ERTC 2020

Emission-free Production of Hydrogen (with CCUS) for Low-Carbon Refining

REINERTSEN
NEW ENERGY

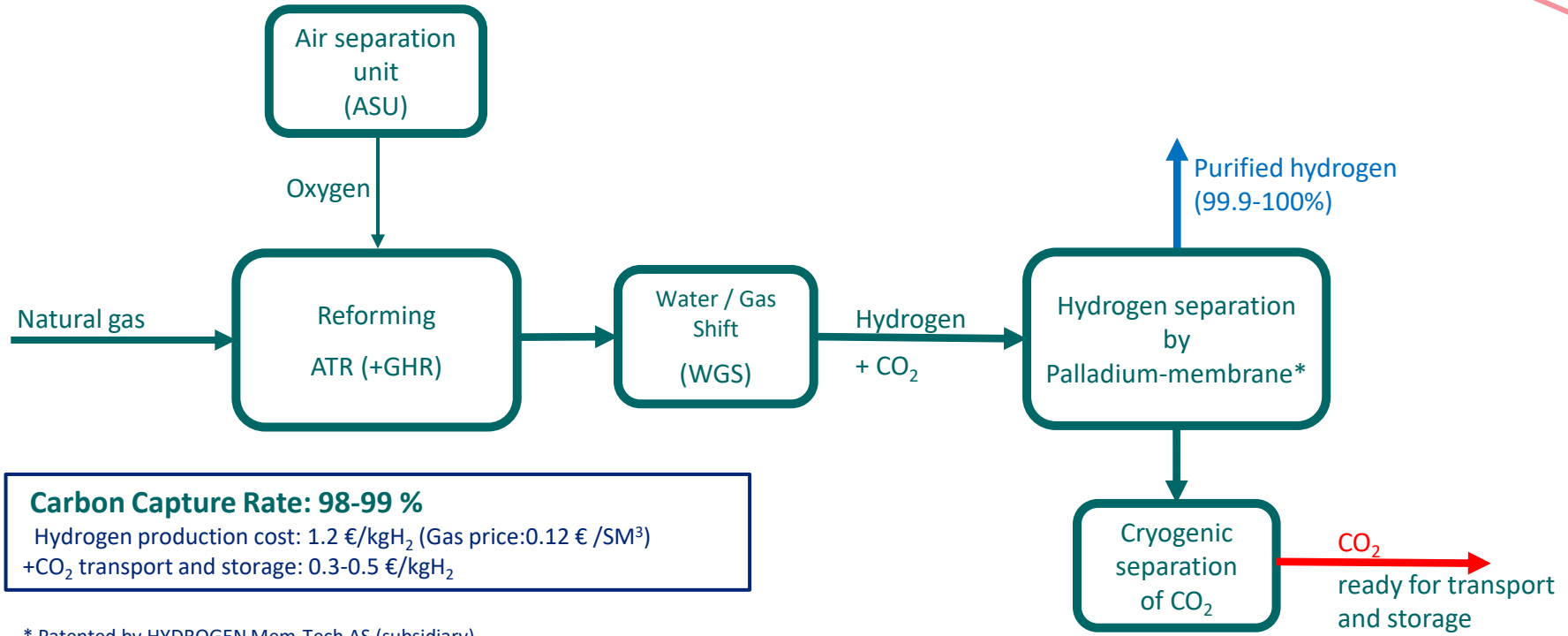
.... Developing Clean Energy Solutions

Large scale, emission-free production of hydrogen – **HyPro-Zero™**

Based on existing technology in a new combination!

Clean and affordable!

