EV related programmes in Poland and cooperation opportunities at EU level

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✓ Need for „EV Development Strategy in Poland”
✓ Examples of EV projects, concepts and technologies in Poland
✓ Polish successes at European (FP7 & ENIAC) and national level
✓ Proposals for EU cooperation
Need for „EV Development Strategy in Poland”

2006
ZNTK Radom

2008
Elipsa

2009
SAM II Impact Automotuve

2010

European Economic Recovery Plan

3rd FP7 Transport Call for EGCI

ENT19 Calls

A European strategy on clean and energy efficient vehicles

PL – EU cooperation

EV strategy proposal for Ministry of Economics Engagement of MoE in creation of national strategy

Consultations with national stakeholders Revision of TP composition

Project „Development of electric vehicles market, with infrastructure and charging stations – basis for energetic safety in Poland”

IniTech Call 8 clean transport projects funded

National Research and Development Works Programme

And other producers: CarT, 3xE, FIAT, FSO, Polish Automotive Chamber

CarT, 3xE, FIAT, FSO, Polish Automotive Chamber
Polish NCP is widely involved in consultations with different national stakeholders interested in creation of such national programme.

After a number of meetings in 2009/2010 a draft proposal of Polish Road Transport Technology Platform composition was proposed.
Strategic goals:
- More autonomy of Poland in fuel supply
- Gradual elimination of oil as fuel

Specific goals:
- Development of EV market
- Diffused energy development
- Better utilisation of resources contributed to EU budget (ie. FP7 annual contribution is around 150 mln €)
- Others (what?)
EV development programme - assumptions

Goals of the programme:
- Research focused on strictly defined products as a basis for further tests/demonstration phase
- Research on whole vehicles / sections / elements of the system development (charging infrastructure, production processes, modern technologies)
- Conducting reasonable R&D policy at national, european and international level

Programme advantages (national level):
- Better economical effect of R&D expenditures
- Real reformation of science – industry cooperation
- Lowering the research results acquisition costs
- Uplifting the quality of achieved results (ie. access to infrastructure not available in Poland)
- Possibility of building partnerships for FP7/FP8 collaboration

Programme advantages (European level):
- Possibility of acquiring highest level research results in Europe
- Real opportunity to participate in European EV research programme (500 mln €)
- Better utilisation of Polish contribution to research funding (Polish annual FP7 contribution is ~150 mln € and is slightly utilized)
EV development programme – strategy elements

EV programme in Poland

- Electrical energy production
- Energy capacitors (batteries)
- Infrastructure
  - Electrical bus
  - Electrical taxi
  - Electrical farming vehicle
  - Passenger Van
  - Electric car
EV development programme – strategy elements (in details)
EV development programme

- EV Programme areas
  - Research areas
    - Power systems
    - Body & chassis
    - Drives
    - Control
  - Investments
  - Others

Need for "EV Development Strategy in Poland"
Need for „EV Development Strategy in Poland”
8/13

**EV development programme – R&D&I financing sources**

- **FP7 (1bln €)**
- **Own resources**
- **National Framework Programme**
- **CIP**
- **EBI credits (4 bln euro):**
  - **BGK (?)**
- **Structural Funds**
  - **Ini Tech initiative**
  - **Joint Programming**
  - **ERA NETs, Era net +**
EV development programme, budget simulation – R&D&I part

Of which 180 mln € from national public resources
- 50+1 mln from National R&D Works Programme for national projects
- 50 mln from NRDWP from international cooperation projects within ERA-NET scheme
- 10 mln from IniTech initiative
- 69 mln from Structural Funds

Total: > 14,5 mln €

*1 1,56 mln € in 1st FP7 EGCI Call
0,98 mln € from 2008 and 2009 ENIAC Calls
*2 up to 0.4 mln € in 2nd ENT19 Call
*3 5,2 mln € in 8 national projects
*4 large number of projects financed with National/MS sources
*5 5 mln € for “Development of electric vehicles market, with infrastructure and charging stations” project
EV development programme in Poland is in definition phase and:

- R&D is being conducted at universities, technical universities, R&D units and centres
- R&D is performed for whole electric transport units (electric bus, vehicles for disabled people)
- One major project is run - “Development of electric vehicles market, with infrastructure and charging stations – basis for energetic safety in Poland”. Value of 5 mln EUR; Impact Automotive cars, Solaris buses and FSO Chrysler Aveo EV conversions will be tested.
EV development programme

Green Mobility Programs EU Member States

- Sweden
  - Joint Vehicle Research Progr. (90 mE pa, 2009-13)
- Poland
  - Initiative promoting electric cars and renewables
- The Netherlands
  - Strategy Plan to be published in July
- Ireland
  - EV Deployment Progr. (225,000 vehicles by 2020)
- U.K.
  - Low Carbon Vehicle Innovation Platform, TSB (150mE)
- Germany
  - Strategy Plan (1m PHEV/EV by 2020, 500mE 09-11)
- Austria
  - Climate & Energy Fund (150mE p.a.)
- France
  - Program Predit et al. (290mE, 100,000 EV in 5yrs)
- Spain
  - Pilot Project Movele (10mE, 100,000 EV in 5yrs)
- Italy
  - Industria 2015 (150mE in 2009)

www.kpk.gov.pl
National Research and Development Works Programme:

Research area „Energy and infrastructure”,

Subarea 3.7 „Safe, effective and ecological means of transport”:
- Constructions and systems for user protection and rescue in case of malfunction
- „Intelligent transport mode” and „intelligent infrastructure” providing and processing data on vehicle or infrastructure status, road conditions, threats, users behaviors
- Materials and systems for lowering pollution emission
- Development and running of „clean” mass transport means using renewable energy

Subarea 3.8
- Development of intelligent transport systems and implementation of ICT technologies allowing decreasing of volume of vehicles and increasing of effectiveness of urban and suburban transport
Cooperation with Ministry of Economics

Remarks for creation of national EV development plan – prepared by NCP Poland with support of national stakeholders and sent to Ministry of Economy in February 2010.

MoE created three Working Groups with the aim of developing the National Plan:
- Research, development and industry
- Infrastructure
- Incentives

Ministry of Economy is currently engaged in bilateral dialogue and supports the Programme development.
✓ Need for „EV Development Strategy in Poland”
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Examples of EV projects, concepts and technologies in Poland

Development of electric vehicles market, with infrastructure and charging stations – basis for energetic safety in Poland

Direct goal of the project is to initiate development of EV and diffused energy market in Poland utilising renewable energy sources. Realization of this project will contribute to raising Polands energetic autonomy and improvement of natural habitat.

Goal of the project is to develop new technologies and solutions, ie.:

- Support platform for new cooperation and investment affiliations in automotive, renewable energy and other markets
- Development of knowledge base system for EV's and renewable energy system
- Multifunctional town EV
- Remote vehicle monitoring system
- Light EV's
- EV service station model
- Model and test implementation of EV charging systems
- Prototypes of in-house and in-institution micro power plants

Project budget: around 5 mln €.

Coordinated by Agency for Regional Development MARR S.A. in Mielec in cooperation with 18 national partners.

www.kpk.gov.pl
**Electrobus – Electric bus with accumulators charged from power grids**

**Goal of the project:**
Development of ecological bus with electric drive, using energy recuperation

**EV for people with limb disfunction**

**Goal of the project:**
Building cheap electric vehicle for disable people, intended for city travel without additional legitimations for driving. It will be mostly based on parts available on domestic market and will utilise Polish R&D potential. Final effect of the project will be a prototype ready for mass production.
„Kul-Car” – electric city car for drivers on wheel chairs
Idea of the project is development of a prototype of city EV intended for drivers moving on wheel chairs.
Price of series production car should be less than 10k EUR which should be much lower than competition can offer at the moment and relieves disabled people from using van cars and not being able to move around a city upon a need.

