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AUTOCLUSTERS

Automotive network for innovation

ANALYSIS OF ELECTROMOBILE INFRASTRUCTURE IN SOUTH-EAST EUROPE COUNTRIES

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TABLE OF CONTENTS

1. INTRODUCTION

Automotive industry is for European Union very important part of economy. Automotive industry is a motor of innovation, education, building of knowledge-based society. Automotive industry is a key employer in EU and contributes to sustainability development. Great challenge for the automotive industry is environmental protection and innovation.

Project with the short name „Autoclusters“ brings together Universities, R&D institutions, SME support facilities from EU-15, NMS as well as IPA to prepare and create the first automotive network in South East Europe. The second level clustering activities proposed by the project are strictly oriented on the activities, which are improving the innovation capacities in the region and improve technology and know-how transfer - improving the innovation circle. The project in the first stage analyses the cluster's development and best practices across the regions as well as creating the connection with other existing European activities in the automotive clustering. The project focuses highly towards producing concrete results and addresses the main challenges that are particularly specific for SEE region, particularly the same across the whole EU territory.

In the frame of project there are several work packages. One of them is Work Package no.6. which is divided into 2 tasks:

- solving small innovative pilot projects (min. 3 projects)
- creation FP7 project proposals (min. 3 projects)

This publication is part of the one small innovative pilot project with the name: Electromobile infrastructure analysis in SEE, acronym: „SEEE-Mobility“. Small project consists from 6 project activities (PA1...PA6). One of the project activity is „Analysis of Electromobile Infrastruture“.

The main focus of analysis is on determination of current situation of electromobile infrastructure in terms of electric cars, or green cars in PPs´ countries. Project partners in this small project are: Technical University of Iasi (Romania), West Panon Regional Development Company (Hungary), Technical University of Gabrovo (Bulgaria), Automotive Cluster Slovenia (Slovenia), Automotive Cluster Croatia (Croatia), Automotive Cluster Serbia (Serbia), Automotive Cluster – West Slovakia (Slovakia) – *Leader*

The main objective of this projects is to create certain picture about development initiatives related to the e-mobilitiy in PPs´ countries. Based on gathered information we would like to create set of recommendations and opportunities for regional and national polices in connection to the activites with western EU countries, companies, universities etc. Establish a list of potential carmakers or developers (SMEs, universitiies, R&D centres...) able to build this kind of vehicle in SEE and try to linkage these bodies with the aim of cooperation in R&D area. Gain results and reccommendations for planning next activities in development of e-vehicles with the connection to FP7 project proposals. Try to engage the regional and national authorities into the process of e-mobility development and consult with them what is the best way for preparing electric vehicle infrastructure in the near future.

Our project plan is to analyse e-infrastructure from two points of view:

1. **Technical and physical infrastructure** (it means: power stations, services centres, recycling of batteries, suppliers, electricity production, potential renewable energy sources, actual legislation in EU in terms of e-cars, potential partners organization for e-mobility development etc.).

2. **R&D and innovation infrastructure** (R&D labs, innovation centres, university centres, firms´ R&D centres, local market trends, SWOT analysis of the region/city with focus on e-mobility and its future development in horizon 10 years).

One of the characteristics of this small project is its innovativennes. Our project team is convinced that this project is innovative and brings new opportunities and ideas for next development of close cooperation between partners and other subjects and increase level of automotive industry and suppliers sector in our countries.

The main innovative features of this small project are:

- focusing on electro mobility in terms of developing strong cooperation between PPs´ countries in the South-East region; electromobility networking
- looking for ways how to be part of EU green cars initiatives in cooperation with great western countries, companies, universities, R&D institutions, etc.
- writing the first analysis about electromobility in the frame South-East region
- dissemination activities about electromobility in project partners countries (leaflets, seminars, conferences about electromobility);
- encouraging regional and national level decision makers for taking initiatives in developing green cars strategies, policies, infrastructures, cooperation etc.
- networking universities, R&D institutions, SMEs, agencies, etc. in terms of green cars
- sharing ideas, solutions, recommendations about electromobility between project partners´countries
- common development electromobility initiatives in project partners´countries
- our project is oriented on automotive industry what is a great challenge for creating innovative automotive networks between SEE and Western countries and create stronger EU region against competititors from other world regions in area R&D (such as USA, Japan, China and other Asian emerging countries).
- generating ideas for FP7 project proposals

Methodological approach is based on few simple steps: writing analysis; creation of recommendations and conclusions; dissemination results and increasing consumer awareness by print media, electronic media and conferences (or seminars); building contacts and communication with OEMs, suppliers, local authorities and other relevant partners; planning next procedures and activities (sustainability effect).

What are the important steps for us for writing Analysis?

- identification of current national, regional policys, plans – contact and communicate with ministries: economy, transport, science, industry, with their relevant departments
- identification of current cities and regions initiatives in term of e-mobility (or green cars),
- identification of current initiatives and plans of OEM and suppliers (Tier-1, Tier-2, Tier-3) established in PPs´ countries

- identification of initiatives of domestic energetics companies in term of e-mobility (or green cars)
- identification of initiatives of domestic universities, secondary schools, research institutions – current research projects with focus on e-mobility (or green cars), laboratories, educational and study programmes with focus on automotive industry (mainly e-mobility, green cars), current international cooperation with focus on e.mobility (or green cars)
- serching on internet about e-mobility (or green cars) initiatives in PP´s countries
- collection of photos and documents related to the e-mobility (or green cars) in PP´s countries

Which type of information is important for us:

- aims of institutions in terms of e-mobility (or green cars),
- intentions of institutions in terms of e-mobility (or green cars)
- examples of research projects (domestic or international)
- photos from initiatives (for example: development of student green car)
- inspiration for collection and identification of important information from organization or institutions could be publication of ITD Hungary called „E-mobility technology in Hungary“, 2010

2. OPPORTUNITIES AND POTENTIAL OF THE E-MOBILITY IN EUROPEAN UNION

International Collaboration Efforts

On eof the most important thig in the process of greening our world is close cooperation and collaboration between all public bodies, industrial players and academic units. International collaboration would brings and shares new ideas, new inspirations and helps to improve research, development and innovation process. We have to all together look on our Earth in terms of creation of environmentaly friendly technologies, factories, cars, etc. International collaboration efforts in green cars area could be one of the importatnt points of view where we can be helpful and useful for bringing the best environment contributions. Green cars area brings new challenges, opportunities for building new and better life.

According to the publication Technology Roadmap written by International Energy Agency, one of the important points in electric vehicle inititiave is international collaboration efforts. Governments around the world must work together to ensure sufficient coordination of activities related to the EV/PHEV. Key areas for information sharing and collaboration *(International Energy Agency:Technology Roadmap, 2009)*:

- research programmes
- codes and standards
- vehicle testing facilities
- setting of market development targets, such as vehicle sales
- allignment of infrastructure, charging and vehicle systems as appropriate
- policy development and experience in implementing different approaches.

Márie Geoghegan-Quinn, Commissioner for Research, Innovation and Science says that key role in defining research objectives and establishing industrial targets will play car and truck manufacturers, equipment suppliers, logistics operators, research centres in cooperation with European Commission and Member States. The European Green Car Initiative will be based on a broad spectrum on generic research, including nanotechnologies, new materials, and digital electronic and transport technologies *(European Green Car Initiative. Towards an electric future?, 2010).*

Three main challenges of the new automotive industry in Europe we could define according to European Green Cars Initiative as:

- Climate changes and air pollution with aim to reduce vehicle emissions of greenhouse gases and other pollutants
- Rising oil prices and concerns about the security of oil supplies
- Economic crisis impacts on automotive industry

Based on these three challenges automotive industry is shifting to the new area of environmentaly friendly cars. All efforts is focused on reduction of emissions, increasing air quality, supporting renewable energy sources, looking for new jobs and accelerating research and development activities. European Green Cars Initiative is one of the main pillars of European Economic Recovery Plan consits of:

- the automotive sector (European Green Cars Initiative)

- manufacturing sector (Factories of the Future Initiative)
- constructions sector (Energy-efficient Buildings Initiative)

All three schemes are public-private partnerships (PPPs) that aim to boost research, innovation and investments in green technologies in their respective sectors. The main long-term goal is to become a low-carbon, knowledge-based economy.

Dramatic changes and current developoment trends in automotive industry will bring new needs for building overhaul transport infrastructure considering greener cars (electromobility recharging stations, power supplies…), creating new business models to handle new ways of designing, powering, selling and using cars, building recycling networks, new study programs and training for universities, research topics, creating new forms of collaboration between competititors, universities, research centres, governments, regions; reinforcing cooperation between different industrial sectors (automotive-electrotechnics, chemistry, power industry, ICT, etc.).

Advantages of Electric Vehicles

Electric cars brings new views on our every day mobility. Electric cars are environmently-friendly cars. Using electric cars we can contribute to decreasing CO2 emissions and pollutions and raise quality of life. Electric cars can help improve grid efficiency and promote the development of renewable energies. Electric cars bring to our cities and regions new opportunities to have cleaner cities with lower local emissions and pollutants.

Electric cars bring new opportunities in the automotive world by developing new technologies and supporting innovations. Electromobility industry can help to increase our economy and interest of investors. Electromobility can shape new modern face of our countries. The main advantages of electric cars are:

- Zero Emissions
- Low noise
- Lower maintenance
- Good for inner city short trips
- Improving air quality (particularly in cities)
- Reducing greenhouse gas emissions
- Mass use of electric cars will bring slowing down the global warming
- Electric cars have the potential to be fueled from clean sustainable energy – be it solar, wind or hydroxy gas powering a charging generator
- Can reduce our dependece on oil

Publication *European Green Car Initiative. Towards an electric future?, 2010* states that electric cars are now widely viewed as a key part of the solution to our climate and energy security problems. In the short-term, focus is on making improvements of existing cars with Internal Combustion Engines (ICEs). In the long term, focus is on electrification of cars. It is necessary for cleaner urban transport and cleaners cities. Ideas about advantages of electric cars are based on (Dr. Pietro Menga):

- economic impqact on community
- green cars allow savings in oil imports
- reduction of CO2
- electric cars do not emit other pollutants such as nitrous oxide

- reduction in acid rain
- reduction in health expenses due to local air pollution
- electric cars are silent – reduction of noise pollutions
- electric cars powered by electricity from nuclear power or renewable sources like wind, hydroelectric or solar power would release no greenhouse gases while on the move
- electric cars are less harmfull to the environment even though electricity comes from fossil-fuel burining power plants in comparison with cars that burn fossil fuels directly in their engines. This is because power plants use energy more efficiently than ICEs.

In the current time, electric cars have several critical problems:

- one major problem is cost
- second major problem is range
- third problem is lifetime
- fourth problem is lack of an infrastructure to support electric cars.

