EGVI PROJECT MONITORING REPORT 2017

EUROPEAN GREEN VEHICLE INITIATIVE

EGVI
European Green Vehicles Initiative

TABLE OF CONTENTS

1. Introduction: The EGVI cPPP

On 17th December 2013, 8 contractual Public Private Partnerships (cPPPs) were signed, including the European Green Vehicle Initiative, co-signed by Máire Geoghegan-Quinn, European Commissioner for Research, Innovation and Science and Mr Wolfgang Steiger, Director for Future Technologies of the Volkswagen Group.

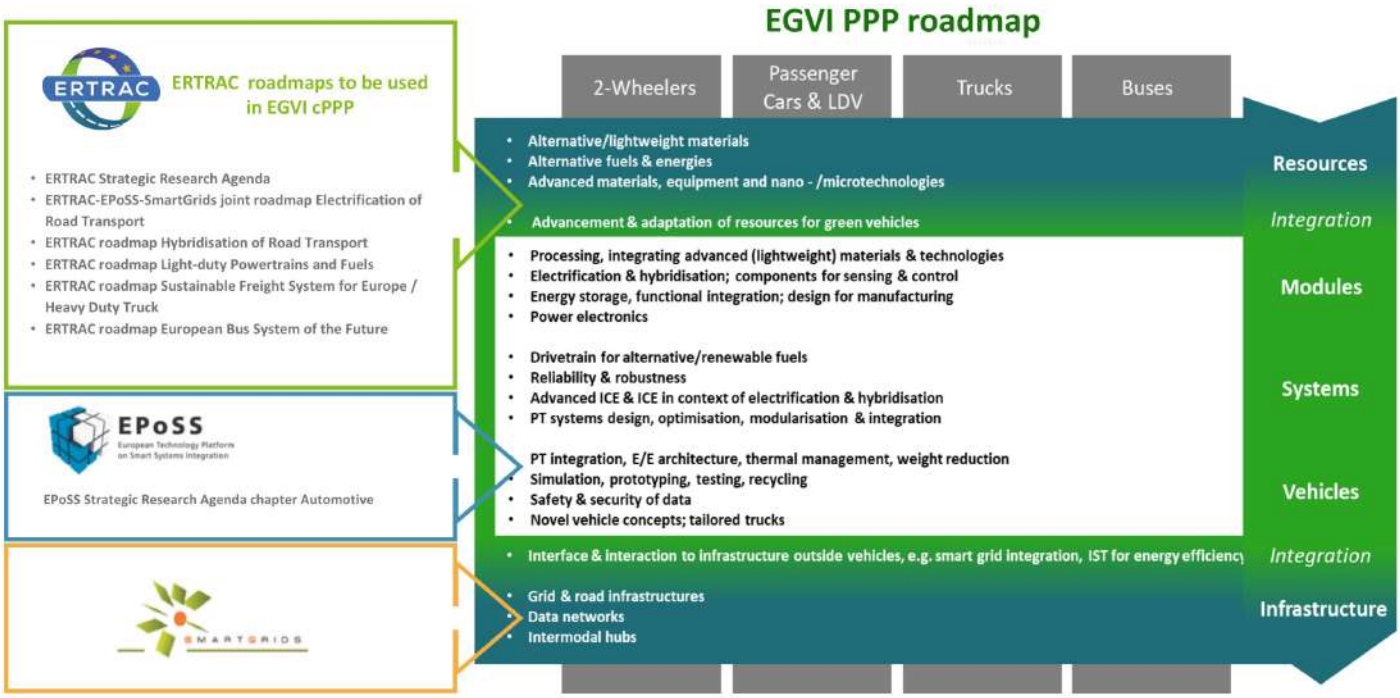
The EGVI cPPP has been launched to take over from the successful European Green Cars Initiative launched in 2009 by the European Commission as part of the European Economic Recovery Plan. All parties (public and private sides) expressed their willingness to continue their close collaboration to tackle the challenges of decarbonisation of road transport. Following the success of this first collaboration between the European Commission and the automotive sector, a specific contractual PPP has been launched with even more ambitious targets in terms of reduction of CO_2 emissions, reduction of energy consumption and development of alternative powertrains.

With a total budget of €750 million from the Horizon 2020 programme, and an expected adequate amount from private investments, the EGVI cPPP covers topics which contribute to reaching the goal of energy efficiency of vehicles using alternative powertrains, in particular the electrification and hybridisation of powertrains and their adaptation to renewable fuels.

The "electrification" pillar of the European Green Cars Initiative has been extended from passenger cars to all types of vehicles (2 wheelers, passenger cars, trucks & buses and new vehicles concept) focusing on the improvement of energy efficiency of vehicles using alternative powertrain. The integrated R&D&I programme and added value of a cPPP was supported both by the European Commission and the automotive sector as a way to achieve the targets set by the European Transport, Energy, Environment and Climate protection policies.

The cPPP roadmap is based on roadmaps published by the three supporting European Technology Platforms (ETPs), namely ERTRAC[1], EPoSS[2] and Smart Grids[3] (now merged into the newly ETIP-SNET), especially the roadmap "European Roadmap Electrification of Road Transport" jointly published by the three ETPs, which is promoting a cross-sector and integrated approach to achieve its ambitious goals. This technical roadmap was updated in 2017 and its revised milestones correspond to the expected market developments for electric vehicles. The roadmap emphasizes that in order to reach the milestones, technological improvements have to be achieved, including the improved performance and availability of next generation of batteries, the development of advanced alternative drivetrain technologies, the exploitation of synergies thanks to efficient system integration as well as the integration of electric vehicles into the electricity grid.

1. http://www.ertrac.org/
2. https://www.smart-systems-integration.org/public
3. https://www.etip-snet.eu/



By addressing various product layers - from the module to packaging and electronic control and ensuring the interlinks with the grid - the integrated approach of EGVI allows to cover the entire process chain from resource application to demonstration and creation of services; and from extended research and development to innovation and market uptake.