PATENT PENDING

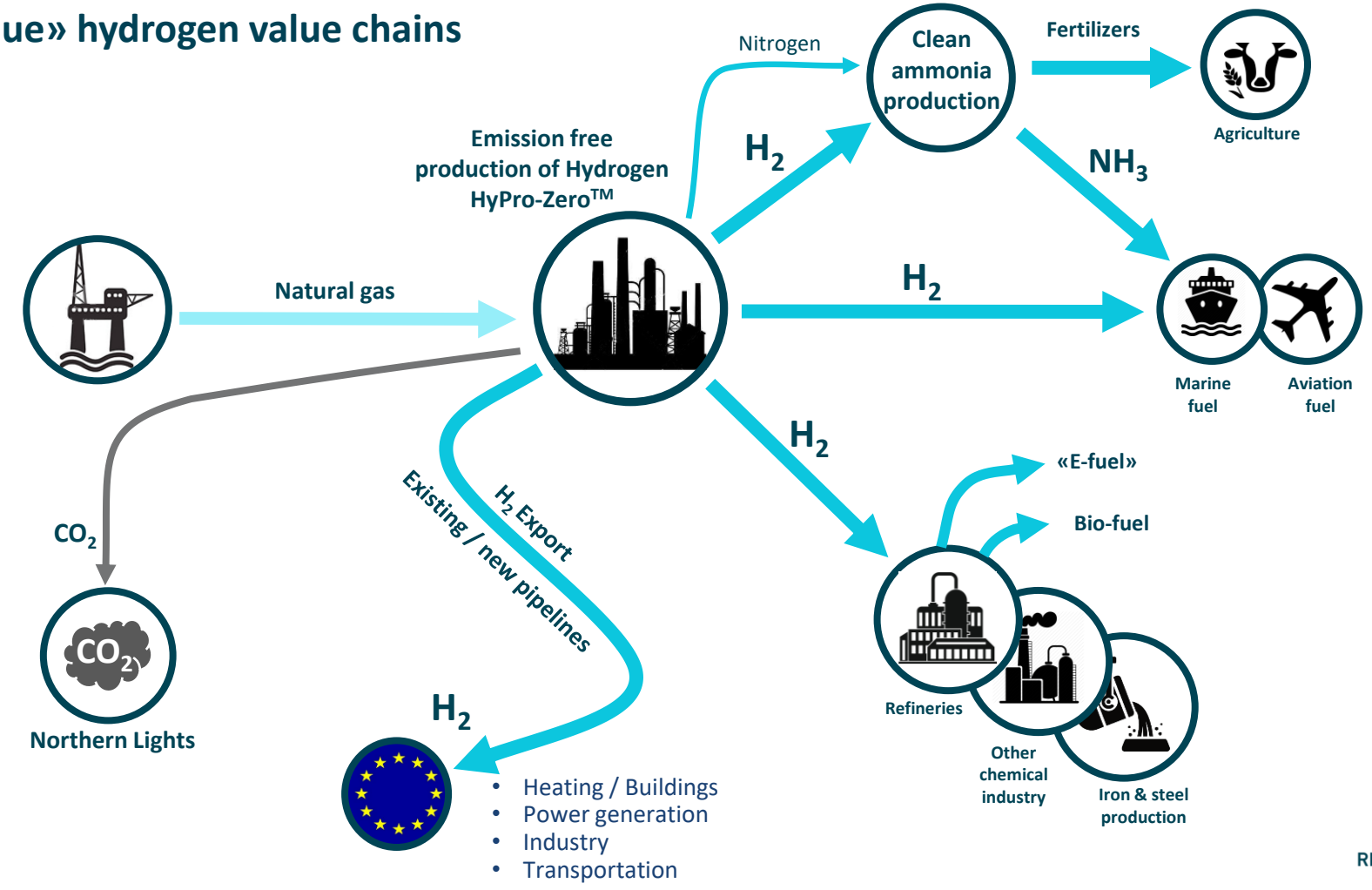


Carbon Capture Rate: 98-99 %

Hydrogen production cost: 1.2 €/kgH_2 (Gas price:0.12 € /SM^3)
+CO_2 transport and storage: 0.3-0.5 €/kgH_2

* Patented by HYDROGEN Mem-Tech AS (subsidiary)

