Worlds First Demonstration Co-SOEC based PtL Plant

IEA AMF: Recent Progress in SAF Research

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AVL at a Glance

1948
Founded

75+
Years of Experience

26
Countries Represented

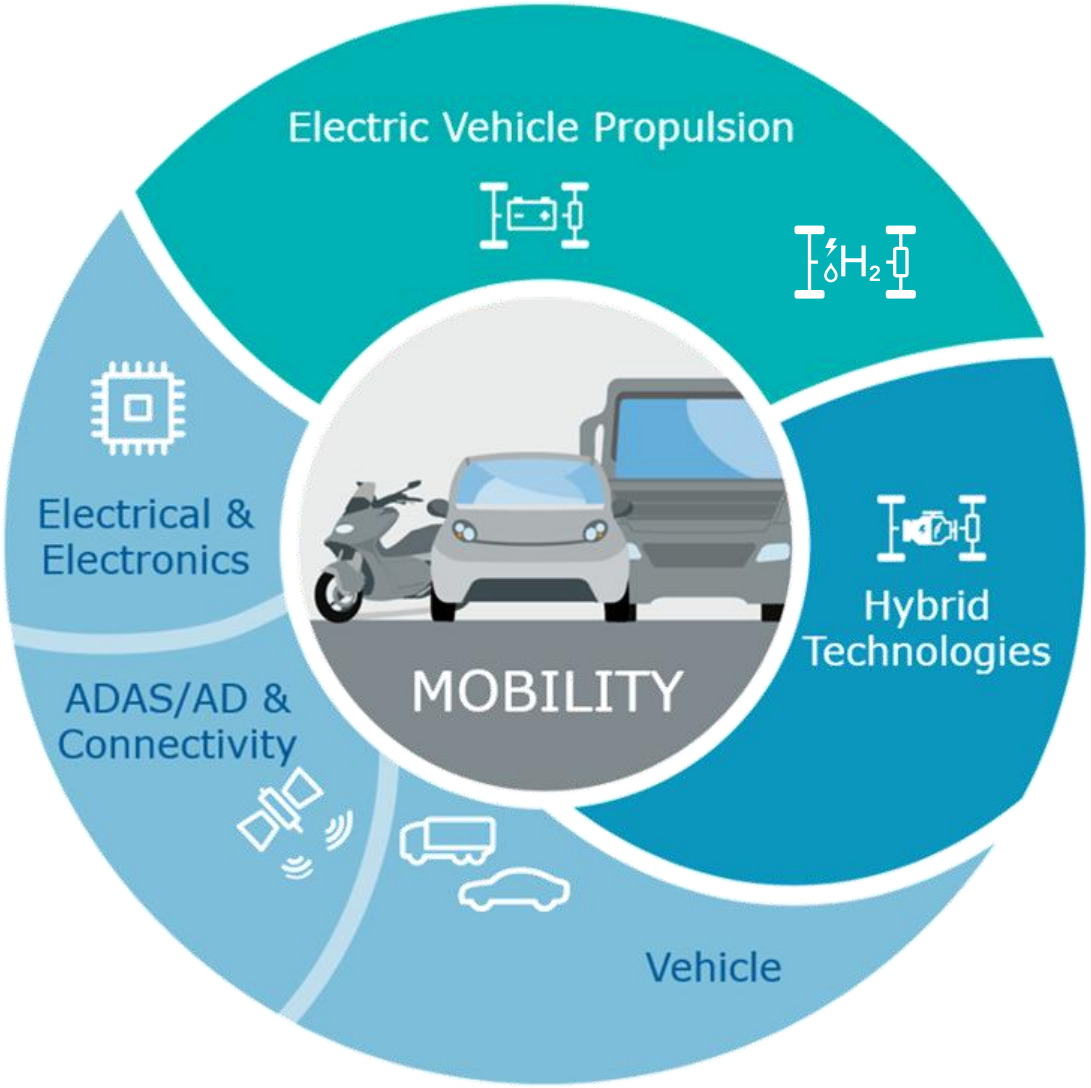
45
Global Tech and Engineering Centers

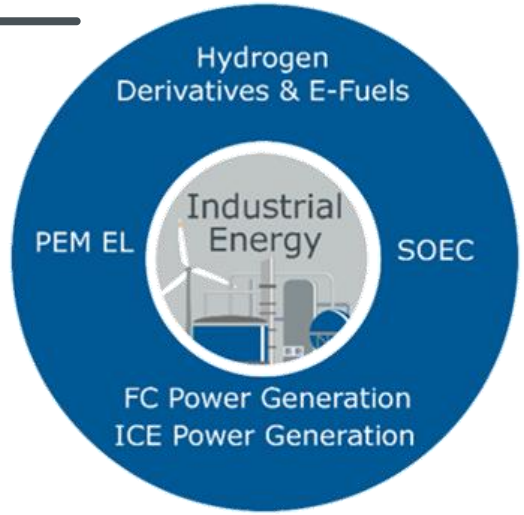
12,200
Employees Worldwide

68 %
Engineers and Scientists

10 %
Of Turnover Invested in Inhouse R&D

2,200
Granted Patents in Force


Electric Vehicle Propulsion
H_2
Electrical &
Electronics
Hybrid
Technologies
MOBILITY
ADAS/AD &
Connectivity
Vehicle


Hydrogen
Derivatives & E-Fuels
PEM EL
Industrial
Energy
SOEC
FC Power Generation
ICE Power Generation

H_2 for Industrial Energy and Mobility

AVL

2025

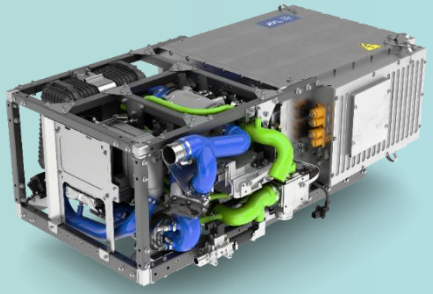
Commercial Share **200 Mio€**

Patents **>250**

Locations & People **6/650**

Share outside automotive **~60 %**

TOYOTA



Leading PEM System Development

