

Hoeller Electrolyzer GmbH

Next generation PEM electrolyzer stacks

November 2021 – private and confidential



HOELLER
THE STACK COMPANY

Our goal: green hydrogen for less than EUR 4 / kg

HOELLER
THE STACK COMPANY



We develop the next generation of hydrogen electrolysis stacks, the core component of electrolyzers

We were founded in 2016

OUR MANAGEMENT



OUR SHAREHOLDERS

Stefan Höller (58%), WERTPLAN (25%), Böhm Family (8%), SFM Holding (6%), Management & Advisory Board (3%)

OUR ADVISORY BOARD



Prof. Dr. Eike Manfred Böhm

- + CTO of KION Group
- + Honorary professor Hochschule Esslingen

Dr. Tom Smolinka

- + Head of department chemical energy storage at Fraunhofer ISE

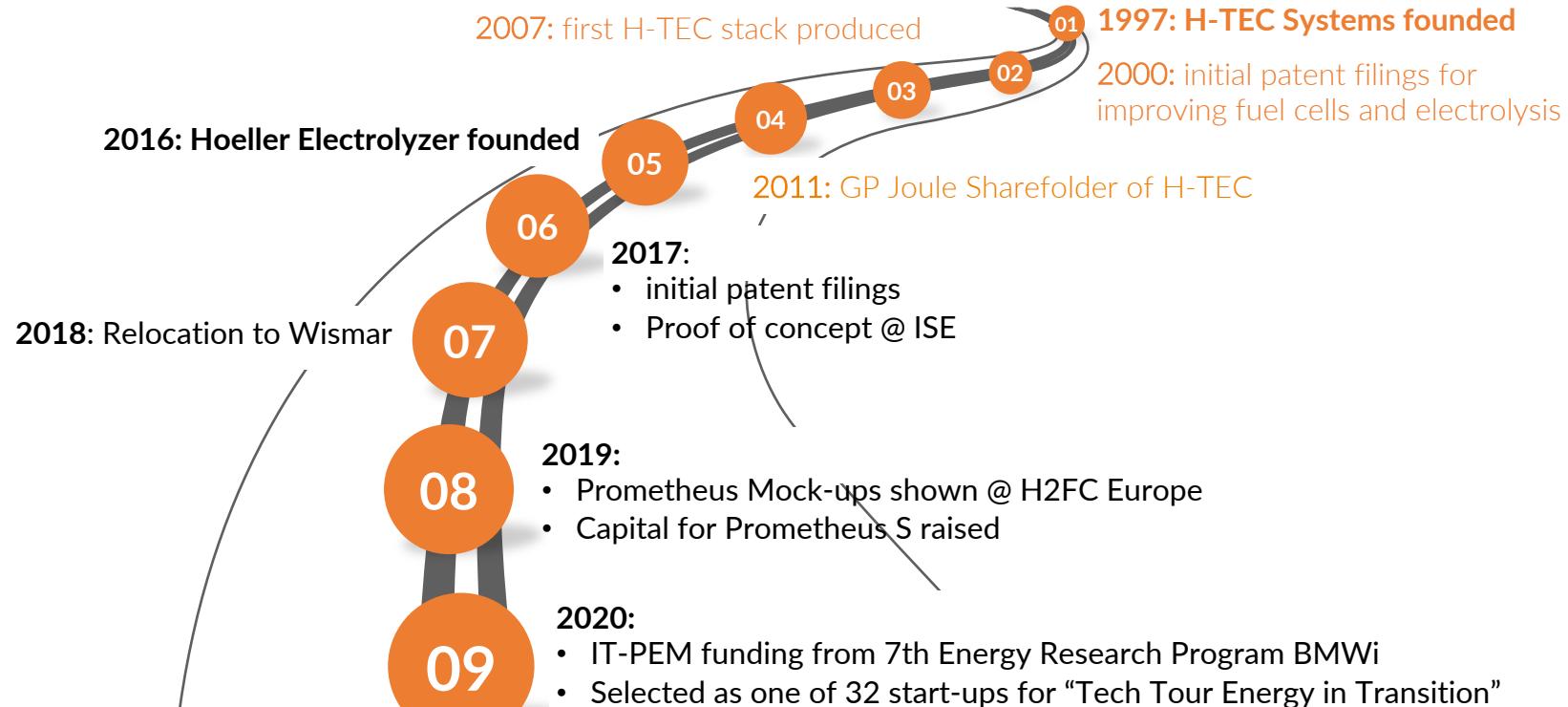


Matthias Geilert

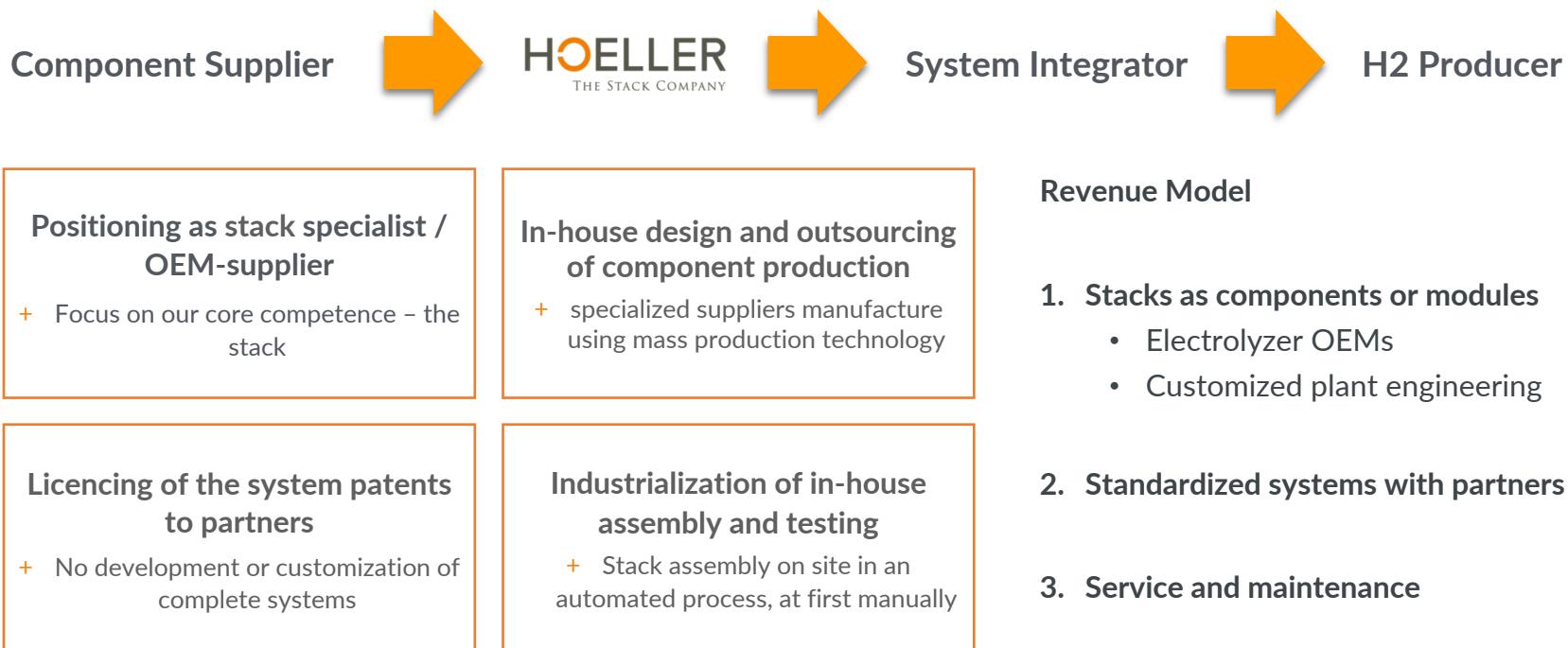
- + Tax adviser, attorney-at-law and tax lawyer at Geilert Law Office



