



Germany and India



Partners in Green Energy



www.lilinavitas.com



Lili Navitas
GREEN ENERGY

Introductory Remarks



“

Born Indian, it is for me the biggest pleasure and honor to help bring India and Germany together in achieving climate targets and become self-sufficient in their energy needs.

Kiran Bhojani - Founder and CEO



Kiran Bhojani

Founder & CEO

-
- 17 years Executive Vice President at E.ON
 - 10 years Investment Banking
 - 4 years Green Hydrogen



Gerd J. Lamers

Executive Director
Green Technology

-
- 16 years in Renewables
 - 6 years in Green Hydrogen
 - Evaluated over 200 Green Energy Projects - Worldwide



Jan Andreas

Anleg – Founder & CEO
Hydrogen Technology

-
- 30 years of Hydrogen experience
 - Green Technology Expert
 - Hydrogen Mobility Specialist



Marc Schwarzlose

Sundronix – MD
New-Technology

-
- Green-Technology Entrepreneur
 - Diverse Portfolio (Carbon Capture, Solar Manufacturing, Pyrolysis)
 - Airline Pilot & Instructor & Quality Officer



Multifuel-Engine

- Application focused Engineering for Serial Production in India
- Proven Technology for over 20 Customers Worldwide



Eco system for the entire green Mobility Sector

- Total Integration of New Power Sources in Existing Products
- Storage, Transport & Refueling-Stations



Biogas & Renewable Fuels

- Biogas, Hydrogen & Others – a Fuel for your Requirements
- Extensive Experience in Biogas Construction & Operations
- Biogas-Plant envisaged in India for your Fuel needs



