Green Hydrogen – Which End-Markets to Focus on?

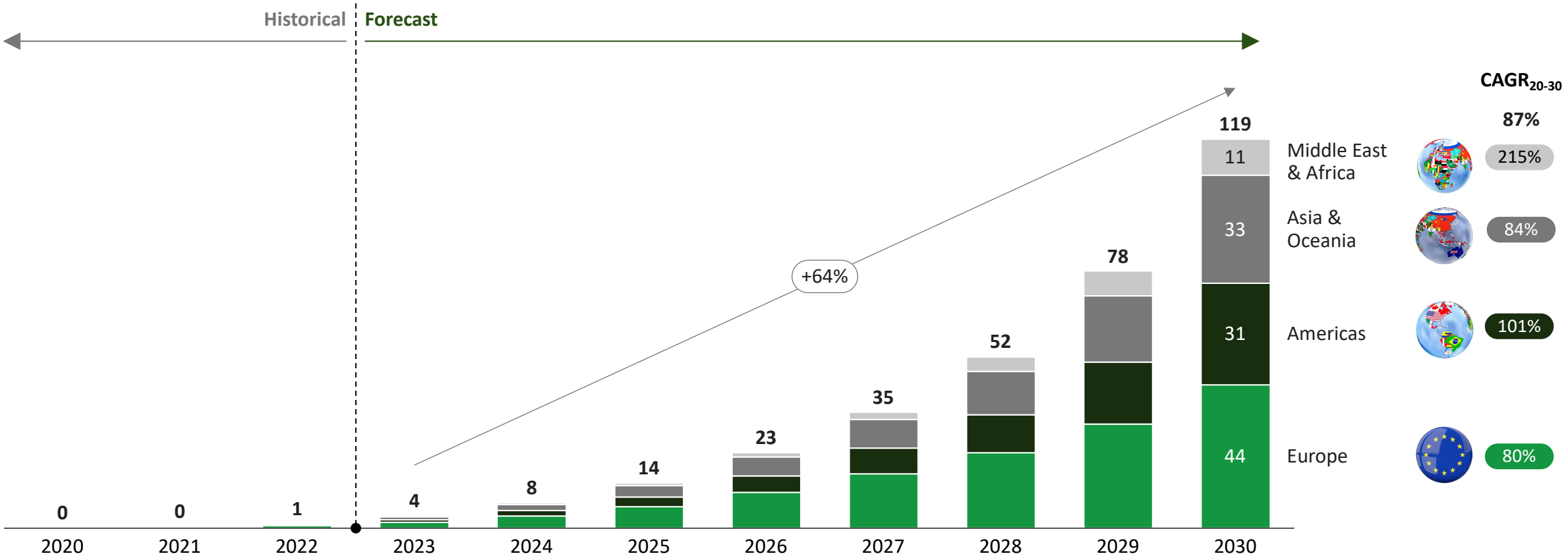
Presentation at APGH 2024

June 10, 2024

Roland Berger

We forecast a total installed electrolyzer base of up to ~120 GW by the end of the decade

The Roland Berger electrolyzer forecast until 2030 by geography [GW, cumulative]



We see three main project archetypes: on-site industrial projects will define the 2020s; "gigaprojects" will come into play at the end of the decade

The Roland Berger electrolyzer forecast until 2030 by project archetype [GW, cumulative]

Archetype 1:

Small-scale (e.g., mobility) projects

1-15 MW

- **Local** green H_2 production for **mobility applications,** coupled with HRS supply and (semi-)captive fleet decarbonization and/or light industry use
- Typically **grid power supply**
- Strong track-record in Europe, US, Asia; increasingly "established business"

Archetype 2:

On-site industrial decarbonization projects

10-300+ MW

- **On-site** green H_2 production near **large industrial consumers** as "anchor load" (refining, fertilizer, steel, etc.), mobility off-take as add-on?
- Typically **grid power supply** (green PPA[1)])
- Increasingly strong regulatory support (e.g., RED III, CfDs)

Archetype 3:

Green molecule export "gigaprojects"

