

# Energy Transformation at the Shell Rhineland Refinery - Project REFHYNE

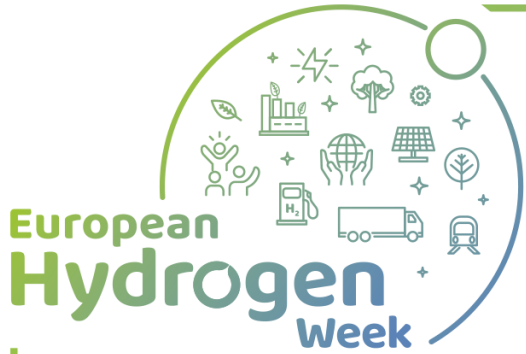
Dr. Frithjof Kublik  
Shell Rheinland Refinery

REFHYNE Project



#PRD2020  
#CleanHydrogen

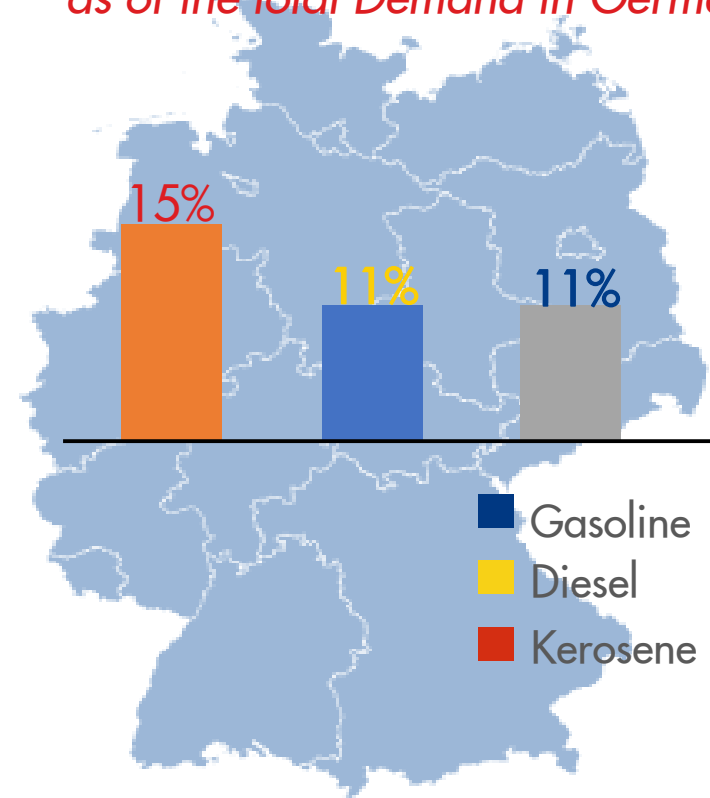


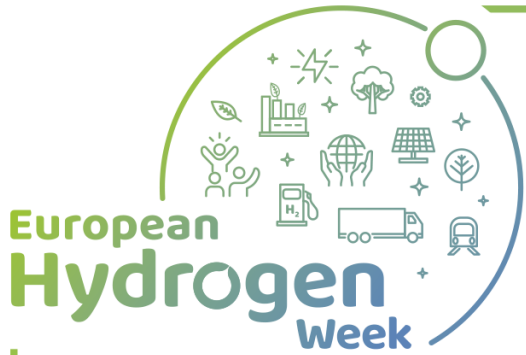


# The Shell Rheinland Refinery is today already a Major Energy Supply Hub

- Crude Oil throughput of more than 17 million tons per year
  - Largest refinery in Germany
  - Crude arrives via pipeline from Rotterdam and Wilhelmshaven
- Supply Channels from Rhineland:
  - 34 percent via ship and own harbours
  - 28 percent via road
  - 22 percent via pipelines
  - 11 percent via pipelines to neighbour industries
  - 5 percent via rail

*Percentage of the Rhineland Refinery Supply  
as of the total Demand in Germany*





## About 180,000 tons of annual hydrogen demand in the Shell Rheinland Refinery

**Used for:**

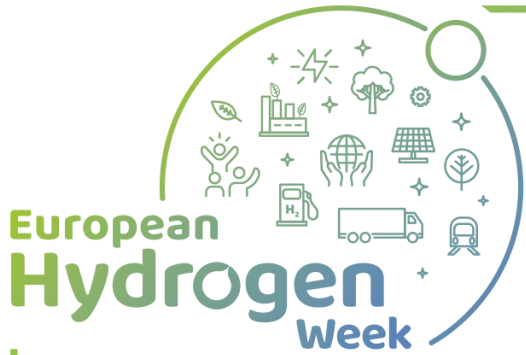
- De-Sulphurisation (Gasoil, Naphtha)
- Cracking (Hydrocracker)

