A European Strategy on Clean and Energy-Efficient Vehicles

ACEA comments

March 15, 2010

I. General comments

- **ACEA welcomes the initiative** to develop a Strategy on Clean and Energy-Efficient Vehicles, especially in light of the high environmental and economic challenges ahead.
- The Strategy should **contribute to defending and strengthening Europe's manufacturing base**, starting with key principles such as
  - Using better regulation and impact assessments, including cost-effectiveness analysis, taking into consideration customers needs and expectations
  - Avoiding excessive legislation
  - Ensuring access to finance for investments
- **An integrated, technology-neutral, long-term policy environment** is needed to achieve the desired results while limiting costs. This means, in particular,
  - A balanced policy framework based on realistic market assessment regarding alternative power-trains and internal combustion engines.
  - Supportive policies on R&D, market introduction and manufacturing of energy-efficient vehicles and components
  - More **policy coordination**
    - between and within **EU institutions** (including different Directorates General of the Commission)
    - between the **EU and Member State** level
  - More integration of different **policies**, in particular
    - environment, energy/fuels, transport, research and fiscal matters
  - Involvement of and contribution by **all relevant stakeholders**

II. Specific issues

1. Should the vision agreed in the CARS 21 mid-term review be adjusted? (i.e. 2020 perspective of improved combustion engine's market dominance combined with growing market penetration of electric and hydrogen vehicles and hybridisation conceived as the bridging technology and 2050 perspective of transport decarbonisation)

- Manufacturers have, despite the economic crisis, tried to keep up investment in both current and future technologies to improve environmental performance. However, investments are still hampered by limited access to finance.

- Limited OEM budget requires careful **investments in multiple technology developments:**
    - Conflicting political targets and customer expectations
    - Cumulative costs of regulations
    - Pave the way towards truly sustainable mobility and goods transport
- Since the vision was agreed in 2008, political momentum to support breakthrough technologies has significantly increased, which, if used and coordinated right, will be helpful in ensuring their market introduction.
- Taking into account the state of play on technologies and market developments, as well as the outlook for the future, **the vision that CARS 21 stakeholders agreed upon remains ambitious and realistic and is a sound basis for designing future policies.**

2. What is the potential of different clean automotive propulsion technologies (improved fuel efficiency, hybridisation and alternative powertrains) for contributing to decarbonisation objective in the short, medium and long term?

- The **internal combustion engine** using petrol or diesel will remain the **dominant source of power in the coming decades**. There is still some potential to improve fuel efficiency of advanced petrol or diesel powered vehicles. However, the costs to further reduce CO2 emissions will be even higher in the future given that combustion engine technology is already highly developed, especially in Europe, where the most progress has been made on fuel efficiency so far.
- The development and product cycles of the automotive industry need to be sufficiently reflected in **lead-times**. Example: there are only about 1-2 vehicle development cycles until the year 2020 which do not allow a dramatic cut of car emissions in the envisaged timeframe – irrespective of the type of clean automotive propulsion technology.
- **Emerging technologies** to further increase the efficiency of advanced petrol or diesel powered vehicles (short-, mid- and long-term)
    - **Engine improvements:** downsizing, variable valve timing, turbocharging, gasoline direct injection, compression ignition diesel, cylinder deactivation, digital/camless valve actuation, homogenous charge compression ignition
    - **Transmission improvements:** 6+ speed, smart shifting, continuously variable, automated manual, dual clutch
    - **Lightweighting:** trend towards lighter weight materials and, in particular for commercial vehicles, specialisation of vehicles and measures on body and trailer --> **challenge: reducing mass of a vehicle without compromising other utility factors like space, size or structural integrity (safety)**

  - **Hybrids**: the technical complexity increases from micro over mild and full hybrid vehicles; full hybrids allow for pure electric driving within a limited range --> **technological challenges cover durability and reliability of batteries, weight and volume reduction of components, cost reduction** (cost-benefit ratio)
  - **Overall vehicle**: efficient accessories (electric power steering, electric water pump), aerodynamics, tyre rolling resistance

- Eco-innovations do not show in test-cycle but provide real-world CO2 reductions. Examples include more efficient systems and components (LED, Heat Recovery, Photovoltaic panels), Aerodynamic-related features, Driver information (eco-navigation systems, eco-driving related in-vehicle technologies).