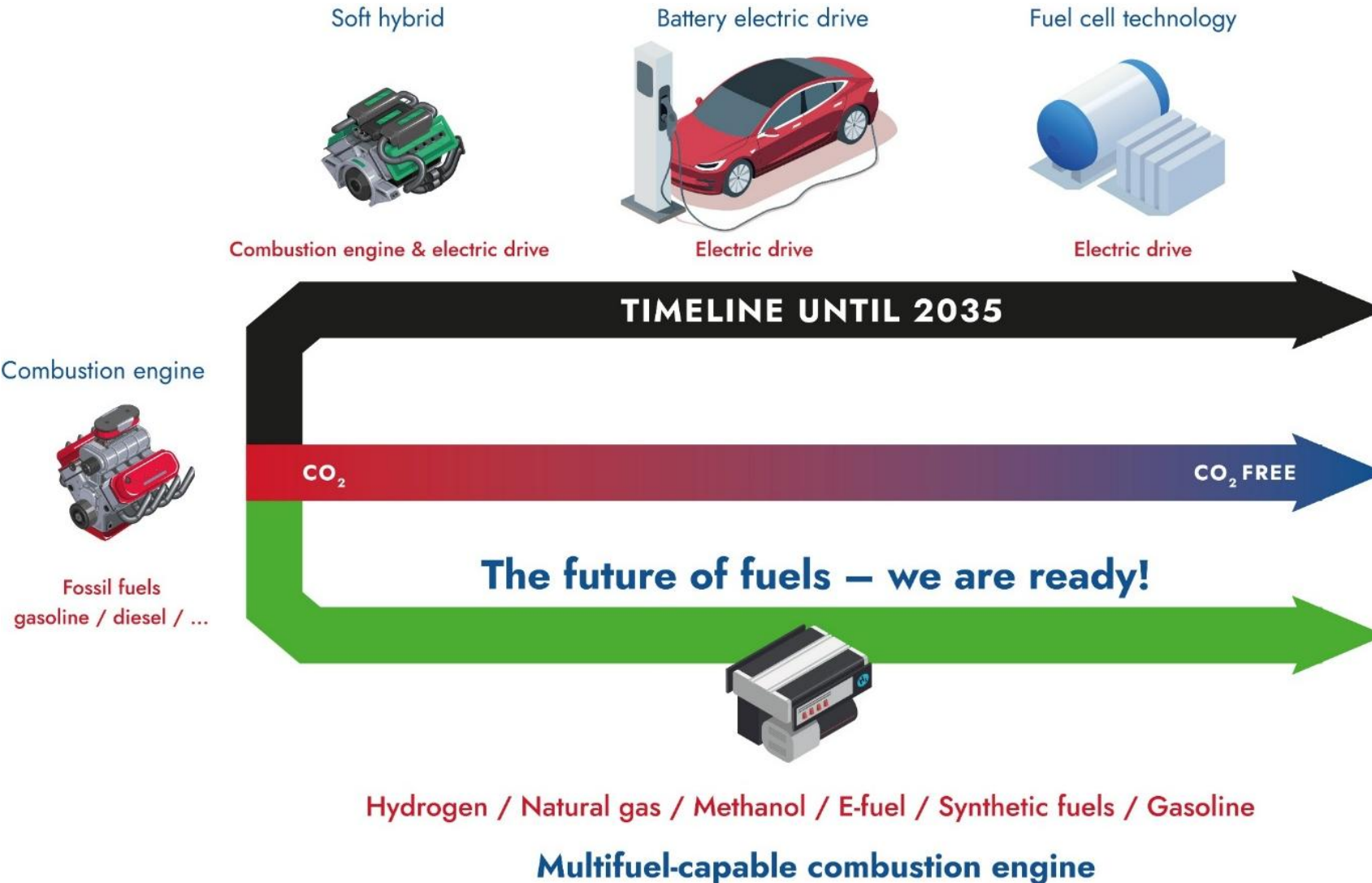
Green Hydrogen & Ammonia

- Green Hydrogen/Ammonia/Methanol Export from India to Europe
- Consortium with Off-Take and full Value Chain established



New Fuels for old Applications

Market Situation and Industry Need



- Historical Industrial step-by-step approach due to the inflexibility of the big conglomerates
- Clinging to old business models, old technology and production facilities
- Common solution needed
- Industry forces several technology changes in 25 years
 1. ICE
 2. Hybrid
 3. Battery
 4. Fuel-Cell
- Risk for stranded assets, fuel dependences, O&M uncertainty
- Mitigation by ONE engine/generator for all fuels

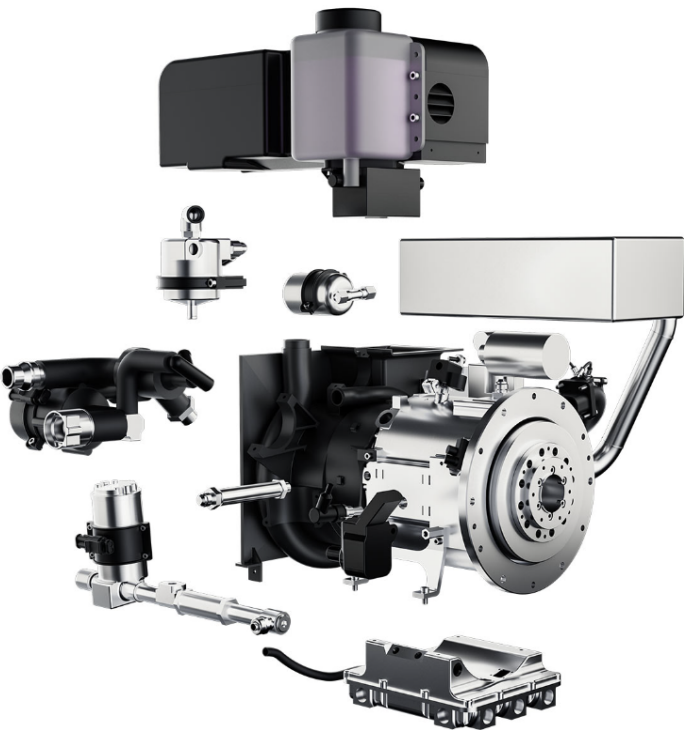
Product ready for the evolving Market

SPECIFICATIONS

The aim of our engine is to create an emission-free, future-oriented drive system. The aim is to create an engine application with hydrogen that can be easily retrofitted or integrated for all areas of modern industry. The advantage: torque-controlled operation like with a conventional diesel engine is possible at any time. The use of our hydrogen engine also works in motor applications in which the operation of fuel cells does not make sense.

