ACEA
European Automobile Manufacturers Association

ACEA VIEW

ECVs, alternative powertrains and the post-2020 CO_2 framework

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European Automobile Manufacturers Association

ACEA VIEW ON ELECTRICALLY CHARGEABLE VEHICLES, ALTERNATIVE POWERTRAINS AND THEIR MARKET UPTAKE IN RELATION TO THE POST-2020 CO_2 FRAMEWORK

The importance of protection of the natural environment, the depletion of oil reserves, the dwindling of already limited resources and the need to mitigate the effects of climate change are some of the key sustainability challenges that society is facing today.

The reduction of CO_2 emissions is a challenge that requires a global response. Solutions must be framed around a holistic approach encompassing as many stakeholders as possible. For its part, the transport sector must be firmly embedded in an economy-wide carbon-reduction framework, while also working to maximise CO_2 reductions through a **comprehensive approach** that links manufacturing, technology, energy, infrastructure, government and consumers.

Alternative powertrains for transport must be seen in the broader context of the whole decarbonisation process, carefully balanced with European efforts towards sustainable growth and competitiveness. A transition towards a more sustainable transport system should be supported with incentives rather than further burdened[1]. All existing forecasts agree that transport demand is likely to increase in line with GDP and trade growth. **A technology-neutral policy** reinforces the potential for overall technological progress and enhances the competitiveness of the EU economy as well.

Alternative fuels represents one of the essential parts in the sustainable mobility puzzle. Automakers already support a widely available, diverse range of low carbon and renewable energy sources and technologies that include biofuels, CNG, LPG, clean diesel, hybrids, electricity and hydrogen (e.g. fuel cell vehicles).

Electrification of the mobility and transport system is an essential part of the future alternative fuel mobility mix. However, the freedom for consumers to select the technology they choose should be guaranteed and **there is no silver bullet**. A **realistic picture of how the electrification and use of other alternative powertrain vehicles** will proceed is essential. The internal combustion engine using conventional fuels will remain the dominant source of propulsive power for at least the next decade. There is a lot of uncertainty regarding the rate of uptake of alternative powertrains because of factors limiting greater rates of electrification of the fleet, creating a high level of uncertainty for the industry:

- Differences among member states' incentives policies and market conditions,
- Lack of implementing standardisation for recharging & refuelling points;
- Insufficient investment in charging and refuelling infrastructure and no clear visibility on the roadmap.

[1] See also ACEA position on White Paper on Transport

From the perspective of the automobile industry – and **in the light of the upcoming discussions on the post-2020 CO_2 framework – the contribution of alternative fuels vehicles is highly uncertain. ACEA expects the market share of electrically chargeable vehicles (ECVs), (including plug-ins, pure EVs and range-extended EVs) to be in the range of 2 to 8% of newly registered vehicles by the next decade for passenger cars. The market uptake of all other alternative powertrains is even more uncertain.** This uncertainty can be seen from the following three perspectives:

1. Current development in ECVs registrations so far (see Annex I)
2. Significant variations between existing scenarios (see Annex II)
3. Insufficient progress on the conditions needed to facilitate ECVs uptake (see Annex III)

Higher market penetration of electrically chargeable vehicles is possible but will depend on the extent to which the following assumptions are fulfilled:

- **Customers'** education/information. Information available to consumers must be improved, and this is the responsibility of all stakeholders involved.
- **Infrastructure providers' engagement in the deployment** of the recharging and refuelling infrastructure. This is necessary to support consumer acceptance. Customers should have free choice between different energy suppliers, open access to all charging and refuelling stations independent of the provider and customer-friendly operation and billing systems across the EU.
- **National governments** need to provide appropriate and predictable framework conditions and technology-neutral market incentives. They must also ensure a stable regulatory framework and R&D&I support. **Swift implementation of the Directive** by the member states is essential to make a viable, pan-European network of alternative fuels infrastructure available.
- **EU institutions (namely the European Commission)** must ensure a level playing field across EU 28 with respect to EU State Aid rules. **The Commission has a clear coordinating role to ensure harmonised implementation of the Directive.**
- **Standardisation bodies and the industry** need to agree and conclude work quickly on standards and common interfaces (e.g. vehicle-to-infrastructure) for Europe. The goal must be to establish world-wide standards. Again, the Directive on alternative fuels infrastructure provides clear guidance.

