EKONAMI©

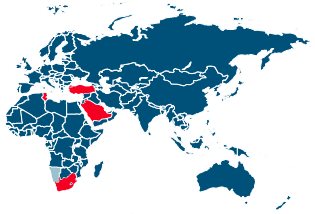
H_2 + E-FUELS

Green Hydrogen and Power to X

Creating Business Linkages for the emerging Hydrogen Economy in South Africa

11.September 2023

About Us



Ekonami Create a sustainable solution and stands for a green future and a livable planet.

As a German process provider, engineering EPCM company for Modular Standardized power to methanol plants (H2 + E fuels), we integrate the most critical process units to achieve optimized fuel system solutions.

Ekonami Ekonami established plants as an industry partner in various countries to build the world's first complete PtoMeOH plant based on a modular standard. Investing in the greenest vision for the future is our mission and our declared purpose.

We believe that renewable energy sources must be affordable and reliable to everyone so that together, we can reduce the environmental impact of traditional energy sources by using hydrogen and green Methanol.

Why Methanol / SNG ?

Methanol a pathway for the Green Fuel Infrastructure

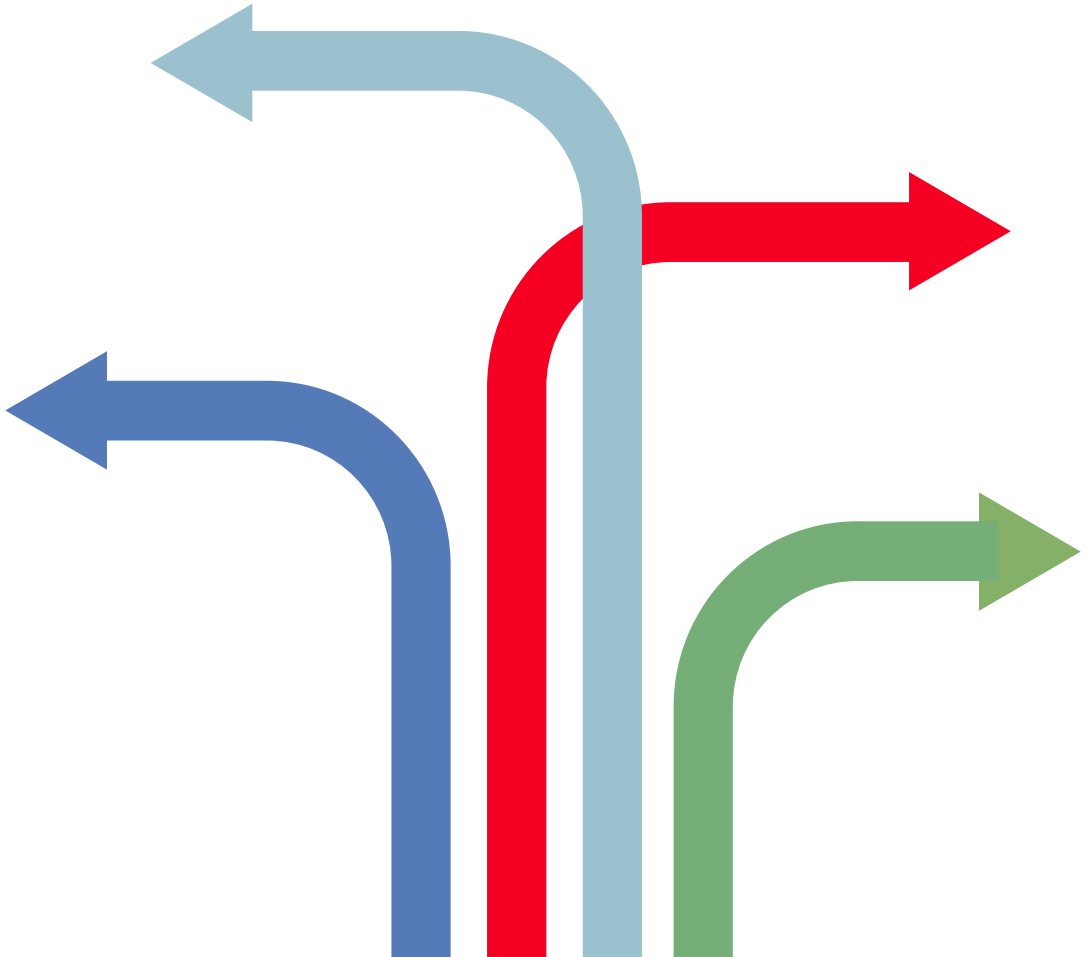
Demand

Today, a forecasted demand of 300 mill t/a of Green Methanol need is 98 million tpa; the current demand is 99 % Fossil-based.

Application

MeOH is not new; we use it daily. It is liquid at room temperature.
We can use it as a fuel, chemical feedstock

Marin application
- Available infrastructure 120 Ports World Wide



NH_3 or MeOH or SNG

None of them is the final solution, but all play a role. MeOH and SNG have a drop in value in the local economy, leading to a systematic construction of the H2 industry.

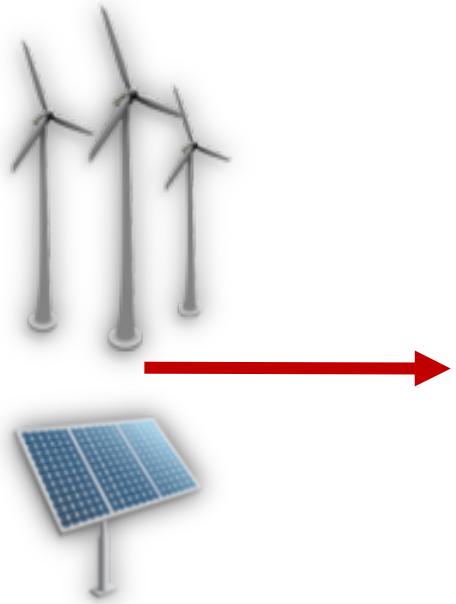
Hard to Abate Sectors

MeOH SNG is a tool for the hard-to-abate sectors to change gears from mitigation to net zero via the introduction of a circular CO2 solution .