Principle:	hydrogen combustion engine
Dimensions:	380 x 380 x 380 mm
Weight:	30 Kg - 75 Kg
Power:	scalable
No requirement for hydrogen quality	
Output voltages: 48V, 120V DC or 400V AC (other voltages possible)	
Scalable power range from 5 KW to 100 KW (depending on speed & variant)	
Easy connection to pressure storage tank system with over 97% usable tank volume	

Fuels available:	H2, LPG/CNG/CBG + Biogas, Ammonia, Methanol, Kerosene, Ethanol
Efficiency:	Up to 40%
Serial Price:	Diesel-equivalent
Space required:	< Petrol/Diesel-Engines
Gen-Sets for easiest integration in any Battery-System or full replacement	
Proof-of-Concept for a fool-proof integration for your Serial Products	



Product ready for the evolving Market

H180 SERIES

Specifications	H180-1	H180-2	H180-3
Concept	hydrogen combustion engine		
Piston	1	2	3
Displacement (ccm)	185	370	555
Motor Control	Electronic engine control		
speed/load control	CAN communication/ analog 0-5V		
revolutions per minute (rpm)	1000-6000		
Weight (kg)	30	36	42
Dimensions	380x380x380	380x380x450	380x380x600
Max. Power @4750rpm (kW)	10	20	30
Max. Power @ 3000 rpm (kW)	6	12	18
Max. torque @ 4750 rpm (Nm)	20	40	60
Required hydrogen pressure (bar)	12		
Max. hydrogen flow (m³/h refers to atmospheric pressure)	12	24	36
fuel consumption (g/kWh)	75-90 (depending on load and speed)		
system voltage (V)	12V		

H450 SERIES

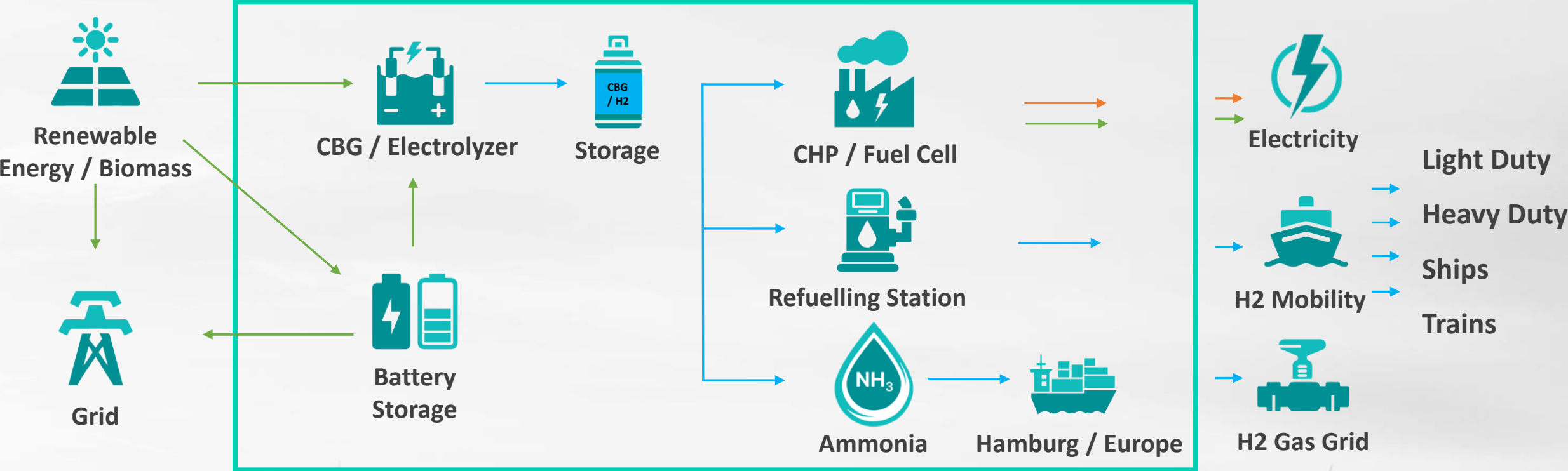
Specifications	H450-1	H450-2	H450-3
Concept	hydrogen combustion engine		
Piston	1	2	3
Displacement (ccm)	446	892	1338
Motor Control	Electronic engine control		
speed/load control	CAN communication/ analog 0-5V		
revolutions per minute (rpm)	1000-6000		
Weight (kg)	38	48	60
Dimensions	380x420x420	380x420x520	380x420x700
Max. Power @4750rpm (kW)	25	50	75
Max. Power @ 3000 rpm (kW)	15	30	45
Max. torque @ 4750 rpm (Nm)	50	100	150
Required hydrogen pressure (bar)	12		
Max. hydrogen flow (m³/h refers to atmospheric pressure)	12	24	36
fuel consumption (g/kWh)	75-90 (depending on load and speed)		
system voltage (V)	12V		

Data for other fuel types on request.



