Railenergy

Innovative Integrated Energy Efficiency Solutions for Railway Rolling Stock, Rail Infrastructure and Train Operation

Project objective

The overall objective of Railenergy is to cut the energy consumption in the railway system thus contributing to the reduction of life cycle costs of railway operation and of CO2 emission.

The project target is to achieve a 6% reduction of the specific energy consumption (i.e. energy consumption per e.g. seat-km or tons-km) of the rail system by 2020.

The project will investigate and validate solutions ranging from the introduction of innovative trackside & traction technologies, components and layouts to the development of rolling stock, operation and infrastructure management strategies.
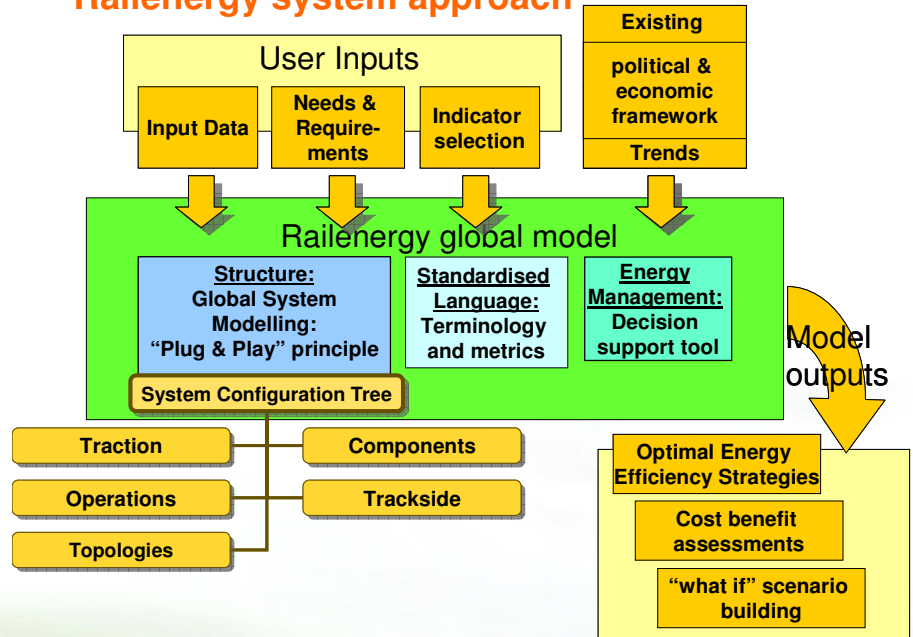
Project Background

The 3 largest European networks are spending €1.75 Billion on energy and the energy costs increased 20-30% on average last year!
The inter-relationship of railway sub-systems is highly complex, especially with regard to assessing their consumption of energy.
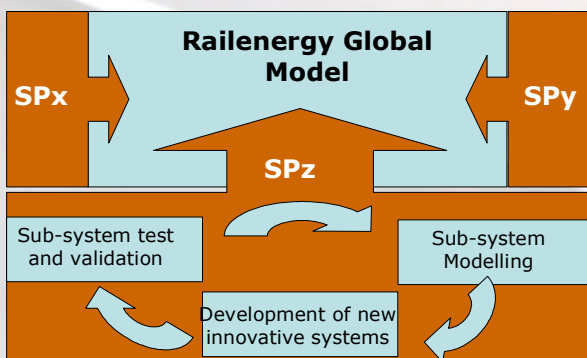
Holistic approach

Therefore, a fully integrated approach is the only way to achieve true energy savings. The special feature of the Railenergy IP is the holistic approach to energy efficiency. No technical or operational measure is better than its global contribution to the system efficiency.

Plug & Play principle for sub-systems

Railenergy Global Model

In order to achieve this, a Global Model will be developed to simulate the energy losses in the railway system. The model will be based on a "plug & play" principle for each component or operational pattern:

- Open architecture for the whole sector
- Ability to break a global target into manageable units
- Help select the best combination of solutions for energy cost saving (during design, procurement and operation phases)

Railenergy system approach

- Specific modules to assess the contribution of any new technical solution developed within Railenergy
- The ability to convert all test or simulation results into a common unit for measurement of Life Cycle Cost
- Support investment decisions
- "WHAT-IF" function to accommodate new technology options and different load profiles

Railenergy Project Outputs

- Relevant baseline figures and scenarios for selected reference systems
- A system-based concept for modelling energy consumption
- A common and standardised methodology to determine energy consumption by rail sub-systems and components in the development and procurement phases
- An integrated simulation tool for energy consumption and LCC
- An integrated railway energy efficiency management approach & decision support tool
- Strategic energy efficiency targets for rolling stock, infrastructure and traffic management
- An Energy Management Module which could provide the operator with a diagnostic of their complete installation (main energy flows, and their distribution, power peaks and mean, links with energy contract subscription, real time and statistics…)
- New validated energy efficiency-oriented railway technologies for trackside and on-board sub-systems and equipment, developed in compliance with the new integrated approach
- Refined best practices for Railway Operators and Infrastructure Managers
- Strategies for incentives, pricing, and policies