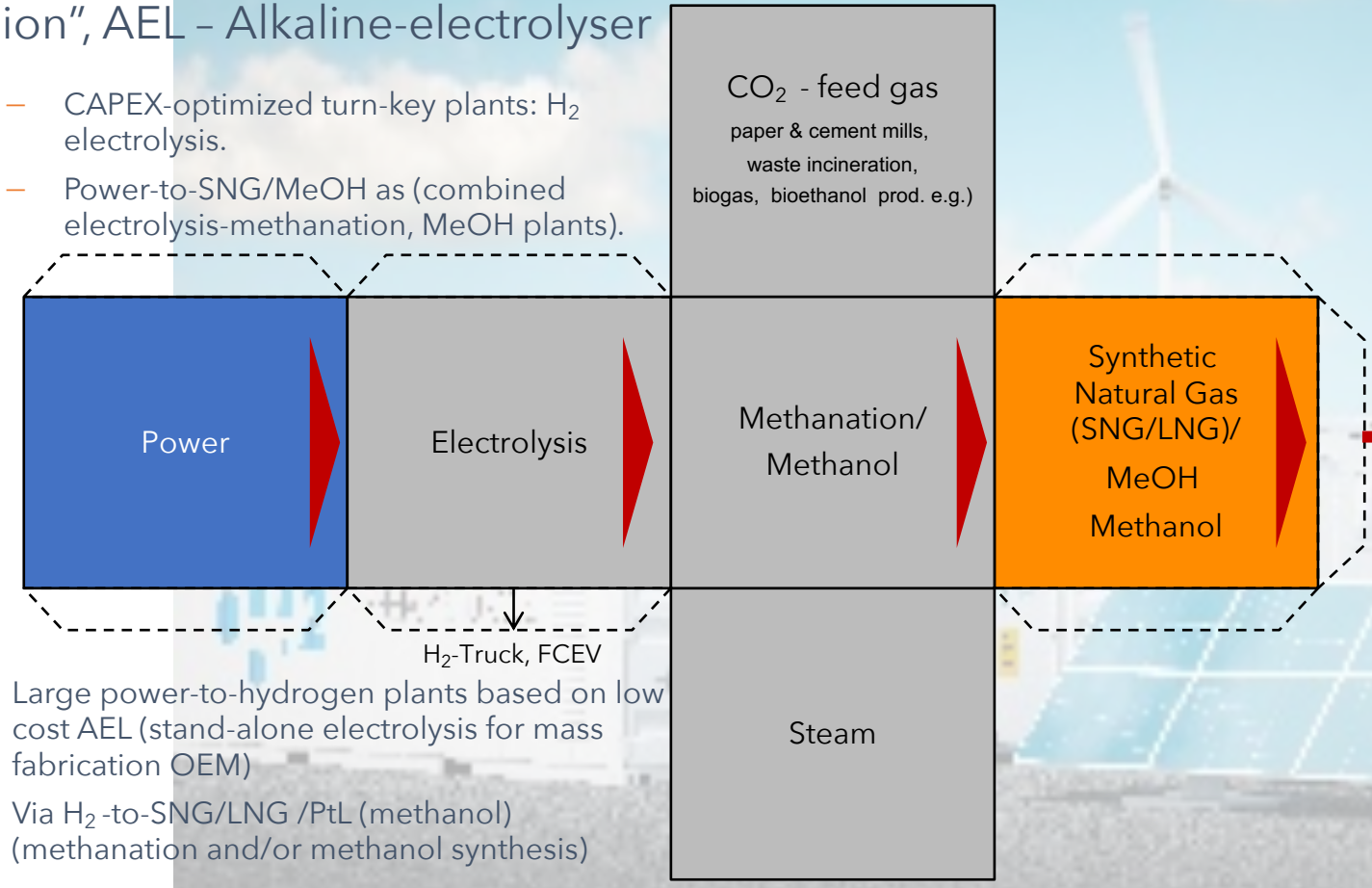
MeOH or CH4

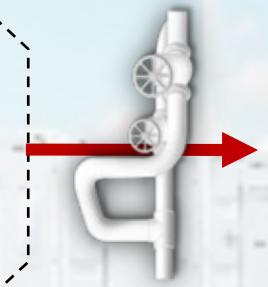
EKONAMI Methanol / Methanitaion Production

- EKONAMI designs & builds CAPEX-optimized turn-key plants AEL/PtX(L)
- "smart energy conversion", AEL – Alkaline-electrolyser



- CAPEX-optimized turn-key plants: H_2 electrolysis.
- Power-to-SNG/MeOH as (combined electrolysis-methanation, MeOH plants).





- Large power-to-hydrogen plants based on low cost AEL (stand-alone electrolysis for mass fabrication OEM)
- Via H_2 -to-SNG/LNG /PtL (methanol) (methanation and/or methanol synthesis)

H_2Module

EKONAMI
H_2 + E-FUELS

EKONAMI SE

specializes in process provider, engineering, and EPC services for power-to-methanol plants. They offer a range of modularized and standardized flexible methanol synthesis skids to optimize e-fuel system solutions. The company's approach involves integrating essential process units to ensure maximum efficiency. Additionally, their Modular Electrolysis EKO series can be seamlessly integrated into any Power to X solution without compromising efficiency.

The photo shows a EKO Series H.10 MW unit which is receiving the final steps before being shipped ex-factory Germany. Once delivered the unit is commission ready.

EKO H SERIES AT A GLANCE

AEL

40 bar

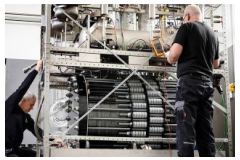
The modular EKO H Series from Ekonami utilizes AEL Electrolysis technology, which is backed by our innovative approach and supported by long-standing real-world data. The EKO series does not require a high-pressure compressor. The higher pressure allows us to reduce the requirement for buffer tanks and compressors. This concept improves the overall energy efficiency of our equipment and reduces operational costs.

