



Rethinking Propulsion.

A3PS - Strategy for Clean Vehicles

Dr. Andreas Dorda
Vienna, 11th December, 2012

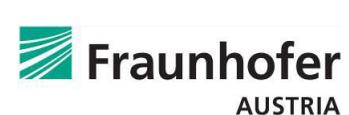
A3PS – Who we are. What we do.

- Public Private Partnership between industry, research and technology policy for the development and market introduction of alternative propulsion systems and fuels.
- Strategic platform with a joint mission to develop efficient, competitive and clean vehicles as well as their energy carriers and infrastructure.
- Stimulating the co-operation of complimentary partners in order to overcome the “chicken and egg problem”.
- Providing a broad portfolio of services for its member institutions.

A3PS – Objectives and Tasks

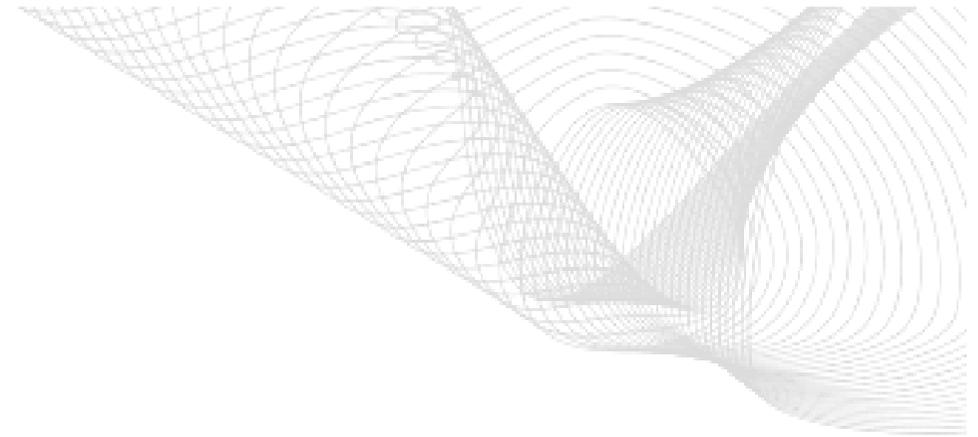
- **Networking:** Stimulating R&D co-operations embedding the Austrian industry and research institutions into national and international new value chains in a leading position.
- **Information:** Strengthening the competence of Austrian enterprises and research institutions by collecting, compiling and disseminating information on alternative propulsion systems and energy carriers in a targeted way to the members of the agency.
- **Know-How Presentation:** Presenting the technological know-how, engineering competence and products of the A3PS members in national and international conferences and initiatives.
- **Safeguarding interests:** Supporting the representation of Austrian interests in international committees and initiatives of the EU and the IEA.
- **Orientation:** Establishing a common view between industry, research institutions and technology by developing a common strategy and roadmaps for the development and market introduction of alternative propulsion systems and energy carriers.
- **Explanation:** Providing well-founded and balanced advice for policy makers to support the optimisation of their policy instruments (funding programs, regulations, standards, public procurement, etc.) and to inform the public about the opportunities and perspectives of these new technologies.

A3PS – Members



A3PS Members – Industry

- AVL
- FRONIUS
- KTM
- MAGNA STEYR
- Miba Group
- OMV
- PLANSEE
- AustriaTech



A3PS Members – University Institutes

- TU Graz – Inst. for Internal Combustion Engines and Thermodynamics
- TU Graz – Inst. of Chemical Engineering and Environmental Technology
- TU Graz – Inst. of Electrical Measurement and Measurement Signal Processing
- TU Wien – Inst. for Powertrains and Automotive Technology
- TU Wien – Inst. of Chemical Engineering
- TU Wien – Inst. of Chemical Technologies and Analytics
- TU Wien – Inst. of Energy Systems and Electric Drives
- BOKU – Department of Sustainable Agricultural Systems
- Montanuniversität Leoben – Chair of Physical Chemistry