**Produced by:**

- Platformers (Mogas Upgrading)
- Steam Cracker
- Gasifiers
- Steam Methane Reformer (SMR)

**About 20-30% is produced through SMRs based on natural gas:  
=> This could be potentially replaced by hydrogen from electrolyzers based on renewable power**

**=> GREEN HYDROGEN reducing the refinery CO<sub>2</sub> footprint**



# REFHYNE – Building the world-wide largest PEM-Electrolyser

## Investing in the future

- Construction of the world's largest PEM hydrogen electrolysis with ITM
- Completion in 2021
- 10 megawatts
- 1,300 tons of production capacity
- Connection to the existing electricity and water network

## Why lighthouse project?

- First large-scale water electrolyser integrated in a refinery
- Green hydrogen production for the refining process
- Reduction of CO2 footprint of the refinery
- Build experience in grid balancing services
- Stepping stone to and reference for the 100 MW class



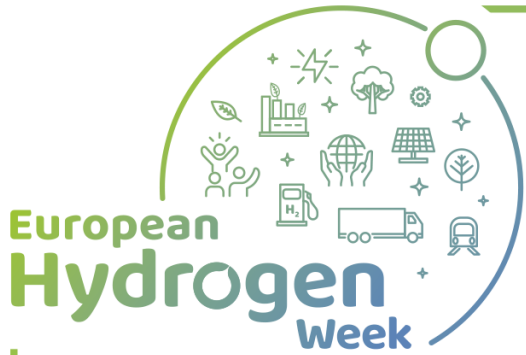
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November 2020







# REFHYNE Ground Breaking Event: June 25<sup>th</sup> 2019

Brussels/Cologne, June 25th, 2019

## Construction starts on the world's largest PEM electrolyser at Shell's Rheinland Refinery

Ground-breaking ceremony for a new hydrogen electrolysis plant at the Shell Rheinland refinery in Wesseling, Germany, that will help contribute to a cleaner, lower-carbon energy future.

The total investment is at 16 million euros, of which the European Fuel Cell Hydrogen Joint Undertaking contributes 10 million euros, 6 million euros will be contributed by the REFHYNE consortium with Shell, ITM Power, SINTEF, thinkstep and Element Energy.

Construction of the new plant, which features advanced polymer electrolyte membrane (PEM) technology, is expected to be completed in the second half of 2020. The plant will produce up to 1,300 tons of hydrogen per year when operating at peak rates.

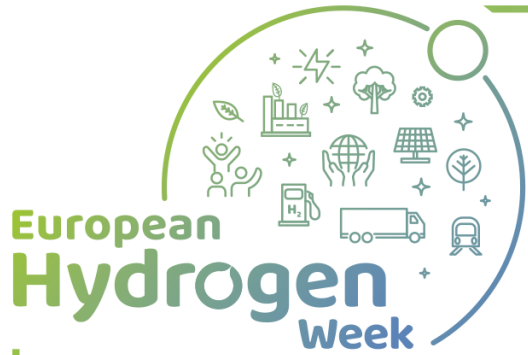
Hydrogen will be produced using electricity instead of natural gas. Producing hydrogen with electricity generated from renewable power sources could help significantly reduce CO2 emissions from the Shell Rheinland refinery.



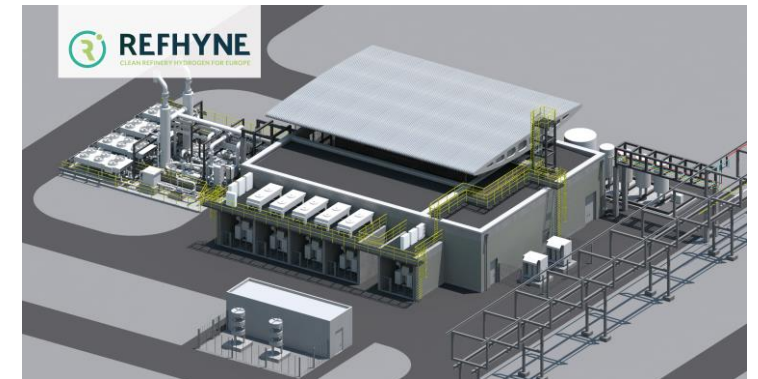
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# REFHYNE 10 MW Electrolyser - Design

