

PROJECT PROPOSALS FOR THE 2ND CALL OF FP7

Template for the project synopsis

1. Project full name

DIESEL proposal

2. Scope of the project

a. Main (measurable) objectives

- Identify future emission reduction potential of the engines that **are** offered (further to stage 3B)
- Analysis of the complete system in the rail environment (reduction of the emissions of the whole propulsion system including after treatment and in engine technology)
- Research transparency (non ring fenced development) and understanding for state of the art for diesel manufacturers
- Learn about potential problems (e.g. reliability, maintenance, implementation into the vehicles, weight, space, cost, waste heat, temperature levels of the cooling, etc)
- Validation of diesel engines to show whether they can/not deliver reliable, affordable engines that are suitable for railway applications and still meet stage IIIB of the directive.
- If not, show what is possible in terms of cost size weight and emissions.
- Deliver actual specifications in time for the Loco / DMU manufactures to design and build compliant products to meet customer orders,
- **Ensure the engine is optimised for the entire life cycle of the vehicle**
- Aftertreatment experiments on test beds and service trials
- Real life demonstration of the system on at least **two** locos / DMU
- Project will address both engine types, below and above 560 kW, **with a priority for large engines**

b. Expected deliverables (concrete outputs): *please include both intermediate and final deliverables for measuring the progress of the project*

- Demonstrating that the sector can deliver reliable and LCC effective solutions and the boundary conditions under which this can be achieved
- Knowledge about necessary boundary conditions
- Operational data (not only simulations)
- Roadmap/ Vision (10 years?) for the future in terms next stages
-Scientific content to be developed
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3. Problem that the project will address (why is the project being initiated?)

- No railway proven solution to comply with 3B available off the shelf for Loco's or DMUs (see above for more details)
- (see UNIFE/UIC/EUROMOT ppt) for more info
- No existing experience in any after treatment technology
- No comparisons exist for rail applications of the advantages and disadvantages of Selective Catalytic Reduction vs. Exhaust Gas Recirculation
- Desk Top analysis of Road Industry Introduction of aftertreatment devices has identified **significant business risks to the European railway industry that could result in decline of market share to competing modes of transport.** Even where rail was previously proven to be the right choice.

4. State of the art: previous or on-going research or standardization initiatives in this area

- No specific rail research done in this field (Green?)
- UK test bed investigations on Continuous Regenerative Traps

5. Estimated budget (total and EC Contribution)

(Please note that under FP7 R&D activities as well as demonstration will be 50% funded)

- More than 4mil€ funding

6. Project duration *(indicative range: between 24 and 48 months)*

- 48 months
 - o Provisional plan for the timing for the engines:
 - Project start 01/2009
 - 01/ 2010: engine data should be available to loco manufacturers
 - Mid 2010: engine delivery
 - 01/ 2011: engine itself running on the track in the locomotives
- 2 phase project:
 - o phase 1 (M0-M24): feasibility study, including identification of the most appropriate technology for the future, deliver guidelines for system design
 - identification of the engines and of the development program that the diesel engine manufacturers intend to put in place to meet the stage 3B requirements at the implementation date fixed by the directive.
 - Identification of the vehicles.
 - Supply by the diesel engine manufacturer of the data needed to redesign of the vehicle.
 - Redesign of the vehicle.
 - Building or adaptation of the vehicle and delivery of the diesel engine with its environment.
 - testing of the vehicle before field testing.
 - o phase 2 (M24-M48): continuation of test bench testing in parallel with field testing See appendix 1 for details of the proposed DMU service trial
 - Field testing of the vehicle. See appendix 1 for a more concise summary of the DMU testing
 - During field testing, interruptions to install newly available components.
 - Continuation of field testing after the date of implementation of stage 3B?