Green Ammonia Export to Europe

Project Development along the Value Chain



Design > Project Development > Planning > Purchasing > Construction > Commissioning > Operation

Lili Navitas – The Door to Europe



Integrated Project from FOB India to the Customers in Europe

- Integrated Ammonia Supply Chain:
 - Green Ammonia Sourcing
 - Storage
 - Ocean Shipping
 - Inland Shipping
 - Decentralized Ammonia/H2 Cracking Technology at point of consumption
 - Generates Local Industrial H2 Offtake
- Strategic partners for the Development: Laeisz Shipping, Duiker

Green Energy Supply Chain Solutions

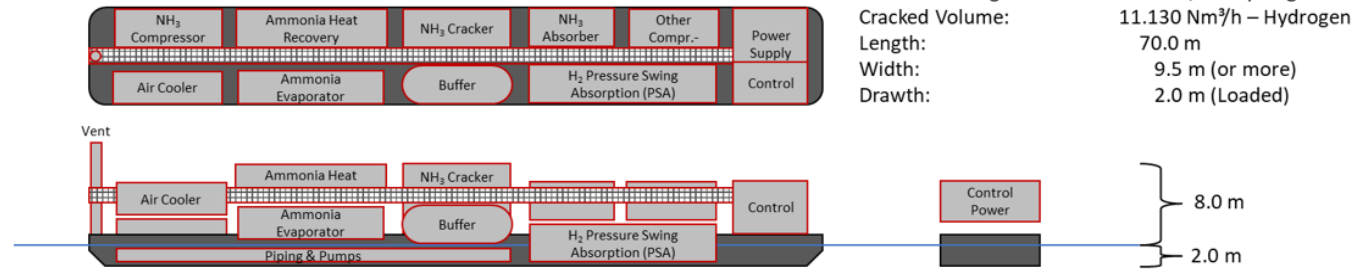


Built for Scale

- All aspects of the Value Chain on Scale
 - Production
 - Shipping
 - Conversion
 - Distribution
- Access to the European Market
- Strategic Partners to Scale with You

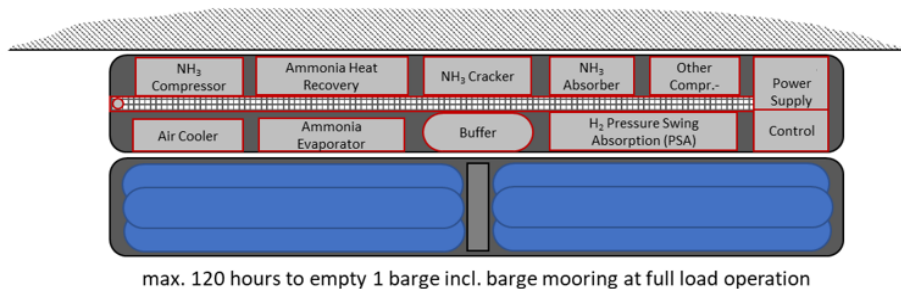


Ammonia Cracking Barge (Draft)



Hightech to solve the Problems of early technology Adopters

- Cracker landside or seaside (Barge or Ship)
- Integrated Technology
 - NH₃ as Energy Source
 - **No additional Electricity needed**
- In-House Floating Cracker Technology
 - Higher Permission Rate
 - Higher Flexibility
 - Easer to integrate in existing Infrastructure



Ammonia Cracking Barge

&

Refrigerated Ammonia Tank Barge

moored inland port

Strategic Partnership Opportunities for Indian Partner

Consortium Partner

Join as full consortium member with equity participation and operational responsibilities.

- Equity Stake in Project Infrastructure
- Green Ammonia Supply Agreements

Strategic Supplier

Primary green ammonia supplier leveraging production capabilities.

- Long-Term Supply Contracts
- Guaranteed Off-Take-Volumes

Technology Partner

Technical expertise in ammonia cracking and renewable energy integration.