Following an integrated approach, by including inputs from the automotive (via ERTRAC), the smart systems (via EPoSS) and the smart grid (via ETIP-SNET), the European Green Vehicles Initiative is proposing a system approach to tackle the challenge of decarbonisation of road transport. Integrating different perspectives under a single umbrella in a common system approach is a unique opportunity to meet the CO_2 emissions reduction objectives set at European level.

2. Main activities and achievements during 2017

2.1 Implementation of the calls for proposals evaluated in 2017

The Green Vehicles topics published in the 2017 Work Programme of Horizon 2020 have been defined in accordance with the EGVI cPPP Roadmap.
The topics opened in the 2017 calls for proposals were the following:

- Optimisation of **Heavy Duty Vehicles** for **alternative fuels use** (GV-01)
  1 project selected for funding
- Next generation electric drivetrains for fully electric vehicles, focusing on **high efficiency and low cost** (GV-04)
  1 project selected for funding
- Electric vehicle **user-centric design** for optimised energy efficiency (GV-05)
  3 projects selected for funding
- Physical integration of hybrid and electric vehicle **batteries at pack level** aiming at increased energy density and efficiency (GV-06)
  2 projects selected for funding
- Multi-level **modelling and testing** of electric vehicles and their components (GV-07)
  2 projects selected for funding
- **Electrified urban commercial vehicles integration** with fast charging infrastructure (GV-08)
  1 project selected for funding
- **Aerodynamic** and flexible **trucks** (GV-09)
  1 project selected for funding
- Demonstration (pilots) for **integration of electrified L-category vehicles** in the urban transport system (GV-10)
  2 projects selected for funding
- **Production** of next generation **battery cells** in Europe for transport applications (GV-13)
  1 project selected for funding

The 2017 calls have been drafted following the integrated approach promoted by the EGVI cPPP: different types of vehicles have been addressed by the 9 topics, and several areas of the process chain from resources up to vehicles have been covered by the topics, as described in the cPPP roadmap.

Table 1 - Breakdown of topics per vehicles type and roadmap areas

2017	2 wheelers	Passengers cars & LDV	Trucks	Buses
Resources integration	GV-13	GV-06 GV-13	GV-01	
Modules	GV-04 GV-05 GV-07	GV-04 GV-05 GV-06 GV-07		
Systems	GV-04 GV-05 GV-07	GV-04 GV-05 GV-07		
Vehicles	GV-10	GV-04 GV-08	GV-01 GV-09	GV-08
Vehicles integration	GV-10	GV-08		GV-08

2.2 Mobilisation of stakeholders, outreach, success stories

EGVIA has organised two **General Assembly meetings** (for its members only) – one in spring and one in autumn – coupled with the visit of the Laboratory of Applied Thermodynamics of Thessaloniki University.

On 8th March, EGVIA supported the organisation of the ERTRAC Annual conference, in Brussels, gathering 250 participants. This conference has been the opportunity to publicly present the Vision of the platform for 2050. This vision has been preliminary shared with EGVIA members and include a chapter fully dedicated to the "Environmental Sustainability: Energy and resource efficiency, decarbonisation and air quality" which set-up ambitious targets:

- 100% renewable energy for transport (electricity, alternative fuels)
- Emissions free urban areas
- Negligible or near zero emission in rural areas
- Energy efficient road vehicles in real world conditions
- Gapless energy supply – charging infrastructure and alternative fuels everywhere needed
- Circular economy for vehicles and infrastructure
- Affordable and energy efficient vehicle production and maintenance

The press release is available on ERTRAC website.

On 31st May, EGVIA organised a workshop dedicated to the topic of reduction of CO_2 emissions from **Heavy-Duty Vehicles**. The workshop was an interesting combination of

- 10 project presentations organised in 3 technical sessions:
  - **Expected impact of the alternative fuels on CO_2 reduction**
  - **Solutions for better fuel efficiency of Heavy Duty Trucks**
  - **Energy management & recovery**
- And a **panel discussion** "Heavy Duty Trucks of the future" bringing on stage Tony Sandberg from Scania who focused on the new powertrains solutions for Heavy-Duty trucks, Neville Jackson from Ricardo who presented the technological challenges related to electrification and simulation and Dimitrios Savvidis from DG CLIMA who shared information on the upcoming CO_2 legislation as well as the potential benefits of the VECTO tool. This led to interesting discussions on the cost of electrification for long distance transportation, the relevance of a well to wheel approach and the overall CO_2 case while taking into account the production processes.

With almost 100 participants, the workshop raised interest from many stakeholders and led to fruitful discussions with some of the experts in the area.
All information about the outcomes, as well as the project presentations are available on EGVI website.

With support from the European Commission, DG Research and Innovation, INEA and ERTRAC, EGVIA has organised on 29th and 30th November 2017 the first **European Conference on Results from Road Transport Research in H2020 projects.**
Over one day and a half, 36 projects funded under the H2020 transport programme – including 17 EGVI funded projects - have presented their preliminary results to an audience of about 200 participants from all across Europe. Various technological challenges were covered in order to highlight the contribution of ongoing EU-funded research projects to meet EU policy goals.
All information about the outcomes of this conference can be found online.

In order to reach a wider audience, EGVI has also decided to be more active on social media, via the creation of a Twitter account and the relaunch of the LinkedIn page. A quarterly newsletter is also sent to more than 500 stakeholders, both from the public and the private side.

Interested parties will soon be able to register directly via EGVI website, in the meantime, registration can be done by sending an email to: info@egvi.eu

At the end of 2017, EGVIA had gathered 84 members among which 17 OEMs, 22 automotive suppliers, 2 representatives of the smart systems industry, 1 representative of the smart grid industry, 14 research organisations, 20 universities and 8 associated members, mainly other European association active in this area. However, the association is attracting new members and is on a developing path.
A particular attention is given, within EGVIA, to get a consensus among its members in the prioritisation of decision, especially thanks to an appropriate consultation processes and the organisation of conferences and workshops. The strategy prepared for EGVIA by the Executive Board is validated by the General Assembly (gathering all EGVIA members) which meets at least once twice a year.

More information about the EGVI PPP activities and the association can be found on https://egvi.eu/.

