i-RESEV NEWSLETTER

ISSUE No. 3 - December 2013

INTRODUCTION

i-RESEV PROJECT

i-RESEV is an acronym for the research project entitled **"ICT-aided integration of Electric Vehicles into the Energy Systems with a high share of Renewable Energy Sources"**. This three-year project started in January 2012, and it has been supported by the Croatian Science Foundation. The main information about the project can be found on the web site http://powerlab.fsb.hr/iresev and the previous newsletter issues posted therein.

CONTENT OF THIS NEWSLETTER ISSUE

This newsletter issue describes the main project activities since August 2013 when the 2nd Issue was published. This includes an outline of main project results, and a related list of recent publications. The project news section is also given, with the emphasis on recently organised International Summer School and SDEWES Special Session. Finally, we keep running the general section dedicated to energy policies and directives, as well as a popular section including information on upcoming events, web portals, and project calls.

PROJECT NEWS

i-RESEV 2013 International Summer School

The project team organised an International Summer School on **Integration of Electric Vehicles into Energy Systems with a high share of Renewable Energy Sources**, which was held in Dubrovnik from September 17-22, 2013. The main objective was to provide an educational platform and a forum for disseminating and discussing recent R&D efforts in the propulsive area of integration of electrified transport into future greener energy systems.

The Summer School Programme was as follows:

- 17/09/2013

  Electric and Hybrid-electric Vehicles: Configurations, Modelling, Optimisation, and Control
  Prof. Francis Assadian, Cranfield University, UK
  Prof. Josko Deur, University of Zagreb, Croatia
- 18/09/2013

  Synthesis of Naturalistic Driving Cycles and Modelling of Electric Vehicle Fleets
  Dr. Tae-Kyung Lee, Ford Motor Company, USA
  Rashid A. Waraich, ETH Zurich, Switzerland
- 19/09/2013

  Integration of Electric Vehicles into Grid Systems and Smart Charging
  Dr. Filipe J. Soares, Prof. Joao A. Peças Lopes, Porto University, Portugal
  Rashid A. Waraich, ETH Zurich, Switzerland
- 20/09/2013

  Energy System Planning including Vehicle-to-Grid Aspects
  Prof. David Connolly, Aalborg University, Denmark
  Prof. Neven Duic and Dr. Goran Krajacic, University of Zagreb, Croatia
- 21/09/2013

  Energy Storage Systems
  Prof. Ingo Stadler, Cologne University of Applied Science, Germany
  Dr. David Dallinger, Fraunhofer Institute, Germany
- 22/09/2013

  Round Table
  Student presentations
  City Tour

The summer school was attended by 19 participants, mostly Ph.D. students from the following institutions:

- **AVL-AST, Croatia**
- **Cardiff University, UK**
- **Cologne University of Applied Science, Germany**
- **ETH Zurich, Switzerland**
- **Linköping University, Sweden**
- **Royal Institute of Technology, Sweden**
- **Technical University of Ostrava, Czech Republic**
- **Universidad de Extremadura, Spain**
- **University of Dubrovnik, Croatia**
- **University of Liege, Belgium**
- **University of Pannonia, Hungary**
- **University of Strathclyde, UK**
- **University of Zagreb, Croatia**
- **Volkswagen, Germany.**

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The University of Zagreb has approved an ECTS credit of 2 points for the course participants.

Fourteen participants have filled out the web survey, and credited the course with the following average grades (on the scale from 1 to 5, with 5 being the highest grade):

Category	Grade
Overall educational value	4.42
Overall scientific and technological value	4.33
Day 1: Electric vehicles	4.27
Day 2: Driving cycles	4.42
Day 3: Smart charging	4.25
Day 4: Energy planning	4.08
Day 5: Energy storage incl. V2G	3.91
Conference venue incl. food service	3.83
Social program	3.67

The full programme and other information about the summer school can be found on the i-RESEV webpage.

2013 SDEWES SPECIAL SESSION

As a part of 2013 International SDEWES Conference, held in Dubrovnik in September 2013, the i-RESEV team organised a Special Session on the topic of Integrated Energy and Electric Vehicle Transport Systems. The session included two poster papers and 12 oral presentations that could have been grouped in two sub-sessions related to (i) electric vehicles and fleets and (ii) integration of electric vehicles into energy systems. The presenters were from Europe, Asia and South America.

COST PROJECT MEETING

The i-RESEV group organised joint meeting of two COST projects (TU1105 - "NVH Analysis Techniques for Design and Optimization of Hybrid and Electric Vehicles" and MP1004 - "Hybrid Energy Storage Devices and Systems for Mobile and Stationary Applications"), which was held in Dubrovnik on September 19-20, 2013.

