

# **Austrian Agency for Alternative Propulsion Systems**

**A Cooperation between  
Industry, Research Institutions and Technology Policy**

**Alternative Propulsion Systems and Energy Carriers –  
Vehicle Integration and System Optimization**

## Content of this presentation:

- Austrian Agency for Alternative Propulsion Systems (A3PS)
- Automotive industry in Austria
- National and European framework conditions and policy goals
- Funding instruments of the Austrian Ministry for Transport, Innovation and Technology (bmvit)
- Marketing and networking for A3PS members in FP 7, EU-technology platforms and the International Energy Agency

# Austrian Agency for Alternative Propulsion Systems



- Public Private Partnership between industry, research and technology policy as strategic cooperation for the development and market introduction of alternative propulsion systems and fuels.
- BMVIT can facilitate the development of new technologies far beyond funding R&D projects.
- Platform of complementary partners with a joint mission for the development of efficient, competitive and clean vehicles as well as their energy carriers and infrastructure by providing a broad portfolio of services for its member institutions.

# Austrian Agency for Alternative Propulsion Systems

## Objectives and Tasks (1) :

- Collecting, compiling and disseminating information on alternative propulsion systems and energy carriers in a targeted way to the members of the agency **(information)**.
- Stimulating the formation of international partnerships, research co-operations and the embedding of Austrian industry and research institutions in a leading position into new value chains **(networking)**.
- Aligning and focusing on common priorities between industry, research institutions and technology policy by the development of concepts and roadmaps to coordinate the implementation of strategies and the formation of reference markets **(orientation)**.

# Austrian Agency for Alternative Propulsion Systems

## Objectives and Tasks (2) :

- Providing well-founded and balanced advice for policy makers supporting the optimization 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 (**forming of opinion**).
- Supporting the representation of Austrian interests in international committees and initiatives of the EU and the IEA (**representation of interests**).
- Present the technological competence and the engineering and product know-how of the A3PS members in national and international conferences and initiatives (**know-how presentation**).

# Austrian Agency for Alternative Propulsion Systems

## Strategy and Orientation (1) :

- Promoting **all** alternative propulsion systems and fuels (fuel cells, hydrogen, hybrid drive trains, batteries, CNG, liquid/gas-based biofuels,...)
- Stimulating the co-operation of complimentary partners in order to overcome the “chicken and egg problem”.
- Focusing on vehicle technology but taking aspects of environmental and energy policy and technologies into account (sustainability in fuel production, Kyoto commitment, security of supply,...).
- Reducing development risks by promoting multi-use technologies with economic value beyond vehicle applications (electric motor, electronics, simulation, material research,...).

# Austrian Agency for Alternative Propulsion Systems

## Strategy and Orientation (2) :

- A3PS pursues no own research but supports R&D institutions by information-, research- and cooperation management.
- Clear distinction of thematic promotion and strategic partnership of A3PS with industry and research from the operational duties of the Austrian Research Promotion Agency FFG (evaluating proposals, signing contracts, funding projects).
- Harmonizing regional and national research activities in order to avoid duplication of efforts and to achieve a critical mass in the international perception.
- bmvit as neutral partner for all stakeholders and facilitator in joining consortia or integrating technology users in demonstration projects by public procurement.

# Austrian Agency for Alternative Propulsion Systems

## Strategy and Orientation (3) :

- 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 27 partners in the Agency.
- Pursuing a technology breakthrough in a key area of the energy and transport industry by gaining synergies in a strategic and determined public private partnership between industry, research institutions and policy makers.



# Austrian Agency for Alternative Propulsion Systems

## Services for the members of the agency (1) :

- 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 date and result 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.

# Austrian Agency for Alternative Propulsion Systems

## Services for the members of the agency (2) :

- Building up interdisciplinary research co-operations and trans-sectoral demonstration projects.
- 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.

# Austrian Agency for Alternative Propulsion Systems

## Services for the members of the agency (3) :

- Advising policy makers based on the comprehensive know-how of A3PS members in the planning of technology policy strategies and instruments.
- 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).

