



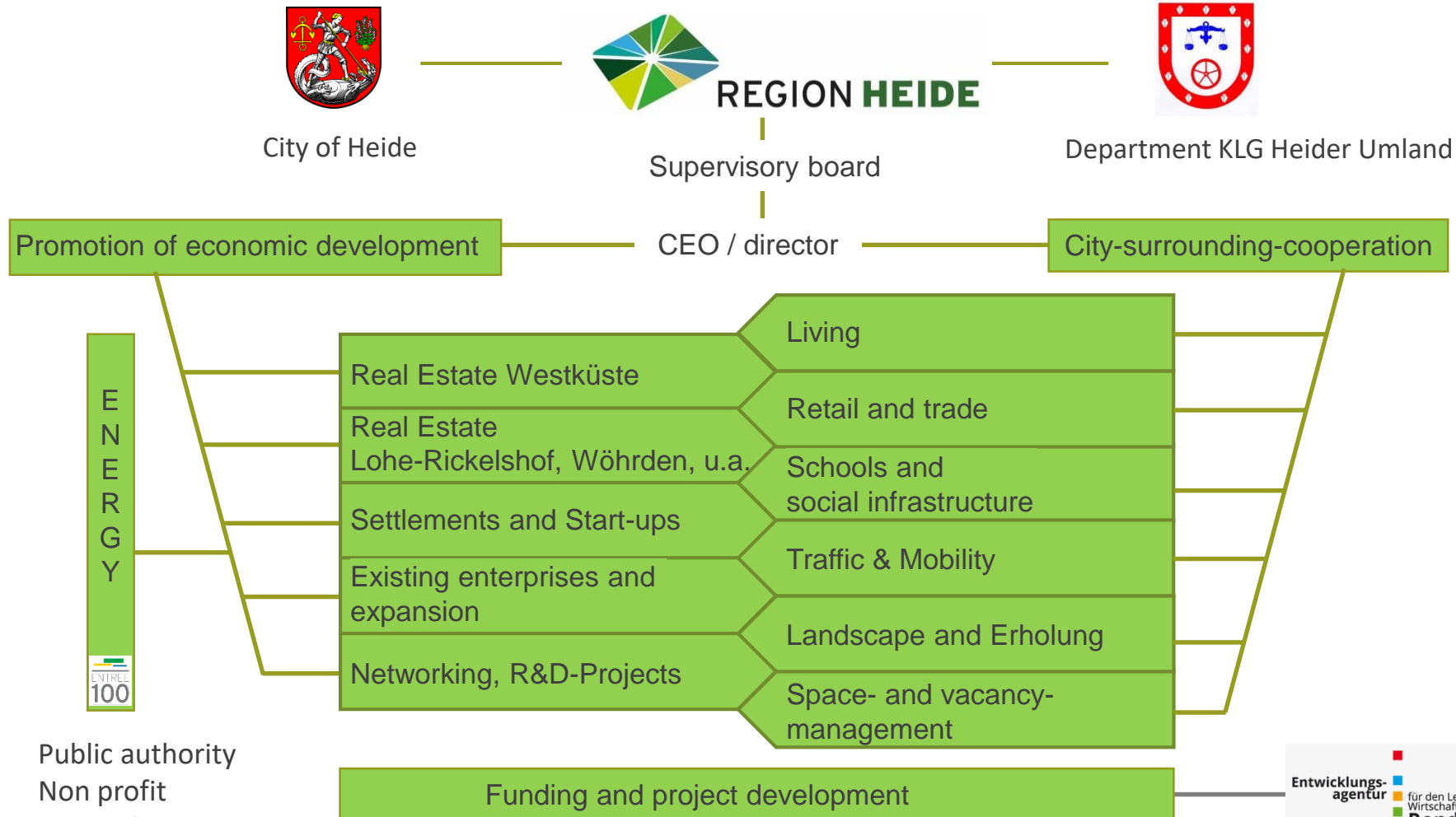
# ENTREE100

Project initiative for multi-MW-Applications  
in Hydrogen und Flexibilities



17.05.2019: Potential of hydrogen by railways in SH - S2R/FCH - Brussels

# Development agency Region Heide

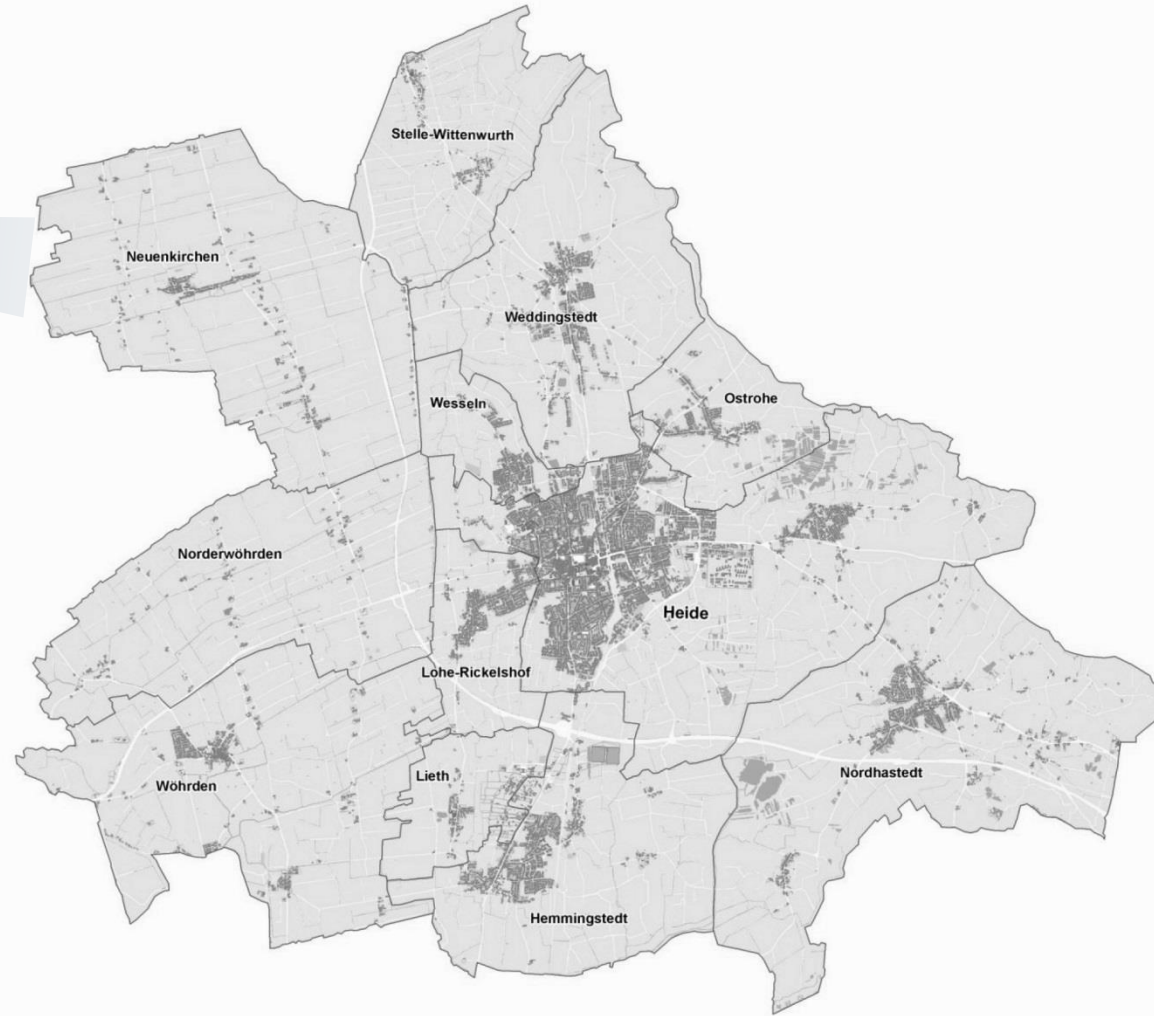
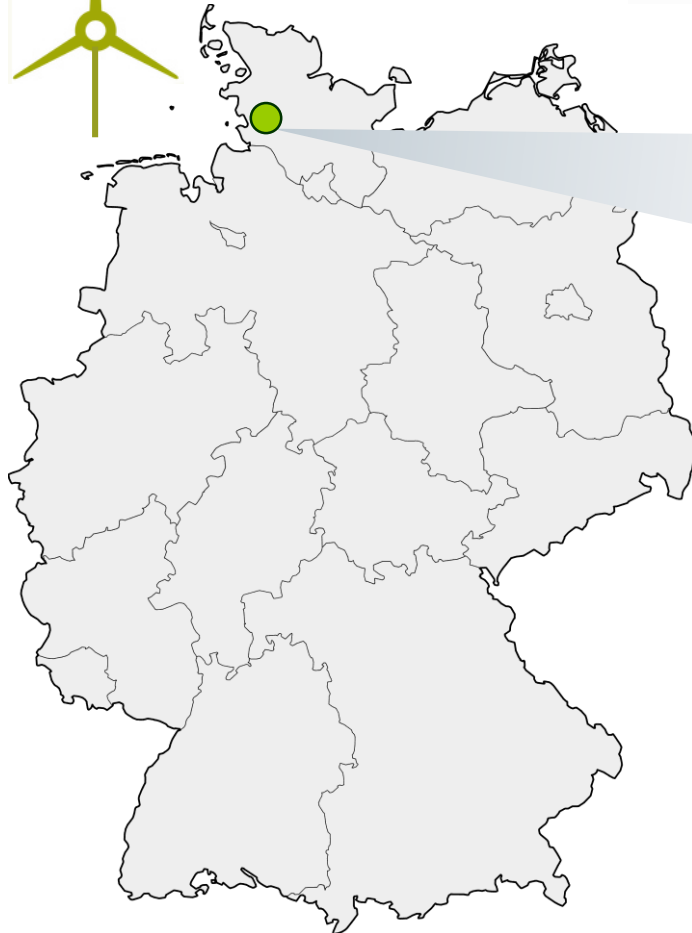
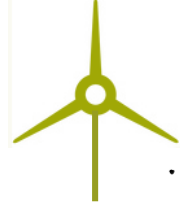


ENERGY

Public authority  
 Non profit  
 10 employees  
 Founded 2013

Entwicklungs-  
 agentur  
 für den Lebens- und  
 Wirtschaftsraum  
**Rendsburg**

# Region Heide - Facts



- City of Heide  
+ Department KLG  
Heider Umland
- 37.000 inhabitants
- Motorway to Hamburg  
(approx. 45 min)
- 15 km to north sea