- **Alternative fuels and higher quality conventional fuels** are a further part in the jigsaw puzzle to sustainable mobility. Automakers support a widely available, diverse range of low carbon and renewable energy sources that include biofuels, CNG, LPG and cleaner conventional fuels. The energy sector needs to contribute by providing alternative fuels and higher quality conventional fuels as well as the necessary refueling infrastructure.
  - **Biofuels:** Offer a solution for reducing CO2 emissions from transport and dependency on fossil fuels, including for Heavy Duty Vehicles, where they are also seen as a long-term solution for low-carbon transport. First generation biofuels coming from products such as corn (e.g. ethanol blended with petrol) and vegetable oils (e.g. FAME blended with diesel) remain viable pathways pending EU agreement of sustainability criteria and addressing a number of technical concerns to ensure market fuels that are 'fit for purpose'. Additionally hydrotreated vegetable oils (HVO) are a viable and sustainable option. However, the longer term must be addressed through policy intervention now that **encourages and stimulates investment in second generation biofuel production pathways.** They are likely to be compatible with the whole vehicle fleet because their properties are similar to hydrocarbons currently in use, such as diesel and petrol. Moreover, second-generation biofuels can be made of non-food feedstock such as agricultural waste material, so that they do not compete with food production.
  - **CNG, LPG and biogas** are fuels with potential for well-to-wheel CO2 emission reductions. The application of CNG, LPG and biogas depends on an adequate fuel distribution infrastructure.

- **Hydrogen and electrification** offer many benefits, mainly for passenger transport, such as very low to zero tailpipe emissions and reduced noise
  - **Electrically chargeable vehicles:** battery electric vehicles (BEV), extended-range electric vehicles (EREV), plug-in hybrid electric vehicles (PHEV), which can be put to market starting in the short-term, even though with relatively low market shares
  - **Hydrogen powered vehicles:** burning hydrogen in an internal combustion engine or using it as an energy carrier in a fuel cell vehicle

- Hydrogen and electrification of the mobility and transport system can be part of the solution, but there is **no silver bullet** (diverse transportation needs). However, it cannot be said yet if the battery technology is sufficiently developed and can be applied to achieve acceptable driving ranges to meet overall demand for individual mobility.
- **Electric mobility / hydrogen pose many questions** with answers having to cover a multitude of interdependent parameters. Significant simultaneous investments by a variety of players will be necessary to ensure that barriers to market acceptance are tackled and to realize electro-mobility's potential.
- Electric mobility / hydrogen are a shared responsibility of the participating industries, scientific institutes and governments and can only work based on a **coordinated collaboration** and competitive-neutral guidelines of all key players, as well as on acceptance by customers. This requires a framework encouraging the market launch of electrically chargeable vehicles and hydrogen powered vehicles without hampering the introduction of this technology by solving all challenges right from the beginning.
- **Key pillars for success** for all improved and new technologies mentioned:
    - Supportive long-term policy environment by EU institutions and national governments
    - Infrastructure: recharging infrastructure for electrically chargeable vehicles, filling station infrastructure for hydrogen powered vehicles
    - Customer acceptance and market demand
        - Subsidies and fiscal incentives
    - Standardisation: common interface (e. g. vehicle - infrastructure)
    - Technology ability
        - Electrically chargeable vehicles: reliability, durability, affordability, vehicles for a variety of customer needs
        - Hydrogen powered vehicles: hydrogen storage in the car
    - Low carbon energy production, such as from renewables, to address well-to-wheel emissions
- **Electrification and hydrogen** may have a **potential role for LCVs/HDVs**:
    - Limited customer acceptance: Recharging needs (infrastructure availability, recharging time) do not create a valid business/economic case --> contradiction with design drivers for LCVs/HDVs which are lowest cost of ownership and maximisation of cargo capacity
    - Electrification of power-train does not provide sufficient driving range for long distances (batteries would become too heavy and too large which would reduce the payload and load volume)
    - LCVs/HDVs need to be very robust --> no room for unproven technologies
- ACEA believes that at this point **none of the options should be discarded**, and that it is competition that will have to select the best of them. All of the technologies mentioned can significantly contribute to CO2 emission reductions. Their broad application and market penetration will depend on further technological improvements, cost reduction, the appropriate refueling infrastructure, market acceptance, energy production and a supportive long-term policy framework.

