Country Update Austria

Policy framework

R&D-Funding Program "Mobility of the Future"

1. Call (2012/13): Budget 7,3 Mio. EUR:
•22 Projects for evaluation → 11 Projects selected

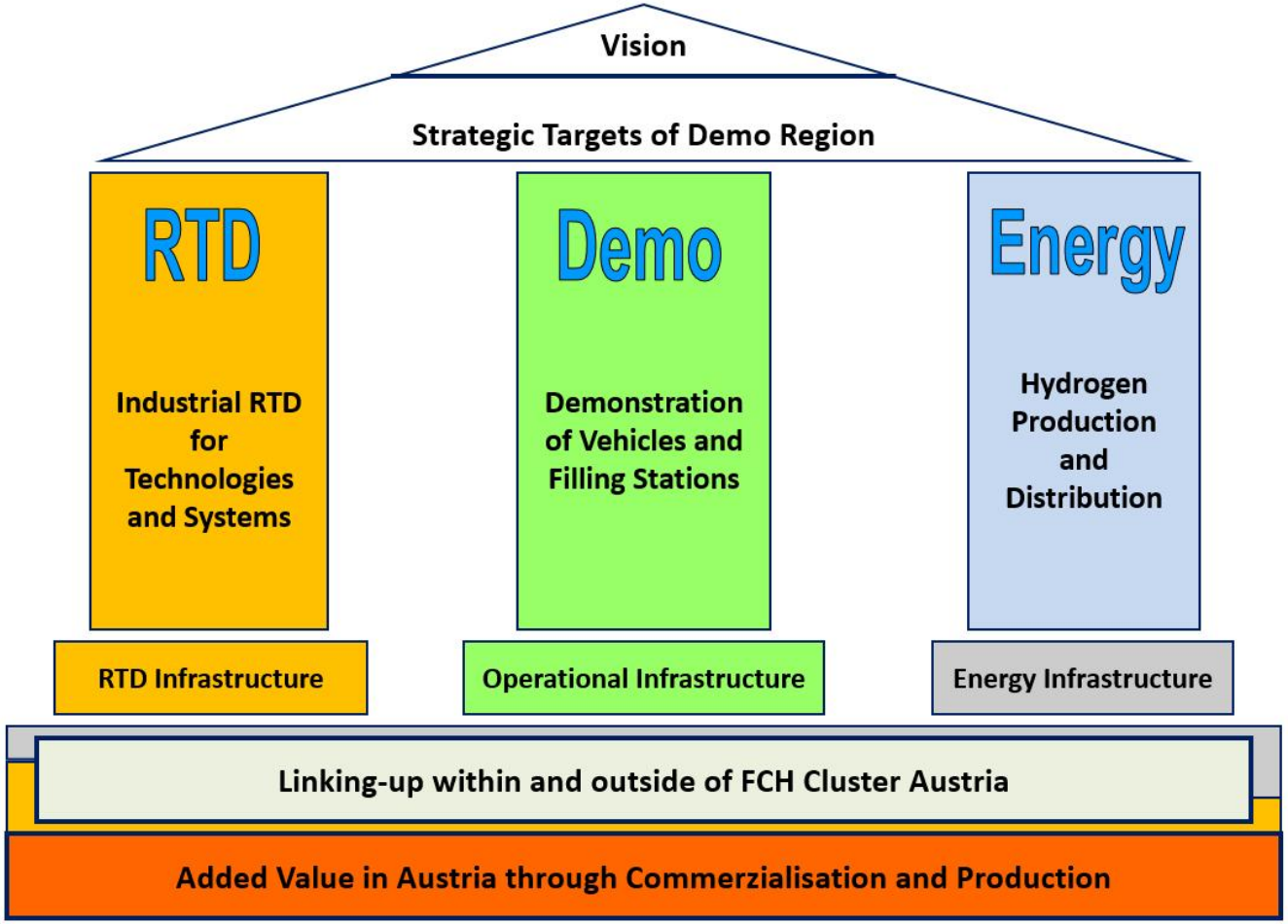
2. Call (2013/14) Funding volume: Budget 7 Mio. EUR (6 Mio. Euro only for FCH-projects):
•24 Projects for evaluation → 14 Projects selected