Therefore, fixing more stringent CO_2 objectives is not an appropriate tool for fostering the alternative fuel vehicles market. The European automotive sector has already invested heavily in a diverse range of technologies. Further policy support is necessary to achieve sustainably higher EU alternative powertrain vehicles penetration rates.

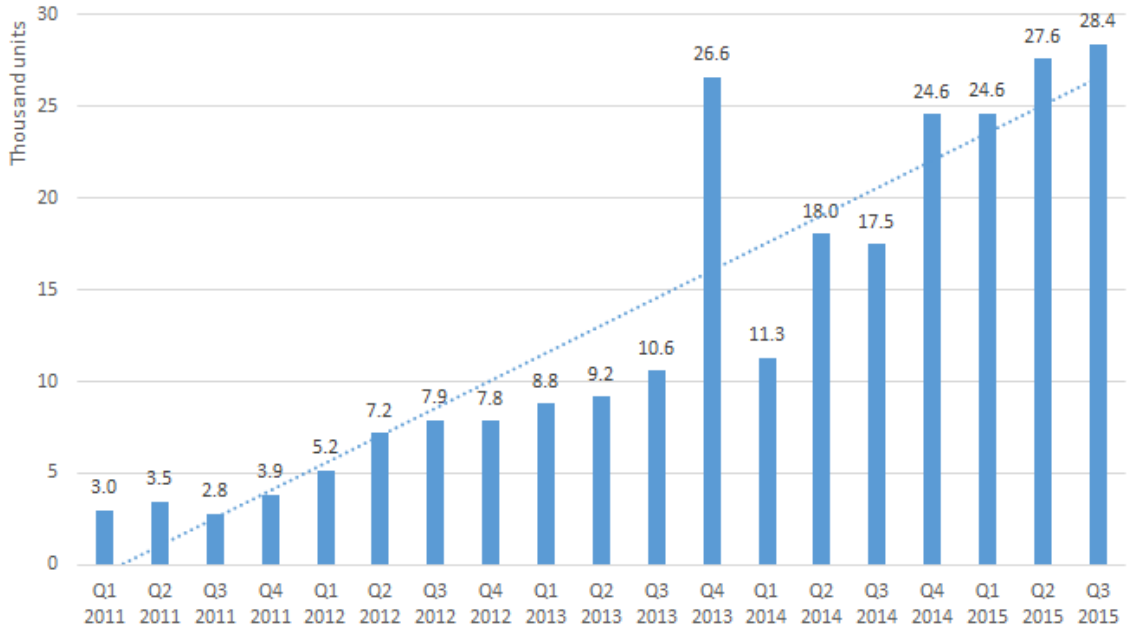
ANNEX I: CURRENT REGISTRATIONS AND TRENDS

ECV and alternative fuel vehicle sales are growing rapidly, but from a low base. A statistical background is necessary to ensure clarity on the situation:

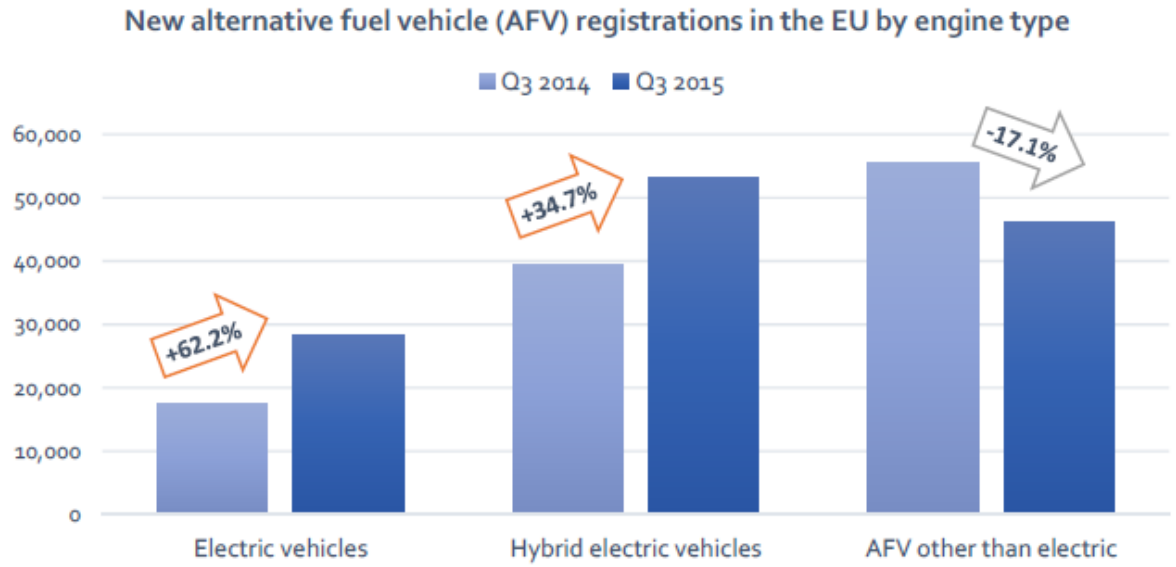
- This growth is starting from near-zero values, so the growth rates are deceptively strong
- There is no long term trajectory that can be derived from the recent trends
- The differences between quarterly registrations are significant (some quarter more than 100% growth, on the contrary to the -7-7% decline for ECVs in Q4 2014 for example) showing the significant instability of such a market and not a clear predictability of the market development (registrations dependent on high number of external factors)
- Despite impressive growth figures, alternative fuel vehicles' overall market share is below expectations made in the past.