- While urban areas create specific mobility needs due to often congested conditions and a typically limited traveling distance, other transport needs do require larger daily driving distances at higher speed. All these diverse transportation needs will lead to **further diversification of future vehicle types and their propulsion**, and electrically chargeable vehicles will cover a certain area in this application map for passenger transport.

What is the decarbonisation potential of the complementary measures in the short, medium and long term (e.g. guidelines on eco-driving, application of Intelligent Transport Systems) and how reliable are these potentials?

- Vehicle manufacturers are committed to further reduce emissions and the **integrated approach** allows achieving environmental goals at lowest costs to society.
- **Eco-Driving, infrastructure and traffic management**
    - These measures are **cost-effective** and can be applied **on the whole vehicle parc**.
    - Japan already estimates and calculates the CO2 reduction contribution of infrastructure measures, which contribute more than 12 % to its CO2 reduction program. For instance, the difference in average running speed on a certain road section before and after the installation of an infrastructure measure, multiplied by traffic volume, gives the CO2 reduction achieved through this measure. Eco-driving is part of the reduction programme as well.
    - CARS 21 Mid-Term Review on measurability: "…. it should be **investigated whether and how it is possible to measure their contribution in the future.** If the precise contribution of a measure cannot be determined with full accuracy….**fair technical assessment of the likely CO2 reduction** which they can deliver…"
    - **Eco-driving** has a long-term potential of 10% (short-term 20-25%)
    - Commission is requested to make a **fair technical assessment**
- For **goods transport**, there is significant emission reduction potential in
    - **removing restrictions**, such as through cabotage
    - increasing the size and dimension of vehicles, such as with the **European Modular System**
    - optimizing **logistics**
- **ICT and ITS** are promising technologies to improve infrastructure and thereby reduce emissions. It will be essential to
    - Establish infrastructure at the same time as the corresponding vehicle technology
    - Ensure cost-effectiveness and reliability

3. What are the implications of new propulsion technologies in a lifecycle analysis perspective as regards vehicles, and in a well-to-wheel perspective as regards energy supply chains?

- From an overall vehicle Life Cycle perspective all elementary flows (Life Cycle Assessment) and cost flows (Life Cycle Costing) need to be identified that occur from the extraction of raw material and raw energy carriers to the production of materials/energy/fuel carrier, the production of parts, the assembly of vehicles to the use of vehicles and their final recovery. Well-to-wheel is a sub-set of this life cycle perspective. While these approaches are very complex they are very important to look at. The most important take-way from these perspectives is that an integrated approach of all life cycle stakeholders is necessary to guarantee a holistic improvement:
    - **Material and energy suppliers** have to ensure efficient and sustainable processes in mining and production with reduced costs and environmental impacts. Resource availability needs to be ensured by sufficient investments and exploitation – supported by a free access to global resources. For energy suppliers low carbon energy production such as renewable energy production is key to realize CO2 savings potential.
    - **Automotive manufacturers and suppliers** have to further improve the efficiency for current as well as new propulsion technologies while keeping technology options offered to the market in line with customer demands (affordability, comfort, safety, reliability and durability etc.).
    - **Fuel and electricity providers** have to ensure the sufficient infrastructure.
    - **Customers** can contribute by eco-driving and openness to new technologies. Governments can help to keep the cost-of-ownership acceptable and support with measures managing the traffic flow. Vehicle recovery is well captured by end-of-life operators under existing regulation also for new propulsion technologies.
- Given the **complex systems** there is **no clear answer** to the question of what is the best technology from a life cycle perspective. This depends on several detailed conditions and assumptions in terms of precise source of resources, energy, electricity, efficiencies, etc. that may even change several times during the life cycle of a vehicle.
- CO2 savings will be maximized if the **well-to-wheel impact** is clearly addressed at all stages of the fuel and energy chain – low carbon energy production such as renewable energy production is key to realize CO2 savings potential. Any framework needs to clearly identify and address the stakeholders' responsibility and sphere of influence (vehicle manufacturers do not have any influence on emissions from the well-to-tank chain).

