

## CONFERENCE ABSTRACTS

**JAMSHID ARIAN ASSL, IEV ARIANA SA/NV & E4 RESEARCH CENTER** **WED, 11.40-13.20**

**AITS – Ariana Intelligent Transportation System**

The present invention is the first in the world to have accomplished to provide with a fully automatic system called Ariana Intelligent Transportation System "AITS". It is a clean mobility transportation system which combines the IEV (Intelligent Electric Vehicle) or IEFCV (Intelligent Electric Fuel Cell Vehicle) with the AICS (Ariana Intelligent Charging Station).

**KLAUS D. BECCU, BATTELLE GENEVA RESEARCH CENTER** **WED, 11.40-13.20**

**Future perspectives of electromobility in terms of electrochemical energy storage**

Cost, cycle life & energy density of storage batteries determine the future of electromobility. Among other deficiencies, recent US-DOE Li-ion project results have disclosed high capacity losses already in 12 mths (40°C), a major drawback for Li-ion. In comparison: the low cost & high safety Ti-Ni Metalhydride [NiMH] system, used in 2.3 million hybrid vehicles, has demonstrated much improved performance. High promises in energy density are announced by the new Proton-Ion system (MH-air based).

**JÉRÔME BERNARD, PAUL SCHERRER INSTITUT** **TUES, 13.30-15.10**

**Direct Electrical Coupling of Fuel Cell and Battery for Electric Powertrains**

The direct electrical coupling of a fuel cell and a battery (referred to as a passive hybrid topology) doesn't require any DC/DC converters. Nevertheless it is possible to actively control the power sharing by adjusting the fuel cell operating pressure. Using this concept, simulations results show that the power demand of an electric vehicle may be fulfilled while sustaining the battery state of charge. By removing the DC/DC converter, the hybrid system becomes simpler, lighter and cheaper.

**SAM CROSS, EURELECTRIC** **WED, 15.00-16.40**

**European Electricity industry perspectives on EVs:  
Achieving an electrified, decarbonised transport sector**

**THOMAS EBELING, NISSAN EUROPE** **WED, 15.00-16.40**

**The European launch of LEAF, the world's first affordable 100% electric vehicle**

Nissan LEAF, the first affordable 100% electric vehicle for the global mass market, arrives in Europe in 2011. Together with its Alliance partner Renault, Nissan is working with governments, cities and other organizations around the world to put in place the necessary infrastructure and incentives for the successful roll-out of electric vehicles. The Alliance expects pure electric vehicles to make up 10% of new car sales worldwide by 2020 and aims to be leader in this new field.

**FLORENCE FUSALBA, COMMISSARIAT À L'ENERGIE ATOMIQUE ET  
AUX ENERGIES ALTERNATIVES (CEA)** **WED, 11.40-13.20**

**Emphasis on Power Li-Ion technology: Quick Charge & Durability introducing Titanate-based negative electrodes in Batteries**

Regarding battery, high power chemistries and new cells designs are currently under development in order to sustain frequent use of quick charge without detrimental effect on the lifespan. In this paper, Batteries based Lithium Titanate negative electrodes as high rate charge - high peak power candidates will be discussed as a promising technology for both EV-HEV batteries and storage enhanced grid charging systems.

**GEORGES GIL,**  
**ETHZ – SWISS FEDERAL INSTITUTE OF TECHNOLOGY ZURICH** **TUES, 13.30-15.10**

**Parametric study on the influence of driving cycles on fuel consumption for different powertrains**

When assessing the performance of powertrain technology, one refers to the raw energy demand resulting from applying a predefined driving cycle. The choice of that cycle has huge implications on the final result, especially for hybrid systems, where the energy buffer's state depends not only on the current speed, but also on previous events. This paper quantifies that influence, by introducing characteristic cycle parameters such as average and top speed, and outlining their influence on fuel consumption.

