

# **Multiannual Roadmap for the Contractual PPP “European Green Vehicles Initiative”**

**Draft Version 1.0 (26 July 2012) for Stakeholders Consultation**

Comments and recommendations  
to be sent to [info@ertrac.org](mailto:info@ertrac.org) or [info@smart-systems-integration.org](mailto:info@smart-systems-integration.org)  
before the 18<sup>th</sup> of September.

## **PART I: Vision 2030**

### *1. Context setting: goals, links with EU policy objectives, and societal challenges addressed.*

Energy efficiency of road vehicles and alternative powertrains have been identified by the industry and by policy-makers worldwide as decisive for achieving major cuts in CO<sub>2</sub> emissions and for moving forward towards a sustainable transport system. The European Commission in its 2011 White Paper for Transport<sup>1</sup> set the objective of delivering a competitive and resource efficient transport system which allows to substantially cut carbon emissions and to reduce dependence on imported fuels. The challenge of energy efficient vehicles and alternative powertrains relates to several important objectives of the European Union: reduction of emissions and improvement of air quality, cut of CO<sub>2</sub> and prevention of climate change, maintaining energy security, and increased use of renewable energies. Focusing on this challenge, the European Green Vehicles Initiative will thus contribute to reach the targets set by the European policies of Transport, Energy, Environment and Climate Protection. Being by nature a cross-sectors matter, advancements for the energy efficiency of road vehicles will be built on the expertise of three European Technology Platforms, ERTRAC, EPoSS, and SmartGrids, following a system approach integrating the research domains of automotive, energy, ICT, and smart grids.

By developing energy efficient road vehicles and alternative powertrains (“green vehicles”), the initiative will address the societal challenge of sustainable transport, and at the same time have a major impact on the innovative strength and global competitiveness of the European economy e.g. in terms of protection and further growth of manufacturing basis, employment, and skills. The initiative will follow the approach of Horizon 2020<sup>2</sup> to use research and innovation activities for reaching industrial leadership positions. Considering that Europe’s competitors on the global markets – who are well aware of the leverage effect of public funding – have set up massive R&D support programmes for green vehicles development, Europe cannot afford to lack ambition or to let fragmentation reduce the efficiency of its action on this field. In its recent report<sup>3</sup> published in June 2012, the CARS21 High Level Group, gathering European Commissioners, national Ministers and CEOs of the automotive industry, concludes that in front of this challenge for the EU global competitiveness it is indeed necessary to launch a specific major initiative on breakthrough technologies. The instrument considered the most suitable is the contractual Public Private Partnership as described in article 19 of the Horizon 2020 proposal, in which both the public and private sides express their commitment to support the development and implementation of a research and innovation activity of strategic importance to the EU competitiveness and industrial leadership, and to address specific societal challenges.

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<sup>1</sup> COM(2011) 144, White Paper 2011 “Roadmap to a Single Transport Area - Towards a competitive and resource efficient transport system”.

<sup>2</sup> COM(2011) 809, Proposal for a Regulation of the European Parliament and of the Council establishing Horizon 2020 - The Framework Programme for Research and Innovation (2014-2020)

<sup>3</sup> CARS 21 High Level Group on the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union, Final Report 2012, 6 June 2012

## 2. Overall Vision 2030 and research and innovation strategy of the industrial sectors involved.

The three technology platforms involved in the PPP cover the research and innovation strategies of road transport (ERTRAC<sup>4</sup>), smart systems (EPoSS<sup>5</sup>) and smart grids (SmartGrids<sup>6</sup>). They have specific scopes but their strategies are complementary and match the PPP objectives.

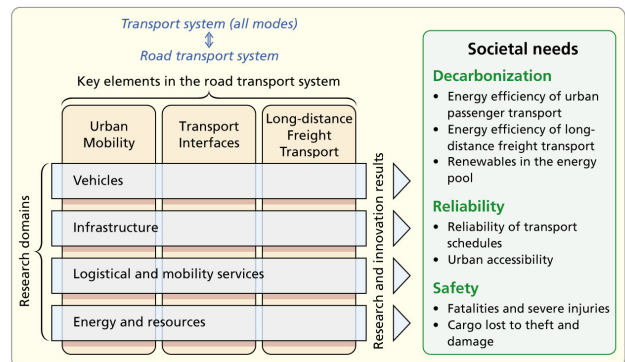
ERTRAC - the European Road Transport Research Advisory Council, has recently revised its Strategic Research Agenda (SRA) by taking a system approach and addressing Grand Societal Challenges. As described in the table and figure below, objectives have been set, for an overall efficiency improvement of the transport system by 50% in 2030 compared to 2010, and with specific targets for each of the societal needs identified: decarbonisation, reliability and safety.

Table 1 Guiding objectives for 2030

	Indicator	Guiding objective
Decarbonization	Energy efficiency: urban passenger transport	+80% (pkm/kWh) *
	Energy efficiency: long-distance freight transport	+40% (tkm/kWh) *
	Renewables in the energy pool	Biofuels: 25% Electricity: 5%
Reliability	Reliability of transport schedules	+50% *
	Urban accessibility	Preserve Improve where possible
Safety	Fatalities and severe injuries	-60% *
	Cargo lost to theft and damage	-70% *

\* Versus 2010 baseline

Figure 2 A systems approach to achieving a 50% more efficient road transport system



The ERTRAC SRA is being implemented through Roadmaps covering topics for research, development, and innovation framework. Together, the ERTRAC roadmaps cover all aspects of the transport system and allow to reach the objectives set in the SRA. The approach focuses on the following three key elements of the transport system: urban mobility; long-distance freight transport; and interfaces between transport means. Together, these elements provide an integrated core transport system that serves the road transport demand of more than 80% of the population, so they are of the greatest strategic significance to meet the European societal challenges.