«Blue» hydrogen value chains



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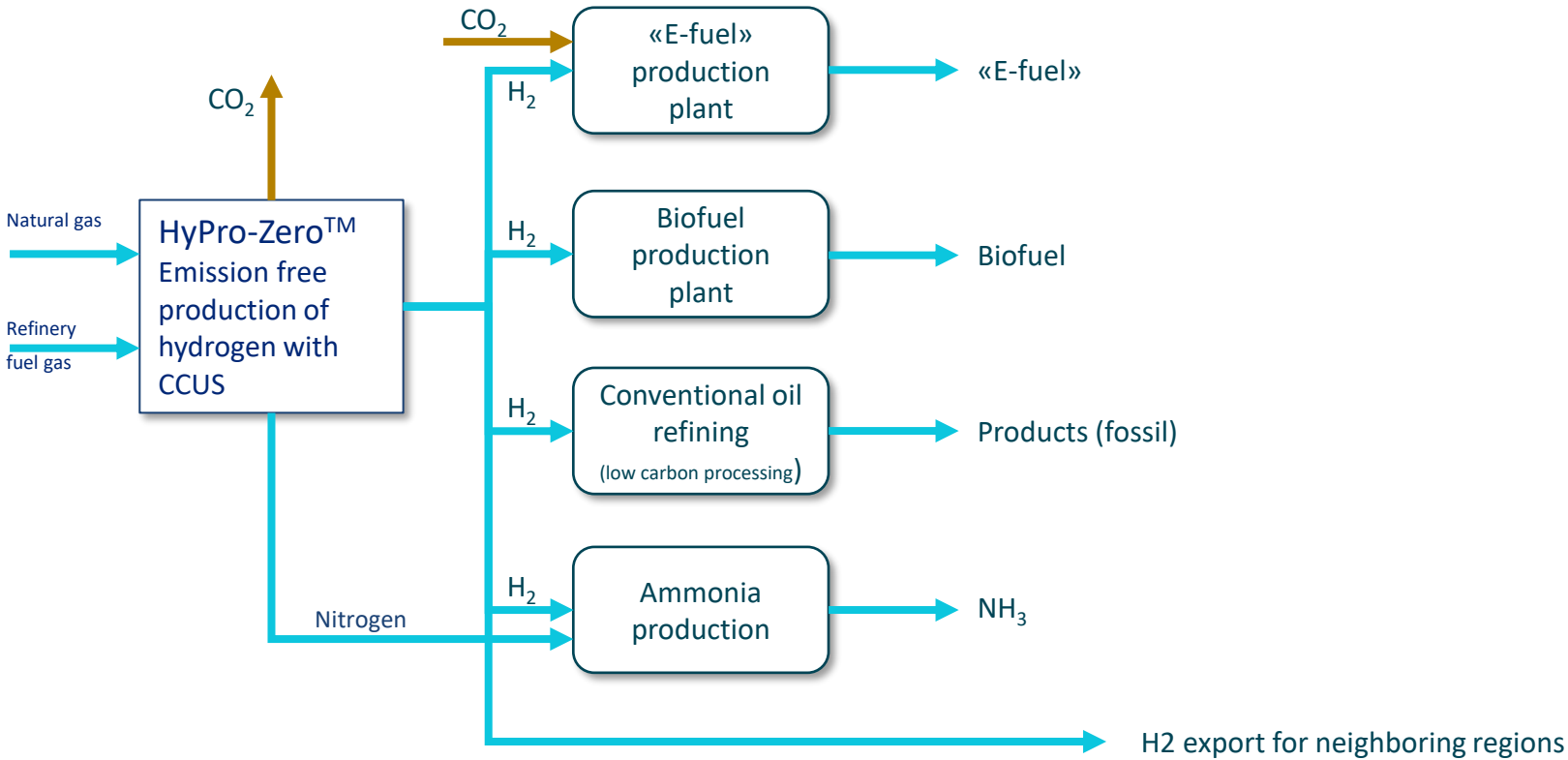
Applications for blue hydrogen in future refineries



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Production of “E-fuels” and Biofuels