PARTICIPATION IN NEW EU PROJECT

Together with eight EU partners, the i-RESEV team has successfully applied the Intelligent Energy Europe (IEE) project “BEAST”-Beyond Energy Action Strategies. The project coordinator will be East Sweden Energy Agency from Linköping. The project is still in negotiation phase with the planned total project budget of around one million Euros and expected start in early spring 2014.

The BEAST project will be the first step in closing the implementation gap of Sustainable Energy Action Plans (SEAPs). In 9 EU countries, the project will try to: 1) establish structures for efficient delivery of SEAPs in certain communities, 2) identify and prepare 23 bankable sustainable energy projects, and 3) implement actions leading to measurable energy savings and/or increase renewable energy sources supply.

The i-RESEV team will support local communities in Croatia in development of their local projects. This will mostly concern planning for integration of EV and electric chargers. Some other actions, such as energy savings and renewable energy projects, will be studied in cooperation with the EU partners. BEAST project will also provide a platform for disseminating the results of i-RESEV project.

In Croatia the project proposal was supported by the City of Velika Gorica, Regional Energy Agency Kvarner, Regional Development Agency Dubrovnik Neretva County, Regional Development Agency of Slavonija and Baranja and Municipality of the Island of Mljet.

2ND PROJECT WORKSHOP

The 2nd Project Workshop will be held at the University of Zagreb-FMENA on January 24, 2014. The main aim of the workshop is to disseminate the project results obtained in the 2nd research year to domestic community involved or interested in electric vehicle and energy system R&D activities. The workshop will also include a round table preceded by presentations from Hrvatski Telekom d.d., ETREL d.o.o., Ljubljana and UNDP Croatia. More detailed information about the workshop is given in a separate section below, and the workshop programme can be downloaded here.

OVERVIEW OF RESEARCH RESULTS

This section gives an overview of recent project activities and results related to EV control system optimisation and design, characterisation of vehicle fleets, and planning of EV-grid integration.

EREV OPTIMAL CONTROL FOR BLENDED MODE

The 2nd Newsletter Issue and the related publications have described the control variables optimization and an energy management control strategy for the basic, charge-depleting/charge-sustaining (CD/CS) regime of the considered series-parallel Extended Range Electric Vehicle (EREV). Dynamic programming (DP)-based control variables optimization was conducted to gain an insight into the vehicle optimal behaviour for

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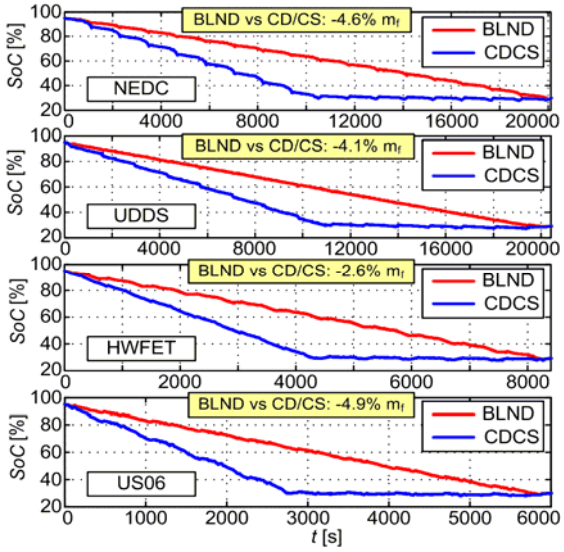
each regime (CD or CS), and the obtained results were used for the purpose of development and verification of the EREV control strategy. The proposed control strategy was based on combining a rule-based controller, including a state-of-charge controller, with an equivalent consumption minimization strategy (ECMS) as an instantaneous optimization algorithm.