ERTRAC, thanks to its multi-stakeholders membership gathering all the actors of road transport research, is then able to cover the four enabling research and innovation domains, which are: vehicles, infrastructure, logistical and mobility services, and energy and resources. A mix of these domains are usually needed in order to address efficiently one issue and be efficient in delivering benefits towards the societal objectives. For the European Green Vehicles Initiative, ERTRAC will extract from its roadmaps the topics needful for the specific objective of the PPP.

EPoSS, the European Technology Platform on Smart Systems Integration focusses on Smart Systems, defined as intelligent, often miniaturised, technical subsystems with their own and independent functionality evolving from microsystems technology. One of the most important application fields of smart systems is the automobile. According to the EPoSS SRA, priorities of R&D in this area are clustered around safety, driver assistance and convenience, energy efficient and environment friendly smart power trains and subsystem. A particular focus is on enabling technologies for clean propulsion and electrification. In the electric vehicle the following functionalities will be provided by smart systems: management of energy storage systems, intelligent power electronics, active control

<sup>4</sup> <http://www.ertrac.org>

<sup>5</sup> <http://www.smart-systems-integration.org>

<sup>6</sup> <http://www.smartgrids.eu>

of motors and wheels, smart integration of range extenders, and advanced vehicle to grid connection systems.

SmartGrids, the European Technology Platform for the Electricity Networks of the Future, focuses on research topics and priorities necessary for the advancement of the electricity networks and intelligent electric systems. It is active in the European Green Cars Initiative but also strongly involved in the European Electricity Grid Initiative (EEGI). Very recently in 2012 SmartGrids has updated its Strategic Research Agenda, which now covers the needs up to 2035 for research, development and demonstration initiatives both on national and European levels with the goal to advance a SmartGrids based European Energy System.

### *3. Strategic objectives of the initiative and role of the PPP in the overall industrial strategy.*

As recognized by the Horizon 2020 proposal, a Smart, Green, and Integrated Transport System is to be established in Europe in order to tackle the Societal Challenge resulting from global trends. Its creation implies major innovative steps in a multitude of different technology domains including transport, energy, and ICT. The road transport sector is the largest one to contribute to the realization of a Smart, Green and Integrated Transport System, regarding both economic strength and potential for major innovations. In order to achieve critical mass, to deliver tangible results and to attract the required public attention, the PPP European Green Vehicles Initiative of Horizon 2020 should be incorporated primarily in this domain. At the same time, activities in other Societal Challenges, e.g. Smart, Clean and Efficient Energy, and selected factors of Industrial Leadership, e.g. Key Enabling Technologies, will be essential for completing the objective, the technology focus and the process chain environment of the initiative.

According to ERTRAC, EPoSS and SmartGrids, delivering solutions for the major societal, environmental and economic challenges ahead will require well focused and coordinated research and innovation activities for the next 15 to 20 years. At the same time, a proper level of flexibility has to be kept since fundamental framework conditions in these domains may change rapidly due to adverse events. A close interaction in the decision-making between industry and public authorities such as the European Commission will be essential to generate market credibility and to justify the strategic allocation of resources. Therefore a Public-Private Partnership approach is favored. The aim is to accelerate research, development and demonstration of those technologies allowing the efficient use of clean energies in road vehicles. Therefore the objective of the PPP European Green Vehicles Initiative in Horizon 2020 will be **Energy Efficiency of Vehicles and Alternative Powertrains**.

Only those topics which are essential for this goal will be in the scope of the PPP European Green Vehicles Initiative. Required technologies will be considered at all product layers from modules to systems and vehicles. Neither the development of resources, nor the creation of infrastructures are in the scope, however the integration of these resources and the integration into these infrastructures are of great interest. Furthermore, not only passenger cars are considered but also two-wheelers (or other new light vehicle concepts), trucks and buses.

(see Figure 1)



Acting with a PPP at European level is seen as an added value action complementary to national and local actions, because vehicles and mobility services have to be developed for international markets, using standardized solutions, and need to be able to compete on a worldwide basis.

### Why a contractual PPP?

- To ensure a **lasting commitment** from the industry and the European Commission to address the shared objectives, with the ambition to deliver results in a timely and continuous manner;
- To guarantee **critical mass** of funding for topics that are of strategic importance for the EU, tackling specific societal challenges and aiming at industrial leadership;
- To drive forward **innovation**, by integrating in a ring-fenced programme research activities together with actions necessary to accelerate the implementation of research results, towards the deployment of innovative solutions and pushing for production within the EU;
- To set up a **collaborative process** where private and public actors are putting together their specific competences, the public side setting European transport, energy and industrial policy ambitions while the industry identifies research and innovation priorities to fulfill them;
- To best use the competences of each side, the European institutions being responsible for the public funding allocation, project evaluation and management, while the private partners concentrate on setting recommendations for research topics, and to monitor and evaluate progress towards the objectives;
- To maintain **transparency** of the priorities setting and **openness** for participation in the programme to any interested stakeholders, qualities which cannot be fulfilled if the PPP is further institutionalized. This is a particular need for the automotive industry, which includes several competitors and which is based on fragmented supply chains including SMEs;
- To guarantee **flexibility** and an ability to adapt the technology coverage of the programme according to research findings, allowing the budget to be always oriented towards the best usages according to real industry situation and the state of the art research.
- To ensure a **lasting cooperation** of the industries concerned (automotive, smart systems, smart grids) and the involvement of the corresponding services within the European Commission.

### The Commitment of the industry:

The PPP EGVI will contribute to reach objectives of major EU policies, and in particular the White Paper for Transport: by delivering innovative technologies which will help to reach the EU's target of CO<sub>2</sub> emissions reduction by 60%.

The PPP EGVI will contribute to the deployment of green vehicles such as described in the roadmaps for electrification, hybridization, and long distance trucks. Those roadmaps include milestones of vehicle deployment on the European roads, e.g. an accumulated number 5 Million electric and plug-in hybrid vehicles by 2020 and further growth potential thereafter with corresponding potentials of CO<sub>2</sub> emissions reduction.