ACEA statistics covered only ECVs up until 2014. As from 2015 ACEA has enlarged its statistics to cover all alternative fuelled vehicles.

ACEA STATISTICS FOR ECVS FROM 2011-2015



DETAILS FROM THE ACEA REGISTRATION STATISTICS FOR Q3 2015 (ALL ALTERNATIVE FUELS):



In the third quarter of 2015, total alternative fuel vehicle registrations in the EU increased (+13.4%), reaching 127,661 units. Of these, electric vehicle (EV) registrations showed a substantial increase (+62.2%), rising from 17,488 units in Q3 2014 to 28,360 units in Q3 2015. Demand for new hybrid vehicles (HEV) also grew significantly (+34.7%), totalling 53,183 units. On the other hand, registrations of new passenger cars powered by propane or natural gas showed a decline in the third quarter (-17.1), totalling 46,118.

Looking at the EU's major markets, Spain saw the largest increase of AFVs registered over the third quarter (+74.0%), followed by the Netherlands (+55.5%), France (+46.1%) and the UK (+26.4%). While growth in Spain was sustained across all AFV categories, growth in the Netherlands, France and the UK was totally driven by electric and hybrid electric vehicle markets.

Among the EU+EFTA countries, Norway registered the largest number of electrically chargeable vehicles over the period, totalling 7,823 units.

In the first three quarters of 2015, a total of 415,896 alternative fuel vehicles were registered in the EU, representing a 4% market share of all passenger car registrations over the nine-month period – this is up from 3.6% the previous year. Taking electric vehicles alone for the same period, the figure was 86,142 cars, or 0.8% of total market – up from 0.5% the year before.

Alternative Fuel Vehicles (AFV) = electric vehicles (EV) + hybrid electric vehicles (HEV) + natural gas vehicles (NGV) + LPG-fueled vehicles

	Q3 2015	Q3 2014	% Change	Q1-Q3 2015	Q1-Q3 2014	% Change
AUSTRIA	1,266	859	47.4	4,298	3,326	29.2
BELGIUM	2,466	2,092	17.9	8,989	7,934	13.3
BULGARIA	0	0		20	2	900.0
CZECH REPUBLIC	1,328	939	41.4	4,131	2,166	90.7
DENMARK[2]	948	337	181.3	2,200	1,017	116.3
ESTONIA	127	197	-35.5	325	468	-30.6
FINLAND	811	210	286.2	2,622	1,563	67.8
FRANCE	17,527	11,998	46.1	55,393	37,817	46.5
GERMANY	12,797	12,460	2.7	39,484	37,467	5.4
GREECE	353	200	76.5	921	544	69.3
HUNGARY	337	147	129.3	765	433	76.7
IRELAND[3]	724	343	111.1	1,992	1,199	66.1
ITALY	43,753	49,742	-12.0	165,050	158,877	3.9
LATVIA	100	126	-20.6	275	336	-18.2
LITHUANIA	84	38	121.1	280	120	133.3
NETHERLANDS	10,545	6,780	55.5	27,326	24,533	11.4
POLAND	2,876	2,161	33.1	8,387	5,510	52.2
PORTUGAL	1,216	653	86.2	3,513	2,049	71.4
ROMANIA	128	39	228.2	299	174	71.8
SLOVAKIA	273	328	-16.8	942	857	9.9
SPAIN	6,143	3,530	74.0	16,103	9,219	74.7
SWEDEN	5,481	4,885	12.2	16,300	13,739	18.6
UNITED KINGDOM	18,378	14,537	26.4	56,281	37,848	48.7
EUROPEAN UNION	**127,661**	**112,601**	**13.4**	**415,896**	**347,198**	**19.8**
EU15	*122,408*	*108,626*	*12.7*	*400,472*	*337,132*	*18.8*
EU (New Members)	*5,253*	*3,975*	*32.2*	*15,424*	*10,066*	*53.2*
NORWAY	10,553	7,347	43.6	33,014	22,409	47.3
SWITZERLAND	3,062	2,240	36.7	9,773	6,812	43.5
EFTA	*13,615*	*9,587*	*42.0*	*42,787*	*29,221*	*46.4*
TOTAL EUROPE (EU+EFTA)	*141,276*	*122,188*	*15.6*	*458,683*	*376,419*	*21.9*
WEST. EUROPE (EU15+EFTA)	*136,023*	*118,213*	*15.1*	*443,259*	*366,353*	*21.0*

