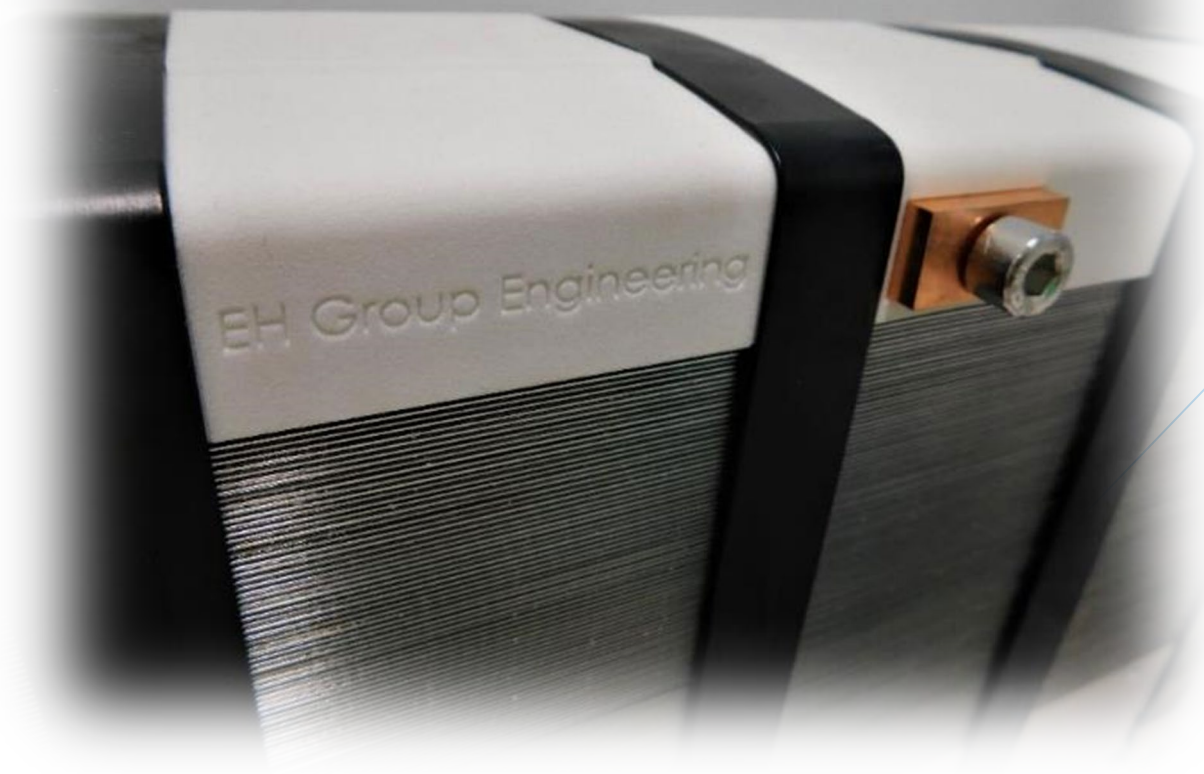




EH GROUP ENGINEERING



www.ehgroup.ch

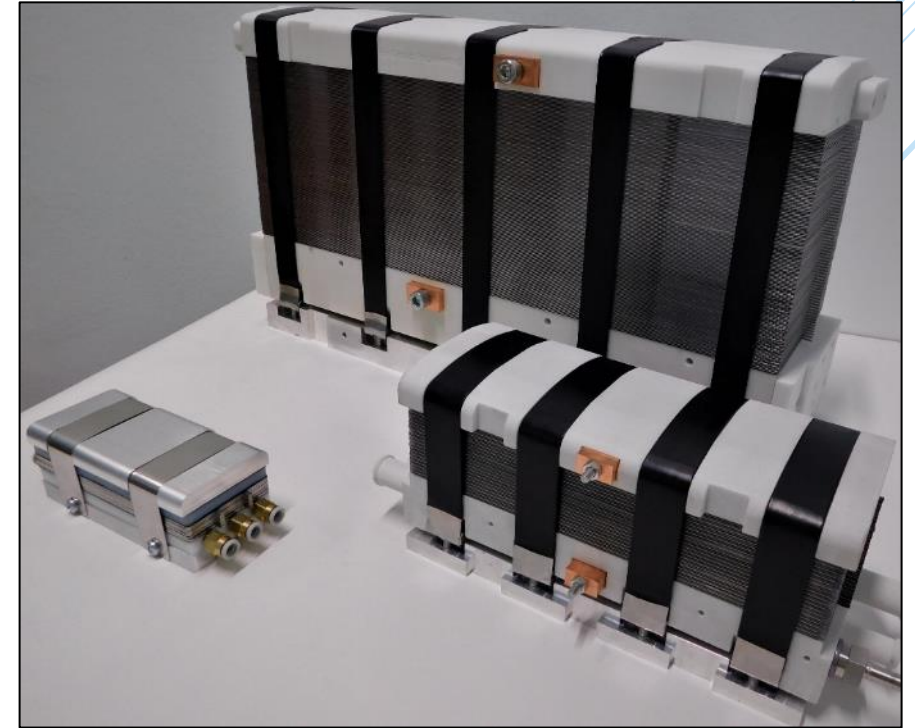


EH Group Fuel Cell Technology

- Uniquely simplified and re-designed fuel cell stack at the microstructure level - more **compact, lightweight and efficient**.
- Completely new concept of FC production with
 - Continuous production process
 - Unique machinery with fully integrated assembly
 - **Significantly faster & cheaper at scale***: **< 100EUR/kW**
- Operates with **minimal effects of gravity** & in any orientation - great candidate for mobile applications;
→ Collaboration with



* At scale refers to 100,000+ units per annum





Our Technology Edge

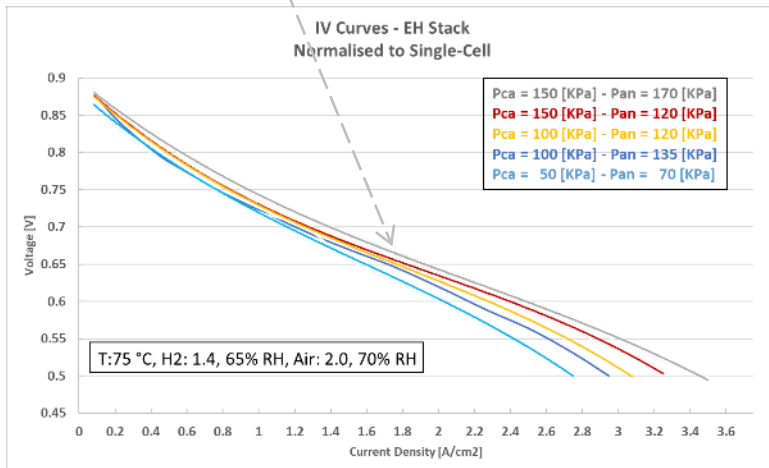
Technology Comparison

Parameters	Toyota (MIRAI)	Honda	PowerCell	Ballard (<i>High Performance FC</i>)	EHG FC STACKS
Volume Power Density [kW/L]	3.1	3.1	4.8	4.3	8.0
Weight Power Density [kW/kg]	2.0	2.0	2.9	2.7	4.0
Cell Pitch [mm]	1.34	~1	~1.0	N/A	<0.8

NOTE: data from other suppliers are collected from the public domain and EHG doesn't guarantee 100% accuracy

Example of Performance Curve

High Power Density at **lower** pressure



The Edge

STACK:

- Higher Power Density
- Power range: **0.1 – 250 [kW]**

SYSTEM

- Compact design
- Higher efficiency

SOLUTION

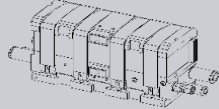
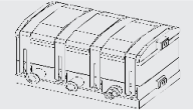
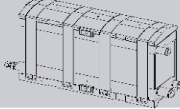
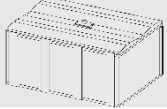
- Scalable
- Durable
- Customisable





EHG Fuel Cell Products

Fuel Cell Stack Platforms

Product Name	Power Range [kW]	Layout
EH-31	0.1 – 4.0	
EH-51	2.5 – 15	
EH-81	20 – 100	
EH-87	150 – 250	