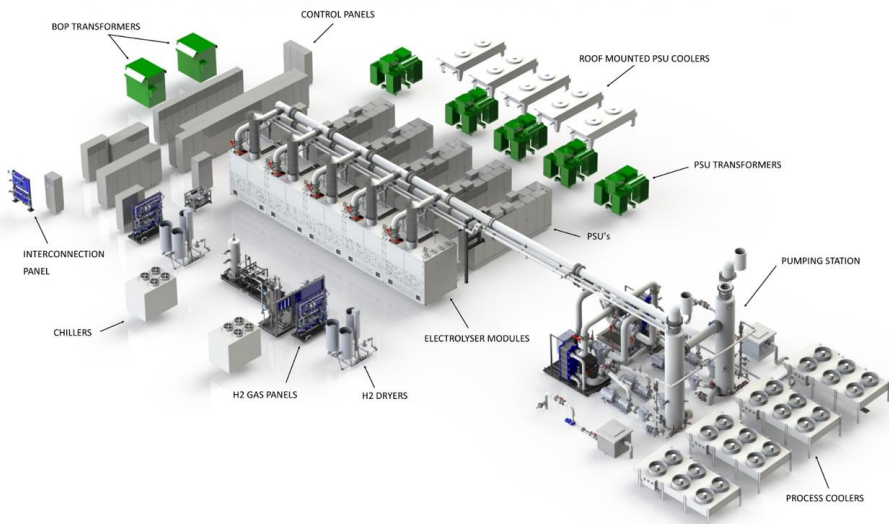
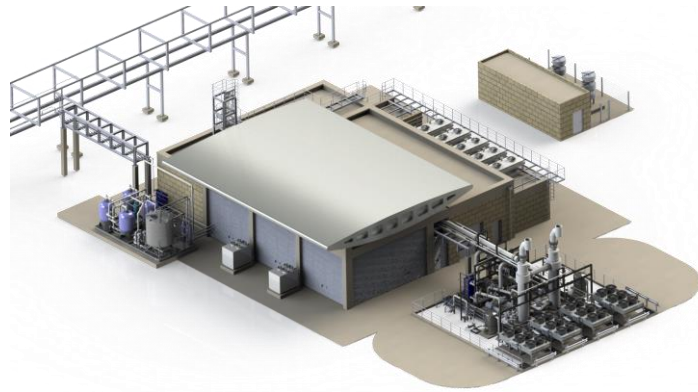


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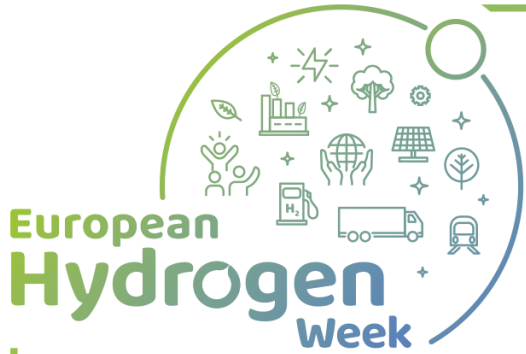




# From Design to Implementation today







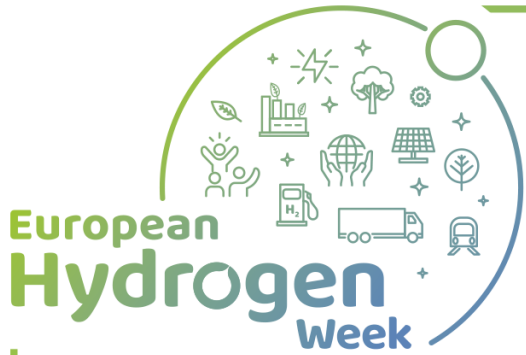
High Calibre Visit by

EU Commissioner DG Energy Kadri Simson  
NRW Minister of Economic Affairs Prof. Andreas Pinkwart  
FCHJU Executive Director Bart Biebuyck  
on July 6<sup>th</sup>, 2020

Welcome in the Shell Refinery in Corona times visiting the REFHYNE construction site and the inauguration of the first hydrogen car for the refinery







# REFHYNE - Platform for New Opportunities

Rheinland Refinery  
-> Industrial Use for Hydrogen  
-> EU RED II Opportunities



Hydrogen for Mobility (HRSs)  
-> cars, buses, trucks, trains, ships



Power Market  
-> Primary/Secondary Grid Balancing

## REFHYNE – 10 MW Electrolyser



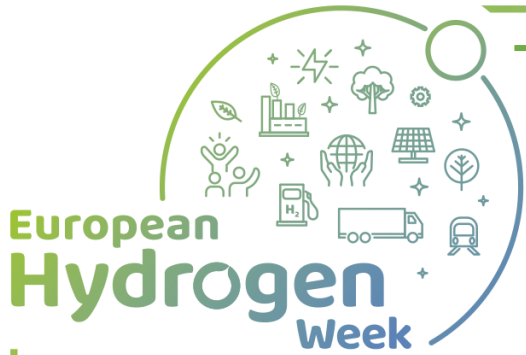
RVK Cologne (local bus comp.)  
-> 50 H<sub>2</sub> buses operated by 2021