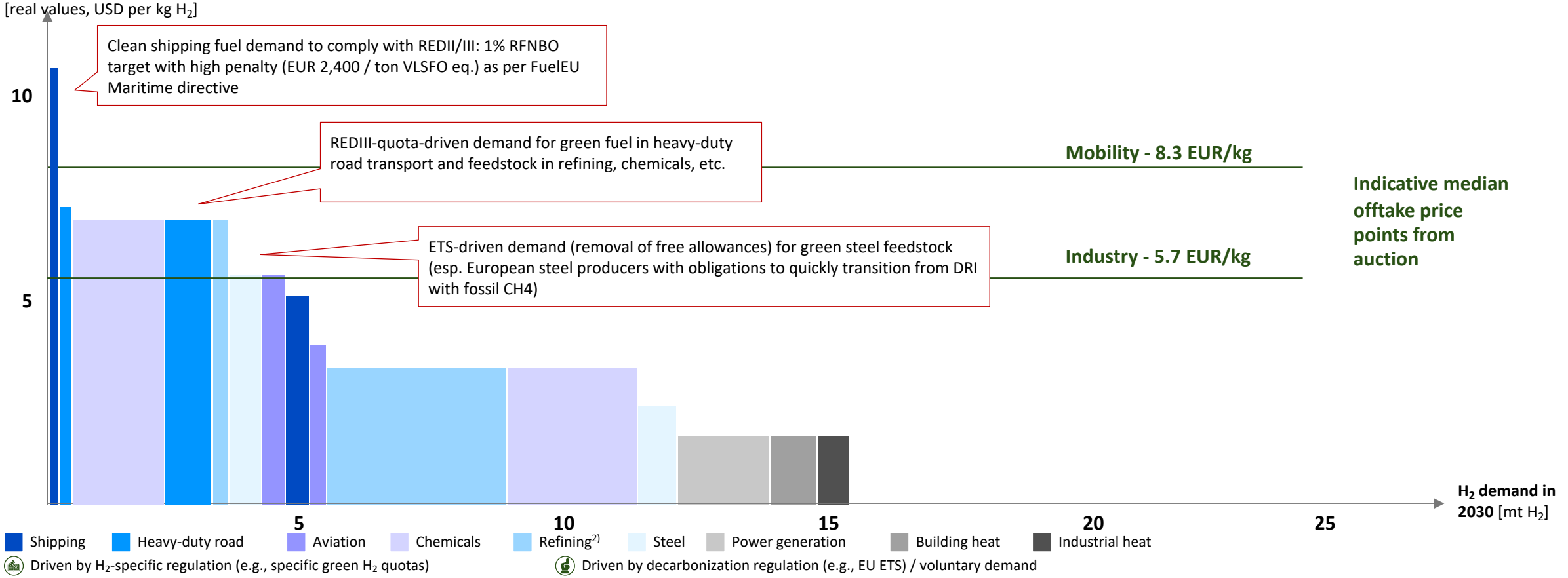
(multi-)GW

- **Regional/international projects** with low-cost green H_2, NH_3, MeOH, etc. production for **export** (often multi-phased)
- Typically co-located, **additional RES** (PV, on-/offshore wind)
- Longest lead times, biggest volumes

1) Power Purchase Agreement

In Europe, H_2-specific regulation drives WtP predominately in shipping, transport, and chemicals – Auction results mirror WtP structure in the market

Maximum indicative willingness-to-pay for green molecules in 2030 in Europe by sector[1)]



1) Analysis includes key expected H_2 demand segments; several sectors not shown due to expected low H_2 demand potential (e.g., rail or passenger cars); regulations on European level considered, might vary per country due to country-specific reg.; 2) H_2-specific regulation (42% green H_2 share in 2030) only applies for non-fuel related products requiring H_2; green H_2 required for RFNBO prod. incl. in aviation & shipping segment

