePower EU imp. Target*

"Green" criteria ✓
Delegated acts pursuant to RED II define what is needed for projects to sell into EU use quota market (2030: ~5 Mt H_2-eq)

Imports

Carbon price ✓
CBAM creates incentive for low-C NH_3 imports

Midstream

H_2 infra regulation ≈
Enables repurposing of up to 32,000 km gas grid**

Refuelling infra ✓
AFIR: every 200km HRS resulting in >600 HRS and fueling up to ~50k trucks[2] by 2031

Demand

H_2 use quotas ✓
RED III: 42% green H_2 in industry 2030 (~4 Mt H_2)
FuelEU Maritime: 1% e-fuels 2031 (~0.5 Mt H_2)
REFuelEU aviation: 1.2% e-SAF 2030 (~0.5 Mt H_2)

Carbon price ✓
ETS 2030: ~130 € expect.
- no free allow. by 2034

Cross value chain funding ✓
Important Projects of Common European Interest (up to €10.6bn approved for IPCEI Hy2Tech and Hy2Use in 2022, more expected in 2023); Innovation Fund; Germany "*Klimaschutzverträge*"

✓ Regulation in place or agreed on ≈ Some national reg.; EU in the making ? Regulation lacking

1. First auction includes imports for e-ammonia, e-methanol and e-SAF 2. Assuming regional truck distribution with a H_2 fuel consumption of 0.06kg/km and annual mileage of 80,000km | Source: European Commission; BCG H_2 demand model; Transport & Environment; BCG analysis
*Assuming 2 to 4 EUR/kg subsidy, 800 mln EUR budget, 10 years tenor. **EHB is planned to provide 53k kilometers, of which 60% repurposed at up to 143 bn EUR cost - source: EHB 2023 website.

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What is a good Hydrogen path for roll-out – 2x suggestions *"tbd"*

1. Art of pacing & incentivizing local **demand switch** – e.g. steel, refining

2. Anticipate future demand by 5-10 years, and **build/repurpose supporting infrastructure** early, in collaboration with neighbours

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