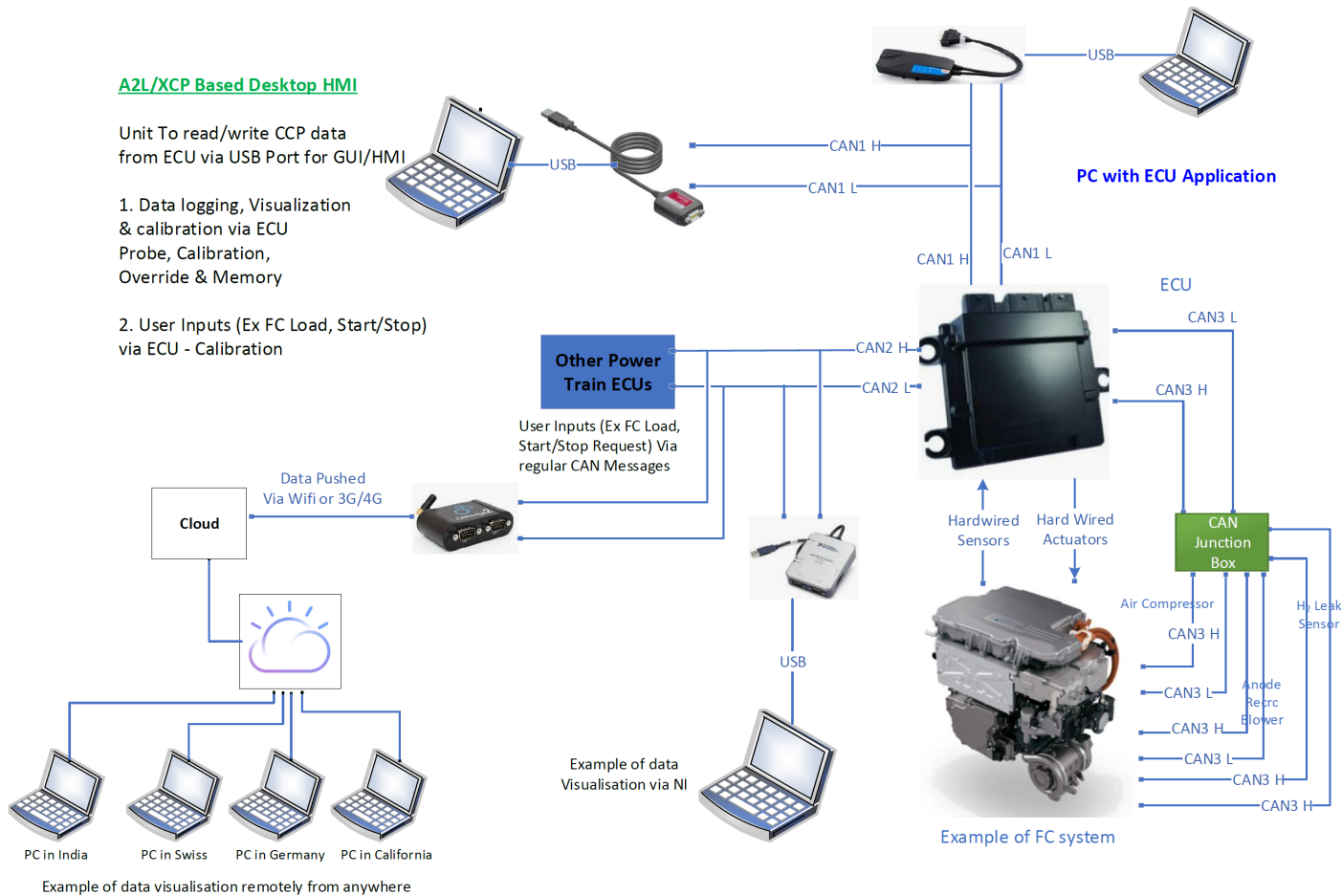
Fuel Cell System Platforms

Performance	Power output [kW]			
Max power output [kW]	20	40	67	106
Nominal power output [kW]	15	35	60	95
Operating current range [A]	20 – 450 ¹	20 – 450 ¹	20 – 450 ¹	20 – 450 ¹
Operating Voltage range [V]	40 – 90	65 – 146	112 – 250	178 – 396
Peak system efficiency (BoL) [%]	60 – 62			
Nominal system efficiency (BoL) [%]	50 – 54			