A3PS Members – SMEs and Research Institutes

- AIT Austrian Institute of Technology
- Bioenergy 2020+
- Biovest Consulting
- CEST – Competence Centre for Electrochemical Surface Technology
- Fraunhofer Austria Research
- FTW Telecommunications Research Center Vienna
- HyCentA
- JOANNEUM RESEARCH
- VIRTUAL VEHICLE Research and Test Center
- PROFACTOR
- RIC / BRP Rotax
- Spirit Design
- THIEN eDrives
- Alset

A3PS – Strategy and Orientation 1/2

- Promoting **all** alternative propulsion systems and fuels
- Reducing development risks by promoting multi-use technologies with economic value beyond vehicle applications
- Taking aspects of transport, environmental and energy policy and technologies into account
- Supporting R&D institutions by information-, research- and cooperation management
- Clear distinction from the operational duties of the Austrian Research Promotion Agency FFG
- Harmonizing regional and national research activities in order to avoid duplication of efforts and to achieve a critical mass in the international perception.

A3PS – Strategy and Orientation 2/2

- bmvit as neutral partner for all stakeholders and facilitator in joining consortia or integrating technology users in demonstration projects by public procurement.
- Saving money by avoiding duplication of expenses for activities of common interest (studies, organization of conferences,...).
- Giving Austrian research institutions a long-term security in planning investments due to a clear public commitment beyond election terms.
- Making bmvit confident to invest so heavily in this technology field by assembling already 31 partners in the Agency.
- Pursuing a technology breakthrough in a key area of the energy and transport industry by a strategic partnership between industry, research institutions and policy makers.

A3PS – Services for the members of the agency 1/3

- Compiling and summarizing all available information on alternative propulsion systems.
- Analyzing technological trends as well as public and private R&D-strategies
- Evaluating technology foresight and assessment studies.
- Organizing internal workshops with invited experts and informing about dates and out-come of international conferences
- Discussing topics and organization of bmvit program calls with A3PS members in order to optimize the funding instruments.
- Informing extensively and in detail about all regional, national and international funding opportunities.
- Stimulating interdisciplinary research co-operations and trans-sectoral demonstration projects.

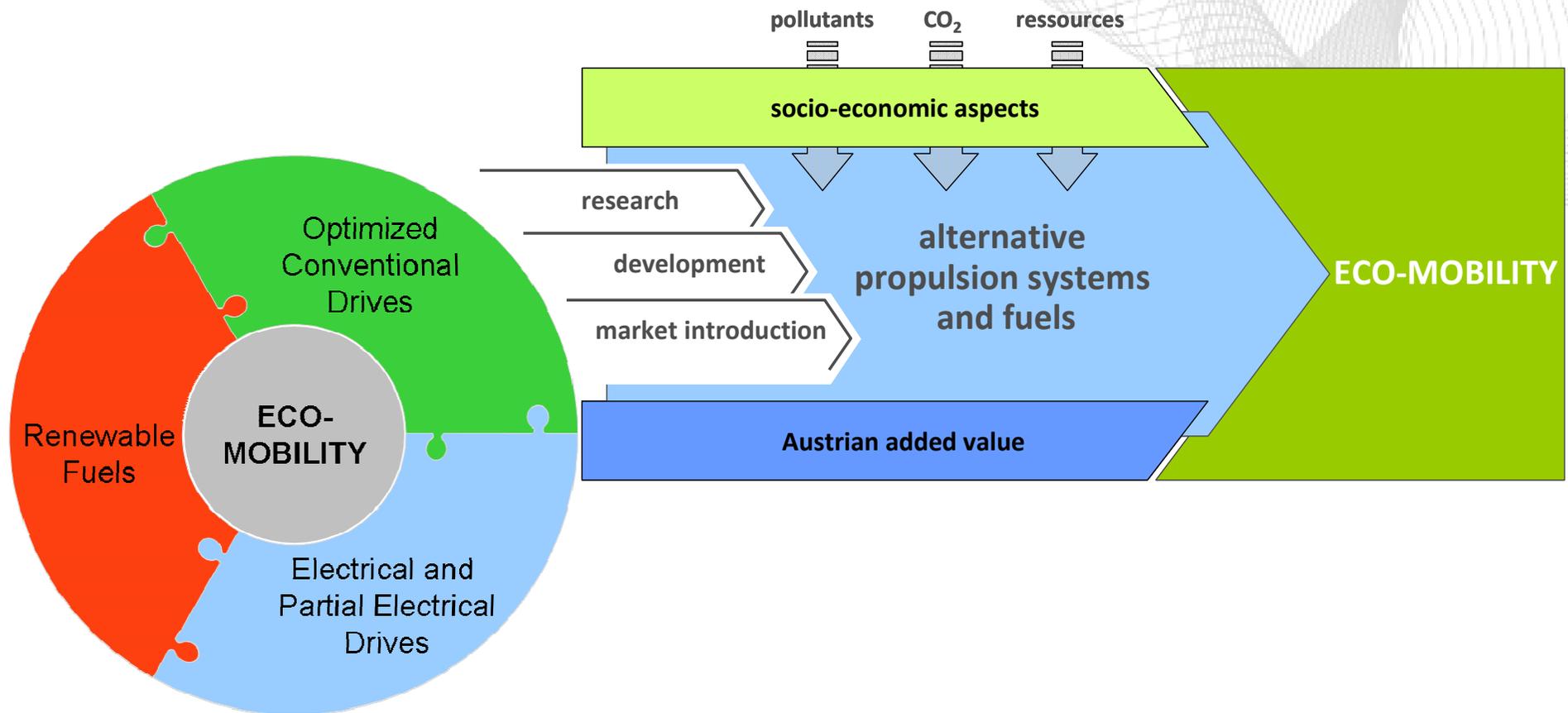
A3PS – Services for the members of the agency 2/3