Automotive R&D Focus – European Council for Automotive R&D

These main problems in electromobility industry require strong efforts in terms of research and development. Organization ACEA (European Automobile Manufacturers´Association) is focusing creating strategies for support of R&D in automotive industry. Initiative named EUCAR (European Council for Automotive R&D) brought documents with detailed needs for research in automotive industry. On Eucar webpage we can find all important documents with information about possible cooperation areas in automotive R&D. The R&D areas of major interest for the automotive industry are *(EUCAR: The Automotive Industry Focus on Future R&D Challenges, Brussels, 2009)*:

- Urban Mobility and Transport
- Safety Applications in Co-operative Systems
- Alternative Fuels
- Suitable Materials
- Electrification of the Vehicle
- Ecological and Efficient Manufacturing

In more detail picture on R&D areas is consiting from:

Urban Mobility and Transport
- Advanced driving-assisted vehicles
- Energy efficient transport of people and goods with improved logistics
- Safety of urban road transport
- Traffic management
- Market implementation of innovation.

Alternative Fuels
- Scenarios for alternative fuels and strategies for their market introduction
- Preparation of specifications for alternative fuels
- Optimisation of powertrains with alternative fuels
- Integrated safety of alternatively-powered vehicles.

Electrification of the Vehicle
- Affordable and safe battery systems with improved performance
- Post Lithium-ion technologies

- Efficient vehicle and energy management system
- High voltage systems and components
- Connection to the infrastructure
- Field tests and demonstrators
- Road map for market penetration of the electric vehicle.

Safety Applications in Co-operative Systems

- Connecting independent driver assistance systems in an integrated co-operative system
- Fail-safe co-operative systems
- Reliability of sensors and data acquisition through the entire chain
- Sensor data fusion and information processing in co-operative systems
- Accident prevention and collision mitigation in co-operative safety systems
- Driver feedback for safe, clean and efficient driving
- Preparation for standardisation of information and data-protocols, interfaces and evaluation
- Development and standardisation of computer modelling
- Data-collection to assist crash avoidance.

Suitable Materials

- Improving the energy efficiency of powertrains
- Successful market launch of new materials for weight reduction
- Lighter and more compact seating systems
- Smart acoustic insulation and damping
- Innovative functional integration of interior components
- Sustainable material processing along the entire value chain.

Ecological and Efficient Manufacturing

- Innovative green painting processes
- Green manufacturing of vehicles and sub-systems
- Affordable manufacturing of green vehicles
- Digital manufacturing for integrated product and process development
- Virtual engineering for product and process performance management over the whole lifecycle.

In the current time, there is project named AUTOCLUSTERS in the frame of EU Programme South East Eruope. Leader partner of the project “Automotive Cluster – West Slovakia” with its project partners from 9 SEE countries brings new look on electric initiative area in SEE regions. In the frame of project was done analytical study about R&D and innovative capacities in SEE with focus on automotive industry *(Švač, V. et al: Innovation Trends and Challenges and Cooperation Possibilities with R&D in Automotive Industry, Bratislava, Slovakia, 2010)*. The project AUTOCLUSTERS has been involved in the identification and surveying the innovation capacities of the automotive industry resulting in the creation of an automotive R&D database consisting of 212 automotive R&D capacities in the project partner countries/regions of Southeastern Europe.

One of the analytical outcomes of the project AUTOCLUSTERS is the current orientation of the 212 R&D capacities on the following fields:

- Manufacturing technologies, mechanical engineering and electrotechnics – 40%
- Material research and chemistry – 15,6%
- Product development, vehicle development and prototyping – 14,6%

Lack of the automotive R&D capacities in the field of:

- Environmental technologies, engines and power-train components (eco-vehicles) – 3,3%
- Testing and analysis of new technologies – 7,1%
- ICT, intelligent components, safety and interior components – 8,5%
- Chassis and vehicle body parts – 8,5%

This analytical study shows that countries in SEE region need to focus its own R&D activities mainly on green technologies and ICT related to the electromobility. In the study we can find several recommendations for next e-mobility development in the SEE countries and regions and development of cooperation activities between partners' countries in connection to the Western Europe. Automotive industry in SEE region has built wide network of car production plants. In this region there are 42 car production and assembly plants. Besides these plants there were identified 12 local car producers. According to OICA (Organization of Motor Vehicle Manufacturers) car production volume in project partners countries/regions in 2008 was 2 400 384 cars. It was 3.4% share of worldwide car production. This potential creates a lot of opportunities for building up new R&D and innovation capacities, testing laboratories, institutes with focus on new product development, new technologies and process improvement considering ecological aspects.

German´s Electromobility Initiative

One of the most ambitious initiatives regarding development of green cars is German Federal Government´s National Electromobility Development Plan approved in August 2009. The aim of the National Electromobility Development Plan is to speed up research and development in battery electric vehicles and their market preparation and introduction in Germany. Germany wants to be lead market in electromobility and maintain the leading role of its scientific capabilities and its motor-vehicle manufacturing and parts supply industry. The Germany Federal Government is looking to have one million electric vehicles on the road by 2020. The main actors in this German initiative are responsible ministries, the Federal Ministry of Economics and Technology (BMWi), the Federal Ministry of Transport, Building and Urban Affairs (BMVBS)m the Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMU) and the Federal Ministry of Education and Research (BMBF). These ministries entered into intensive joint dialogue with the business and science community to discuss the challenges and opportunities and draft guidelines for implementing the ten-year plan to achieve its electromobility goals.

The starting point of German Initiative is:

- electromobility has been identified as a mojr element and accorded a strategic role in the German Federal Government´s policy agenda.

The main Goal is:

- The German Federal Government´s Economic Stimulus Package II aims az combining near-term economic impacts with strengthening Germany´s long-term future viability.

SWOT Analysis of Electromobility in Germany (Tab.1) *(German Federal Government´s National Electromobility Development Plan, 2009)* shows us very good and precise job what we can see in the whole document. German´s plan is very attractive and has strong orientation on research and development. German´s plan could be very good example for other EU member state in developing electromobility initiative.

Tab.1

SWOT analysis: Electromobility in Germany	
Streengths	**Weaknesses**
▪ Global leader in motor-vehicle manufacture, drive technology and power electronics ▪ Leader in energy technology (particularly renewable energies) ▪ Leading position in industrial information and communication technology (ICT) ▪ Rapid development of renewable energies in electricity mix ▪ Modern infrastructure and high technical standard in energy supply grids ▪ Good research infrastructure in major high-tech sectors ▪ Germany well positioned for developing and constructing complex system technologies ▪ Established and efficient recycling systems ▪ Generally good infrastructure for testing and certification of technical products ▪ High innovativeness and advanced environmental awareness	▪ Very few production facilities for cells and battery systems ▪ Battery research and training of junior scientists in need of expansion ▪ Multisectoral cooperation among motor-vehicle manufacturing industry, electric power industry and battery manufacturers still in infancy ▪ Lack of serial production experience with hybrid drives ▪ High battery costs worldwide ▪ Lack of norms and standards, e.g. for interfaces between vehicle and charging infrastructure, for safety aspects or testing and measurement procedures ▪ European and global standards and norms still unspecified
Opportunities	**Risks**
▪ Germany established as lead market for electromobility ▪ Reduction of import dependence on petroleum; securing long-term mobility ▪ Contribution to climate protection and reduction of local emissions ▪ Additional impetus for renewable energies and strengthening supply security ▪ Improved grid integration of variable renewable energies and efficiency of electricity generation overall through mobile storage units ▪ Innovatory impetus for German motor-vehicle manufacturers, parts suppliers and ICT industries ▪ Multisectoral cooperation ▪ Creation of new jobs for highly skilled personnel	▪ High investment needs ▪ Insufficient access to key technologies in cell and battery systems ▪ Progressive economies of scale for battery systems not assured ▪ Isolated technical applications could impede market penetration ▪ Danger of raw materials dependence and availability curbing growth ▪ Reticence towards electric vehicles (e.g. costs, safety, range) ▪ Unrealistic public expectations causing possible disappointment ▪ Faster progress made by competitors

Source: German Federal Government´s National Electromobility Development Plan, 2009

The main research and development challenges of the German´s Electromobility Plan are:

1. **Energy storage**: Electromobility requires efficient, safe and affordable battery systems (developing new materials or technologies, recycling, computer simulations etc.)

2. **Vehicle technology**: Electromobility requires new concepts for vehicles, drives and components (motors and components, system integration of drives, transmission, optimising power electronics, reliability, cooling etc.)
3. **Grid integration**: Electromobility requires new methods for integrating vehicles into power grids (electricity generation and grid infrastructure, grid – vehicle interface, ICT for electromobility)

The key factors in electromobility development are **education and cooperation**. German´s Electromobility Plan is focused on training initiative together with industry and trade unions in all areas:

- engineering courses of study,
- post-graduate programmes,
- endowed professorships,
- research priorities in universities and institutes,
- commercial training up to technician and master craftsman.

Regarding cooperation in area of electromobility there are some activities with focus on cooperation among government, science and industry and cooperation in Europe, we choose several activities:

- Interministerial Working Group on Electromobility;
- A National Electromobility Platform consisting of policymakers, industrialists and scientists, local government officials and consumers;
- International Electromobility Conference;
- Interlink with the programmes in the neighbouring European states and the European Commision;
- Other activities: monitoring of the activities of neighbouring EU countries in promoting and developing technologies, infrastructures, norms, standards etc., coshaping European roadmaps, coordinating policy positions bilaterally with individual neighbouring states and launching joint programmes on electromobility.

The German´s Electromobility Development Plan document is writing about 5 basic groups of green cars. (Tab.2)

Tab.2

Vehicle type	Acronym	Ration of power grid use for battery supply	Typical features
Electric vehicles	BEV (battery electric vehicle)	100%	▪ Electromotor with grid chargeable battery ▪ Cars but also two-wheeled vehicles ▪ High potential for CO_2 reduction through use of renewable energies
Electric vehicles with range extension	REEV (range-extended electric vehicle	Partial, depending on battery range and use	▪ Electromotor with grid chargeable battery ▪ Modified low-performance internal combustion engine or fuel cell
Plug-in hybrid	PHEV (plug-in hybrid electric vehicle)	Partial, depending on battery range and use	▪ Electromotor with grid chargeable battery

vehicle			▪ Combination of classical internal combustion engine and electromotor ▪ Cars as well as commercial vehicles (e.g. delivery vehicles)
Hybrid vehicle	HEV (hybrid electric vehicle)	No grid connection	▪ Conventional internal combustion engine plus electromotor ▪ Battery charging through braking energy recovery ▪ Cars and commercial vehicles
Fuel cell vehicle	FCHEV (fuel-cell hybrid electric vehicle)	No grid connection	▪ Electromotor with fuel cell for energy supply

Source: German Federal Government´s National Electromobility Development Plan, 2009

A europan strategy on clean and energy efficient vehicles

One of the most important documents related to the green cars is European strategy on clean and energy efficient vehicles (COM (2010) 186, 28.4.2010). This strategy was realesed on 28th April 2010. One aim of the flagship initiative is hence to promote "green" vehicles by encouraging research, setting common standards and developing the infrastructure needed to support "the shift towards a resource efficient and low-carbon economy that is efficient in the way it uses all resources". European Commision is convinced that a new industrial approach based on clean and energy efficient vehicles will boost the competitiveness of the European industry, provide new jobs in the automotive industry and in other sectors in the supply chain and support restructuring.