# Region Heide - Impressions



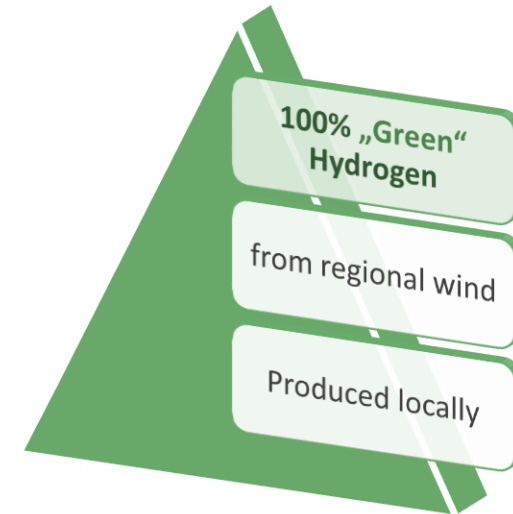
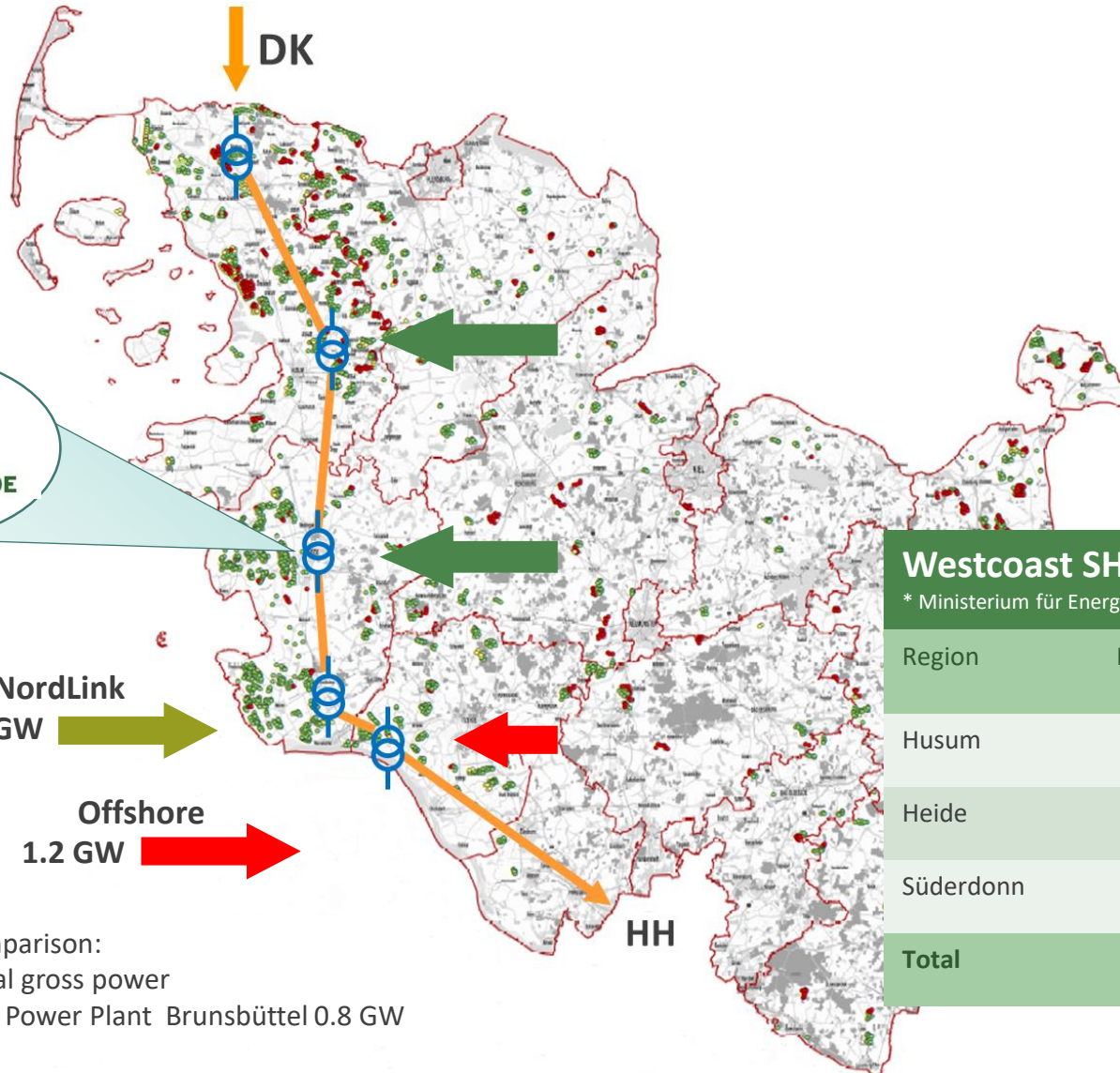
Germany's largest market place