**PHILIP GOTT, IHS AUTOMOTIVE CONSULTING** **WED, 9.30-11.10**

**Impact of Alternative Powertrain Technologies on Energy Demand**

Three plausible alternative futures are postulated for the period 2010 to 2030 and include the automotive and energy industry responses to different economic, security and climate change policy sets. This paper provides an overview of Global Redesign, Vortex and Metamorphosis scenarios, forecasts of light sales by segment, different levels of CO<sub>2</sub> requirements and presents the powertrain solutions and market shares that will meet those requirements. The net impact on the vehicle in-use fleet demand for the different fuels – gasoline, Diesel, ethanol, CNG and electricity – are forecast. The paper concludes that a significant reduction in petroleum dependency can be accomplished by 2030, but that a significant displacement of petroleum by alternative fuels will require much more aggressive adoption of those fuels than is now anticipated.

**MURAT GUENAK (KEYNOTE SPEAKER),**  
**DESIGNER MEMBER OF EXECUTIVE BOARD, MIA-ELECTRIC** **TUES, 13.00-13.30**

**Influences of new technologies on car design and impacts on the life style**

**STEN KARLSSON, CHALMERS UNIVERSITY OF TECHNOLOGY** **TUES, 15.40-17.20**

**The Importance of Car Movement Data for Determining Design, Viability and Potential of PHEVs**

We will demonstrate that representative car movement data is a crucial factor in determining viability, potentials, and design strategies for PHEVs, by assessing these parameters with the help of a specific data set for individual vehicle movements from a mid-size Swedish town. We will then present the on-going Swedish car movement data project and some early results and experience.

**JI WEON KO, SUNGKYUNKWAN UNIVERSITY** **TUES, 15.40-17.20**

**Analysis of EWB Performance for a Fuel Cell Electric Vehicle during Regenerative Braking using HILS**

In this study, the regenerative braking characteristics of a fuel cell electric vehicle (FCEV) equipped with electronic wedge brakes (EWB) on the front wheels were analysed. A regenerative braking control algorithm was proposed for the regenerative braking and friction braking for the front wheels, and for the friction braking for the rear wheels; and a powertrain model of an FCEV composed of a motor, fuel cells, and batteries, and a MATLAB model of the control algorithm, were developed. They were linked to the CarSim-RT (real-time) model of the vehicle under study, whereas the braking hardware in the loop simulator (HILS) of the FCEV was built using the EWB hardware. HILS was used to examine the dynamic response of the regenerative motor torque and the EWB clamping force that corresponded to the driver's braking demand.

**THOMAS KOERFER, FEV MOTORENTECHNIK GMBH** **TUES, 13.30-15.10**

**Modern DI-Diesel Engines – Backbone of low CO<sub>2</sub> Vehicle Portfolios under stringent governmental regulations**

The EV plays a key role for CO<sub>2</sub>-reduction, but is still linked with various challenges. The estimated number of EV's in the near future indicates that for legal compliance CO<sub>2</sub>-minimization must also be realized by the ICE's. Regarding the defaults for the CO<sub>2</sub>-values in 2015/20, already attractive values are offered by diesel cars, but for the realization of future goals still further efforts are necessary. This paper presents approaches for the clean realization of low CO<sub>2</sub>-figures.

**PAUL LIN, BYD AUTO CO., LTD.** **WED, 15.00-16.40**

**BYD Green City Solution**

**SARA MARQUES, INSTITUTO SUPERIOR TÉCNICO TRANSPORTES,**  
**ENERGIA E AMBIENTE (DTEA-IST)** **WED, 9.30-11.10**

**Conventional, Plug-in Hybrid and Pure Electric Vehicle Life-Cycle Comparison Considering Smart Connection to the Portuguese Electrical Grid and Consequent Impact in CO<sub>2</sub> Emissions**

This study analyses the impact that plug-in (pure electric and hybrid) vehicles connected to the electrical grid may have in the Portuguese Electrical Power System and the respective effect on the CO<sub>2</sub> emissions. It also shows a comparison from fuel life-cycle CO<sub>2</sub> emissions perspective between a conventional light-duty fleet and a fleet with plug-in vehicles. Three scenarios are created where the plug-in vehicle integration in light-duty fleet changes (reference value, 20% and 50% of plug-in vehicles), and where base electricity generation values are used, which results in life-cycle CO<sub>2</sub> emissions reductions from 7%-11% (considering the total Electrical Power System plus car fleet). In other two scenarios, where it is added an increase in 30% in renewable electricity generation sources, impacts are in the order of 37%-43% in the reduction of life-cycle CO<sub>2</sub> emissions.