Action plan for green vehicles describes three basic groups of powertrains with the aim ofpromoting clean and energy effiecient vehicles and facilitating the deployment of breakthrough technologies in ultra-low-carbon vehicles:

- Alternative fuels to burn in combustion engines to substitute petrol or diesel fuel include liquid biofuels and gaseous fuels (including LPG, CNG, and biogas);
- Electric vehicles use an electric motor to move the vehicle and are recharged with electricity;
- Hydrogen fuel cell vehicles can also deliver similar environmental benefits to battery electric vehicles.

One of the great challenges for the automotive industry in Europe is **supporting research and development and innovation activities in area of green technologies**. Target of European Commission is continuing in research in areas: low carbon fuels, clean and energy efficient transport, improvements of conventional engines, electric drivetrains, alternative battery technologies and hydrogen technologies.

According to the strategy next important area of interest is market uptake and consumer information or increasing consumer awareness about environmentaly-friendly technologies (vehicles). A "greening" of the European vehicle fleet will only be successful if consumers are indeed choosing to buy clean and energy efficient vehicles. The most promising areas for development of new green cars are cities and urban zones. Local and regional authorities could have therefore an important role to play as contracting authorities, making a smart use

of public procurement rules to accelerate market uptake. For this purpose there was approved Directive 2009/33/EC on the promotion of clean and energy efficient road transport vehicles. This directive aims at reducing greenhouse gas emissions and improving air quality (Particularly in cities) requires that public authorities take into account energy and environmental impacts linked to the operation of vehicles over their lifetime.

Strategy regards next aspects as well: global issues, employment, emissions legislation, standardizations, infrtastructure, energy/power generation and distribution, recycling and transportation of batteries. Very important action will be common coordination of all actions not only on EC level but on state members' levels, as well. As is written in the strategy actions in the areas identified by this strategy requires a high level of coordination across relevant policy areas (industrial, transport, energy, trade, climate action and environment, employment, health and consumers, research) and all stakeholders to put everything in place to give the EU a sustainable transport system with a competitive industrial base.

Our initiative in the project AUTOCLUSTERS is focused on looking for ways for common actions in connections to EU strategy for clean and energy efficient vehicles and in connection with partners from Western EU countries. We hope that our project activities can contribute to build green Europe in terms of automotive industry.

Great European practical initiatives related to the green cars we can see in running research projects. In publication *Collaborative R&D for Automotive Innovation 2010-2011* written by EUCAR we can see list and short descriptions of 52 research projects in the following fields:

- fuels and powertrain (21 projects),
- integrated safety (21 projects),
- materials and manufacturing (5 projects),
- mobility and transport (5 projects).

The main leaders in these fields are:

- powertrain – AB Volvo
- fuels – Ford
- battery electric vehicles and fuel cell electric vehicles – Daimler
- safety – PeugeotCitroen, Renault
- human vehicle interaction – CR Fiat
- intelligent transport systems and services – AB Volvo
- electric and electronics – AB Volvo
- materials – CR Fiat
- manufacturing – AB Volvo
- virtual engineering – Daimler
- mobility – CR Fiat
- commercial vehicle forum – AB Volvo

Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system

The European Commission adopted a roadmap (Brussels, 28.3.2011 COM(2011) 144 final) of 40 concrete initiatives for the next decade to build a competitive transport system that will increase mobility, remove major barriers in key areas and fuel growth and employment. At

the same time, the proposals will dramatically reduce Europe's dependence on imported oil and cut carbon emissions in transport by 60% by 2050. By 2050, key goals will include:

- No more conventionally-fuelled cars in cities.
- 40% use of sustainable low carbon fuels in aviation; at least 40% cut in shipping emissions.
- A 50% shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport.
- All of which will contribute to a 60% cut in transport emissions by the middle of the century.

Initiatives in the world

Based on several international literature sources we can choose some interesting initiatives in area of supporting and developing e-mobility. This could serve for us as an inspiration material for looking for the best opportunities and solutions for building cooperation with other countries and ways how to do development activities in area e-mobility:

USA

According to document "*One Million Electric Vehicle By 2015*, Febraury 2011 Status Report, presindet Obama´s goal of putting one million electric vehicles on the road by 2015 represents a key milestone toward dramatically reducing dependence on oil and ensuring that America leads in the growing electric vehicle manufacturing industry. Leading vehicle manufacturers already have plans for cumulative U.S. production capacity of more than 1.2 millions electric vehicles by 2015, according public announcements and news reports. President Obama has proposed steps to accelerate America´s leadership in electric vehicles deployment, including improvements to existing consumer tax credits, programs to help cities prepare for growing demand for electric vehicles and strong support for research and development.

The production capacity of EV models announced to enter the U.S. market through 2015 should be sufficient to achieve the goal of one million EVs by 2015. The table below shows EVs expected to enter the U.S. commercial market over the next few years, including the production capacity by year, based on manufacturer announcements and media reports. Major auto manufacturers such as Chrysler, BYD, Coda, Honda, Mitsubishi, Hyundai, Toyota, Volkswagen and Volvo are not included in this table, but have announced or are expected to introduce EVs in this time period. Because the U.S. is a major market for these automakers, it is likely that additional production capacity of several hundred thousand EVs is not accounted for in this table.

Estimated U.S. Supply of Electric Vehicles from 2011 through 2015						
Manufacturer and Model	**2011**	**2012**	**2013**	**2014**	**2015**	**Total**
Fisker Karma PHEV	1,000	5,000	10,000	10,000	10,000	36,000
Fisker Nina PHEV		5,000	40,000	75,000	75,000	195,000
Ford Focus EV		10,000	20,000	20,000	20,000	70,000
Ford Transit Connect EV	400	800	1,000	1,000	1,000	4,200
GM Chevrolet Volt	15,000	120,000	120,000	120,000	120,000	505,000
Navistar eStar EV (truck)	200	800	1,000	1,000	1,000	4,000
Nissan LEAF EV	25,000	25,000	50,000	100,000	100,000	300,000
Smith Electric Vehicles Newton EV (truck)	1,000	1,000	1,000	1,000	1,000	5,000
Tesla Motors Model S EV		5,000	10,000	20,000	20,000	55,000
Tesla Motors Roadster EV	1,000					1,000
Think City EV	2,000	5,000	10,000	20,000	20,000	57,000
Cumulative Total						1,222,200

Note: The above numbers have been taken from announced production figures and media reports. In some cases more conservative estimates have been used due to: delays that have occurred since announced

New Initiatives to Support Advanced Technology Vehicles

President Obama is proposing three steps to address consumer demand and position the United States as a global leader in manufacturing and deploying next-generation vehicle technologies:

- **Make electric vehicles more affordable with a rebate up to $7,500**: The President is proposing to transform the existing $7,500 tax credit for electric vehicles into a rebate that will be available to all consumers immediately at the point of sale.
- **Advance innovative technologies through new R&D investments:** Building on Recovery Act investments, the President's Budget proposes enhanced R&D investments in electric drive, batteries, and energy storage technologies.
- **Reward communities that invest in electric vehicle infrastructure through competitive grants**: To provide an incentive for communities to invest in EV infrastructure and remove regulatory barriers, the President is proposing a new initiative that will provide grants to up to 30 communities that are prioritizing advanced technology vehicle deployment.

Source: http://www.whitehouse.gov/the-press-office/2011/01/26/vice-president-biden-announces-plan-put-one-million-advanced-technology-

The US President has announced that the FY 2012 Budget will include enhanced R&D investments in battery and other electric drive technologies.7 Investments will support R&D initiatives through DOE's Vehicle Technologies Program, as well as a new Energy Innovation Hub devoted to developing better batteries and energy storage capacity to support electric vehicles and other technologies.

President Obama called for putting one million electric vehicles on the road by 2015 – affirming and highlighting a goal aimed at building U.S. leadership in technologies that reduce our dependence on oil. This goal represents a key milestone in transforming our

national vehicle fleet, a transformation that will deliver significant benefits for the American people, including:

- Dramatically reducing petroleum dependence and improving transportation
- sustainability;
- Improved environmental stewardship;
- Job creation and economic growth.

Japan

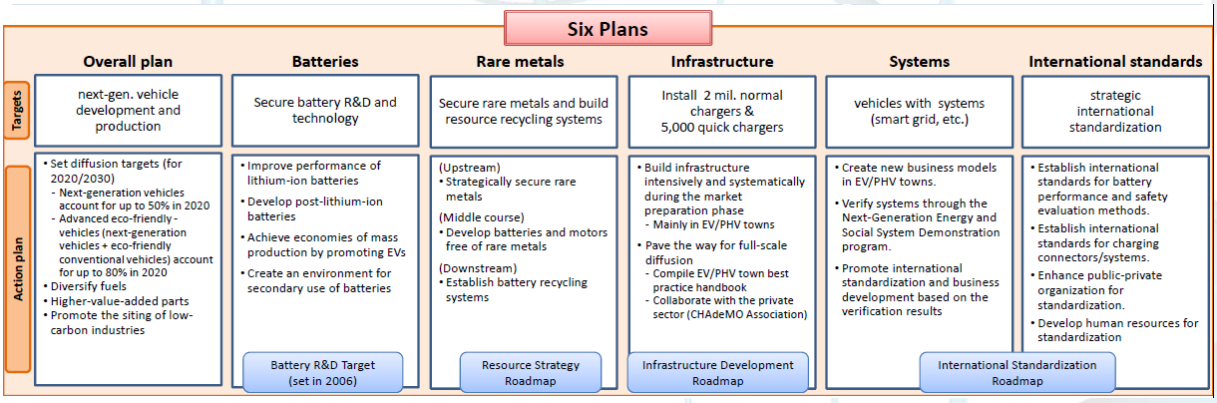
According to news from Japan Auto industry (www.jama-english.jp; http://www.eu-japan.eu/global/events/seminar-greencarenvironment-26102010.html?year=2010), The Japanese Ministry of Economy, Trade and Industry (METI) announced its *"Next-Generation Vehicle Strategy 2010",* for medium to long-term actions for the automotive and related industries. Strategy was presented last year 2010. Next-generation vehicles includes hybrid vehicles(HV), electric vehicles(EV), plug-in hybrid vehicles(PHEV), fuel cell vehicles(FCV), clean diesel vehicles(CDV) and compressed natural gas vehicles(CNGV) and others

The strategy comes at a time when there is an obvious increasing urgency to deal with global environmental challenges such as climate change or the limited supply of natural resources. It shows that the automotive industry must work to further improve fuel efficiency, reduce CO2 emissions, diversify fuel sources and introduce next-generation vehicles*1 to the market on a full-scale basis.

The “Next Generation Vehicle Strategy 2010”, issued in April 2010 by METI, is based on 6 strategies to develop vehicles of the future:

(1) An overall strategy to make Japan the base for the development and production of next generation vehicles;
(2) a battery strategy;
(3) a resources strategy;
(4) a strategy for the improvement of infrastructure;
(5) systems strategy;
(6) an international standardisation strategy (CHAdeMO Protocol).