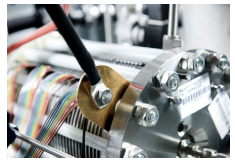
AC/DC

COST

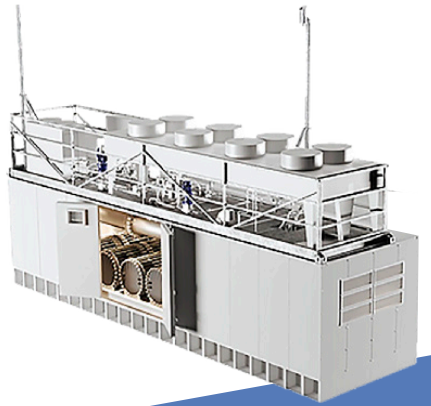
Electricity is the main operating cost, the EKO series can receive electricity in either AC or DC mode. This flexibility reduces total system complexity.

EKO series is a next-generation AEL Electrolysis technology, which has been developed to maximize energy efficiency. By using an innovative approach to AEL technology that is paired with our manufacturing capability. Through this paring, we could minimize the use of PGM metals. This reduces the stack cost significantly.





EKO Series	*H.05*	*H.10*	*H.20*
Input	5 MW	10 MW	20 MW
Water Consumption	0,9l/Nm³ H2	0,9l/Nm³ H2	0,9l/Nm³ H2
Load range	Dynamic Operating 0-100 % (CSU 5 min)		
Output (Hydrogen Gas) / h	1250 Nm³	2500 Nm³	5000 Nm³
Purity	99,99%	99,99%	99,99%
H2 production presure	40 bar	40 bar	40 bar
Power Consumption / Nm³ H2	4.9 kWhel	4.9 kWhel	4.9 kWhel
Other	CE conformity		
Saftey	Continuous monitoring of H2 in O2 (HTO), and O2 in H2 (OTH) monitoring of H2 gas		



H_2

EKO SERIES H .05
EKO SERIES H .10
EKO SERIES H .20

MeOH Module

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EKO EF SERIES

40 bar

Flex L

The EKO Series EF process is designed to address the challenges of fluctuating feed streams and partial load in E-methanol production. This process eliminates the need for costly H2 buffer tanks and allows each module to operate within Flex load range of 10-100%. Additionally, the key innovation of decreasing operating pressure to 40 bar enables methanol plants to operate with fluctuating renewable energy sources, even off-grid.

Service

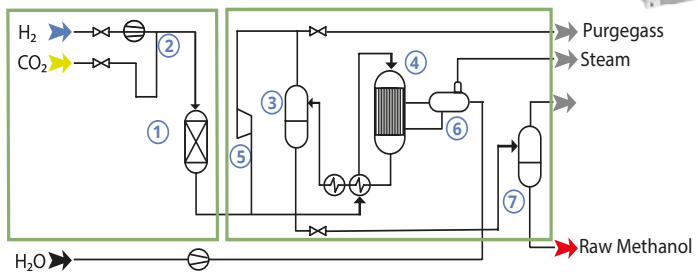
COST

Fast servicing and support can be achieved through a high grade of standardization in manufacturing. This approach does not only positively affect the availability of spare parts but also the cost.

EKO EF series is developed with the aid of long-standing relationships with industry partnerships. We pair this with innovation and mass production allowing us to manage cost carefully.