What are the resource implications in introducing innovative propulsion technologies?

- The Commission needs to ensure that the automotive industry will continue to be able to purchase raw materials also outside the EU --> **Free market access** to third countries with level playing field (avoidance of any trade distorting measures such as export duties)

- In the mid- and long-term, the EU should also develop a **strategy** to ensure **access to raw materials**, including **rare earth materials**, at acceptable prices, in particular through effective anti-trust policy. Negative impacts of increased global demand for the European industry should be avoided.

4. What are the state of play and the future scenarios of technological developments in alternative powertrains (electric and hydrogen) and their market penetration?

- Diverse transportation needs will lead to **further diversification of future vehicle types and their propulsion**.
- The **internal combustion engine** using conventional fuels will remain the **dominant source of power in the coming decades**, and there is still some (though increasingly costly) potential to improve fuel efficiency of conventional vehicles.
- **Emerging technologies** to further increase the efficiency of conventional power trains (short-, mid- and long-term) include engine and transmission improvements, lightweighting, hybrids and other measures on the overall vehicle.
- **Eco-innovations** do not show in test-cycle but provide real-world CO2 reductions. Examples include more efficient systems and components (LED, Heat Recovery, Photovoltaic panels), Aerodynamic-related features, Driver information (eco-navigation systems, eco-driving related in-vehicle technologies).
- **Alternative fuels and higher quality conventional fuels** are a further part in the jigsaw puzzle to sustainable mobility, including biofuels, biogas, CNG, LPG and cleaner conventional fuels.
- **Hydrogen and electrification** offer many benefits, such as very low to zero tailpipe emissions and reduced noise.
    - Electric mobility / hydrogen are a shared responsibility of the participating industries, scientific institutes and governments and can only work based on a **coordinated collaboration** and competitive-neutral guidelines of all key players, as well as on acceptance by customers.
- ACEA believes that there is **no silver bullet** (diverse transportation needs) and that at this point none of the options should be discarded, and that it is competition that will have to select the best of them. All of the technologies mentioned can significantly contribute to CO2 emission reductions. Their broad application and market penetration will depend on further technological improvements, cost reduction, the appropriate refueling infrastructure, market acceptance, energy production and a supportive long-term policy framework.
- **Manufacturers continue investing** in new technologies despite the difficult economic situation --> progress is being made on transition technologies like full-, mild- and plug-in hybrid, and on advanced lithium-ion batteries.
- An important challenge is to ensure **realistic process towards new power train technologies**, by developing sound objectives, based on factual analysis, involving all relevant stakeholders.

- Most stakeholders assume a **realistic market share** for new, electrically chargeable vehicles in the range of **3 to 10% by 2020 to 2025** --> the internal combustion engine using conventional fuels will remain the dominant source of power in the coming decades. The market penetration of electrically chargeable vehicles will depend on the extent to which the key pillars for success (see question 2) can be solved.
- Full-scale production of **hydrogen** powered vehicles is expected in the **long-term**.

What are major risks and opportunities associated for different stakeholders? What will be the economic, societal, employment and environmental impacts brought by these developments?