- Supporting the definition of interesting niches for Austrian research institutions within international development and R&D processes.
- Facilitating the integration in national and international networks as well as participation in FP7 projects and other research activities.
- Safeguarding interests of A3PS members in international fora like EU-technology platforms, ERA-NET's, IEA,...
- Informing the public on the potentials and the state of development of alternative propulsion systems.
- Advising policy makers based on the comprehensive know-how of A3PS members in the planning of technology policy strategies and instruments.

A3PS – Services for the members of the agency 3/3

- Formulating roadmaps for the successful implementation of these new technologies.
- Supporting the creation of innovation friendly framework conditions (regulatory policy and fiscal policy, fuel taxation, endowment of funding instruments, technical and safety standards, emission limits, garage regulation, differentiated access restrictions to sensitive areas).
- Marketing for Austrian technology expertise and the engineering and product know-how of the members by publications and presentations at conferences.
- Providing support to Austrian R&D institutions by gaining additional workforce for their limited human resources by A3PS employees.

A3PS Roadmap – Eco-Mobility from Austria 2015 plus



“Eco-Mobility offers ecological, economical and social sustainable mobility solutions considering the whole portfolio of drive technologies“

A3PS Roadmap – Eco-Mobility from Austria 2015 plus

Main messages:

- Rising of a **broad portfolio** of alternative propulsion systems optimally suited for different **application purposes** and **vehicle classes** in the coming decades.
- General trend towards **electrification** of drive train with **batteries** and/or **fuel cells** with intermediate steps covering different forms of hybridization.
- **Renewable energy sources** are necessary to reach climate targets.
- These drive technologies are summarized by the A3PS-members under the term “**eco-mobility**”.

A3PS Roadmap – Eco-Mobility from Austria 2015 plus

- Optimized **conventional drives** and **hybrid drives** will maintain a dominant market share in the short and medium term.
- Therefore higher efficiency of **optimized ICE** essential to achieve CO₂ - goals.
- Not only climate protection is a challenge. Don't forget **pollutants!**
- Long term goal of largely **emission free** transport powered by **renewable energy sources** requires alternative propulsion systems.
- **Purely electric drives** powered by renewables have the greatest potential to reduce greenhouse gases, pollutants, noise and dependency on fossil fuels.
- Considerable **R&D** still necessary in order to make these technologies ready for the market.

A3PS Roadmap – Eco-Mobility from Austria 2015 plus

- Focus on key components such as **batteries** or **fuel cells** avoiding expensive or rare materials.
- **Hydrogen** has advantages due to the potential for its production from many renewable energy sources and **higher energy density** compared to electric power storages.
- Financing an area-wide **hydrogen infrastructure** represents a great challenge for the energy supply industry.
- The current focal point of research lies on the development of cost-effective materials for storage at **higher pressures**.
- **Liquid biofuels** will dominate long distance (freight) transport due to their high energy density.
- Advantage of present **biofuels** to use **existing infrastructure** and **conventional ICE**.

