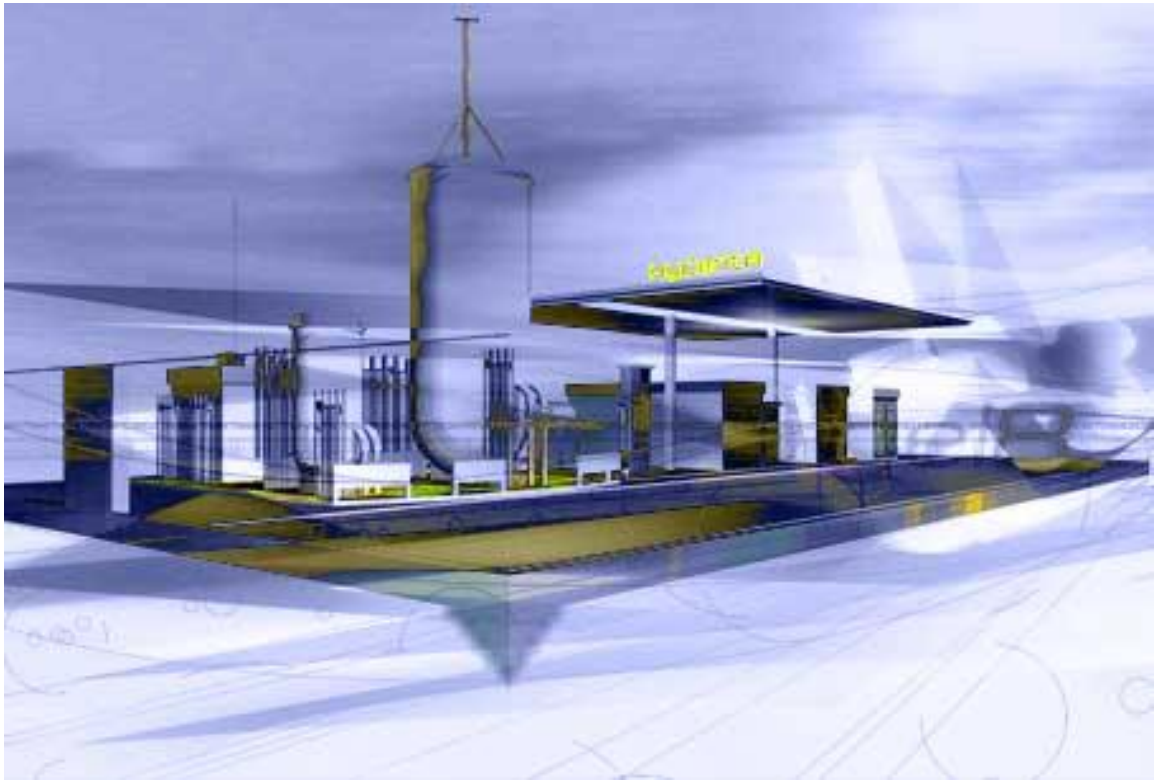
FCH Austria:
Status Quo and Perspectives



Assoc.Prof. Dr. Manfred Klell

Eco-Mobility, Vienna, 20th October 2014

Carbonfree Energy Economy

HyCentA
HYDROGEN CENTER AUSTRIA

Primary Energy:

renewable
Sun,
Wind,
Water

Energy Carrier:

Electricity & Hydrogen

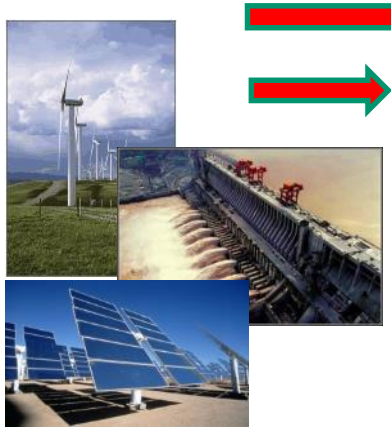
Storage & Distribution:

Electr. Grid
Gasgrid
Gasstorage

Net Energy

Transport
Homes
Industry



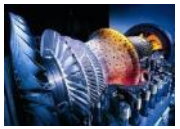


power to hydrogen




Electr. Gear & Motors





FC, ICE, Turbine

Transport

Electricity

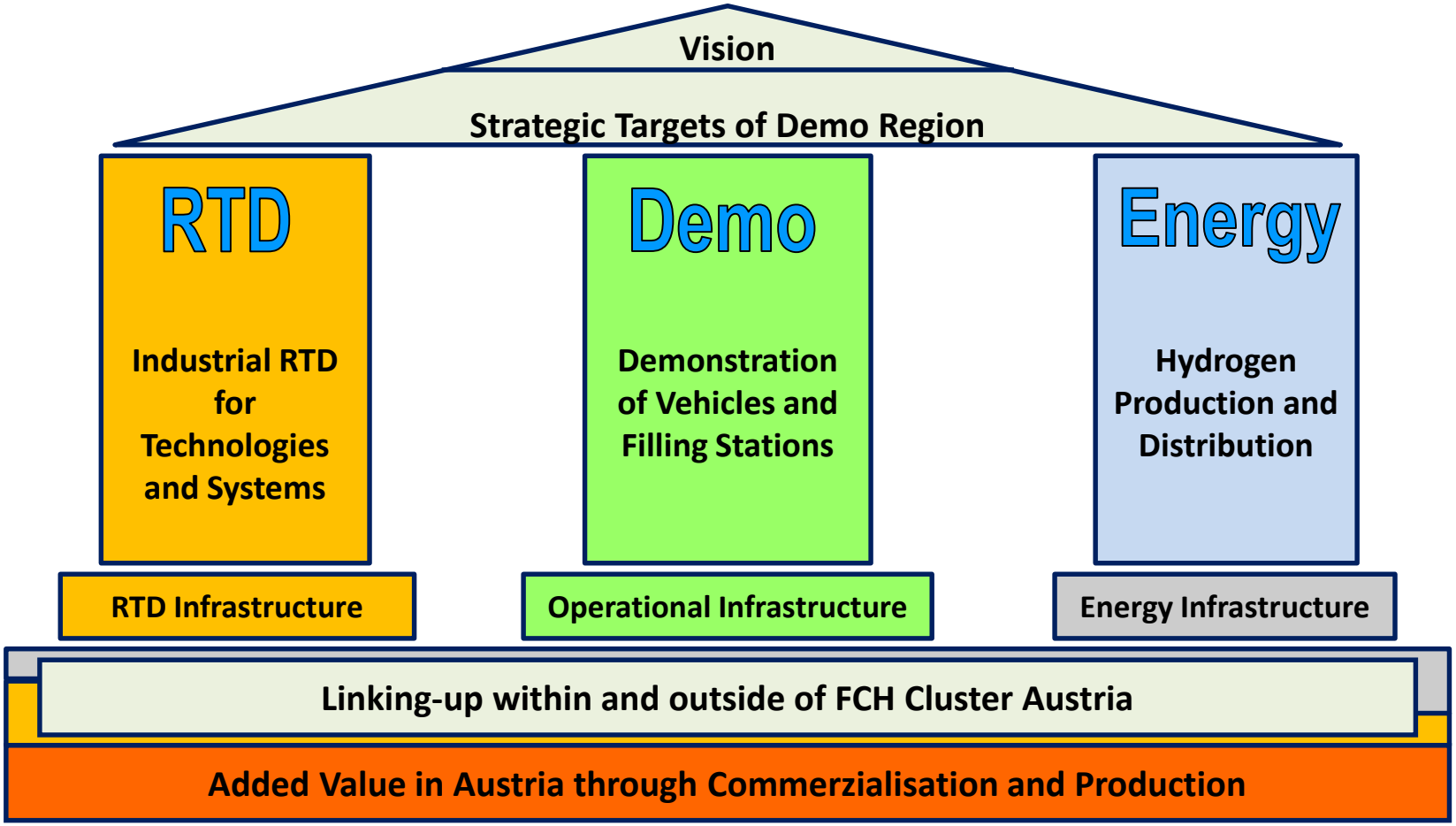
short range,
long charging

Hydrogen

long range,
short filling

FCH Austria - Vision

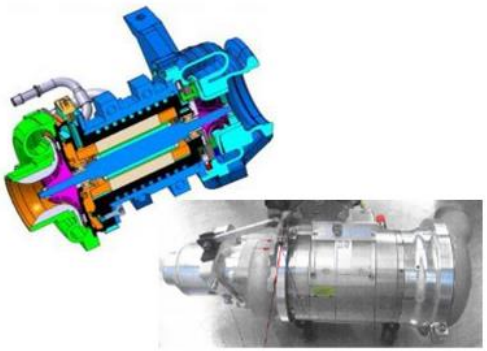
Austria as **capable supplier** and **internationally acknowledged partner** for Fuel Cell & Hydrogen Technology with **H2 Stations** and **FC Demo-Vehicles**