By 2020, the objective of the government is to make next generation vehicles account for 20 to 50% in the total sales of vehicles in Japan and by 2030 for 50 to 70%.



	Short characteristics of strategies on e-mobility
France	In October 2009, the French Ministry for Ecology, Energy, Sustainable Development and the Sea, presented a national 14-point plan designed to accelerate the development and subsequent commercialization of electric vehicles and plug-in hybrids in France4. The government intends for its strategy to lead to the production of two million EVs and PHEVs (combined) by 2020. Among the budget indications of the plan are a public investment of 1.5 billion EUR to establish a network of 1 million charging points by 2015 and the building of a 625 million EUR lithium-ion battery plant at a plant owned by Renault with a public contribution of 125 million EUR.
Spain	The Pilot Project MOVELE of the Institute for Diversification & Energy Saving (IDAE) and the Spanish Ministry of Industry, Tourism and Trade. Being the initial phase of a bigger plan for one million electric cars on its roads by 2014 the initiative is meant to show the technical, economic and energy feasibility of electric mobility in urban and periurban areas.
Austria	The Austrian Climate and Energy Fund of the Ministries for Environment and for Transport, Innovation and Technology has a total budget of about 150 million EUR p.a.. For 2009, three funding programmes have been launched for the topics energy research, automotive R&D and market preparation. A major focus is put on R&D and demonstration activities for electro-mobility. Furthermore there are several instruments of the Federal Ministry of Transport, Innovation and Technology (BMVIT) for the development of automotive technologies that apply to the EV topic. The total funding is 60 million EUR.

Source: Report on a European Commission Workshop European Commissions' and Member States' R&D Programmes for the Electric Vehicle Draft Version 1.0 / 15 November 2009

Announced national EV and PHEV sales targets

Country	Target	Announcement / Report Date	Source
Australia	2012: first cars on road 2018: mass adoption 2050: up to 65% stock	04 Jun 2009	Project Better Place Energy White Paper (referencing Garnault Report)
Australia	2020: 20% production	10 Jun 2009	Mitsubishi Australia
Canada	2018: 500 000	Jun 2008	Government of Canada's Canadian Electric Vehicle Technology Roadmap
China	2011: 500 000 annual production	1 Apr 2009	"government officials and Chinese auto executives", per *The New York Times*
China	540 000 by 2015	8 Jul 2009	Pike Research
China	2008: 21 000 000 electric bike stock	27 Apr 2009	*The Economist*
China	2030: 20% to 30% market share	Oct 2008	McKinsey & Co.
Denmark	2020: 200 000		ENS Denmark
France	2020: 2 000 000	Oct 2009	Jean-Louis Borloo, Minister of Ecology
Germany	2020: 1 000 000	Nov 2008	Nationale Strategiekonferenz Elektromobilität
Ireland	2020: 350 000	28 Apr 2009	Houses of the Oireachtas
Ireland	2020: 250 000 2030: 40% market share	26 Nov 2008	Minister for Energy Eamon Ryan and Minister for Transport Noel Dempsey
Israel	2011: 40 000 EVs 2012: 40 000 to 100 000 EVs annually	9 Sep 2008	Project Better Place
Japan	2020: 50% market share next-generated vehicles	Jul–Aug 2008	Prime Minister Yasuo Fukuda
Netherlands	2015: 10 000 stock in Amsterdam 2040: 100% stock in Amsterdam (~200 000)	28 May 2009	Marijke Vos, Amsterdam councilmember
New Zealand	2020: 5% market share 2040: 60% market share	11 Oct 2007	Prime Minister Helen Clark
Spain	2010: 2 000	24 Feb 2009	Instituto para la Diversificación y Ahorro de la Energía
Spain	2014: 1 000 000	31 Jul 2009	Industry Minister Miguel Sebastian

Sweden	2020: 600 000	May 2009	Nordic Energy Perspectives
Switzerland	2020: 145 000	Jul 2009	Alpiq Consulting
United Kingdom	2020: 1 200 000 stock EVs + 350 000 stock PHEVs 2030: 3 300 000 stock EVs + 7 900 000 stock PHEVs	Oct 2008	Department for Transport, "High Range" scenario
United States	2015: 1 000 000 PHEV stock	Jan 2009	President Barack Obama
United States	610 000 by 2015	8 Jul 2009	Pike Research
Worldwide	2015: 1 700 000	8 Jul 2009	Pike Research
Worldwide	2030: 5% to 10% market share	Oct 2008	McKinsey & Co.
Worldwide	2020: 10% market share	26 Jun 2009	Carlos Ghosn, President, Renault
Europe	2015: 250 000 EVs	4 Jul 2008	Frost & Sullivan
Europe	2015: 480 000 EVs	8 May 2009	Frost & Sullivan
Nordic countries	2020: 1 300 000	May 2009	Nordic Energy Perspectives

Source: *International Energy Agency:Technology Roadmap, 2009*

3. CURRENT INITIATIVES AND CAPACITIES FOR E-MOBILITY IN CHOSEN PROJECT PARTNERS´ COUNTRIES OF THE SOUTH-EAST EUROPE REGION

This chapter describes basic characteristics in chosen countries in South-East Europe region in terms of development of electromobility. Electromobility becomes the most important area of discussions and future development of automotive industry and research and development activities as well. Electromobility in the South-East Europe countries needs more efforts mainly in area of cooperation with partners from the Western European countries and looking for some interconnections related to the automotive industry. Based on our previous analysis there are more than 200 automotive R&D capacities and 42 automotive production and assembly plants in South East region (Source: *Švač, V. et al: Innovation Trends and Challenges and Cooperation Possibilities with R&D in Automotive Industry*. AUTOCLUSTERS project, Trnava, Slovakia, 2010)

Bulgaria – Short analysis of current situation in terms of e-mobility in Bulgaria
Written by Nikolay Madjarov, TU of Gabrovo

The mobility takes a great place in modern society. It becomes almost impossible to be active without mobile phones, computers and cars. At other hand saving nature and own country in privacy attains bigger importance for every state and government.
Much was talked, much was written.
Production of electric vehicles is advancing forward with greater pace than ever.

How will electrical vehicles be introduced to the market?
How is their standardization going to be made?
What infrastructure has to be built for their usage?
How to recycle their batteries?
Many questions like these are already finding their answers.

The Bulgarian Ministry of Economy, Energy and Tourism initiate a dialogue that will facilitate the entry of the electric vehicles in Bulgaria and around the world. Part of it is the “Electric Vehicles – Challenges of the New Mobility” conference that was organized on February 10 and 11 in Sofia. There were presented leading car manufacturers, design offices, manufacturers of batteries and charging infrastructure, investors in projects for the production of electric vehicles and infrastructure in Bulgaria.

The government was praised by vice president of the European Commission and Commissioner for Industry and Entrepreneurship Antonio Tajani. He said that Bulgaria occupies the leading positions among European countries in terms of policy for the introduction of electric cars. Also, there were represented good Practices at National and Local Level from Different EU Countries.

The main Bulgarian contribution is four traditional vehicles converted to electricity. New Renault Kangoo converted by a team of University of Transport "Todor Kableshkov with solar panels on the roof, and the first converted used car in Bulgaria - Fiat Punto, a project of Kostov Motors and batteries from Bulgarian manufacturer Monbat, leight freight Pony,

original development of Di Fan, Lom and light motor lorry, developed and produced by Bgcar.

The participants in this invent had opportunity to make test-drive of e-vehicles: Mitsubishi I miev, Mercedes e-cell, Peugeote I on, Citroen c-zero and two e- bicycles. The team of TU Gabrovo participated in this event (look at photos below).

The Bulgarian institutions have different intentions and initiatives in term of e-mobility. It is formed group of experts in Ministry of Economy, Energy and Tourism discusses opportunities and potential of the e-mobility, options for stimulating the purchase and use of electric cars in Bulgaria.

In Sofia is founded **Electric Mobility Industrial Cluster (EMIC).** This is a non government organization of institutions and companies, related to the research and development of elements, parts and services for manufacturing of electrical vehicles and conversion cars with internal combustion engine, environmental protection, utilization of renewable energy, implementation of innovations and know-how and latest scientific achievements are basic principles in the search for sustainable solutions for the development of "green industry" in Bulgaria. EMIC combines knowledge and experience of various companies, organizations

and individuals. At the beginning at the end of 2010 it has 8 members, now it has 20 members and 6 partners.

The Bulgarian company Renergy Ltd. initiated a pilot project "e-mobility" associated with the construction of public infrastructure of charging stations for electric vehicles in Sofia. The aims of the project are:

- promoting electric vehicles and the concept of sustainable mobility,
- construction of public infrastructure of charging stations,
- stimulating capital citizens, companies and institutions to buy e- vehicles,
- help for reducing pollution,
- contribute for sustainable development and improving the appearance of Sofia.

The concept of the project envisages the next 12 months to be built 15 to 20 charging stations for electric vehicles at key locations in Sofia. The first year of operation of the charging system allows free charge for owners of the electric vehicles. The cost of charging during this period will be covered by Renergy Ltd. In the next phase of the project, Renergy Ltd plans extension of the project in other Bulgarian towns Bourgas, Plovdiv and Varna and seaside resorts.

One of the world leaders of e-mobility, company Siemens is a technology partner of the project in terms of monitoring, management and communication between electric vehicles, charging stations and electrical network.

European Bank for Reconstruction and Development (EBRD) has provided grant funding under the project. The aim is to prepare an analysis of the regulatory framework, involved in the process parties, institutions and administrative procedures, and the main challenges facing the financial and technical development of the network of charging stations in urban environments.

Useful links:
http://electromobili.bg/
http://www.publics.bg/en/news/3722/Experts_Electric_Vehicles_Are_Only_One_Part_of_Electric_Mobility.html

We identified the following research organizations:

1. **Higher Transport School "Todor Kableshkov", Sofia.**

There is research team. Head of the group is Assoc. Professor Ivan Milenov, PhD. In the last five years their research has been in the field of AC drives for electromobiles. The final purpose of this research is to create methods for designing electrical cars, according European standards.

2. **Center for investigation of batteries, Technical University, Sofia**

In this center charging and operation characteristics of different type of batteries, and especially this for electrical cars, are investigated. Head of the research group is Assoc. Professor Stoyan Gishin, PhD.

Romania – Report about e-mobility
Written by Cristian- Gyozo Haba, TU of Iasi

1. TU of iasi held three workshops of working group of Technical University of Iasi. On these workshops were discussed information about the Methodology for writing *Analysis e-mobility* and how the requirements can be practically achieved. The main conclusions of the working group in the frame of TU Iasi are:

- the targeted area of interest for small project E-Mobility **"***Iasi metropolitan area*" has been established;
- the need to determine the existing situation in the **"***Iasi metropolitan area***"** and the main problems facing have been established;
- the directions and means to solve by extending e-mobility (tram, trolley bus, electric train, electric scooter and motorcycle) have been analyzed and proposed;
- the need to contact the local responsible factors has been imposed.

2. Local factors involved have been contacted:
   a. Iasi City Hall
   b. Iasi Metropolitan Area Association
   c. The Public Transport Autonomous Administration of Iasi. (RATP).

