

Hydrogen and Fuel Cell Activities and R&D-Programs in Austria

Dr. Andreas Dorda
Deputy Head of Department Mobility and Transport Technologies
Austrian Ministry for Transport, Innovation Technology

Challenges

- Dependency on Energy Import: Fossil fuels worth around € 400 billion are imported annually, which accounts for more than 25% of all imports into the EU
- Emission reduction: Simultaneous reduction of greenhouse gases, pollutants and noise to achieve EC climate goals, COP21 objectives and clear air regulations
- Storage of intermittent renewable energy sources, setup of nationwide grid of hydrogen refueling stations, development of cheap and reliable fuel cells
- Securing the competitiveness of the Austrian automotive supply industry

Austrian Automotive Industry

- Automotive Industry is a global key industry sector and one of the most successful industrial branches in Austria.
- 75,000 employees in 700 companies
- Turnover of 21,5 Billion €/year
- Automotive export revenues 3 times higher than import expenditures
- 26% of employees in R&D and 21,459 € for R&D per employee (industrial average 8,700 €)

Promotion of alternative propulsion systems and fuels

Overall R&D-funding volume: ~ 60 M€ per year:

- Mobility of the future: funding of cooperative R&D-projects
- FFG basis program: Bottom-up product-optimization
- FFG-Headquarter program
- Research infrastructure (e.g.: Hydrogen Center Austria)
- Centers of competence (e.g. K2-Mobility, ViF)
- Climate & Energy fund: R&D for energy carriers
- Climate & Energy fund: Program “Zero Emission Mobility” preparing market introduction
- International networking (IPHE, IEA, H2020, Joint Undertaking “Fuel Cells & Hydrogen”, European technology platforms ERTRAC BIOFUELS, ERA-NET Transport)

R&D-Funding Programs "A3 & A3plus": 50 Mio. Euro (2002-2011)

4 calls for proposals (2002-2006):

152 proposals for evaluation → 79 projects selected (with FCH-Focus)

Total project volume: 39.6 Mio. €

Funding: 20.5 Mio. €

2 calls for Lighthouse Projects (2005 & 2006):

25 proposals for evaluation → 9 projects selected (with FCH-Focus)

Total project volume: 7.4 Mio. €

Funding: 3.6 Mio. €

5 calls for proposals (2007-2011):

139 proposals for evaluation → 76 selected projects (incl. 3 lighthouse projects with FCH-Focus)

Total project volume: 44 Mio. €

Funding: 25.8 Mio. €

A3

A3plus

R&D-Program “Mobility of the Future”. Funding for fuel cells and hydrogen: 17.1 M€