Europe's largest region for cabbage



**WE'VE GOT ENERGY!**

# Our Asset - Energy



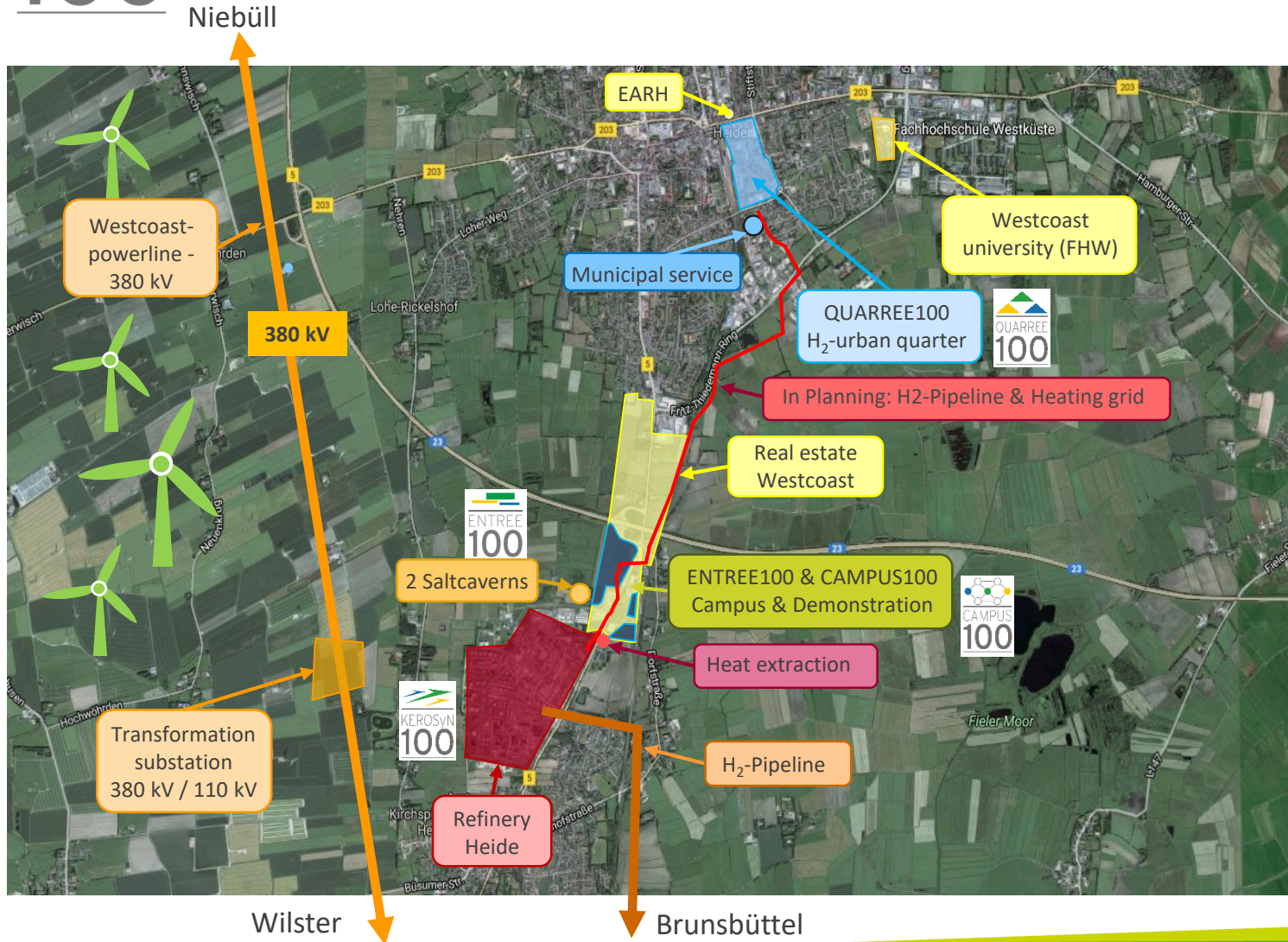
### Westcoast SH - Windpower Onshore 2016 \*

\* Ministerium für Energiewende SH

Region	In operation	Under construction	Applied	Total
Husum	1,8 GW	0,4 GW	0,8 GW	<b>3,0 GW</b>
Heide	0,9 GW	0,1 GW	0,1 GW	<b>1,1 GW</b>
Süderdonn	0,8 GW	0,1 GW	0,1 GW	<b>1,0 GW</b>
<b>Total</b>	<b>3,5 GW</b>	<b>0,6 GW</b>	<b>1,0 GW</b>	<b>5,1 GW</b>

For comparison:  
 Electrical gross power  
 Nuclear Power Plant Brunsbüttel 0.8 GW

# Region Heide – infrastructure today



**Project Initiative**  
Energy System Transformation  
 towards 100% Renewable Energy



**Project (2017 – 2022)**  
 System-beneficial urban energy  
 supply systems for full integration of  
 renewable energies



**Project (2017 – 2021)**  
 R&D to produce green, synthetic jet  
 fuel by hydrogen and CO<sub>2</sub> via  
 methanol



**Research**  
 Institute for transformation of the  
 energy system



# „Reallabor Westküste 100“

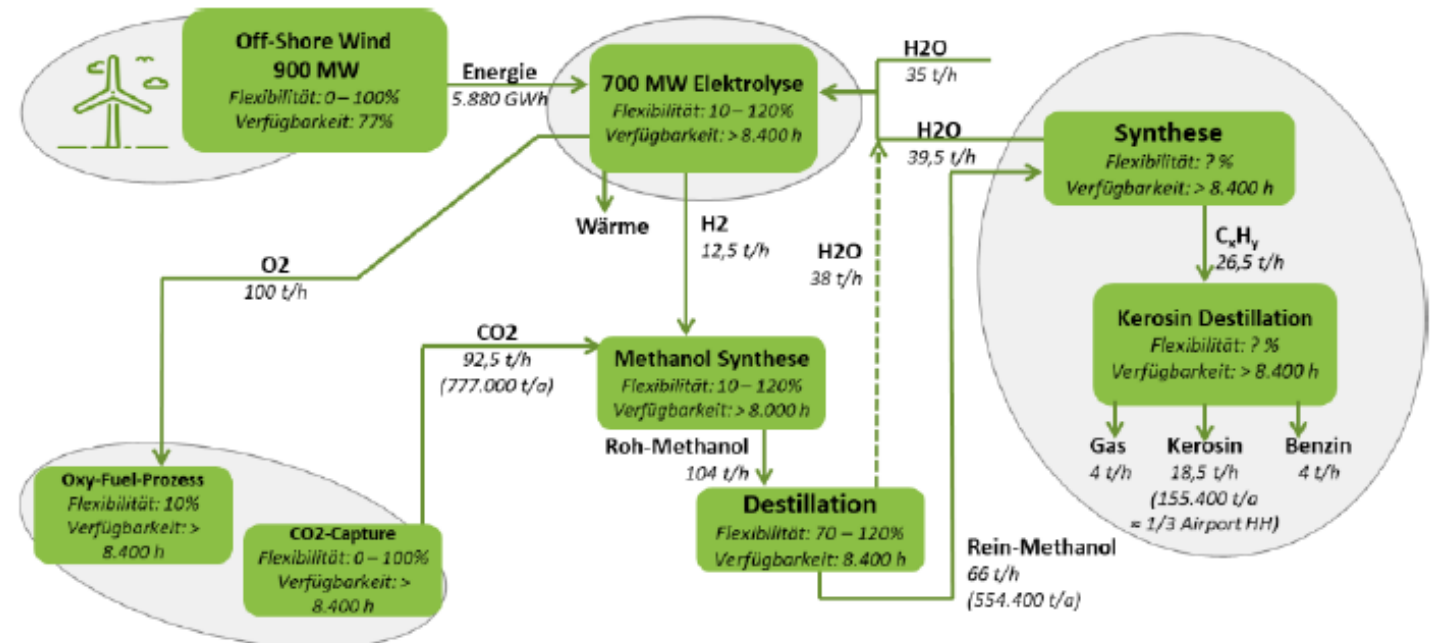
Supply-Chain orientierted Energy Transition process meets Decarbonisation of Industry