Green Vehicles funded projects targets and achievements are covering many different areas and vehicles type:

The three projects funded under the GV-01-2014 topic (**FIVE-VB, eCAIMAN** and **SPICY)** have been working on new cell materials for lithium-ion batteries for automotive applications. They achieved promising results in different chemical solutions while offering opportunities for important cost reduction and their intense exchange and discussion led also to the **submission of a joint white paper on standardization of test standards** presented during the TRA in Vienna last April 2018 and submitted to the standardisation committee at the end of the projects.
Thanks to its newly developed CNG engine technologies, **GasON** project demonstrated a **18% CO_2 emissions reduction** compared to the 2014 best in class CNG engines.
One of the main targets of the **EVERLASTING** project is to **reduce the cost over the full lifetime of an EV battery by 20%** by proposing a standardized architecture, improving the energy use and increasing the lifetime of the battery.
DEMOBASE, FIVE-VB, HELIS, iModBatt and **EVERLASTING** set targets for **recycling of batteries** after the end of life of vehicles – which will become a critical topic with the large-scale uptake of electromobility across Europe and beyond.
The **PaREGEn** project aims at establishing a solid basis for model-supported engine design and control based on an in-depth understanding of the Cause and Effect Relationship (CER) of particle formation during the incylinder processes. 3 more projects have been selected in the GV-02-2016 topic in addition to **PaREGEn** to deal with technologies for low emission light duty powertrains with promising results **DiePeR, UPGRADE** and **EAGLE**.
Projects from GV-2-2016 topic dealing with **improvement of particle measurement** (**DownToTen**, **SUREAL-23** and **PEMs4Nano**), **sampling system development**, and P**N-Portable Emission Measurement System demonstrator**, could have a significant impact on **improving air quality**, particularly in urban areas and **positively impacting human health on a mid to long term perspective**.
Thanks to the development of novel injector concept for direct high-pressure gas injection (HPGI) into the cylinder and ignition by small pilot quantities of diesel, the **HDGAS** project demonstrated a **21 % lower CO_2 emissions than the comparable state of the art Diesel technology**. In parallel, the project has started a standardisation procedure for fuelling interface which has been submitted to ISO standardisation office.
XERIC's new hybrid climate control system (CCS) for EVs is proving good performance at TRL6 in **reducing by more than 50% the energy used all over the year for passenger comfort** and **by 30% the energy used for air cooling/dehumidifying in extreme summer conditions.**

OPTEMUS achieved **73 % reduction of energy consumption for passenger comfort** in cold environment (-10 °C ambient temperature) and **35 % reduction of energy consumption for component cooling** in hot environment (+35 °C ambient temperature) thanks to the integration of a CRU, a **water-to-water (W2W) heat pump system** that uses a two-plate type heat exchangers with a water-glycol mixture as the working fluid and natural refrigerant.

During the 3 years of the project, **RESOLVE** developed **4 prototypes** as well as an integrated, scalable, modular range of fully electric LV drivetrains; this 4kW drivetrain management module (DMM) is expected to cost €500 for 2000 volume per year compared to €800 at the launch of the project.
Evaluation of energy and cost efficient wireless charging solution up to 100kW for an electric light-duty vehicle will be investigated by the **ASSURED** project.
13 of the EGVI-funded projects listed "**user acceptance**" indicator (Noise, Vibration and Harshness, performance, comfort ....) as one of the priority in the projects.

Many technological areas are covered by the PPP projects, all of them contributing at different layers to improve the energy efficiency of vehicles and make road transport more sustainable.

2.3 Governance

The EGVI cPPP was established through a contractual arrangement, based on article 25 of the Horizon 2020 regulation. The private side of the cPPP is represented by the European Green Vehicles Initiative Association (EGVIA), an international non-profit association based in Brussels aiming at coordinating the activities from the private side and engaging in the EGVI contractual PPP with the European Commission, represented by DG RTD.
The EGVI cPPP Partnership Board is the governing body of the partnership gathering representatives of the private side appointed by EGVIA (Industry Delegation) and the European Commission services (under the leadership of DG RTD).
One partnership board meeting has been organised in 2017, on 22nd March, mainly to discuss the EGVIA recommendations for the upcoming Work Programme (2018-2020).

The existing structure has proven to be very efficient and no changes have been made neither in the composition of the Partnership Board nor in the way of working together.

3. Monitoring of the overall progress since the launch of the cPPP

3.1 Achievement of the goals of the cPPP

The main goal of the Horizon 2020 programme is to support research and innovation activities, achieving excellence in science, strengthening industrial leadership and tackling societal challenges.

The EGVI roadmap states that "***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 industry***".

Considering the very good coverage of the EGVI roadmap areas over the 4 years existence of the initiative (see the tables below), it makes no doubts that the 52 selected projects for funding in the 23 topics published between 2014 and 2017 will contribute to achieve the ambitious goals set at the launch of the initiative.

The new edition of the EGVI project portfolio published in April 2018 is listed all projects funded from 2014 to 2017 and is presenting objectives and first results from the selected projects (status – March 2018). To download the publication, please visit: https://egvi.eu/mediaroom/78/22/EGVI-cPPP-Project-Portfolio-2018-edition

From the resources integration (battery materials, lightweight ...) up to the vehicles integration (grid integration of EVs, electric buses in urban areas ...) via research and innovation activities in modules and systems, but also modelling and testing activities to accelerate the deployment of green innovations on the market, all areas have been covered and promising results are expected from the funded projects.