**JIM MC DOWELL, SAIC** **TUES, 13.30-15.10**

**Advancing Diesel Engine Thermal Efficiency**

The SAIC team has offered the US Army powertrain solutions from 7 Tons to 60 Tons that achieve higher thermal efficiency, using a wide range fuels while constraining emissions. In all of these offerings the team made modifications to existing engines that allowed improvements in the thermal efficiency and reduce daily fuel consumption. These efficiency improvements were achieved through a combination of techniques, combustion cycle adjustments using in-cylinder pressure monitoring; precise control of fuel injector timing; turbo-compounding and using a non-prime power source for stationary operation was critical to minimizing the daily fuel consumed.

**PHILIPPE MÉAN, ALPIQ** **WED, 15.00-16.40**

**Potential markets, implementation strategies and recharging regimes for a successful mass penetration of electric vehicles in Switzerland by 2020**

**JOACHIM MONKELBAAN, INTERNATIONAL CENTER FOR TRADE AND SUSTAINABLE ENERGY (ICTSD)** **WED, 15.00-16.40**

**Deploying Climate-Related Technologies in the Transport Sector: Exploring Trade Links**

This paper analyses how the WTO negotiations on environmental goods (EGs) could contribute to the deployment of low-carbon technologies in the transport sector. The analysis largely focuses on road transport. Product categories that may, in principle, be characterised as EGs include alternative-fuel vehicles (AFVs), certain components used in AFVs (such as batteries used in electric cars) and alternative fuels (such as biofuels). Some WTO members have proposed that certain types of equipment used in public transport as well as bicycles could also be considered EGs. This paper, however, focuses on technology options. In theory, the elimination or reduction

of tariffs and NTBs could contribute to the diffusion of AFVs worldwide by reducing their costs in the domestic market. However, trade liberalisation alone is unlikely to have a significant impact on the penetration of AFVs into automobile markets.

**JETHRO NAUDE, STATUS ECONOMICS, INC. TUES, 15.40-17.20**

**The Effectiveness of Plug-In Hybrid Electric Vehicles in Reducing the Demand for Gasoline**

**TOBIAS OTT, ETHZ – SWISS FEDERAL INSTITUTE OF TECHNOLOGY ZURICH TUES, 13.30-15.10**

**How much fuel can a hybrid electric vehicle save?**

A method is presented to calculate the lower bound for the achievable fuel consumption of a hybrid electric vehicle. The resulting minimal fuel consumption for various drive cycles is calculated and compared to a conventional vehicle. The influence of an increasing degree of hybridization is investigated and it is shown, that most of the fuel saving potential is achieved with a relatively low hybridization ratio of 20%.

**MARCO PIFFARETTI, PROTOSCAR TUES, 15.40-17.20**

**The evolution to a purpose designed, premium EV**

Protoscar unveils its world premiere the market ready Home Charge Device for EVs and PHEVs. It has been developed during the evolution of the LAMPO and LAMPO2 electric demonstration sports cars, whose third generation LAMPO3 is now in the works. Protoscar (www.protoscar.com) – a Swiss company working for OEMs, power utilities and governments, since 24 years specialized in CleanCar projects – focuses its news on charging infrastructure, particularly on the market ready Home Charge Device and the off-board DC-fast charger. The charging technologies are shown together with LAMPO at the Geneva Car Show (March 1st, 2011) on the e'mobile stand (5141).