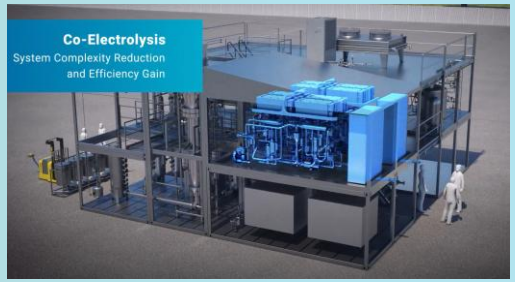
TECO 2030

SOP Marine Fuel Cell System Development

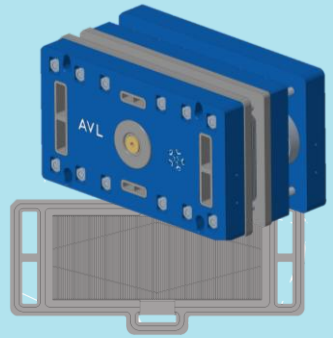
AIRBUS

Fuel Cell System Development Partner

1 MW SOEC Industrial H2 Production



Co-SOEC based Plant for SAF Production



Next Generation PEM & AEM EL Stack

Synthetic Chemicals & Fuels
Water / Steam Electrolysis / Co-Electrolysis

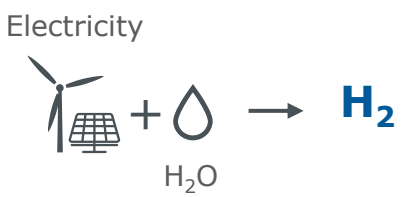
Carbon-free Fuels

Hydrogen H_2

+
- Production Efficiency
- Flexibility: Engine; PEM FC
- Future Availability (Industry)
- Good Fuel Properties

-
- Storage Density
- Safety due to high Reactivity

Electrolysis



Ammonia NH_3

+
- Storage as Liquid Gas
- Best Carbon free H_2 Carrier

-
- Toxic
- Corrosive
- Poor Fuel Properties

Haber-Bosch Process

Carbon-neutral Fuels

Methane CH_4

+
- Available Technologies and Infrastructure

-
- Upstream Emissions (CH_4)
- Energy Demand in case of Liquification (LNG)