2014	2 wheelers	Passengers cars & LDV	Trucks	Buses
Resources integration	NMP17	NMP17 GV1	NMP17	NMP17
Modules	NMP17	NMP17 GV1 GV2 GV3 GV4	NMP17 GV4 GV7	NMP17 GV4 GV7
Systems	GV5	GV2 GV3 GV4	GV4 GV7	GV4 GV7
Vehicles	GV5	GV2 GV4	GV4 GV7	GV4 GV7
Vehicles integration	GV5	GV2		

2015	2 wheelers	Passengers cars & LDV	Trucks	Buses
Resources integration				
Modules		GV8	GV6	GV6
Systems		GV8	GV6	GV6
Vehicles		GV8	GV6	GV6
Vehicles integration		GV8		

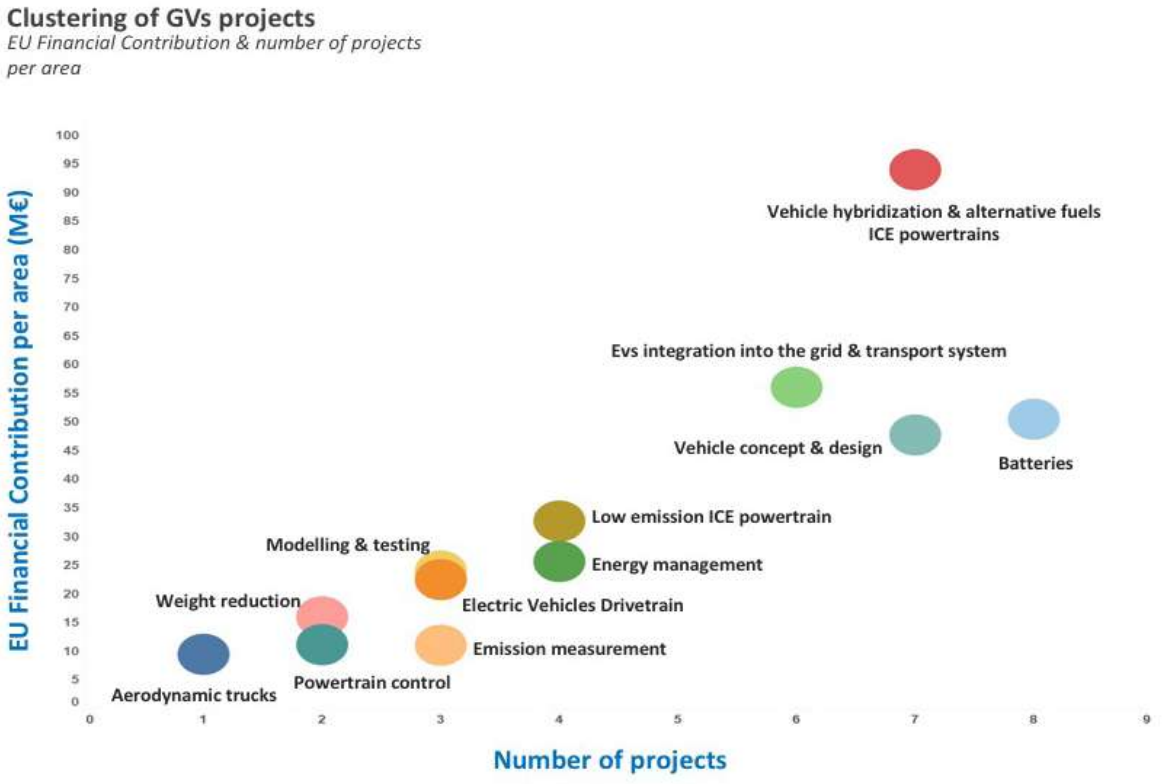
2016	2 wheelers	Passengers cars & LDV	Trucks	Buses
Resources integration	NMBP-08	NMBP-08		
Modules	NMBP-08	GV2 GV3 NMBP-08	GV3	GV3
Systems		GV2 GV3	GV3	GV3
Vehicles		GV2 GV3	GV3	GV3
Vehicles integration				

2017	2 wheelers	Passengers cars & LDV	Trucks	Buses
Resources integration	GV-13	GV-06 GV-13	GV-01	
Modules	GV-04 GV-05 GV-07	GV-04 GV-05 GV-06 GV-07		
Systems	GV-04 GV-05 GV-07	GV-04 GV-05 GV-07		
Vehicles	GV-10	GV-04 GV-08	GV-01 GV-09	GV-08
Vehicles integration	GV-10	GV-08		GV-08

The launch of the EGVI cPPP contributed to the submission of a remarkable number of competitive projects, among which 52 have been selected for EU funding and to the emergence of even more innovative ideas. Key contributions have been developed in many technological areas such as:

- Battery performance improvement (energy density, power density, lifetime ...)
- Recycling and second life of batteries
- Charging time reduction
- New charging modes
- Grid integration optimisation
- Advanced ICE
- Reduction of materials used (lightweight ...)
- Thermal & energy management in vehicles
- Non-CO_2 emissions reduction i.e. noise, particulates ...
- Aerodynamics
- Vehicle components
- Power electronics integration
- Cost reduction
- User acceptance
- Safety improvement
- Vehicle integration into the transport system (urban areas, improvement of freight trans portation ....)
- Life cycle assessment
- New methodologies development

A financial support of the collaborative activities performed in EGVI funded projects is one of the most important driving force towards world-class science and technology developments in Europe.



In each area covered by the roadmap, EGVI projects have contributed to strengthen the innovation eco-system between universities, research centres, SMEs and industry, thus leading to a stronger research and innovation, as proven by the success stories examples previously mentioned.

3.2 Progress achieved on KPIs.

With 23 topics funded under both the Sustainable Transport Work Programme (Green Vehicles chapter) and NMBP, the European Green Vehicles Initiative projects have provided significant contribution to the key performance indicators:

Common key performance indicators[4] :

MOBILISED PRIVATE INVESTMENTS:

Assessing what have been the additional private investments complementing the EU funding in the area covered by the EGVI cPPP is an extremely challenging task, due to the complex automotive research and innovation landscape. Sometimes information is limited due to confidentiality reasons, and often additional investments follow only after the completion of EU-funded projects.
However, some global figures demonstrate that there is a continuous growing investment in Research and Development activities in the automotive sector since the launch of Green Cars Initiative:

- In the 2009 Innovation Scoreboard published by the JRC[5] , investments in R&D activities from Automobiles and Parts was estimated to €30 bn a year.
- In the edition from 2017, the total estimated yearly investment of automobiles and parts in R&D is about €54 b[6].