**BERND PROPFE, GERMAN AEROSPACE CENTER WED, 11.40-13.20**

**Customer Suitability of Electric Vehicles based on Battery-state-of-charge Analysis**

Based on German driving profiles, the paper analyses technical restrictions of EV batteries and their implications for the suitability as EVs. Minimal & maximal battery SOC curves serve as an indicator for the behaviour of EV batteries. In 3 scenarios, charging infrastructure developments are compared with electric ranges. It is shown that from a technical point of view range anxiety is negligible. Furthermore, infrastructure development has a bigger impact on the suitability than battery sizes.

**HANNES ROSE, FRAUNHOFER INSTITUTE IAO WED, 9.30-11.10**

**Total Cost of Mobility: Towards a Holistic Assessment of Environmental and Economical Costs of individual Mobility**

Life-cycle consideration of ecological and economical impacts becomes increasingly important for the development of vehicles with alternative propulsion concepts. This paper concerns the development of a parametric vehicle model to analyse energy-, resource-, and cost-efficiency of existing and future vehicle concepts. Modelling results support multi-criteria decision making for OEMs and suppliers (development), mobility providers (financing and business models), and politics (legislation).

**ANDREW SIMONS, PAUL SCHERRER INSTITUT WED, 9.30-11.10**

**Life Cycle Assessment of hydrogen Use in Passenger Vehicles**

The life cycle assessment (LCA) presents initial findings of potential environmental and human health impacts from fuel cell hybrid electric vehicles (FCHEV). The LCA is significant because it is based on the ecoinvent database of emissions and background processes, and it assesses a broad range of emission pathways. Although the paper highlights key areas in the life cycle of

FCHEV, including the production of hydrogen (H<sub>2</sub>), it also highlights the need for additional and more accurate data on FCHEV production. Results are compared to internal combustion engine vehicles (ICEV).

**GEOFF SNELSON (KEYNOTE SPEAKER), CORPORATE DIRECTOR STRATEGY & PARTNERSHIPS MILTON KEYNES COUNCIL WED, 14.30-15.00**

**Lessons learnt from Milton Keynes City**

**PIERRE STRUB, CONSULTANT WED, 11.40-13.20**

**Electricity consumptions, CO<sub>2</sub> - emissions and supply of grid balancing energy of EV and PHEV in Switzerland 2015 – 2035**

Imagine the visions of the innovators and idealists to become true: Electric cars producing net CO<sub>2</sub>-reductions and net energy-reductions of the overall systems while running. It's not a perpetuum mobile though, it's gathering of system efficiency potentials and using existing technologies the better way. First of all it is using renewables or gas fired power plants or nuclear power to charge the batteries. Second it is using the batteries of the electric cars to provide balancing energy. Third - in consequence - it is (partially) replacing and shut off peak load power plants while they are running in their less efficient mode - idle mode. Fourth: electricity production of renewable energy power plants can be fully used and stored in the batteries during low demand in the grid.

**MARTIN WEILENMANN, EMPA TUES, 15.40-17.20**

**Fuel Consumption and Exhaust Emissions of Mobile Air Conditionings, Status and Options for the Future**

Mobile air conditionings are the largest energy consumers in cars apart from driving itself. A test series with 12 vehicles (diesel and gasoline) was conducted to investigate for extra fuel consumption and CO<sub>2</sub> and pollutant emissions. These tests were run at different ambient temperatures, humidities and solar irradiation. Combining the results with the average meteorological year in Switzerland shows 4% rise of fuel consumption due to A/Cs. Different measures to lower this value are discussed.