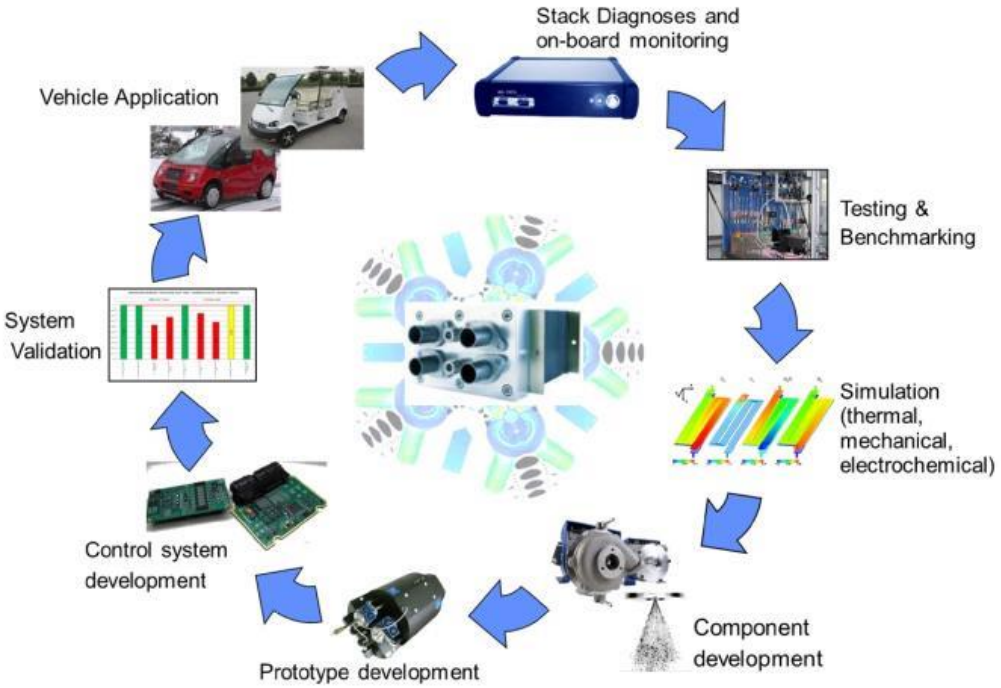
Strategy AVL

Research Topics:

- **PEM FC test stands for system and components**
- **Simulation Tools, Measuring- and Testsytems** for PEM-FC und SOFC
- **Aging process** of FC-Systems
- highly dynamic test stand for FC-components
- **SOFC for APU, Heat/Cool/Power**
- **PEM FC Range Extender Vehicle**
- **PEM FC Vehicle**
- **High Temperature Electrolysis SOEC**



Automotive PEM compressor (18kW, >2.5bar)



Strategy FRONIUS

Research Topics:

- **Valve technology** and **Testing** for H2 pressure vessels
- Accelerated aging of FC-Systems
- **PEM-FC Range Extender**
- **PEM High Pressure Electrolysis**
- Development of **cost-efficient components** and **system-integration** for PEM High Pressure Electrolysis
- broadening of product portfolio for PEM High Pressure Electrolysis and for stationary as well as mobile PEM-FC Applications

EC 25/50F

EC Home / Backup

HyLOG Fleet 26F

Municipal Vehicles

Voltage: 80V

Power: 2 x 10kW / 30kWp

Environment: Outdoor / public roads

Class 1 Forklift Trucks

Voltage: 80V

Power 1 x 10kW / 30kWp

Environment: Indoor / outdoor plant grounds, public roads

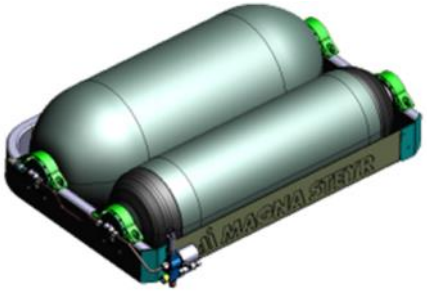
Strategy MAGNA

MAGNA STEYR

HyCentA HYDROGEN CENTER AUSTRIA

Research Topics:

- **Vehicle concepts** including simulation tools for innovative power trains (ICE & xEV)
- **Development of Production processes – parallel production of** conventional, hybrid, and fuel cell power trains
- **Storage** of hydrogen in automotive applications – optimization of costs and capacity
- **Tests** and **Validation** of components, systems and vehicles
- **Integration** into different vehicles



Strategy OMV

Research Topics:

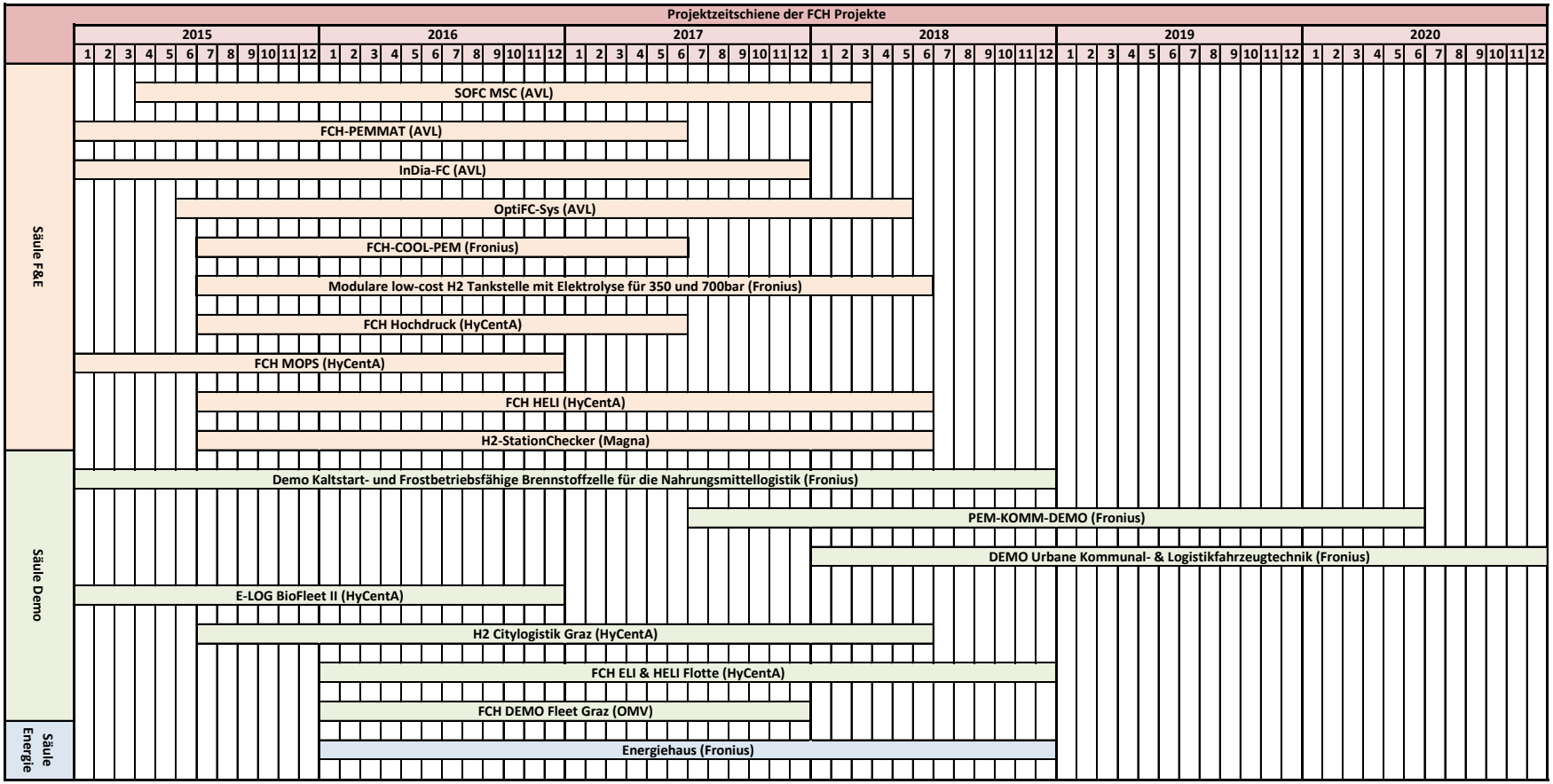
- **H2 Production:** central vs. local, renewable, power-to-hydrogen
- **H2 Dispenser technology:** compression, high pressure storage
- **H2 Filling stations** in Austria: cross linking with DE, IT, SLO, CZ
- **H2 Logistics & Distribution**
- **FC Demo Vehicles** (Hyundai, Honda 2015, Toyota 2015, Daimler 2017)