The indicative share of private investment is as follows:

- 1/3 for Research activities, i.e. about €18 bn per year
- 2/3 for Development activities
- About 30% - 35% dedicated to topics related to the area covered by the EGVI PPP i.e. about €5,4 bn per year.

Since 2014, according to the JRC innovation Scoreboard, the total investment in R&D activities from Automobiles and Parts has always be in the range of € 50 bn per year, and the indicative breakdown mentioned above is applicable to each year.

Among the 34 projects which provided feedback to the online questionnaire, 100% expect their project's results to be taken up at higher TRL levels, which will require important additional investments from private stakeholders.

NEW SKILLS AND / OR JOBS PROFILE:

27 projects out of the 34 which provided feedback to the online questionnaire stated that their activities contributed to develop new skills for consortium members.
Among the skills to be developed, the following main categories haven been identified:

- Simulation and new testing methods
- Model guided application
- Virtual engineering
- Batteries technology:
  - ↗ Cell manufacturing and electrical engineering for integration.
  - ↗ Swelling issue in terms of cell manufacturing
  - ↗ Electrochemistry knowledge of ASS
  - ↗ Thin multi-layered thermal spray coatings
  - ↗ Battery System design and optimisation
- Measurement methodology
  - ↗ Measurement of some of the particular size and number temporal responses down below 10nm
  - ↗ Measurement procedure to provide the molecular analysis of combustion particles
  - ↗ Understanding of the particle losses (for smaller particles)

4. Information included in this section are partly based on inputs received from 32 projects to the online questionnaire sent in April 2018 (status May 31st). Part of the information reflects feedback received by those projects only and not the overall figures of the initiative.
5. http://iri.jrc.ec.europa.eu/scoreboard09.html
6. http://iri.jrc.ec.europa.eu/scoreboard17.html

- Design and optimization of innovative refrigerant and cooling cycles
- Design optimization - Target Weighing Approach (TWA)
- Vehicle dynamics expert for tilting 3/4 wheelers

Among those, 6 projects are planning to develop new curricula in universities after the end of the project. The potential new curricula or new skills to be developed are, but not limited to:

- Advanced material manufacturing and modelling
- Electric vehicle motor technologies, power electronics, e-Drive integration design
- Combined approaches of material testing - cell tesing - electrochemistry - coupled with mechanical phenomena on micro- and macroscopic level
- Lithium sulphur electrochemistry of battery
- Design and optimisation of Battery Systems
- Battery manufacturing processes
- Energy management specific case study
- Target Weighing Approach and multi-parameter design optimisation

At the time of the report, only 9 projects do not expect to have a direct impact either on job saving or job creation in a 2 years' timeframe after the end of the project. Most of these projects either started very recently and are facing difficulty to assess the potential for jobs creation or are still too far to market to have a significant impact on jobs. However, some projects being lower TRL than the others, jobs impact might occur in a longer timeframe.

IMPACT OF THE CPPP ON SMES:

Out of the 925 participants, 154 are SMEs (17% of EGVI participants, gathering 13% of the total EU-funding allocated to beneficiaries), including at least 17 SMEs participating for the very first time in an H2020 project.

19 projects mentioned that the activities will lead to opening up new research fields for the participating SMEs and 18 that the project will lead to new business opportunities / new business collaborations for the participating SMEs.

100% of the participating SMEs expressed their interest to join more H2020 projects in the future which is testifying the attractiveness of Green Vehicle initiative for this specific category of stakeholders.

Specific technological knowledge has been developed by SMEs during the projects' course, but many respondents also mentioned that SMEs gained knowledge in the following items, in addition to R&D related benefits:

- **Meeting specific demands and needs of OEMs and Tier 1 suppliers**
  - ↗ ***Added value for SMEs***: *better integration into the value chain and development of opportunties for future business collaborations as well as a more targeted orientation for future R&D activties*
- **Getting a better understanding about the EU funding landscape**
  - ↗ ***Added value for SMEs***: *opportunity for future EU-funded project application in other areas. Gaining experience in submitting an H2020 proposal could also be a strong asset, as the drafting and submission process can be very time consuming.*
- **Developing new partnerships**
  - ↗ ***Added value for SMEs***: *future collaboration opportunities, at European, national or regional levels and a better integration into the value chain.*
- **Complexity of a big multidisciplinary project**
  - ↗ ***Added value for SMEs***: *gaining experience in view of future projects submission*
- **New funding opportunities**
  - ↗ **Added value for SMEs**: *gaining experience in view of future projects submission and enlarging the financial support opportunities of their activities.*

Non-financial benefit should also be taken into account as these could contribute to a higher success rate of SMEs in future EU-funded projects and because getting involved at an earlier stage of the technological developed could turn out to be a critical competitive advantage for SMEs in a few years.
Moreover, gaining knowledge in H2020 projects and creating new collaboration opportunities is an important factor of development for SMEs.

SIGNIFICANT INNOVATIONS:

The following information has been extracted from the 34 responses to online questionnaire received from project coordinators

- **224 innovations** have been developed – including 45 stated by projects as "breakthrough innovations".
  Among these 224 innovations, the average TRL at the launch of the project was 3,74 and the TRL (expected or achieved – depending on the status of the projects) at the end of the EU-funded activities is 5,76
  On average, EU financial support provided through the European Green Vehicles Initiative allowed to jump 2 TRLs in about 3 years (typical duration of EGVI projects).
  Innovations cover the following topics:
  - Technical applications (industrialisation of new materials, sensors, integration)
  - Future engines
  - Development of new cell chemistries
  - Reduction of the use of critical raw material (with a strong focus on cobalt)
  - Innovative fuel storage systems
  - Energy and thermal control systems
  - Non-CO_2 emission reduction technologies
  - Cost reduction
  - Efficiency improvements (powertrains and subsystems levels)
  - Robustness and reliability
- **184 demonstrators** (including 100 battery cells for a single project) have already been developed by the projects.
  Demonstrators include vehicles or components which offer new functionalities allowing testing activities.

More demonstrators will be developed in the years to come.