SOURCE: NATIONAL AUTOMOBILE MANUFACTURERS' ASSOCIATIONS

[1] *Only countries for which sourced data is available are listed*

[2] *No data available for HEV*

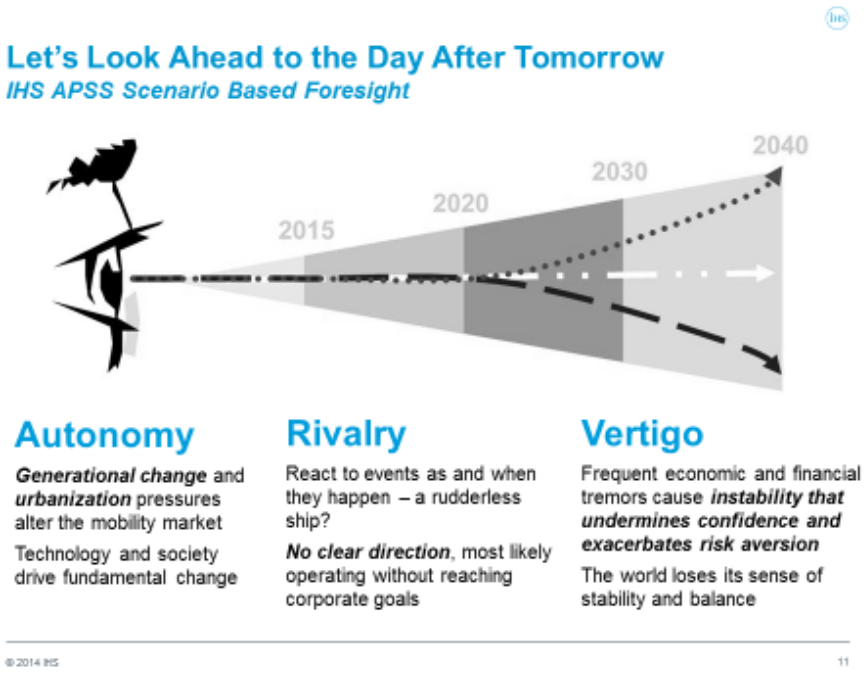
[3] *Only includes EV and HEV*

ANNEX II: DIFFERENCES IN FUTURE PREDICTIONS

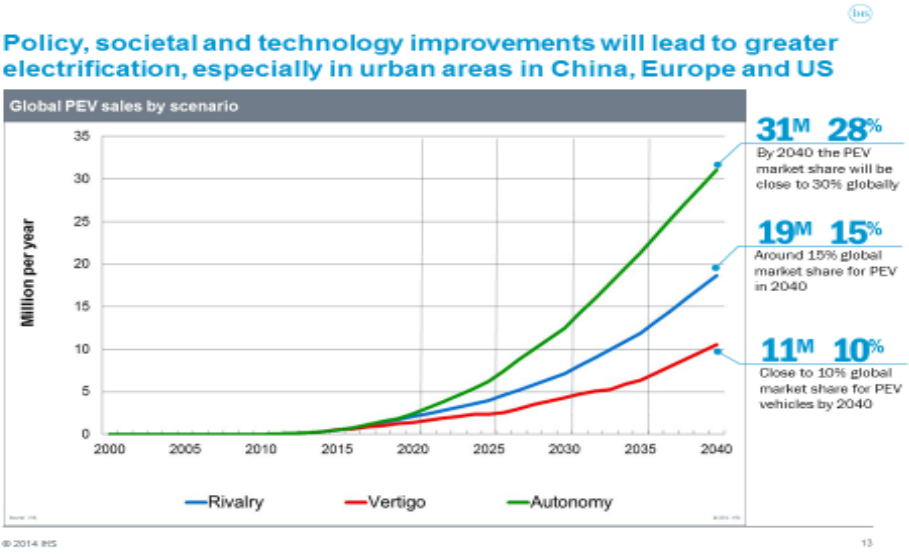
Uncertainty in the future structure of the market is not limited to ACEA forecasts. Even other specialised market research institutes and NGOs working for the Commission operate on the presumption of a range of scenarios, with several possible outcomes with varying timeframes and predictions. It confirms that the future market for these vehicles really is unknown.

A number of examples are given below:

IHS is a global leader in automotive sector market research. IHS recognises that the market uptake of ECVs might lead in different directions depending the circumstances and assumptions used. The following slides[2] show clearly how broad the spectrum is in relation to future alternative vehicle development and clearly confirm the uncertainty of any predictions.



[2] Presentation made by IHS during the CLEPA workshop on e-mobility, 18 November 2014



Ricardo-AEA, in its final December 2012 report for Greenpeace[3] and Transport & Environment**,** quite rightly showed huge discrepancies in the different scenarios used by different institutes. Those predictions vary from a 5 to 50% rate of market penetration of electrically chargeable vehicles in 2025 depending on the assumptions made. This clearly describes the uncertainty with which all stakeholders work.

Notes: where literature sc
figures using the new flee
Estimates from Greenpea
large market segments.

[3] http://www.transportenvironment.org/sites/te/files/publications/Ricardo%20AEA_2025%20targets_Report_Jan_2013_0.pdf – p.10

The CE Delft study[4] executed for the Commission - DG CLIMA in 2011, can be used as a good example of how divergent the assumptions and forecasts based on them might be. This study explains concretely the key challenges and steps needed to foster market uptake of ECVs are. However, given the 2014-2015 figures (see figures of sales above), it is clear that for the moment sales are bumping along the lower-level forecasts and scenarios.

[4] http://www.cedelft.eu/publicatie/impact_of_electric_vehicles/1153 - p. 22

ANNEX III: ACEA VIEWS ON CONDITIONS NEEDED FOR HIGHER ECV MARKET UPTAKE