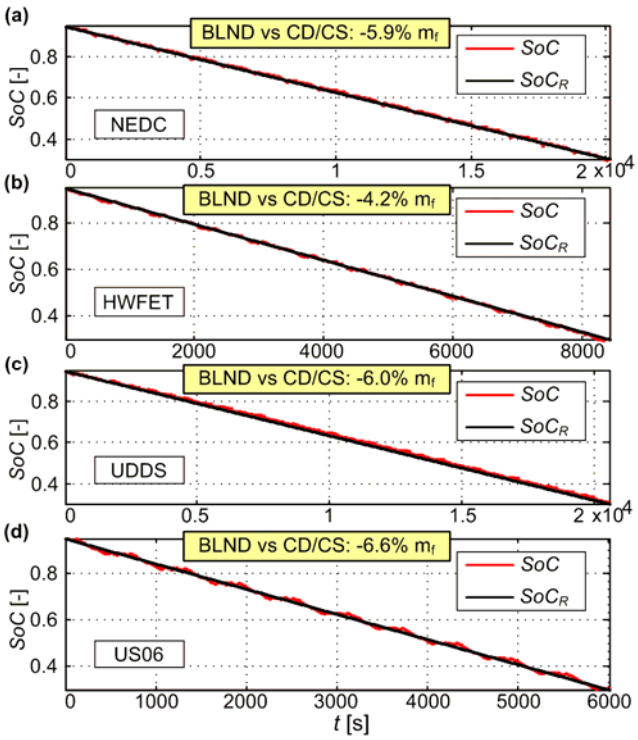
If the vehicle driving range is known in advance, and if it exceeds the vehicle all-electric-range (AER), the battery could be discharged more gradually by combining all operating modes during whole operating cycle (blended operating regime, BLND). In this way, more control freedom is introduced and the potential for energy consumption reduction is further increased.

Below figure shows the BLND vs. CD/CS regime comparative optimization results for the case of several repetitive certification driving cycles. The number of driving cycle repetitions is chosen in order to adjust CD duration approximately the same to that of the CS when CD/CS optimization is concerned. In the case of this scenario of approximately 50:50 CD/CS duration ratio, benefits of BLND operation have been found to be the most emphasized. That is, the fuel consumption (m_f) reduction in the BLND mode when compared to the CD/CS mode ranges from approximately 2.5% to more often closer to 5%, depending on the type of driving cycle. The results of DP optimization also indicate that the optimal state-of-charge (SoC) trajectory during the blended mode have a linear (ramp) shape for the considered case of zero road grade.



CD/CS vs. BLND regime optimization results for NEDC, HWFET, UDDS and US06 repetitive cycles.

The aforementioned control strategy, which was originally developed for the CD/CS operating mode, can be readily adapted to the BLND mode. This is due to the explicit presence of SoC controller, which can now be forced to follow a time-varying SoC reference. Thus, the control strategy is extended with the linear SoC ramp generator, and the engine on/off power thresholds are optimized for different driving cycle by using the DIRECT algorithm. Below figure indicates that the actual SoC trajectories follow the referent ones accurately, and end up in the minimal allowed SoC value at the end of cycle (here 30%).



Reference and actual SoC trajectories for NEDC, HWFET, UDDS, US06 repetitive driving cycles.

The control strategy extension and appropriate tuning have resulted in the BLND-mode fuel consumption reduction in the range from 4% to 7% when compared to the basic CD/CS strategy. This is because of more accurate SoC following and, correspondingly, a wider use of 2D-ECMS approach that searches for instantaneously optimal solution over a wide region of the engine torque vs. speed map. When compared to the globally optimal DP results obtained for the BLND mode, the control strategy has a lower fuel economy by around 2% for HWFET cycle, approximately 5% for NEDC and US06 cycles, and around 10% for the UDDS cycle. This may be regarded as favourable performance, having in mind that the DP off-line optimization method does not include any constraints on frequency of switching on/off the engine and clutches, and that it has the full road (driving cycle) preview.

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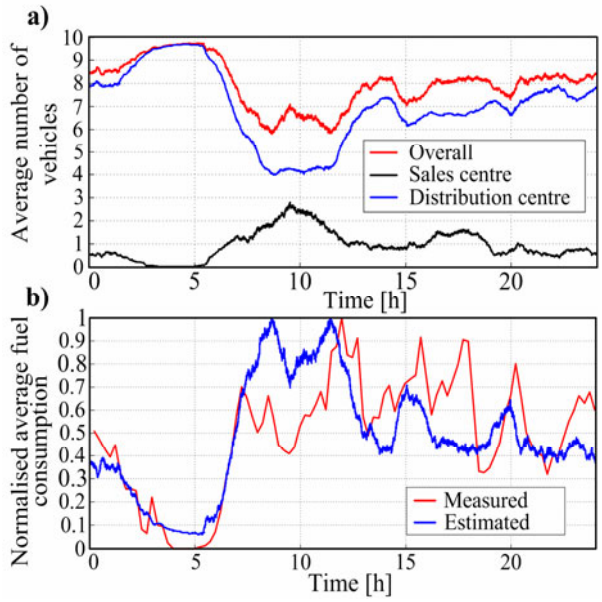
NATURALISTIC DRIVING CYCLES: DATA COLLECTION, ANALYSIS AND SYNTHESIS

As it was stated in the 2nd Newsletter Issue, the project team has established cooperation with one of the PAB partners, the leading Croatian retailer Konzum d.d., to acquire realistic driving cycle data related to a delivery vehicle fleet system. The data have been recorded for a representative fleet sample of ten delivery vehicles equipped with GPS/GPRS system, and three-month period of continuous 24 hour operation. The main recorded signals include the vehicle velocity, absolute vehicle position, and cumulative fuel consumption, where the sampling time was 1 sec.