3. Call Oct. 2014 - Feb. 2015: Budget 6 Mio. EUR - Fuel cells and hydrogen
- Fuel cell components and systems
- Production of hydrogen & storage technologies in the vehicle and filling stations
- Hydrogen supply infrastructure & distribution for mobile applications
- System and vehicle integration

Energy Research Program 2014 - Budget 29 Mio. EUR with FCH-Targets:
- Speed up the implementation by increasing the power density and life-time of FCs
- System optimization as well as reduction of production costs
- Consideration of the production chain from CO_2 separation, electrolysis to methanisation
- Cost efficient, reliable and stable materials for SOFC, SOEC and PEMFC

FCH-Cluster Austria

Country Update Austria



Country Update Austria

VISIONS of the FCH-Cluster Austria

- Austria as **qualified Supply Country** for components, engineering services and development tools for FCH Technologies (AVL, MAGNA, MIBA, Plansee)
- **Niches** for Austrian products and services in existing Partnerships (Toyota-BMW, Nissan-Daimler-Renault-Ford, Honda-GM, VW-Ballard,…) (AVL)
- Development of the Hydrogen Technologies into a **Business Segment** (Fronius)
- **Capable HRS-Infrastructure and Demo Vehicle Fleets** in Austria (OMV)
- **Austria as international accepted research partner** for FCH-Technologies (HyCentA, TU Vienna)

Country Update Austria

(Industry) Activities

- **H_2-Production:** local vs. peripheral, renewable, power-to-hydrogen
- **H_2-Refilling Stations:** Compression, High Pressure Storage
- **H_2-Refilling Stations Infrastructure in Austria:**
  Model Regions, Networks with DE, IT, SLO, CZ
- **H_2-Logistics & Distribution**
- **Demo Vehicles FCV** (Hyundai, Honda, Toyota 2015, Daimler starting 2017)

Country Update Austria

Power-to-Gas

Strategy process for the FTI-Roadmap *„Power-to-Gas for Austria“* under responsibility of bmvit.

Partners from Austria and Germany are:

- DBI GUT
- DBI GTI
- ZSW Ulm
- ZSW Stuttgart
- DVGW EBI
- TU Vienna
- TU Graz
- Virtual Vehicle
- AIT
- HyCentA
- JKU Linz
- Montanuni Leoben
- Climate and Energy Fund
- A3PS
- New Energy Capital Invest
- Air Liquide
- APG
- Biovest Consulting GmbH
- Christof Group
- ErreDueGas Austria
- Fronius International GmbH
- Österreichs Energie
- Ökostrom AG
- OMV AG
- RAG
- Verbund AG
- AVL List
- Axiom GmbH
- EVN AG
- FGW
- Linde Gas GmbH
- OÖ Ferngas Netz GmbH
- Repotec

Targets:

- Promotion of R&D and technology innovation for P2G
- Suggestions for Austrian Funding Programs
- Integration of the mobility sector
- Expansion of the topic to Power-to-Liquid
- Expert Workshops

Review IPHE

What have been the most valuable aspects or outcomes of IPHE?

Direct information exchange between participants with

- high commitment for the development and deployment of FCH-technologies
- high technical and scientific competence
- direct responsibility for R&D-programs and political support measures

Especially the information exchange with countries outside Europe is very valuable which cannot be provided by EU-bodies. The last bullet point facilitates quick and direct decision on joint activities in strong contrast to Horizon 2020 program committees where national policy representatives must consult their technical departments back home after the meetings.

Review IPHE

What is your greatest need that can be addressed through IPHE?

Intensified lobbying for FCH-technologies targeting different stakeholder communities:

- convincing policy makers about the importance and opportunities of these technologies
- organising joint activities of R&D-program managers
- briefing the scientific community on technological trends and barriers in the development process on a global scale
- providing guidance for technology users (vehicle fleet managers, salesmen and manufacturers, utilities,…)
- informing the population on the rising change in the energy and transport system

Review IPHE

List top 3 actions/next steps to be undertaken through IPHE.

- Develop information for the stakeholders listed under point 2
- Intensify relationships with strategic R&D- and policy-organisations either to
  - convince institutions slightly reluctant about FCH-technologies in the past (e.g. the European Technology Platform ERTRAC)
  - or to avoid duplication of efforts in other international organisations (like IEA)
- continue the very valuable information exchange and planning of joint activities like in the past 10 years

Country Update Austria

Review IPHE

List at least one specific action you would be willing to support.