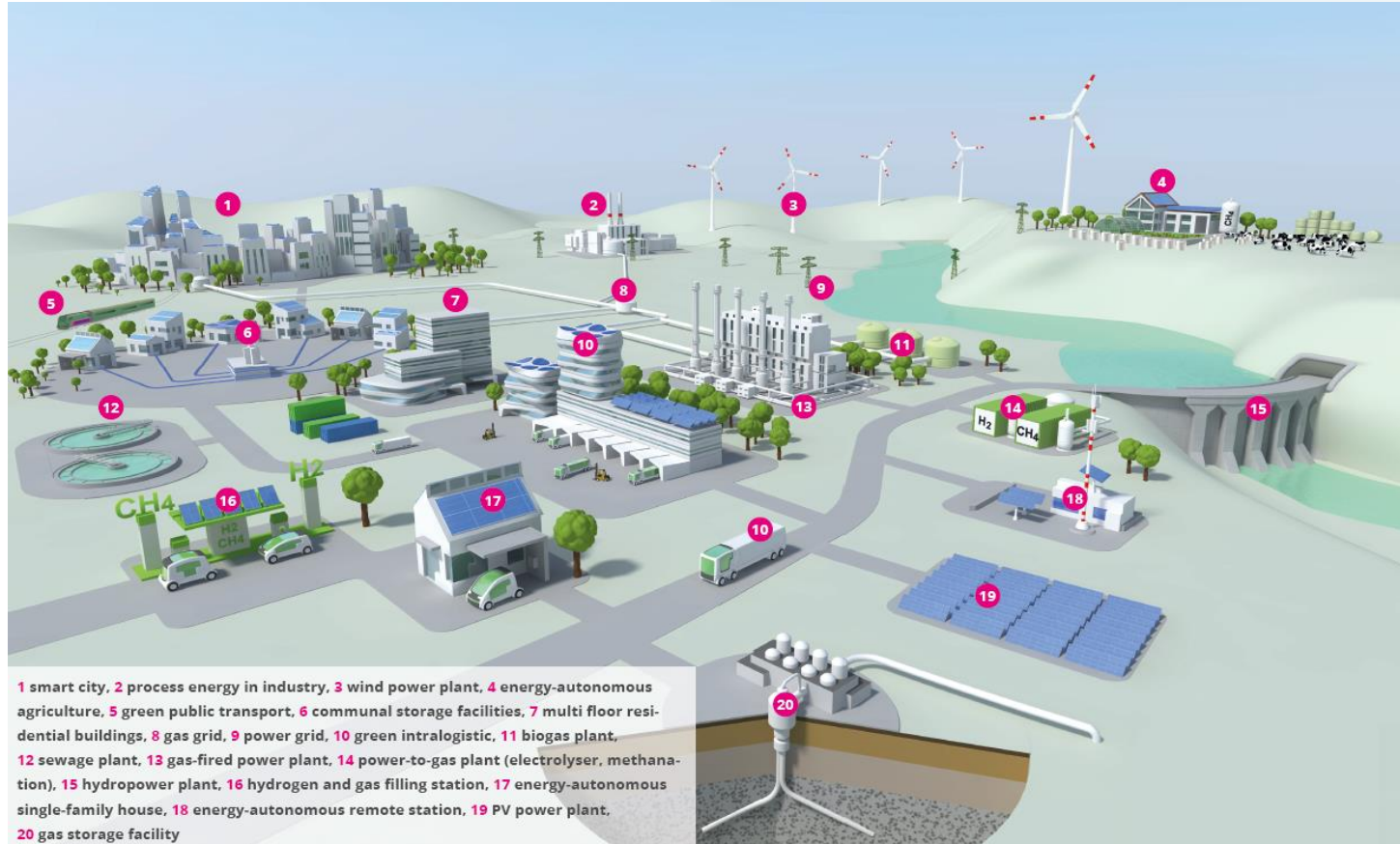
Hydrogen Model Region “WIVA P&G”:

Total Budget: 125 Mio. Euro (Funding: 50%)

- 1. Green energy:** Production of green H₂ via electrolysis & storage, distribution and utilization of renewable energy
- 2. Green industry:** Optimization of industrial processes, lowering emissions in the industrial sector and usage of hydrogen in different processes
- 3. Green mobility:** New approaches for transport and logistics sector; lower CO₂ emissions (well-to-wheel) & local zero-emissions; higher efficiencies; lower costs for fuel cells; utilization of fuel cells in newly developed vehicles and applications

WIVA P&G:

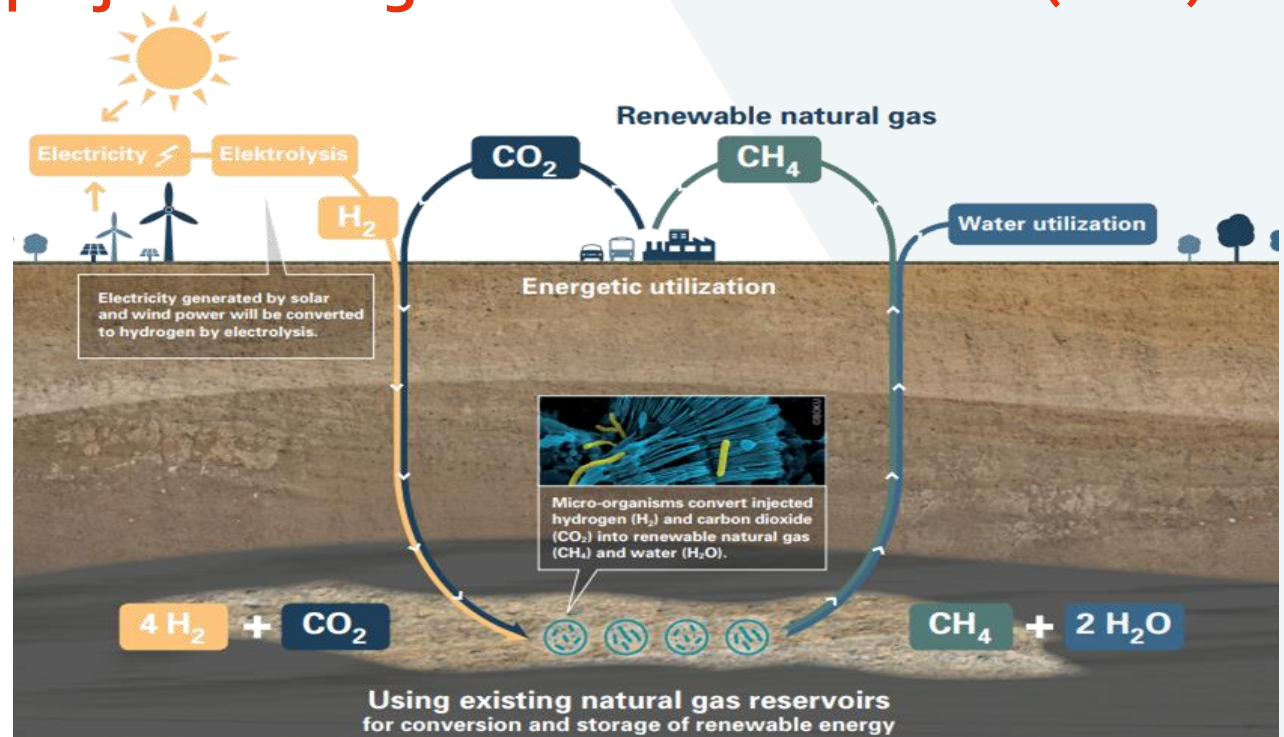
System approach including hydrogen production, storage and use in transport, industry and stationary applications



Example: WIVA - project Underground Sun.Conversion (RAG)

WIVA P&G:

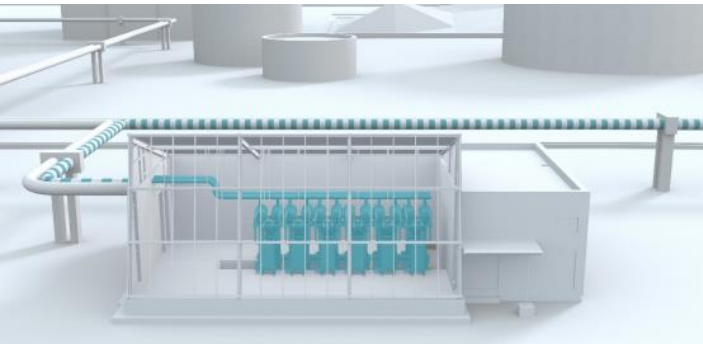
Use of exhausted natural gas fields for underground hydrogen storage.
Conversion of injected carbon dioxide and hydrogen into renewable natural gas by micro-organisms





International success: EU-project H2FUTURE

- Scenario for Transformation: **Decarbonisation of Steel Maker voestalpine** using green hydrogen
- **FCH JU AWARD FOR H2FUTURE**: We are proud to announce, that H2FUTURE was amongst the winning projects for the FCH JU "success story" award 2018.



