

CLEAN RAIL DIESEL FOR EUROPE - TACKLING THE CHALLENGE OF REDUCING EMISSIONS

CLEANER-D* – CLEAN EUROPEAN RAIL-DIESEL – IS A RESEARCH PROJECT PARTLY FUNDED BY THE EUROPEAN COMMISSION UNDER THE 7TH FRAMEWORK PROGRAMME THAT BEGAN IN JUNE 2009. SET TO RUN FOR FOUR YEARS (BUDGET: €13.6M OF WHICH €8M IS FUNDED), IT AIMS AT DEVELOPING, IMPROVING AND INTEGRATING EMISSION REDUCTION TECHNOLOGIES FOR DIESEL LOCOMOTIVES AND RAILCARS.

In 2004, the European Commission amended the Non-Road Mobile Machinery Directive (NRMM). This amendment (2004/26/EC) put railway engines within the scope of the Directive, from which it had been excluded so far. The step change from stage IIIA to stage IIIB, just three years after the implementation of IIIA as far as locomotives are concerned, represents a major step in terms of engine and after-treatment technology. Due in particular to limitations of weight and space inherent to rail vehicles, advanced technical adaptations will be necessary. It has become clear that (especially) the technology for locomotives will not be mature before the exhaust gas requirements, according to stage IIIB, come into effect in 2012.

CleanER-D was launched to tackle the technical challenges that need to be solved to comply with this new emissions regulation. The quantitative target of the project is to achieve emission levels within the limits established by the new European Directive 2004/26/EC and to

be prepared for further upcoming regulation, by evaluating the best possible innovative solutions. Hybrid technologies will also be assessed for their contribution to reducing energy consumption and CO₂ emissions. The 26 consortium partners from all over Europe are working in close collaboration to achieve the goal of greening diesel vehicles.

SHARING THE WORK LOAD

The research work in CleanER-D is divided into several subprojects. A technical management team ensures a harmonised work flow between them and takes care of system integration. The main goals of the project are to demonstrate the feasibility and reliability in service of railway rolling stock powered with diesel engines compliant with stage IIIB of the NRMM. To reach this target three operational projects have been established. Two of them focus on re-powering of existing diesel vehicles with a low emission engine. The re-powering exercise will be performed on a railcar and a locomotive.

RE-POWERING

A class 842 rail car operated by Czech Railways will be redesigned with two 242kW TEDOM horizontal engines. The partners are confident this will prove a success due to the know-how of Czech Railways on railcar repowering; in an earlier project, the state railways refurbished the class 842 railcar (a previous version of the 843) with stage IIIA engines.

In the locomotive project, Deutsche Bahn is providing a class 225 locomotive for refurbishment with an MTU 1600kW 12 cylinder engine. The locomotive interior will be completely dismantled and equipped with a brand new auxiliary system, assembled around the engine according to space and weight constraints.

NEW ENGINE, NEW LOCOMOTIVE

The third demonstration project involves installing the new-generation, Caterpillar 16 cylinder engine above 2000kW in a newly designed Vossloh locomotive. The technical installation of this new engine into a new locomotive offers greater flexibility than repowering schemes; nevertheless, the subproject partners will face challenges in mounting this powerful engine designed for heavy haul operations, due to weight restrictions regarding the typical, European four-axle configuration of the locomotive. Further to this demonstration, the entire consortium will gain useful and validated technical information on a stage IIIB design compared to a stage IIIA system.

ENVIRONMENTAL ASPECTS

The European railway sector endeavours to meet new challenges such as increasing energy prices and stricter environmental frameworks set by the European Union. While rail is the most environmentally-friendly transport mode, diesel-powered vehicles, which still constitute about 20% of European



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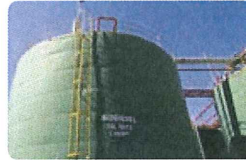
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THE MAIN GOALS OF THE PROJECT ARE TO DEMONSTRATE THE FEASIBILITY AND RELIABILITY IN SERVICE OF RAILWAY ROLLING STOCK POWERED WITH DIESEL ENGINES COMPLIANT WITH STAGE IIIB OF THE NRMM

operations, remain the weak link in the sector; special attention must be devoted to improve their emissions performance and decrease their overall negative environmental impacts. These socio-economic and 'green' aspects will be explored in the CleanER-D sustainability subproject. The calculation of life cycle costs and development of a methodology for cost/benefit analysis are core elements of this specific work. Finally, optimisation of technical solutions and possible trade-offs will be studied and identified.

INTELLIGENT SOLUTIONS AND HYBRIDISATION

CleanER-D includes two scientific subprojects, aimed at enhancing the development of intelligent solutions to boost the compatibility of rail compared to other modes of transport.

State-of-the-art and innovative after-treatment technologies will be examined and the potential for further improvements evaluated. Recommendations for the most promising technologies will be summarised, providing comprehensive information for rolling stock manufacturers as well as railway operators. To ensure maximum exploitation, the partners will look beyond the railway sector – reviewing the achievements of other transport modes and assessing their transferability to rail.

The hybridisation of diesel vehicles, currently the most promising, medium-term technology for meeting future environmental requirements, including the reduction of CO₂ emissions, is also covered in CleanER-D. The hybrid solutions subproject is evaluating the potential for energy savings and reducing emissions by implementing different energy storage technologies.

Studies on the hybridisation of a diesel-driven rail vehicle will lead to the most promising propulsion system architecture with appropriate energy management, combined with a state-of-the-art energy storage system.

PROVEN AND HOLISTIC

Four years down the line, CleanER-D aims to deliver a holistic vision on the future of diesel applications in rail and present two, proven, stage IIIB locomotives equipped with engines from two different manufacturers, as well as a railcar certainly powered by a forward-looking, stage IIIB, diesel engine ■

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*for more information visit www.cleaner-d.eu