# Austrian Agency for Alternative Propulsion Systems

## Services for the members of the agency (4) :

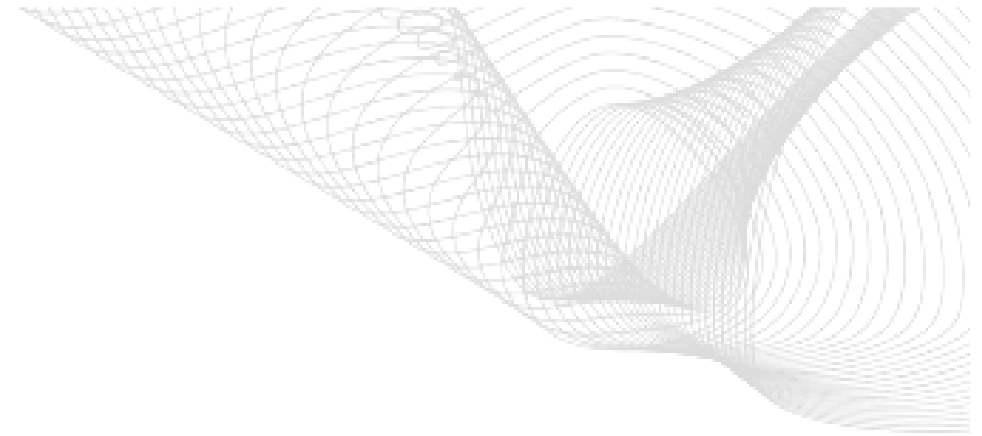
- Marketing for Austrian technology expertise and the engineering and product know-how of the members by publications and presentations at conferences.
- Providing support to Austrian R&D institutions by gaining additional workforce for their limited human resources by A3PS employees.

# A3PS Member Institutions:



# Industry

- AVL List
- FRONIUS International
- KTM Sportmotorcycle
- MAGNA STEYR
- OMV
- Plansee
- AustriaTech



# University Institutes

- TU Graz - Institute for ICE and Thermodynamics
- TU Graz - Inst. of Chemical Engineering and Environmental Technology - Laboratory for Fuel Cell Systems
- TU Graz - Institute of Electrical Measurement and Measurement Signal Processing
- TU Vienna - Institute for Powertrains and Automotive Technology
- TU Vienna - Institute of Chemical Technologies and Analytics - Research Division Electrochemistry
- TU Vienna - Institute of Chemical Engineering
- TU Vienna - Institute of Electrical Power Systems and Energy Economics
- BOKU Vienna - University of Natural Resources and Applied Life Sciences - Department of Sustainable Agricultural Systems

## SMEs and Research Institutes

- AIT Austrian Institute of Technology
- bioenergy 2020+
- Biovest Consulting
- Bitter
- CEST - Competence Centre for Electrochemical Surface Technology
- EVERYNEAR – Energy very near
- Fraunhofer Austria Research
- HyCentA - Hydrogen Center Austria
- JOANNEUM RESEARCH
- PROFACTOR
- RIC (Regionales Innovations Centrum)
- VIRTUAL VEHICLE Research and Test Center



# Automotive Industry in Austria



- Automotive industry is a global key industry sector and one of the most successful branches in Austria
- More than 175.000 employees
- Turnover of 35 Billion€/a (>10% of GDP)
- High competence on the drive train (AVL, Magna, KTM, BMW, Opel Austria, ....)
- Change of the drive train has direct and strong impact on Austrian industry
- Change is already visible
  - Trend towards electrification of the drive train
  - Successful introduction of hybrid cars

# European/Austrian Policy Goals



- Reduction of greenhouse gases (as of 1990) by at least 20% by 2020
- Increasing energy efficiency by 20% until 2020
- 20% renewable energy by 2020 (**34% for Austria**)