Initial analysis, related to travelled distance per cycle distributions, arrival and departure time distributions and resting time distributions for the main distribution centre are described in the 2nd Newsletter Issue.

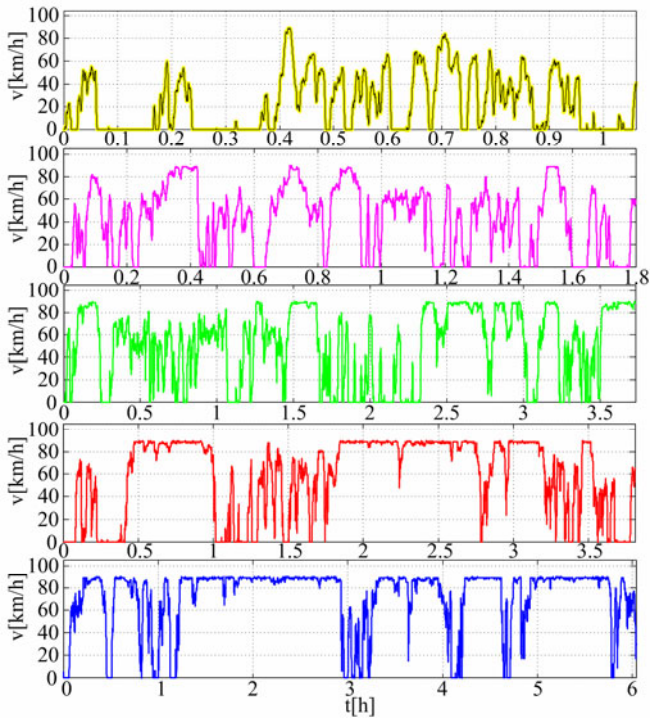
Additional analysis is related to statistics of the number of parked vehicles and estimation of vehicle fleet energy consumption. The below figure (first subplot) shows daily-averaged time distributions of number of vehicles parked in sales centres, in the distribution centre, and their combination that gives overall vehicle parked time distribution. The time distribution of number of on-road vehicles, which is important for fuel consumption estimation in energy planning algorithms, is simply calculated by inverting overall vehicles parked time distribution.



Average number of parked vehicles (a), and normalized measured and estimated fuel consumptions (b).

This distribution is normalized and shown on the second subplot of figure, along with daily-averaged fuel consumption, which is directly calculated using measured cumulative fuel consumption data. This plot graphically confirms correlation between these two time distributions. However, some discrepancies can be observed, which can be caused by: (i) the fact that vehicles can be parked elsewhere (not only in distribution and sales centres, as assumed), (ii) different driving conditions during the day.

Another important fleet-related topic is driving cycle synthesis (velocity vs. time). The main idea is to replace a large set of actual/measured driving cycles with just a few representative cycles. The synthesis is based on discrete Markov chain probability methodology. The synthesis procedure can be divided into three main steps: (i) clustering of recorded driving cycles, (ii) determination of transition probability matrix (stochastic modelling), and (iii) generation and validation of synthetic driving cycles (stochastic simulation). The aim of clustering the recorded driving cycles is to separate recorded cycles into several characteristic groups according to some predefined criteria and to model these groups separately. Two different cases of stochastic modelling are considered. The first one is when the vehicle velocity is used as a Markov chain state, and the second one is when both the vehicle velocity and acceleration are used as states. The figure below gives examples of synthesized driving cycles for the latter case and different data clusters starting from city driving to long-distance driving.



Example of synthesized driving cycles for each cluster of recorded driving cycles.