Strategy HyCentA

First Austrian research center for hydrogen with test stands and filling facility since 2005

- **Testing activities** with customer-specific hydrogen test setups with electronic process control
- **Thermodynamic analysis** of hydrogen processes and systems
- **Economical and ecological analysis** of hydrogen processes and systems
- Expertise in questions of **safety, standards and regulations** of hydrogen processes and systems
- Scientific **research, lecturing and publications**

Projects FCH



Project E-LOG BioFleet 2010 – 2014

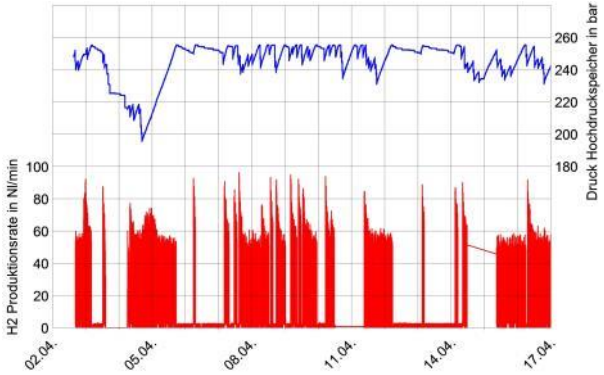
Austrian lighthouse project

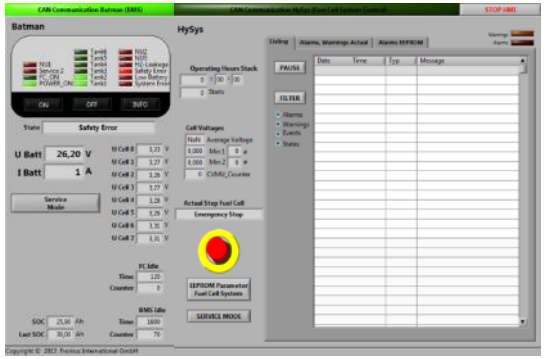
- Replacement of industrial trucks battery by a fuel cell range extender and a 200 bar hydrogen storage system
- Onsite hydrogen production from biomethane
- European‘s first hydrogen indoor refueling infrastructure

Project E-LOG BioFleet II 2014 – 2016

Scientific project contents

- Monitoring and optimization of the fuel cell battery hybrid system
- Monitoring and optimization of the onsite hydrogen infrastructure
- Maintenance and service requirements under real-life operating conditions and advanced system lifetime
- User research and evaluation of demonstration