RNG: Methanation

BNG: Bio-Fuel Production

Alcohols CH_3-(CH_2)-OH

+
- Liquid → Acceptable Storage Density

-
- Ethanol: Dependance from Bio-Source

Bio Alcohol / Synthesis

Methanol: Gasification of biomaterial + Synthesis or Methanol synthesis
Ethanol: Sugar Fermentation

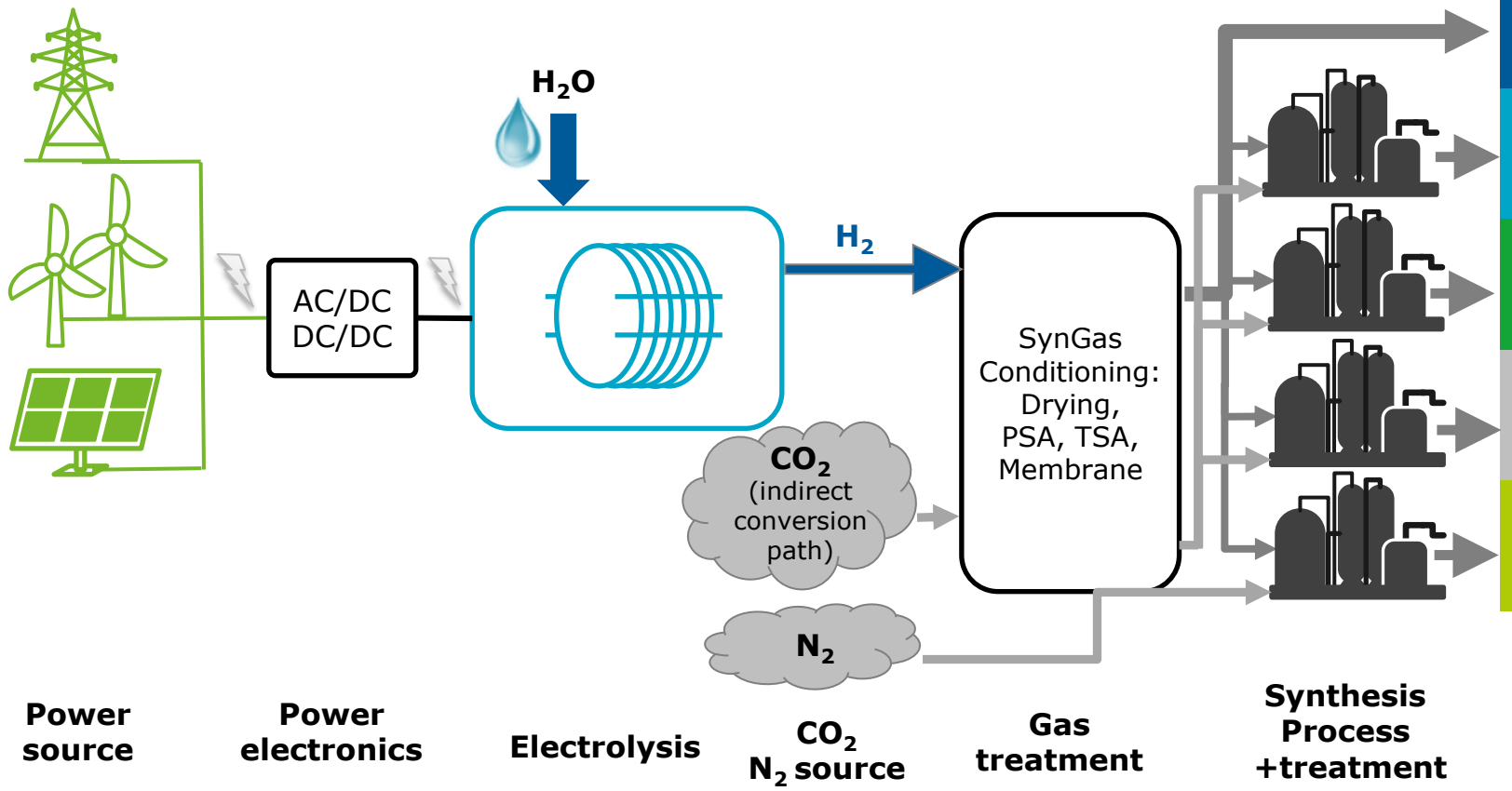
Paraffins C_nH_{2n+2}

+
- Available Technologies and Infrastructure
- Best Storage Density

-
- Poor Production Efficiency

E-Fuel (e.g. Fischer-Tropsch)