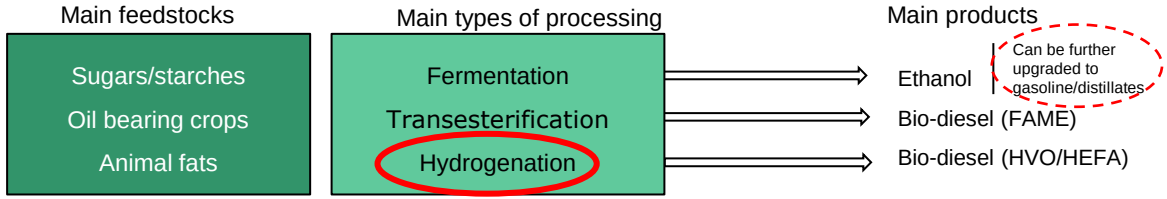
Reference is made to Concawe report 20/20 and other sources

- The technology for biofuel and “E-fuel” is partly immature – more R&D is required
- The availability of competitive, sustainable feedstock and CO_2 is limited !?
- **Significant cost reduction is needed**
- **Extremely high requirements for valuable, renewable electricity for production of hydrogen through electrolysis**

- Most “E-fuel” and Biofuel projects are so far based on production of “green” hydrogen by electrolysis !
- **Alternative, emission-free production of hydrogen from natural gas or refinery fuel gas (with CCUS) would cost 60-70 % less – and have similar or lower CO_2 emission !!!**

BIOFUEL PATHWAYS (liquid fuels)