EKo Series	*EF.05*	*EF.10*	*EF.20*
Nominal methanol production tonin tons p.a. (8 000 hours)	4 000	8 000	16 000
Tons of CO_2 input per ton Methanol	1.4	1.4	1.4
kg H2 per tone of Methanol	200		
Process presure	40 bar	40 bar	40 bar
Process temperature	240° C	240° C	240° C
H2 production presure	40 bar	40 bar	40 bar
Min./max. load	10 - 100 %	10 - 100 %	10 - 100 %
Auxiliary power consumption in kW	90	160	300

FEEDGAS Module **METHANOL Module**



1. **Oxygen sperater**
2. **Optional 40 bar compressor**
3. **$H_2$0 absorber**
4. **Methanol Converter**
5. **Recycel gas compressor**
6. **Steam drum**
7. **Separator**

MeOH

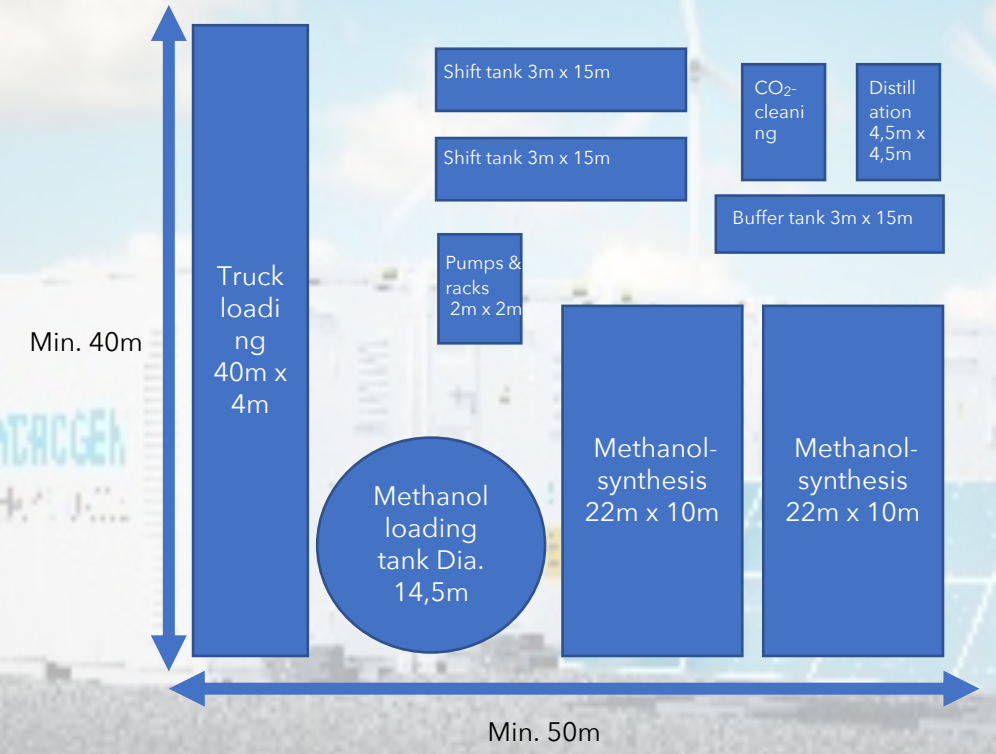
EKO SERIES EF .05
EKO SERIES EF .10
EKO SERIES EF .20

MeOH

EKONAMI Special Requirement

- Methanol plant with 24.000 t/year if MeOH without AEL plant footprint with
  - 2 modules of 20MW synthesis
  - 2 modules of distillation
  - Buffer tank for MeOH
  - Shift tanks for MeOH
  - Loading tank for MeOH
  - Truck loading for MeOH
- No oxygen truck loading (44.000t 7 year)

AEL has a plot area of 50m x 40m for a 40 Mw_{el} unit



SNG

EKONAMI References

The development and erection of the 2012 built and operated „Audi-plant“ was done by company ***Solarfuel*** (CTO of EKONAMI is technology and data holder and was shareholder and key manager.)