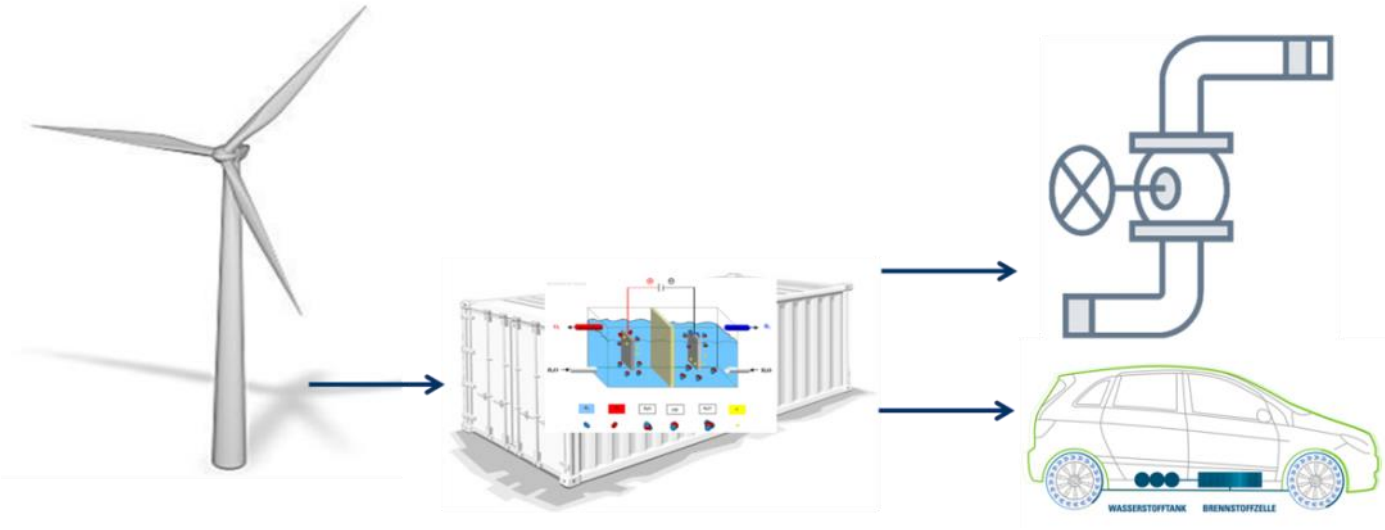


Project w2h Wind2Hydrogen 2014 – 2016

HyCentA HYDROGEN CENTER AUSTRIA

Storage of volatile, renewable electricity by production of hydrogen

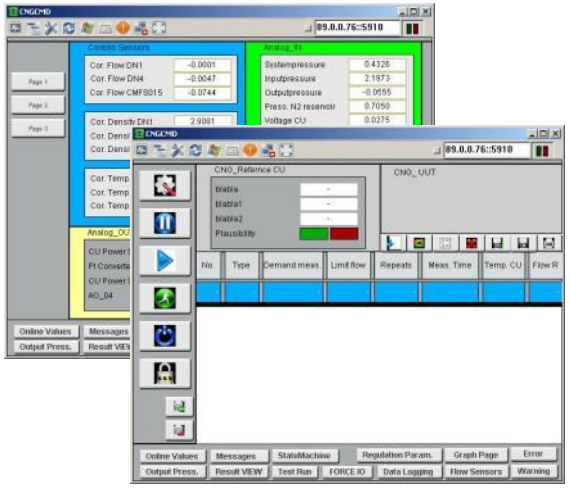
- **Installation of a 100 kW pilot plant**
- **Development of innovative high pressure PEM-electrolycer 150 – 300 bar**
- **Production of hydrogen for sustainable mobility and injection into the gas grid without mechanical compression**