- Technology licensing agreements
- Operations & maintenance contracts

One-Stop-Shop for Green Energy



Customers and Technology ready



Transportation and Storage organised



Fully Deployed Value Chain

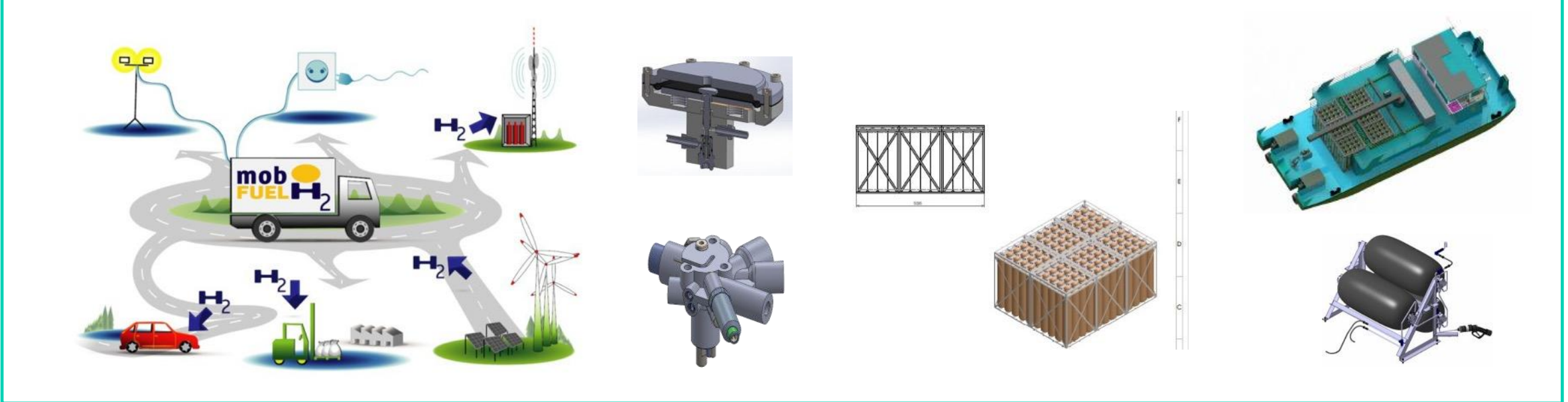


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GREEN ENERGY

ARGO ANLEG
Advanced Hydrogen Technologies

Partners for Green Infrastructure





Proven Technology for World Class Players

BIG in JAPAN:
Argo-Anleg delivers innovative H2 tank system “ICE”
for groundbreaking KEYOU-Komatsu project in Japan

World première:
H2 wheel loader from Liebherr with technology from
Argo-Anleg

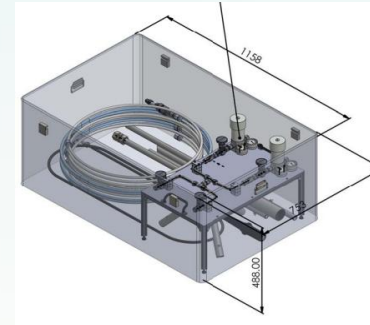


Refueling Stations Stationary & Mobile



Mobile Refueling and Overflow-Module

- Overflow-Module for 100% Flexibility
- Mobile Refueling for any Application

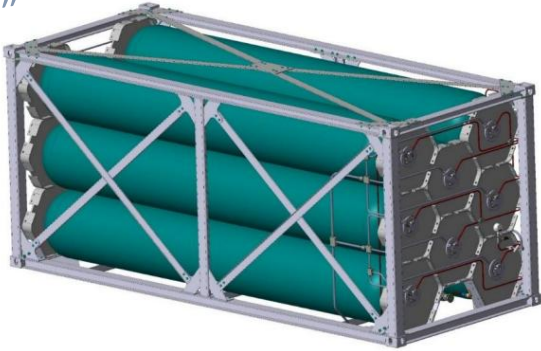


Stationary Refueling Stations

- Designed, Engineered and Built for Best-in-Class Operators
- Different Technology/Products available

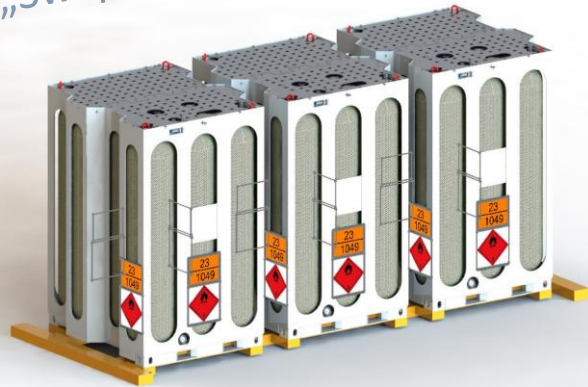


„Swappable solution“



Source: Argo-Anleg GmbH

„Swappable solution“



Source: Argo-Anleg GmbH



MEGC, MEGC 20", 500kg @
500bar, ADR, ADN approval
pending

Total per truck: 2 units (1.000kg)