At all the meetings we presented the project *Analysis e-mobility* and concrete ways for cooperation has been proposed. Our dialog companions were interested to cooperate and disposed to provide the information they hold concerning:

- the state of infrastructure (it means roads, tram and trolley bus runways, electrical supply network, power stations, etc.);
- the current and future transport needs in "*Iasi Metropolitan Area*";
- works (projects) to improve the e-mobility condition, in progress in different stages;
- local strategy regarding passengers and goods transport for the city of Iasi and Metropolitan Area;

3. We received from partners outlined above requested materials (partially) – ongoing activity

4. Sorting material and per person allocation of concrete material to study and exploit - ongoing activity.

Slovenia – electromobility
Written by Automotive Cluster Slovenia

Technical point of view
The company Elektro Ljubljana currently enables the owners of the electric vehicles to charge in seven points - six in Ljubljana and one in Vrhnika, presumably by the summer, this number will double. Electricity at all filling vacancies is derived solely from its own renewable energy - green energy. Elektro Ljubljana will complement the infrastructure charging points in proportion to the expanding use of electric vehicles in Slovenia, but also offers the possibility of installing charging stations for all interested investors. In all of its filling positions Elektro Ljubljana offers free electricity (and it is expected to do so, until the end of 2011).

Currently the post of Slovenia has actively introduced more electric vehicles in its fleet of delivery vehicles. The company is actively involved in environmental projects in the international area, which are carried out under the Post Europ, International Post Corporation and Universal Postal Union. In this context, the Post of Slovenia has set up the goal of reducing carbon emissions by 2020 for 20% in comparison to the level in the year 2008. Post of Slovenia currently undertakes the following activities:

- 3 light trucks with electric drive (e-LDV) are from April 2010 started to be used for delivery in urban centres Celje, Koper and Ljubljana
- In 2009 were for the first time introduced four bicycles on electric drive, which was followed in 2010 with 37 additional bicycles with electric drive
- They have carried out the contract of two electric cars, which should be delivered at the end of the year 2010,
- In June 2010, they have tested the electric vehicle bureau
- They are continually monitor and seek the appropriate providers for possible testing of e-vehicles, which would be suitable for postal activities

According to a study made under the title 'The strategy of eco-efficiency of transport in the Post of Slovenia", which is based on the gradual introduction of environmental friendly vehicles, (which introduction was proved to be reasonable in both views: environmentally and financially) will, during the preparation of the business plan of the Post of Slovenia, with consideration of the guidelines of the elaborated strategy, and with consideration of the current trends, prepare a proposal on alternative propulsion vehicles, showing the effects (economic and environmental) for the coming 5-year period.

R&D point of view – R&D infrastructure

Some Members of the Automotive Cluster of Slovenia are already actively involved as producers of certain components of the leading manufacturers of electric vehicles (Hidria, Iskra Avtoelektrika, Elaphe). When the production of next-generation Twingo and the Smart Fourfour in Revoz in Novo Mesto will start, there is a possibility that at least some of these vehicles will be produced in as electrical.

In 2007, the Agency for Research and Development (ARRS) funded a targeted development projects (CRP) in the amount of 11,122,500.00 Euros, among which, the largest project is “Slovenia and the transition to a low carbon society”. In 2009, the Ministry of Higher Education, Science and Technology (MVZT) carried out a tender for the Centre of Excellence (CO) in amount of 80 million Euros. Among the selected CO is also the CO for the low-carbon technology (CO NOT).

CO NOT combines key Slovenian potential in new, low-carbon energy sources, and use of these resources in fixed and mobile consumers. They will convert the solar energy into electricity and store it in the batteries and super capacitors (Lithium Technologies) or it will be converted into hydrogen, which will be used in fuel cells (hydrogen technology). Lithium and hydrogen technologies form a whole, which in will in the future cover a large spectrum of users, such as hybrid and electric cars, energy supply of buildings and other. During the transitional period it will apply for the same purposes as hydropower, biomass, etc.. The CO will join 22 partners, from which 12 laboratories (from two research institutes and two universities) and 10 industrial partners from different Slovenian regions. The consortium covers the whole vertical, ranging from basic applied research to the development of prototypes and, finally, modules and systems. It combines complementary knowledge, which is covering nearly all areas required for the development of lithium and hydrogen

technologies on the basis of primary solar energy. Benefits of CO is the focus on low-carbon technologies, multidisciplinary, and complementary skills of partners in the consortium, which covers almost all areas required for the development of lithium and hydrogen technologies on the basis of primary solar energy.

Croatia – Analysis of e-mobility in Croatia
Written by Branko Mihalić, Autocluster Croatia

It is known that the automobile industry in Croatia is almost not represented, if we talk about the production of final product - a car. The only existing is the production of some small series or special products (tractors, busses, special vehicles such as fire-fighting vehicles and so), lacking any significant foreign investment. It is produced solely what the domestic economy can produce and sell in the market (local & global).

Where Croatia has a significant role in the automotive industry, it is the development and manufacture of parts for the automotive industry which are exported to the global market, though even that did not particularly strong as some other successful examples (Slovakia, Hungary, Slovenia, ...). In doing so, we can rely on the expertise of our workers and engineers, we have development potential, we have high product quality and good industrial tradition. So we are able to compete with the "newly discovered" cheap labor markets, but yet not through lower prices, but high quality and technologically advanced products and services.

Typical is also a lack of support from the state, as this sector is considered strategic as it is in some neighboring countries. However, the automotive industry in Croatia, including more than 80 companies and over 10,000 employees, which is not negligible.
In such a situation, especially in light of the indifference of the state, nor E-mobility infrastructure in Croatia is not very developed because it is left to private initiative and enthusiasm of individuals who want to create something new or show that something is possible, however, all this has not in some commercially and it would hardly be able to pay off commercially in the near future.

Some of the entities that are active in this respect are:

1. BRODARSKI INSTITUT
2. DOK-ING d.o.o.
3. VST d.o.o.
4. AVL-AST d.o.o.
5. ZAGREB UNIVERSITY– FACULTY OF MECHANICAL ENGINEERING AND SHIPBUILDING
6. ZAGREB UNIVERSITY– FACULTY OF ELECTRICAL ENGINEERING AND COMPUTING
7. SPLIT UNIVERSITY– FACULTY OF ELECTRICAL & MECHANICAL ENGINEERING AND SHIPBUILDING
8. CROEV – CROATIAN ELEKTRIC VEHICLE ASSOCIATION
9. EKO-ENERGO KLASTER d.o.o.
10. AUTOCLUSTER CROATIA

BRODARSKI INSTITUT

Member of the Autocluster CROATIA, Brodarski Institut from Zagreb, has been working for years with SMEs from Croatia and the Region on new product development projects. The

projects have been financially supported by national funds of the Ministry of sciences and technology or by EU funds through the program FP7.

Brodarski Institut is a research and development institution in the field of applied technical sciences and technology. The Institute is a limited liability company in the ownership of the Republic of Croatia. Its more then 60 years of experience in development of complex systems and products enabled it to develop a large specter of scientific disciplines, appropriate infrastructure and human resources. It is situated in the south part of the Croatian capital Zagreb on an area of 150.000 sq. meters, with 32.000 sq. meters of labs and offices and employs about 100 full time and 30 to 50 part time researchers. At the beginning of this millennium the Institute understood the right meaning of sustainability for the economy as a whole. Therefore the Institute directed its huge potential towards activities of a paramount importance for sustainable development of the society: sustainable mobility (maritime and inland water as well as road transport), renewable energy, energy efficiency and ecology.

For the first 40 years of existence the Institute has been dealing with military technology, and 20 years ago it started with the transfer of its knowledge and expertise from military technology to civil application.
In the field of machinery and automotive industry the Institute, in close cooperation with SMEs, has led several projects.

Tractor for Forest Exploitation

Third generation tractor for forest exploitation has been developed in cooperation for several SMEs from Croatia. Besides some innovations in the mechanical systems, the specific of this machine is its environment friendly systems using bio-fuel and bio-degradable lubricant.

Telescopic Forklift

A new generation telescopic forklift with a variable spatial reach has also been developed by Brodarski Institute for the benefit of an industrial from Croatia. The undercarriage of a conventional forklift HercuLift D30 was used as a base of the prototype. Hydraulic and mechanical structure of the machine is designed by virtue of state-of-the art and in accordance with durability and stability standards. The telescopic forklift is of medium category, with 3 tons lifting capacity, 4 m lifting height and 1500 kg capacity in full reach. Forks can be switched with other tools, such as a grab bucket, digging bucket or a loading shovel. Active stability monitoring system is augmented enabling thus safer activity with increased productivity. Protective cage structure provides a high protection level for the operator and ensures a good view of the cargo.
The forklift enables maximum environmental protection by reducing harmful emissions.

Projects in Road Transport System and Means
The experience and expertise gained in special vehicles and machinery enabled the Institute to develop activities in the field of road transport. According to its orientation towards sustainable development, for the last several years Brodarski Institut is focused on the following area of road transport:

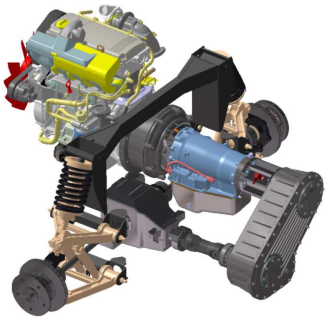
- Research and development of drive systems for transport means that will enable fuel economy and protection of the environment. Even more, research and development of drive systems for Zero-Emission-Vehicles.
- Having in mind that passenger's transport in urban and suburban areas, due to the mass use of cars, is responsible for congestions and, as a consequence, for fuel and time wasting, pollution and frustration, to this kind of passenger's transport system was put a special consideration. Thus the Institute is focused on research of transport modes (like flexible transport, door to door, etc,) that will enable decrease of the road congestions which may bring enormous benefits concerning fuel economy, environment protection and social life.
- Innovative transport modes need appropriate transport means. Therefore the Institut is also focused on research and development of transport means.

According to its orientation, Brodarski Institut has elaborated several studies concerning energy efficiency in road transport, based on the investigation of the World best practice and its own research. Some of these studies are presented in the document of the Institute's experience, and some projects will be initiated for cooperation with SMEs.

Electric Chassis for Green Low Floor Minibus

Since urban transport causes the biggest part of road transport GHG emissions and is manly using fossil fuels, it is the most responsible for pollution of the place where more than 80% of the European population live in – urban areas. Low floor minibuses in urban transport used in "door to door" transport mode and as a feeder of the big traffic lines, may substantially decrease congestions. In the context of upcoming Peak-Oil, GHG limitations and urgent need for environment protection, this kind of passenger transport means deserves mush more consideration.

Brodarski Institut was looking for an appropriate solution for a electric low floor minibus. A new concept of drive train was conceived (protected industrial design) and, in partnership with an industrial from Serbia and in cooperation with some Croatian SMEs, a new chassis for low floor minibus was developed. Based on this chassis, our partner will built minibuses with many competitive advantages compared to the existing solutions available on the market, especially in regard of size/capacity and fuel consumption.