MOBILO utility vehicle
Basic concept was developed at Academy of Fine Arts with the aim of creating utility vehicle to be used on parking lots and as a town car.
Due to its good maneuverability, small size, ease to park and very low price it could be treated as a „briefcase” for work or rental car for town sightseeing tours.
Examples of R&D works for Electrical Vehicles conducted in Poland:

- Prototype electric engines for vehicles,
- Super-capacitor based electrical energy containers,
- Power units in Li-ion batteries,
- Fuel cells and hydrogen containers,
- Car drives with engines built-in wheels,
- Mobile and stationary charging stations for energy containers,
- ICT infrastructure for EV charging,
- On-board diagnostics and EV control devices,
- Remote diagnostics, monitoring and control systems for EV’s,
- Integration of communication systems with the driver,
- EV energy management systems,
- Telediagnosis, remote localisation, remote software modification.
Examples of EV projects, concepts and technologies in Poland 5/5

- High-efficiency segmented thermoelectric element for automotive applications,

- Development of new high-temperature thermoelectric materials for automotive applications

- Investigation of novel composite materials to be used as components of thermoelectric generators for the conversion of renewable energy,

- Enhancement of ecological properties of combustion engine systems by using of thermoelectric generators

And many more.
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<table>
<thead>
<tr>
<th>Acronym</th>
<th>Title</th>
<th>Polish partner</th>
<th>Req. Contribution</th>
<th>Call</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIDE-MOB</td>
<td>Building blocks concepts for efficient and safe multiuse urban electrical vehicles</td>
<td>Bumar</td>
<td>370.000</td>
<td>SST 2010</td>
</tr>
<tr>
<td>CAPIRE</td>
<td>Coordination Action on PPP Implementation for Road-Transport Electrification</td>
<td>Solaris Bus &amp; Coach</td>
<td>95.500</td>
<td>SST 2010</td>
</tr>
<tr>
<td>OSTLER</td>
<td>Optimised storage integration for the electric car</td>
<td>Cracow University of Technology</td>
<td>132.000</td>
<td>SST 2010</td>
</tr>
<tr>
<td>SmartBatt</td>
<td>Smart and Safe Integration of Batteries in Electric Vehicles</td>
<td>Impact Design Europe</td>
<td>135.000</td>
<td>SST 2010</td>
</tr>
<tr>
<td>EuroLion</td>
<td>High energy density Li-ion cells for traction</td>
<td>Warsaw University of Technology</td>
<td>324.000</td>
<td>ECh Storage 2010</td>
</tr>
<tr>
<td></td>
<td><strong>Green Cars - Integrated EU demonstration project on electromobility</strong></td>
<td>Solaris Bus &amp; Coach Warsaw Municipality</td>
<td>Unknown (results not published yet)</td>
<td>TREN 2010</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>1,566,700</strong></td>
<td></td>
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</tbody>
</table>
Polish successes in ENIAC JU Calls

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Title</th>
<th>Partners</th>
<th>Requested financing</th>
<th>Call</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE2A</td>
<td>Nanoelectronics for Safe, Fuel Efficient and Environment Friendly Automotive Solutions</td>
<td>Ameipox, Wroclaw University of Technology, Institute of Electron Technology</td>
<td>138.000 EUR, 172.000 EUR, 358.000 EUR</td>
<td>2008</td>
</tr>
<tr>
<td>LAST POWER</td>
<td>Institute of High Pressure Physics UNIPRESS</td>
<td></td>
<td>288.000 EUR</td>
<td>2009</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>956.000 EUR</strong></td>
<td></td>
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</table>
Polish successes at European (FP7 & ENIAC) and national level

**IniTech Call**

- Coordinated by The National Centre for Research and Development (NCBiR)
- Launched in 2009
- Projects start in 2010
- 10% of signed projects (8 out of 74) for clean transport solutions