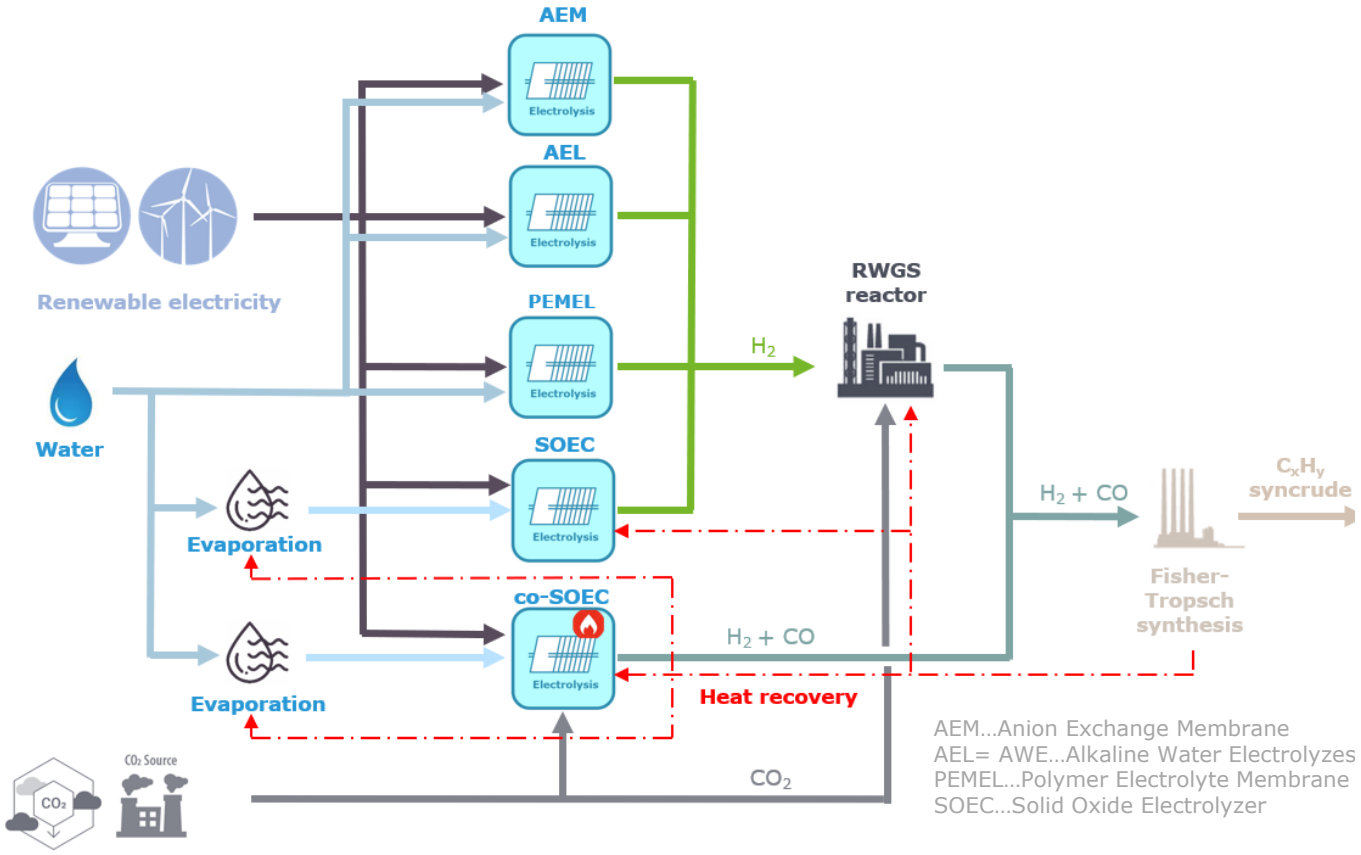
Synthetic Chemicals & Fuels – Production Paths
Water / Steam Electrolysis / Co-Electrolysis

