

# The Austrian view of international research on sustainable transport

Dr. Andreas Dorda  
Austrian Federal Ministry  
for Transport, Innovation and Technology

Alter-Motive  
Midterm Conference  
April 20th 2010

## 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% in 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**)



# Supporting instruments of the Austrian Federal Ministry for Transport, Innovation and Technology

**Total funding increased from 40M€ in 2008 to 60M€ in 2009 and 2010!**

- A3 and A3plus Technology programme: funding cooperative R&D projects developing alternative propulsion systems and fuels
- Programme Energy 2020: ICE-optimisation, light weight structures, electronics
- Lighthouse Projects: demonstration for market introduction
- FFG basic programme: bottom-up product optimisation
- Headquarter programme
- 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)

## **A3 programme 1/2 (Austrian Advanced Automotive Technology programme)**

- Funding programme launched by the Federal Ministry for Transport, Innovation and Technology (BMVIT) in 2001
- Concentrates on highly innovative research projects and covers the entire innovation cycle
- Funding from basic research to demonstration projects
- Research topics are:
  - Alternative propulsion systems development
  - Vehicle electronics
  - Material research
  - Production technologies

## A3 programme 2/2

- 4 calls for proposals (2002-2006)
  - 152 Proposals
  - 78 projects approved (international evaluation)
  - Total project volume 39.6 Mio. €
  - Promotion of 20.4 Mio. €
  
- 2 calls for Lighthouse Projects (2005 and 2006)
  - 25 Proposals
  - 8 projects approved (international evaluation)
  - Total project volume 7.4 Mio. €
  - Promotion of 3.4 Mio. €

## A3plus programme 1/2

# Goal:

## Achieve real technological breakthroughs in the fields of

- Alternative drive systems and their components
- Alternative fuels
- Innovative storage concepts
- Development and promotion of necessary supplying infrastructures for refueling and the use of alternative drive systems
- Concepts for embedding alternative drives in the total vehicle design

## A3plus programme 2/2

- Funding development of alternative propulsion systems for all land transport modes
- Funding R&D and lighthouse projects
- 3 calls in 2007 and 2008:
  - 57 proposals received
  - 49 funded projects (including 3 lighthouse projects)
  - Funding volume: 14 M€
- Call 2009:
  - 32 proposals received
  - 15 funded projects
  - Funding volume: 5 M€

## A3plus Projects 2009 1/2

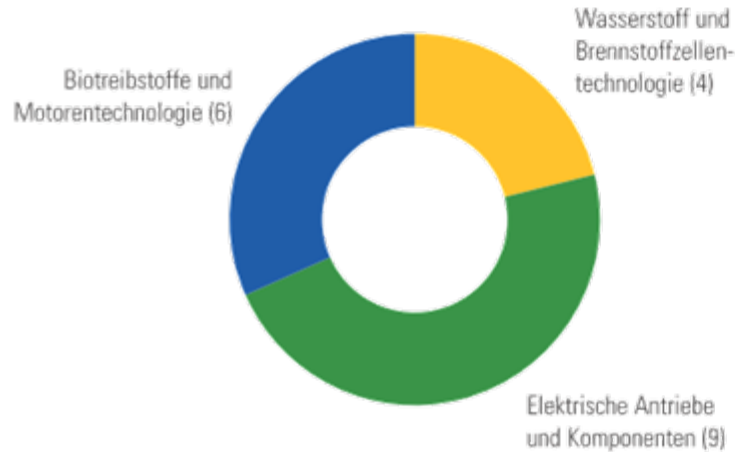
- OptiWWAl: Optimierung des Wärmehaushalts von Wasserstoff-Feststoffspeichersystemen aus Aluminium (ARC Leichtmetallkompetenzzentrum Ranshofen)
- Algenwasserstoff: Herstellung von biogenem Wasserstoff durch Algenkultivierung (Bio Diesel International AG)
- Safe H2 Storage II: Sicheres, druckloses, flüssiges Speichersystem für Wasserstoff bei Raumtemperatur (OMV Refining & Marketing GmbH)
- BioEnergie – Dezentrale Erzeugung von Strom / Wärme / Wasserstoff aus Biogas (HyCentA Research GmbH)
- SOFC APU System Entwicklung (AVL List GmbH)
- MEMBAT: Modellierung, Emulation und Management hochkomplexer Traktionsbatterien (AVL List GmbH)
- LiHSA: Li-Battery Housing for Safety Application (AIT-Austrian Institute of Technology)