<table>
<thead>
<tr>
<th>Title</th>
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<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovative system for volatile hydrocarbons reduction in new generation cars</td>
<td>Delphi Poland</td>
<td>857.000 EUR</td>
</tr>
<tr>
<td>Innovative technology for road surfaces with lowered noise emission</td>
<td>Mostostal Warszawa</td>
<td>514.000 EUR</td>
</tr>
<tr>
<td>Development and implementation of E10 lead-free gasoline production</td>
<td>The Oil and Gas Institute</td>
<td>325.000 EUR</td>
</tr>
<tr>
<td>ITRAM - Innovative tram</td>
<td>Solaris Bus &amp; Coach</td>
<td>885.000 EUR</td>
</tr>
<tr>
<td>Development of new generation tram for city transport needs</td>
<td>NEWAG</td>
<td>1.405.000 EUR</td>
</tr>
<tr>
<td>Wireless bus diagnostics system</td>
<td>DIAGBUS (Research and industrial consortium, represented by Solaris)</td>
<td>720.000 EUR</td>
</tr>
<tr>
<td>Innovative high-power resonance feeder for hybrid and electric vehicles</td>
<td>Fideltronik Imel</td>
<td>171.000 EUR</td>
</tr>
<tr>
<td>Power consumption lowering in chosen subassemblies in buses and trolleybuses</td>
<td>PP-SBC (Research and industrial consortium, represented by Solaris)</td>
<td>368.000 EUR</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>5.245.500 EUR</strong></td>
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The Route Map shows how the Implementation Plan will bring the Strategic Research Agenda to the realisation of the targets set in VISION 2020.
Proposals for EU cooperation

Current running programmes (PL and EU)

European Green Car Initiative

Strategic Research Agenda

Expected research results

Research topics

Prototype of electric bus with electric energy containers charged from power network.

Electric Vehicle: Vans/Minibuses, Buses

Prototype of electric van/minibus with electric energy containers charged from power network.

A prototype of high efficient on-board charging station of EV energy containers with high efficiency converter and advanced control module of charging system.

Electric Vehicle Internal Systems.

High Speed energy management system providing for optimal braking energy recuperation at energy container.

Topic 1: Electric bus with electric energy containers charged from power network.

Topic 2: Electric vans/minibuses with electric energy containers charged from power network.

Topic 1: A high efficient on-board charging system of EV energy containers with high efficiency converter and advanced control of charging process.

Topic 2: High power system with supercapacitor-based energy container.
Proposals for EU cooperation

**Current running programmes (PL and EU)**

- **European Green Cars Initiative**
  - **Topic 1:** Control system of Electric Vehicle
  - **Expected research results:** A cockpit control & monitoring console operating as an on-board computer
  - **Technology integrator:** Electric Vehicle Control System cooperating with infrastructure information systems

- **Topic 2:** An anti-collision system for traction vehicles.
  - **Expected research results:** Reduction in the number of traction vehicles collisions due to a system automatically signaling a threat of collision.

- **Topic 3:** A system to control an access to and starting electric vehicles.
  - **Expected research results:** An improved anti-theft and anti-start protection of electric vehicle

- **Topic 4:** An infrastructure integrated system to inform driver on parking lots.
  - **Expected research results:** Helping a driver finding a free parking lot close to electric vehicle due to information sent directly to on-board computer

**Agenda**

- **Strategic Research Agenda**
  - **Current running programmes (PL and EU)**
    - **European Green Cars Initiative**
      - **Topic 1:** High efficiency Electric Vehicle lighting system based on LED technology
      - **Expected research results:** A series of types of vehicle lamps and reflectors based on LEDs. Minimization energy consumption for lighting.
      - **Technology integrator:** Electric Vehicle Lighting System
Proposals for EU cooperation

Current running programmes (PL and EU)

European Green Cars Initiative

Expected research results

Technology integrator

Topic 1:
An infrastructure to enable fast charging of Electric Vehicle energy containers (batteries, supercapacitors).

A prototype of EV fast charging station with a payment system.

Infrastructure enabling charging of Electric Vehicle energy containers.

Topic 2:
Infrastructural system of Electric Vehicle charging system, based on Ch2G: Charger to Grid idea, equipped with electric energy containers and enabled to provide the ancillary

A prototype of Ch2G charging station equipped with electric energy storages and enabled to provide the ancillary services for the power grid.

Topic 1:
A centralized system of remote monitoring and diagnostics of technical condition of road vehicles, including public transport/city busses and Electric Vehicles.

Maintaining high operational efficiency of road vehicles, in particular public transport/city busses and Electric Vehicles, based on a system of remote monitoring and diagnostics of technical condition of vehicles cooperating with on-board computer.

Infrastructure enabling charging of Electric Vehicle energy containers.

Topic 2:
Elimination from road traffic the vehicles with weight exceeding adequate levels.