The industry is ready to match EU funding with similar private funding. Considering the scope and objectives of the initiative as outlined in this paper a total programme budget of 3 Bn Euros is necessary all along Horizon 2020 (framework 2014-2020), to represent critical mass and allow to reach tangible results. This figure is to be compared with the 30 Bn Euros that the European automotive industry is investing each year in R&D, out of any public support scheme, the majority of it being allocated to energy efficiency.

The PPP EGVI shall work with principles of transparency and openness. Using the wide stakeholders basis of the European Technology Platforms ERTRAC, EPoSS, and Smart Grids, a scheme for operation and governance will be set up to organize the tasks of delivering research topics recommendations

agreed across the community, monitoring project progress and continuously evaluating the efficiency of the measures taken, as well as of building communication channels with the European Member States. A legal entity will be created to represent the private part of the PPP, in the format of a non-profit association, to formalize the principles of work and get the commitment of the interested members to the objectives of the Initiative.

## **PART II: Research and Innovation Strategy**

Only those topics which contribute to reaching the goal of Energy Efficiency of Vehicles and Alternative Powertrains will be in the scope of the PPP, in particular the electrification and hybridization of powertrains, and their adaptation to renewable fuels, as well as the functionality improvement of the vehicle, the reduction of its complexity and weight, and the management of its thermal and other energy flows. As shown in Figure 1, neither the development of new fuels and materials nor the creation of grid and road infrastructures are within the scope: only their integration into vehicles or integration of vehicles within them should be covered as judged necessary to reach the objectives.

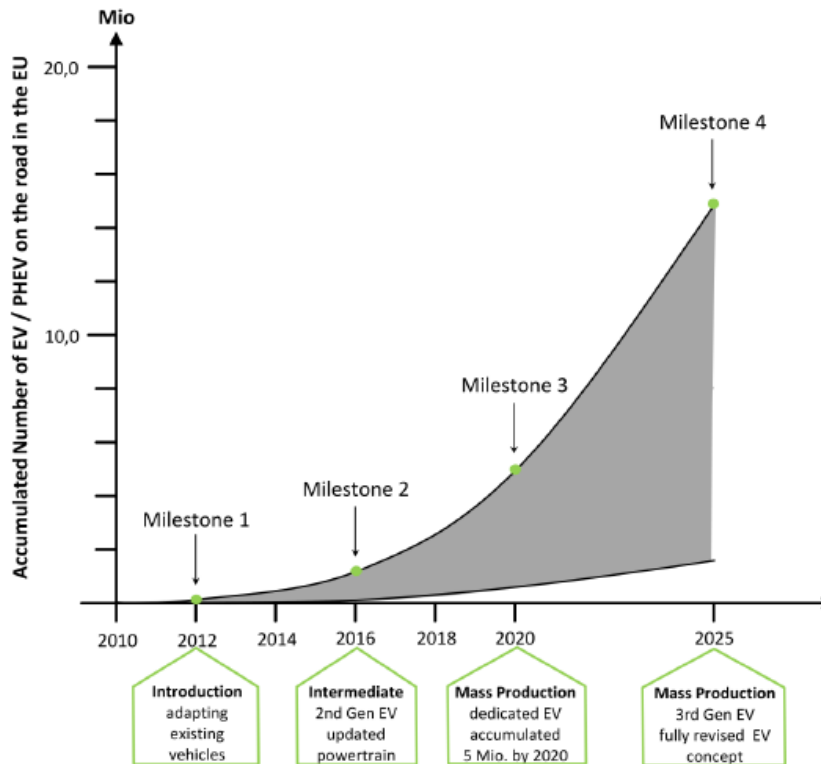
One example of a topic covered by the integrated PPP approach would be the application of a new material which could lead to weight reduction of a module. Within the PPP, the adaptation and processing of the material would be covered as well as the functionality improvement of the module, the integration into the vehicle, the prototyping and testing, the establishment of a prototype line and finally the demonstration of the product. On the path towards innovation, the results of projects within the process chain may raise new questions and feed them back into the R&D work.

At the same time, advice for EU to address policies regarding transport and energy will be delivered, e.g. indicating when standardization or public procurement can be helpful to the innovation process. Indeed, the technology focus and the process chain environment of the initiative should not be limitative but further links need to be made e.g. to the other PPPs, to standardization activities, education programmes, infrastructure creation, etc.

The long-term technology roadmaps developed as part of the Strategic Research Agendas of the involved European Technology Platforms describe the course of research and innovation leading to the goals of PPP European Green Vehicles Initiative. Their milestones will ensure coherence of technology developments in the relevant technology fields and to derive thematic priorities and time scales. In view of the objective of the PPP European Green Vehicles Initiative, particularly the roadmaps on electrification and hybridization are relevant, with in addition specific roadmaps for trucks and for buses.

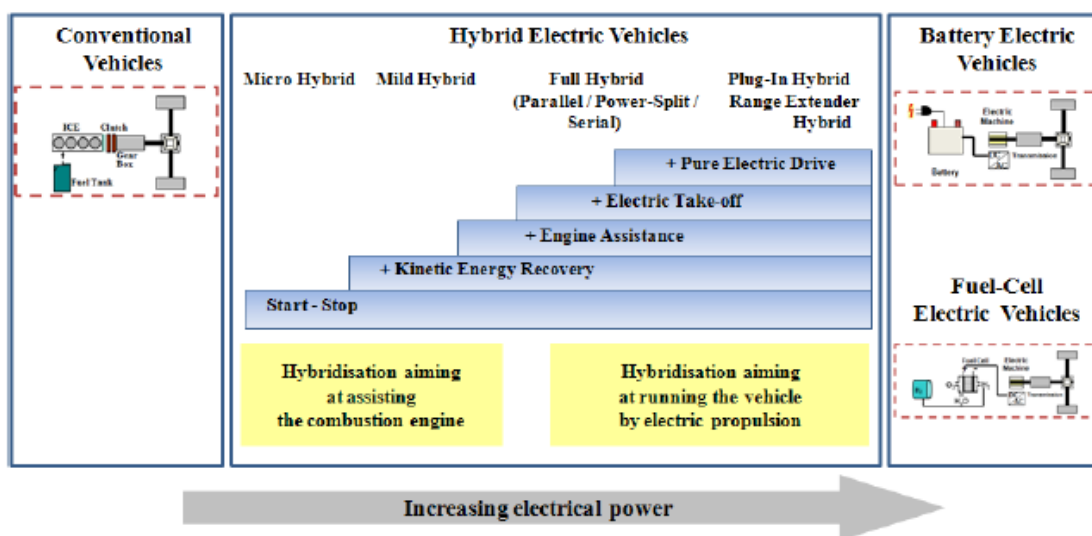
According to the “European Roadmap Electrification of Road Transport”, a mass production of dedicated electric and plug-in hybrid vehicles will be achievable by 2020 if fundamental progress is made in six technology fields: energy storage systems, drivetrain technologies, vehicle integration, safety, road integration and grid integration. Mass deployment of the technology will however require significant increases of energy efficiency and reductions of cost which may be provided as of 2025 by a fully revised electric vehicle concept.

