

# LONG RUN

## D2.6 – Characteristics and specifications of EAS for stoichiometric gas combustion concept with biomethane (TWC)

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## Publishable summary

This report describes the development and layout of an exhaust aftertreatment system for a stoichiometric gas engine developed in WP4 of LONGRUN. The report includes measurements from on a synthetic gas test bench, modelling of reaction kinetics and the layout of the exhaust aftertreatment system.

At start of the work the LONGRUN emission targets for gas engines were discussed. The contractually agreed target for NO<sub>x</sub> (30% reduction based on EURO VI = 0,32 g/kWh) was considerably lowered to 0,1 g/kWh (referring to a combined WHTC cold/ warm).

Two aftertreatment system configurations were investigated in detail:

1<sup>st</sup> EAS concept: a main three-way catalyst (TWC) and coated CNG particulate filter (CPF)

With the chosen engine-out emission traces of a WHTC, the tailpipe brake-specific NO<sub>x</sub> and the tailpipe average NH<sub>3</sub> targets were not met. Both an improved cold start and lambda control had to be applied to meet the targets.

2<sup>nd</sup> EAS concept: close-coupled three-way catalyst (ccTWC), a main three-way catalyst (TWC), and a coated CNG particulate filter (CPF)

This concept uses a small close coupled TWC and a main TWC. The volumes of both these TWCs are equal to the TWC volume of the 1<sup>st</sup> concept. The purpose of this TWC split is to gain advantage in their overall light-off performance due to the higher exhaust temperature at the close-coupled TWC position. With this system, CO and CH<sub>4</sub> emissions can be significantly reduced compared to the 1<sup>st</sup> EAS concept. NO<sub>x</sub> emissions in the cold WHTC are approximately 30% lower when using the 2<sup>nd</sup> EAS concept, while hot emissions remain on a similar level. This leads to overall reduced NO<sub>x</sub> emissions for the 2<sup>nd</sup> EAS concept. N<sub>2</sub>O emissions increase in the 2<sup>nd</sup> EAS concept as a side effect of increased NO<sub>x</sub> conversion. NH<sub>3</sub> emissions are slightly lower when using the 2<sup>nd</sup> EAS concept. Still, to meet the LONGRUN project targets also for the 2<sup>nd</sup> EAS concept an improved cold start and lambda control had to be applied to meet the targets.

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### Project partners:

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