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PROJECT AUTOCLUSTERS SUPPORT FOR DEVELOPMENT OF ELECTRIC MOBILITY

BY

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Abstract. The project Autoclusters took place in the frame of the South-East Europe Transnational Cooperation Programme from 2009 to 2012. The main objective of the project was to create the first automotive cluster in the South East Europe (SEE) with the goal to increase innovation in the automotive industry of the region. One important part of the project was related to the development of the electric vehicles and electric mobility in SEE. Present paper presents the most important achievements of this project in the area of electric mobility.

Key words: electric mobility; electric vehicles; automotive clustering; SEE programme.

1. Introduction

Automotive industry is crossing a period of dramatic changes that can be kept under control only by knowing very well which of the most important factors are shaping its future progress. Development of new transport modalities (European Commission, 2011), resulting in creation of new infrastructures, enforcement of environment protection, proliferation of renewable energies, creation of new business models to support future ways of designing, powering,

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selling and using cars (European Commission, 2010), are only some of these factors.

To overcome the effects of all these changes, action must be taken to create new study and training programs in universities, to identify new research topics, to initiate new forms of collaboration between manufacturing companies, SMEs, universities, research centers, central, regional and local government bodies and to improve cooperation between industrial sectors such as automotive, electric and electronics, chemistry, energy generation and ICT.

Project Autoclusters was issued from the experience gained in previous European projects by partners from West and Central Europe. They noticed that relocation of automotive activities in countries from South-East Europe region cannot be successful if not supported by a major enhancement in innovation, in all aspects of activities, and by the improvement of group effort of all involved stakeholders.

2. Project Description

2.1. Project Goals and Partnership

The main objective of the Autoclusters project was to build on previous initiatives that were launched in the automotive industry for increasing innovation at all levels of activity. The relatively new concept of clustering was the base for assembling the efforts of different actors in the automotive industry towards an advance based on innovation, creativity and inventiveness. A cluster is grouping together manufacturers, suppliers, local authorities, R&D centers and universities, all recognizing the importance of innovation and willing to work together for solving identified common problems.

The main goals of the Autoclusters project are given below:

1. To create first sustainable network in automotive industry in SEE region with specific focus on innovation activities by cooperation between automotive companies, R&D centers, automotive clusters and universities.

2. To create a partnership consisting of institutions from European Union (EU) states, New Member States, non-EU members as well experienced institutions from EU-15 as defined by SEE Programme (European Commission, 2011).

3. To extend the network by inviting not only clusters and other SME supporting facilities, but also R&D institutions and universities which are well known to promote and create the innovation effect.

The partnership of the Autoclusters Project included 11 partners from 9 countries from the SEE region as defined by SEE Programme (European Commission, 2011) (see Fig. 1):

- a) Automotive Cluster – West Slovakia (Slovakia – leader of the project).

- b) "Gheorghe Asachi" Technical University of Iași (Romania).

- c) Technical University of Gabrovo (Bulgaria).

- d) Slovak Technical University of Bratislava (Slovakia).
- e) West Panon Regional Development Company (Hungary).
- f) Automotive Cluster Slovenia (Slovenia).
- g) Automotive Cluster Croatia (Croatia).
- h) Automotive Cluster Serbia (Serbia).
- i) CREATE-NET (Center for REsearch And Telecommunication Experimentation for NETworked communities) (Italy).
- j) Comunimpresa Scarl (Italy) and
- k) Automotive Cluster Vienna Region (Austria).

Though the partnership consisted of 11 partners, in reality the created network included a much larger number of participants because each autocluster entity represents an association of tenths of companies working in the automotive industry of the respective country. As we can see from the composition point of view, the project partnership formed a balanced structure including five autocluster entities, three universities, one development agency, one research center and one consulting company. From geographic point of view, the partnership had a higher share in the western part of the SEE region.



Fig. 1 – Map of Autoclusters project partners in the SEE region.

2.2. Project Results

The activity of the project was organized in eight work packages that covered the period April 2009...March 2012. The first two work packages were dedicated to the management of the project, communication and dissemination of project results.

Work package 3 was allocated for the analysis of the best practices and cluster development in the SEE region and issued a comprehensive study and a set of best practices that were identified in each of the partner's country (APBN, 2009).

The work package 4 consisted of a study of innovation capacity and possibility of cooperation in the automotive industry in SEE (Švač *et al.*, 2010) and the creation of a large database of innovation capacities in the SEE region. The database includes more than 250 entries corresponding to large companies, SMEs, R&D institutions, universities and research laboratories activating in the automotive industry.

In addition, a series of activities have been allocated for the education and skill improvement of the internal staff, of stakeholders in each partner's region and also of other stakeholders and beneficiaries in non-EU member states like Russia, Republic of Moldova and Ukraine. A total of more than 1,500 participants from 12 countries were educated in 41 seminars.