EH FC System Process Control Automation

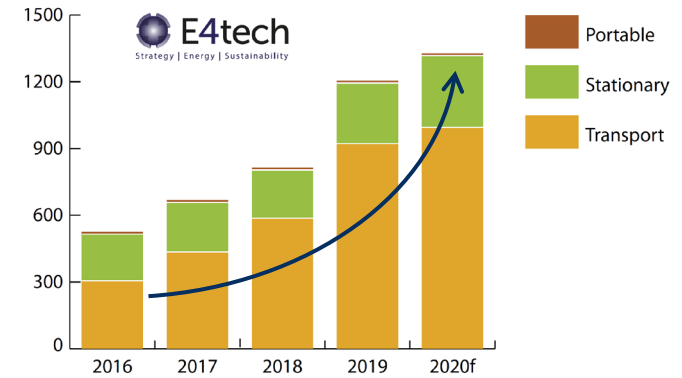


- Cloud based Data Telemetry
- Live ongoing data from deployed systems
- Remote Support
- Predictive Maintenance
- Digital Twin of EH FC System

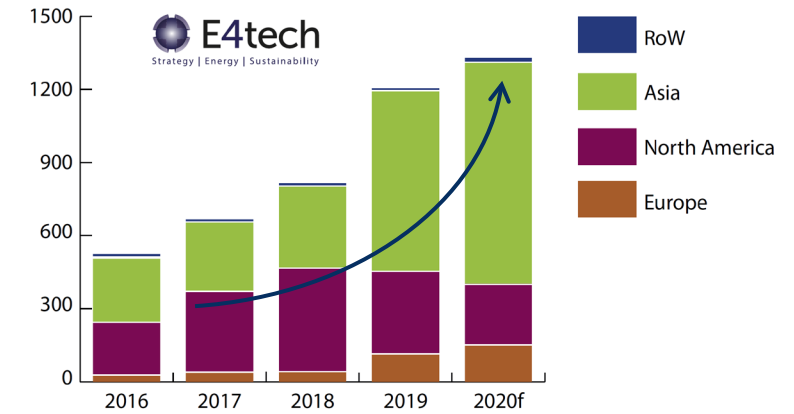


Global Market Opportunity

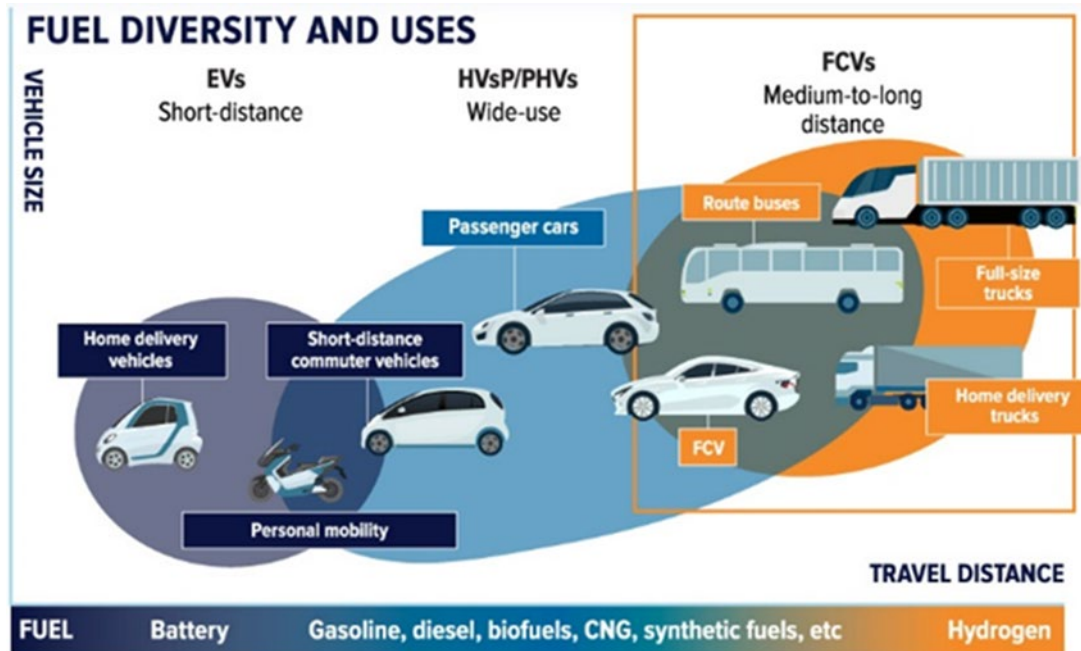
- **Compound growth of 40+%** projected from 2016-25, **2bio-25+bio USD**
- **Mobile** (buses, trucks, maritime)
- **Stationary** (micro-grid, backup) applications
- **China** major subsidies to 2025+, **Japan** '2040 Hydrogen Society',
- **EU Green Deal, California** Fuel Cell Partnership