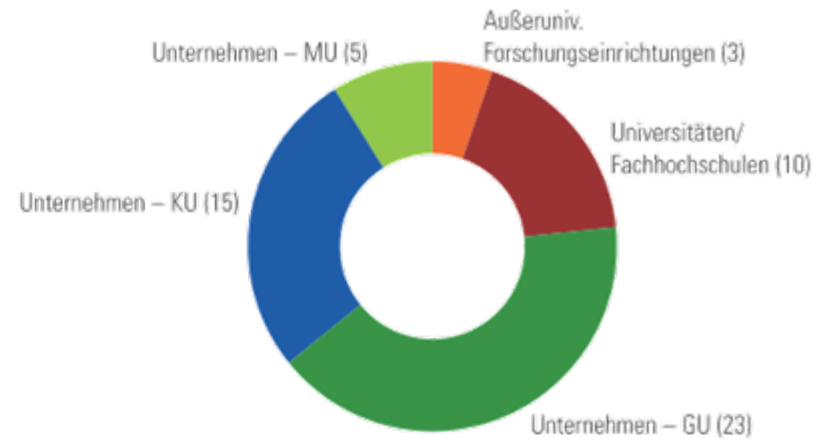
## A3plus Projects 2009 2/2

- Zink-Luft-Akku: Neue Materialien für die aufladbare Zink-Luft Batterie (TU Graz – Institut für Thermische Verfahrenstechnik und Umwelttechnik)
- Ballade: Benutzerfreundliche, allgegenwertige Ladestationen für den Elektrofahrzeug-verkehr (Paybox Austria)
- Heliostar: Hocheffizientes, leichtes, integrierbares On-board Solarsystem zur Treibstoff- und Abgas Reduktion bei Lastfahrzeugen (Sunplugged – Solare Energiesysteme GmbH)
- E3ON: Effiziente elektrische Energiespeicher für den Nahverkehr (TU Graz – Institut für elektrische Messtechnik und Messsignalverarbeitung)
- Oxidiesel: Oxigenate als neue Biokomponenten im Dieselkraftstoff (TU Wien, IFA)
- Hybrid Rotary Engine components in Aluminium alloys (ARC Leichtmetallkompetenzzentrum Ranshofen)

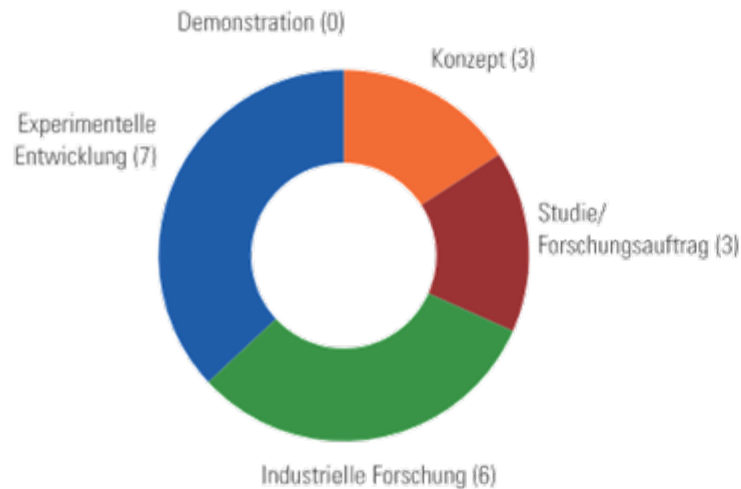
## PROJEKTE NACH THEMENBEREICH



## PROJEKTPARTNER NACH ORGANISATIONSTYP



## PROJEKTARTEN



## The HyLOG Project - Hydrogen Power Logistic System 1/5

Demonstration and investigation of the total system for an emission-free industrial transport logistic solution.

Specific goals:

- Developing a 2,5 kW range extender propulsion system with a 26 litre, 350 bar compressed hydrogen tank system and its certifiable integration into a series-production logistics traction vehicle
- Construction and demonstration of operation of an autonomous filling infrastructure with local production of H<sub>2</sub> from solar power
- Developing and estimating market potential of the overall system

# The HyLOG Project 2/5



Source: Fronius International

# The HyLOG Project 3/5

## Solar H2 Filling Station Sattledt



Source: Fronius International

## The HyLOG Project – Results 4/5

- Since May 2009: 5 days/week 2-shift operation
- 4-5 shift / cartridge exchange
  
- Key advantages:
  - Fast refueling increases system flexibility and availability
  - Increased productivity through constant power, reduced maintenance
  - No emissions
  
- Improvement potentials / Critical aspects
  - Minimum vehicle size for economic operation required
  - Competitive price for hydrogen as an energy carrier
  - Replacement of cartridge by indoor / onboard refuelling
  - System cost reduction through volume manufacturing
  - Limited freeze start capability

# The HyLOG Project 5/5

- Project Management
  - Fronius International
  - Contact: DI Dr. Ewald Wahlmüller
  
- Project Partners
  - HyCentA Research Graz
  - Bitter Group Steyr
  - Biovest Consulting Vienna
  - Clusterland Oberösterreich



BIOVEST CONSULTING

---



**CLUSTERLAND**  
OBERÖSTERREICH GmbH

## Neue Energien 2020

- Third call of this programme took place in 2009 with a budget of 40 M€
- Relevant for the transport sector are the following areas:
  - Energy-efficient vehicle components and systems
  - Advanced storage technologies
  - Energy systems, nets and users (electromobility)