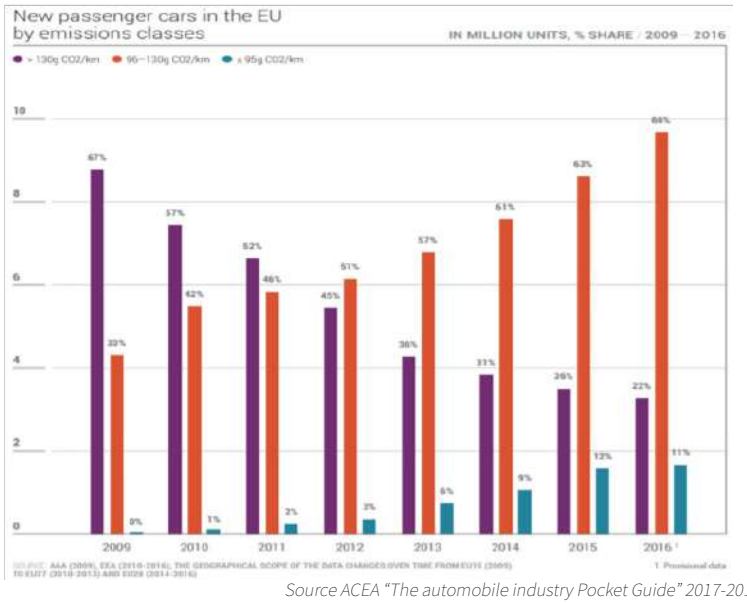
On average, **about 20 months have been saved in research and development cycle thanks to the EU-funded projects.**

Specific indicators[7] :

NUMBER OF ELECTRIC AND HYBRID VEHICLES:

According to ACEA[8], in 2016, 4,2% of the new passenger cars registered in the EU-15 are running on alternative fuel (electric vehicles, hybrid vehicles and other alternative fuels) and about 5% of all cars on European's roads run on alternative energy sources.

Figures are promising as 11% of the new passenger cars in the EU emits less than 95g CO_2 / km in 2016; back in 2010, it was only 1%.



Source ACEA "The automobile industry Pocket Guide" 2017-2018

7. Information included in this section are partly based on inputs received from 32 projects to the online questionnaire sent in April 2018 (status May 31st) and to the excel technical monitoring document. Part of the information reflects feedback received by those projects only and not the overall figures of the initiative.

8. http://www.acea.be/uploads/publications/ACEA_Pocket_Guide_2017-2018.pdf

The updated version of the joint ETPs roadmap on electrification of road transport[9] has provided an updated version of the EVs and PHEV sales forecast from 2020 to 2030 which is using many reports already published as a basis for its analysis. Two scenarri have been drafted:

- Under a perseverant market scenario based on CO_2 targets achieved with a focus on technology improvements and hybridisation of ICE-based vehicles, a market share of about 10% could be envisaged by 2025
- Under the assumption of major technological breakthroughs for EVs (mainly considering battery capacity and cost), market share could be of about 40% by 2025.

CONTRIBUTION TO THE REDUCTION OF ENERGY USE: the reduction of energy use is targeting in many EGVI funded projects via different areas as identified in the roadmap:

- **Grid integration optimisation** (grid stability and reliability, integration of renewable energy sources into the grid ...)
- **Advanced ICE developments** both for passenger cars and Heavy-Duty Vehicles will contribute to drastcally reduce the fuel consumption.
- An improved **thermal & energy management in vehicles** will contribute to avoid losses of energy within the vehicles. Ambitious targets are defined in this area by the 21 projects which identified this area as 1 of the key performance indicator they will contribute to.
- A better **aerodynamics** of vehicles will also have an impact on the fuel consumption reduction, and consequently on the CO_2 emissions.
- The benefit of a **higher integration of electronic components** is also an area explored by several EGVI-funded projects as a way to contribute to the reduction of energy use in road vehicles.

CONTRIBUTION TO THE REDUCTION OF CO_2 EMISSIONS: most of the innovations developed in the projects will have a **direct contribution to the reduction of CO_2 emissions** from road transport, according to the inputs provided by the projects which responded to the excel monitoring document sent in April 2018.
The range of CO_2 emissions saved thanks to the project is depending on too many factors to be able to provide a single figure (targeted level of the innovation i.e. module, vehicles ...; potential market share; timeline for the large-scale deployment of the innovations ...).
However, with an important focus on the electrification of powertrains (via purely electric powered vehicles and hybrid vehicles), more than 30 projects will bring a significant direct contribution to the CO_2 emissions reduction.
Reduction of non-CO_2 emissions (noise, various pollutants - NOx, PM, ...) which is becoming a high topic on the political agenda is also addressed by 10 EGVI funded projects.
The average of CO_2 emissions from new passenger cars is continuously decreasing since the launch of the initiative in 2009; today, 11% of the new passenger cars in the EU emits less than 95g CO_2 / km in 2016, compared to only 1% in 2010.
ERTRAC is currently finalising a CO_2 evaluation study aiming at assessing the potential contribution of three different types of measures (better vehicles, better traffic conditions and traffic reduction technologies) in different use case and according to each vehicle types. This analysis will be of upmost importance to identify the future research needs in order to achieve the 60% CO_2 emission reduction by 2050 compared to 1990 levels. The first outlook is available in the Strategic Research Agenda of the platform.

CONTRIBUTION TO THE REDUCTION OF USE OF MATERIAL RESOURCES: reducing the use of material resources is one of the key objectives of many EGVI funded projects: in the battery related projects funded by the initiative, the raw materials is almost always one of the key aspects of the projects; in particular, the reduction of the use of cobalt in batteries has been a key challenge for several projects.
Reducing the materials used is also on the key area of the partnership roadmap and 13 projects are directly contributing to this Key Performance indicator, i.e. via weight reduction activities, reducing the use of rare earth material, use of composites ...

9. See page 37 : https://egvi.eu/uploads/Modules/Publications/ertrac_electrificationroadmap2017.pdf

It is also important to note that cost reduction and user acceptance are also driving factors for most EGVI-funded projects, in order to ensure that innovations will indeed be competitive on the European market while fulfilling the users' requirements.