Reallabor Westküste100 – a complete value-added chain

## Application Reallabor

(submitted 05 April 2019, desicion July 2019)

- Application in the call “Reallabore” of the 7<sup>th</sup> Energy Research Program (BMWl, German Federal Ministry for Economic Affairs and Energy)
- 9 partners (7 enterprises, 1 university, 1 municipal entity)
- 30 MW elektrolyse
- Complete value-added chain from RES to Syn-Fuel
- First integration of the cement industry as unavoidable source of CO<sub>2</sub>
- Option for scale-up to 700 MW elektrolyse



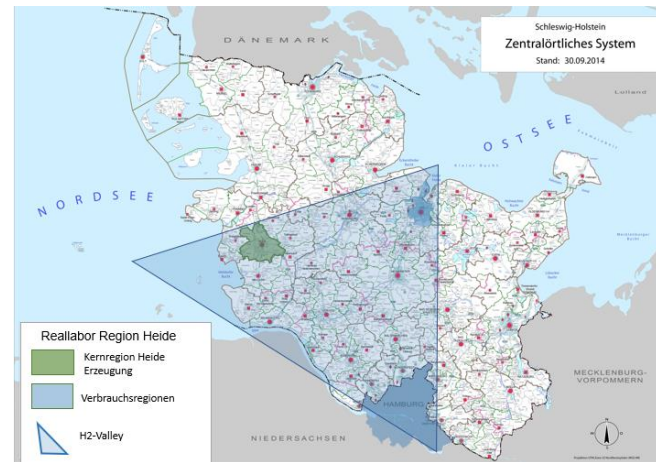
# H2 Valley Heide-Hamburg-Northern Germany

H4Valley - 100% Green Hydrogen for Integrated Economies

## H4Valley

PROPOSAL TO THE CALL H2020-FCH-03-1-2019  
(Horizon2020)

- H2 integrated hydrogen economy from RES to diverse end-user application portfolio
- H2-Application with 5t/d (1.500 t/a) H2 demand
- H2-Application in transport sector (trucks, busses, cars, garbage trucks)
- H2-Application in energy sector (cooperation with QUARREE100)
- H2-Application in industry sector (Production of synthetic fuels)



H4Valley – expanded Region (Heide – Hamburg - Kiel)



H4Valley – core region (Heide – Hamburg)



# Schleswig-Holstein

fuel cells and hydrogen  
in the railway environment

# Track overview from NAH.SH



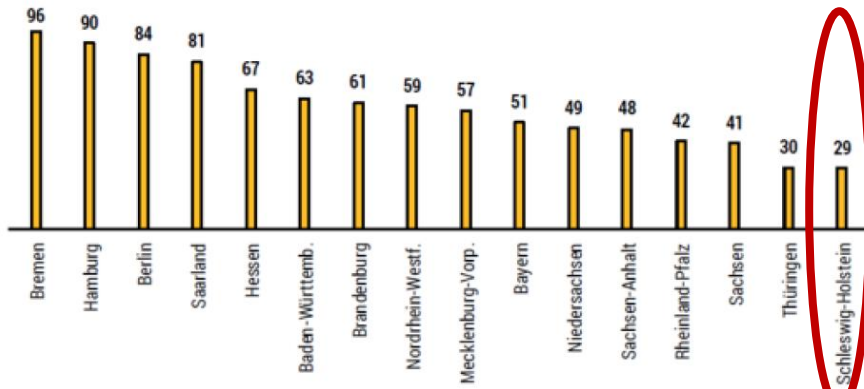
# Hydrogen train option in Schleswig-Holstein



The H2-Consortium Westküste (from left to right): Dr. Uffe Borup (NEL), Frederic Pfeffer (Entwicklungsagentur Region Heide), Jean-Marc Bazenet (EDF Deutschland), Dirk Burmeister (Entwicklungsagentur Region Heide), Harro Possel (IPP Projects); Source: Entwicklungsagentur Region Heide