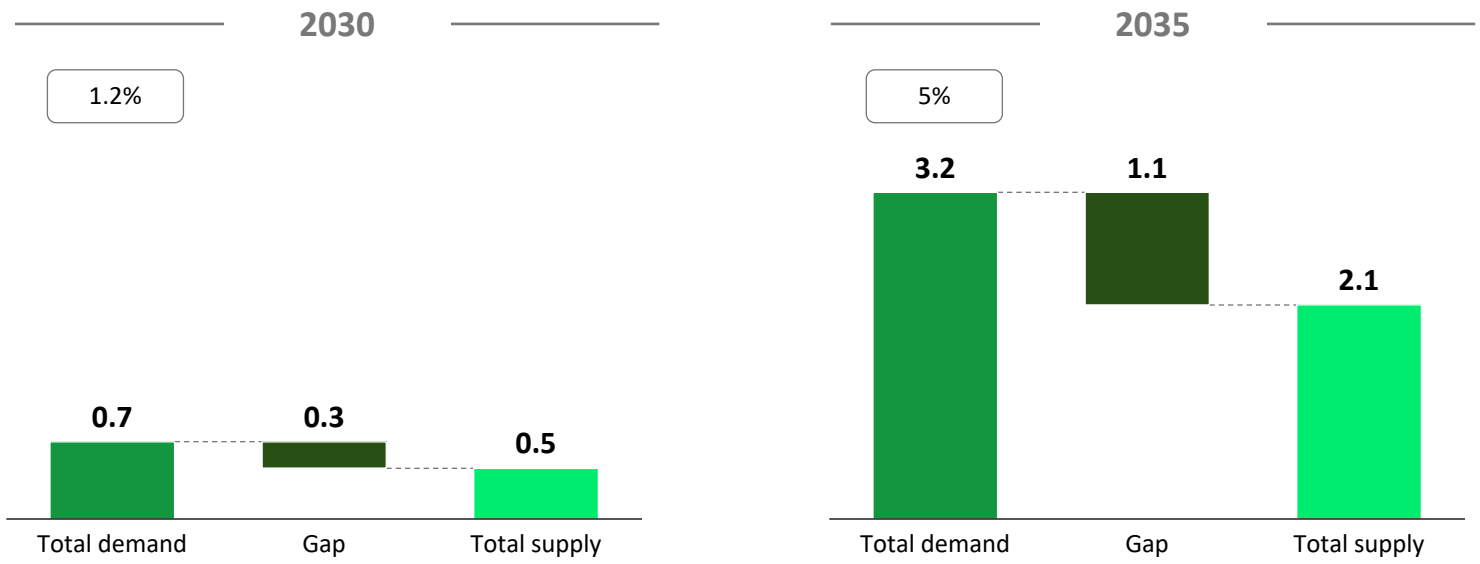
Source: Roland Berger

Indicative

Example: Sustainable Aviation Fuel - Supply gap for locally produced PtL in Europe anticipated for 2030 – which could be met via imports

Calculation of PtL SAF volumes to be imported to Europe and required green H_2 volumes

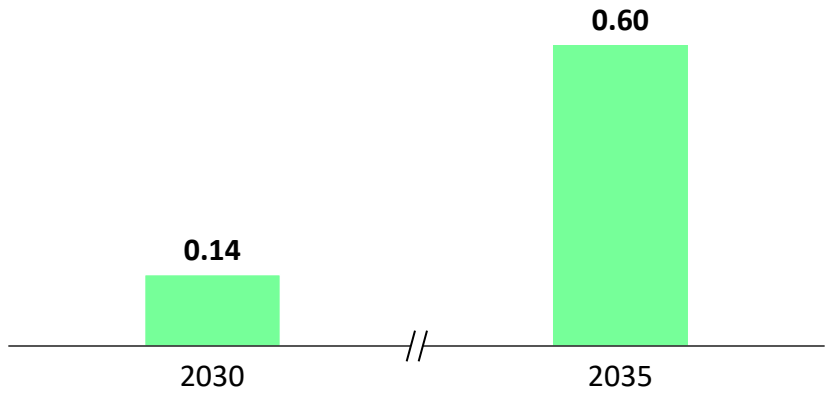
Comparison of PtL SAF supply and demand in Europe
[in mt PtL SAF]



- **RB supply forecast** based on **project announcements** and **realization rates**
- **Demand forecast based on announced e-kerosene / PTL SAF sub-quotas**

xx% Share in total jet fuel demand in Europe

Required H_2 (for volumes via imports) [mt H_2]



- For **PtL SAF produced in Europe, H_2 production on-site likely**, thus no demand for H_2 imports
- For **gap, import of volumes can be expected** (as synthetic crude oil or PtL SAF)

Source: Desk research, interviews with market participants, Roland Berger

Roland
Berger