3.3 Evolution over the years

Taking into consideration the remarkable interest in the EGVI call from very diverse organisations, it can be concluded that the objective of ensuring the excellent science and technology base in Europe is being well promoted through the EGVI partnership.

Progress achieved in the European Green Cars Initiative (EGCI)

The EGVI cPPP is the successor of the previously launched European Green Cars Initiative (EGCI). EGCI was set up under the 7th Framework Programme for Research & Development (FP7) in response to the global economic crisis of 2008, as part of the European Economic Recovery Plan. In the period 2010 – 2013 four calls were launched and a total of 113 projects funded.
It became an efficient tool for the funding of research, development and innovation in the field of sustainable mobility around three main pillars: electro-mobility, long distance trucks and logistics.

The 113 research and innovation projects have covered strategic areas such as:

Battery Technologies
Several breakthroughs and incremental innovations haven been achieved in this area thanks to the 54 projects covering those topics. Significant advancements have been made in the improvement of battery lifetime (increase of life time of the battery by up to 30% in realistic driving situations) and energy density (148 Wh/kg at system level demonstrated), contributing to reduce range anxiety for end users; reduction of the Total Cost of Ownership of electric vehicles, reduction of the cost of cell production; development of wireless charging solutions.

Lightweight design
The 13 Green Cars projects covering this area allowed significant improvement in the introduction of lightweight materials such as hybrids, CFRPs or thermoplastics, cost reduction thanks to volume savings. The Life Cycle Analysis (LCA) was also taken into account under this particular area.

Safety systems
Funded projects will contribute to achieve a similar level of safety as the one of conventional vehicles. Among the 30 projects covering this item, several improvements have occurred in the pedestrian warning and detection systems, new procedures for testing (also thanks to modelling and simulation tools) as well as the interlink with scarce materials and lightweight of electric vehicles.

Smart grid development
The 10 projects funded under Green Cars allowed development of the Vehicle to Grid and Vehicle to Infrastructures common interfaces as well as development of pre-normative standards for interoperability.

Drivetrain technologies.
Covering both passenger cars and heavy-duty vehicles, promising results have been achieved in engine downsizing, hybridisation, and optimisation of electric drivetrain.

Energy management and recovery
Significant improvements have been achieved both for passenger cars and heavy-duty vehicles in steady heat recovery potential, development of vehicle individual energy consumption model that considers specifics of electric drives including recuperation, improvement of energy efficiency of auxiliaries ...

Due to the high degree of satisfaction from both private and public sides, a continuation of the collaboration launched under the EGCI has been formalised with the launch of the EGVI cPPP.
Although the scope of the two initiatives slightly differs – the EGVI cPPP specifically focuses on the energy efficiency of vehicles using alternative powertrains and covers additional vehicle types – the approach and targets developed are similar.

Additional facts and figures on the impact of the EGCI at EU level are available on EGVIA website.

EGVI cPPP over the years

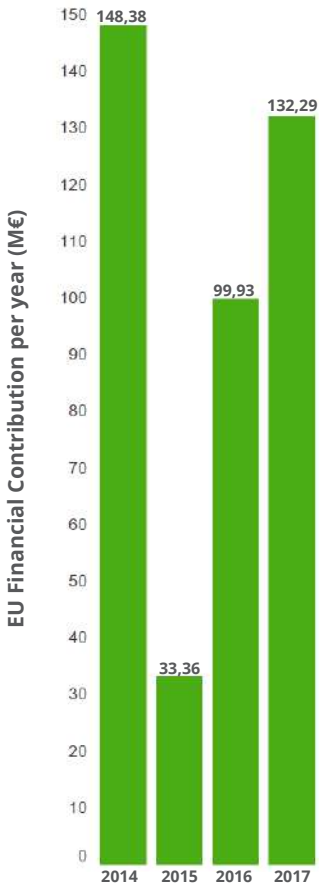
Since the launch of the EGVI in 2014, the attractiveness of the initiative remains very high: five calls covering 23 topics have been successfully closed and evaluated. In total 52 projects were funded receiving a total EU contribution of € 413.96 million.

2014	2015	2016	2017	2018-2020
• 17 projects • € 150 million • Average funding per project: €8.8 million • Success rate: 17,35%	•5 projects •€ 34 million •Average funding per project: €6.8 million •Success rate: 11,9%	•14 projects •€ 100 million •Average funding per project: € 7.14 million •Success rate: 34,15%	•16 projects •€ 132.3 million •Average funding per project: € 8.27 million •Success rate: 28,57%	•~ € 291 million available

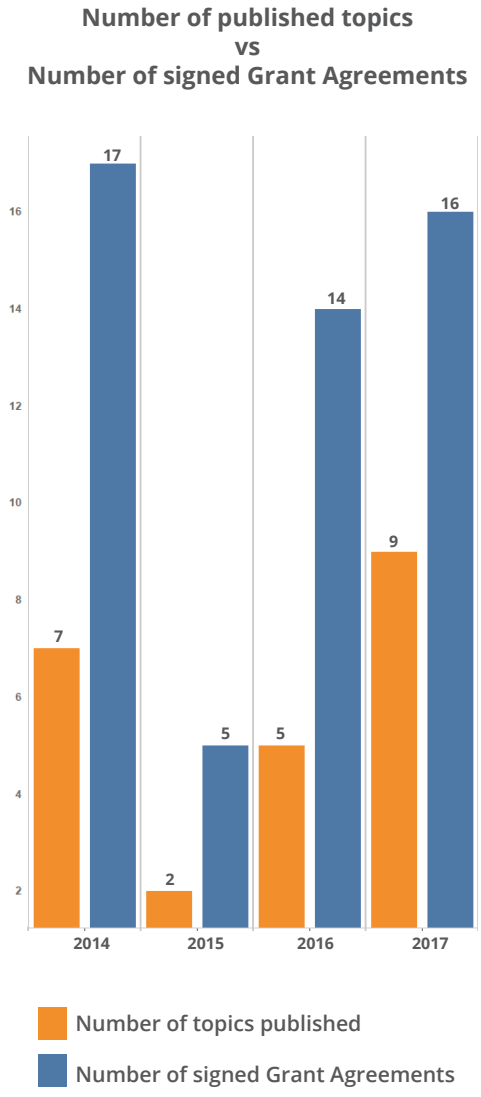
There is still a high interest in the EGVI topics: in total, 249 proposals have been received, out of which 237 were identified as eligible and evaluated. As a result of evaluations, 109 proposals were above threshold and (only) 52 were selected for funding i.e. about 50% of the most qualitative proposals submitted.