Alternative fuels are essential for a sustainable transport future and the term covers a wide range of possible options – fuel cells, gas solutions – CNG, LPG, LNG and ECVs. Advanced diesel and petrol solutions should also not be forgotten. Each of these solutions requires different enabling conditions.

These enabling factors are numerous. Differences between member states incentive schemes, lack of implementing standardisation for recharging & refuelling points and insufficient investment in charging and refuelling infrastructure are barriers to higher market uptake and create a high level of uncertainty for the industry. Considering the number of challenges to be tackled by different stakeholders, ACEA members expect a market uptake of 2 to 8% of newly registered electrically vehicles by the next decade for passenger cars.

Key steps for the successful commercial adoption of ECVs should be implemented via an **integrated approach** and can be identified as the following:

- Customer acceptance (vehicles for a variety of customer needs, affordability)
- Readiness/availability of recharging infrastructure
- Vehicle energy storage system (costs, need for further R&D&I)
- Appropriate market incentives (public policy)
- Further standardisation (interface vehicle-infrastructure)
- Adjusting and restructuring the supply chain for ECVs to ensure sustainable production and supply

Therefore, significant simultaneous investment is necessary by a variety of players to ensure barriers to market acceptance are tackled and to realise the full potential of electromobility.

The success of the electrification of the transport system will be founded on, and requires, the **coordinated collaboration of all key stakeholders** and contributors, i.e. the so called Integrated Approach:

Respecting Integrated Approach principles, there are a number of **key challenges** that should be tackled by different stakeholders. Successful market adoption of ECVs should be achieved with the synchronised efforts of the following groups:

1. **Customers and society**

Consumers have expectations and routines in line with their individual mobility needs and habits that need to be met (e.g. availability of appropriate mileage, variability of vehicle use, comfort of driving etc). It also involves key issues such as affordability of mobility as well as the **availability and convenience of recharging.** These expectations need to be considered in the development of new technologies and infrastructures.