MeOH

EKONAMI References

Current Projects

Turkey

10 MW AEL Elec
10 MW Methanol

JÜLICH Forschungszentrum

7 Further 10 MW in development
70 000 tpa potential

Qatar

10 MW AEL Elec
10 MW Methanol

JÜLICH Forschungszentrum

Tunisia

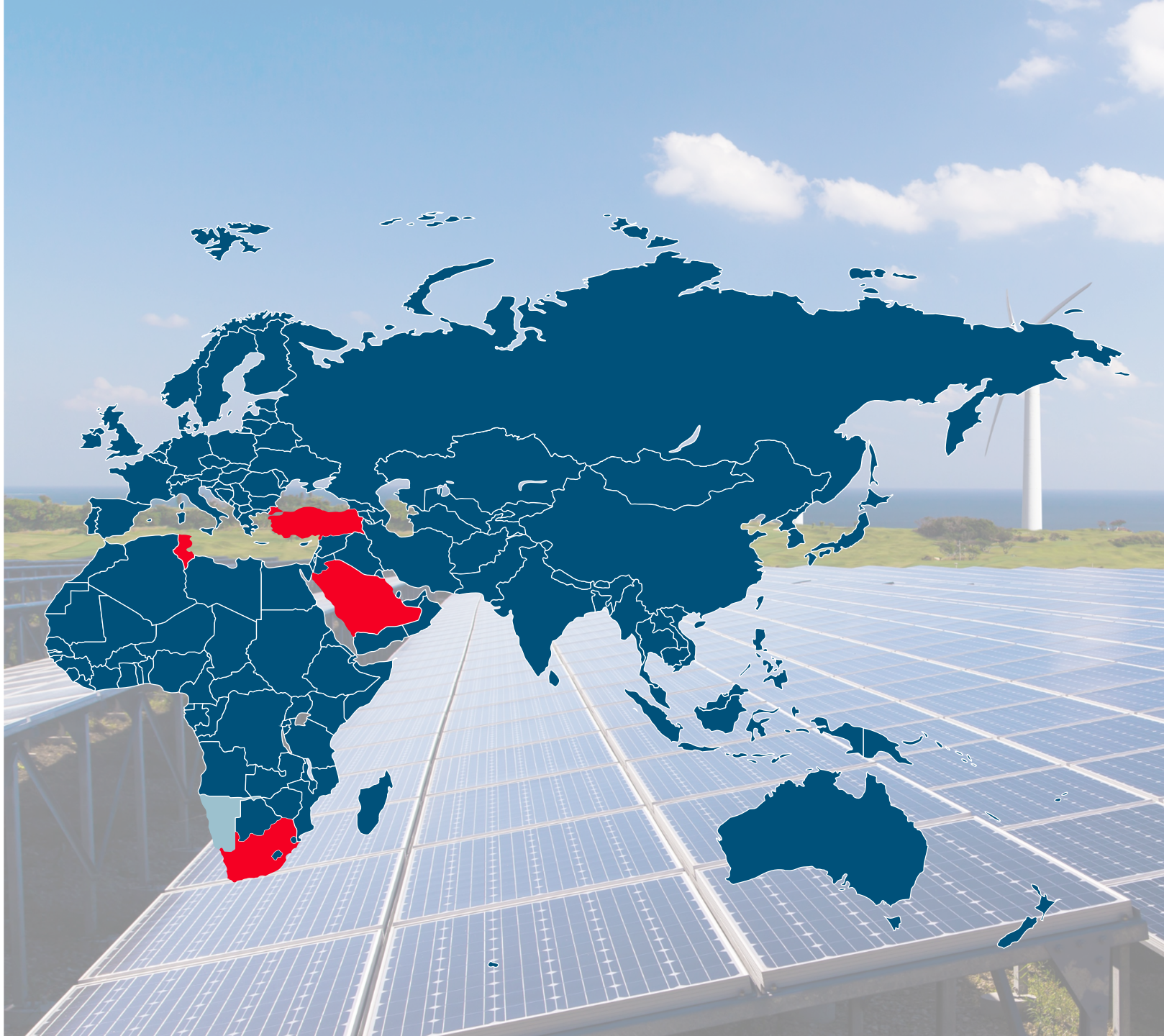
1 x 10 MW AEL
10 MW Methanol

JÜLICH Forschungszentrum

South Africa Project Horizon

200 000 tpa Green Fuel

Focus hard-to-abate sector



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