(see Figure 2)



**Figure 2:** Milestones of the European Industry Roadmap for Electrification of Road Transport. Lower black curve: Evolutionary development of accumulated number of EV/PHEV. Upper black curve: Expected development under assumption of reaching the major technological breakthroughs as described for the six technology fields in table 4.

Future customer demands combined with legal requirements will drive the introduction of Hybrid Electric Vehicle (HEV) technologies, increasing the energy efficiency of vehicles propelled by conventional powertrains, while developing enabling technologies for the future large scale vehicle electrification. Without hybridisation, especially with Plug-In Hybrids and Range Extender Hybrids, the goals of decarbonisation cannot be achieved. (see Figure 3)



**Figure 3:** The classification of Hybrids

The Multi-Annual Implementation Plan of the PPP EGVI is based on the relevant research and innovation roadmaps developed by the European Technology Platforms. The table below outlines the roadmaps which can be used as source for this content.

<b>ERTRAC-EPoSS-SmartGrids joint roadmap Electrification of Road Transport</b>
<b>ERTRAC roadmap European Technology and Production Concept for Electric Vehicles</b>
<b>ERTRAC roadmap Hybridisation of Road Transport</b>
<b>ERTRAC roadmap Light-duty Powertrains and Fuels</b>
<b>ERTRAC roadmap Sustainable Freight System for Europe / Heavy Duty Truck</b>
<b>ERTRAC roadmap European Bus System of the Future</b>
<b>EPoSS Strategic Research Agenda chapter Automotive</b>
<b>SmartGrids Strategic Research Agenda</b>

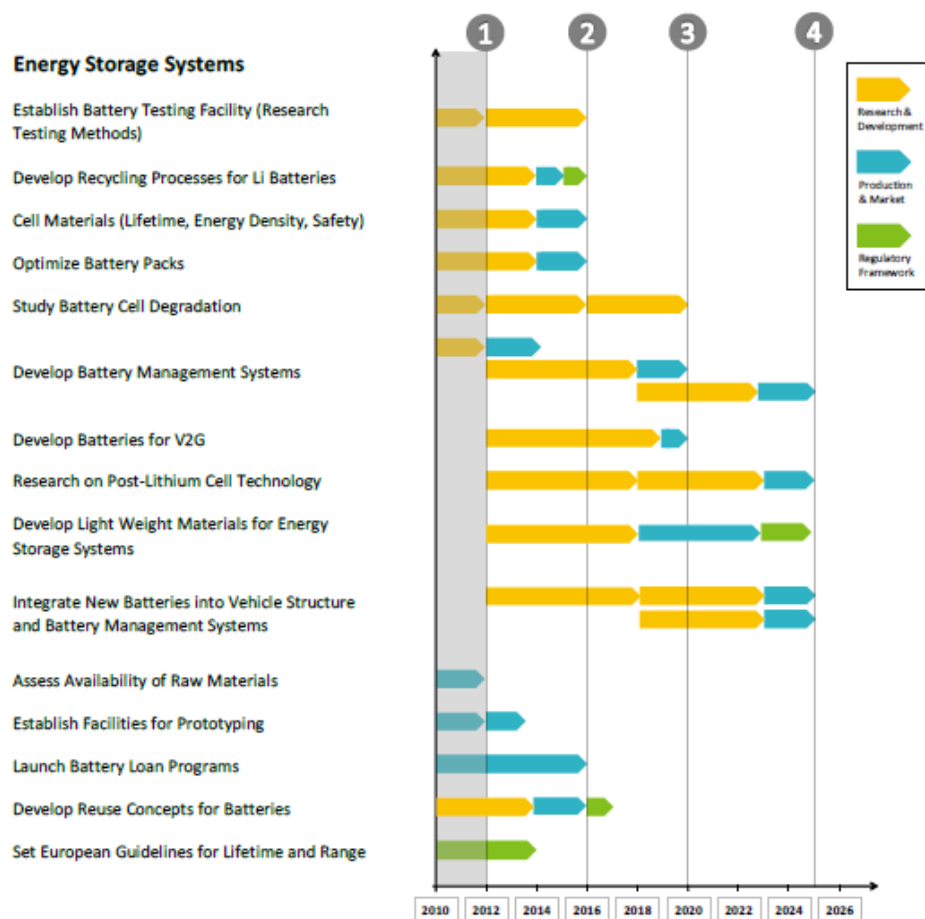
Additional roadmaps may be developed by the technology platforms, and used by the PPP, if important missing aspects are identified. Moreover, these roadmaps will be updated periodically: they are snapshot of the situation today, and it will be a task of the partners within the platforms to monitor and continuously update them.

For the multi-annual implementation of the EGVI PPP, research priorities will be extracted from the roadmaps according to industry recommendations, and bearing in mind the scope decided for the initiative. Some subdomains of roadmaps will fully fall into the coverage of the EGVI, while for others only a part of the topics will be likely to be selected for coverage by the PPP. An example is given in the table below for the roadmap Electrification of Road Transport.