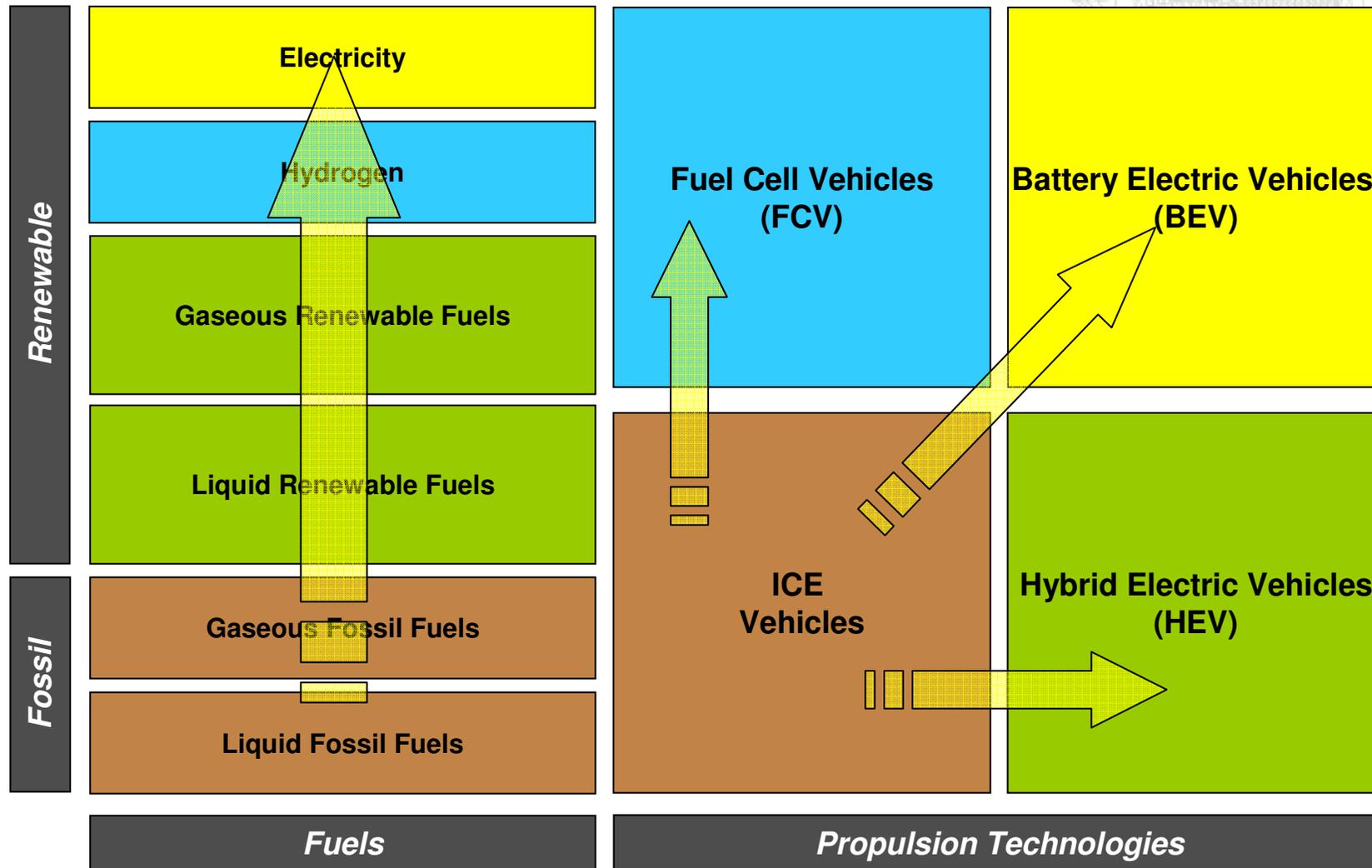
A3PS Roadmap – Eco-Mobility from Austria 2015 plus

- There is a need for R&D in the **process-technical optimization** of fuel production and the **mutual adaptation** of drive and fuel.
- For a life cycle assessment which extends beyond the vehicle, aspects of **land use** for energy generation, possible competition with **food production** and **biodiversity** for the cultivation in sensitive regions should to be taken into consideration.
- **Lightweight construction, system integration, recycling, smart control and regulation of components** are essential for the development of all alternative propulsion systems and energy carriers.
- Diversification of propulsion systems should and will generate **economic** and **social benefit** in addition to **ecological sustainability**.