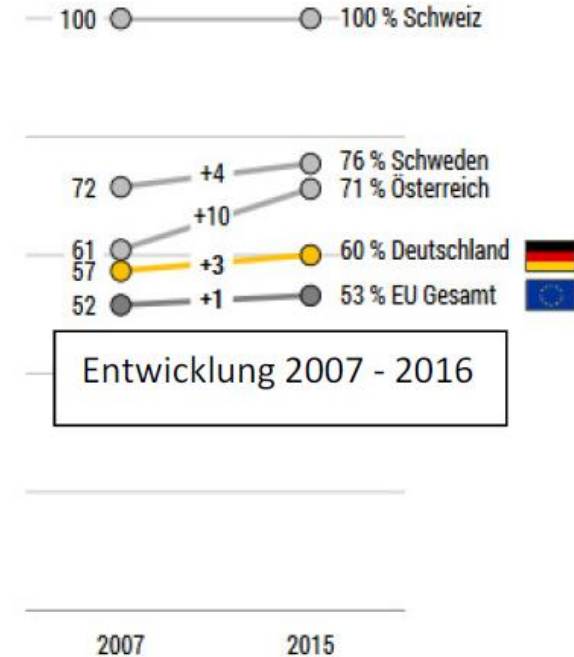
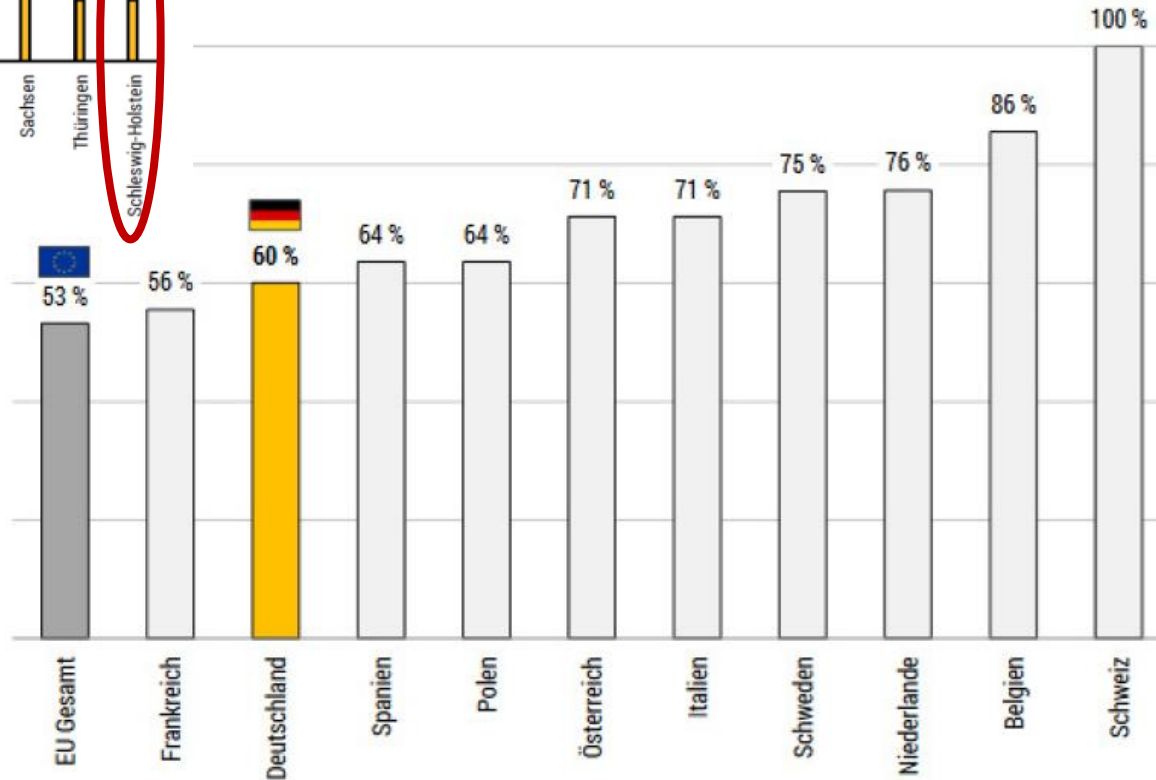