Work package 5 aimed to increase innovation capacity in the SEE region through the organization of exhibitions at universities with the goal to stimulate highly educated experts. Another part of the work package was dedicated to improving cooperation by means of a created exchange programme and network. Exchange study visits took place at manufacturing facilities and research laboratories of automotive companies, at research centers and universities involved in the automotive area. A number of 10 exhibitions at universities and 10 exchange study visits took place in the partner's countries including namely:

1. Visits at working facilities of well know companies activating in the automotive industry (Fig. 2) such as Continental and Delphi (Iași, Romania), Volkswagen (Bratislava, Slovakia), Iveco (Bolzano, Italy) and Autotest (Lana, Italy), Fiat (Kragujevac, Serbia), Hella Saturnus (Ljubljana, Slovenia) and ZMDI (Varna, Bulgaria).



Fig. 2 – Visiting assembling lines of FIAT in Kragujevac and Hellas Saturnus in Ljubljana.

2. Meetings with and demonstrations of innovative automotive technologies and electric cars made by representatives of companies such as Kaproni and Belchev Motors (Bulgaria), DOK-ING and RIMAC Automobili (Croatia) or Poliauto and TIS Innovation Park (Italy).

3. Visits at highly equipped research laboratories with work related to automotive industry of the following universities (Fig. 3): "Gheorghe Asachi"

Technical University of Iași (Romania), Politecnico di Milano (Italy), Slovak Technical University of Bratislava (Slovakia), University of Split (Croatia), University of Ljubljana (Slovenia), and "Istvan Szechenyi" University of Győr (Hungary).



Fig. 3 – Visiting automotive laboratories in "Gheorghe Asachi" Technical University of Iași and University of Ljubljana.

One of the most important and consistent package, Work package 6, was focused on the development of pilot R&D cooperative projects aimed to strengthen the cooperation between partners and to create a solid and substantial foundation for further collaboration in the network.

Three small pilot projects proposed by partners have been accepted for implementation as a result of an evaluation done by a jury made of internal and external experts. The three implemented projects were: SEEE-Mobility, Automotivenets and Platform.

The SEE *E*-mobility and the Automotivenets projects which are related to the electric mobility, will be described in the next section.

The Platform small pilot project created a collaboration Web based tool, integrated in the framework of the European Alliance for Innovation portal, aimed to be used by actual and future partners of the Autoclusters network.

The second part of the work package 6 was dedicated to the proposition and preparation of five FP7 project proposals that have been successfully submitted to the evaluation process. All project proposals included two or more of the project partners and covered relevant topics in the automotive area.

Work package 7 was dedicated to the study of labor market, territorial intelligence, skill improvement, retiring trends, availability of work force and attractiveness of territories resulting in the elaboration of a common methodology helping the understanding and solving the problems issued by the continuous changing of industrial relations and the underdevelopment of social dialogue in automotive sector of SEE countries (ISMO, 2012).

The last work package was dedicated to the creation of a network extending the initial network of partners by the recruitment of new entities

(SMEs, universities, R&D centers) interested to innovate in the SEE region automotive industry. Relations of cooperation were established with European Alliance for Innovation (EAI), the Network of Automotive Excellence (NoAE) and the Transnational Automotive Network in Central Europe (AutoNet).

3. Electric Mobility

Though not defined in the initial application from of the project, the topic of electric mobility arose naturally in the implementation of work packages 5 and 6. Automotive industry is shifting to a new area of environmental friendly car, where electric cars and electric mobility have the most important share, boosting research, innovation and investments in associated technologies. Therefore, it is not surprising that this topic emerged from partners in the form of a small project and FP7 project proposals and became subject of study in the project work.

We can identify several activities that were related to electric mobility in the project which will be discussed in the following.

During work package 5 project partners had the opportunity to meet representatives of companies involved in the development of electric cars and also to see and participate in demonstrations of fully operational prototypes. We can mention Kaproni and Belchev Motors (Bulgaria), DOK-ING and RIMAC Automobili (Croatia) (Fig. 4);



Fig. 4 – Testing electric cars from RIMAC Automobili and DOK-ING.

The Automotivenets small pilot project consisted in the organization of a workshop and a student competition related to innovation in the automotive industry. The workshop offered the attendees an up-to-date on EU funding opportunities promoting collaboration and innovation in the automotive industry in SEE with examples of successful interregional and inter-sector cooperation.

Student competition organized within small project Automotivenets included research at post graduate and doctoral level and rewarded students doing research in the automotive area. The results were presented in form of scientific papers defended before an evaluation commission. Among the 17 enrolled papers in the PhD competition 5 (29%) were in the area of electric

mobility. In the competition final, among the four winning papers, two were in the area of electric mobility (50%) (Sticea, 2011; Krastev, 2011).

The SEE *E*-mobility project main goal was to obtain a broad picture of initiatives related to electric mobility (European Commission, 2010; International Energy Agency, 2009) in project partner's countries. Within this project relevant information has been collected about a list of potential actors capable to promote, develop and sustain the use of electric vehicle in the SEE region.

Significant information related to electric mobility was gathered with the occasion of auto motor shows in Geneve and Frankfurt. Members of the project teams discussed with representatives of major companies involved in the development of future electric cars such as Renault, Mitsubishi, Citroen, Honda, Mercedes, Peugeot, Hyundai, Smart, etc. but also with start-ups like EDAG, Dekra or RIMAC. Representatives of the equipment manufacturers for electric cars such as Siemens, Bosch, Johnson Controls, Continental, Delphi and Valeo were also questioned for the most pertinent opinions regarding the future development of electric mobility.