A wealth of experience in electrolyzers



Value Chain Strategy & Revenue Model



Intellectual property

OUR BRANDS

- German brand 30 2017 103 466
„HOELLER THE STACK COMPANY“



- German brand 30 2017 103 467
„PROMETHEUS“



- International brand 1 463 866
„PROMETHEUS“



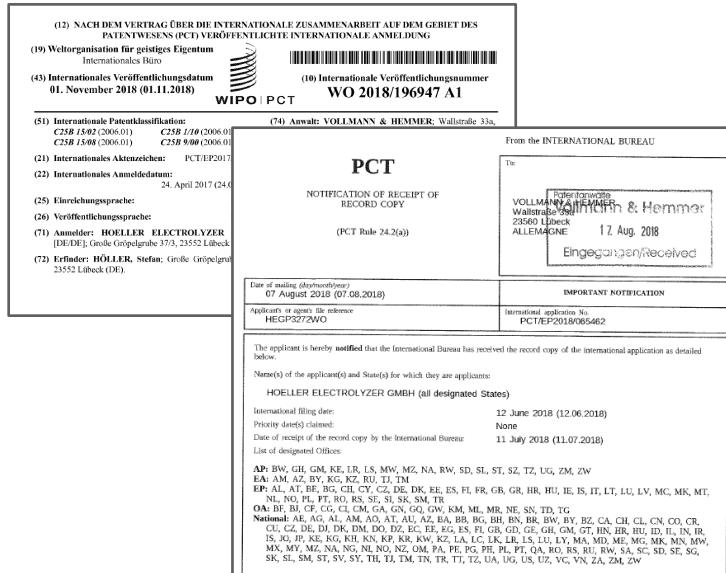
OUR TECHNOLOGY

We filed thirteen patent applications since 2017 to protect our innovation in the stack and the system



Patent filings for Prometheus

Granted: EP 3 615 713: Water quality (system)



Published:

1. WO 2018/196947 A1: Temperature increase (system)
2. WO 2018/197415 A1: Flow reversal (system/stack)
3. WO 2019/228616: Reduction of local element formation (stack)
4. WO 2019/238218: Heat exchange (system)
5. WO 2020/20467 A1: Micro porous transport layer (stack)
6. WO 2021/104606 A1: Seals for high-pressure operations (stack)
7. WO 2021/104812 A1: Seals for high-pressure operations (add-on)
8. WO 2021/155919: Hydraulic pressure system (stack)

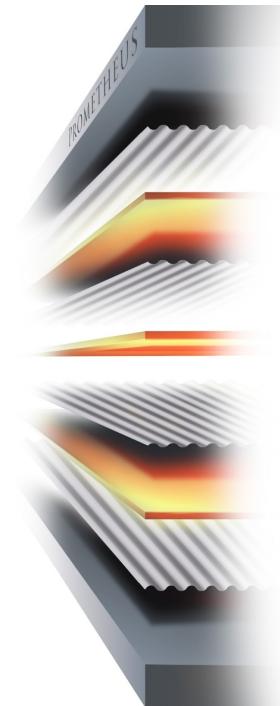
Applied:

1. PCT/EP2021/051707: Safety system (stack)
2. PCT/EP2021/061583: Water electrolysis (stack)
3. PCT/EP2020/063724: Temperature increase (add-on)
4. PCT/EP2021/071805: High voltage stack (stack)
5. PCT/EP2020/087012: Connecting devices (stack)

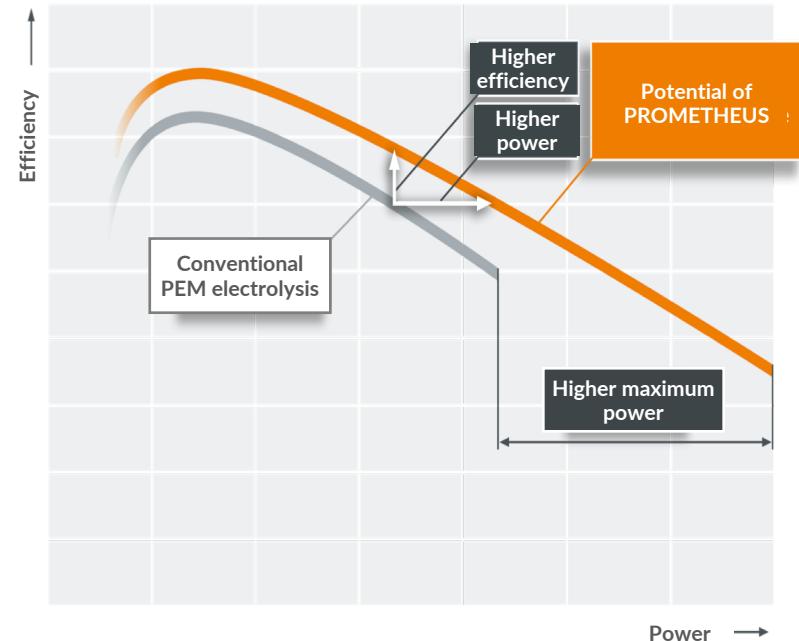
Next generation PEM stacks

Key improvement levers

- MEMBRANE ELECTRODE ASSEMBLY – Better connectivity to reduce catalyst need
- END PLATE – Advanced design to optimize installation space
- POROUS TRANSPORT LAYER – Lower resistance to increase power and efficiency
- BIPOLAR PLATE – Optimization of the flow field to maximize power
- HIGHER OUTPUT PRESSURE – Simplification of the system



