



# **Deriving Effective Least-Cost Policy Strategies for Alternative Automotive Concepts and Fuels**

**REPORT**  
**on the National Workshop**  
**GERMANY**

## **Authors**

**Felipe TORO, Felix REITZE**

## **Project Partner:**

**Institute for Resource Efficiency and Energy Strategies – IREES**



**Berlin, 17.01.2011**

## A. General information

Title of the workshop:

**CO<sub>2</sub> reduction potentials of Alternative Fuels and Passenger Car Technologies until 2020-2030**

***“The role of Transport, Energy and R&D Policies”***

Date of the workshop: **17.01.2011**

Location: *Berlin*

*Federal Ministry of Transport, Building and Urban Development*

Organisers:

**Institute for Resource Efficiency and Energy Strategies – IREES**

- **MBA-Dipl.-Ing. Felipe Andrés Toro**
- **Dr. Felix Reitze**
- 

Number of Participants: **30 (+ 3 own staff)**

*Comment from AA:*

- *Strive for 50 to 60, but at least 40 participants at each of the workshops*
- *They have to know that we need their feedback*
- *WS-participants should receive WS invitation, short project description (from the brochure, translated into the workshop language) and a questionnaire for stakeholders and they should receive it along with invitation*

Number of invitations sent: **210** *(preferably: by stakeholder category. This will be for our internal information to assess the degree of the interest among the particular groups)*

<b>Contacted companies/person: to get E-Mail address</b>					
50 companies					
<b>Searched for suitable date (via phone)</b>	<b>Remark:</b>				
40 companies					
<b>Contacted companies/person: announcement</b>	<b>reply</b>	<b>Left the company</b>	<b>Searched for a substitute</b>	<b>No interest</b>	<b>No interest, but contact my colleague</b>
128 person	30 person	10	10	8	5
<b>Contacted companies/person: invitation</b>	<b>reply</b>	<b>Fixed participation until Nov. 25</b>			
173 person	40 person	25			
<b>Contacted companies/person: agenda</b>	<b>reply</b>	<b>Fixed participation until Dec 20</b>			
60 person	30 person	30			
<b>Contacted companies/person: final agenda</b>	<b>reply</b>	<b>Fixed participation until Jan 10</b>			
60 person	30 person	30			

## B. List of participants

Nr	Titel	Name	Vorname	Company	Nr
1	Dr.	Ajanovic	Amela	Vienna University of Technology; Energy Economics Group	OS
2	Dipl.-Ing.	Baumann	Elmar	Verband der Deutschen Biokraftstoffindustrie e.V.	IA
3	Dr.	Berger	Stefan	Adam Opel GmbH	OEM
4	Dr.	Bonhoff	Klaus-Peter	NOW GmbH	RES
5	Dr.	Frisch	Klaus- Ruthard	Deutscher Verband Flüssiggas e.V.	IA
6	Herr	Fritsche	Uwe R.	Öko-Institut	RES
7	Dipl.-Ing	Grothues	Georg	EnergieRegion.NRW	EA
8	Prof. Dr.	Haas	Reinhardt	Vienna University of Technology; Energy Economics Group	RES
9	M.Sc.	Jain	Sulabh	IREES GmbH, Karlsruhe	OS
10	Dr.	Jochem	Patrick	Karlsruher Insitut für Technologie (KIT-IIP)	RES
11	Dr.	Koers	Martin	Verband der Automobilindustrie (VDA)	IA
12	Dr.-Ing.	Kraft	Axel	Fraunhofer UMSICHT	RES
13	Dipl. Phys.	Lambrecht	Udo	IFEU - Institut für Energie- und Umweltforschung Heidelberg GmbH	RES
14	Dr.	Lohrmann	Martin	VOLKSWAGEN AG	OEM
15	Herr	Oeliger	Dietmar	NABU	NGO
16	Frau	Parker	Nilgün	Bundesministerium für Verkehr, Bau und Stadtentwicklung (BMVBS)	POL
17	Dr.	Poganietz	Witold- Roger	Karlsruher Institut für Technologie (KIT)	RES
18	Dr.	Reitze	Felix	IREES GmbH, Karlsruhe	OS
19	Dr.	Rosenkranz	Christian	Johnson Controls / VB Autobatterie GmbH & Co., KGaA	OEM
20	Dr.	Rumpke	Christian	dena	RES
21	Dr.	Schade	Wolfgang	Fraunhofer ISI	RES
22	Dipl.-Ing. agr.	Seiffert	Michael	DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH	RES
23	Dr.	Thraen	Daniela	DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH	RES
24	MBA.Dipl- Ing.	Toro	Felipe	IREES GmbH, Karlsruhe	OS
25	M.Sc	van Bree	Bas	ECN Policy Studies	RES