Organisation of the yearly A3PS-conference inviting IPHE-colleagues like on the 20th of Oct. 2014 as key note speakers and participants presenting their strategies, R&D-programs and projects for the development and market introduction of FCH-technologies as well as analysing the challenges and opportunities of these technologies in the final panel discussion.

Country Update Austria

(Industry) Activities

Valve Technologies and Test Methods for H2-Pressure Storage
Accelerated Aging Testing for FC-Systems
PEM-FC Range Extender
PEM-High Pressure Electrolysis
Development of cost efficient Components and System Integration for PEM-High Pressure Electrolysis and PEM-FC
Increasing the **Product Portfolio** for PEM-High Pressure Electrolysis and stationary as well as mobile PEM-FC applications

Country Update Austria

(Industry) Activities

PEM-FC-Systems- and Component Test Bed
Simulation Tools, Measurement- and Test Systems for PEM-FC and SOFC
Analysis of **Aging Processes** of FC-Systems
High dynamic Test Bed Components
SOFC-APU & CHP
SOFC Systems for **Heating/Cooling/Electricity**
PEM-FC-Range Extender Vehicle
PEM-FC-Vehicle
High Temperature Electrolysis SOEC

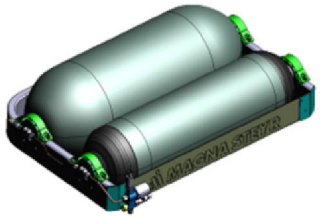
Automotive PEM compressor (18kW, >2.5bar)

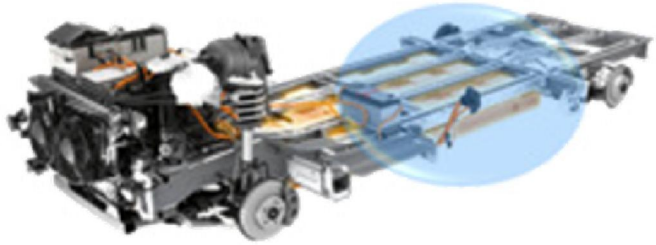
Country Update Austria

(Industry) Activities

MAGNA STEYR

Vehicle Concepts including Simulation
Modular Systems for innovative Propulsion Systems (ICE&xEV)
Development of Production Processes: Synergies and parallel Production of conventional, hybrid and FC-Propulsion Systems
Storage of H_2 **in the Vehicle**: Optimization of Costs & Storage Capacity
Test and Validation of Components, Systems and Vehicles
Geometrical and Functional Integration of new Technologies into the Vehicle



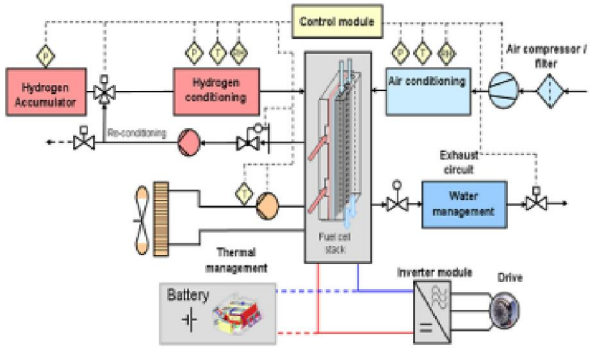


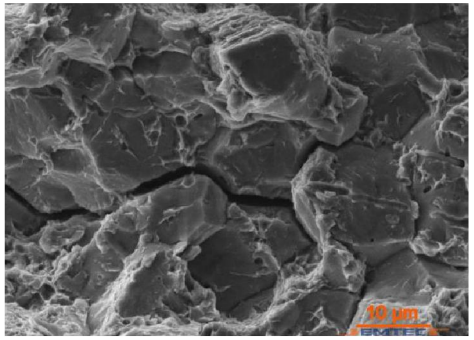
Country Update Austria

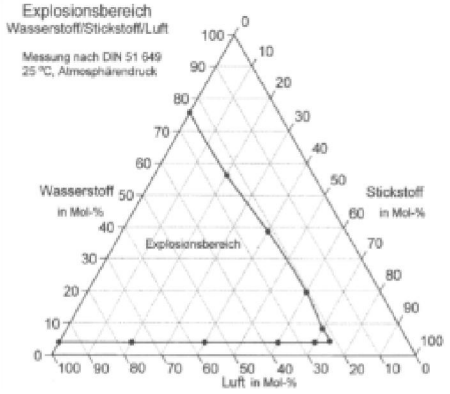
(Industry) Activities

HyCentA

Technical, ecological and economical Analysis of Hydrogen Systems and Processes
Operation of Hydrogen- and FC-**Test Beds** and Hydrogen **Discharge Point**
Engineering for Hydrogen Infrastructure and Vehicles including **licensing**
Proposal for a CD-Laboratory „Thermodynamics of Hydrogen“