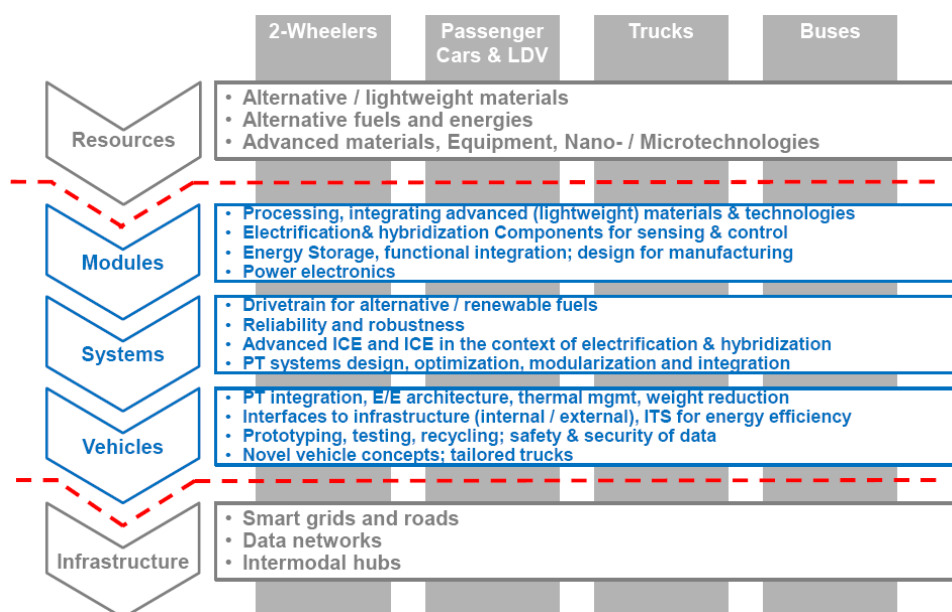
<b>Electrification of Road Transport</b>	
<b>Energy Storage Systems</b>	<b>fully</b>
<b>Drive Train Technologies</b>	<b>fully</b>
<b>Vehicle System Integration</b>	<b>fully</b>
<b>Transport System Integration</b>	<b>partly</b>
<b>Grid Integration</b>	<b>partly</b>
<b>Safety</b>	<b>partly</b>

On this basis, the content of the PPP EGVI can already be specified, and broken down into the technology fields covered. Concerning the timeline for coverage of the various subdomains, the PPP will base its work on the detailed roadmaps which define on a timeline the different types of activities (research and development, demonstration, support to market introduction, standardization and regulation) which are necessary for the milestones and the objectives to be reached. As example, the detailed roadmap for the chapter on Energy Storage Systems of the Electrification Roadmap is shown below. Such detailed roadmap for a subdomain exists for each subdomains of all the ETP roadmaps mentioned above as sources for the EGVI PPP.





The annual recommendations for funding topics will be made on this basis by the new PPP organization, with priorities selected by industrial delegates. The annual selection is therefore a matter for the future prioritization exercise, which should be open and flexible, and allow to adapt according to technology and market evolutions towards 2020. Figure 4 below gives some (non-exhaustive) examples of technology content to be covered by the PPP:

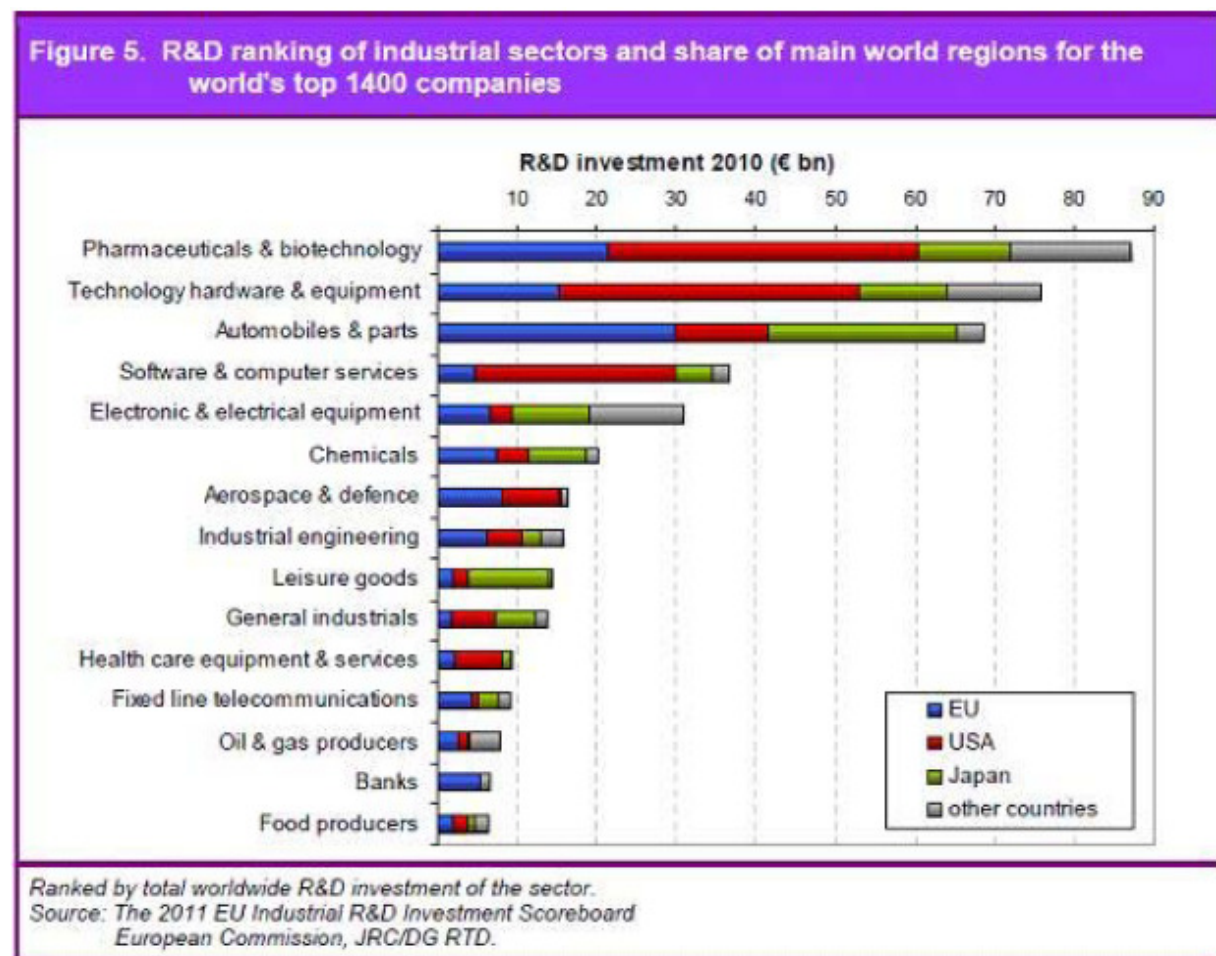


**Figure 4:** examples of technology content of the PPP EGVI (blue)

### PART III: Expected Impacts

- *Scale of the R&D involved and ability to leverage additional investments in R&D.*

The impacts of the PPP have to be considered in relation with the general context of the industry in Europe and worldwide. The European automotive industry invests about EUR 30 Bn per year in research and development, the majority of it being today allocated to improve the energy efficiency of the vehicles. This accounts for more than 12% of gross expenditure on R&D in the EU27<sup>7</sup>, and places the automotive industry at the first rank of the sectors investing in R&D in Europe, as shown by the report of the EC Joint Research Center (JRC) on Industrial R&D Investment<sup>8</sup>. With European automotive companies being at the top of this scoreboard of industrial R&D spending, the automotive industry can truly be considered as a European R&D champion.



The JRC report also shows that R&D investments of the automotive sector in Europe are higher than the investments made by Europe's competitors, which proves the very high commitment of the European industry towards new technologies and innovation. The share of smart systems in the expenses for automotive R&D can be estimated to about 30% of total R&D expenses for automobile technologies, and it can be expected that it will even increase in the future.

Considering those levels of investments at European and worldwide levels, and looking at the objectives of the PPP, in the context of key European policies such as the Transport White Paper, a

<sup>7</sup> Eurostats, [http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/R\\_%26\\_D\\_expenditure](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/R_%26_D_expenditure)

<sup>8</sup> European Commission, Joint Research Centre, 2011 Industrial R&D Investment Scoreboard

**total 7 years programme budget of EUR 3Bn** seems necessary all along Horizon 2020, in order to constitute a critical mass and to bring tangible impacts. If one considers a funding rate in practice of about 50%, this proposal **means a EUR 1.5 Bn EC funding**. In order to illustrate the potentially high leverage effect of that funding, one can compare it with the total R&D spending of the industry, which as shown above by the figure 5 from the JRC is about EUR 30 Bn per year. It means an impact on about EUR 210 Bn of R&D on average during the seven years duration of Horizon 2020: the EUR 3 Bn initiative is therefore impacting investments just on R&D that are up to 70 times higher.

Since the EGVI PPP is focused on highly innovative technologies which require risky investments, the EU funding will make a substantial contribution to the overall innovation chain: promising results of European research projects, which are usually in a pre-competitive stage, lead to further investments within companies into in-house or other collaborative research projects, and if successful in development phases, lead at the end to massive investments in the view of production and market introduction of innovative technologies. In particular where significant breakthroughs are envisaged, the EU funding can be substantial trigger for the overall innovation chain by covering those few % of the total R&D investments that are highly risky for the industry, but that can if successful lead to a cascade of investments towards a successful market introduction.

That funding by the EU has therefore a very important lighthouse role. One has to consider that the societal challenges driving the PPP and its projects are shared within the companies involved, which further invest in house in order to pursue the same objectives. Projects from the PPP can therefore have a high influence on the industry R&D. Moreover, the task of validating technology options by research and demonstration activities are also of very high value, especially because the EU framework programmes allow to work at the European wide level, delivering an assessment across the national markets, which is precious for the R&D of companies who are acting across all the EU countries.

In practice, the funding allocated by the European Commission to research and development is being complemented by funding from national and regional authorities. If one takes into account the investment of industry, EU funding reaches only a level of about only 3%, but these 3% are of high importance, in particular if focused on integration and systems approaches, as the results from this precompetitive research can later be further developed into new technologies, which resulted from a mix a funding, public and private. From this standpoint, the money spent at the European level has a multiplicative effect for the development of products, because it paves the way to investments in many companies, in many countries. European research projects have the added value of reducing the R&D spending risk for the participating companies, because if a larger group is working together towards the same goal, then a risk-sharing effect takes place.

With the EGVI PPP, by setting up a well visible European programme for green vehicles, the European Commission will support the research excellence of the sector in Europe and ensure that innovative technologies for greener vehicles will be developed by European companies within Europe. The realisation of the EGVI has the opportunity to strengthen the R&D base of the European automotive industry, which already files around 6300 patents per year<sup>9</sup>. Also, these investments will benefit the sector of embedded systems and the energy sector, e.g. boosting the development of smart grids, which are very key sectors for future growth opportunities in Europe.

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<sup>9</sup> ACEA, [http://www.acea.be/news/news\\_detail/automotive\\_sector\\_tops\\_rd\\_investment\\_scoreboard/](http://www.acea.be/news/news_detail/automotive_sector_tops_rd_investment_scoreboard/)

- *Expected impacts on industry and society e.g. on competitiveness, growth, employment, trade, productivity, climate change and environment.*

In addition to its leverage effect on R&D investments, the EGVI PPP will have positive economic and social impacts. In 2008 the launch of the European Green Cars Initiative was part of European Economic Recovery Plan. Support to R&D in the automotive sector was at that time identified as a key measure to support one of the most important industrial sectors of Europe, which has major impacts on employment and economic activity. In brief, EU policy-makers had understood that supporting innovation in the automotive sector can help the entire EU economy to go better and bring Europe out of the economic crisis.