7. The leader of the proposal preparation

- UNIFE (rail supply industry)
 - o Supported by a core team (BT, Alstom, Vossloh, Siemens + Voith, UIC)

8. Required level of support from UNIFE staff

Low <i>(UNIFE just to be informed about project preparation)</i>	
Medium <i>(UNIFE to assist with the consortium meetings and preparatory work for the proposal)</i>	
High <i>(UNIFE responsible for proposal preparation and overall co-ordination of the project implementation)</i>	XXX

9. Main potential partners (names of companies supporting the proposal as opposed to potentially interested stakeholders)

- Loco+ DMU manufactures
 - o Alstom
 - o Siemens
 - o BT
 - o Vossloh
 - o Voith
 - o Other DMU manufacturers
- Engine manufactures
 - o At least MTU and CAT
 - o One additional small engine supplier <560 kW
 - o parallel process of several subprojects
- Specialized institutes (Chalmers, CNTKetc...)
- Independent test facility
- Operators
 - o UIC
 - o SNCF
 - o Railion / DB
 - o PKP
 - o CFR
 - o ATOC
- Diesel particle filter (Aftertreatment suppliers) suppliers **but not directly as diesel engine manufacturers are responsible for meeting the requirements of the directive; they will also supply the DPF.**
 - o Hug
 - o Huss
 - o Tehag
 - o others

10. Contributions to standards – can the results of this projects be transferred into future EN standards?

- Contribution to the evolution of the NRMM Directive
- Standards for design and operating conditions and maintenance of stage 3B compliant vehicles

11. Implications of the project for current individual company products and practices – is the proposal supported internally within each major partner at the strategic level?

- Yes for Alstom, Vossloh, Siemens and BT. To be checked with the other main project partners

12. Risk factors that could jeopardize the implementation of results. How to ensure market up-take and who will have the responsibility over the implementation?

Risks:

- Ongoing and future tenders
- Engine manufactures unable to supply compliant engines
- Stage 4 coming earlier than planned
- Net dis benefit to Europe when all factors considered

Implementation:

- Through the revisal of the NRMM Directive
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Appendix 1. DMU engine testing

The UK has secured a test track (Old Dalby) and a test train (Class 153) for engine trials. The resources have been secured for up to two years and have been provided by The Department of Transport and Porterbrook Leasing Company respectively to allow engine manufacturers to demonstrate the technologies they plan to provide for the next generation of European DMUs that will need to significantly reduce their emissions.

The advantage of the 153 unit is that it is a single vehicle train based on a simple platform that can be easily modified to accept different propulsion systems. The 153 also complies with UK gauge which has a reputation of being the tightest and smallest in Europe for which to design vehicles. In short if it fits onto a 153 then it will fit onto most other DMUs.

The plan is to fit up to five engines, one after the other, to the DMU and run it along the track for three months each. The engine solutions we would like to look at are:

- The vehicles existing engine (run for one week)
- A IIIA compliant engine with in engine technology (run for one week)
- An SCR DMU engine compliant with IIIB (run for three months)
- An EGR DMU engine compliant with IIIB (run for three Months)

Once this is done we can evaluate the performance of these engines not only based on Fuel consumption and power output but also on Emissions, purchase costs, weight, size, maintenance costs, reliability and starting ability.

- Finally we can test a third engine which may not comply with IIIB but can demonstrate an optimal solution with respect to all of the elements above.

These tests are vital to ensure that the railway industry remains competitive with other modes of transport and will provide empirical evidence of the true impact of after treatment devices.

Proposal for an agenda with MTU + CAT:

- Explain the overall objectives
- Basic agreement on scope + objectives of the project
- Confirmation of their participation + interest
- Provision of engine + associated components
 - o Discussions on supplying engines
- Future potential (beyond 3B) of the engines to be tested
 - o How
 - o When
 - o Implications (weight, heat, cost, etc)
- Availability of series stage 3B production?
- Schedule of potential project with their development plan
 - o Decision on how to synchronise these activities
- Recommendation of independent test rigs?
- Recommendation of scientific expertise (universities...)

Special question to MTU:

- what can the contribution from GREEN be for this potential project?

Meetings:

11 Dec: CAT, Geneva 11 – 16.30, Ben van Vlaanderen
18 Dec: MTU, Friedrichshafen, 11 -16.30, Thorsten Kuhn