- Electric and hydrogen technology offer major benefits for the environment and can **help lead the way** to sustainable mobility.
- These technologies are also an **opportunity and challenge** to sustain and strengthen the engineering and manufacturing leadership of the European automotive industry. A **supportive policy framework will be crucial** for this, all the more in light of measures taken in other parts of the world (also see question 6). Effects on employment will depend on overall industry competitiveness.
- The automotive **industry is facing the full risk of investment** in new technologies without knowing if they will be accepted by customers.
- The following major risks can be identified:
    - No **customer acceptance** of new technology --> missing market demand --> no return on investment
    - Lack of **standardisation** and restricted access to **infrastructure** could result in poor customer acceptance
    - Low carbon **energy production** missing --> limited CO2 savings potential
    - **Affordability** will be key to
        - ensuring **market uptake** of new technologies to
            - realise the potential for CO2 emission reduction
            - safeguard profitability and employment
        - avoiding that mobility becomes unaffordable for certain groups in society

5. How can a trade-off situation be avoided where electrifying the power train would reduce or reverse improvements made in conventional technologies in the framework of existing and upcoming legislation on the CO2 emissions of road vehicles?

- **Economic environment and customer acceptance** continue to define demand for more fuel efficient cars, including when they run counter to legislators' intentions
    - Car industry is driven by **competition**
    - **Cost-effectiveness** of technological measures
    - **Market demand** → e.g. harmonised CO2 based taxation
- The **EU vehicle manufacturers invest heavily in emission reducing technologies**. They are the largest private investor in R&D (more than € 26bn per year) and intend to remain world-wide technology leaders in fuel efficiency and safety --> all stakeholders have to accept their responsibility/role in contributing to further significant emission reductions, example: to provide low carbon energy production
- Especially in the pre-competitive domain, **publicly funded research programmes should support research** in promising technologies of any type which demonstrate the greatest overall potential for reduced emissions and consumption.
- **Further tightening** short-term legislative requirements would increase the cumulative cost of regulation and **take up financial resources** to improve conventional power trains. These resources would not be available to develop new technologies.

6. What actions should be best taken at regional/ national /European or international level to promote technology development and market uptake of alternative powertrains (electric and hydrogen)?

- European policy makers have been **voicing increasing support** for alternative powertrain technologies. Manufacturers welcome this, in particular with regards to the **competitiveness challenge from other parts of the world, such as China, Japan and the US**, where governments are already heavily supporting the development of new technologies.
- ACEA requests the Commission to work intensively on a **supportive policy/action plan** which is the prerequisite for the EU industry to remain world-wide technology leaders in fuel efficiency and safety.
- The challenge for Europe is to **turn declarations and national, regional and local initiatives into sensible, coordinated support**.

Basic principles of EU strategy

- Defend and strengthen **Europe's manufacturing base**
  - An essential prerequisite for **better regulation** are thorough **impact assessments** that take into consideration of **customers needs and expectations** (customers have expectations and routines in line with their individual mobility needs and habits)
  - **Early stakeholder consultation** needs to be integral part of impact assessments to avoid unrealistic assumption. Example: The DG-ENV impact assessment on long-term CO2 target assumes a CO2 reduction of 26 % by mass reduction which means a weight reduction of more than 500 kg (in comparison: mass of a small car is about 1,000 kg)
  - **Cost-effectiveness assessments** and allowing for **product diversity** are of crucial importance, in view of affordability and customers' use patterns.
  - **Affordability** of new vehicles must be ensured throughout the process of continued emission reductions, as fleet renewal remains crucial for achieving EU goals on climate change, as well as on air quality and road safety goals
    - Policy framework needs to balance economic, social and environmental pillars of mobility
  - **Fair** and **balanced trade** agreements
- Vehicle manufacturers are committed to further reduce emissions but a fully **integrated approach** allows achieving environmental goals at lowest cost to society --> this is even more important the more different technologies become available
  - Need for technological progress AND demand change
  - Eco-driving and related in-vehicle technologies, infrastructure and traffic management, ITS…. can significantly contribute to emission reductions
- New breakthrough technologies are a shared responsibility of the participating industries, scientific institutes and governments and can only work based on **coordinated collaboration and competitive-neutral guidelines** for all key players taking into consideration customer needs and expectations.
- Need for **technology-neutral targets**
  - Industry invests in **multiple technology developments**
    - Conflicting political targets and customer expectations
    - Cumulative cost of regulations
    - Pave the way towards truly sustainable mobility
  - **None of the technical options should be discarded**. It is competition that will have to select the best of them. All of the technologies mentioned can significantly contribute to CO2 emission reductions. Their broad application and market penetration will depend on further technological improvements, cost reductions, infrastructure developments, energy production, market acceptance and policy support.