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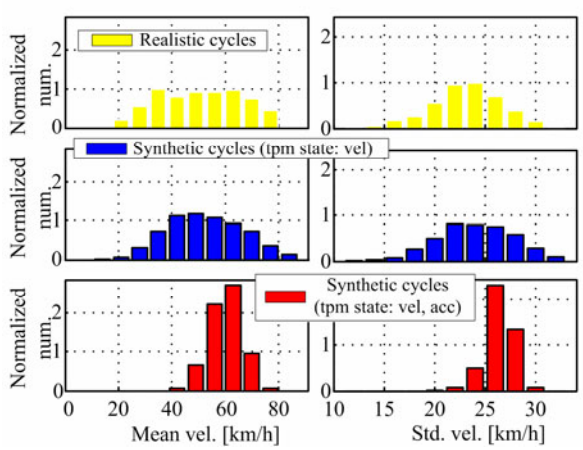
Apart from the stochastic modelling and driving cycle generation/synthesis, validation of synthesized driving cycle is also the crucial part of driving cycle synthesis procedure. Several cycle-related measures are considered in validation (e.g. cycle mean velocity and standard deviation of velocity). The figure given below shows distributions of the cycle measures for realistic cycles and synthetic cycles modelled through one-state and two-state Markov chains. It can be observed that the one-state synthetic cycle distributions (the blue ones) better follows the original distributions of realistic cycles. However, the two-state synthetic cycle distributions (the red ones) are grouped closer to the realistic cycles distributions mean values. This is interpreted as a favourable property, since synthetic cycle measure positioned closer to the mean value of realistic cycle distribution is considered statistically more representative.

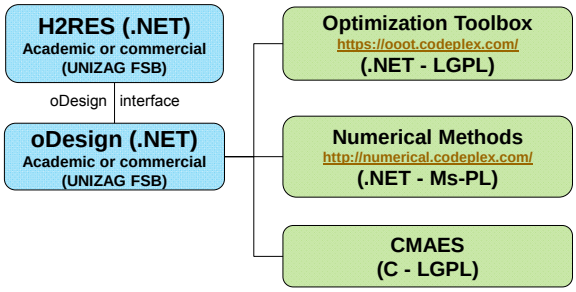
Synthesized driving cycles are very useful from the standpoint of electric vehicle controls design and verification. Also, they can be used for various other fleet-related analyses and applications, including those related to EV-grid integration and smart charging.



Mean velocity and velocity standard deviation distributions for realistic driving cycles and for synthetic cycles obtained from one-state and two-state Markov chains.

H2RES optimization module

One of the aims of i-RESEV project is to upgrade the existing H2RES energy planning software. In addition to its extension with EV module, the goal of recent work has been to expand the H2RES software optimization capabilities. Design of energy systems is a complex task that can involve several layers of energy supply and demand interconnections with different energy carriers and their grids (e.g. electricity, natural gas, district heating and different fuels in the transport sector). Based on a comprehensive overview of optimization methods suitable for energy system planning, the H2RES software has been expanded with selected optimization algorithms. The necessity of implementation of more than one optimization library leads to implementation of each of the libraries individually. In order to isolate this task as much as possible from H2RES, it has been decided to add an additional layer – oDesign library. One of the benefits of this approach is that implementation of the third party libraries can be done outside of the H2RES framework, which has simplified execution of this task. Another important advantage of this approach is that oDesign library will be possible to be used outside of the H2RES, as well.



Integration of optimization libraries with H2RES

Currently implemented optimization libraries are:

- Optimization Toolbox
- Numerical Methods
- CMAES

After connection with those libraries, some of the optimization methods available in oDesign optimization library includes:

- Genetic Algorithms (GA)
- Evolution strategy (CMAES)
- Hill Climbing
- Nelder–Mead (Simplex) method
- Fletcher-Reeves Conjugate Gradient
- Particle Swarm Optimization (PSO)
- Sequential Quadratic Programming (SQP)

In addition to implementing optimization functionality, programming logic involving expert knowledge has also been incorporated into H2RES. This is expressed in the merit-order algorithm of the hourly energy generating function, which is the key to running an H2RES energy scenario. The duty of the generating function is to provide adequate power generation to supply the existing demand for each hour. Merit-order in this case favours Renewable Energy Sources (RES) and utilises EVs as a way or storing and discharging energy when it is necessary or economically

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reasonable to do so. With this expert knowledge, it is possible to utilise the maximum amount of energy from RES, exploit the possibilities of V2G mode and keep non-RES generation to a minimum.

ENERGY POLICY

On the 16th October, 2013, the Croatian government adopted new National Renewable Energy Action Plan (NREAP) for the period until 2020. In the first i-RESEV Newsletter Issue, it was already mentioned that Croatia, as a new EU member state, has fully adopted Directive 2009/28/EC on the promotion of the use of renewable energy sources (RES). The directive prescribes that each Member State shall adopt a national renewable energy action plan (NREAP). The national renewable energy action plans shall set out Member States' national targets for the share of energy from renewable sources consumed in transport, electricity and heating and cooling in 2020, taking into account the effects of other policy measures relating to energy efficiency on final consumption of energy, and adequate measures to be taken to achieve those national overall targets, including cooperation between local, regional and national authorities, planned statistical transfers or joint projects, national policies to develop existing biomass resources and mobilise new biomass resources for different uses.