# Electrification of tracks



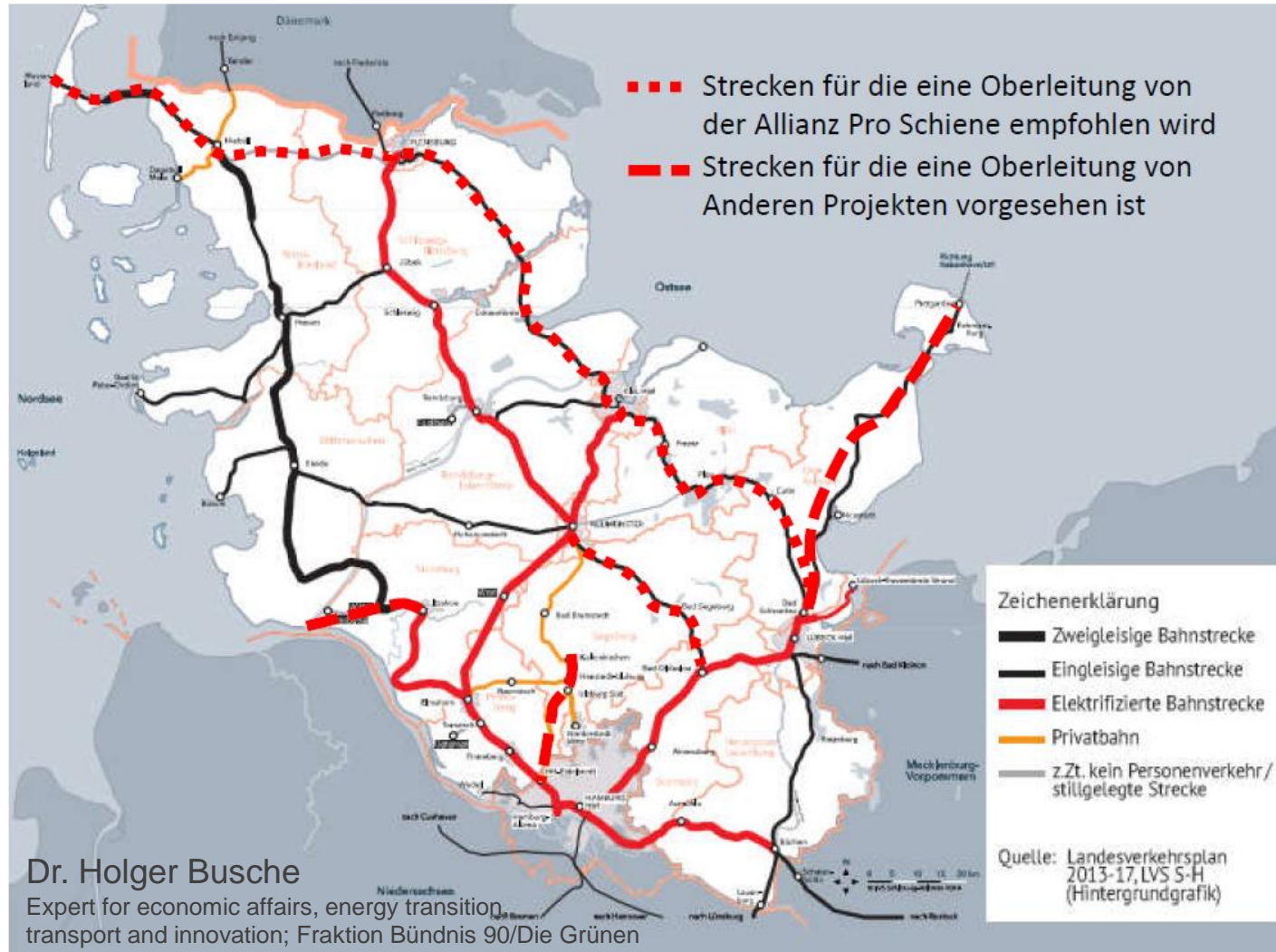
Schleswig-Holstein

376 km out of 1,275 km electrified (29%)



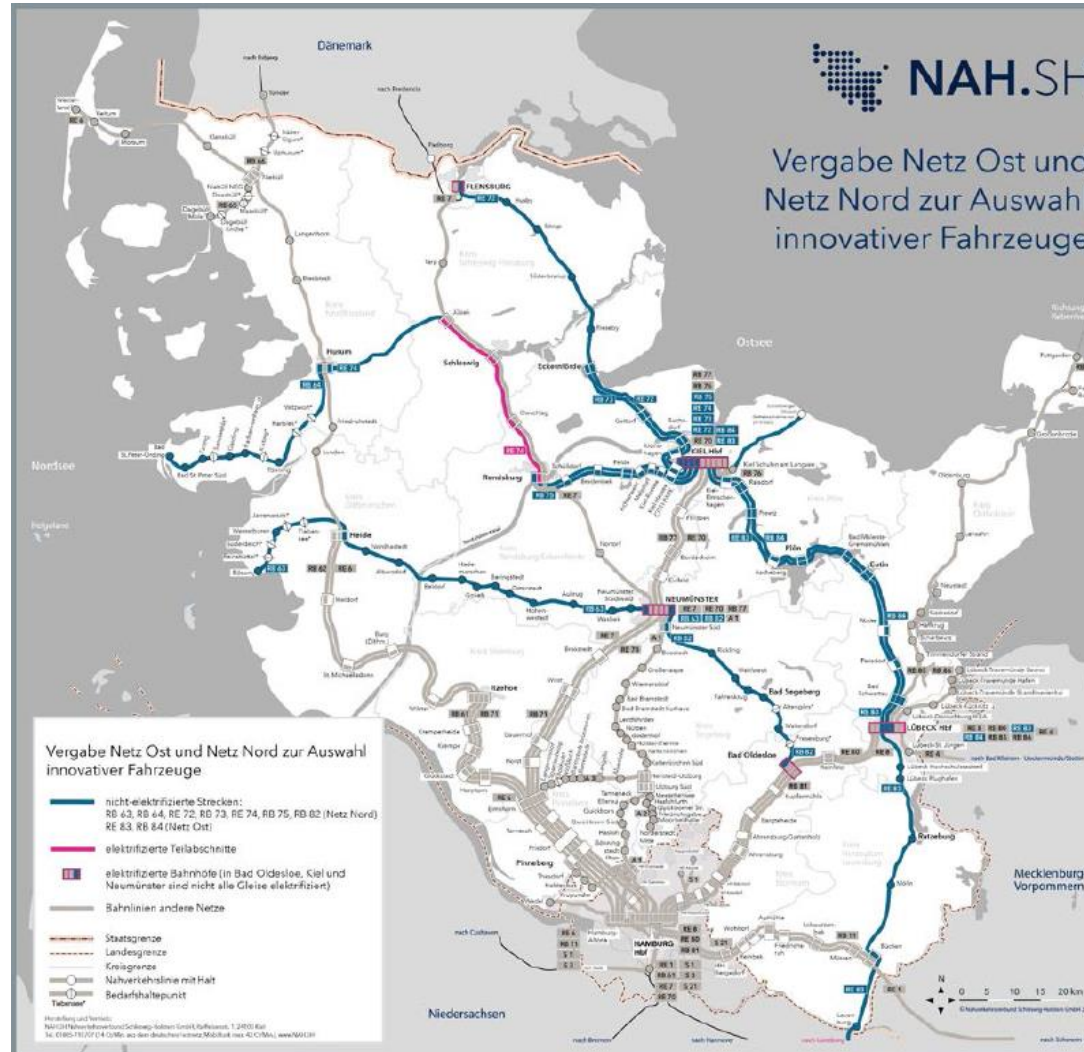
Entwicklung 2007 - 2016

# Electrification vs non-electrified tracks (idea)



Dr. Holger Busche  
 Expert for economic affairs, energy transition,  
 transport and innovation; Fraktion Bündnis 90/Die Grünen