**MARTIN WIETSCHEL (KEYNOTE SPEAKER), COORDINATOR OF BUSINESS UNIT ENERGY ECONOMY FRAUNHOFER INSTITUTE WED, 9.00-9.30**

**Creation of a new fuel supply infrastructure (CNG, LPG, Ethanol, Electricity, H<sub>2</sub>...)**

**ERIK WILHELM, PAUL SCHERRER INSTITUT WED, 9.30-11.10**

**Multi-Criteria Analysis of Driver Preference for New Vehicle Technology to Identify Robust Alternatives**

A large number of vehicle technologies are being researched and developed to improve personal transportation. This study compares surveyed and observed preferences for various vehicle criteria to examine how attractive future technologies may be to consumers. Observed preferences are used to distinguish between technologies that appeal to different market segments, and to validate a multi-criteria decision analysis algorithm. Applying this algorithm, bio-diesel and fuel cell vehicles are identified as being robust over a wide range of Swiss primary energy and technology cost assumptions. A focused examination of battery technology cost identifies a threshold value of \$52/kWh as being important for Li Ion technology to be widely adopted in electric vehicles.

## DIALOGUE SESSION ABSTRACTS

**WED 13.20-14.30**

The Dialogue Session will be taking place during the standing lunch. Posters can be seen in the Foyer until 17.00.

**NORMAN ABELL, GLOBAL ENERGY AND TRANSPORTATION CO.****Hybrid Electric, Sustainable Fuel, Mobile Water Purification/Electricity Generation Vehicle****LUCA BUZZONI, REGIONE EMILIA-ROMAGNA****Innovative Electric Storage System and New Prospects**

The paper deals with a new class of trolley buses and trams that do not need a catenary (the first nor the rails), but offer the same energy and environmental benefits of traditional electric traction, well above those offered by thermal traction. Starting from the analysis of mission, defines storage characteristics and quick charging specifics, proceeds to a cost-benefit analysis.

**MIHAELA CHEFNEUX, ICPE-SA****E-BIKE: A Solution for Sustainable Development of "Politehnica" University Campus**

The authors of the paper propose an ecologic transportation system based on two-wheeled electric vehicles, adapted to the needs of a medium size community, such as the "Politehnica" campus. Two types of electric scooters are presented, both designed and equipped with propulsion systems manufactured at ICPE-Servomotor Department. Both prototypes make use of brushless permanent magnet synchronous servomotors, one of them with hub motor rear wheel and the other one with CVT transmission. The two prototypes have been tested and the results are presented in the paper.

**MARGARIDA COELHO, UNIVERSITY OF AVEIRO****Life Cycle Analysis of Hydrogen – A Well-to-Pump Analysis for Application to the Transportation Sector in Portugal**

A life cycle analysis of hydrogen is presented involving various processes of H<sub>2</sub> production. The main objective was to adapt GREET 1.8c\_0 model (developed by Argonne National Laboratory), in order to represent the European reality and more specifically the Portuguese. GEMIS 4.5 model (developed by Oeko-Institut) was used to obtain the energy consumption and emissions for production of photovoltaic panels and wind towers. It was concluded that the use of wind energy is the best way to produce H<sub>2</sub>.

**ANA FILIPA FERREIRA, INSTITUTO SUPERIOR TÉCNICO****Biohydrogen pathways for the Portuguese road transportation sector-Uncertainty in the LCA analysis**

This study analyses uncertainty of energy consumption and CO<sub>2</sub> emissions of BioHydrogen life cycle. Uncertainty due to sugarcane and potato peels feedstock transformation can divert the results by 7.3 - 7.7% and 10.0-11.6%. Sugarcane appears as a promising H<sub>2</sub> feedstock with 0.32MJ expended energy and 28gCO<sub>2</sub> emitted per 1 MJ of H<sub>2</sub>. Results are compared with other fuel pathways (diesel, biodiesel, electricity). The fuel usage impact in conventional and alternative vehicle technologies is assessed.

**SIGITAS KUDARAUSKAS, S. KUDARAUSKAS PERSONAL ENTREPRISE****Advances Powertrain for Hybrid Vehicles: The Free-Swinging Piston Engine and Oscillating Rotary Generator**

The original free-swinging vane-shaped piston engine with oscillating rotary generator distinguishes by its compactness, minimum frictional losses, full-balanced mechanical system, possibility of four-stroke and multi-fuel operation, optimal magnetic circuit of the generator, etc. Because this engine can optimally operate over large range of output power, supercapacitors can be used for energy storage, and the powertrain can be optimized. In this way, a competitive hybrid vehicle can be created.