The project issued a study (Švač *et al.*, 2011) that captures the actual situation of *E*-mobility in SEE identifying also a number of carmakers, SMEs, power stations, service centers, battery recycling centers, suppliers, electricity companies, local and regional councils and organizations, universities and R&D centers which, working together, could increase awareness of this technology making it feasible in a near future.

Regarding Romania, the study revealed that there are important accomplishments and continuous interest for the development of electric vehicles, the infrastructure needed to exploit them, as well as for the management of the electric individual or public transport.

A large number of important initiatives are under development in this direction namely

- a) initiatives of private persons or automotive related companies (Prototype research centers);
- b) declared research objectives of many Scientific and Technological Research Institutes demonstrated by projects self financed or supported by national or international research grants;
- c) coordinated efforts of Research and Development Centers from Universities and other academic media;
- d) financially supported Government Programs which are expected to bring significant results in this field.

The efforts are directed to a number of key objectives:

1. Design and test of original full electric or hybrid vehicles for general or special purposes (personal ecological transportation systems, light electric vehicles, bicycle and scooter hybrid models).
2. Design, test and optimization of the electric propulsion motors, electric supply systems (with accumulator batteries or fuel cells) and control

units (electric motor for a scooter hybrid model, propulsion systems with permanent magnet synchronous servo motors for low capacity electric transport, brushless synchronous motor of 10 kW for electric vehicle hybrid car).

3. Development of innovative infrastructures like recharging stations in public or private parking.

As the result of several meetings and discussions with representatives from industry, academia, research community and local authorities, a set of recommendations regarding the development of *E*-mobility in SEE countries was compiled and disseminated in the public space. The set of recommendations that address regional, national and international levels can be divided into three basic groups (Švač *et al*, 2011):

a) starting/building relevant initiatives in terms of international cooperation in electric mobility (cooperation between governments, local authorities, universities, R&D centers, common R&D projects, etc.);

b) looking for ways to promote and develop electric mobility in own country at regional and national level (development of new study programmes in universities, initiation of new research projects, development of the electric infrastructure, increasing awareness);

c) setting up basic national priorities (strategies, policies, action plans, etc.) for automotive development in terms of electric mobility.

Another part of the project that related to electric mobility was the preparation of FP7 project proposals. At the end there were selected five proposals that were successfully submitted for evaluation. The proposals were:

1. FP7 FastInCHarge – Innovative fast inductive charging solution for electric vehicles – Technical University of Gabrovo.

2. FP7 Carbonglass – Substitution of future's critical raw material: carbon and glass fibres – West Pannon Regional Development Company.

3. FP7 Urbanic Games – Croate Net.

4. FP7 IAPP4SMC – Industry Academia Partnership and Pathways for Innovative Production Management of Multifunctional Materials – Faculty of Materials Science and Technology, Slovak Technical University of Bratislava.

5. FP7 Minibuses – Electric Chassis for Green Low Floor Minibus – Automotive Cluster Croatia.

As we can see, among the five submitted projects proposals two are in the area of electric mobility. More, the FastINCharge project, which aims to develop an innovative fast wireless (inductive) charging solution for electric vehicles, was accepted for financing in FP7 and now is under development.

4. Conclusions

The project Autoclusters started in 2009, just at the beginning of a period when Europe's economy and automotive industry begin to face a difficult period of crisis. Project Autoclusters attempted and succeeded to build a network of partners ready to promote the increase of innovation and

collaboration in the field as an important factor for overcoming the difficulties of economic crisis.

An important part of project activities found their relationship with the area of electric mobility fostered by actual initiatives that try to make the automotive industry more ecological and which can benefit from the latest developments in the area of electrical motor manufacturing and control, development of electronics, development of information technologies and introduction of new electric materials. A picture of the actual state of the electric mobility was taken resulting in a set of recommendations that project partners proposed to the stakeholders involved in the field.

The project created a network of partners which is actually perpetuated by the Autoclusters Network. This network increased the set of initial partners, augmented the number of cooperation agreements with other similar networks at the European level and is seeking continuously to work for the replication of objectives and relevant results of the Autoclusters project.

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ELECTROMOBILITATEA SPRIJINITĂ DE PROIECTUL AUTOCLUSTERS

(Rezumat)

Proiectul „Autoclusters” s-a desfășurat în cadrul Programului de Cooperare Transnațională Sud-Estul Europei în perioada 2009...2012. Obiectivul principal al proiectului a fost de a crea primul „cluster” din industria auto în sud-estul Europei (SEE), cu scopul de a crește capacitatea de inovare în industria de automobile din regiune. O parte importantă a proiectului a avut în vedere dezvoltarea vehiculelor electrice și a electromobilității în regiunea SEE. Prezenta lucrare prezintă cele mai importante aspecte ale acestui proiect legate de domeniul electromobilității.