Actions recommended at regional /national /European or international level

- Define an **EU roadmap** with all stakeholders involved. The roadmap should support EU vehicle manufacturers in remaining world-wide technology leaders in fuel efficiency, safety, and in engineering and manufacturing of clean and energy efficient vehicles.
    - Define a **technology-neutral, long-term policy environment in the EU**
    - Need for a balanced policy framework based on **realistic market assessment** regarding alternative power-trains/fuels and internal combustion engines.
    - Develop **sound objectives**, based on factual analysis, involving all stakeholders.
- Actions regarding **key pillars** for success in keeping EU leadership:
    - **Policy environment**
        - **Funding** for the industry from the EU and national governments for **R&D**, manufacturing of energy-efficient vehicles and components
        - **Removal of** all substantial administrative and financial management **burdens** in the current and future EU Research Framework Programmes
        - New technologies generally first come in low volume and at a significant cost premium, which needs to be offset by a positive policy framework. Examples include
            - **Fiscal incentives/ purchase subsidies**: tax incentives, faster depreciation, subsidies for home/office charging infrastructure, incentives for commercial customers and public fleets
            - **Non-fiscal incentives**: administrative simplifications for designation of public parking space for energy-efficient vehicles
        - **Collaboration and coordination** at EU level to avoid distortion of the internal market
            - at the EU level and between the EU and Member States
            - between stakeholders and EU institutions
    - **Market readiness**
        - The **education/information for customers** is the responsibility of all stakeholders involved, for instance through public awareness campaigns.
        - Define an **encouraging framework** for the build-up of a recharging/filling infrastructure which is the prerequisite for customer's acceptance of new power train technologies. The **energy/ fuel sector** is responsible for the build-up of the infrastructure. In case of recharging infrastructure, customers should have the free choice between different energy suppliers and access to all charging stations independent of the charging station provider or energy provider. Customer-friendly operation and billing systems need to be harmonised EU wide.

- Global standardisation and harmonisation
  - **Standardisation bodies and the industry** need to agree quickly on standards and common interfaces (e.g. vehicle-to-infrastructure) for Europe as a whole to avoid a fragmented pattern of local competing and incompatible solutions. The goal must be to establish **world-wide standards and regulations**.
- **Technology ability**
  - The **automobile industry** needs to offer vehicles for various customer needs, maintaining high safety and comfort standards. The automotive industry needs to further reduce the costs of new technologies and to tackle technical challenges.
  - Presently, **battery cost** can add around € 6,000-16,000 per car, plus additional costs for power electrics etc.
    - **R&D support** is therefore much needed, including through
      - Ensuring a supportive policy framework for private investment in R&D
      - the EU Framework Programmes
      - loans by the European Investment Bank
    - Ensuring **access to finance**
- **Well-to-wheel consideration**
  - CO2 savings will be maximized if the **well-to-wheel impact** is clearly addressed at all stages of the fuel and energy chain – low carbon energy production such as renewable energy production is key to realising CO2 savings potential.
  - Any framework needs to clearly **identify** and address the **stakeholders' responsibility and sphere of influence** (for instance, vehicle manufacturers do not have any influence on the well-to-tank chain (emissions).

- The Commission should perform a **fair technical assessment of fully integrated approach pillars** (eco-driving, infrastructure, traffic management ….)
- **Fuel and vehicle manufacturers need a consistent EU wide strategy**, agreed upon by the Commission and Member State governments, on alternative fuels which provide sufficient certainty that such alternative fuels will remain economically competitive and attractive (e.g. through appropriate tax measures)

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