Innovative EM system architect for technical fields in energy, manufacturing, infrastructure, and transport.

Provider of custom-made EM solutions based on state of the art products (software & hardware) developed in-house.

Technical pioneer, incorporating three pillars of modern energy practices: energy monitoring, energy efficiency, and energy flexibility.
RAILWAYS ENERGY METERING & MANAGEMENT

- Energy Measurement and Management for traction (EN 50163) and non-traction - data acquisition from energy meters in railways vehicles and infrastructure, data validation, billing, customer portals, data integration.
- Customers: railway infrastructure managers and railways operators
- Benefits: cost allocation and billing for infrastructure managers, energy efficiency and cost reduction for railways operators.
INTEGRATED RAILWAY ENERGY MANAGEMENT (UIC)

1. On-board Metering
Fit remote read-out systems for billing, management information and feedback to drivers

2. Training
Improve energy awareness for all staff and give eco-driving coaching to train drivers

3. Traffic Management
Avoid stopping heavy freight, or slowing down high-speed passenger services

4. Electrical Power Supply
Measure and manage system transmission losses

5. Parked Trains
Shut-down diesel engines and switch-off electrical systems

6. Train Lighting and HVAC
This can compromise over 20% of total train energy use — so improve control system to save while in traffic, and when parked out of service

7a. Depot and Workshop Buildings
Avoid waste and inefficiency in heating and lighting

7b. Stations and Offices
Apply latest building services techniques for equipment efficiency and simply switch-off areas not in use.

8. Reporting and Feedback
Give regular energy reports to senior management
INTRODUCTION

- All new trains put into operation after 2014 need to be equipped with electrical energy metering devices and
- from 2017 onwards, these data must be transferred into a data collection system (Data Collection System – DCS).
- Countries within the EU have committed to enabling the collection and exchange of data required for accurate billing of energy from 2019 on.
- Solvera Lynx in collaboration with Knorr-Bremse offers railway solutions to comply with the adopted standards
- development custom-made software and hardware solutions for collection, processing, and evaluation of energy data for railways
LEGAL FRAMEWORK AND STANDARDISATION

Directives level
- RISC (Railway Interoperability and Safety Committee)
- Propose legislation
- EC/DG MOVE (The Directorate-General for Mobility & Transport of the European Commission)
- Adopt legislation
- European Parliament and European Council

TSI level
- Change requests, lobbying, opinions about TSIs etc. in the work process
- CER (Community of European Railway and Infrastructure Companies)
- ERA (European Railway Agency)
- UNIFE (Association of the European Rail Industry)
- UIC (International Union of Railways)

Standards level
- JPC Rail (Joint Programme Committee Rail)
- Defining which standards must be produced in relation to TSIs etc.
- CEN (European Committee for Standardization)
- ETSI (European Telecommunications Standards Institute)
- CENELEC (European Committee for Electrotechnical Standardization)

CEN/TC 256 (rail standards)
CENELEC/TC9X (rail standards)
THE VALUE CHAIN FOR METERING ON ROLLING STOCK

STRATEGY AND POLICY

- Development of Tech. Specs for Interoperability (TSI)
- Economic valuation and

TESTING

- EN, ISO, IEC
- Common Architecture
- TSI

INTEGRATION AND ASSESSMENT

- Assessment of Integration
- Field tests

VERIFICATION AND CERTIFICATION

- EN, ISO, IEC
- Common Architecture
- TSI
- Homologation

USE AND REVERIFICATION

- Validation, Allocation, Reconciliation and Billing
- Quality control
IMPLEMENTATION
VARIOUS POSSIBILITIES FOR BILLING SYSTEMS

billing & settlement systems

DCS

DHS

traction meters

Train operators

... others (EN 61107)
INTEGRATED RAILWAY ENERGY MANAGEMENT (UIC)

1. **On-board Metering**
   Fit remote read-out systems for billing, management information and feedback to drivers.

2. **Training**
   Improve energy awareness for all staff and give eco-driving coaching to train drivers.

3. **Traffic Management**
   Avoid stopping heavy freight, or slowing down high-speed passenger services.

4. **Electrical Power Supply**
   Measure and manage system transmission losses.

5. **Parked Trains**
   Shut-down diesel engines and switch-off electrical systems.

6. **Train Lighting and HVAC**
   This can compromise over 20% of total train energy use – so improve control system to save while in traffic, and when parked out of service.

6. **Diesel Fuel**
   Keep accurate records and use the data to improve maintenance as well as driving technique.

7. **Depot and Workshop Buildings**
   Avoid waste and inefficiency in heating and lighting.

7. **Stations and Offices**
   Apply latest building services techniques for equipment efficiency and simply switch-off areas not in use.

8. **Reporting and Feedback**
   Give regular energy reports to senior management.
SOLVERA LYNX RAILWAY (ENERGY) DATA EN 50463

Gemalogic sustainable energy management information system for railways

ERESS billing / settlement

Gemalogic DCS

GsmBox / Combox

railway infrastructure energy meters
(energy substations, railways stations, wagons and tracks heating, maintenance depots, office buildings)

GsmBox.R

MS
LEM
FAR
other

on-board energy meters
RAILWAY ENERGY DATA HANDLING

- On-board data handling system – energy data metering and energy management applications for:
  - Railway infrastructure managers
  - Train operators
  - Energy measurement data acquisition, logging (storage), transmission and presentation

- Data acquisition box. Railways - Measure and save
  - Can connect different types of electricity and diesel flow meters
  - Connectivity
  - Has a wide range of communication channels
  - Meets railway standards
  - Compliant with EN50155 & EN50463 requirements
  - Trip performance indicators generated during train drive
  - Optional SW package and human interface (display)
GEMALOGIC
ANALYSES LOCOMOTIVE

- Energy consumption data
  - Data to server every X minutes on minute resolution
  - Energy data calculated on different intervals
  - Large On-board storage

- Speed and location
  - Speed data
  - Location data

- Location
  - Google maps location data
GEMALOGIC

ANALYSES TRAIN

- Integrating timetables
  - Train data connected to timetables
  - Timetables connected with timestamp in GemaLogic
  - Integrating train data

- Train composition
  - Train properties
  - Data validation

- Train analyses
  - Energy consumption, specific consumption, coasting...
SUPPORT FOR BILLING

- Energy consumption
  - Per locomotive
  - Train
  - Operator
  - Section
  - Validation

- Possibility to calculate estimates – average train

- Data exchange for billing with other systems
SUPPORT FOR ENERGY EFFICIENCY

- **Comparison between locomotives, trains, sections**
  - Energy data, coasting, speed
  - Specific consumption per section
  - Driver and train type specific
  - Enables energy efficiency analyses

- **Advanced analysis**
  - Monitoring and targeting (M&T, CUSUM)

- **Driver advisory**
  - Feedback for the driver on driving
  - Used for training
THANK YOU!

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