Megawatts by application

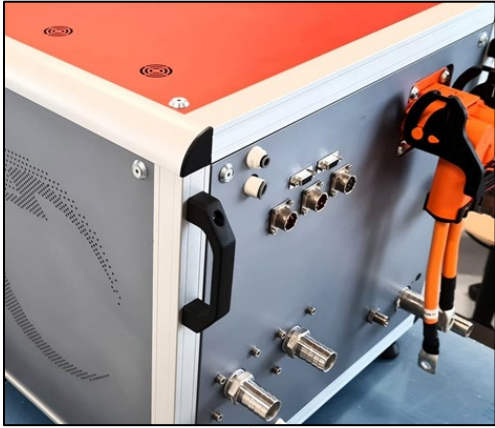


Megawatts by region

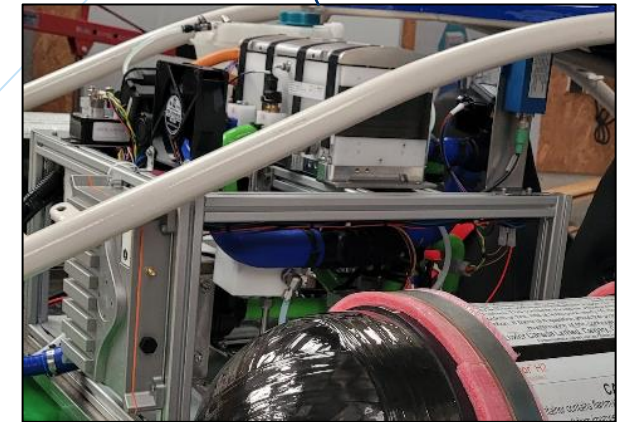




EH Fuel Cell - Mobile Applications



- Stacks & systems deployed since early 2020
- From 10kW stacks to 100kW systems
- Wide range of commercial vehicles
- Off-road mobility
- Maritime