Potential of the Hoeller PEM electrolysis



PROMETHEUS DEVELOPMENT OBJECTIVES



PROMETHEUS S

Foot print	25 x 21 cm
Rated power	100 kW
H2 production	16 Nm ³ / h (34 kg/d)
SOP	2Q2022



PROMETHEUS L

Foot print	60 x 48 cm
Rated power	1.5 MW
H2 production	295 Nm ³ / h (635kg/d)
SOP	2Q2023



PROMETHEUS M

Foot print	42 x 29 cm
Rated power	325 kW
H2 production	68 Nm ³ / h (147 kg/d)
SOP	1Q2024

2nd generation stacks: IT-PEM



Successful proof of concept – further steps required to optimize individual components



Development period of **approx. 36 months**



Joint research project with
Fraunhofer Institute ISE



Public research funding based on the
7th Energy Research Programme
„Innovation for the Energy
Transition“



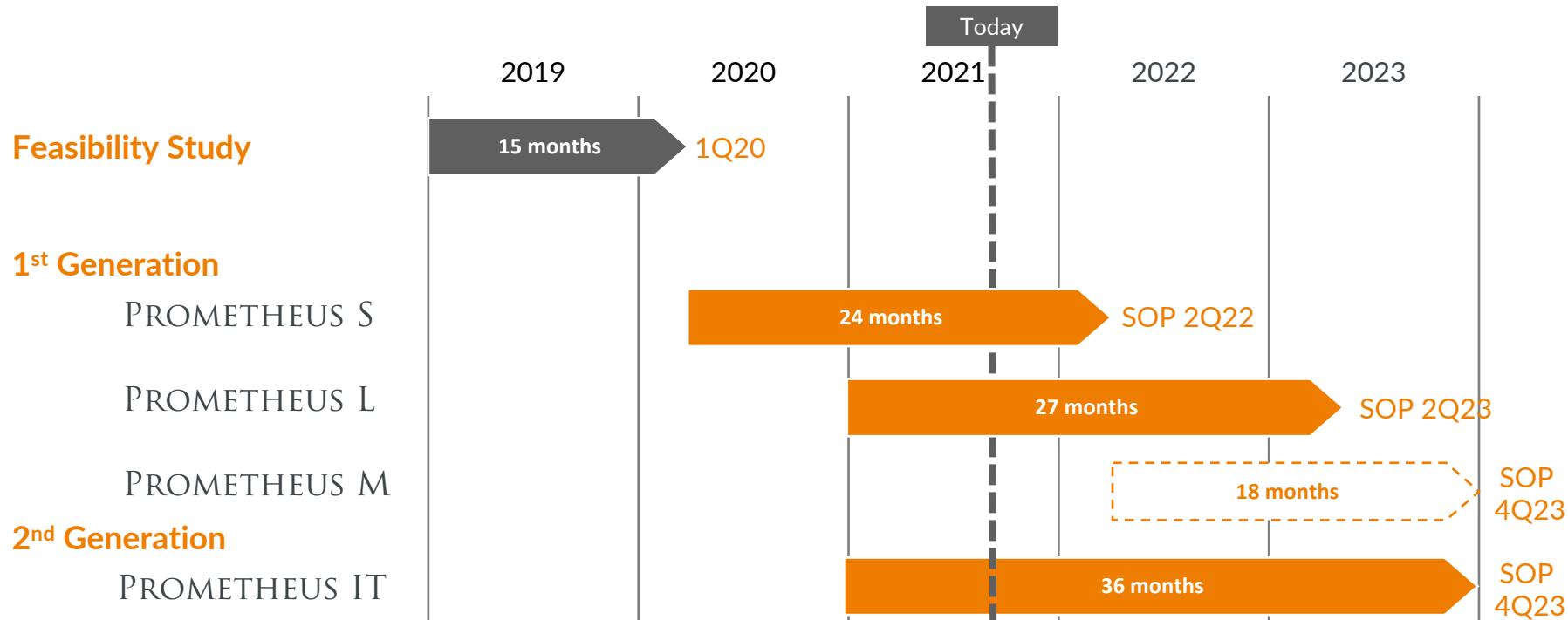
Direct **approval** from the BMWi
expected due to partnership with
Fraunhofer Institut