Nr	Titel	Name	Vorname	Company	Nr
26	Herr	Weitz	Michael	CHOREN Industries GmbH	IND
27	Prof. Dr.	Wietschel	Martin	Fraunhofer ISI	RES
28	Dr.	Wind	Jörg	Daimler AG	IND
29	Dipl.-Ing.	Wurster	Reinhold	Ludwig-Bölkow-Systemtechnik GmbH	RES
30	Dr.	Zierock	Karl-Heinz	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit	POL
31	Dr	Zimmer	Wiebke	Öko-Institut	RES
32	Dr.	Ziolek	Andreas	EnergieRegion.NRW	EA
33	Herr	Dieter	Bockey	Union zur Förderung von Oel- und Proteinpflanzen e.V.	IA
34	Dipl.-Ing.	Schäfer-Sparenberg	Carolin	Wuppertal Institute for Climate Environment & Energy	RES
35	M.Sc.	Malte	Beckmann	Wuppertal Institute	RES
36	Herr	Deufel	Robert	Stadtwerke Augsburg	IND
37	Herr	Giesel	Rainer B.	Informationsdrehscheibe Erdgasfahrzeuge Berlin e.V..	IND
38	Frau	Hass	Andrea	IBBK Fachgruppe Biogas GmbH	IND
39	Dr./Dipl.-Ing.	Müller-Langer	Franziska	DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH	RES
40	Frau	Rewerts	Astrid	Bauernverband	IA

- 1) list your own staff first
- 2) Stakeholder category (type): e.g. OS=own staff, IA=Industry Association, IND=Industry, RES=Research, OEM=Original Equipment Manufacturer, EA=Energy Agency, NGO=Non-Government Organization

## C) Agenda for the National Workshop, Germany

Topic	Speakers	Time
<b>Welcome with Coffee</b>		<b>09:00 - 09:30</b>
Opening of the Workshop/ Presentation Alter-Motive Project	<b>Mr. TORO (IREES)</b>	09:30 - 09:45
View from the German Government on State of the Art on alternative fuels and alternative mobility technologies. Current strategy and future policy plans	<b>Mrs. PARKER (BMVBS)</b>	09:45 - 10:15
Current Demonstration and R&D activities in Passenger Cars Potentials for Emissions Reductions, Barriers  <b>Topics:</b> <b>Hybrid, Electric vehicles, Fuel Cells, Flex-Fuels,</b> <b>Increasing efficiency ICE</b>	<ol style="list-style-type: none"> <li>1. <b>Dr. BONHOFF (NOW)</b></li> <li>2. <b>Dr. SCHADE (Fraunhofer ISI)</b></li> <li>3. <b>Dr. BERGER – (OPEL)</b></li> <li>4. <b>Mr. LOHRMANN (Volkswagen AG)</b></li> <li>5. <b>Dr. KOERS (VDA)</b></li> <li>6. <b>Dr. ZIOLEK (EnergieRegion NRW)</b></li> </ol>	10:15-11:30
<b>Coffee Break</b>	<b>Conference Participants</b>	<b>11:30-11:45</b>
Current R&D activities in Alternative fuels, Potentials for Emissions Reductions, Successful case studies, Barriers for future development  <b>Topics:</b> <b>Hydrogen, Biofuels, Electricity</b>	<ol style="list-style-type: none"> <li>1. <b>Dr. KRAFT ( Fraunhofer UMSICHT)</b></li> <li>2. <b>Dr. POGANIETZ (KIT - ITAS)</b></li> <li>3. <b>Dr. THRÄN (DBFZ)</b></li> <li>4. <b>Dr. RUMPKE (dena)</b></li> <li>5. <b>Mr. BAUMANN (VDB)</b></li> </ol>	11:45 - 13:00
<b>Lunch</b>	<b>Conference participants</b>	<b>13:00-14:00</b>
Policies for the successful Introduction of AF and AAMT	<b>Mr. VAN BREE (ECN)</b>	14:00-14:15
Internet-based scenarios and <b>ALTER-MOTIVE Action plan</b>	<b>Dr. AJANOVIC (EEG)</b>	14:30-14:45
General Discussion on <b>Alter-Motive Action Plan</b> and presentation outcomes	<p>4 – 6 Discussion panel participants selected from both presentation groups:</p> <ul style="list-style-type: none"> <li>• Ms. PARKER (BMVBS)</li> <li>• Prof. Dr. WIETSCHEL (ISI)</li> <li>• Dr. BERGER (OPEL)</li> <li>• Dr. WIND (Daimler)</li> <li>• DR. THRÄN</li> <li>• Mr. BAUMANN</li> <li>• Dr. ZIOLEK (EnergieRegion NRW)</li> </ul> <p>Moderator: Prof. Dr. HAAS (EEG)</p>	14:45-16:25
Summary and Main conclusions	<b>Mr. TORO (IREES)</b>	16:30-16:45
<b>Farewell Coffee</b>	<b>Conference participants</b>	<b>16:45-17:00</b>