Platform for synthetic  
e-fuels for aviation



Lighthouse Project for the EU FCHJU

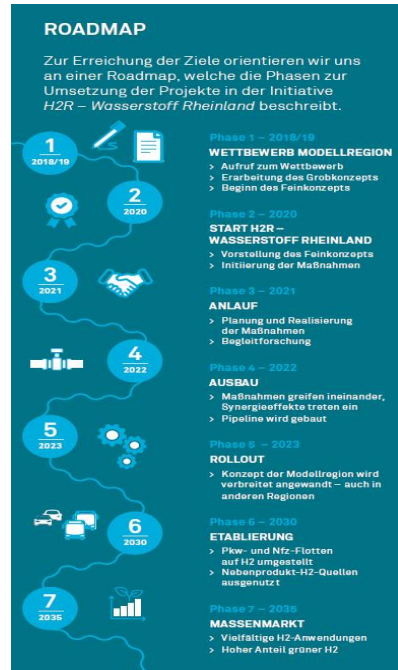


# Target: Development of an innovative H<sub>2</sub> Supply Chain for large H<sub>2</sub> consumers like buses, trucks, trains, ships for the H<sub>2</sub> Model Region Rheinland (H2R) and along the river Rhine

Implementation of the H<sub>2</sub> Rheinland (H2R) Region Concept ... prepared by the consortium with support from the State of NRW, ... submitted in September 2020

see also:

<https://www.wasserstoff-rheinland.de/>



## MACHEN SIE MIT!

Wichtige regionale Unternehmen und Akteure unterstützen die Initiative H2R – Wasserstoff Rheinland. Werden Sie Teil und gestalten Sie die Energie- und Verkehrswende in der Region mit!

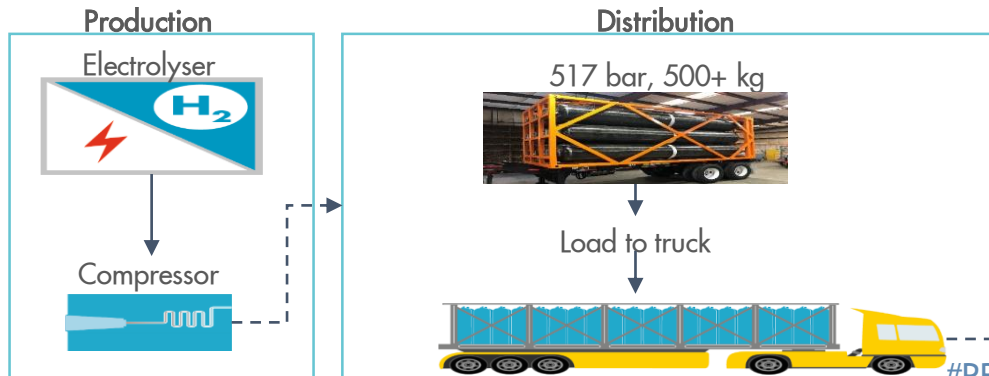


Gefördert durch:

Ministerium für Wirtschaft, Innovation, Digitalisierung und Energie des Landes Nordrhein-Westfalen

Wir freuen uns auf Ihre Kontaktaufnahme.

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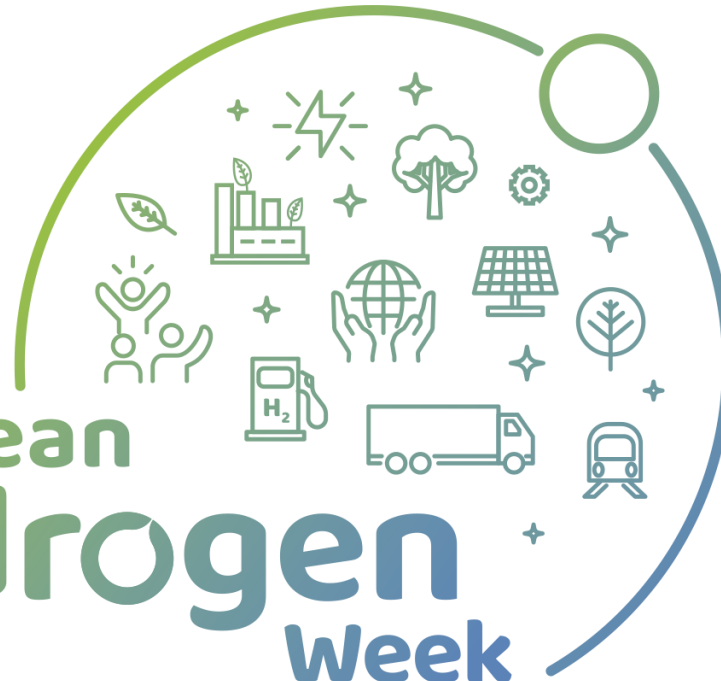
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# European Hydrogen Week



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