250kW EHG Fuel Cell System

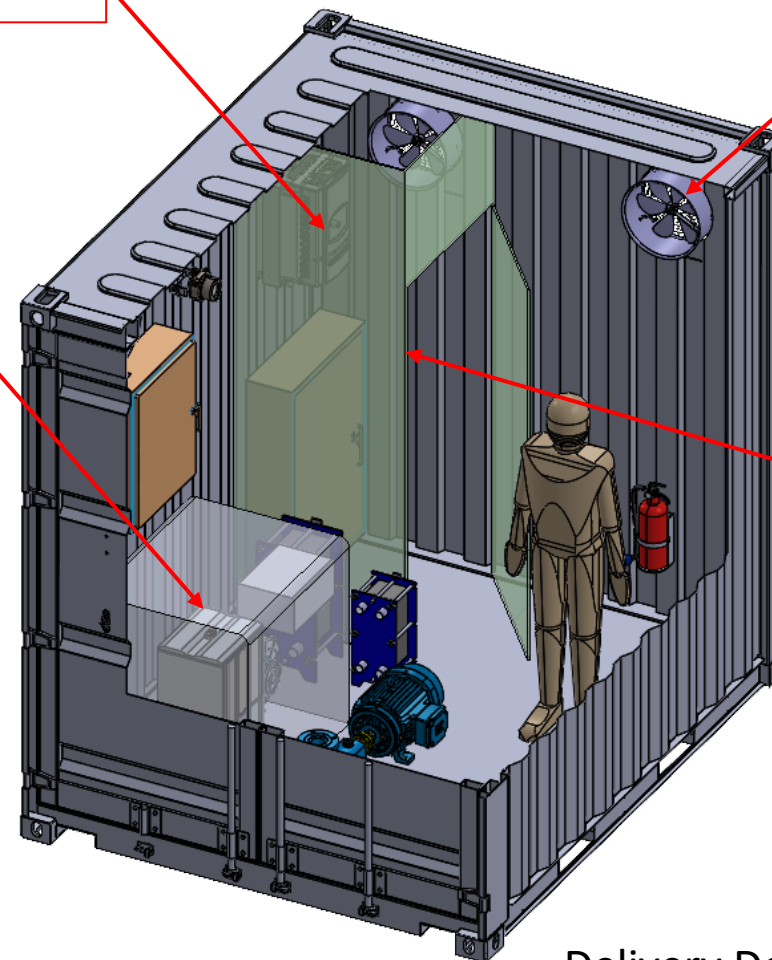


EHG FC System

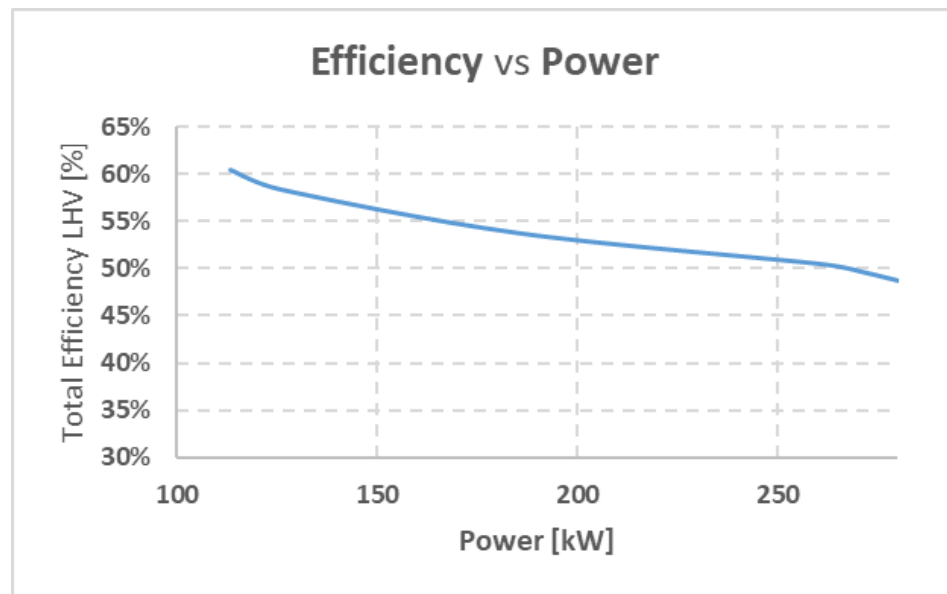
Inverter

Ventilation

Independent electronic room



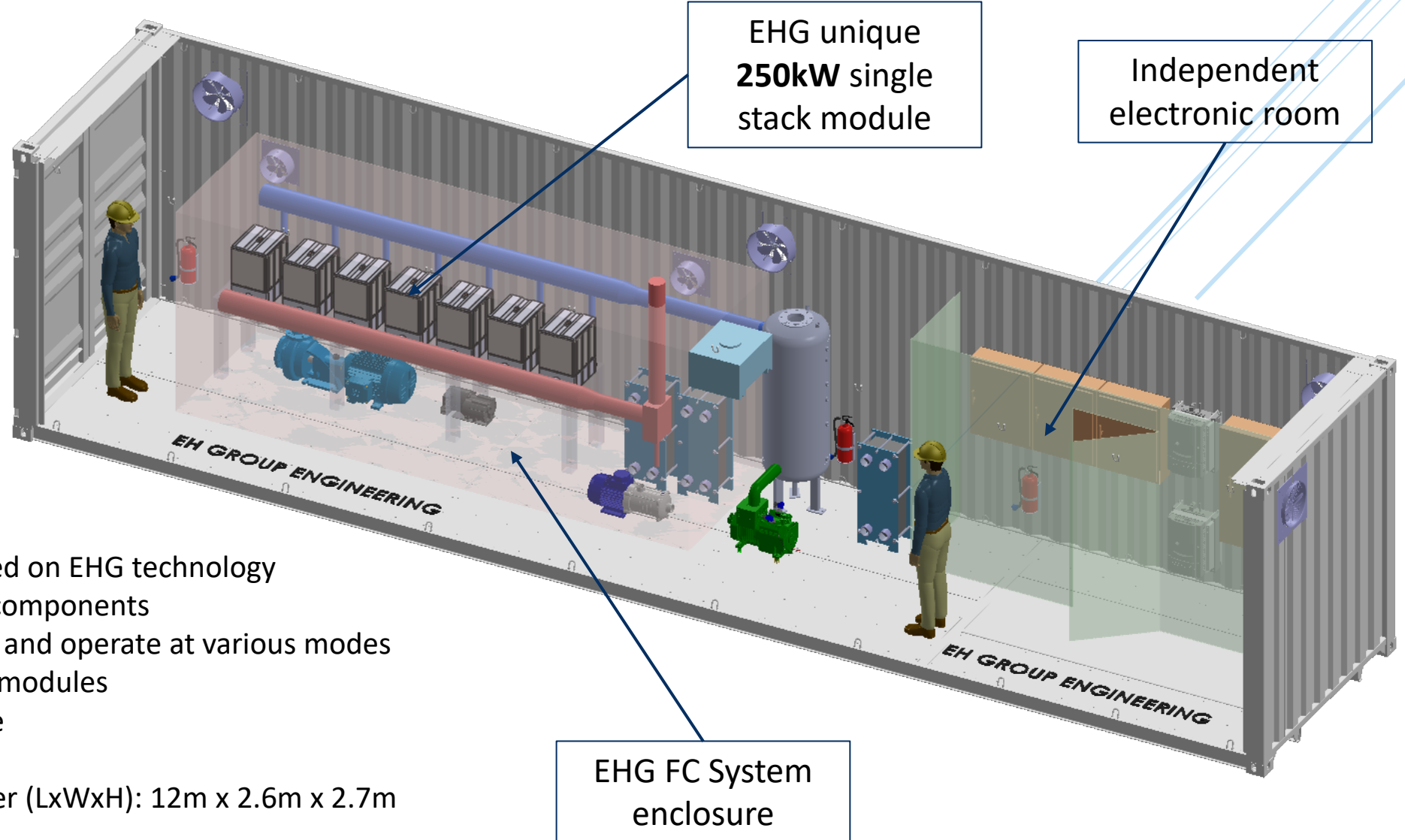
Total System Efficiency vs. Power output



Delivery December 2021



1.5MW FC System – Under Development