A centralized system of remote real-time monitoring of heavy vehicle weight and the real-time system to eliminate vehicles with weight exceeding adequate levels.
Proposals for EU cooperation

Current running programmes (PL and EU)

- European Green Cars Initiative
- Norwegian EEA grant
- Honda Initiation Grant Europe 2010
- 2009-2011 MSHE project

Expected research results

- Investigation of novel composite materials to be used as components of thermoelectric generators for the conversion of renewable energy
- High-efficiency segmented thermoelectric element for automotive applications
- Development of new high-temperature thermoelectric materials for automotive applications
- Technology for development of new materials for thermoelectric generators
- Technology for development of active elements for thermoelectric generators
- Development of assumptions for TEG generator in combustion engines

Technology integrator

Future vision

Power system

Thermoelectrical generators in hybrid drives
Submitted needs for EV’s and technologies

Example - Warsaw municipality:
- Electric buses
- Taxis
- Vans
- Messenger cars
- Town Guard
- Town transport traffic control
- City cleaning
- Park vehicles
- Police vehicles (for chosen tasks)
Submitted needs for EV’s and technologies

- Efficient electrical engines constructions
- Setups and algorithms for engine control, integrated with rapid charge system
- Algorithms and systems for optimal LiOn battery management
- Nanotechnologies for traction batteries production
- New technologies for traction batteries
- Intelligent energy grid management systems, with utilization of EV batteries as mobile energy storage systems
- Construction and production of innovative hardware for EV’s:
  i. Electrical support, air conditioning.
  ii. On-board instruments
- Traction batteries and ECU’s manufacturing
- Electrical engines manufacturing
- Electrical brakes and suspension elements production
- Electronics, specialist informatics
Submitted needs for EV’s and technologies

- Analysis of possibilities of increase of efficiency of hybrid cars by application of thermoelectric generators
- Development of waste heat recovery thermoelectric generator TEG for hybrid cars
- Development of new high-temperature thermoelectric materials for thermoelectric generators

Only a part of needs submitted by EV manufacturers and R&D units. It does not include future needs connected to EV sector development.
Era Net Transport II - Action Group 19 „Electric Mobility” (NL, NO, FI, AT, PL)

1st Call – analysis of current status of European EV market – already closed

2nd Call (budget around 1.8 mln €):
Criteria for loading systems in parking areas,
- Intelligence in vehicles or in infrastructure?
- Possibility to integrate tax-paying software
- The importance of criteria to create a level playing field for suppliers
- Identification of main elements to be addressed in the concept for these criteria
- Recommendations on the further development of criteria for loading systems in public/private parking facilities

Safety issues for electric (& hybrid) vehicle.
- Submersion in water
- Collision safety (considering the weight of the battery packs, battery fluids that may be exposed, the specific carriage work of EV’s and PHV’s, etc)
- Electric system integrity, functional safety
- Mechanical system integrity, functional safety
- Battery safety related to slow and fast charging
- Driving behaviour of the vehicle (including braking and road-holding)
- Electromagnetic radiation
- Firemen and SAR instructions and protocols
- Recommendations on the development of standards for the European Type Approval and the development of test models for EV’s and PHV’s

Large interest in participation from Polish R&D and industrial sector.
ENT 19 – Electric Road Transport 1st Call project

**Aim:**
Analysis of European EV market in terms of users and market attitude and policies supporting the development process.

**Reason:**
Large shortages of knowledge about EV market in EU countries (i.e. in terms of political support like incentives, subsidies, taxes as well as development of commercial services and industry allowing the growth and expansion of the sector).

**Actions:**
- Analysis of EU market potential for electric road transport. Overview of synergies at EU level and user groups at national level
- Estimation of conditions necessary for integration: analysis of best conditions for integration of electric road transport with current transport systems
- Development of a roadmap: guidebook for policy makers on how to create conditions for quick and effective implementation of electric road transport system
- Benefiting from potential of electrically advanced countries: Denmark, Italy, France, Spain, UK, Germany, USA and Japan (as good practice examples for legislation and implementation solutions)

**Countries covered by the project activities**
Consortium: Poland, Norway, Finland, Netherlands, Austria.
Thank you!

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