By the same Directive, Croatia has adopted mandatory targets of 20% RES in the gross final energy consumption and 10% of RES in the gross final energy consumption in transport.

Compared to the plans published in the Croatian energy strategy from 2009, in general the new NREAP has several major differences in the calculations of the gross final energy consumption (GFEC) and capacities of planned RES installations necessary for the achievement of the targets for 2020. Due to financial crises, which has not been taken into account in the strategy from 2009; predicted GFEC in NREAP is 84.97 TWh, which is significantly lower (24.34%) from the one predicted in 2009, which was at 112.30 TWh. New predictions are based on lower GDP growth rates. The rates are 0.7% for 2013, 2.4% for 2014, 3.5% for the period 2015-2016 and 4% for the period 2017-2020. Another parameter used for calculations is elasticity GFEC/GDP. It has been assumed to 0.61 for the period 2010-2015 and 0.46 for the period 2016-2020. There is no description in NREAP on the methodology behind elasticity assumptions. Simple calculations of forecasting energy demand by the assumed elasticity that takes into account GFEC (not separately final energy consumption by the sectors or specific branches of the sectors) could produce high uncertainty in the final results. Applied simplified methodology of predicting GFEC is not recommended for the calculations of targets that are linked to financial obligations, e.g. if Croatia or any other member state will not be able to fulfil the 2020 targets, it will most probably pay the fees to the common EU budget or will be punished through some other mechanism. However, even that there is no detailed description behind elasticity calculations, demand stated in NREAP is close to the results published by Pukšec. T. et. al., *Energy demand modelling and GHG emission reduction: case study Croatia, SDEWES, 2013*. For this paper Pukšec et. al. predicted final energy consumption in 2020 at 83.79 TWh, so that by adding some average transmission and distribution losses of 1.92 TWh and own consumption of energy branch 1.05 TWh it could be estimated that GFEC in their case will be close to 86.76 TWh. Their results are based on more detailed "Bottom-up" analysis of energy demand through all sectors.

Consequently, as predicted energy demand in 2020 will be 24% lower than one planned in the 2009 strategy, the need for RES capacity also could be lower in order to achieve the same RES share in GFEC. With this argument, Croatian government has reduced the goals for RES in 2020 to only 400 MW capacity of installed wind power plants or 33.3% of previously planned, capacity of biomass power plants is reduced from 140 MW to 125 MW, geothermal power plants from 20 MW to 10 MW, small hydro power plants are at the same capacity of 100 MW, while planned capacity of solar photovoltaic installations is increased from 45 MW to 54 MW.

To i-RESEV team the most interesting data from NREAP are planned consumptions of electricity in the road transport. It is predicted by NREAP that in 2016 there will be 22.1 GWh which approximately corresponds to an average consumption of 10,000 electric vehicles. The consumption will increase by the same rate or 10,000 vehicles yearly, up to approximately 50,000 electric vehicles on the road or total consumption of 111.65 GWh of electricity for the road transport in 2020. The i-RESEV team has predicted lower rate of electric vehicles on the roads by 2020, so NREAP goals represent a positive step towards electrification of transport sector in Croatia.

In the last project year i-RESEV team will run its own calculations and will model all results and goals set by NREAP in order to check the consistency of results and to better asses its own predictions.

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PUBLICATIONS

The above and related research results have been recently published in the below journal and conference papers. Previously published papers are referenced in the previous newsletter issues, as well as on the project web site.

Journals:

1. Katić, K., Perković, L., Novosel, T., Gašparović, G., Krajačić, G., Ban, M., Duić, N., "Utilization of the four step model for energy planning – Case study for the transportation sector of the City of Zagreb", Applied Energy (submitted).
2. Cipek, M., Škugor, B., Čorić, M., Kasać, J., Deur, J., "Control Variable Optimisation for an Extended Range Electric Vehicle", International Journal of Powertrains (submitted).

Conferences:

3. Škugor, B., Deur, J., "The vehicle fleet data collection, processing, analysis, and naturalistic driving cycles synthesis", 8th SDEWES Conference, Dubrovnik, Croatia, 2013.
4. Škugor, B., Cipek, M., Deur, J., "Control Variables Optimization and Feedback Control Strategy Design for the Blended Operating Mode of an Extended Range Electric Vehicle", SAE World Congress, Detroit, MI, 2014. (accepted)

ONGOING EU PROJECTS

The below EU projects deal with various aspects of EV-grid integration.