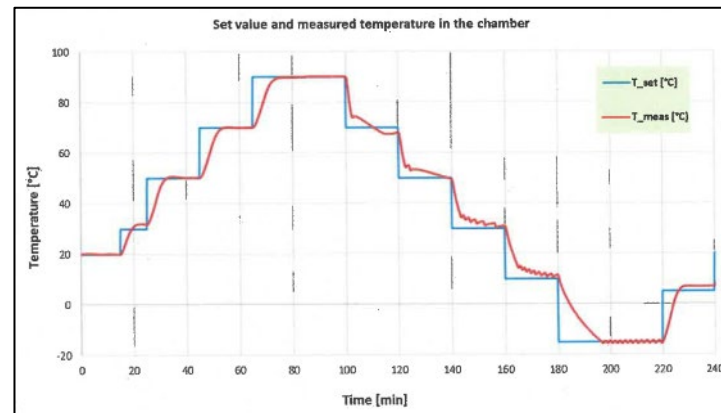


- 250kW FC stack modules based on EHG technology
- Complete integration of BoP components
- Possibility of load modulation and operate at various modes
- Possibility to have redundant modules
- 2-3 serviceman working space
- Integration in an 40ft container (LxWxH): 12m x 2.6m x 2.7m
- Total weight 30 – 40 [tons]