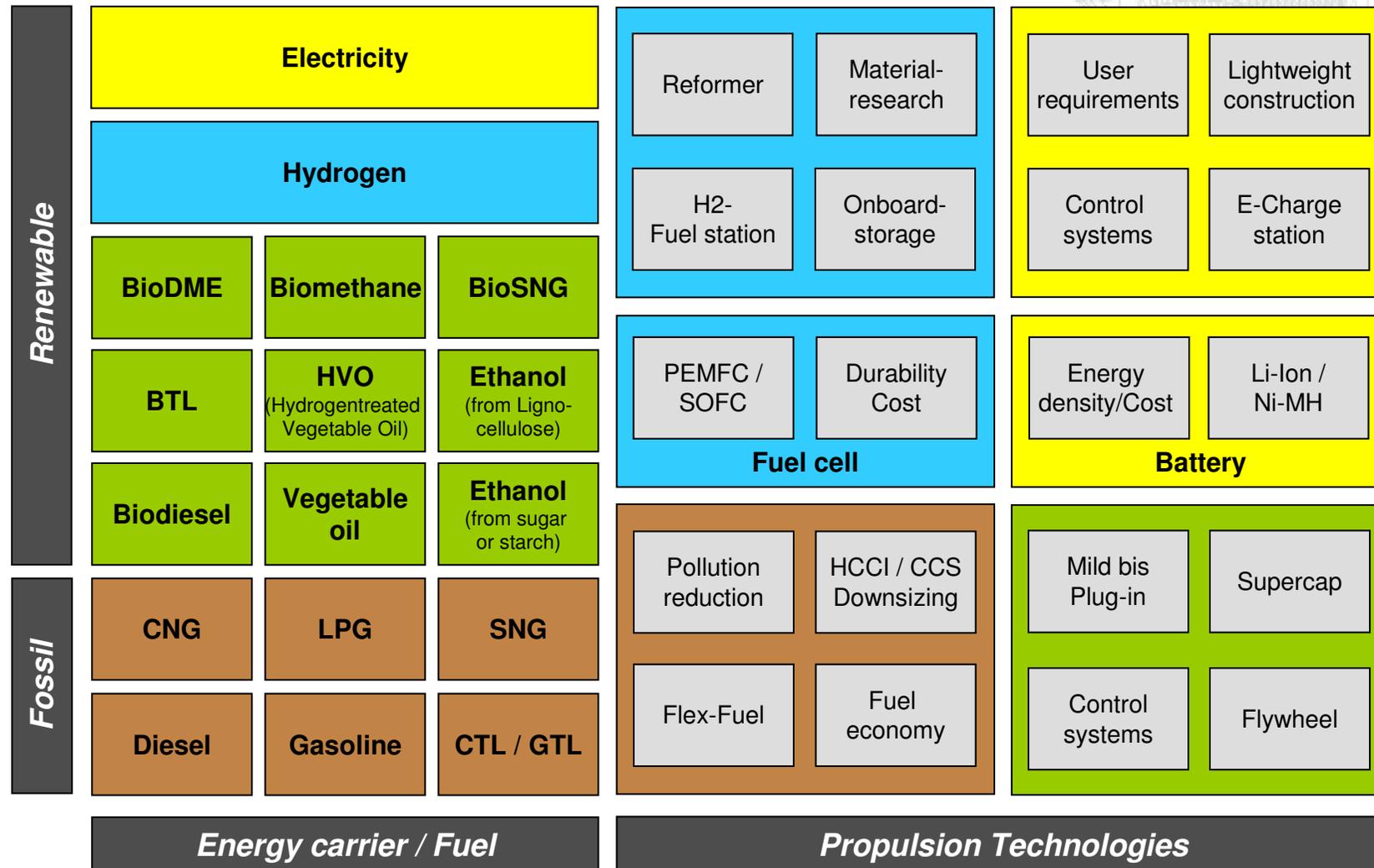
A3PS Roadmap – Eco-Mobility from Austria 2015 plus

- Strong position of the **Austrian supply industry and research institutions** due to their **high expertise in engineering and products**.
- Many technical problems of alternative propulsion systems are already solved. Main challenge is now to **reduce costs** in order to gain competitiveness compared to ICE as well as world regions with lower production costs.
- **Smart production technologies** are key for cost-efficient industrialization and series production of small vehicle quantities in the initial phase.