1. eCo - FEV, Efficient Cooperative infrastructure for Fully Electric Vehicles, Coordinator: Dr. Massimiliano Lenardi
2. e-DASH, Electricity Demand and Supply Harmonization for EVs, Coordinator: Antonio Paradell
3. EMERALD, Energy ManagEment and RechArging for efficient eLectric car Driving, Coordinator: Marco Boero
4. FastInCharge, Innovative Fast Inductive Charging solution for electric vehicles, Coordinator: David Mignan
5. OPTIMORE, Optimised Modular Range Extender for every day customer usage, Coordinator: Dr. Theodor Sams
6. PowerUp, Specification, Implementation, Field Trial, and Standardisation of the Vehicle-2-Grid Interface, Coordinator: Andras Kovacs
7. SmartV2G,Smart Vehicle to Grid Interface, Coordinator: Andreas Varesi

UPCOMING EVENTS, WEB PORTALS AND PROJECT CALLS

2nd i-RESEV WORKSHOP

The 2nd Project Workshop will be held at the Faculty of Mechanical Engineering and Naval Architecture, I. Lucica 5, Zagreb, on January 24, 2014. The main goal of the workshop is to disseminate the results and project achievements of the second research year. Workshop will bring together various stakeholders coming from domestic industry, academia and government, which are interested in further promotion of electric vehicles and renewable energy sources.

The workshop will include the following three main sections:

1) **Plenary lecture** of the project leader and his associates, which will outline the main project outcomes in the 2nd research year and the plans for 3rd research year.
2) **Panel discussion** on e-mobility, including invited lectures by representatives from Hrvatski Telekom d.d., ETREL d.o.o., Ljubljana and UNDP Croatia.
3) **Individual presentations** of the team members, concerning the results of the recent and ongoing project activities, and including demonstration of developed software tools, when appropriate.

2ND MEETING OF PROJECT ADVISORY BOARD (PAB)

In February 2014, the representatives of the project team and the PAB member companies will hold their third plenary meeting to discuss the project results and mutual interactions during the 2nd research year, and outline the plans for cooperation in the final, 3rd research year.

2014 SDEWES CONFERENCES

Two SDEWES conferences are being prepared for the year 2014, with the i-RESEV team members being active in organization:

- 1st South East European Conference on Sustainable Development of Energy, Water and Environment Systems
  http://www.ohrid2014.sdewes.org

The conference will be held from 29th June till 4th July, 2014 in Ohrid, Republic of Macedonia. Deadline for abstract submission is 30th April, 2014. 1st SEE SDEWES conference has been initiated to provide a venue for the researchers from the SEE region, but also for world-wide researchers, to present research progress and discuss the state of the art, future directions and priorities in the various areas of

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sustainable development and regional integration.

- The 9th Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES) www.mediterranean2014.sdewes.org

The conference will be held on a cruiser travelling between Venice and Istanbul from 20th to 27th September, 2014. The deadline for the abstracts submission is 15th February, 2014. Conference is dedicated to the improvement and dissemination of knowledge on methods, policies and technologies for increasing the sustainability of development by de-coupling growth from natural resources and replacing them with knowledge based economy, taking into account its economic, environmental and social pillars, as well as methods for assessing and measuring sustainability of development, regarding energy, transport, water, environment and food production systems. The SDEWES conference has become a significant venue for researchers in those areas to meet, and initiate, discuss, share, and disseminate new ideas.

HORIZON 2020 CALLS

Horizon 2020 is the biggest EU Research and Innovation programme ever with a budget of 77 billion EUR available for 7 years (2014-2020). It represents a financial instrument aimed to secure Europe's global competitiveness and strengthen the EU's global position in research, innovation and technology.

Horizon 2020 is a single programme that merges three previously separate programmes:

1. The 7th Research Framework Programme (FP7),
2. Innovation aspects of Competitiveness and Innovation Framework Programme (CIP),
3. EU contribution to the European Institute of Innovation and Technology (EIT).

The programme is seen as a mean to invest in future jobs and growth to overcome the economic crisis and to address people's concerns about their livelihoods, safety and environment. Excellent science, industrial leadership and societal challenges are three main Horizon's priorities.