business incubation centre

Switzerland



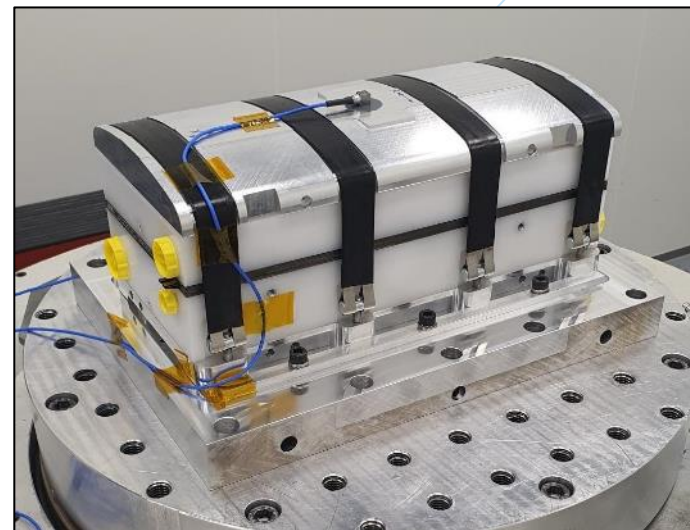
- Two-year collaboration project
- Thermal tests, vibration tests in space labs



Empa

Materials Science and Technology

RUAG





2020 Achievements

European Union's Horizon 2020

Awarded highly competitive Accelerator Pilot (SME Phase II)

Grant of EUR 1.48M - overall Budget EUR 2.1M

Commenced February 2020 – duration 21 months

Accelerate development of our FC technology



EU GA945810 – EHSTACK.

Solar Impulse 'Labelled Solution'

EH Group Engineering now part of global **Solar Impulse Foundation** network

Feasibility, Environmental Impact and Profitability:

1. Credibility of Concept
2. Scalability
3. Environmental benefits
4. Client's economic incentive
5. Seller's profitability



One of the 5 Winners of prestigious De Vigier Foundation
2020 Prize for best start-ups in Switzerland



FACILITIES



- 450m² of brand new customized lab space
- Multiple test bench facilities for testing up to 250kW
- Dedicated Hydrogen Supply
- Electronics & Assembly labs
- Room for expansion for production facilities





Core Team



Dr Mardit Matian

- Founder/Director: Technical lead
- PhD - Imperial College London
- 18+ years fuel cells, H2 production



Alexandre Chainho

- Mechanical designer/integrator
- 14+ year experience FC assembly, system design and prototyping.



Anand Vasappanavara

- Senior Control/Automation Engineer
- MSc Mechanical Engineering, Controls
- 10+ years in fuel cell applications



Dr Isabel Vazquez

- PhD Chemistry Queens University
- Electrochemist & Material Scientist
- 5+ years PEMFC Characterisation



Pierre Georges

- MSc Mechanical Engineering
- Fuel cell retrofit of vehicles



Christopher Brandon

- Co-Founder/Director: Finance & strategy
- MA Economics (Hons) – Univ of Edinburgh
- 23+ years finance & entrepreneurship



Alice Maffezzoli

- Business Development Manager
- MSc Electrical Engineering, MBA
- 10 years business management



Julie Veya

- Mechanical and Robotics Engineer
- MSc Mechanical Engineering ETH
- 3 years FC systems & control



Samuel Goutenoir

- Embedded/Electrical Engineer
- MSc Engineering
- R&I Electronics Engineer 7+ years



Levi op't Land

- MSc Mechanical Engineering
- Forze Racing Team FC Systems Engineer



Sveinung Dybdahl

- Director (USA): Business Devt & Finance
- BSc Business Administration – Univ Bath
- 20+ years in energy and transport finance

Scientific Advisory Board



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