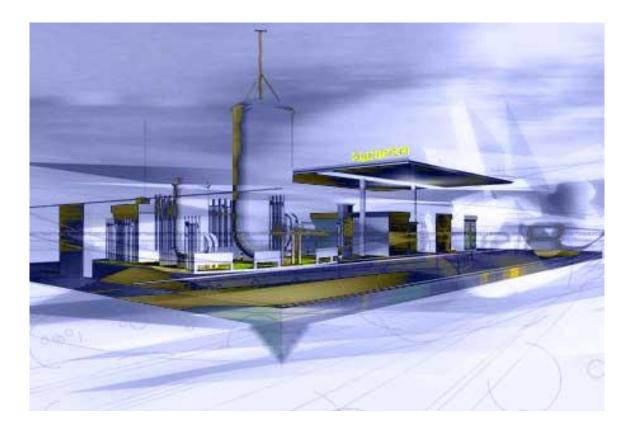
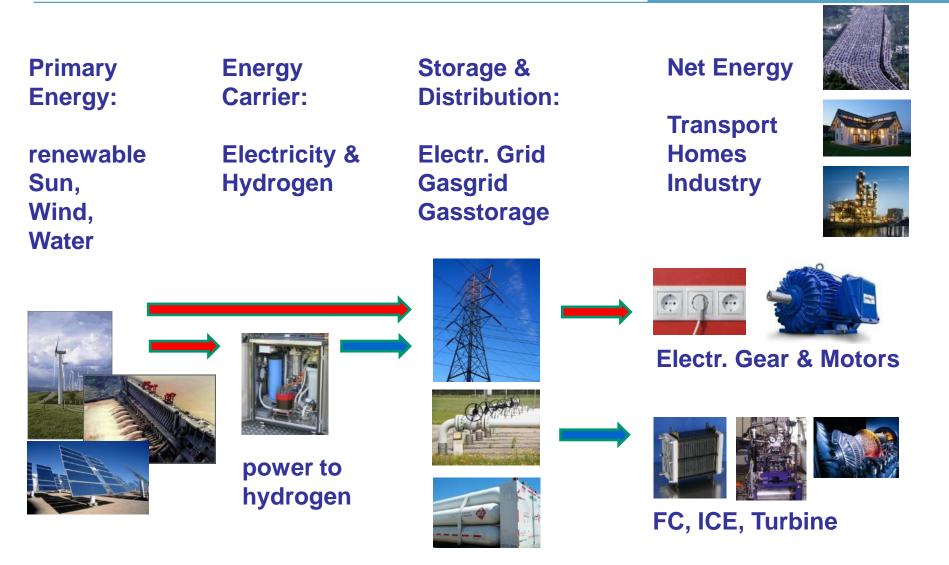
## FCH Austria: Status Quo and Perspectives



Assoc.Prof. Dr. Manfred Klell Eco-Mobility, Vienna, 20<sup>th</sup> October 2014

## **Carbonfree Energy Economy**



### **Transport**







### short range, long charging











Hydrogen



long range, short filling





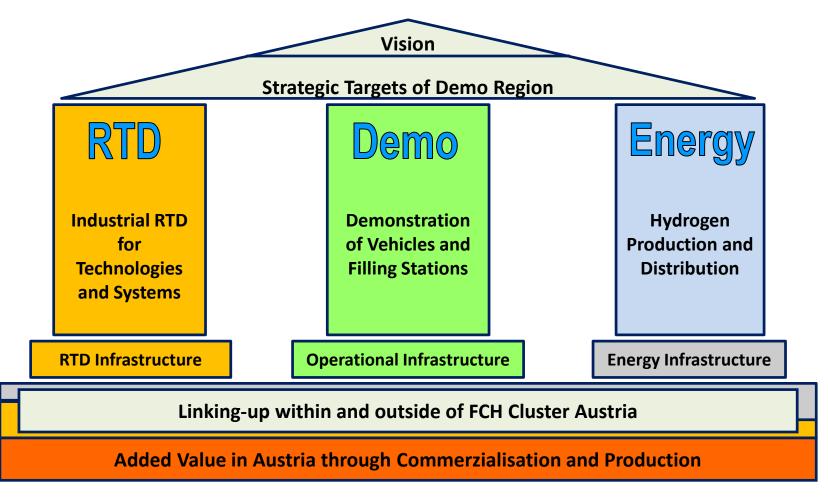




### **FCH Austria - Vision**



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



## Strategy AVL

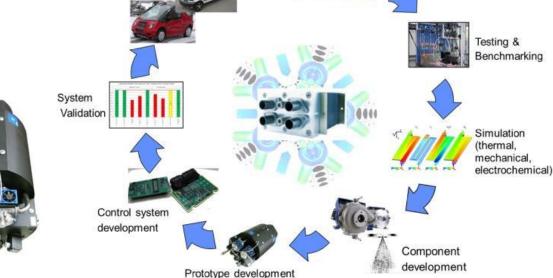




Stack Diagnoses and on-board monitoring

**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



Vehicle Application



Automotive PEM compressor (18kW, >2.5bar)