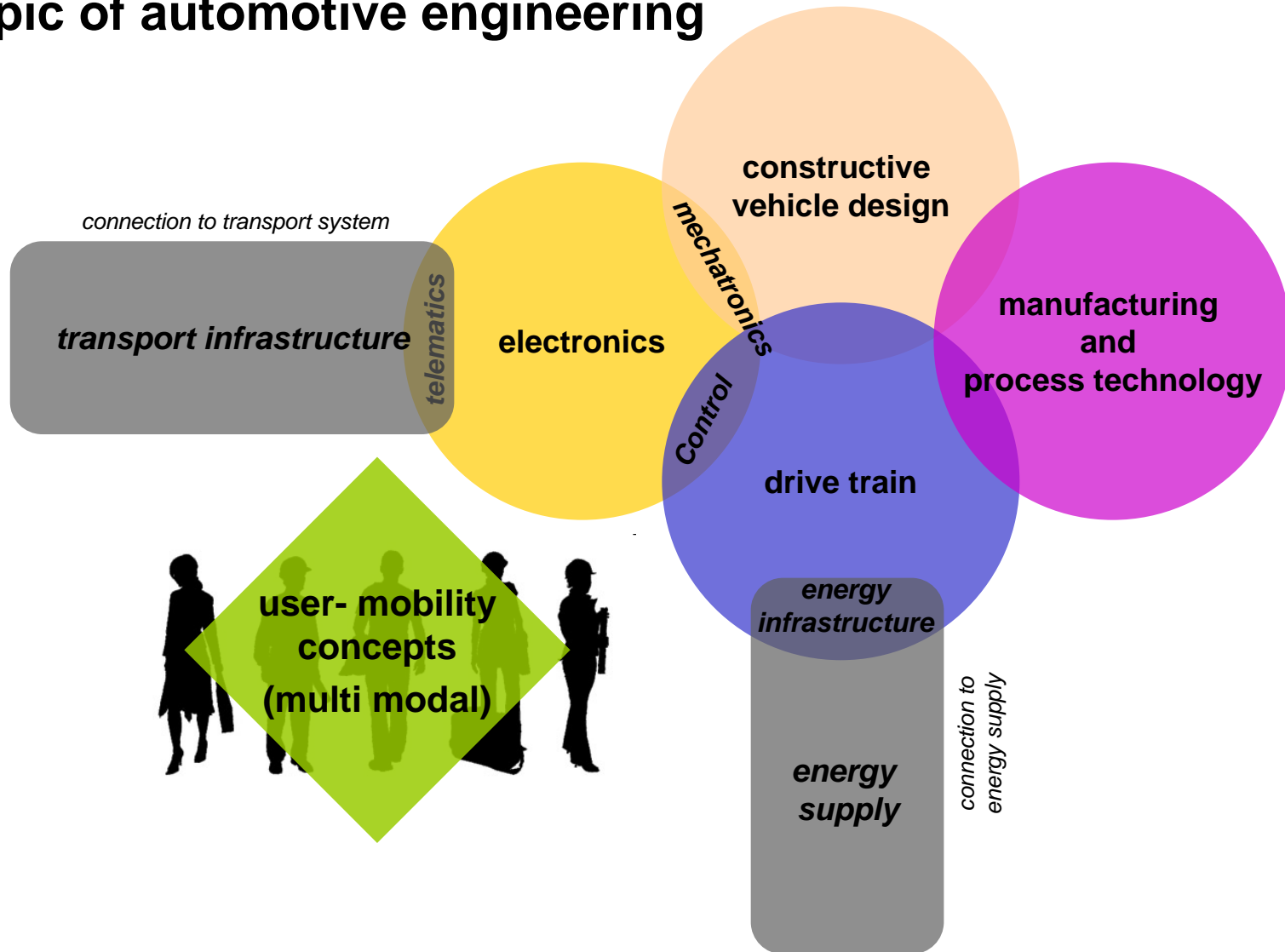
## Lighthouse Projects - Demonstration and Pilot Projects

- Funding instrument of the BMVIT to support the market introduction of new technologies through demonstration.
- Goals:
  - Optimisation 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 funding of 11 M€ in evaluation

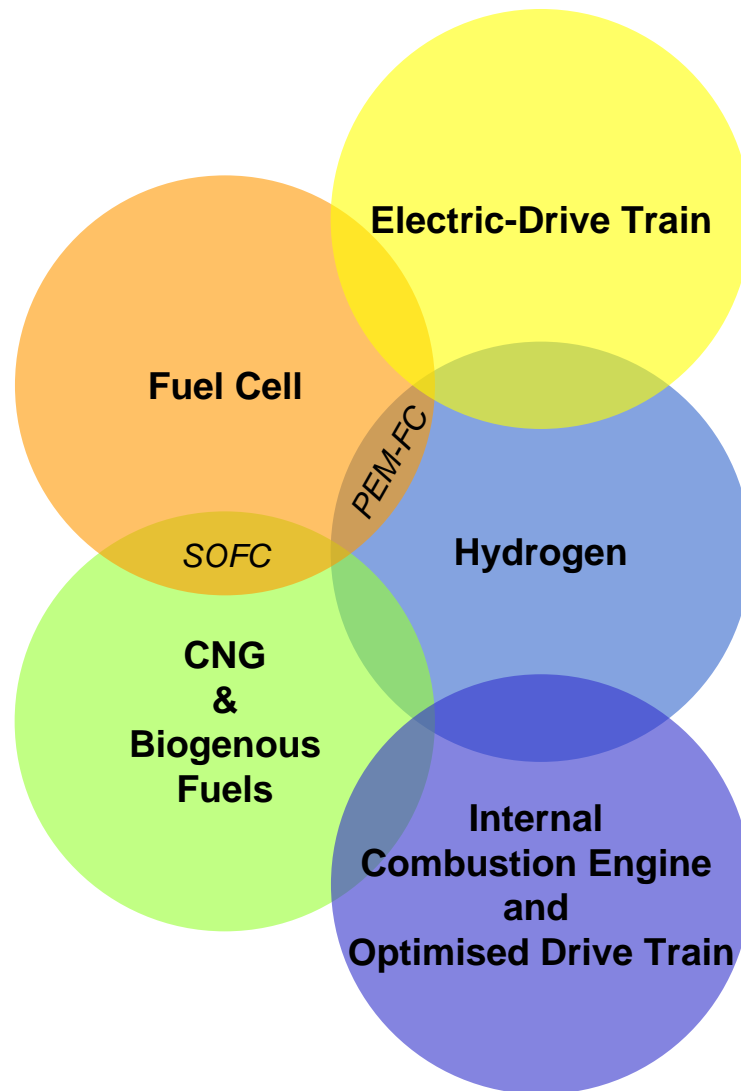
## Electromobility Model Regions

- Funding programme of the Climate and Energy Fund launched in 2008 with an annual budget of 3.5 M€ (Call 2010) for the demonstration of technologies in the area of electric drive systems.
- The programme covers the demonstration and implementation of large-scale proposals including the required infrastructure facilities and involving developers, producers, downstream operators and users.
- Overview of running projects:
  - VLOTTE (Voralberg) – first call 2008, start-up in 2009
  - Electrodrive (Salzburg) – second call 2009