Transport as front runner for fuel cell and hydrogen application

- Vehicle industry urgently needs new power train technologies for reducing greenhouse gases and pollutants
- Synergies combining technology, infrastructure and transport policy at BMVIT
- Train: „H₂Zillertal“ - fully H₂-powered
„eHybridlok“ - H₂ fuel cell as range extender
- Bus: „Postbus“ - fully H₂-powered buses
- Austria-wide coverage for refueling vehicles by hydrogen infrastructure already linked to neighbouring counties

Austrian Climate and Energy Strategy #mission2030-objectives



- share of 45-50 % renewable energy in gross final energy consumption by 2030 (currently 33.5 %)
- 100% of total national electricity consumption from renewable energy sources by 2030 (currently 72%)
- transition to low and zero-emission vehicles via alternative propulsion systems & fuels based on renewable energies (battery vehicles, fuel cell vehicles, bio-gas and liquid bio-fuels)

Austrian Climate and Energy Strategy: Measures

- **Lighthouse 7:** Renewable hydrogen and bio-methane
- **Lighthouse 9:** Energy research initiative
- **Energy Model Regions:** should show that an energy supply based on 100% renewable energy is feasible with innovations from Austria e.g. hydrogen model region “WIVA P&G”

National Hydrogen Strategy

- This strategy is being developed by BMVIT and the Ministry for Sustainability and Tourism in close cooperation with science, industry and industry until the end of 2019.
- The strategy is part of the contents of the *European Hydrogen Initiative* initiated by Austria during the EU-presidency . The elaborated targets and measures will be included in the *National Climate and Energy Plan*, which will be submitted to the EC by the end of this year and which will already be partially implemented in the Renewable Development Act (EAG) 2020.
- 4 Working Groups:
 - Infrastructure, Generation, Storage
 - Greening the Gas
 - Hydrogen in industrial processes
 - Fuel cells and hydrogen end-use (mobility and buildings)

European Hydrogen Initiative

- **Objective:**
maximise the great potentials of sustainable hydrogen technology for the decarbonisation of multiple sectors, the energy system and for the long-term energy security of the EU
- **Signatories:**
23 EU member states and more than 100 companies and research organizations



European Hydrogen Initiative

- **Transport and mobility:** Austria highlights the need to investigate options to support hydrogen application in transport and mobility. Additionally, Austria strives to facilitate the establishment of the necessary fuelling infrastructure to satisfy the increasing hydrogen demand.
- **Energy storage:** Austria highlights the capability of short- and long-term storage of renewable energy with hydrogen as an energy source, hence contributing to energy security.
- **Direct injection into the gas-grid:** Austria investigates how green hydrogen from electrolysis could improve the efficient use of variable and intermittent renewable energy

European Hydrogen Initiative

- **Conversion of Hydrogen to renewable natural gas:** Austria explores the most effective conversion of renewable hydrogen into synthetic methane and other renewable fuels
- **Sector integration and coupling:** Austria emphasises the role of hydrogen as a promising link between the electricity, industry and mobility sectors, opening new windows of opportunity in energy flexibility, availability, security, as well as improved efficiency and cost-effectiveness in the energy transition, contributing to the decarbonisation of the economy.
- **Industry:** Austria promotes the use of renewable hydrogen as well as derived products in industrial processes

Activities complementary to the European Hydrogen Initiative

- **IPHE** (International Partnership for Hydrogen and Fuel Cells in the Economy):
Austria joined 2013, since then played an active role
- **Mission innovation:**
Austria joined 2018, participates in Challenge 8 „Renewable and Clean Hydrogen“.
- **IEA:** Austria participates in Technology Collaboration Programmes Advanced Fuel Cells, Hydrogen as well as Advanced Motor Fuels
- **Hydrogen Energy Ministerial Meeting**, 23 October 2018 Tokyo, Japan:
Signatory of the Tokyo Statement

Austria as potential Hydrogen Valley in the heart of Europe

- Bridging many neighboring countries including eastern Europe
- Central player of the European natural gas grid with huge storage capacity
- High share in renewable energy sources: in transport 2nd in Europe, approaching 100 % renewable electricity
- Strong energy sector and vehicle industry as well as high R&D-competence
- Complementarity with other European countries as provider of supply components and engineering services



Andreas Dorda
Deputy Head of Department Mobility and Transport Technologies
Austrian Ministry for Transport, Innovation Technology
Andreas.dorda@bmvit.gv.at
Tel.: +43 1 711 62 65