In addition, customers need to accept some of the specific characteristics of new technologies, such as different driving or recharging requirements. The education and information of customers is the **responsibility of all stakeholders** involved, from the policy makers and the energy suppliers to the vehicle manufacturers.

Cost-effectiveness assessments and product diversity are also of crucial importance, in view of the need for **affordability,** as well as customers' usage patterns.

2. **Energy sector and infrastructure providers**

Without an **appropriate charging infrastructure** ECVs cannot successfully be introduced in the market and will not be accepted by the customer. The public sector, infrastructure providers and the energy sector will have to build up a recharging infrastructure as a prerequisite for customer

acceptance. A supporting framework is required to help build-up an infrastructure, and the recently adopted Directive on alternative fuels gives clear guidance (see details in annex II).

Customers should have the **free choice between different energy suppliers** (from which utility they get their electricity) **and access to all charging stations** independent of the charging station provider or energy provider (e.g. national/international roaming).

A customer-friendly operation and billing system is essential to support customer acceptance. This includes different payment systems such as cash equivalent, credit cards, prepaid card, electric vehicle identification with monthly bill, etc.

The first generation of electrically chargeable vehicles do not offer full vehicle-to-grid communication capabilities (e.g. intelligent recharging with link to smart energy management). In the future, it will be important to recharge vehicles in an intelligent manner in order to prevent charging at peak loads for the power network and to allow customers to recharge at low cost (requiring variable pricing of electricity in order to control electric power market demand). The **tariffs for recharging ECVs at home should not be higher than those for normal household appliances.** A stable price in relation to conventional fuels has to be ensured. This builds up trust in e-mobility for all users and investors.

As far as possible future options are concerned, the vehicle battery may be used to **feed energy back into the grid** whenever the price for control energy or balancing energy is particularly high. Many **technological, safety and legal issues still have to be resolved** before this can really happen, however (e.g. negative effects on the durability of the battery, the power grid and consumer convenience) and responsibility should always stay with the vehicle. The priority of the automobile industry is to charge the vehicle while optimising battery life. However, vehicle batteries might one day be able to serve as bi-directional energy storage devices that will compensate for fluctuations in wind energy, for example.

While battery electric power does not create any tailpipe emissions, it is important to also improve the **well-to-tank impact**, i.e. the level of emissions from generating electricity by the energy sector. Furthermore **renewable electricity production will automatically increase the benefits** of electrically chargeable vehicles.

3. Industry and suppliers of key technologies

The key component for both the performance and cost of an electrically chargeable vehicle is the **energy storage system.** Today it is expected that the energy storage system will be a lithium based battery system. However, battery costs significantly influence the final price of the vehicle (for example battery costs for passenger cars can add €6,000 – 16,000 to the price of the vehicle in

comparison to a traditional combustion engine type. The extent of additional costs (e.g. power electronics or cooling) cannot be fully compensated for by the automobile industry's cost reduction efforts (economies of scale, learning curve etc.). Therefore, **subsidies and incentives are necessary** to foster the market introduction of such vehicles.

It has to be taken into account that a battery system includes, besides the battery cells, components for interconnections and packaging, as well as electrical and thermal management equipment. All these additional components have a significant influence on the overall volume, weight and cost of a battery system.

Even if significant progress has occurred in terms of the energy density of modern batteries, the specific energy levels and energy densities remain about hundred times lower than that of fuels for combustion engines. This fact is one of the main challenges for electric mobility, as it influences both costs and usability. To overcome, in the long term, the performance hurdles of Li-ion technologies, it is necessary to continue investing in R&D&I for further improvement of the overall comfort and performance of electrically chargeable vehicles.

It should be noted that **lithium and rare earths as raw materials** are, at this stage, sufficiently available. Nevertheless, it could become a future challenge and therefore it is important **to ensure sustainable access to those materials**.

4. National, regional and local governments (incl. cities) and EU institutions

EU vehicle manufacturers are world-wide technology leaders in fuel efficiency and safety. Electrically chargeable vehicles provide **opportunities for further EU leadership** in engineering and manufacturing.