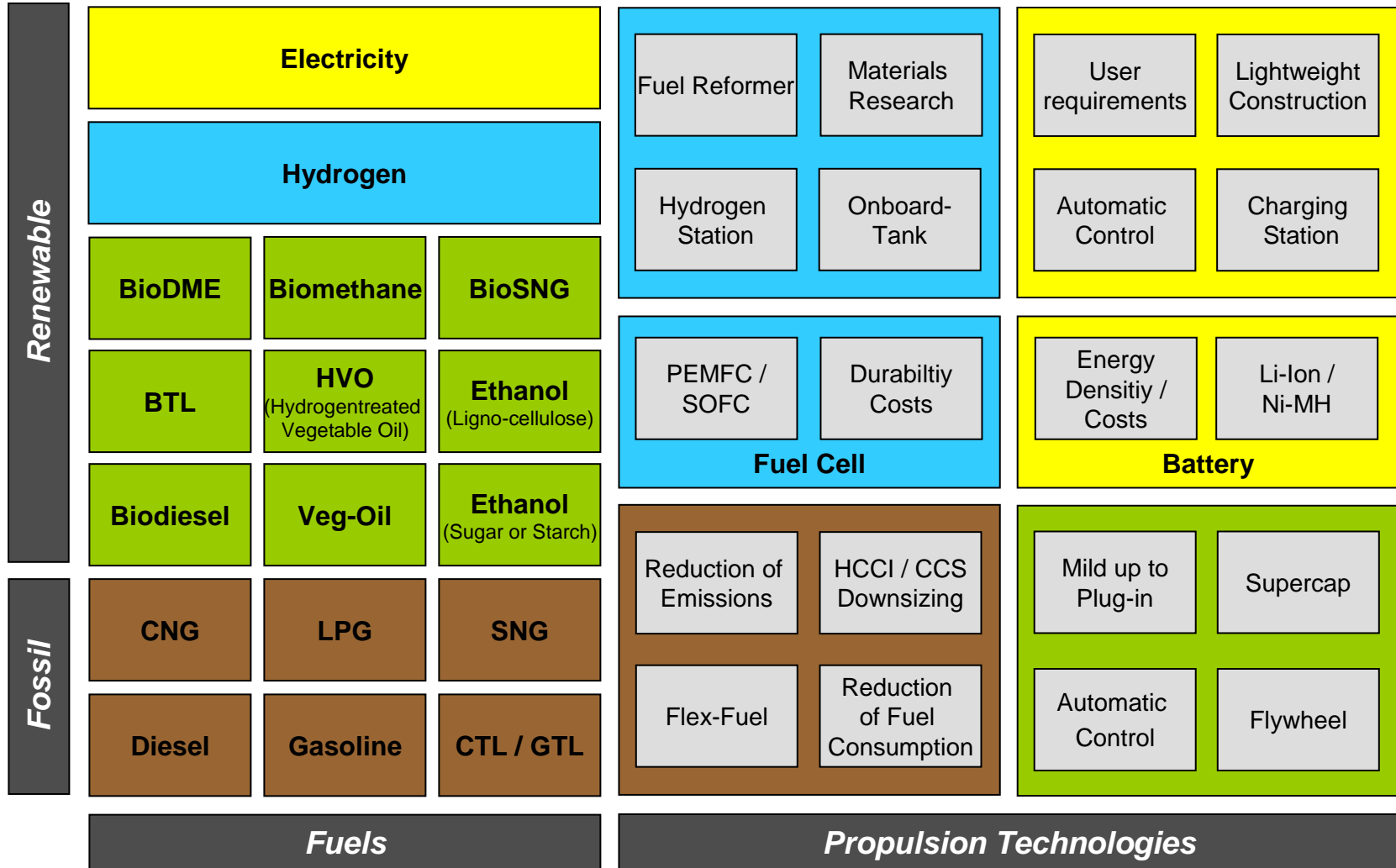
# Topic of automotive engineering



# For electromobility relevant topics of the drivetrain



# Roadmap for alternative propulsion systems and fuels

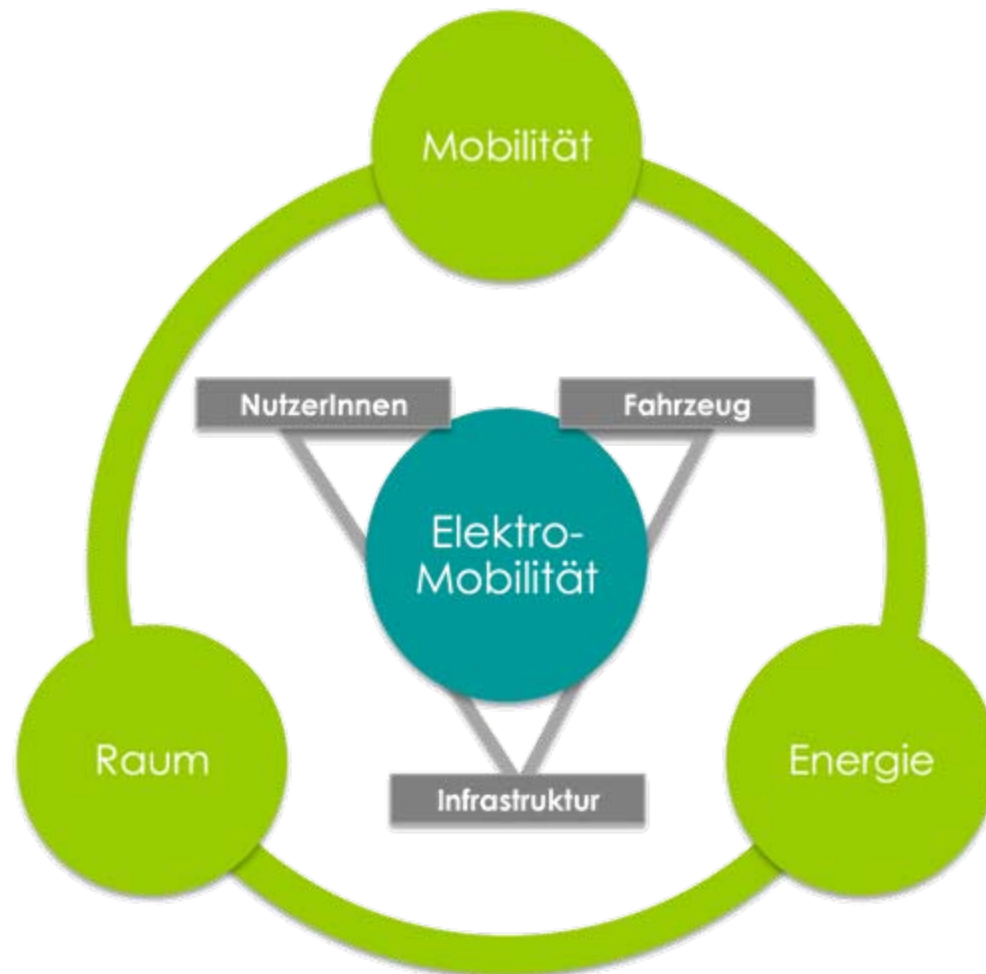


# National Implementation Plan for Electric Mobility

The Implementation of electric mobility supported by the BMVIT gives opportunities for:

- Clean road traffic
- Supplied by renewable energies
- Imbedded into an optimised, intermodal traffic system linked to the public transport
- Demonstration of Austrian expertise, job preservation and competitiveness of Austrian industry

# Model of electric mobility in Austria



## Multiple responsibility for electric mobility in BMVIT

The National Implementation Plan for Electric Mobility is managed by the BMVIT because of its responsibility and instruments for:

- Technology policy and research funding
- Infrastructure development, -financing and -construction,
- Transport policy and traffic planning
- Owner- and financing responsibilities for the big traffic service providers and infrastructure operators



## **Integrative Approach**

### **Individuality**

customised solutions for different fields of application and model regions shall be developed individually, solutions should not be sold as a cure-all

### **National, sustainable overall planning**

to avoid isolated applications and uncoordinated activities

## Field of Consideration and Targets

All technologies (BEV, FCV und HEV) and vehicle classes (single- and multi-lane, car and truck applications)

- to make a contribution for sustainable mobility in the context of the targets of transport policy and an overall strategy
- to make a first step out of combustion of fossil fuels
- to strengthen the Austrian industry by technological upgrading and innovation
- the focus is on electric mobility as potential for short-distance traffic and as a feeder to public transport