#### *D. General summary: (1-2 pages)*

The workshop started with the introduction of the ALTER-MOTIVE project highlighting the purpose, project structure and main results obtained until January 2011 covering aspects of WP2 with respect to the *review of historical information* especially with respect the indicators considered, the country reports and the inventory of existing policies and tax schemes for alternative fuels and alternative mobility technologies. Emphasis was given to the information and deliverables available at the website ([www.alter-motive.org](http://www.alter-motive.org)) . The presentation of the technology and fuel assessment focused on the state of the art developments and the WTT and TTW Databases as well as the biomass potentials supply potential review for Europe and for the review on the major technological improvement potentials options for existing Internal Combustion Engines. A short overview and an invitation to visit our case study collection highlighting the criteria applied to define successful case studies. The results with respect to *Policy effectiveness (WP5)*, *internet based scenarios and the Action Plan (WP6)* was presented in more detail in the afternoon sessions.

The participants included policy makers at national level, Original Equipment Manufacturers (OEM) including R&D Divisions, Applied Research Institutes in the area of Biomass and Biofuels, Transport Economics and Policy, Energy Economics and Policy, Alternative Fuel Technologies, The Biofuel and Car Manufacturers Associations as well as Energy Agencies from the Länder and at national level and umbrella organizations such as the National Organization for Hydrogen including the E-Mobility Model-Regions program.

From the view of the Federal Government, it was mentioned that the German Fuel Strategy was in the process of being updated (from 2009) and currently a pre-study is carried out and should be based on a wider spectrum of transport energy carriers and technologies. The strategy covers all Transport modi (passanger cars, aviation, etc) as well as fuels from existing fossil fues to biofuels, LPG/CNG, BTL, H2 and E-Mobility and it will cover issues such as uses competition of biomass, climate change (2°C objective), the relationship with the EU Targets (20-20-20), foreseen CO2 emissions reductions (2015:130 g CO2/km; 2020:95 g CO2/km), technical standards, local emissions levels as well as infrastructure development especially for (e-mobility, H2, CNG/LNG, etc). The objective is the diversification of the transport mix, however it poses a challenge due to the several amount of options and programs at National and EU Levels. The various areas and contents of the current strategy work was highlighted and also done in conjunction with the EU Fuel Strategy which is also being developed and will have a council communication in 2011. The overview from the German Government opened the discussion for both Alternative Automotive and Alternative Fuels Sessions.

