For more information, please contact:
Name: Cécile Favre – EU Technical Affairs Manager
Email: cecile.favre@aecc.eu
Tel: +32 2 7068160

## INDUSTRY POSITION

# THE COMBUSTION ENGINE – PART OF THE SOLUTION FOR LOW-EMISSION MOBILITY

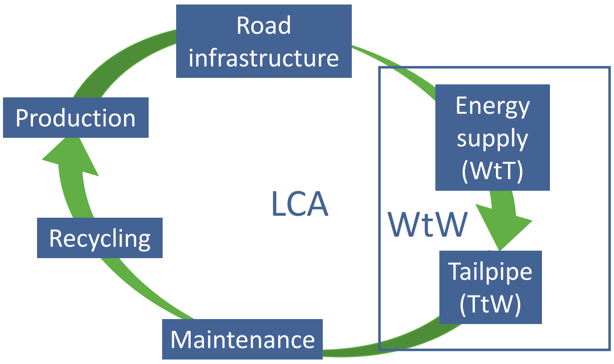
### Brussels – 8 November 2017

The COP21 Paris Climate Agreement target limits the global average temperature increase to less than 2°C above pre-industrial levels. The EU is committed to reducing greenhouse gas emissions by 80-95% by 2050 compared to 1990 levels with an intermediate target of 40% by 2030. This suggests moving away from today's fossil fuel-based energy sources to reduce greenhouse gas emissions from road transport in the EU.

**To achieve this change, several vehicle technology options are required. Road transport decarbonisation technologies, including pure electric and hybrid vehicles (combined electric and liquid fuel) are becoming available along with an electric charging infrastructure. Lower carbon liquid fuel sources and fuel efficiency improvement will also contribute. Low-emission diesel and gasoline engines will therefore play a role in reducing greenhouse gas emissions from road transport for some time to come.**

EU legislation defines tailpipe $CO_2$ targets for cars and vans based on the NEDC test cycle. The new WLTP procedure has been progressively introduced since 1 September 2017 and aims to provide a more realistic measure of vehicle $CO_2$ emissions per kilometre driven under average conditions. There are nevertheless a number of parameters to be accounted for when comparing the impact of different powertrains on climate.

In addition to the greenhouse gas emitted at the tailpipe (Tank-to-Wheel, TtW), there are also greenhouse gases generated by the production and delivery of the fuel or electricity to the vehicle, called Well-to-Tank (WtT) emissions. Their sum is referred to as Well-to-Wheel (WtW) emissions.




These parameters are very different for liquid and electric powertrains as pure electric vehicles have zero TtW emissions (used for vehicle tax incentives) but will have differing WtW values depending on the renewable content of the generated electricity. For example, electricity generated by wind has a very low WtT greenhouse gas value whereas electricity generated by coal has a relatively high WtT contribution. Equally, liquid fuels derived from renewable carbon sources in addition to extracted oil are not accounted for in the currently solely regulated tailpipe/TtW $CO_2$ emissions.

For a true comparison of the greenhouse gas contribution of the various types of vehicle now available it is also necessary to account for the greenhouse gases created during the manufacture of the vehicle, the energy transmission and storage, vehicle maintenance and recycling. This Life Cycle Analysis (LCA) is very complex but can provide a more comprehensive method of comparing pure electric, hybrid and liquid fuel vehicle greenhouse gas contributions.

Global warming is not limited to $CO_2$ emissions from energy sources. Other greenhouse gases with a global warming potential, such as methane ($CH_4$) and nitrous oxide ($N_2O$), should be accounted for as $CO_2$ equivalent ($CO_{2\ eq}$).

Data collected during real-world driving show tailpipe $CO_2$ emissions and electric consumption are usually higher than those listed for liquid fuel, pure electric and hybrid vehicles due to road gradients and other effects encountered on the road compared to a vehicle test laboratory. The real-world contribution of different vehicle types to total greenhouse gas emissions is difficult to determine; for electric and hybrid vehicles it will depend on the way the electricity was generated and for liquid fuel vehicles will depend on the renewable carbon content of the fuel.

In a Well-to-Wheel context, the internal combustion engine can, in the long term, continue to be a key contributor to climate-friendly mobility not only by using non-fossil, synthetic liquid or gaseous fuels produced from renewable sources; but also through technological improvements in the engine fuel efficiency.

**Decarbonisation of transport will take place by a number of pathways including liquid fuel, pure electric and hybrid vehicle technologies. Thanks to efficient aftertreatment technologies, the reduction of greenhouse gas emissions from conventional and hybrid vehicles can be combined with ultra-low particulate and nitrogen oxide (NOx) emissions enabling climate change and air quality to be tackled simultaneously.**

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