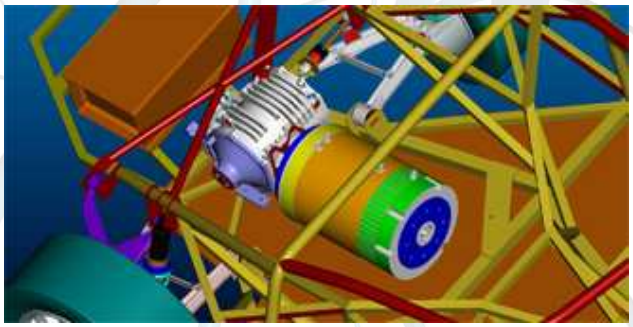
Our next development project in this field will be implementation of an electric drive in this chassis to get electrically driven minibus, i.e. a new minibus which will be a zero-emission-vehicle. The project will be developed in cooperation with several SMEs from Croatia, Serbia and Germany, and it is proposed for financial support from EU funds from FP7 program. New partners from SEE are also invited to join this project in the attempt to develop an advanced low floor minibus.

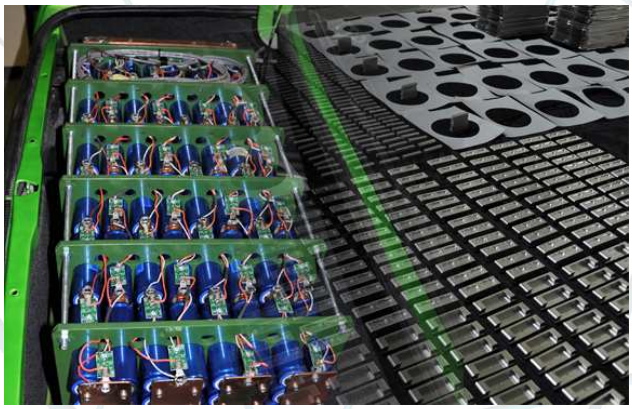
XD CONCEPT by DOK-ING

- Fully electrically driven concept car
- Made in Croatia
- Shown at Geneve Auto Salon 2010.

VST CONVERSION

- Ultimate Sporty Electric Car
- “Acceleration better than any Ferrari”
- Streetrace 402 Champion
- 200 – 800 HP
- Guinness Book of Records Application
- 200 kms range





In the coming period, AC Croatia should appear as a link between all those who are somehow involved in the automotive industry in Croatia. Given the variety of products and services provided by Autocluster member, the disadvantages outlined and the fragmentation of local economy, it is obvious that we need to connect, organize, consolidate our resources and specialize in specific products. The Clustering model is tested to overcome these shortcomings, as well as to increase competitiveness and innovation.
Autocluster Croatia will in fact represent the interests of its members and continuing its proactive approach, information and lobbying, contributing to the promotion, information and successful integration into the global automotive industry, as well as the utilization of domestic and international (EU) support for research and development, introduction of modern technologies, etc.

Serbia Electromobile

Written by Igor Vijatov, Autocluster Serbia

Serbia government doesn't have strategies, regional plans, cities activities regarding infrastructure for electric car. In Serbia we can find some independent initiatives, which are not coordinated and supported by any government agency.

1. Serbian Deputy Prime Minister Bozidar Djelic said that our country will soon be opening the largest branch of the German research center Fraunhofer and participate in the German project for the production of batteries for electric cars. They also discussed specific projects, such as the development of electric cars.

2. Ministry of Environment and Spatial Planning Mr Oliver Dulić
   Ministry is in line with its policy of incentives for the introduction of clean technologies, 10 months ago ministry has brought a decree to subsidize purchase of hybrid vehicles (both classical and electric) to 100,000 dinars.
   This Ministry will intercede for the new law which will liberate import, free from custom and without VAT.
   Minister said: Given the fact that they are relatively expensive and inaccessible even to citizens of countries with much higher standard, it is essential that these vehicles are treated differently than vehicles with internal combustion engines.

3. Kragujevac – first electric vehicle, made on Zastava 10 platform, registered in Kragujevac.
   First electromobil was registered for public transport and can develop speed up to 120 km/h, car can be driven 100 km with one battery charge.
   Team of Zastava experts, that made conversion of the car with gasoline engine to the electric engine, communicated that registration followed the detailed examination of car prototype at Mechanical faculty in Kragujevac and after complying applicable laws and issuing required certificates.
   Batteries in the car are lithium batteries of Chinese world known producer, which was contracted by expert team for long term cooperation on electromobil development activities. This cooperation will be expanded to further development of electro-components for electromobil. It is world known producer and supplier of electro-components, but so far its identity is kept secret.
   Lot of time will be needed to begin with serial production of electromobile, said member of the team, Mr. Radojević.
   According to Radojević, electromobil will have to go through serious testing in factory conditions, and after that, the testing of technical solutions and performance in public transport.

4. Electric car promotion
   Electric car Tesla Roadster (Tesla Roadster) was in Belgrade, as part of promotional tour that began in the German city of Essen, and will end in Istanbul.
   Special small battery electric sports car was fully charged in eight hours of special equipment, which was set up in front of City Power Beograd (EDB).
   Division Director EDB of Planning and Investment Nebojsa Radovanovic told that the device battery power temporarily placed in front of Old Court and announced that EDB will soon set up a similar device near the "blue bridge" at Milan Toplice bb, where are plants of the company.
   He said that the EDB will soon get from RWE four cars to electric drive as a gift.

When it has seen a rise in the use of a car, according to him, the means for power - the network voltage of 220 volts will be placed around the city and EDB therefore will have no problems in its distribution network.

Slovakia – electromobility development

Written by Vladimír Švač, on behalf Automotive Cluster – West Slovakia, Trnava

Automotive industry in Slovakia is very well established. Slovakia belongs to the countries with the highest number of produced cars per 1000 inhabitans. In Slovakia, there are established 3 worlds know car manufacturers: VW Slovakia in Bratislava, PSA PeugeotCitroen in Trnava and KIA Slovakia in Zilina.

In spite of very well developed automotive industry in Slovakia there are missing activities related to the development of electromobility. Based on our research findings we can say that electromobility in Slovakia is in very weak phase of development. There is no national strategy for electromobility, no national action plan for development of electromobility, but Slovak Ministry of Economy expressed an interest in this importatnt field of automotive industry.

Next, we have identified several research initiatives at Slovak technical universities (Slovak University of Technology in Bratislava, Technical University of Košice) with focus on e-mobility. Some activities are realized by private companies (RWE, Dalkia, VW). Interesting initiatives are realized by organization Automotive Cluster – West Slovakia in terms of developing policies, strategies and cooperation on regional level, international project cooperation with partners from EU countries and cooperation activities with neighbouring cluster from Austria: Automotive Cluster Vienna Region (Austria).

Some basic facts about electromobility in Slovakia:

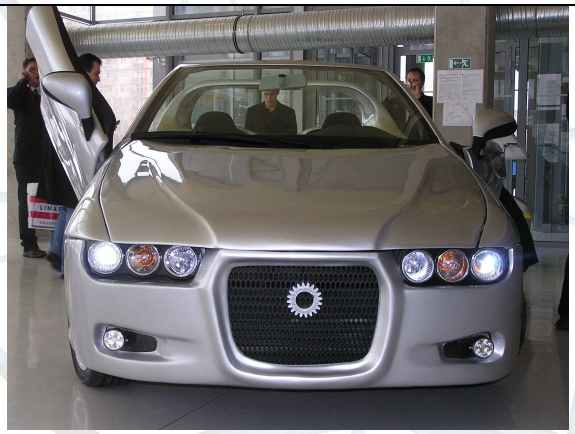
- there is only one charging station for electric cars in city Košice on the East of Slovakia (introduced in December 2010) built by RWE company (Východoslovenská energetika, a.s.). Plan of RWE is to build e-mobility charging station network mainly to connect the capital city of Slovakia, Bratislava and the second largest city of Slovakia, Košice on the East of the country.
- there is approved law (2nd March 2011) based on DIRECTIVE 2009/33/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on the promotion of clean and energy-efficient road transport vehicles
- Peouget company started sales of electric cars Peugeot iOn
- VW Slovakia plant produces car VW Touareg Hybrid
- Company DALKIA will use electric car Citroen C-ZERO, Dalkia is a European leader in the provision of energy services, and has been active in Slovakia since 1992

Examples of three domestic schools research projects are part of development activities in area of electromobility in Slovakia:

- Slovak University of Technology in Bratislava, cooperation between two faculties: Faculty of Mechanical Engineering and Faculty of Electrical Engineering and Information Technologies and private company E-ON – project of **Students electric formula**
- Technical University of Košice, Faculty of Mechanical Engineering – **Students Project ICAR 2010**
- Technical University of Košice, Faculty of Electrical Engineering and Informatics – **small project with focus on vehicle electronics and informatics systems**
- Secondary Technical School of Automobile in Košice – **Students Electric Vehicle**

Students electric formula (Slovak University of Technology in Bratislava

Students electric vehicle - Secondary Technical School of Automobile in Košice



Students ICAR 2010 – Technical University of Košice

E-Mobility Technology in Hungary
Adapted from ITD Hungary – Investment and Trade Development Agency
Source: ITD Hungary: E-mobility technology in Hungary, Budapest, 2010

ITD Hungary, the government's investment and trade development agency, is taking a proactive involvement in the "greening" process currently under way in the automotive industry, a trend that has been accelerated and institutionalised by the effects of the global economic crisis. Hungarian companies with the necessary skills to become involved in the development and manufacture of alternatively powered vehicles are being pro-actively sought out.

In Hungary there are several pro-active organizations related to the e-mobility. We have selected some of them with basic characteritics:

Alliance of Alternatively Driven Vehicles
The alliance's tasks include assisting the management of alternatively powered motorsport disciplines, organising races for alternatively powered vehicles, developing appropriate rules for these events and arranging conferences, trade fairs and forums for domestic and international innovators, developers and researchers associated with alternatively powered vehicles.

The Széchenyi Race for Alternatively Powered Vehicles
Széchenyi Race is organised every April in Győr. Europe's top competition for innovators working on the development of alternatively powered vehicles is organised by the INNO-MOBIL Sports Association and the Alliance of Alternatively Driven Vehicles (Alternatív Hajtású Járműsport Szövetség). The event welcomes vehicles powered by a variety of methods, including electrical current, hydrogen, solar power and compressed air – the possibilities are almost endless.

The Hungarian Vehicle Engineering Cluster (HVEC)
was founded in January 2009 by six Hungarian engineering SMEs – all with considerable experience in international projects. HVEC's management organisation is MAJÁK Non-Profit Ltd., headed by the former chairman of the Pannon Automotive Cluster (PANAC) Zoltán Kabács. HVEC aims to coordinate the activities of Hungarian engineering companies operating in the field of vehicle and vehicle parts development. The organisation assists SMEs by jointly marketing their operations in target countries, supporting knowledge transfer among employees and running a knowledge database for members. HVEC offers complex solutions and services to companies already engaged in R&D, and those who wish to be involved in vehicle development in the future. The cluster was established to implement joint innovation projects, as well as to support individual inventors and help establish new companies and spin-offs. HVEC cooperates with research centres, universities and intermediaries to form clusters and networks, and spur innovation and economic development.