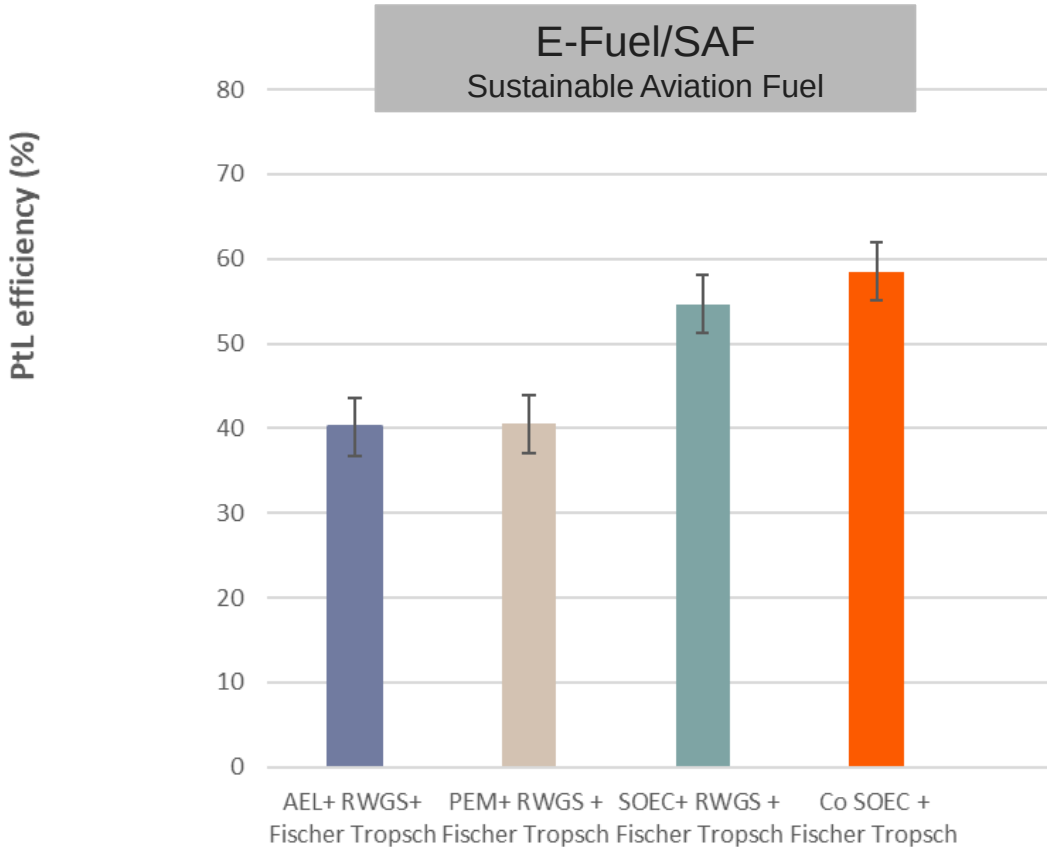


Product	PEMEL/AEL	SOEC
Hydrogen	~ 70 %	~ 85 %
Ammonia	~ 50 %	~ 70 %
Methan	~ 50 %	~ 80 %
Methanol	~ 45 %	~ 70 %
FT Fuels	~ 40 %	**~ 55 %**

SOEC improves the efficiency of all major eFuel production routes significantly

Synthetic Aviation Fuels (SAF) – Technology Comparison
Water / Steam Electrolysis / Co-Electrolysis