#### **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





F

EC Home / Backup



HyLOG Fleet 26F



<u>Municipal Vehicles</u> 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



### **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





### **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**



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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





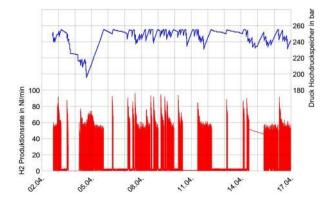


Project E-LOG BioFleet II 2014 – 2016

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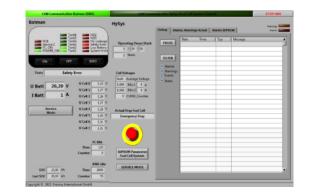
### **Scientific project contents**

- 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



### HyLogger





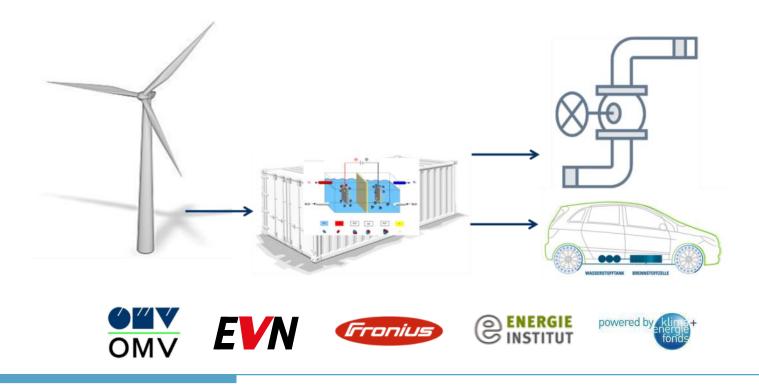




## Project w2h Wind2Hydrogen 2014 - 2016 HyCentA

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



## **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.



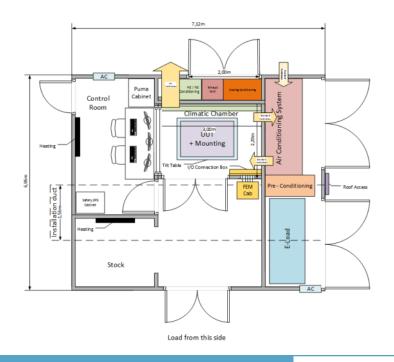
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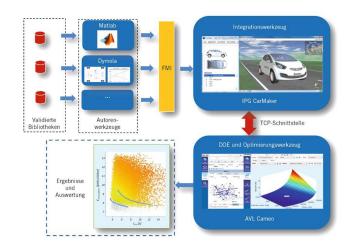


## **Project HIFAI – RSA 2014 – 2017**



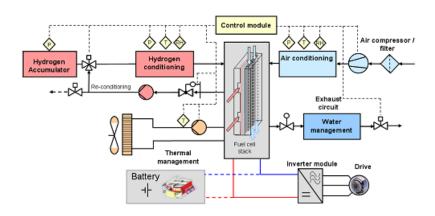
- System integration test bench for scientific research on PEM fuel cell systems up to 100 kW
- Hardware in the Loop, real time simulation of vehicle, driver, and driving cycle
- Continuous tool chain for optimization of application concepts by combining simulation, optimization and test bed tools

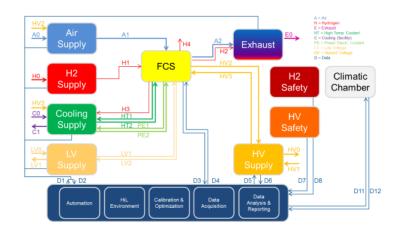






- Research topics:
  - Optimization of energy and thermo management
  - Accelerated aging tests procedures
  - Improved cold start behavior
  - System configuration and integration for stationary and mobile applications
  - Improved energy efficiency of entire test bed











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







Targetoption 1: COMET K1 Centre for Hydrogen

Targetoption 2: Christian Doppler Labor "Thermodynamics of Hydrogen"

Targetoption 3: TU Graz Foundation Institute for "Hydrogen Economy"



## Thank you for your kind attention!

### **Contact:**

HyCentA Research GmbH Assoc.Prof. Dr. Manfred Klell (CEO) Inffeldgasse 15 A-8010 Graz

Tel.: 0316-873-9500 klell@hycenta.at