The AAMT Session covered several aspects with respect to R&D and Demonstration Projects in Germany from various stakeholders perspective including the NOW, OEM R&D activities in H2, fuel cells, Technology and Innovation R&D Analysis, Local Energy Agency in NRW and R&D activities view from the Car Manuacturers association. The following main messages are highlighted:

1. Study for analysis: Portafolio Power Trains for EU. Total Cost of Ownership (TCO) for emerging AAMT to decrease strongly to 2015

2. The National Innovation Programme (H2/FC)=1,4 Billion (2007-2016),
3. E-Mobility Model Regions = 130 Mio. (70 Projects 2009-2001)
4. There are several options to reduce GHG Emissions in EU until 2020 and until 2050 including improvement options to existing ICEs (drive and transmission, injection technologies, engine control systems, light weight vehicles, etc.) as well as the use of Hybrids, CNG/LPG and BEV.
5. In the long term higher potentials are observed for BEV than for Fuel Cells. Car technologies could contribute to almost 45% reduction by 2020. Biofuels to 16% under discussion. The EU target of reducing -10% GHG reductions in Non-ETS sectors from 2005 to 2020 is easily feasible for car transport.

The AF Session covered several aspects with respect to R&D and Demonstration Projects in Germany from various stakeholders perspective including the NOW, OEM R&D activities in H2, fuel cells, Technology and Innovation R&D Analysis, Local Energy Agency in NRW and R&D activities view from the Car Manufacturers association. The following main messages are highlighted:

1. Different production approaches of biofuels are in R & D stage, but nobody can assure today the most convenient approach to reduce CO2 emissions.
2. The biomass potential in Europe is restricted. Therefore the various uses of biomass in competition should be considered.
3. Biofuels should play a determined role for passenger cars. However, in the middle and long run the uses will be extended to other types of transport uses (trucks, buses, LDV, airplanes)
4. Sustainability should be included in the criteria catalog of biofuels at all costs. For calculating the CO2 balance the complete production process must be considered.
5. Based on high investments of new plants the production technology will be inserted in production technologies of existing plants.
6. Partial battle between the chemical industry and biofuel industry for alcohols because they can be used in production of both branches. The input of resources is quote-driven. This argument is however difficult to be measured in real markets.
7. E.g. KIT conducts a so called pyrolysis pilot plant (bioliq) since 2008. In 2015 Bioliq will be brought into the market. Other approaches experiment with H2 production by algae or with carbon algae recycling systems. No synthetic biofuel will be brought onto market before 2020. Biodiesel production in Germany will double within the next ten years.



8. The abatement costs of biofuels are comparatively high.
9. The build-up of a necessary infrastructure is most important for the market success of alternative fuels .
10. The sophisticated reflection of user groups must be observed carefully.

The major conclusions from the round discussion at the end include:

The workshop was focussing on prospects for future developments of alternative and improved conventional technologies. It was of special interest to hear the points-of-view of the classical car manufacturers and also the corresponding view of the German ministry.

The major conclusions -- which were not really disputed by any participant -- were.

Various solutions are required, because it is difficult to assess today what is the most convenient approach for Germany.

1. Of highest priority are improvements of technical efficiency: for gasoline and Diesel cars,

ICE and hybrid as well as for fuel cell cars (FCC), battery electric vehicles (BEV). Here special focus must be put on batteries, however, in combination with H<sub>2</sub> and FC efforts as it is happening in Germany. These technologies are complementary to each other and not substituting.

2. Incentives provided should not be technology-specific but should rather be based on CO<sub>2</sub>-reduction.

Valid rules and standards must be defined.

3. For BEV and FCC specific model regions to learn also which business cases are feasible are of high relevance

4. With respect to BEV there was rather broad scepticism that infrastructure should be pre-financed by the public

5. As a general principles for future technologies it was agreed to think what has to be put on the way before 2020 so that it works by 2030

6. With respect to biofuels 1st generation the potentials up to 2020 are limited at about twice the amounts of today.

Moreover, it should be proven carefully whether the use of biofuels in other transport sectors than passenger cars could make more sense.