# Track lines recently in tender process



## Verkehrsleistung

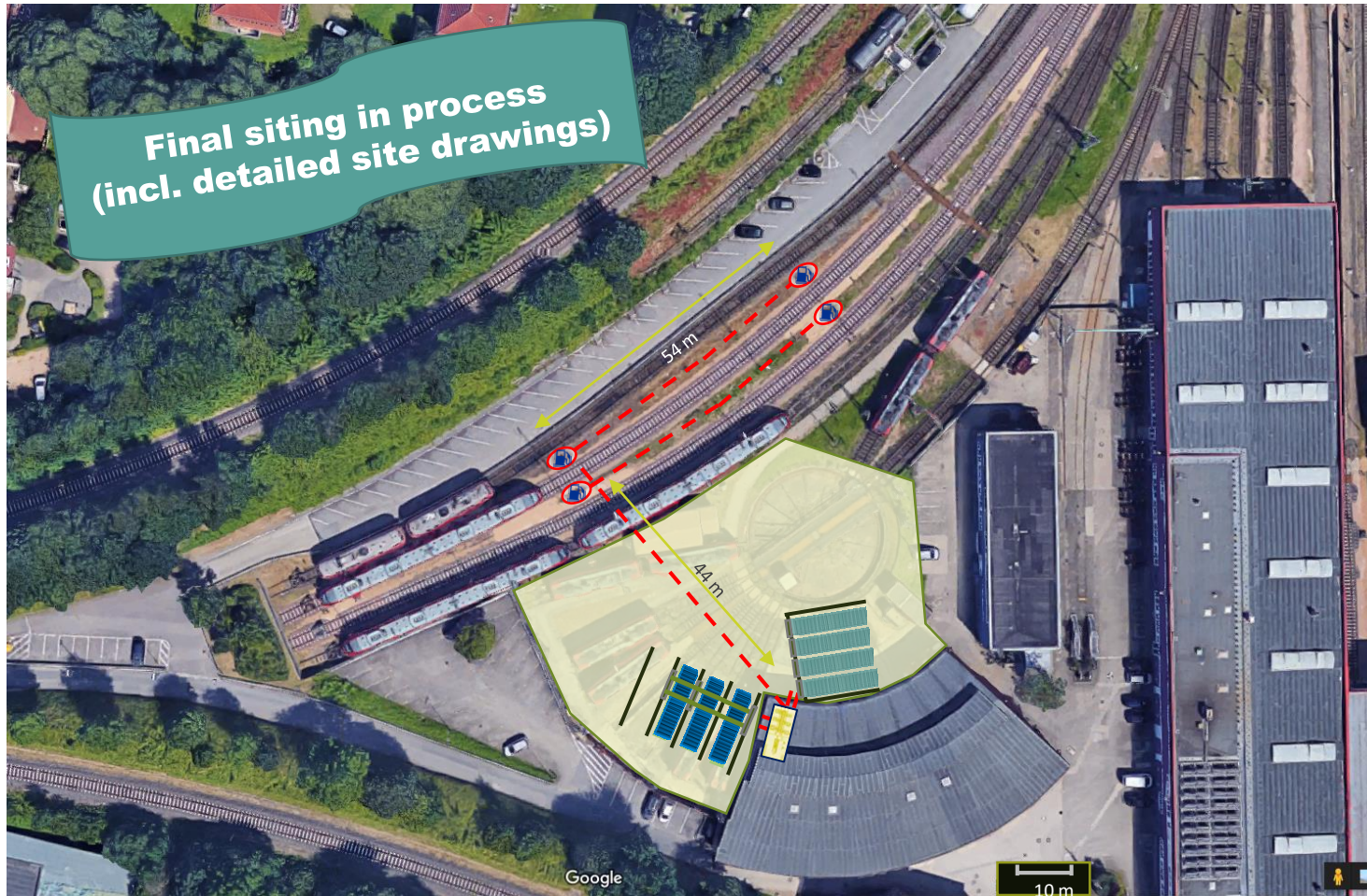
### Netz Ost

- Größtes Netz in SH: ca. 7,1 von 25,5 Mio. Zug-km
- 2 – 3 Lose denkbar (Betreiber)
- Dieselnetz: 4 Mio. Zug-km, Elektronetz 1,5 Mio. Zug-km, S-Bahnvorlauf 1 Mio. Zug-km
- DB Regio RB SH als Altbetreiber aller Strecken

### Netz Nord

- Dieselnetz mit 5,6 Mio. Zug-km
- 2 Lose denkbar (Betreiber)
- Derzeit NBE und DB Regio RB SH als Altbetreiber

# Preliminary Site Layout (example)



Dispensers planning (35 MPa)  
- each dispenser: 0,6x0,6m



mobile swap-storage  
- 12,2 x 2,4 m (40ft.)  
- 50 MPa



On-site storage  
- 12,2 x 2,4 m (40ft.)  
- 35 MPa



H2 Station®  
- Cooling and controls  
- Compressors (redundant)

# Phases in the associated EU Siting process

Phase	Task	Content	Delivery
Phase 1	Preliminary Site Layout	Site visit, lite risk study, pre dialogue with AHJ	1) Site check list/accessories, 2) Site Sketch, 3) Site budget estimate, 4) Draft time schedule, 5) Stakeholder paper & 6) Protocol signing
Phase 2	Site Quantitative Risk Assessment	Site Risk Assessment	1) Site risk mitigation list, 2) Input to AHJ & 3) Protocol signing
Phase 3	Site Layout	CAD 3D work, site construction and module placement (Customer to deliver present site drawing in DWG)	1) Draft DWG Site Layout, 2) One review + Adjustment, 3) HRS installation budget, 4) 3D EX Zone drawings, 5) Placement of Grounding, 6) Fundaments Specification, 7) Sign-off Site drawing, 8) Updated time schedule & 9) Protocol signing
Phase 4	Building Application	4a) Nel management of building application 4b) Send documentation on HRS modules – No support included	4a) Subcontracting architect and AHJ. Nel will secure Building and Operation Permit 4b) Hand over HRS Module documentation
Phase 5	Installation Planning	If 4a) → Tender & Programming management If 4b) → Align time schedule and sign Site PO	1) Site specific Bill of Material from Site Layout & 2) Protocol signing
Phase 6	Installation & Commissioning	Transport, Cranes and Installation	1) Module G certificate, 2) Ready for SAT & 3) Protocol signing
SAT	Site Acceptance Test	SAT test on site with customer	1) Signed SAT document & 2) Protocol closure

## **When to act**

/ local specifics

/ regional added value

/ more than providing transportation

## **AND in SH**

/ 100% green and regional energy for H2-to-Rail



Martin Eckhard  
Dr. Stefan Rehm

[www.region-heide.de](http://www.region-heide.de)

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