The situation in 2012 is not very much different than the one in 2008: innovation is still seen as a very key aspect for the industry in order to remain competitive, to preserve its markets, and therefore to guarantee further employment and growth opportunities. Projects from the EGVI PPP and the resulting technologies and methodologies will lead to additional investments in Europe in engineering capacities, in production tools, in manufacturing facilities, in infrastructures, in new services, in maintenance services, in training, etc, which overall constitute a very positive impact on the EU economy and society.

Looking at employment, about 12 Mn jobs, a majority of which highly skilled, are directly or indirectly depending on the European automotive industry<sup>10</sup>. This represents about 6% of all employment in the EU. The 16 major car, truck and bus manufacturers in Europe operate 169 vehicle assembly and engine production plants in 16 Member States<sup>11</sup>, often sustaining the economy of complete cities and regions. Automotive suppliers give direct jobs to about 5 Mn employees<sup>12</sup>, within large companies but also within a dense network of more than 3.000 SME's located all across Europe. Moreover, manufacturers and suppliers of the automotive industry are important costumers of sourcing industries such as metals, electronics, chemicals, plastics, textiles, glasses, etc, which are highly impacted by the growth rate of the automotive sector. This considerable socio-economic contribution of the automotive industry has to be sustained, and the related European value chains have to be strengthened and adapted to new challenges. The expected innovations in the EGVI areas can support employment in Europe, for various levels of education: not only the R&D and engineering activities have to be retained in Europe, but also production and supporting services. Education and training can support the availability of a skilled workforce, and suitable measures will consequently contribute to improving the problematic situation in the labour market of many countries e.g. high youth unemployment.

Another point is that only thanks to innovation it will be possible to compensate the loss of employment in the future in Europe, because today most companies are setting production capacities in China, South America and in Europe neighbouring countries, in particular for products based on conventional technologies and older platforms. From this standpoint, the innovation approach compensates this trend with new products integrating innovative technologies, which are designed for the European consumers, and better fit for a production in the EU. Linked to that aspect, one key target is the improvement of the productivity of the European automotive industry,

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<sup>10</sup> ACEA, Eurostat, mentioned in MEMO/12/419

<sup>11</sup> ACEA, 2011 Annual Automotive Statistics Overview

<sup>12</sup> CLEPA, European Association of Automotive Suppliers

defining productivity as a measure of the efficiency of production (output-input ratio), which can be impacted by targeted R&D on design and manufacturing. The scale of impact on competitiveness is difficult to quantify but, as also stated in the CARS21 report, it is clear that the technological leadership and high productivity of the EU automotive industry remain its key competitive factor on the global scale.<sup>13</sup> The EGVI PPP will support R&D investments that have an influence on productivity and competitiveness, which again influence key economic indicators such as jobs, growth and trade.

Concerning trade, the size of the European automotive sector and its global orientation play a significant role in the Europe Union's trade balance. In 2011, there was a positive contribution to the EU trade balance of almost EUR 92 Bn.<sup>14</sup> To a certain extent, the EGVI PPP can support this positive trend by accelerating the development of new technologies and products addressing the needs of consumers worldwide, at competitive cost, meeting expectations in aspects such as quality and reliability, fuel efficiency and emissions, connectivity and comfort, etc, outperforming competitors.

About growth, producing 15,8 Mn vehicles (20% of the world market in 2010) and exporting parts and accessories from Europe worth EUR 33 Bn<sup>15</sup>, the European automotive industry involved in the EGVI has important factors for supporting growth and stabilize the economic cycle in Europe. Growth is expected in various areas covered by the PPP and in particular within the objective of electrification of vehicles, which covers several domains where important new opportunities for growth have been identified (electric drive train components, batteries, novel architectures and concepts, ITS, light materials, services for e-mobility, smart grids management,...). Other supporting measures than R&D support linked to the electrification can also have a high impact on economic activity in European, such as investments in infrastructure, public procurement programmes, support to production facilities, etc.

For the overall impact of the EGVI on climate and environmental aspects, references has to be made to the ERTRAC Strategic Agenda, and to the specific roadmaps feeding the PPP. In the ERTRAC SRA<sup>16</sup>, decarbonization is considered as a Grand Societal Challenge for the road transport sector, and guiding objectives on energy efficiency improvement have been set, both for urban passenger transport (+80 % in pkm/kWh) and for long distance freight transport (+40% in tkm/kWh) in 2030 compared to 2010 levels. The contribution of the EGVI to these objectives can be assessed as very important, because the scope chosen for the PPP - energy efficiency of vehicles - including electrification, hybridization, advanced ICE's and adaptation to alternative fuels, will constitute a large part of the energy efficiency gains towards these objectives. More details about energy efficiency improvements and CO<sub>2</sub> saving expectations for each technology can be found within the different roadmaps.

- *Added value of action at EU level and benefits of a Contractual PPP instrument.*

Acting with a PPP at European level is of added value complementary to national and local actions, because vehicles and mobility services have to be developed for international markets, using standardized cross-borders solutions, and need to be able to compete on a worldwide basis.

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<sup>13</sup>CARS 21 High Level Group on the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union, Final Report 2012, 6 June 2012

<sup>14</sup> Eurostat, mentioned in MEMO/12/419

<sup>15</sup>CARS21 Final Report, Brussels 2012

<sup>16</sup>ERTRAC Strategic Research Agenda 2010

Therefore industrial players from the automotive and energy sectors see such a programme at European level as a necessary step for the development of innovative competitive solutions ready for deployment across Europe.

The Contractual PPP model as proposed for the EGVI offers the best-possible combination of the technological needs of the European industry, the expertise of the leading European stakeholders, and the experience of the EC, in successfully managing large collaborative public research programmes for many years. The EGVI PPP will provide the right contents for the right European programmes and ensure close links with national programmes and other schemes (such as the EIB financial instruments). Therefore it will be THE initiative for supporting R&D for green vehicle technologies in the coming years.