**JOSÉ MAGRANER, GH ELECTROTERMIA S-A.****Advanced DC Ultrafast Charging Infrastructure for e-Mobility**

E-mobility is becoming a real solution for a sustainable new model of the transportation sector. Transportation sector in Spain is responsible 30% of CO<sub>2</sub> emissions and consumes 40% of the final energy generated. The Spanish electric network is ready to accept several millions of Electric Vehicles (EV) with smart-charge systems and become more cost-effective. The aim of this paper is to describe a sustainable DC ultra-fast charging station infrastructure for EVs.

**ALEKSANDAR MAKSIMOVICH, UNIVERSITY OF APPLIED SCIENCES OF CENTRAL SWITZERLAND****Energy Pack for Trolleybuses as an on-board Energy Storage System with Batteries and Supercapacitors**

This paper presents "Energy Pack" as an on-board energy storage system with batteries and supercapacitors for the new generation of the trolleybuses. The «Energy Pack» is a combination of the "Super Accumulator Module" - SAM1 energy storage system with a power electronics module and an energy management which interfaces with a trolleybus enabling autonomous operation, reduced energy consumption and stabilization of the line voltage. The first Swiss-Trolley3 to be equipped with an «Energy Pack» will enter service in Lucerne in 2013.

**URS MUNTWYLER, IEA IA HEV****EV and PV: a winning combination has its 25 years anniversary**

In future, the combination electricity produced from renewable sources and electric mobility is a winning combination. It replaces mainly fossil fuels by "green electricity"; makes an EV driver independent from fossil fuels and dramatically improves the CO<sub>2</sub> balance of EVs. A clean electricity mix will be decisive for the first market introduction phase of the new generation of EVs and PHEVs. In case the electricity mix is dominated by coal plants or nuclear plants, the first buyer groups, the "innovators" and "early adopters", will not accept electric mobility in most of the countries. The random production of PV-electricity can be levelled by electric vehicle charging close to the PV-installation. This avoids peaks in a weak grid, the limitation of peak PV production and saves investments in the grid infrastructure. This also applies to other renewable electricity productions like wind, hydro and others. The synergy of electric vehicle and photovoltaic has 25 years of history started in Switzerland. 1985 the worldwide first solar car race - the "Tour de Sol" - marks the start, and today EV-dealers already offer PV-installations for their customers.

**FABRIZIO NOEMBRINI, EPFL-SWISS FEDERAL INSTITUTE OF TECHNOLOGY LAUSANNE****Well to Wheel Analysis for Future Powertrain Systems**

The transportation related greenhouse gas (GHG) emissions are projected to increase in future decades due to the continuous increase of transportation demand. Considerable reduction in specific GHG emissions in this sector can be achieved by adapting alternative powertrain technologies and fuels. In the present study a well-to-wheel (WTW) CO<sub>2</sub> emissions comparison between different powertrain technologies, based on various primary energy sources and wide range of hydrogen production processes is carried out.

**DANIEL OGG****Polaris – swissauto Range Extender System the key to unlimited electromobility**

The swissauto range extender is a very light, compact and efficient combustion engine and Generator unit to charge the Battery of an electric driven vehicle while driving. Due to its very lean single cylinder design, it provides the most efficient way to produce the 22 kW electrical power output which is needed to drive a compact 4 seater car up to 130 km/h with a neutral Battery state of charge and excellent NVH behaviour. Best in class specific fuel consumption of 230 g/kWh can be reached over a wide band of the operation points of this extremely downsized engine concept.