6. Regarding recommendations for policies in the EU: It should be considered that not all technologies and fuel types are relevant to the same extent in all countries.
7. An integrated treatment of alternative fuels is necessary. There must be an interaction of biofuel itself, necessary infrastructure, user groups, stakeholders and technology ("common coordination of stakeholders and research programmes). Thereby the costs of technology should be considered.
8. European and national research programmes should be connected.

And this will also lead to a diversity in policy priorities. In some countries like Poland biofuels might be of high priority, in other countries like for example Germany the focus is also put on fuel cell cars and hydrogen as well as electric vehicles and batteries due to the nature of the industries.

## **E. Specific report on the debate (try to keep it brief):**

### **1) Critical review of the state of the art**

See section above

### **2) Recent and planned case projects (policy developments)**

Not completed yet as not all participants have been contacted or provided information

Policy Makers:

1. German Kraftstoffstrategie
2. German NOW (Hydrogen several demonstration projections and E-Mobility)
3. Contributions to the fuel Strategy for the EU

From the car industry

1. Several R&D and demonstrations in Fuel Cells and Electromobility from VW, OPEL, DAIMLER, BMW – Platform (NOW, NIP, Modell Regionen)

2 of the fuel producing industry and

1. Several demonstration on Hydrogen fuel infrastructure from ARAL, SHELL

2 others

1. Research and Development on BTL from KIT and also TU FREIBER and CHOREN
2. Research and Development on E-Mobility and Information Technologies (e.g. Model Regio)
3. Biogas Pathways and Demonstration from DENA and other actors from producers to consumers

## **F. Overall conclusions**

The AAMT Session covered several aspects with respect to R&D and Demonstration Projects in Germany from various stakeholders perspective including the NOW, OEM R&D activities in H2, fuel cells, Technology and Innovation R&D Analysis, Local Energy Agency in NRW and R&D activities view from the Car Manufacturers association. The following main messages are highlighted:

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The major conclusions -- which were not really disputed by any participant , highlight that various solutions are required, because it is difficult to assess today what is the most convenient approach for Germany.

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3. Incentives provided should not be technology-specific but should rather be based on CO<sub>2</sub>-reduction. Valid rules and standards must be defined.
4. For BEV and FCC specific model regions to learn also which business cases are feasible are of high relevance. With respect to BEV there was rather broad scepticism that infrastructure should be pre-financed by the public
5. As a general principles for future technologies it was agreed to think what has to be put on the way before 2020 so that it works by 2030. With respect to biofuels 1st generation the potentials up to 2020 are limited at about twice the amounts of today. Moreover, it should be proven carefully whether the use of biofuels in other transport sectors than passenger cars could make more sense.
6. Regarding recommendations for policies in the EU: It should be considered that not all technologies and fuel types are relevant to the same extent in all countries. An integrated treatment of alternative fuels is necessary. There must be an interaction of biofuel itself, necessary infrastructure, user groups, stakeholders and technology ("common coordination of stakeholders and research programmes). Thereby the costs of technology should be considered. European and national research programmes should be connected.

And this will also lead to a diversity in policy priorities. In some countries like Poland biofuels might be of high priority, in other countries like for example Germany the focus is also put on fuel cell cars and hydrogen as well as electric vehicles and batteries due to the nature of the industries.

## **G. Recommendations to Action Plan**

The Action Plan should recommend actions in the next decade that will have an influence for the decade from 2020 until 2030. This involves further demonstration and promotion also for Hydrogen and Fuel Cells. These recommendations should not be technology dependant but rather more general.

Hydrogen and FCs activities are already happening in Europe and should be considered in the action plan!

Some of the measures are irrelevant such as Eco-Driving or Car- Sharing. Further studies are required to study their relevant contribution to CO<sub>2</sub> emissions reduction.

Infrastructure issues should be brought in stronger such as for Hydrogen and Electricity and the issue of subsidies for it. This will help dramatically the entry into the markets for these technologies.

Integrated approach taking into account society, technology and policy.

The portfolio from AF and AAMTs could be extended also to buses.

Stronger network between EU and National Project in order to avoid repetition of research studies.