## Transport sector:

- Reduction of fleet emissions to 130 - 120 - 95 g CO<sub>2</sub>/km
- Further tightening emission standards for emissions of pollutants (EURO 4, 5, 6,...)
- 5.75 % biofuels by 2010 and 10% by 2020 (**5.75% since 2008 in Austria**)

# Instruments of the Ministry for Transport, Innovation and Technology for the development of automotive technologies:

Total funding: 60 M€/year

- A3plus-Technology Program: funding cooperative R&D projects developing alternative propulsion systems and fuels
- Program Energy 2020: ICE-optimization, light weight structures, electronics
- Lighthouse Projects: demonstration for market introduction
- FFG basic program: bottom-up product optimization
- Headquarter Program
- Research Infrastructure (e.g. Hydrogen Center Austria)
- Competence Centers (e.g. K2-Mobility)
- International Cooperation (FP7, ETPs, ERA-NETs, IEA)
- Austrian Agency for Alternative Propulsion Systems (A3PS)

# A3plus: Funding Program for Alternative Propulsion Systems and Fuels

## 4 calls for proposals (2002-2006):

152 proposals received

78 projects selected by international evaluation

Total project volume: 39.6 Mio. €

Funding: 20.4 Mio. €

## 2 calls for Lighthouse Projects (2005 and 2006):

25 proposals received

8 projects selected by international evaluation

Total project volume: 7.4 Mio. €

Funding: 3.4 Mio. €

## 4 calls for proposals (2007-2009):

89 proposals received

64 selected projects (including 3 lighthouse projects)