Project Facts & Structure

- **Integrated Project (FP6)**
  Budget: 14.7 M€
  EC grant: 8 M€
  27 Partners:
  - 4 System integrators
  - 3 Sub-suppliers
  - 3 railway operators
  - 2 infrastructure managers
  - 7 Universities & Institutes
  - 6 Engineering Consultants
  Start: September 2006
  Duration: 48 months

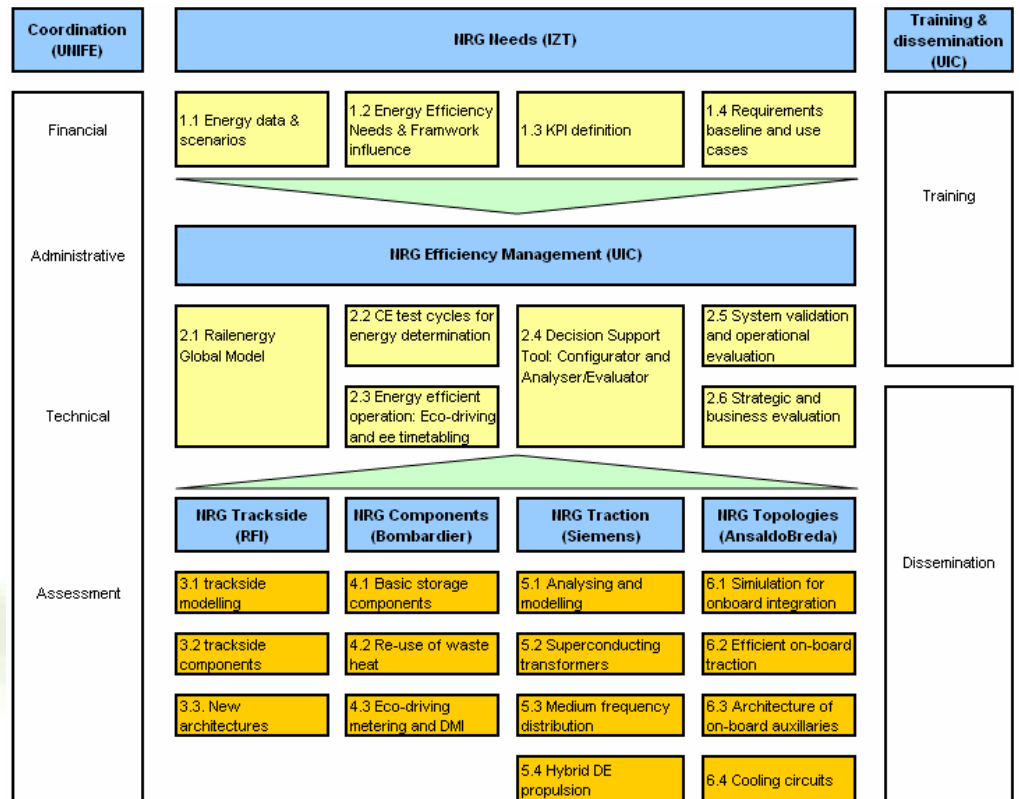- **Coordinator: UNIFE**
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- **Subprojects & leaders:**
  NRG Needs (IZT)
  NRG Efficiency Management (UIC)
  NRG Trackside (RFI)
  NRG Components (Bombardier)
  NRG Traction (Siemens)
  NRG Topologies (AnsaldoBreda)

- **Project website:** www.railenergy.org

Project structure diagram:

Coordination (UNIFE)	NRG Needs (IZT)				Training & dissemination (UIC)
Financial	1.1 Energy data & scenarios	1.2 Energy Efficiency Needs & Framwork influence	1.3 KPI definition	1.4 Requirements baseline and use cases	Training
Administrative	NRG Efficiency Management (UIC)				
Technical	2.1 Railenergy Global Model	2.2 CE test cycles for energy determination	2.4 Decision Support Tool: Configurator and Analyser/Evaluator	2.5 System validation and operational evaluation	Dissemination
		2.3 Energy efficient operation: Eco-driving and ee timetabling		2.6 Strategic and business evaluation	
Assessment	NRG Trackside (RFI)	NRG Components (Bombardier)	NRG Traction (Siemens)	NRG Topologies (AnsaldoBreda)	
	3.1 trackside modelling	4.1 Basic storage components	5.1 Analysing and modelling	6.1 Simiulation for onboard integration	
	3.2 trackside components	4.2 Re-use of waste heat	5.2 Superconducting transformers	6.2 Efficient on-board traction	
	3.3. New architectures	4.3 Eco-driving metering and DMI	5.3 Medium frequency distribution	6.3 Architecture of on-board auxiliaries	
			5.4 Hybrid DE propulsion	6.4 Cooling circuits	

Railenergy Partners

UNIFE · UIC · D'APPOLONIA engineering consulting company · IZT

SIEMENS · ALSTOM · ANSALDOBREDA · BOMBARDIER

BANVERKET · RFI · TRENITALIA · EUROLUM

Faiveley s.a. · saft · TRANSTECHNIK · Rail Cargo Austria Ein Unternehmen der ÖBB

ENOTRAC · emkamatik Engineering – Modeling – Calculation – Real Time Simulation for Railways and Electrical Systems

transrail · SCIROIDEA

TRANSPORT SYSTEMS AND INFRASTRUCTURES GROUP

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