USP's - all H2Tank-Tainer supplied with:

- ✓ MOTV's
- ✓ TPRD's
- ✓ TT's
- ✓ PT's
- ✓ Shock sensor
- ✓ Angle sensor
- ✓ Controller with software /cloud monitoring
(integrated in ATEX proofed box)
- WiFi, 4/5G SIM card, GPS



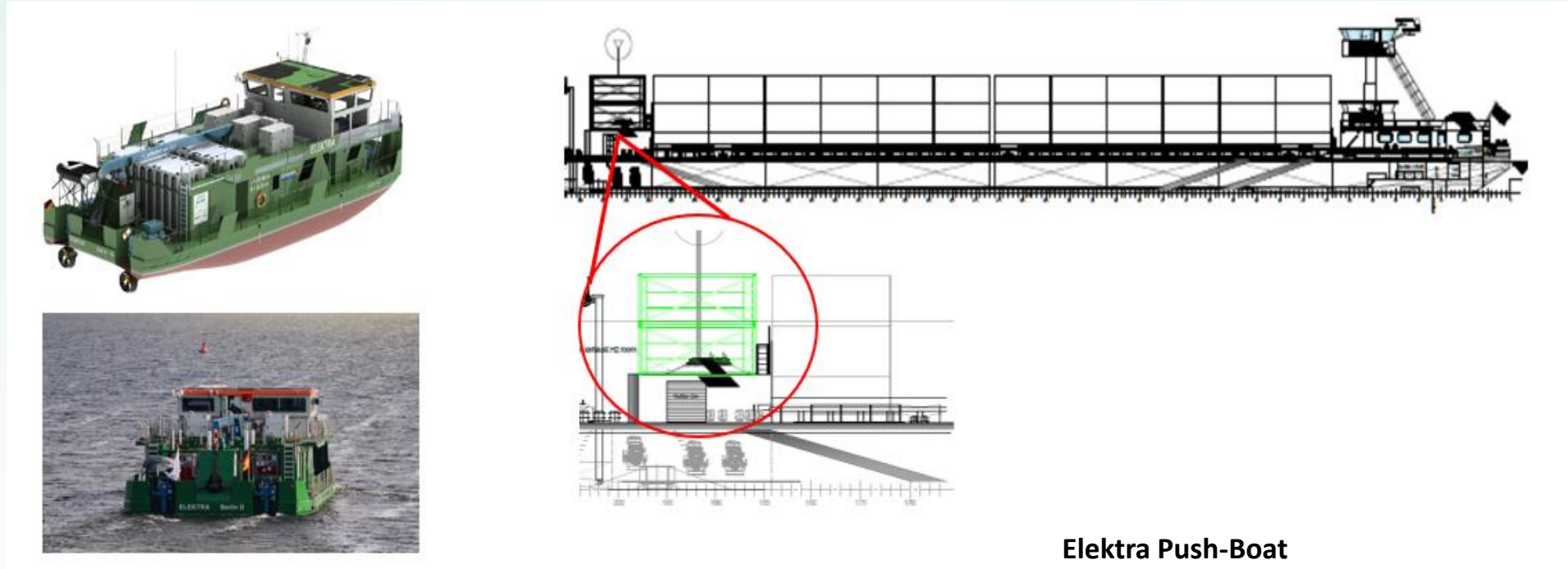
MEGC, 126kg @ 500bar,
Transport via 20" ISO adapter
ADR approval pending

Note:

Storage of 3x H2Tank-Tainer on 1x20ft adapter
Total per truck: 6 units (750kg)



© Schiffswerft Hermann Barthel GmbH



Elektra Push-Boat

- Modular H2 bunkering (6x125 kg @500 bar)
- Modules crate-able
- Refueling onshore
- Can supply different harbors

Elektra Push-Boat

- Multi Energy Supply System (400 kW Fuel Cell Modules, H2-ICU retrofit, H2-rotary engine swap)
- Multi-fuel options
- Systems designed for 24/7 operation