Total project volume: 33.3 Mio. €

Funding volume: 19 Mio. €

**A3**

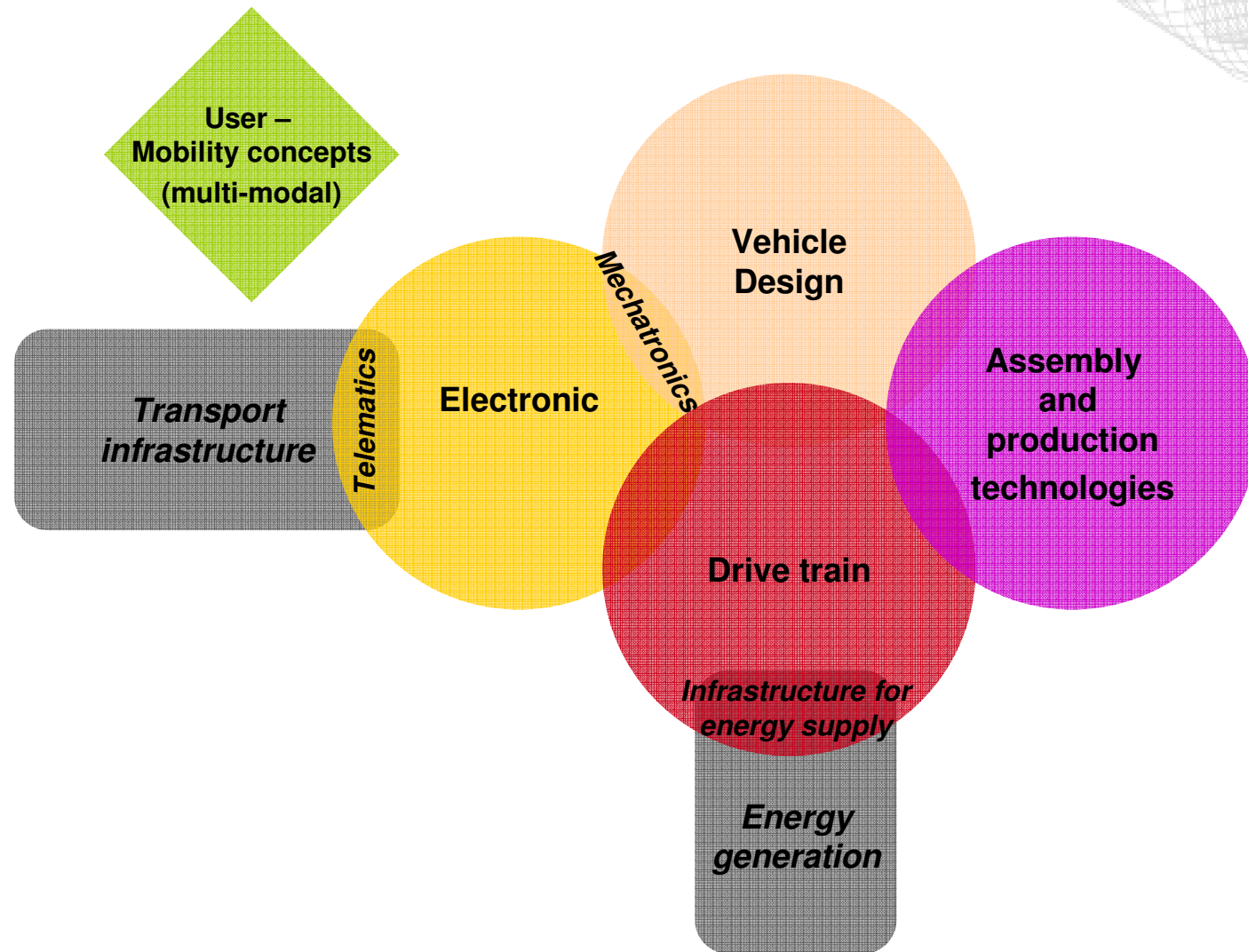
**A3plus**

- Alternative propulsion systems and components
- Vehicle electronics for energy efficient system management and control
- Innovative storage concepts for gases, liquids, electricity
- Alternative fuels (liquid, gaseous / fuel combinations)
- Development of necessary supply infrastructures for alternative propulsion systems

# Lighthouse Projects – Demonstration and Pilot Projects

- Funding instrument of the bmvit to support the **market introduction** of new technologies through demonstration.
- Goals:
  - **Optimization of alternative propulsion systems** and fuels under real life conditions through a close cooperation of developers and users
  - **Preparation of the public for technological change**
- Call 2009 with **11 M€** funding - 2 projects selected for funding
- Call 2010 with **8 M€** funding – evaluation of 5 projects still ongoing

# Thematic focus areas of the Austrian Transport Technology Policy



# National Implementation Plan for Electric Mobility



The implementation of electric mobility supported by the bmvit gives opportunities for:

- Clean road traffic
- Supplied by renewable energies
- Imbedded into an optimized, intermodal traffic system linked to the public transport
- Demonstration of Austrian R&D competence securing the competitiveness of Austrian industry and its broad product and engineering know-how