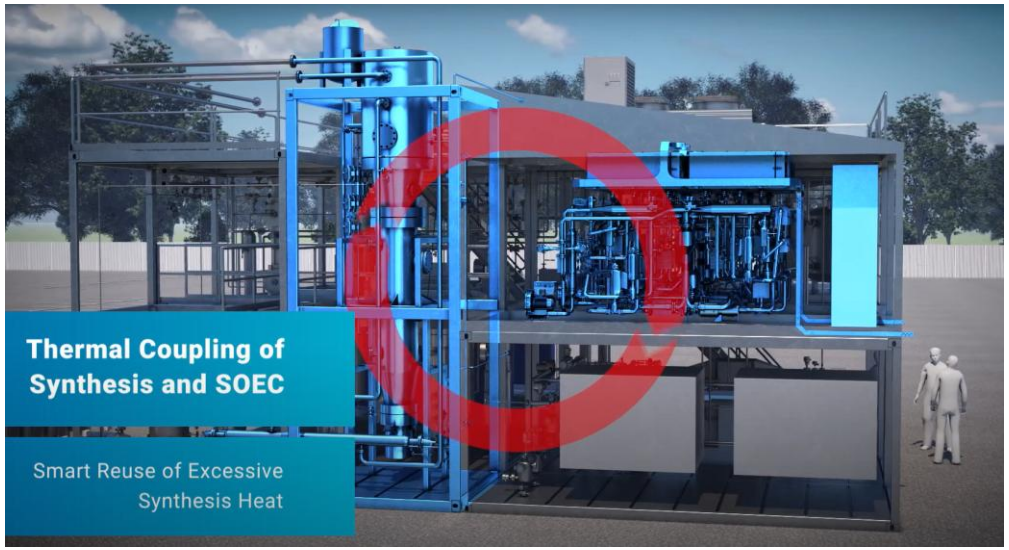


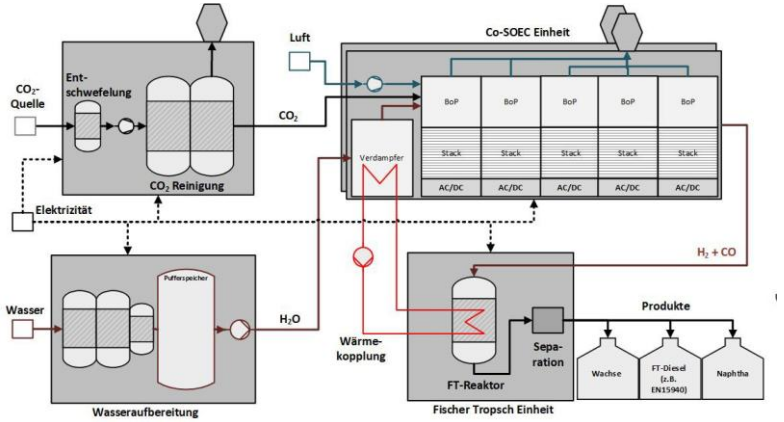
- E-Fuel/SAF production with Co-SOEC has a 15 to 20 % higher potential compared with low temperature electrolysis
- AEL and PEM are currently the market trend (short/mid term) due to higher TLR

Projectscope HiPoLiq

- Project Purpose: Research demonstration of **worlds first Co-SOEC based Power-to-Liquid (PtL) plant** at Wien Energie
- Main project objectives:
  - Develop and demonstrate the functionality of the Co-SOEC process on stack, system & plant level (field)
  - Development and construction of a **200 kW PtL** research demonstration plant at the Wien Energie site and downstream demonstration operation – annual production volume of ~ 60.000 L of SynCrude with significant efficicency increase.

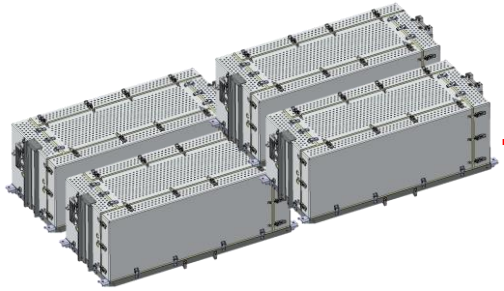
Further from previous development phases:

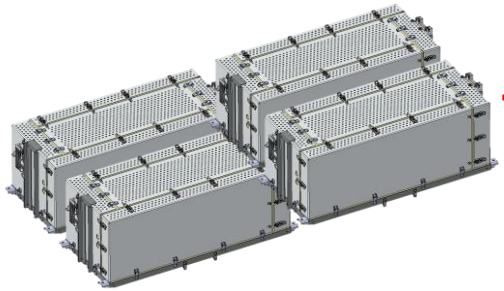




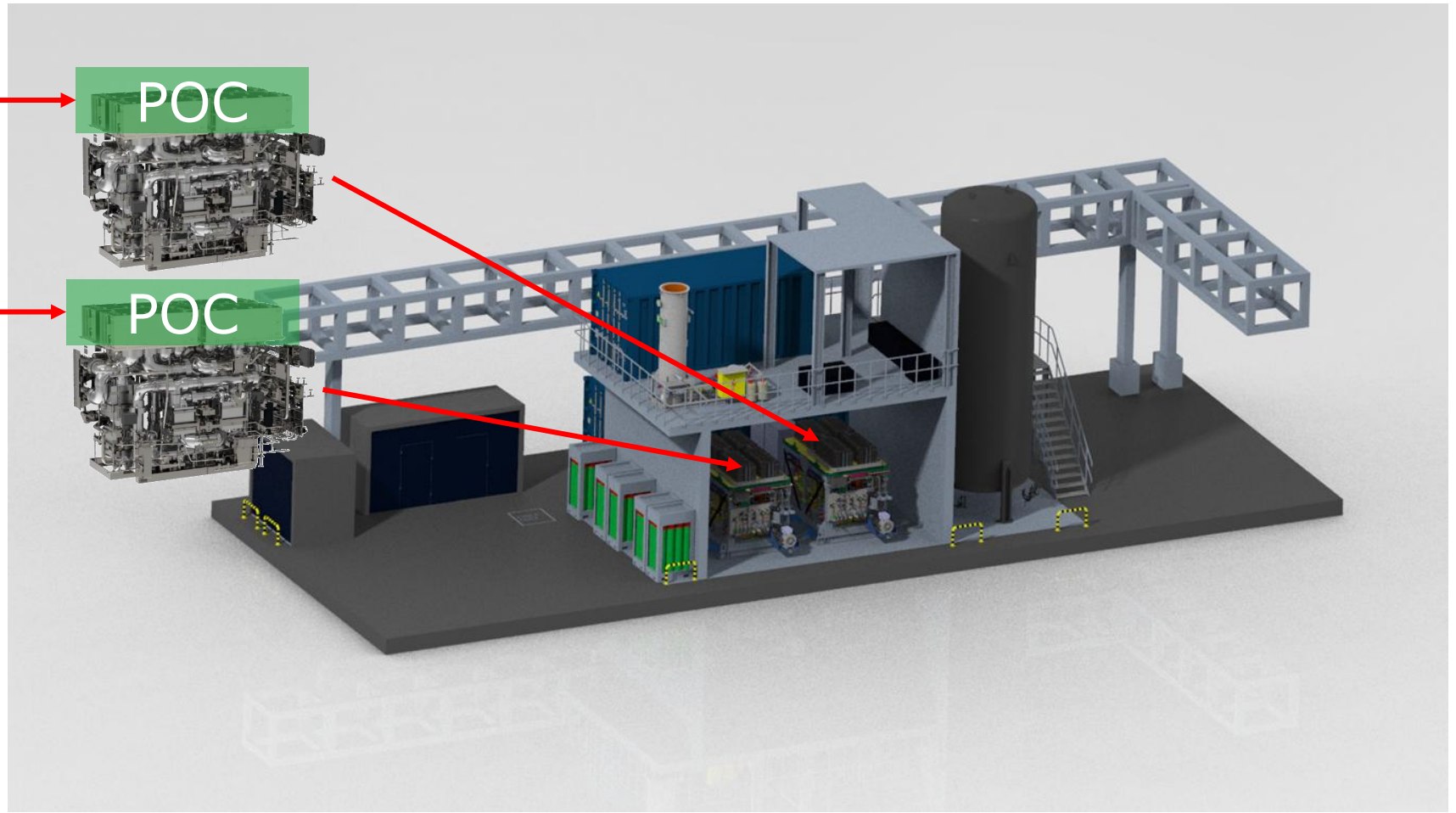
Power-to-Liquid Co-SOEC Demonstration Plant

Stack Module Integration





8x 25kW Co-SOEC
Module ready for system integration



Projectscope HiPoLiq – Site Installation

Thank you!

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Thank you

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