

Public Summary of D4.3

Preliminary design of the onboard dynamic energy manager

What is MERLIN?

MERLIN is a collaborative project funded under the European Commission's 7th Framework Programme on Research and Development. MERLIN started on 1st October 2012 and will last 39 months.

MERLIN's main aim and purpose is to investigate and demonstrate the viability of an integrated management system to achieve a more sustainable and optimised energy usage in European electric mainline railway systems.

What are the issues at stake?

Energy management is a key issue for railway systems and this situation will continue to be prominent for the foreseeable future. Multiple operational scenarios add complexity to the development of suitable and appropriate energy management solutions. Moreover, existing assessment tools lack an integrated approach, and tend to omit the variation in emission levels, energy usage and associated costs resulting from differing traffic peaks. Given that the railway system is a complex and interconnected system, a single supplier, operator or infrastructure manager (as large as they may be) cannot

tackle the energy management issue for the entire network alone. Hence, only through a collaborative approach such as **MERLIN** can effective solutions for this issue be developed. Appropriately, the **MERLIN** consortium brings together the key rail stakeholders from across Europe.

What are MERLIN's main achievements?

- Proposals for technical recommendations (UIC/UNIFE TecRec) on Specification and verification of energy and power consumptions of railway systems and on Energy and power related information protocols at operational level;
- Future business models & recommendations (smart energy management, cost saving);
- Optimised solutions for current and future business models;
- Reference architecture and interfaces related to a strategic support tool and operational energy management tool which supports real time suggestions to network actors.

Public summary:

WARNING: *This document is a synthesis of a confidential document. Access to the full content of the deliverable is restricted to the members of the MERLIN consortium and to the European Commission's services.*

The main aim of MERLIN project is to investigate and demonstrate the viability of an integrated management system to achieve a more sustainable and optimised energy usage. In order to achieve this objective, D4.1 develops the detailed reference architecture of Railway Energy Management System (REM-S) based on D2.3 while D4.2 describes REM-S tool implementation according to the reference architecture.

Deliverable D4.3 "Preliminary design of the onboard dynamic energy manager" intends to describe in detail the mobile unit of the REM-S, contained inside the train, DOEM (Dynamic Onboard Energy Manager). DOEM is in constant communication with the Zone Agent (REM-S agent responsible for Local Optimisation and Real Time Operation in ground) in order to get ground conditions updates and MAO (Minutes Ahead Optimisation) estimation request.

The main aim of D4.3 is to define DOEM modules' general description and specification. A Vehicle Energy Management (VEM) module, Profile Generator (PG) module, Driving Advice Generator (DAG) module, Auxiliary Loads Manager (ALM) module, Data Manager (DM) module and Communication System (CS) module will contribute to the correct operation of this system.

CS will update external conditions, DM will handle the information between train and ground (DOEM and Zone Agent), PG will create new speed and power consumption profiles, DAG will provide suggestions to the driver on how to drive and ALM will manage the most important auxiliary loads, as HVAC's performance within restrictive zones.

The decision making unit, VEM, decides if new profile calculations are necessary, so orders PG its calculation or a new distribution of power among the auxiliary loads through ALM. Finally, with the optimised speed profile, DAG will create the suggestions to the driver.

The first section of the document introduces the objectives and scope of the deliverable. The second chapter summarises the REM-S concept and each basic components (Network Agent, Zone Agent, DOEM...). The following chapters define the functionalities and interfaces of DOEM with the ground components. The fifth and sixth sections are related to each of the modules which are part of the DOEM and the interfaces among those modules. To finalise the document, a conclusion section summarises the achievements.

More information

To know more on the MERLIN project, please visit <http://www.merlin-rail.eu>.