# National Implementation Plan for Electric Mobility



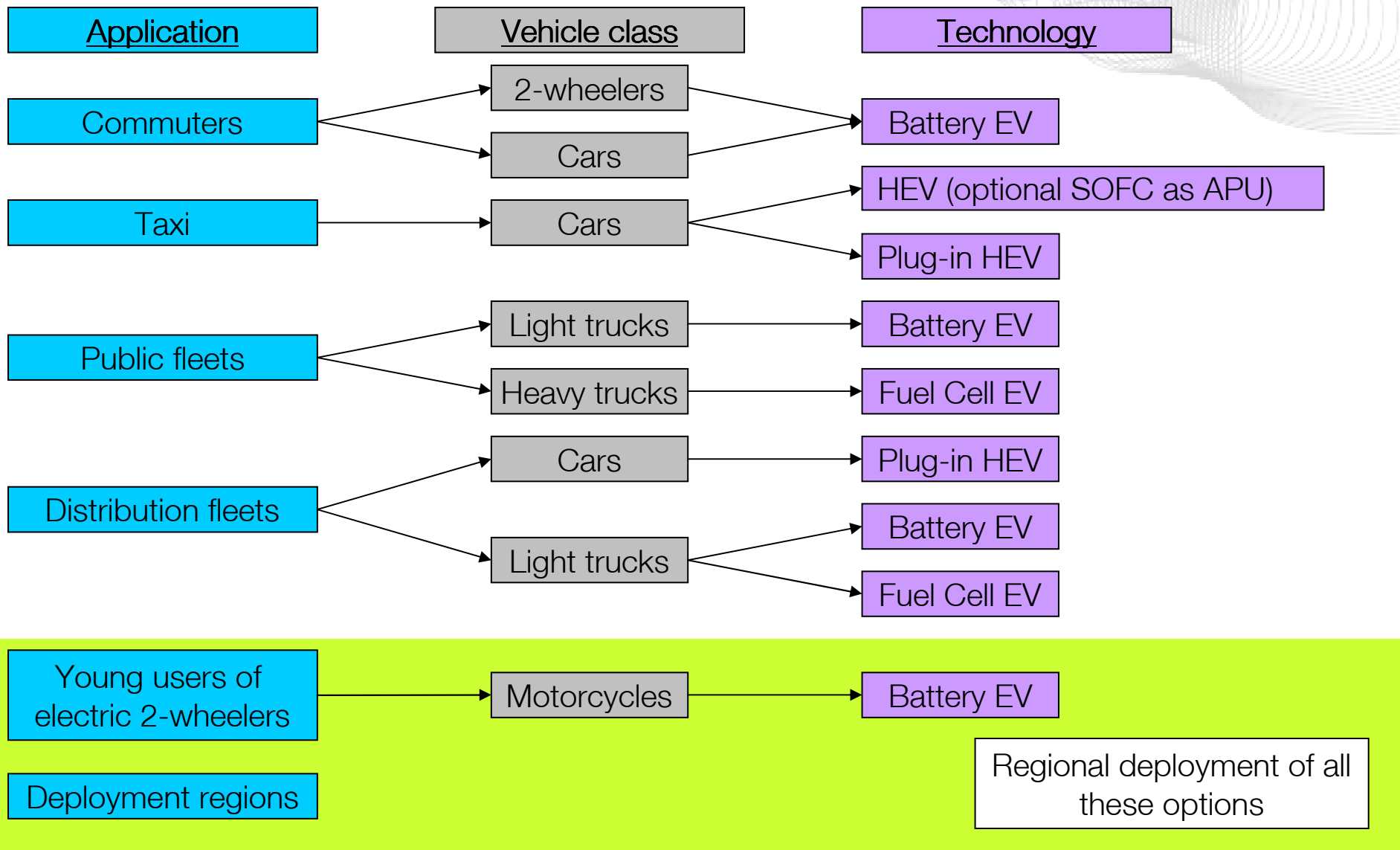
## Fields of action:

- transport policies and mobility management
- regulatory and legislative measures
- funding and preferences for users
- technology and research in politics and funding
- regions of implementation and model systems
- public procurement
- provision of infrastructure
- energy supply
- education and training
- international cooperation
- communication, marketing and awareness
- ministry internal measures