Leila Motors Ltd.
was launched in 2009 to develop unique electric vehicles with high technical and design specifications. The company's know-how is based on the 20 years of experience gained by Intermotor Environmentally-Friendly Development and Manufacturing Ltd. The companyhas industrial capacity for small series production. Thanks to the integration of design and technology development, Leila is able to create products that are both high-tech and aesthetically pleasing, while meeting a demand for custom designs and concepts.

The ANTRO Group
has developed a very charismatic Picture of the car of the future. The process of addressing today's problems has resulted in the Solo concept, a three or four seater multi-hybrid car that comfortably meets the needs of one or two passengers. Combining the highly efficient use of renewable and alternative energies solves the problem of limited oil resources and road traffic pollution. The solar cells on the roof are immediately visible – these charge the batteries while the car is running or parked. The batteries can also be charged from the electricity mains using plug-in technology. The use of electric Wheel motors and a multi-fuel motor generator allows range to be increased up to 600 miles with a maximum speed of 85 miles per hour. Energy loss is reduced by a regenerative braking system and shock absorbers that transform the kinetic energy of the car's movement. However, the key to efficient energy management is reduced air resistance and low weight. The Solo is built with an extremely light carbon composite body that is highly durable and offers outstanding energy absorption. The rounded shape of the vehicle not only creates a friendly look, it also significantly reduces the resistance. Results in terms of CO2 emissions and energy efficiency are also convincing: 45g per km, one third of the emissions produced by today's cars. Fuel consumption can also be kept below 2 litres per 100 km. Solo, a concept car, is the first prototype created by the ANTRO Group. There is a long way to go before the car is market ready and the group is currently seeking investors, partners and, eventually, drivers who want to make a difference.

Széchenyi István University Regional University Knowledge Centre for the Vehicle Industry

Main references:

R&D projects in co-operation with SMEs and multinationals, such as Audi Hungária Motor, Borsodi Műhely, GMPowertrain, Rába Axle and Visiocorp). The Regional University Knowledge Center for the Vehicle Industry serves the research and development needs of the automotive industry in the economic catchment area of Győr and the Slovak-Hungarian border region.

Willisits Engineering Ltd.

was launched in 2009 to develop a world-class electric vehicle drive system with high technical specifications. The company's wealth of know-how is built on 20 years of experience gained by Intermotor Environmentally Friendly Development and Manufacturing Ltd. Willisits develops electric motors with controllers on different power levels for a variety of usage profiles and in a broad range of production quantities in accordance with client demands. Willisits also has industrial capacity for small series production. The company's strategy is to maximise efficiency and quality by focusing simultaneously on cost-effective manufacturing and on establishing an optimal power-to-weight ratio.

First charging station for electric cars in Budapest

Electricity distributors Elmü and Émász, majority-owned by Germany's RWE-EnBW, has started operating the first two electric cars in its fleet of vehicles and opened its first charging station in Budapest. Retail consumers may make use of the charging station for electric cars free for a year until September 30, 2011.

Elmű-Émász estimates there are only ten electric cars in operation in the Hungarian capital, and about twenty overall in the whole country. High purchasing prices are the main obstacle of making the electric car a real alternative to petrol-fuelled vehicles. An electric car powered by lythium-ion battery may cost three or four times more than a car of similar size powered by traditional fuels. "The flag is up: competition will bring prices down in the next few years" – said Marie Therese Thiell, chairperson of Elmü-Émász BOD officiating the inauguration of the charging station. – "No doubt, electric cars are the vehicles of the future" – she added.

Hungarian universities with focus on automotive field:

Budapest

Budapest University of Technology and Economics (BME)
- hydrogen storage
- electric propulsion (DC motors)

Eötvös Loránd University (ELTE)
- development of hydrogen fuel cells

Óbuda University
(successor to the Budapest University of Technology - BMF)
- Donát Bánki Faculty of Mechanical Engineering and Security Technology
  - pneumatic vehicles
- Kandó Kálmán Faculty of Electrical Engeneering
  - electric propulsion

Gödöllő

Szent István University
- biofuels

Győr

Széchenyi István University
- development of electric propulsion (DC motors)
- experiments with solar powered vehicles

Miskolc

University of Miskolc
- pnuematic vehicles

Nyíregyháza

College of Nyíregyháza

Debrecen

Debrecen University
- electric propulsion (AC motors)
- pneumatic propulsion

Source: ITD Hungary: E-mobility technology in Hungary, Budapest, 2010

4. SWOT ANALYSIS OF CHOSEN PROJECT PARTNERS´ COUNTRIES IN THE SOUTH-EAST EUROPE

In this chapter, our intent was to identify basic characteristics of field electromobility in project partners' countries. I could help us to better create list of recommendations for national or regional level, for developing national or regional strategies and policies for supporting and developing e-mobility in South East Europe region in connections to the Western Europe.

SLOVENIA
SWOT ANALYSIS – „E-MOBILITY“ small project **Objective:** Supporting of E-Mobility initiatives in PPs´ countries
Strenghts
❑ Small country (easier to facilitate the infrastructure of charging points) ❑ Growing trend of renewable energy ❑ Good research infrastructure ❑ High environmental awareness ❑ Industry associated with large car manufacturers ❑ High production of components for vehicles with internal combustion engine and battery electric vehicles
Weaknesses
❑ Infrastructure ❑ Requires the development of young researchers in the field of batteries ❑ Poor linkage between industry and electrical distributors ❑ High price of batteries in the world market ❑ Indefinite standards for charging stations, linkage of charging points with vehicles, safety and test protocols
Opportunities
❑ Consolidation in the production of components for battery-electric vehicles ❑ Production of electric motors for major car manufacturers ❑ Reducing the dependence on imported fossil fuels ❑ Improving local emissions of NOx and PM10 ❑ Improving the power network by incorporating renewable energy and battery electric vehicles ❑ Sectoral integration
Threats
❑ High financial input ❑ Access to new technologies ❑ Unknown timeline of the decline in price of technology ❑ Risk of lack of raw materials ❑ Resistance to electric vehicles (cost, safety, driving distance) ❑ Not realistic expectations of the public

BULGARIA
SWOT ANALYSIS – „E-MOBILITY“ small project **Objective:** Supporting of E-Mobility initiatives in PPs countries
Strengths
❑ Increase the energy efficiency in personal transportation; ❑ New and innovative product; ❑ Decrease the pollution in city areas, E-mobility policy coincide with green philosophy; ❑ Bulgaria has traditions in electrical motors production; ❑ Electrical infrastructure is well developed.
Weaknesses
❑ Currently the production of electrical energy storage systems (batteries) is highly energy demanding and environmentally unsafe process; ❑ Lack of automotive manufacturing capacity ❑ Most of the electricity is produced from fossil fuels or non renewable sources; ❑ Risk of peak hours of electricity overconsumption.
Opportunities
❑ Arrival of new technologies; ❑ Undeveloped product; ❑ Investments in infrastructure projects; ❑ Investments in production facilities; ❑ Growing internal and European market.
Threats
❑ Lack of marketing experience in automotive business; ❑ Lack of experience in car production; ❑ Development of other energy efficient transport ❑ Price wars with competitors.

SLOVAKIA
SWOT ANALYSIS – „E-MOBILITY“ small project **Objective:** Supporting of E-Mobility initiatives in PPs countries
Strengths
❑ domestic universities are very interested in cooperation on research projects with foreign partners in the field of e-mobility ❑ several small research activities in e-mobility at domestic universities ❑ very strong Slovak automotive network consists of OEMs and suppliers ❑ a lot of capacities for ICT R&D and new material research for green cars ❑ support activities of Automotive Cluster – West Slovakia in creation of strategic and regional documents, initiatives ❑ Ministry of Economy expressed an interest in developing e-mobility ❑ several positive activities of private companies (RWE, E-ON, Dalkia, VW)

❑ approved Slovak Law: "Návrh zákona o podpore energeticky a environmentálne úsporných motorových vozidiel a o zmene a doplnení niektorých zákonov", approved 2nd March 2011 (http://www.rokovania.sk/Rokovanie.aspx/BodRokovaniaDetail?idMaterial=19260) based on DIRECTIVE 2009/33/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on the promotion of clean and energy-efficient road transport vehicles (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0033:CS:NOT)
Weaknesses
❑ Slovakia has not strategic document related to the e-mobility or green cars initiative ❑ established OEMs have not R&D activities in Slovakia ❑ domestic universities have lack of financial resources for e-mobility R&D ❑ weak marketing management and business development management at domestic universities ❑ still weak involvement of government in area of e-mobility
Opportunities
❑ common research projects in FP7 programmes ❑ universities have to look for strategic industrial and research partners ❑ wide range of opportunities for building cooperation on R&D with prestige partners from abroad ❑ establish cooperation with other governments, countries (Germany, Austria, Switzerland, Italy etc.) ❑ new wave of attracting new foreign investors in the field of R&D
Threats
❑ long term government lack of interest about e-mobility sector ❑ lack of financial resources for e-mobility development on national level ❑ disability to be involved in great EU or world research projects with strong foreign partners

HUNGARY
SWOT ANALYSIS – „E-MOBILITY" small project **Objective:** Supporting of E-Mobility initiatives in PPs countries
Strenghts
❑ history in electric vehicles (early 80s) ❑ new developments in the 90s ❑ engineering background ❑ strong supply base ❑ regional supports
Weaknesses
❑ lacking e-Initiatives ❑ national strategy

❑ lack of ressources ❑ national dedicated support ❑ conscious education of future employment or retraining
Opportunities
❑ european initiatives ❑ automotive industry opens to eMobility ❑ other industries open to eMobility (e.g. Energy, ICT, etc.) ❑ new markets e.g. China ❑ new segments, target groups, costumers ❑ new sales systems
Threats
❑ chinese products ❑ high prices ❑ low ranges ❑ too high expectations ❑ counter lobby ❑ lack of ressources by cities, regions, nations and customers (SEE)

ROMANIA
SWOT ANALYSIS – „E-MOBILITY“ small project **Objective:** Supporting of E-Mobility initiatives in PPs countries
Strenghts
❑ highly skilled staff in design, manufacturing and assembling of cars and car parts, ❑ research-design departments with a good professional level ❑ companies with certified quality management system ❑ potential for a diversified horizontal industry ❑ existence of projects and working prototypes related to electrical vehicles
Weaknesses
❑ poor economic performance of companies producing of automotive components due to unavailability of technological development and restructuring of production, ❑ use of obsolete technology which determines non conformity of products, ❑ gradual increases in the price of energy and other commodity prices ❑ low physical productivity, ❑ low quality of Romanian automotive supply companies compared to the foreign ones ❑ lack of incentives and renewable energy production facilities
Opportunities
❑ sector development opportunities are given growth trends continue domestic demand, especially for buses and special vehicles, but it needs an influx of foreign investment. ❑ starting production of electric cars will determine auto parts industry development, including attracting direct foreign investment.

