# AECC Position on the Commission's Proposal for Stage V Standards for NRMM Engines

The Association for Emissions Control by Catalyst, AECC, registered association n° 78711786419-61, welcomes the European Commission's proposal COM(2014) 581 final introducing Stage V emissions' standards for Non-Road Mobile Machinery (NRMM).

The Clean Air package adopted by the European Commission on 18 December 2013 identified NRMM as a key source of emissions to be tackled in order to generate the improvement in ambient air quality required by EU legislation:

- NOx emissions need further reduction to help resolve $NO_2$ limit breaches in most EU Member States,
- PM emissions need to be further reduced as there is no safe threshold for short-term exposure to ultrafine particles according to the World Health Organization (WHO) REVIHAAP project.

As a consequence, AECC generally supports the Commission's proposal including tightening emissions requirements for applications for which no Stage IV is currently defined in Directive 97/68/EC (e.g. locomotives, inland waterway vessels) or where no emissions requirement is defined at all (e.g. snowmobiles and SI engines above 19 kW that are promoted for gaseous alternative fuel applications). AECC supports a fair and equal treatment for constant speed and variable speed engines.

AECC also welcomes the proposal to be a Regulation, directly applicable in all EU Member States, rather than a Directive that requires transposition into 28 different national legislations.

In 2012, the WHO International Agency for Research on Cancer (IARC) classified Diesel engine exhaust emissions as carcinogenic to humans. This assessment was based on epidemiological studies in which the engines were not equipped with particulate and NOx aftertreatment systems. Studies show that a minimized number of ultrafine particles will benefit society in general and machinery operators in particular. A recent study(1) published by the Health Effects Institute (HEI) in January 2015 showed no evidence of carcinogenic lung tumours or pre-cancerous changes in the lungs of rats extensively exposed to exhaust fumes of a Diesel engine equipped with Diesel Particulate Filter.

In that context AECC welcomes the introduction of a Particle Number (PN) limit for Diesel engines between 19 and 560 kW in the main engine category (NRE). Emissions control technologies are readily available to enable Stage V NRMM requirements to align with on-road Euro VI emissions legislation. They are in use on Heavy-duty vehicles in the USA (since 2010), in Japan (since 2009) and in Europe (since 2013).

**AECC believes that the PN limit should be $6x10^{11}$/kWh and the Particulate Mass (PM) limit should be 10 mg/kWh, instead of the proposed limits of $10^{12}$/kWh and 15 mg/kwh respectively**. These would then align with the Heavy-duty Euro VI requirements as has been shown to be feasible.

Also, to avoid any risk of market distortion, the PN limit should apply also to the bigger engines, above 560 kW. As a matter of fact, the Commission has taken an opposite approach for inland waterway vessels, where only the higher power engines (>300 kW, without any power cap) are proposed to be regulated for PN. Environmental and health effects of ultrafine particles are independent of the source; thus emission control legislation should consider all sources equivalent. In Switzerland, a VERT-certified retrofit manufacturer has actually a reference list of Diesel Particulate Filters (DPF), meeting the particle number standard, for about sixty locomotive and railcars equipped with engines above 560 kW. As a consequence, **AECC supports a single PN limit of $6x10^{11}$/kWh for all NRMM engines above 19 kW**, with possibly delayed implementation for those applications where the change in requirements is more substantial.

The Heavy-duty PMP (Particulate Measurement Program) protocols developed by UNECE can readily be used to measure PM and PN emissions of non-road engines.

AECC also welcomes the proposal to introduce In-Service Conformity provisions for NRMM. Provided that the measurement procedure is sound, it will contribute to the control of emissions from the non-road machinery in the real world and not only of its engine under laboratory-controlled operation.

AECC would like to emphasize that **alternative fuel applications should promote climate-friendly technologies**. In the case of LNG, methane emissions with a much higher global warming potential than $CO_2$ should not be neglected. The Commission proposes a far too high methane allowance (factor A of 6 in Annex II) for gas-fuelled engines above 560 kW in the main NRE category and gensets, and for all inland

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waterway and railway engines. To ensure that only efficient solutions are deployed, a specific $CH_4$ limit aligned with Heavy-duty provisions for Positive Ignition engines (500 mg/kWh) could be defined.

Finally, AECC believes that the proposed timing of introduction of Stage V requirements in 2018/19 with time-limited transitional provisions is a balanced proposal, considering the industry need for lead time on the one hand and the need for a cleaner air in Europe on the other hand.

This position is primarily based on the emissions control industry's global experience with state-of-the-art emission control technologies, such as the Euro VI systems now available in production from most major Heavy-duty vehicle manufacturers, and is specifically backed with test results obtained by AECC in 2010 throughout an extensive technical project(2) using a diesel, 4-cylinder, 4.4-litre, 93 kW NRMM base engine that is available globally.

Should you need more information, you can contact AECC at info@aecc.eu or at +32 2 706 8160.

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*AECC is an international non-profit scientific association of European companies engaged in the development, production and testing of catalyst and filter based technologies for vehicle and engine emissions control. This includes the research, development, testing and manufacture of autocatalysts, substrates and speciality materials incorporated into the catalytic converter and filter and catalyst-based technologies to control engine emissions. Members' technology is incorporated in the exhaust emission control systems on new cars, commercial vehicles, buses, non-road mobile machinery and motorcycles in Europe.*

*More information on AECC can be found at www.aecc.eu. Information on emissions control retrofit for existing heavy-duty vehicles and non-road machinery can also be found at www.dieselretrofit.eu.*

*AECC's members are: BASF Catalysts Germany GmbH, Germany; Ibiden Europe B.V. Stuttgart Branch, Germany; Johnson Matthey PLC, United Kingdom; NGK Europe GmbH, Germany; Solvay, France; and Umicore AG & Co. KG, Germany.*

References:

(1) Advanced Collaborative Emissions Study (ACES): Lifetime Cancer and Non-Cancer Assessment in Rats Exposed to New-Technology Diesel Exhaust, HEI Report 184, http://pubs.healtheffects.org/view.php?id=430.

(2) Measured Emissions from a Dedicated NRMM Engine fitted with Particulate and NOx Emissions Controls, Heavy Duty Diesel Emissions Symposium, Göteborg (September 2010), www.aecc.eu/content/pdf/100921%20AECC%20NRMM%20Test%20Program%20SAE%20HDD%20Gothenburg.pdf.