The European Commission has a clear leading and coordinating role, namely to ensure a harmonised approach throughout EU, respect for EU State Aide rules and avoidance of the fragmentation of the EU internal market. As various EU Member States have already implemented certain supportive policies for market uptake of electrically chargeable vehicles, this is important.

The governments of the US, Japan and China are already supporting the new technology intensively, and this poses a challenge to European vehicle makers in terms of their global competitiveness.

A successful market introduction of electrically chargeable vehicles depends on an appropriate **market incentive system at national level, implemented on the regional/municipal level.** New technologies generally first come onto the market in low volume and at a significant cost premium, which needs to be off-set by a positive policy framework so that vehicles remain affordable and mobility is guaranteed. **Therefore, subsidies and incentives are necessary to foster the market**

introduction of cost-intensive technologies and not a "technology push"**.** With decreasing costs of key components – mainly the battery system – and increased market volumes**,** it is expected that subsidies could be phased-out over time.

Electrically chargeable vehicles can only become a success if**,** ultimately**,** broader market penetration of this power-train technology can take place without any financial incentives. However**,** in order to achieve a large scale replacement of the conventional fossil-based combustion engine by electrically chargeable vehicles**,** there is a need to support the evolution of today's technologies.

Examples of market incentives:

- Tax incentives (exemption registration tax and annual circulation tax) and direct purchase subsidy
- Faster depreciation
- Incentives for commercial customers and public fleets
- Company cars: favourable "benefit-in-kind" taxation
- Subsidies for charging infrastructure
- Incentives for OEMs and industry (production electrically chargeable vehicles**,** R&D&I funds**,** etc.)
- Administrative simplifications for designation of public parking spaces for electrically chargeable vehicles
- Encouragement of new user models (example Germany: interchangeable license plates for electrically chargeable vehicles and conventional vehicles)

Like domestic current**,** electricity for electrically chargeable vehicles **must not be subject to additional taxes or fees**. The same level playing field as established for other electricity consuming products is required. This is the only way that the higher purchase costs of an electrically chargeable vehicle can be approximately amortised during the automobile's life.

5. Global regulatory framework and harmonisation

Comprehensive standards and norms have to be created to ensure the vehicles can be easily connected to the grid in order to recharge the energy storage system. **The goal must be to establish worldwide standards** in order to avoid market fragmentation and to reduce costs (economies of scale)**.** The automotive industry has already announced its proposal for a harmonised system for charging and calls for quick progress in EU and global standardisation activities**,** including the involvement of the International and European Standardisation Bodies.

Standards and common interfaces (e.g. vehicle-to-infrastructure) need to be agreed upon quickly for Europe as a whole to avoid a fragmented pattern of local competing and incompatible solutions. This would provide European industry with a unique opportunity to establish itself as a world leader in electrically chargeable vehicles and related transport systems.

The technical requirements for the **type approval system of electrically chargeable vehicles have to be extended and harmonised.** Vehicle manufacturers support the use of UNECE Regulations for electrically chargeable vehicle type-approval, and assume that some of the necessary Regulations, in addition to Regulation 100, will be made mandatory in the framework of the implementation of the General Safety Regulation.

There is also a need to update existing regulations which limit the global development of new technologies. The **transport of Li-Ion Batteries,** regulated under "Transportation of dangerous goods" (UN recommendation, regulated by ICAO/IATA*), is an example.

* ICAO – International Civil Aviation Organisation, IATA – International Air Transport Association

European Automobile Manufacturers Association

ABOUT ACEA

ACEA's members are BMW Group, DAF Trucks, Daimler, Fiat Chrysler Automobiles, Ford of Europe, Hyundai Motor Europe, Iveco, Jaguar Land Rover, Opel Group, PSA Peugeot Citroën, Renault Group, Toyota Motor Europe, Volkswagen Group, Volvo Cars, Volvo Group. More information can be found on www.acea.be.

ABOUT THE EU AUTOMOBILE INDUSTRY

- Some 12.1 million people - or about 5% of the EU employed population - work in the sector.
- The 3 million jobs in automotive manufacturing represent 10% of EU's manufacturing employment.
- The sector is also a key driver of knowledge and innovation, representing Europe's largest private contributor to R&D, with €42 billion invested annually.

European Automobile Manufacturers' Association – ACEA
Avenue des Nerviens 85 | B-1040 Brussels | www.acea.be
T +32 2 732 55 50 | M +32 485 886 647 | F +32 738 73 10 | info@acea.be | @ACEA_eu