## Electric mobility's dimensions: identified spheres of action

- transport policies and mobility management
- regulatory and legislative measures
- fundings 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

## Strategy, instruments and priority users and applications for the National implementation Plan for E-Mobility

- Comprehensive document on the basis of all the skills and instruments of BMVIT
- Created in cooperation with all departments since September 2009
- Presented by Minister Bures, March, 15th 2010
- <http://www.bmvit.gv.at/e-mobilitaet>

responsible group leader:

- technology: Dr. Andreas Dorda Tel.: 711 62-65 3109
- Legal framework conditions: Mag. Ingrid Holzerbauer-Högler Tel.: 711 62-65 1802
- Infrastructure and transport planning: DI Franz Schwammenhöfer  
Tel.: 711 62-65 1700

# Dimensions of electric mobility

application	commuters	taxis	urban public transport user	recreational traffic	public fleets	company fleets	city logistics	long distance freight
vehicle class	pedelecs	e-scooters	e-motorbikes	cars	light trucks	buses	heavy duty vehicles	
technology	full hybrid		plug in hybrid		battery electric vehicle		fuel cell vehicle	
region	urban		urban agglomeration		transport corridor		rural area traffic	
intermodal links	pedestrians, bicycles		rail short distance		rail long distance	Buses	aviation, shipping	
instruments & fields of action	implementing regions	legislative measures	R&D-funding	infrastructure	ministry internal	synergies with public transport		
	public procurement	transport policy	intermodal links	public relations	international cooperation			
	education and training	financial assistance and compensation measures	business models	energy supply	mobility management			
stakeholders	ministries, provinces, communities	companies	R&D-institutions	automotive industry	energy suppliers	transport service providers	infrastructure companies	
timing	short term		medium term		long term			