Smart, green and integrated transport

This so-called Transport Challenge section has the overall budget of 6.3 billion EUR for the period 2014-2020. Transport main policy goals are competitiveness and sustainability. The challenge is to achieve a transport system that is resource efficient, environmentally friendly, safe and seamless with a substantial reduction of traffic congestion. The project calls are grouped in the following sub-sections:

- Mobility for Growth
- Green Vehicles
- Small Business and Fast Track Innovation for Transport
- Contribution to Smart Cities, Blue Growth

While some of 2014-2015 **Mobility for Growth** calls relate to conventional vehicle technologies and the transport system area, for the topic of i-RESEV project the most interesting calls are grouped under the **Green Vehicles** topic, and they include:

- **GV.1-2014. Next generation of competitive lithium ion batteries to meet customer expectations**
- **GV.2-2014. Optimised and systematic energy management in electric vehicles**
- **GV.3-2014. Future natural gas powertrains and components for cars and vans**
- **GV.4-2014. Hybrid light and heavy duty vehicles**
- **GV.5-2014. Electric two-wheelers and new light vehicle concepts**
- **GV.6-2015. Powertrain control for heavy-duty vehicles with optimised emissions**
- **GV.7-2014. Future natural gas powertrains and components for heavy duty vehicles**
- **GV.8-2015. Electric vehicles' enhanced performance and integration into the transport system and the grid**

Secure, clean and efficient energy

Thematic scope of this so-called Energy Challenge section includes:

- Reducing energy consumption and carbon footprint by smart and sustainable use
- Low-cost, low-carbon electricity supply
- Alternative fuels and mobile energy sources
- A single, smart European electricity grid
- New knowledge and technologies
- Robust decision making and public engagement
- Market uptake of energy innovation

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The energy activities are addressed through four groups of calls:

1. Energy efficiency
2. Smart cities & communities
3. Competitive low-carbon energy
4. SME's and Fast Track to Innovation for Energy

In the 2014-2015 Work Programme, the following call is closely related to the topic of i-RESEV project:

- **SCC 1 – 2014/15: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration – first of the kind) projects**

The i-RESEV team plans active participation in some of the above calls, and welcomes various initiatives in that regard.

CONFERENCES

The following forthcoming conferences are closely related to the topic of i-RESEV project.

- The 5th Innovative Smart Grid Technologies Conference (ISGT 2014), 19-22 February, 2014, Washington, DC, USA
  http://ieee-isgt.org/
- Society of Automotive Engineers' International World congress (SAE 2014), 8-10 April, 2014, Detroit, Michigan, USA
  http://www.sae.org/congress/cfp/index.htm
- The 2014 IEEE Intelligent Vehicles Symposium, 8-11 June, 2014, Ypsilanti, Michigan, USA
  http://www.ieeeiv.net/
- International Conference at the European Mobility Exhibition, 11-12 June, 2014, Paris, France
  http://www.transportspublics-expo.com/en
- 1st South East European Conference on Sustainable Development of Energy, Water and Environment Systems – (SEE SDEWES 2014), 29 June - 4 July, 2014, Ohrid, Republic of Macedonia.
  http://www.ohrid2014.sdewes.org/
- The 16th European Conference on Power Electronics and Applications (EPE 2014), 26-28 August, 2014, Lappeenranta, Finland
  http://media.lut.fi/media/EPE2014-Call-for-papers/#/1/
- The 9th Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES 2014), 20-27 September, 2014, Venice Italy – Istanbul, Turkey.
  http://www.mediterranean2014.sdewes.org/
- The 23rd The Aachen Colloquium on Automobile and Engine Technology, 6-8 October, 2014, Aachen, Germany
  http://www.aachen-colloquium.com/
- Vehicle Power and Propulsion Conference (VPPC 2014), 27-30 October, 2014, Coimbra, Portugal
  www.vppc2014.org
- The European Utility Week, 4-6 November, 2014, Amsterdam, Netherlands
  http://www.european-utility-week.com/
- European Electric Vehicle Congress (EEVC 2014), 2-5 December, 2014, Brussels, Belgium
  http://www.eevc.eu

WEB PORTALS

There are a number of web portals, magazines and libraries that deal with electrified road transport and its integration into energy systems:

- Society of Automotive Engineers (SAE)'s International Global Technology Library – Electric Vehicle
  http://saegtl.org/ev/
- Vehicle Electrification (SAE)'s Magazine
  http://magazine.sae.org/digevsae/
- Information and Communication Technologies for the Fully Electric Vehicle
  http://www.ict4fev.eu/public/
- European Green Cars Initiative
  http://www.green-cars-initiative.eu/public/
- The IEEE Transportation Electrification Initiative
  http://electricvehicle.ieee.org/
- E-mobilnost
  http://www.e-mobilnost.hr/
- ELTIS The Urban Mobility Portal
  http://www.eltis.org/

DISCLAIMER

The opinions, findings, conclusions and/or recommendations included in this newsletter are of sole responsibility of the project team, and they do not necessarily reflect standpoints of the Croatian Science Foundation.

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