OMV EVN Fronius ENERGIE INSTITUT powered by klima+ energie fonds

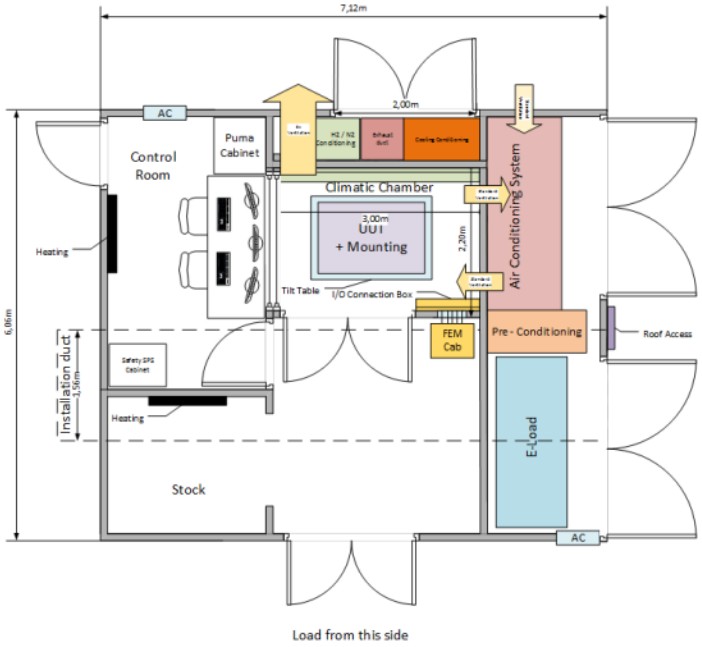
Project FCH Media 2014 – 2016

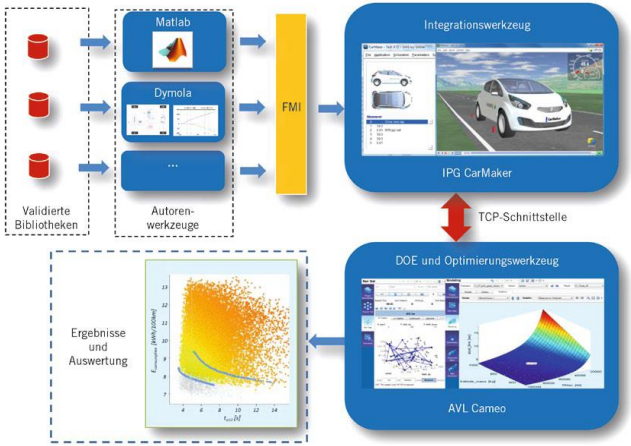
Research on instrumentation and actuation of fuel cell testbenches, focused on high dynamic conditioning of hydrogen and air as well as dynamic flow measurement principles including appropriate calibration techniques.



Project HIFAI – RSA 2014 – 2017

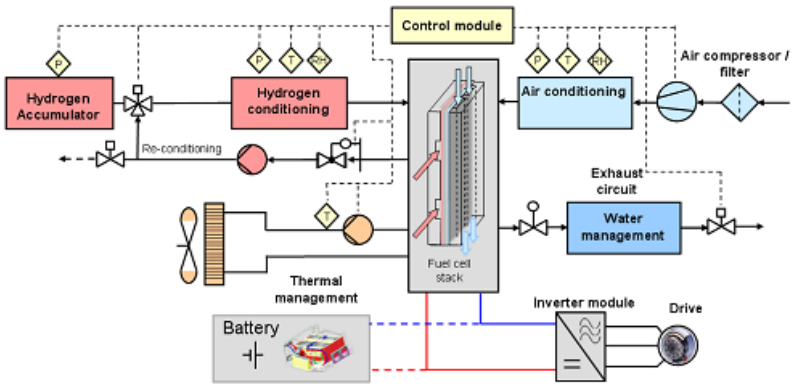
- System integration test bench for scientific research on **PEM fuel cell systems** up to 100 kW
- **Hardware in the Loop**, real time simulation of vehicle, driver, and driving cycle
- Continuous tool chain for optimization of application concepts by combining simulation, optimization and test bed tools

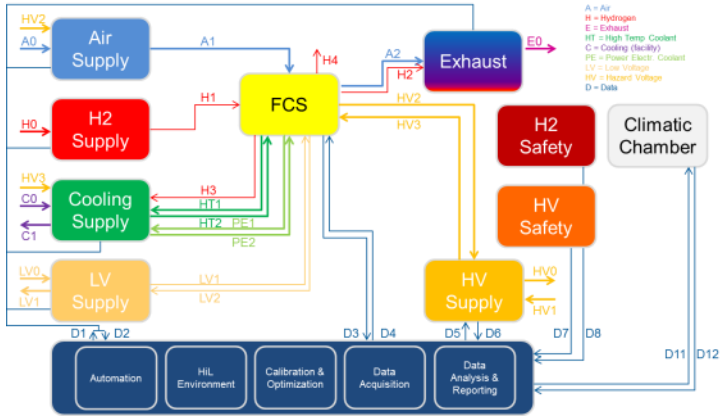




Project HIFAI – RSA 2014 – 2017

- **Research topics:**
  - **Optimization of energy and thermo management**
  - **Accelerated aging tests procedures**
  - **Improved cold start behavior**
  - **System configuration and integration for stationary and mobile applications**
  - **Improved energy efficiency of entire test bed**





HyCentA 2.0

HyCentA 2.0 with Austrian as well as international partners serves as a focus for comprehensive research and development activities for all aspects of hydrogen economy.

HyCentA 2.0

Targetoption 1: COMET K1 Centre for Hydrogen

Targetoption 2: Christian Doppler Labor „Thermodynamics of Hydrogen“

Targetoption 3: TU Graz Foundation Institute for „Hydrogen Economy“

www.hycenta.at

Thank you for your kind attention!

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