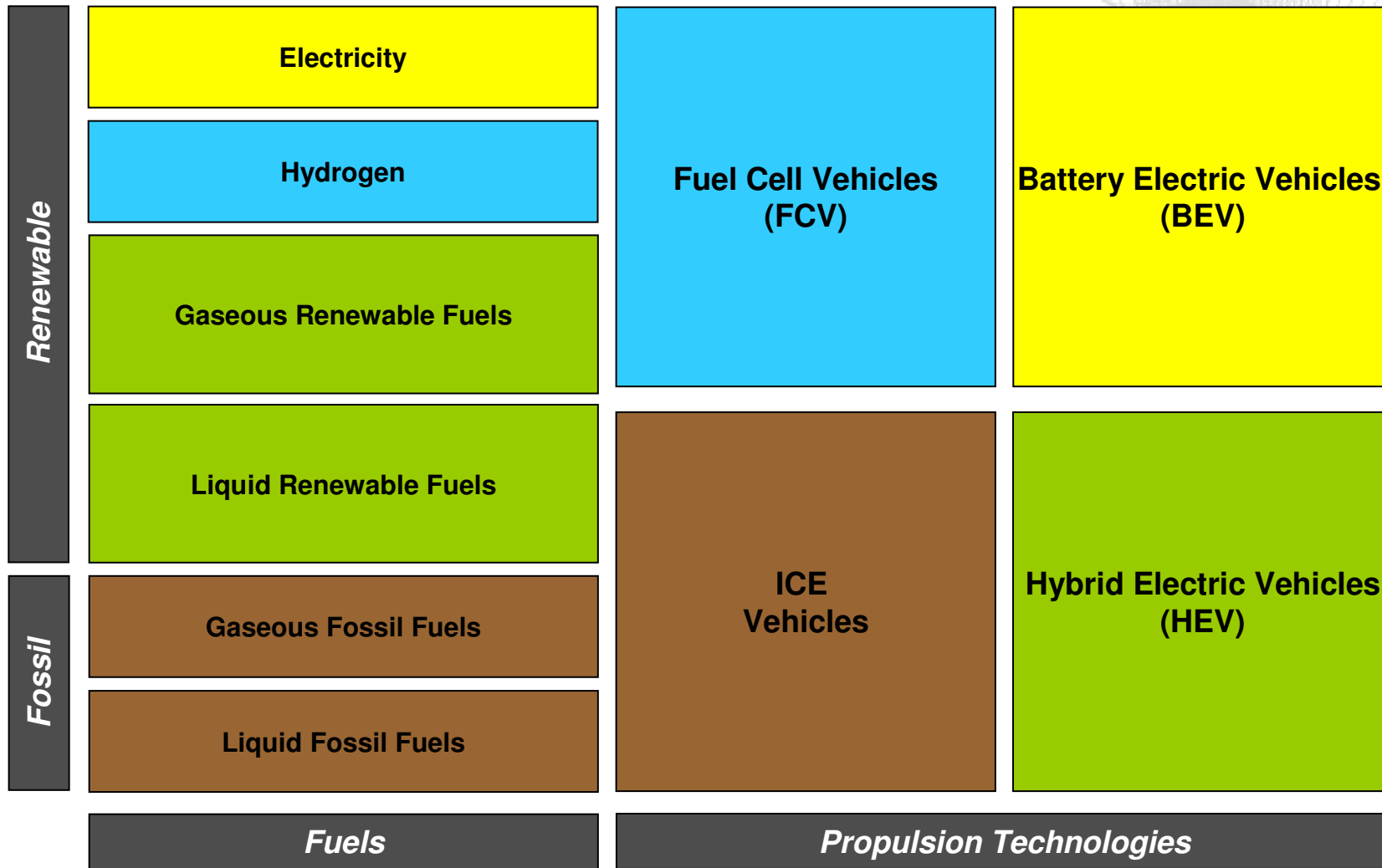
# Dimensions of electric mobility

<b>Application</b>	<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>
<b>Vehicle class</b>	<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>	
<b>Technology</b>	<i>full hybrid</i>	<i>plug in hybrid</i>			<i>battery electric vehicle</i>		<i>fuel cell vehicle</i>	
<b>Region</b>	<i>urban</i>	<i>Urban agglomeration</i>			<i>transport corridor</i>		<i>rural area traffic</i>	
<b>Intermodal links</b>	<i>pedestrians, bicycles</i>	<i>rail short distance</i>		<i>rail long distance</i>		<i>Buses</i>	<i>aviation, shipping</i>	
<b>Instruments &amp; fields of action</b>	<i>implementing regions</i>	<i>legislative measures</i>	<i>R&amp;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>	
<b>takeholders</b>	<i>ministries, provinces, communities</i>	<i>Companies</i>	<i>R&amp;D-institutions</i>	<i>automotive industry</i>	<i>energy suppliers</i>	<i>transport service providers</i>	<i>Infrastructure Companies</i>	
<b>Time horizon</b>	<i>short term</i>		<i>medium term</i>			<i>long term</i>		