The high interest in Green Vehicles topics combined with a limited budget per year led to an **average success rate of EGVI in the first 4 years of 22%**; the success rate dropped in 2015, but that could be explained by the fact that only 2 topics have been published that year, leading to a higher number of projects submitted for a lower amount of money.

The overall success rate in EGVI is almost twice as high as the general one of H2020 (11,6% according the mid-term evaluation of the programme[10]).



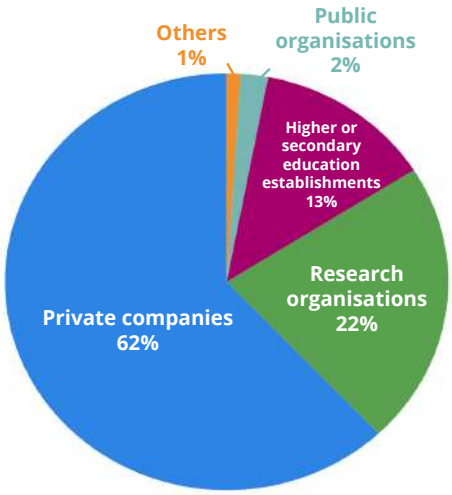
EU Financial Contribution per year in GV projects



10. Please refer to: https://ec.europa.eu/research/evaluations/index.cfm?pg=h2020evaluation

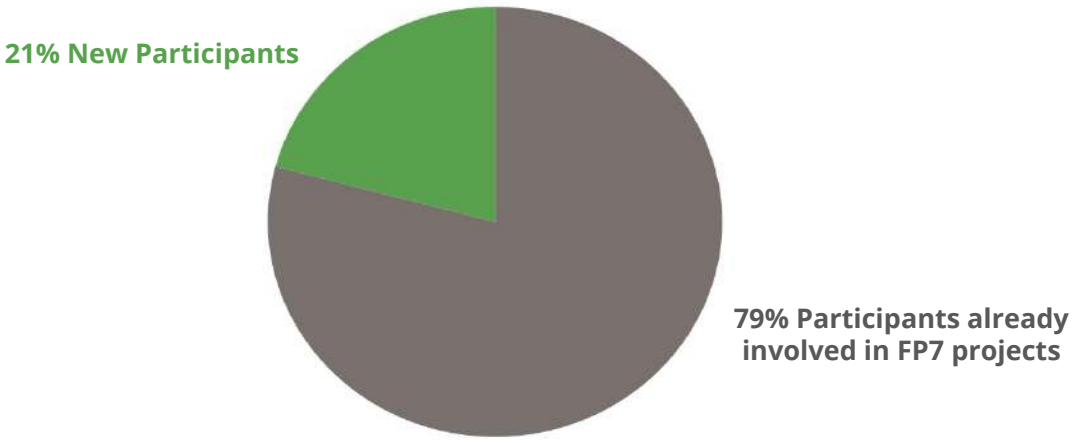
Breakdown of participation in EGVI projects (2014-2017)

EGVI being an industry-driven initiative, the share of participants coming from private companies is important (62%). The high participation rate of private companies should be analysed in line with the one of research organisations (22%) and higher or secondary education establishments (13%); representatives from these group of stakeholders are active in all EGVI funded projects and bring an important added value to the knowledge advancement and technological development pursued in the projects.
Moreover, the collaboration within EGVI-funded projects between private and public entities has proven benefit of the strengthening of the overall value chain at EU-level, contributing the reinforcing the competitiveness of the industry and developing skills of all participants.



Despite a high number of participants, 21% of the total number of participants are new comers to H2020 projects – compared to FP7 participation.

This testifies the attractiveness and openness of the initiative to new participants.



4. Outlook and lessons learnt

The EGVI cPPP offers the possibility for numerous innovative & research projects to be carried out. It is important to monitor the contribution of all projects to the progress towards the general objectives on a regular basis. Therefore, this yearly monitoring report aims at giving a clear and straightforward insight for the evaluation of the progress not only on the individual project basis but also to perform an assessment at programme level.

Decarbonisation is one of the key societal challenge faced by the European Union and the contribution of road transport activities in overcoming this challenge will be of an upmost importance. The European Green Vehicles Initiative is bringing direct and important contribution to the objective of reducing CO_2 emissions in the EU by accelerating the deployment of alternative powertrains (electric, plug-in hybrids, alternative fuel use) and contributing to achieving a higher energy efficient transport system, both for passenger cars and long-distance freight transportation.

Thanks to the €414 million of financial support distributed to the 52 selected projects, a broad range of topics have been covered:

- Batteries technologies, both at cell and pack level
- Hybrid and low emissions ICE powertrains development and alternative fuel
- Modelling and testing
- Weight reduction
- Aerodynamics trucks
- Powertrain control
- Energy management
- Electric vehicles drivetrain
- Vehicle concept and design
- EVs integration into the grid and the transport system
- Emission measurement

Beyond the valuable financial support from the European Union, the EGVI partnership is also a unique opportunity to strengthen the value chain by integrating SMEs, RTOs and universities at early TRL stage and bringing them in direct contact with OEMs and tier 1 suppliers.

On average, 20 months have been saved thanks to the activities carried out in EGVI projects; considering the high degree of competition at worldwide level, this is a key benefit for European competitiveness and will contribute to create (high skills) jobs in Europe.

EUROPEAN GREEN VEHICLE INITIATIVE

Av. de Cortenbergh, 66
1000 Brussels
Belgium
T: +32 (0) 2 736 12 65
E: info@egvi.eu
https//egvi.eu

FOLLOW US ON