**JOÃO RIBAU, INSTITUTO SUPERIOR TÉCNICO****Alternative vehicle energy management strategy optimization model and application to a fuel cell Plug-In Hybrid Vehicle**

This study proposes alternatives for a range extender (RE) of a hybrid plug-in vehicle. Fuel cells were also included, since they have no local emissions and higher efficiency. For fuel cell vehicles three energy management strategies were proposed. Simulations revealed efficiencies of 64% for battery power only operation dropping to 13-35% (the highest for fuel cell vehicle) when RE starts. Maximum Well-to-Wheel energy savings of 75% were achieved for the fuel cell vehicle.

**SARA SAFARIANOVA, ETHZ – SWISS FEDERAL INSTITUTE OF TECHNOLOGY ZURICH****Techno-economic analysis of low GHG emission passenger cars**

The growing demand for passenger transport has been one of the main drivers for the increase in total greenhouse gas emissions in Europe. In this study, the technology options for reducing the CO<sub>2</sub> emissions from passenger cars are analysed from technical, economic and social perspectives. The CO<sub>2</sub> emission reductions for each technology option are estimated along with the cost effective analysis and social acceptability assessment to cover the whole socio-techno-economic domain.

**MINSEOK SONG, SUNGKYUNKWAN UNIVERSITY****Development of the control logic for electric oil pump during mode change of a 6-speed AT-based hybrid electric vehicle**

In this study, an electric oil pump (EOP) control algorithm was proposed for an automatic transmission based parallel hybrid electric vehicle (HEV) during mode change. In the experiment, the engine clutch pressure dropped during the mode change and at the steady state because an additional oil flow rate should be supplied for the engagement of the engine clutch. To minimize the pressure drop during the mode change and to maintain the required line pressure at steady state, a three-stage EOP control algorithm was suggested, and its performance was evaluated through the experiments. It was found from the experiment that the EOP control algorithm reduced the pressure drop and maintained the target line pressure. In addition, the EOP speed at each stage was determined based on the automatic transmission fluid temperature.

**SILVIA ULLI-BEER & BENJAMIN BOKSBERGER, PAUL SCHERRER INSTITUT****Roadmap 2020 for Sustainable Road Transportation: A Time based Coordination of Opportunities and Challenges**

The Policy Roadmap 2020 presents in a concerted view development perspectives of Advanced ICE, NGV, HEV, BEV, FCEV and relevant issues of Regulation, Demand, Supply as well as Infrastructure and Human capital development. Content analysis of 15 expert interviews with practitioners and scientists highlights the need for new alliances and coordinated strategy development as well as political entrepreneurship in order to prepare the ground of market driven diffusion paths of clean passenger cars.

**SIMON VOIGT, FRAUNHOFER IAO****Electric Vehicle Configurator**

This paper concerns the development of an online software-tool named “Electric Vehicle Configurator” (Elveco, www.elveco.eu). The goal of this application is to reveal the differences and advantages between EV-concepts and ICE-vehicles under different conditions and to analyse the preferences of EV-users and possible users for new electric mobility concepts. Elveco is designed not only for comparing EV to ICE vehicles, but also for comparing new vehicle concepts with traditional concepts. In this case the user could get information about the user value for comparing these concepts. Another main objective of Elveco is the evaluation and analysis of the collected data. It is aimed to analyse and assess the user’s acceptance and sensitivity to technical features and related costs. Therefore we investigate following main topics with Elveco: Functions and characteristic of individual transport and vehicles / Measuring consumers’ preferences via an online-tool.

**JÖRG WEIGL, UNIVERSITI TEKNOLOGI MALAYSIA, BUSINESS & ADVANCES TECHNOLOGY CENTER****Performance and Efficiency Comparison of Fuel Cell Hybrid Power Train Topologies**

Based on a prototype of a fuel cell powered motorbike various fuel cell hybrid drive trains have been tested. Tests were first conducted on the road; extensively at the 4000km rally of the South Africa Solar Challenge 2008 in the Technology Class category. Systematic tests with a complete data acquisition system in the lab on dynamometer were then followed. The results are interesting for fuel cell hybrid drivetrains of smaller vehicle, which have the highest potential to be first in market.