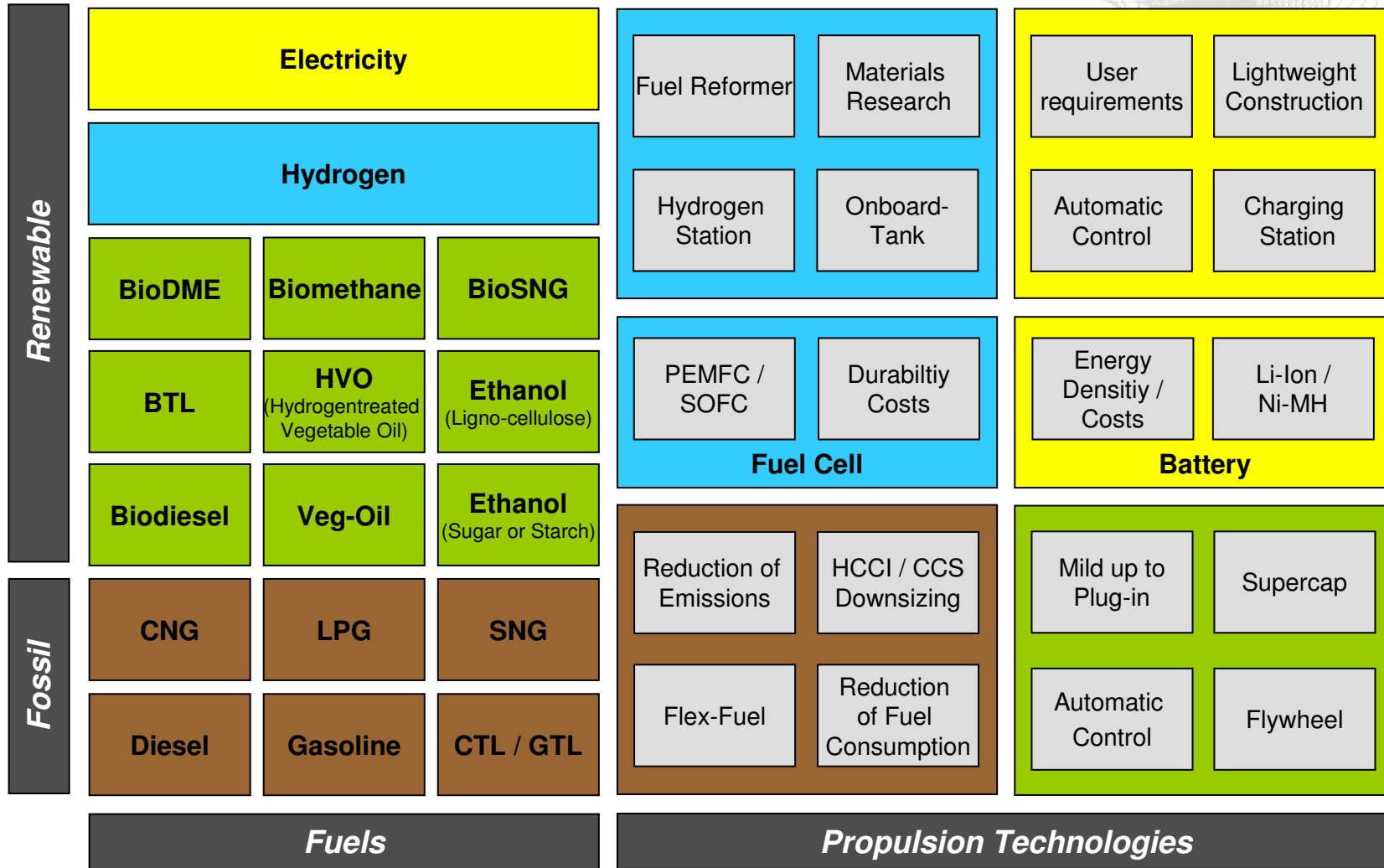
# National Implementation Plan for Electric Mobility – Priority application areas