# Dimensions of electric mobility

application	<u>commuters</u>	taxis	urban public transport user	recreational traffic	public fleets	company fleets	city logistics	long distance freight
vehicle class	<u>pedelecs</u>	<u>e-scooters</u>	<u>e-motorbikes</u>	<u>cars</u>	light trucks	buses	heavy duty vehicles	
technology	full hybrid		<u>plug in hybrid</u>		<u>battery electric vehicle</u>		fuel cell vehicle	
region	urban		<u>urban agglomeration</u>		transport corridor		rural area traffic	
intermodal links	pedestrians, bicycles		<u>rail short distance</u>		rail long distance	<u>Buses</u>	aviation, shipping	
instruments & fields of action	<u>implementing regions</u>	legislative measures		<u>R&amp;D-funding</u>	<u>infrastructure</u>	<u>ministry internal</u>	<u>synergies with public transport</u>	
	public procurement		<u>transport policy</u>		<u>intermodal links</u>	<u>public relations</u>	international cooperation	
	education and training		<u>financial assistance and compensation measures</u>		<u>business models</u>	<u>energy supply</u>	<u>mobility management</u>	
stakeholders	<u>ministries, provinces, communities</u>	<u>companies</u>		<u>R&amp;D-institutions</u>	<u>automotive industry</u>	<u>energy suppliers</u>	<u>transport service providers</u>	<u>infrastructure companies</u>
timing		<u>short term</u>			<u>medium term</u>		long term	

# Dimensions of electric mobility

application	commuters	<u>taxis</u>	urban public transport user	recreational traffic	public fleets	company fleets	city logistics	long distance freight
vehicle class	pedelecs	e-scooters	e-motorbikes	<u>cars</u>	light trucks	buses	heavy duty vehicles	
technology	<u>full hybrid</u>	<u>plug in hybrid</u>			battery electric vehicle		fuel cell vehicle	
region	<u>urban</u>		<u>urban agglomeration</u>		transport corridor		rural area traffic	
intermodal links	pedestrians, bicycles		rail short distance	<u>rail long distance</u>		Buses	<u>aviation, shipping</u>	
instruments & fields of action	<u>implementing regions</u>	<u>legislative measures</u>	R&D-funding	infrastructure	ministry internal	synergies with public transport		
	public procurement	transport policy	intermodal links	public relations	international cooperation			
	education and training	<u>financial assistance and compensation measures</u>	<u>business models</u>	energy supply	mobility management			
stakeholders	<u>ministries, provinces, communities</u>	<u>companies</u>	R&D-institutions	automotive industry	energy suppliers	<u>transport service providers</u>	infrastructure companies	
timing	<u>short term</u>			medium term			long term	

# Dimensions of electric mobility

application	commuters	taxis	<u>urban public transport user</u>	recreational traffic	public fleets	company fleets	city logistics	long distance freight
vehicle class	<u>pedelecs</u>	e-scooters	e-motorbikes	cars	light trucks	<u>buses</u>	heavy duty vehicles	
technology	<u>full hybrid</u>		plug in hybrid		<u>battery electric vehicle</u>		<u>fuel cell vehicle</u>	
region	<u>urban</u>		urban agglomeration		transport corridor		rural area traffic	
intermodal links	<u>pedestrians, bicycles</u>		<u>rail short distance</u>		<u>rail long distance</u>	<u>Buses</u>	<u>aviation, shipping</u>	
instruments & fields of action	<u>implementing regions</u>	legislative measures		<u>R&amp;D-funding</u>	<u>infrastructure</u>	<u>ministry internal</u>	<u>synergies with public transport</u>	
	public procurement		<u>transport policy</u>		<u>intermodal links</u>	<u>public relations</u>	international cooperation	
	<u>education and training</u>		financial assistance and compensation measures		<u>business models</u>	<u>energy supply</u>	<u>mobility management</u>	
stakeholders	<u>ministries, provinces, communities</u>	companies		<u>R&amp;D-institutions</u>	<u>automotive industry</u>	<u>energy suppliers</u>	<u>transport service providers</u>	<u>infrastructure companies</u>
timing		<u>short term</u>			<u>medium term</u>		<u>long term</u>	



# Dimensions of electric mobility

application	commuters	taxis	urban public transport user	<u>recreational traffic</u>	public fleets	company fleets	city logistics	long distance freight
vehicle class	<u>pedelecs</u>	<u>e-scooters</u>	<u>e-motorbikes</u>	<u>cars</u>	light trucks	<u>buses</u>	heavy duty vehicles	
technology	full hybrid		<u>plug in hybrid</u>		<u>battery electric vehicle</u>		<u>fuel cell vehicle</u>	
region	urban		<u>urban agglomeration</u>		transport corridor		<u>rural area traffic</u>	
intermodal links	<u>pedestrians, bicycles</u>		<u>rail short distance</u>		<u>rail long distance</u>	<u>Buses</u>		<u>aviation, shipping</u>
instruments & fields of action	<u>implementing regions</u>	legislative measures		<u>R&amp;D-funding</u>	infrastructure	ministry internal		<u>synergies with public transport</u>
	public procurement	transport policy		<u>intermodal links</u>		<u>public relations</u>		international cooperation
	education and training		<u>financial assistance and compensation measures</u>		<u>business models</u>	energy supply		<u>mobility management</u>
stakeholders	<u>ministries, provinces, communities</u>	companies		<u>R&amp;D-institutions</u>	<u>automotive industry</u>	energy suppliers	transport service providers	infrastructure companies
timing		<u>short term</u>			<u>medium term</u>			<u>long term</u>