Integration of tank-systems into Platform vehicles 40to and busses



MAN Truck Tank-System
development of Tank-System
Gas Handling Unit

**Energy Management of
3 x Fuel Cells, including the
recharge strategy of the Batteries**

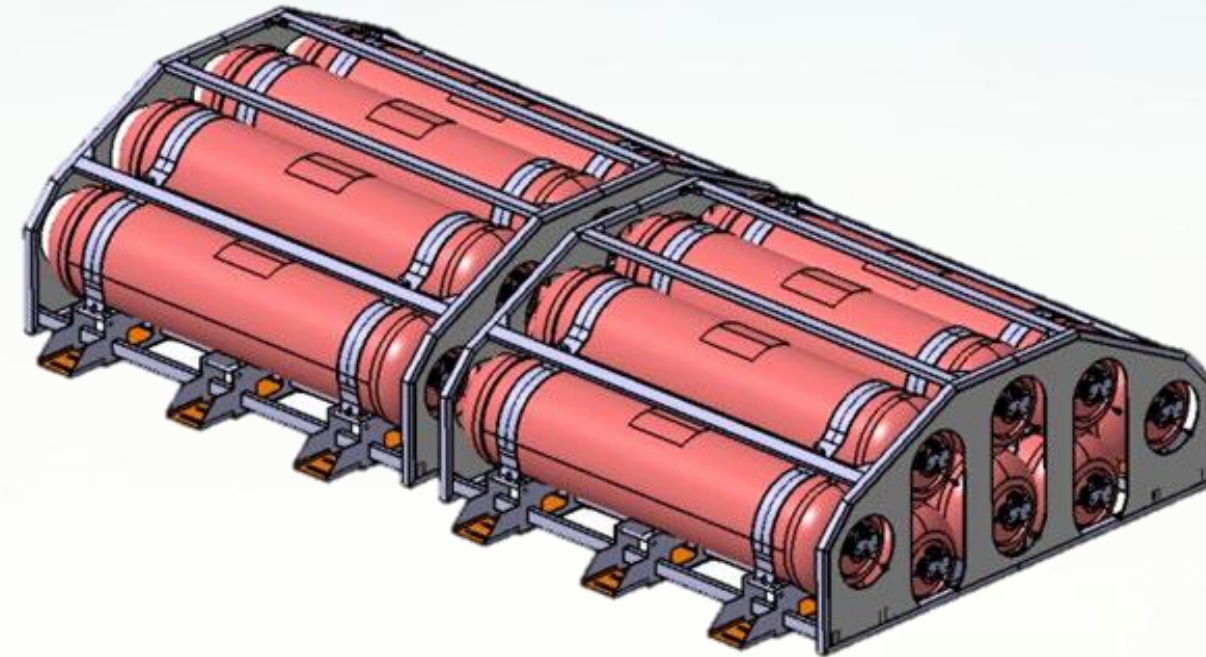
- On Tank Valve
- Fire Safety-Solutions
- Increase of security of the H₂- supply
- New communication with the refueling station

Complete Tank-System for Trains



Integration of Tank-Systems in Trains

- Tank-Systems
- Gas Handling Unit
- On Tank valve, MOTV



References

Delivered solutions for our customers

- **Liebherr & Keyou-Komatsu-Project**
- **MAN Truck, Ursus-Bus, Daimler Truck, Volvo Truck**
- **GM** On Tank valve and Gas Handling Unit
- **Magna Steyr**: Tanksystem B-Class
- HDW: H2 Submarine, ATI-Küste: Deep Sea - submarine
- Mobile Filling Station 350 / 700 bar
- Filling Station for hydride storage tanks
- Proton Motor: Tanksystem for H2 Bus, H2 supply for **Linde** Fork Lifter
- Hydrogenics: Fuel Cell Bus Components
- DLR: Test Rigg components for Ariane Espace engine test rigg

ZBT Testbenches for H2 projects:

- ZSW-Ulm: Special differential pressure regulator for H2 of APU
- **Air Liquide, Air Products, Linde**
- **OPEL** solutions for fuel cell driven cars: GHU / OTV
- **AUDI, VW, Volvo Car**, Symbio Fcell, Green GT
- **Siemens** Train: H2 tank-system
- FutureE
- Amsterdam Ship
- Military Projects
- MUV-Range Extender



**DAIMLER
TRUCK**

SIEMENS



**ZODIAC
AEROSPACE**



Partner for Green Energy Solutions



Multifuel-Engine



**Eco system for the entire
green Mobility Sector**



Biogas & Renewable Fuels



Green Hydrogen & Ammonia