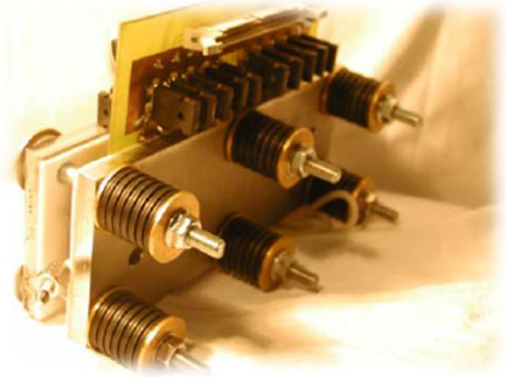
Country Update Austria

(Industry) Activities

PLANSEE

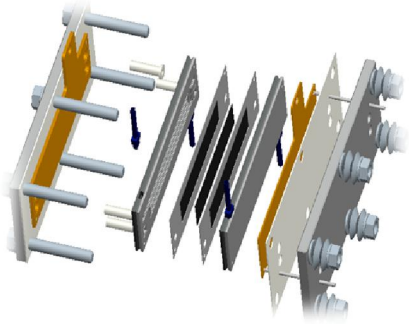
Research on **powder-metallurgical manufactured SOFC Stack Components**
Light Weight **MSC Stack** for SOFC APU Applications
Stack Components and Technologies for **SOFC CHP**
High Temperature Electrolysis SOEC
SOFC Stacks and Stack Components for Heating/Cooling/Electricity

Country Update Austria



(Research) Activities

Optimization of Performance and Life-time of FC
FC in Long Term Tests under Real Conditions and Accelerated Stress Tests (AST)
in-situ Analysis of degradation mechanism of PEM-FC (PEMFC)
Analysis of the current density
Development of the Reformer Sponge Iron Cycle (RESC)
Micro Process Engineering for the Reformation of liquid arenes in Micro Structure Devices for the Application in mobile FC Systems
Development of innovative Eletrolytes and Membranes for Low Temperature FC



Country Update Austria

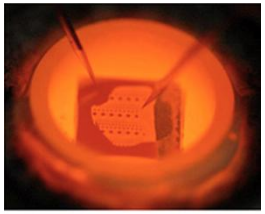
(Research) Activities

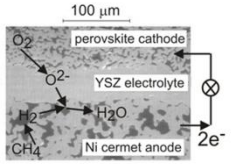
Mass and Charge Transport of SOFC/SOEC Components
Oxygen Exchange Characteristics of mixed conductive Oxides for SOFC/SOEC Cathodes and Anodes
Transport Characteristics of SOFC-Electrolytes
Long Term Stability and Increase of Endurance of SOFC/SOEC Cathodes / Anodes / Electrolytes under Real Conditions

Country Update Austria

(Research) Activities

Development of Simulation Tools for System Optimization
High Resolution Measurement Systems for Hydrogen Propulsion Systems
Real-world Analysis of Fuel Cell Vehicles
Optimization of Energy Efficiency of Hydrogen Range Extender
Control Strategies for FC Systems, CD Laboratory: Model based Calibration Technology
Nanomembran - biomimetic proton conductive membranes with nanometer thickness
Reactions in FC – Crystalline Materials for Ionic Conduction
Elementary Processes like Oxygen Reduction and Hydrogen Oxidation
Material Synthesis and Characterization, Chemistry and Physics of Surfaces, Electric Catalysis





Country Update Austria

(Research) Activities

bioenergy2020+

Allocation of Gaseous Fuels
Processing of Fuel Gases for PEM and SOFC
Cold Processing for PEM
Hot Processing for SOFC
Trace Analysis and Chemistry for all Fuel Gases in all Application
Quality Control of Fuel Gases for all Applications
SOFC **Test Bed** for Heating / Electricity