# Dimensions of electric mobility

application	commuters	taxis	urban public transport user	recreational traffic	<u>public fleets</u>	company fleets	city logistics	long distance freight
vehicle class	<u>pedelecs</u>	<u>e-scooters</u>	<u>e-motorbikes</u>	<u>cars</u>	<u>light trucks</u>	<u>buses</u>	<u>heavy duty vehicles</u>	
technology	full hybrid		<u>plug in hybrid</u>		<u>battery electric vehicle</u>		<u>fuel cell vehicle</u>	
region	<u>urban</u>		<u>urban agglomeration</u>		transport corridor		rural area traffic	
intermodal links	pedestrians, bicycles		rail short distance		rail long distance	Buses		aviation, shipping
instruments & fields of action	<u>implementing regions</u>	legislative measures		<u>R&amp;D-funding</u>	<u>infrastructure</u>	ministry internal		synergies with public transport
	<u>public procurement</u>	transport policy		intermodal links		public relations		international cooperation
	<u>education and training</u>	<u>financial assistance and compensation measures</u>		<u>business models</u>		energy supply		<u>mobility management</u>
stakeholders	<u>ministries, provinces, communities</u>	companies		<u>R&amp;D-institutions</u>	<u>automotive industry</u>	<u>energy suppliers</u>	transport service providers	<u>infrastructure companies</u>
timing	<u>short term</u>				<u>medium term</u>			<u>long term</u>

# Dimensions of electric mobility

application	commuters	taxis	urban public transport user	recreational traffic	public fleets	<u>company fleets</u>	city logistics	long distance freight
vehicle class	pedelecs	e-scooters	e-motorbikes	<u>cars</u>	<u>light trucks</u>	buses	heavy duty vehicles	
technology	<u>full hybrid</u>		<u>plug in hybrid</u>		<u>battery electric vehicle</u>		<u>fuel cell vehicle</u>	
region	<u>urban</u>		<u>urban agglomeration</u>		<u>transport corridor</u>		<u>rural area traffic</u>	
intermodal links	pedestrians, bicycles		rail short distance		<u>rail long distance</u>	Buses	aviation, shipping	
instruments & fields of action	<u>implementing regions</u>	legislative measures		<u>R&amp;D-funding</u>	<u>infrastructure</u>	<u>ministry internal</u>	synergies with public transport	
	public procurement	<u>transport policy</u>		intermodal links		<u>public relations</u>	international cooperation	
	<u>education and training</u>	<u>financial assistance and compensation measures</u>		<u>business models</u>		energy supply	<u>mobility management</u>	
stakeholders	<u>ministries, provinces, communities</u>	<u>companies</u>	<u>R&amp;D-institutions</u>	<u>automotive industry</u>	energy suppliers	transport service providers	infrastructure companies	
timing	<u>short term</u>			<u>medium term</u>			<u>long term</u>	

# Dimensions of electric mobility

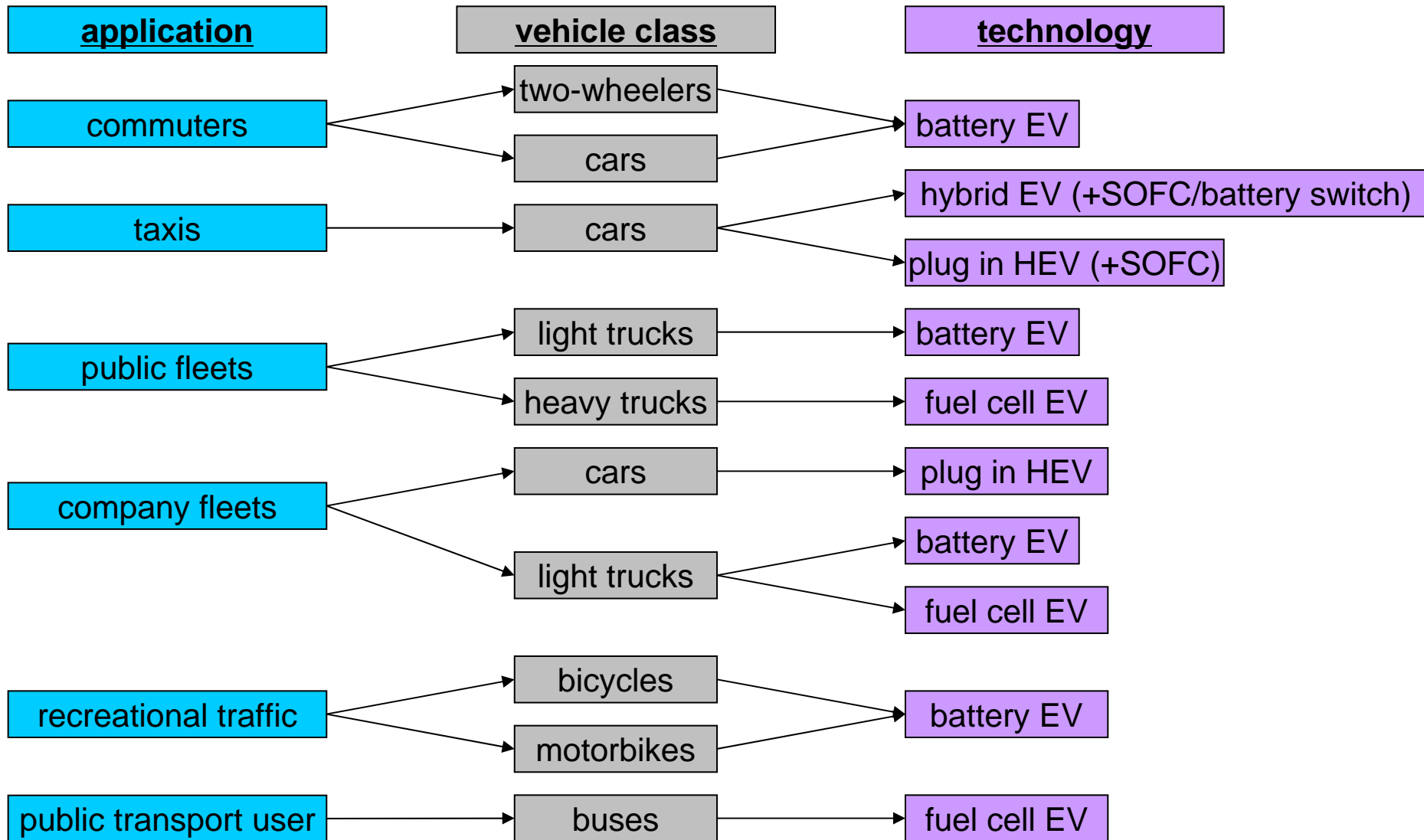
application	commuters	taxis	urban public transport user	recreational traffic	public fleets	company fleets	<u>city logistics</u>	long distance freight
vehicle class	pedelecs	e-scooters	e-motorbikes	cars	<u>light trucks</u>	buses	heavy duty vehicles	
technology	full hybrid	<u>plug in hybrid</u>			<u>battery electric vehicle</u>		fuel cell vehicle	
region	<u>urban</u>		urban agglomeration		transport corridor		rural area traffic	
intermodal links	pedestrians, bicycles		rail short distance		<u>rail long distance</u>	Buses	<u>aviation, shipping</u>	
instruments & fields of action	<u>implementation regions</u>	<u>legislative measures</u>	<u>R&amp;D-funding</u>	<u>infrastructure</u>	ministry internal	synergies with public transport		
	public procurement	<u>transport policy</u>	intermodal links	public relations	international cooperation			
	education and training	<u>financial assistance and compensation measures</u>	<u>business models</u>	energy supply	mobility management			
stakeholders	<u>ministries, provinces, communities</u>	<u>companies</u>	<u>R&amp;D-institutions</u>	<u>automotive industry</u>	energy suppliers	<u>transport service providers</u>	infrastructure companies	
timing	<u>short term</u>			<u>medium term</u>			long term	