Development Scheme for Fuels and Propulsion Technologies



Development Scheme for Fuels and Propulsion Technologies



Dimensions of Electric Mobility

Application	<i>commuters</i>	<i>taxis</i>	<i>Urban public transport user</i>	<i>recreational traffic</i>	<i>public fleets</i>	<i>company fleets</i>	<i>city logistics</i>	<i>long distance freight</i>
Vehicle class	<i>pedelecs</i>	<i>e-scooters</i>	<i>e-motorbikes</i>	<i>cars</i>	<i>light trucks</i>	<i>buses</i>	<i>heavy duty vehicles</i>	
Technology	<i>full hybrid</i>	<i>plug in hybrid</i>		<i>battery electric vehicle</i>			<i>fuel cell vehicle</i>	
Region	<i>urban</i>	<i>Urban agglomeration</i>			<i>transport corridor</i>		<i>rural area traffic</i>	
Intermodal links	<i>pedestrians, bicycles</i>	<i>rail short distance</i>		<i>rail long distance</i>		<i>Buses</i>	<i>aviation, shipping</i>	
Instruments & fields of action	<i>implementing regions</i>	<i>legislative measures</i>	<i>R&D-fundng</i>	<i>infrastructure</i>		<i>ministry internal</i>	<i>synergies with public transport</i>	
	<i>public procurement</i>	<i>transport policy</i>	<i>intermodal links</i>		<i>public relations</i>		<i>International cooperation</i>	
	<i>education and training</i>	<i>financial assistance and compensation measures</i>			<i>business models</i>	<i>energy supply</i>	<i>mobility management</i>	
takeholders	<i>ministries, provinces, communities</i>	<i>Companies</i>	<i>R&D-institutions</i>	<i>automotive industry</i>	<i>energy suppliers</i>	<i>transport service providers</i>	<i>Infrastructure Companies</i>	
Time horizon	<i>short term</i>			<i>medium term</i>			<i>long term</i>	

BMVIT-Program „Mobility of the Future“



Thematic Field: “Transport Technologies” (responsibility:
Andreas Dorda)

Research Areas:

- Development of alternative drives and fuels for all vehicle classes of surface transport
- Liquid and gaseous alternative fuels
- E/E Architecture
- Lightweight components and vehicles

Zukunft Auto

- **January 2013: press conference and official presentation**
- Technical description of all alternative propulsion systems and fuels and comparative evaluation of their advantages, disadvantages and development potential. Information presented as PC-supported information tool.
- Funded by the Ministry for Transport, Innovation and Technology as a technology foresight and assessment project for technology policy decision makers and the industrial and research partners in the A3PS.
- Providing different levels of information addressing scientific experts, industrial and policy decision makers up to the broader public and media, sensitizing them for the ongoing technological change in vehicle technologies.