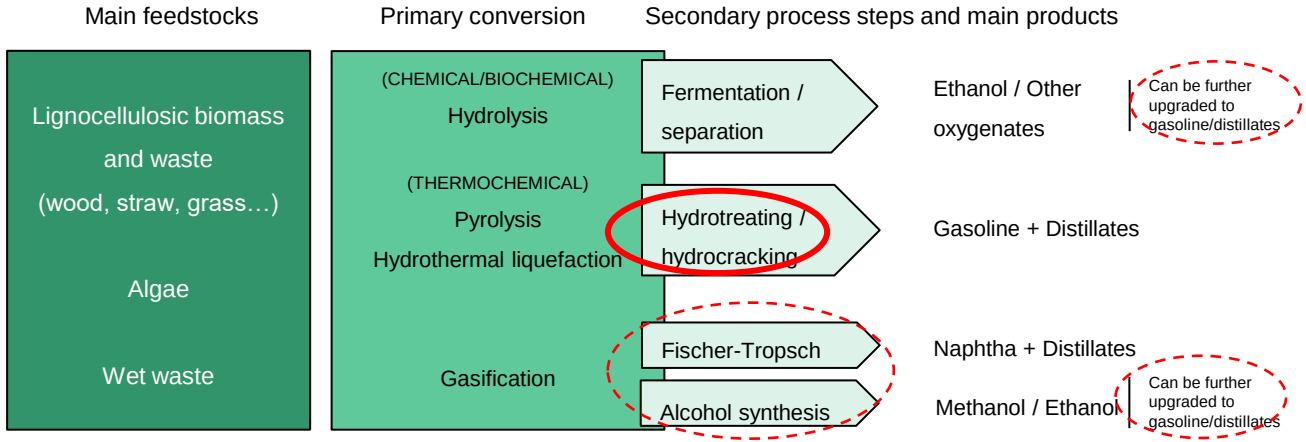
Conventional biofuels



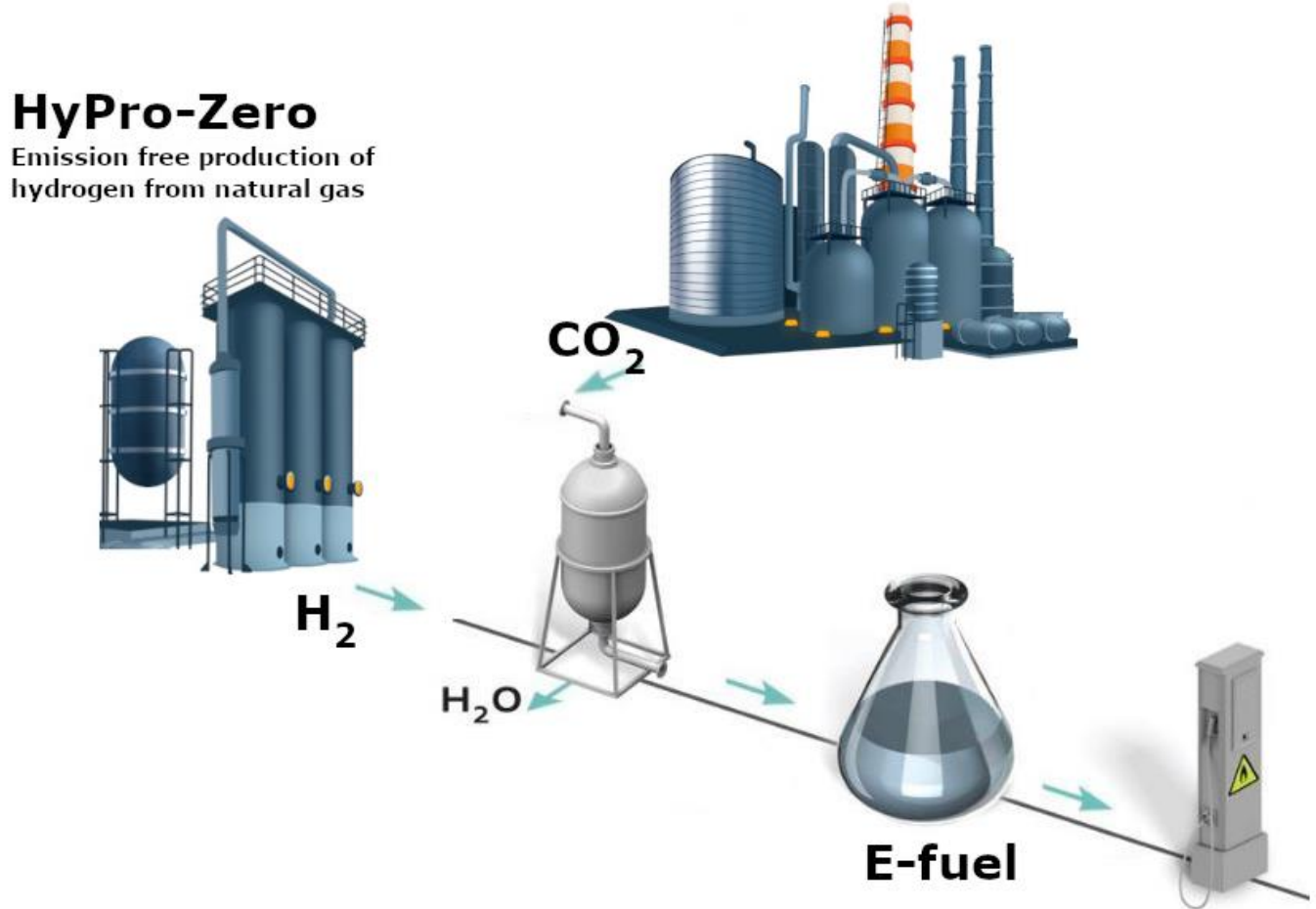
Large H_2 users

Minor/optional H_2 users

Advanced biofuels



“E-fuel” production



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H_2 CONSUMPTION FOR TYPICAL FUEL PLANTS

H_2 CONSUMPTION FOR 200 000 MTPY FUEL PLANT (EXAMPLE)		
HVO plant:	~10 000 Nm^3/h	1 tonnes/h
Pyrolysis oil upgrading plant:	> 50 000 Nm^3/h	4-5 tonnes/h
E-fuel plant:	>100 000 Nm^3/h	9 tonnes/h

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…… we make Zero happen!

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