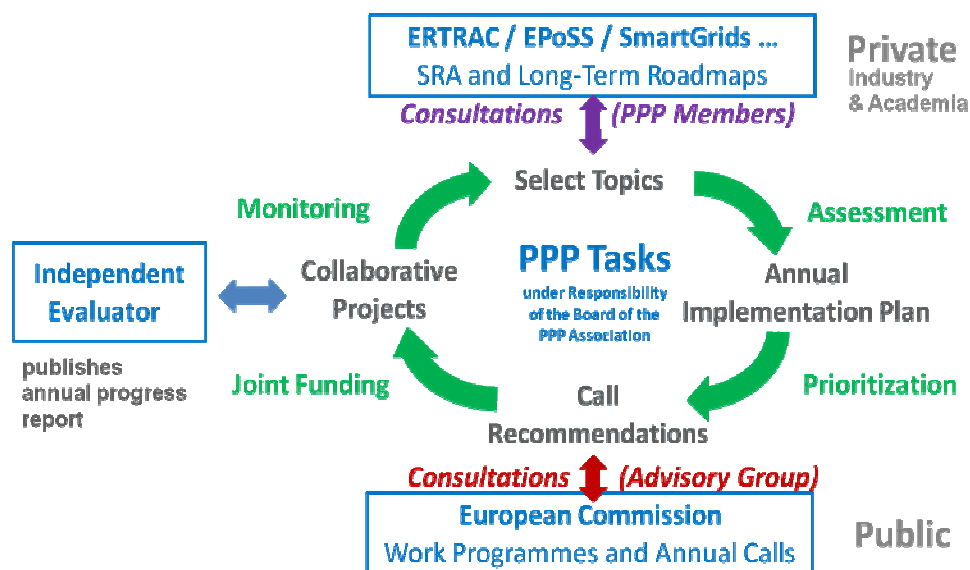
The EGVI topics include activities offering significant opportunities but with high level of risk. Consequently it cannot be expected that all results will be achieved exactly as planned. However, without public financial support for these projects, it is likely that there would be much less or no opportunity at all to address these challenges. Furthermore European Programmes such as the Framework Programmes for Research and Innovation are today the only ones where research collaboration with practically all leading researchers worldwide are possible.

Benefits of using a Contractual PPP instrument:

- Secured commitment of industry and the EC to meet critical societal and industrial policy objectives;
- Builds on success of the European Green Cars Initiative in FP7, which has successfully demonstrated the added value of a basic PPP concept;
- Efficient management: leaner and faster organisation and governance, obtaining the benefits from a formalization of the partnership (less time to set up, reduced costs, less legal and administrative burdens) without the efforts of an institutionalization;
- Open to the participation of a wide stakeholder group, including newcomers and smaller players, and enabling also a wide inclusion of particular experiences from all EU countries;
- Emphasis on defining clear directions and priorities through Roadmaps which have gained wide consensus through the activities of the underpinning Technology Platforms;
- Greater flexibility and agility, capable of responding more rapidly to emerging opportunities in terms of technological development on one hand and to unforeseen, adverse conditions and a shifting economic situation on the other;
- Appropriate structuring of programmes and individual projects in order to guarantee adequate coverage of all research priorities and provide potential synergies in order to enable the pre-determined targets and milestones to be achieved;
- Facilitating the collaboration between competitors on a wider range of topics, thus strengthening the competitiveness of the EU industry as a whole;
- Higher efficiency achieved by avoiding overlapping between smaller competing CPs while focusing on complementing rather than replacing the conventional CP programme;
- High degree of accountability, through the continuous review and monitoring of progress over the course of H2020, being a clear task of the PPP, using the roadmaps;
- More opportunities for creating coherence and complementarities with the diverse landscape of member states funding policies in the field.
- Continue to take advantage of excellent expertise and experience of Commission in its management of collaborative R&D programmes, in view of their policy frameworks;
- Greater focus on the integration of supportive measures like standardization or training and education through dedicated actions.

- *Proposed arrangements to monitor and assess progress towards the objectives.*

The activities of the PPP EGVI will be regularly evaluated in order to monitor and assess their performance. In view of the specific structure of the PPP such evaluation needs to be carried out both internally and externally. The internal evaluation comprises a self-regulating mechanism based on the comparison of current project activities and results with the original annual implementation plan. The required steps of project monitoring and program assessment are fully integrated in the feedback loop of program consultations which constitutes the PPP operation. They are thus a core task of the PPP governance organization. The external evaluation assesses whether the impact of the PPP EGVI is progressing towards the objectives set by the European Technology Platforms and the European Commission. It may give direction for necessary adjustments in case of major deviations or changing framework conditions. Such external evaluation has to be based on evident facts about project results and credible information about their use in the innovation chain. It can only be carried out by an independent entity which is well accepted by both the public and the private sides. It will collect information on specific projects on a trust basis, and anticipate their contribution to the goals of the PPP. The findings will be published in a generalized manner as an annual progress report which may also give advice to the European Commission and the ETPs. The independent entity should refer to a group of senior experts and could be constituted by e.g. a contract with the EC and the PPP EGCI Association or in the framework of a specific Coordination and Support Action.



There are comparable initiatives already going on in other economies such as the US<sup>17</sup> and to a certain, but limited extend there are also EC-funded initiatives<sup>18</sup> but without the critical mass to cover all the projects and topics in question.

<sup>17</sup><https://www.starmetrics.nih.gov/>

<sup>18</sup> See CAPIRE report "Impact Assessment of Publicly Funded Collaborative RTD Projects", [http://www.capire.eu/public/2011-capire-deliverables/CAPIRE\\_D12\\_ProjectAssessment\\_2012-02-27.pdf/at\\_download/file](http://www.capire.eu/public/2011-capire-deliverables/CAPIRE_D12_ProjectAssessment_2012-02-27.pdf/at_download/file)