# Dimensions of electric mobility

long distance freight

application	commuters	taxis	urban public transport user	recreational traffic	public fleets	company fleets	city logistics	<u>long distance freight</u>
vehicle class	pedelecs	e-scooters	e-motorbikes	cars	<u>light trucks</u>	buses	<u>heavy duty vehicles</u>	
technology	<u>full hybrid</u>	plug in hybrid		battery electric vehicle		<u>fuel cell vehicle</u>		
region	urban	urban agglomeration		<u>transport corridor</u>	rural area traffic			
intermodal links	pedestrians, bicycles	rail short distance		rail long distance		Buses	<u>aviation, shipping</u>	
instruments & fields of action	<u>implementing regions</u>	<u>legislative measures</u>	<u>R&amp;D-funding</u>	<u>infrastructure</u>	ministry internal	synergies with public transport		
	public procurement	<u>transport policy</u>	<u>intermodal links</u>	public relations	<u>international cooperation</u>			
	<u>education and training</u>	<u>financial assistance and compensation measures</u>		<u>business models</u>	<u>energy supply</u>	mobility management		
stakeholders	<u>ministries, provinces, communities</u>	<u>companies</u>	<u>R&amp;D-institutions</u>	<u>automotive industry</u>	<u>energy suppliers</u>	<u>transport service providers</u>	<u>infrastructure companies</u>	
timing	<u>short term</u>		<u>medium term</u>			<u>long term</u>		

# Prioritised fields of activity



EV... electric vehicle  
 HEV... hybrid electric vehicle

## The six user's and application areas

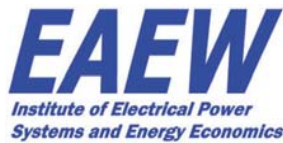
- commuters
- taxis
- public fleets
- company fleets
- implementing regions
- juvenile users of electric two-wheelers

## A3PS - Austrian Agency for Alternative Propulsion Systems 1/2

- Stimulating the cooperation of complimentary partners, building up interdisciplinary research co-operations and trans-sectoral demonstration projects.
- Providing, compiling and analysing information (technology foresight and assessment, studies, lectures, workshops, conferences, travel reports,...).
- Supporting the creation of innovation friendly framework conditions (Regulatory- and fiscal policy, fuel taxation, endowment of research programmes, 7. FP, codes and standards, emission limits, access to sensitive areas,...).
- International networking and marketing for Austrian R&D competence and the product and engineering Know How of A3PS members.



# A3PS - Austrian Agency for Alternative Propulsion Systems 2/2



## Contact

MR Dr. Andreas Dorda  
Federal Ministry for Transport, Innovation and Technology  
Deputy Head of Mobility Department  
Tel.: +43-1-711 62 65 31 09  
andreas.dorda@bmvit.gv.at  
www.bmvit.at

Dr. Andreas Dorda  
Managing Director Austrian Agency  
for Alternative Propulsion Systems (A3PS)  
Tel.: +43-1-205 0168 101  
andreas.dorda@a3ps.at  
www.a3ps.at