# Development scheme for fuels and propulsion technologies



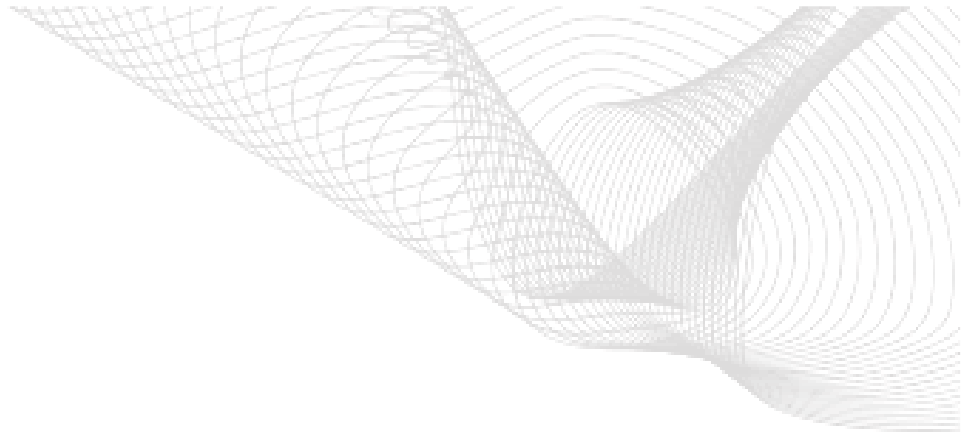
# Development scheme for fuels and propulsion technologies



# APSTAP (Alternative Propulsion Systems Technology Assessment Project)

- 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.

# APSTAP - Dimensions



- 6 main topics
  - Energy carriers
  - Energy storage systems
  - Energy converters
  - Propulsion systems
  - Exhaust after treatment
  - Additional information
- Content
  - 367 articles
  - 86 sub topics
  - 186 glossar entries

# APSTAP - Vehicle Configuration



- Modules
  - Engine: 3 different gasoline and diesel engines; gas/Otto engine; electric motor with battery or fuel cell
  - Fuel: gasoline, E85, diesel, biodiesel (RME & AME), electric power (3 sources), hydrogen (3 sources), methane, biomethane, LPG
  - Exhaust gas treatment (Euro Class 3/4/5)
  - Hybridization (Full hybrid) - Yes/No
- 120 different vehicle configurations
- 2280 data sets (1800 quantitative and 480 qualitative)



# APSTAP - Vehicle Configuration

An abstract graphic in the top right corner consisting of a grid of lines that form a 3D, wavy, mesh-like structure, possibly representing a vehicle component or a data visualization.

- Results
  - Quantitative results (bar chart):
    - ▶ Energy expense (in kWh/km)
    - ▶ Emissions: CO<sub>2</sub>, GHG, NO<sub>x</sub>, PM; (each “tank to wheel” and “well to tank” in g/km)
  - Qualitative results (grades from 1 to 5):
    - ▶ Purchase costs, operational costs, availability, infrastructure
- Data based on GEMIS and HBEFA
  - “Ökobilanzmodell” for “well to tank” emissions
  - Database of emission factors for direct emissions

# International Cooperation and Networking

- EU-JTI “Fuel Cells and Hydrogen” (Scientific Committee)
- EU-Technology Platform BIOFUELS (Chairman of Mirror Group of National Delegates)
- EU-Technology Platform ERTRAC: Plenary, Steering Group, Financing & Governance Group
- EU-R&D-Framework Program 7: Program Committee
- ERA-NET TRANSPORT (Work Package Leader)
- IEA-Implementing Agreement “Hybrid & Electric Vehicles”
- IEA-Implementing Agreement “Advanced Motor Fuels”
- IEA-Implementing Agreement „Advanced Fuel Cells“

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