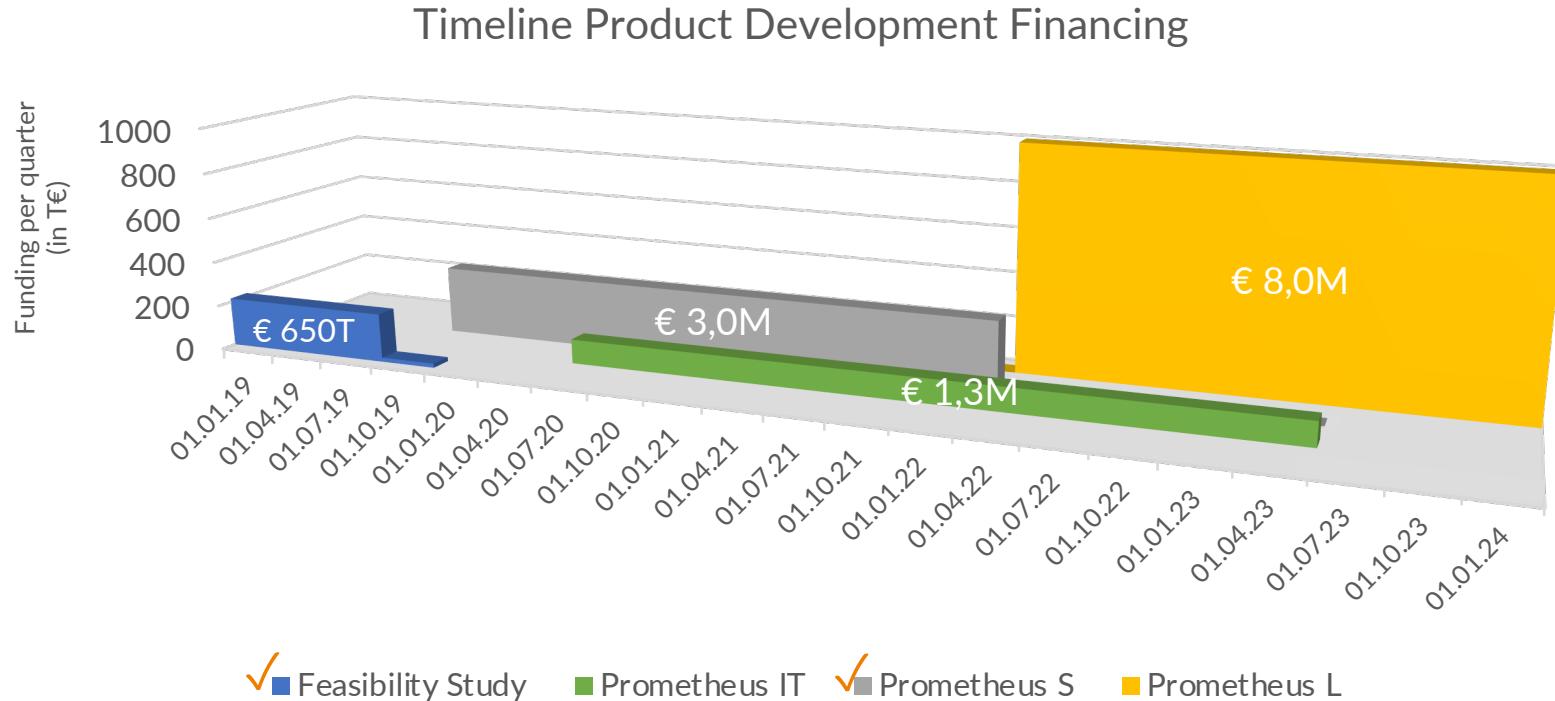
Start of the project January 2021

Overall R&D plan

PRODUCT DEVELOPMENT



Capital need of €8M for Prometheus L in 2022 and 2023



Additional capital need for development of Prometheus M: € 2,5M

THANK YOU FOR YOUR ATTENTION!

www.hoeller-electrolyzer.com

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Overview of our government funding



EUROPEAN UNION

European Regional
Development Fund

- Process for reducing degradation
- Method for reducing local element formation
- Definition of design parameters
- Water supply for an electrolyser
- Process for reducing the entry of impurities
- Process for cooling product gases
- Process to reduce the need for precious metals
- Method for assembling an electrolysis stack
- Development of stack fasteners

This project is co-financed by the European Union from the European Regional Development Fund. Operational Program Mecklenburg-Western Pomerania 2014-2020
- Investments in growth and employment

We are supported by the grant programme of the Federal Ministry for Economic Affairs and Energy. Private investors receive a grant worth 20 per cent of the sum invested.