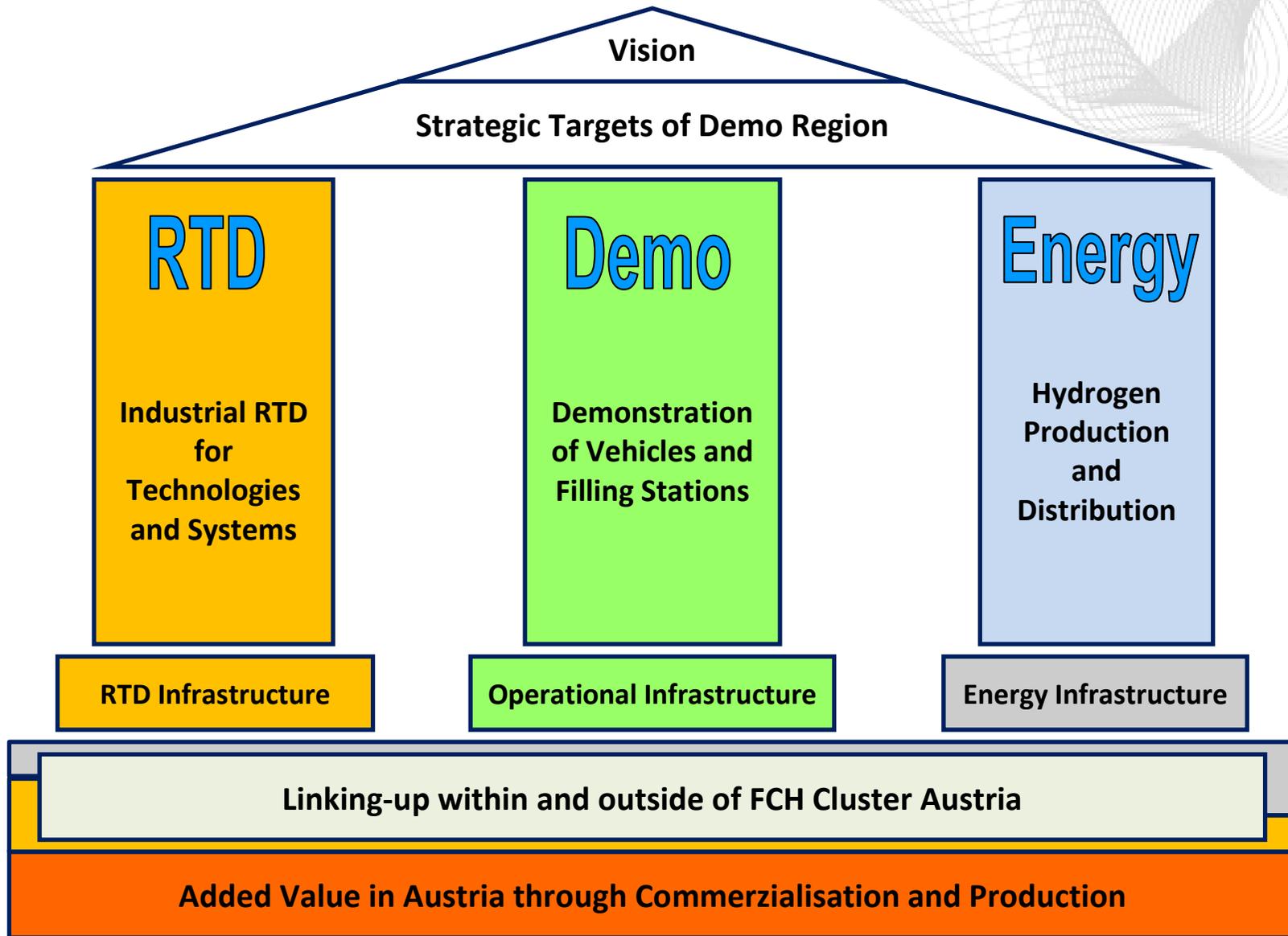
FCH-Cluster-Austria: Why and Why Now?

- crucial for CO₂-, pollution, and fossil combustion free automotive technologies
- high potential in Austria to use renewable energy (sun, wind, hydropower, biomass,...) for energy production, storage and in mobility
- hydrogen is suitable for storing unsteady produced renewable energy
- Austrian industry and research institutions are highly qualified in the field of hydrogen and fuel cells
- FCH-technologies are feasible – topics are now: operating safety, durability and practical validation for implementation in high quantities
- production costs must be reduced

FCH-Cluster-Austria: Why and Why Now?

- for a successful introduction of FCH-technologies the infrastructure must be implemented in the next 2 to 3 years.
- fast fuelling (< 3 min) = high availability
- light weight drive train (specific energy and specific power)
- broad operating conditions -30 bis +50 °C
- application of different types of renewable energy
- sustainable life cycle
- besides mobile applications, Austrian industry and research institutions can provide stationary and portable technologies which are ready for serial production

FCH-Cluster-Austria: 3 pillars of the FCH Cluster Austria



Participating Austrian Institutions



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