Public Summary of D5.3

Smart strategic energy management system software validation report

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.

Sustainable and intelligent management of energy for smarter railway systems in Europe: An integrated optimization approach

The overarching aim of the MERLIN project is to investigate and demonstrate the viability of an integrated management system to optimise energy use. One of the key elements of this management system is a Strategic Decision Making Tool (SDMT), intended to be a decision support system for design or modification of railway systems, specifically targeting the strategic decisions required when designing new railway systems or carrying out significant modifications to existing systems, such as timetable changes, new rolling stock, electrification infrastructure, energy storage systems or revising contractual arrangements for the supply of electricity.

Following the specification defined in Deliverable D5.1 based on the draft architecture proposed in Deliverable D2.2, three software modules (i.e. core module, contract arrangements and optimization algorithm) have been developed in Deliverable D5.2. This Deliverable D5.3 reports on the validation of these newly developed modules.

The aim of these validation tests was to confirm their accuracy, integration success and compliance with the specification. Such test were performed on the basis of a case study creating a test Scenario that has a reasonable number of combinations of Design Parameter values, but where the results from every possible combination are already known in advance. In addition, each feature of the SDMT defined in Deliverable D5.1 was also tested by the test Scenario.

This iterative process resulted in a final release of the tool to all relevant parties for use in the simulation activities as part of WP6. Specially, the following scenarios have been using the SDMT, providing useful feedback:

- Scenario 2 (15kV 16.7Hz, Sweden);

- Scenario 3 (3kV DC, Spain) ;

- Scenario 4 (mixed traffic with 25kV 50Hz and diesel traction, UK)

- Scenario 5 (25kV 50Hz, UK)

The SDMT can be partially deployed depending on the optimisation variables. It has been developed solely for the purpose of the MERLIN project and to implement the proposed strategic decision making architecture. In order to be operational, it requires the use of a multi-train simulator or similar.

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