- medium and long term development of the automotive related country's road infrastructure is seen as important for Romania and entire geographic area.
- the need for renewal of commercial vehicle fleet, regarded as means of production, particularly in the private sector can lead to start of production sector in the next period and become an important generator of jobs.
- developing e-mobility infrastructure is a factor of economic potential growth.
- widespread practice of leasing system with subsidies from government can make electrical vehicles attractive to companies with positive implications for both economic development and environmental protection.

Threats

- excessive bureaucracy in terms of processes and certifications.
- underdeveloped transport infrastructure.
- infrastructure for transport of energy underdeveloped in some regions.
- poor collaboration between manufacturers and local suppliers

CROATIA

SWOT ANALYSIS – „E-MOBILITY“ small project

Objective: Supporting of E-Mobility initiatives in PPs countries

Strenghts

- universally enthusiasm about e-vehicles - globally and locally
- conscience about the need and possibilities of e-vehicles usage
- the existence of a significant number of experts and enthusiasts
- the existence of several world-relevant e-car prototypes
- the existence of innovative resolved components (motors, batteries, management systems)
- the existence of the necessary development and production resources

Weaknesses

- inertia of state institutions in adopting new ideas
- non-recognition of Innovative solutions
- lack of government support and incentives for the development, purchase and use of e-vehicles
- poor infrastructure for e-vehicles (charging)
- small autonomy and inability to fast charge the battery

Opportunities

- further uncontrolled increase in the price of fossil fuels
- the introduction of financial support and grants for the purchase and use of e-vehicles
- benefits of free entry to the city center, free parking and charging for e-vehicles
- the possibility of developing new e-car
- the possibilitiy of conversion of existing vehicles (new and used) into e-vehicle
- significant potential in cities: public transport (mini bus) and small delivery vehicles
- development of key components (batteries) can be a major competitive

advantage ❑ development of high battery autonomy and the possibility of fast charging would allow such mass penetration of e-vehicles ❑ increased demand for electricity from renewable sources = more investment in energy
Threats
❑ unlikely, significant long-term drop of fossil fuels price ❑ the negative influence of automotive and petroleum industries lobbies ❑ insufficient production of electricity and an increase in electricity prices ❑ lack of financial support for e-vehicles projects ❑ lack of financial resources for investments in development & manufacturing

5. OPPORTUNITIES AND RECOMMENDATIONS FOR FUTURE DEVELOPMENT

Based on our meetings and several discussions related to the development of e-mobility in SEE countries we have build table of recommendations for national/regional level and international level in the SEE region. All recommendations we could divide into three basic groups:

- recommendations for starting/building great initiatives in terms of **international cooperation** in e-mobility (cooperations between governments, local authorities, universities, R&D centres, common R&D projects etc.),
- looking for ways how to **promote and develop** e-mobility in own country on regional and national level (development of new study programmes at universities, research projects, electric infrastructure, increasing awarennes),
- set up basic **national priorities** (strategies, politicies, action plans etc.) for automotive development in terms of e-mobility.

Every project partner made Table of Recommendations from two points of view:

- in terms of recommendations for own country
- in terms of recommendations for SEE region

BULGARIA
Recommendations – „E-MOBILITY“ small project **Objective:** Development of automotive industry and electromobility in SEE
For your country (for national or/and regional level authorities, etc.)
❑ decreasing taxes for EV owners ❑ interest-free loans for buying an EV ❑ free parking places ❑ free Charging stations ❑ development EV service /maintenance centers ❑ EV service/ maintenance centers ❑ battery business model (buy / rent – charge / maintenance – disposal / recycling)
For the South-East Europe (or for our PPs´countries/regions)
❑ charging station standartization ❑ charging station network / map.

SLOVENIA
Recommendations – „E-MOBILITY“ small project **Objective:** Development of automotive industry and electromobility in SEE
For your country (for national or/and regional level authorities, etc.)
❑ R&D for AICE - napredni motorji z notranjim izgorevanjem ❑ R&D components for HEV ❑ R&D for safety components ❑ new materials
For the South-East Europe (or for our PPs´countries/regions)
❑ Focus should be on research and development (Components and systems for light construction vehicles) ❑ Integrated network (a new approach to mobility) ❑ Preparing the market for the new technology (education, state subventions for the purchase of new electric vehicles, legislation and standardization, Management system of infrastructure of the charging points

SLOVAKIA
Recommendations – „E-MOBILITY“ small project **Objective:** Development of automotive industry and electromobility in SEE
For your country (for national or/and regional level authorities, etc.)
❑ supporting creation of new education study programmes at universities ❑ developing coordinated national strategies to support the market introduction of electric cars ❑ establishing a clear policy framework out to at least 2015 (establish national targets, objectives, plans, incentives framework to support implementation of EV, building electromobile infrastructure etc.) ❑ creating expert national group for development of e-mobility initiatives in the country ❑ financial support for R&D activities in area of e-mobility ❑ looking for strong foreign partners for e-mobility development (Germany, France) in R&D area ❑ defining the main e-mobility scientific fields for Slovakia ❑ contacting German, Austrain and other national/regional bodies for cooperation ❑ attracting foreign investors into R&D
For the South-East Europe (or for our PPs´countries/regions)
❑ be involved in international collaboration efforts: research programs, codes and standards, vehicle testing facilities, infrastructure, charging systems etc. ❑ establishing cooperation with all relevant organization in EU with focus to support collaboration efforts (ACEA, EUCAR, IEA, VDA,) ❑ common activities on preparation process for FP7 project proposals ❑ be involved in FP7 research projects with strong foreign partners

- do better marketing management of own research results
- promotion of international networking activities
- creating common electromobility South-east Europe network
- common organization of E-mobility conferences in SEE region
- increasing consumer awarennes of the availability and benefits of EVs

HUNGARY

Recommendations – „E-MOBILITY“ small project

Objective: Development of automotive industry and electromobility in SEE

For your country (for national or/and regional level authorities, etc.)

- creating national strategy
- defining prefered sectors, local suppliers
- incentives for e-Mobility users
- support of infrastructure development (e.g. charging stations operated by renewable energy)
- P+R development (where R could mean Renting of eVehicles)
- supporting R&D of eVehicles incl. material science, etc.

For the South-East Europe (or for our PPs´countries/regions)

- common future scope
- map of competencies, capacities focusing on local SMEs
- R&D project (eVehicle) for an OEM (made in SEE for SEE) e.g. DACIA
- standards for e-Mobility solutions
- lobbying for higher support for the SEE region to create infrastructures
- project initiation like three country cooperation building up facilities in bordering regions to facilitate tourism in e-Way (eBikes, eRollers, eCars) in National parks or resort areas or cities

SERBIA

Recommendations – „E-MOBILITY“ small project

Objective: Development of automotive industry and electromobility in SEE

For your country (for national or/and regional level authorities, etc.)

Up till now, no National Strategy for electric mobility has been published in Serbia. Therefore, important steps would be:

- constitution of a National Electric Mobility Platform, that would cover the electric vehicle introduction.
- a joint council of all companies in automotive sector, industry providers, technical organizations and research associations in Serbia that would have the mandate to drive a National Strategy for Development of Electric Mobility.

The National Platform for Electric Mobility would be responsible for fostering the developments into the direction of concrete actions to achieve the objectives of the National Strategy for Development of Electric Mobility. The objective of this platform would be to advise the government on specific electric mobility issues. Working group consisting of representatives from industry and science, municipalities, associations and civil society would work on following topics:

- drive technology
- battery technology
- charging infrastructure and network integration in main cities and along the country's main highways
- standardization and certification
- framework development/legislation

The result of this activity would be the development of a National e-mobility strategy that would speed up research and development in this area.National Strategy would be based on:

- Launching of pilot projects and field tests in selected cities and regions (for example renting of cars with an electric drive at major stations, operating hybrid buses, run by an electric motor in addition to a diesel engine). The battery charging infrastructure would have to be built up gradually, starting at local or regional level.
- Involvement of all important stakeholders: The automotive industry, energy suppliers, academia and civil society should be incorporated in order to provide advice to the government on the development of a comprehensive program.
- Standardization: Drive and battery technology, charging infrastructure, materials and recycling systems have to become standardized. This is clearly a political task – governments & parliaments have to establish a common legal and political framework, also including education and training.
- Provision of sufficient funds: Mobilizing of economic stimulus packages for research and development on electric mobility.
- Organization of charging facilities: for simplicity and cost-efficiency for the successful market introduction and dissemination of electric vehicles. The aim is to set up a simple and cost-efficient infrastructure that allows for charging electric vehicles at home and on the road.

For the South-East Europe (or for our PPs´countries/regions)

- ❑

CROATIA

Recommendations – „E-MOBILITY" small project

Objective: Development of automotive industry and electromobility in SEE

For your country (for national or/and regional level authorities, etc.)

- ❑ **Hh**
- ❑ **Hh**
- ❑ **Hh**
- ❑

For the South-East Europe (or for our PPs´countries/regions)
❑ **Jjj** ❑ **Jjj** ❑

Conclusions from project partners discussion about electromobility recommendations and expectations realized on 22nd February 2011 on Project Meeting in Trento, Italy:

- focus on the regions - what are the competencies, what is the potential of the region
- what are government actions on the electromobility in project partners countries (example as a good practices)
- data national stimulus describtion (1 year free of charge for batteries) recommendations and research/analyses of the electric infrastructure per PPs region.
- presentation on charging infrastructure mapping by PPs
- promote idea for infrastructure, further convince the government for the e-mobility activities
- invititiation of the industry into the e-mobility process, search for the partners in e-mobility activities and network with partners
- investigate and promote the idea of e-mobility, promote the idea and network between the universities and clusters
- gain and share the ideas from PPs, general overview and the idea of e-mobility initiatives and present to the government
- summarization of companies and institutions involved in e-mobility activities in PPs countries. Map University innititatives on Country Regions
- to find partners for developing FP7 project in the area of e-mobility. Get in contact with local authorities
- analyses of electrical infrastructure, answer it is possible to implement emobility in reality (power, infrastructury) will this function, what are the problems
- connect western countries (governemnts or regions) for cooperation in e-mobility
- look for strategic partners for development area automotive R&D for e-mobility

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Address: Hlavná 5,
917 01 Trnava,
Slovakia

Contact Person: Dipl.-Ing. Vladimír Švač, PhD.
E-mail: svac@autoklaster.sk

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Authors Team: **Vladimír Švač** – primary author of this analysis and coordinator of the WP6 activities in the frame of Small Project SEEE-Mobility
Contributors:
Tina Igllicar – Automotive Cluster Slovenia, Slovenia
Branko Mihalič – Automotive Cluster Croatia, Croatia
Cristian-Gyozo Haba – Technical University of Iasi, Romania
Nikolay Madzharov – Technical University of Gabrovo, Bulgaria
Raycho Ilarionov – Technical University of Gabrovo, Bulgaria
Igor Vijatov – Automotive Cluster Serbia, Serbia
Márta Regner – West Panon Regional Development Company, Hungary
Zoltán Kabács – Meshining Engineering, Hungary