HASLERRail

The Efficient Management of the Whole Railway System: a New Paradigm

Simone Danieli

HASLER RAIL ITALIA

EMRailS 2019

Museo Nazionale Ferroviario
di Pietrarsa (Napoli)

February 21st , 2019

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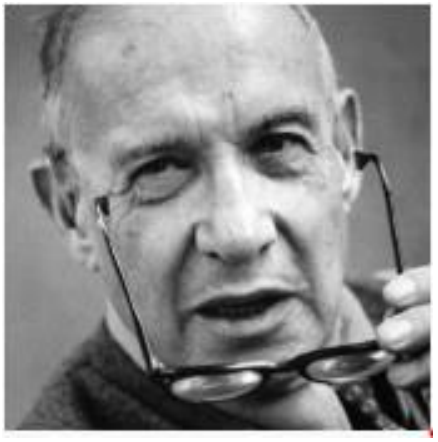

"What gets measured, gets managed."

Peter F. Drucker, Management Consultant
(attributed to)

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AGENDA

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FRAMEWORK IN EUROPE

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1. MEASUREMENT:

→ *an energy saving within Railways contribute to reach national target to lower the emissions (e.g. Kyoto Protocol)*

2. BILLING & INTEROPERABILITY:

→ *Freedom to buy the energy from third parties*

→ *Freedom in circulation on railways networks*

3. ENERGY SAVING POLICY

→ *Increased request of accurate measurement of train energy consumption, to better evaluate the expenses, and apply saving policies.*

→ *Energy Management*

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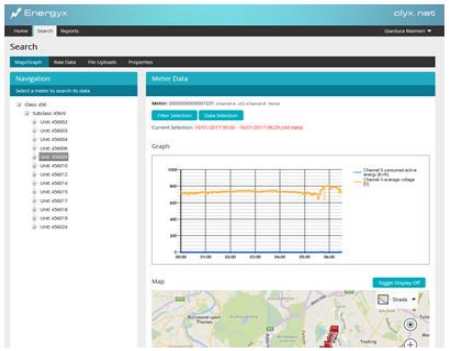
BASIC EUROPEAN REFERENCES



EU Comm. Regulat. 1301 / 2014 (*ENERGY TSI*)

Each Member State shall have to be able to collect train energy consumption data through a ground server.

EU Comm. Regulat. 1302 / 2014 (*LOC & PAS TSI*)

The energy meter will become mandatory on all new and renewed rolling stock that will operate on networks equipped with an energy data collection system.

UIC Leaflet 930

Each Member State shall have to be able to validate energy consumption and to correctly allocate it to the relevant railway undertaker.

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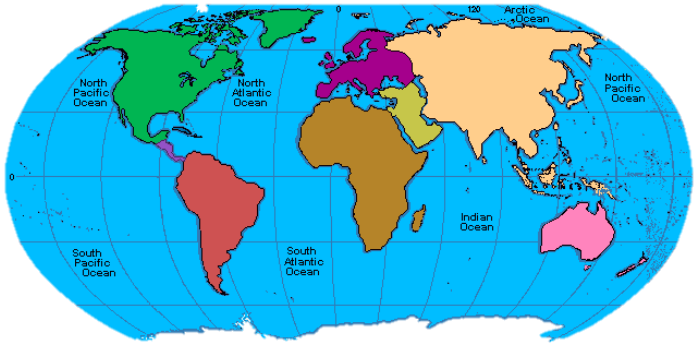
REFERENCE STANDARD

CENELEC
TC 9X

EN 50463-2012

EN 50463-2017



IEC
TC 9

IEC 62888

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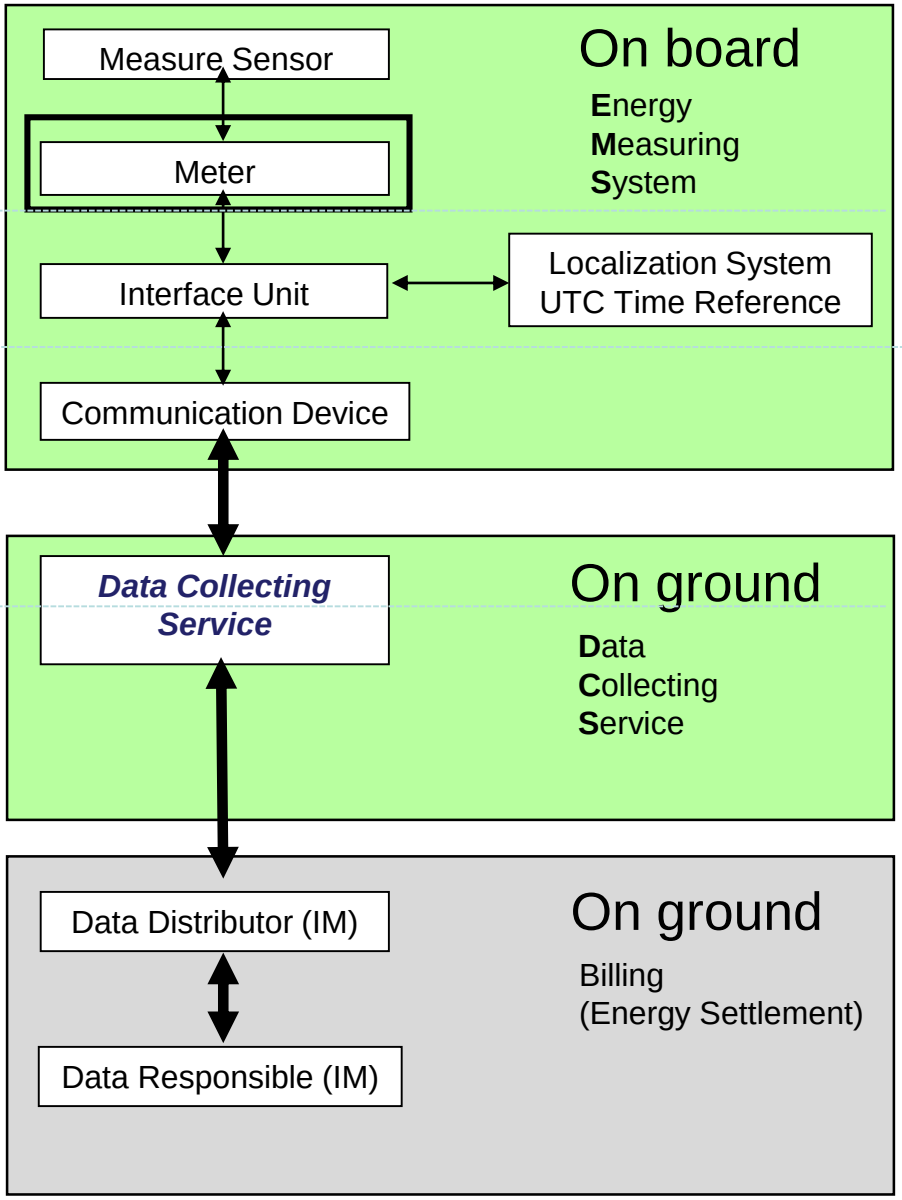
EN50463 CONFORMITY

EN 50463 part 2

EN 50463 part 3

EN 50463 part 4

UIC leaflet 930
(Exchange of data for cross-border railway energy settlement)



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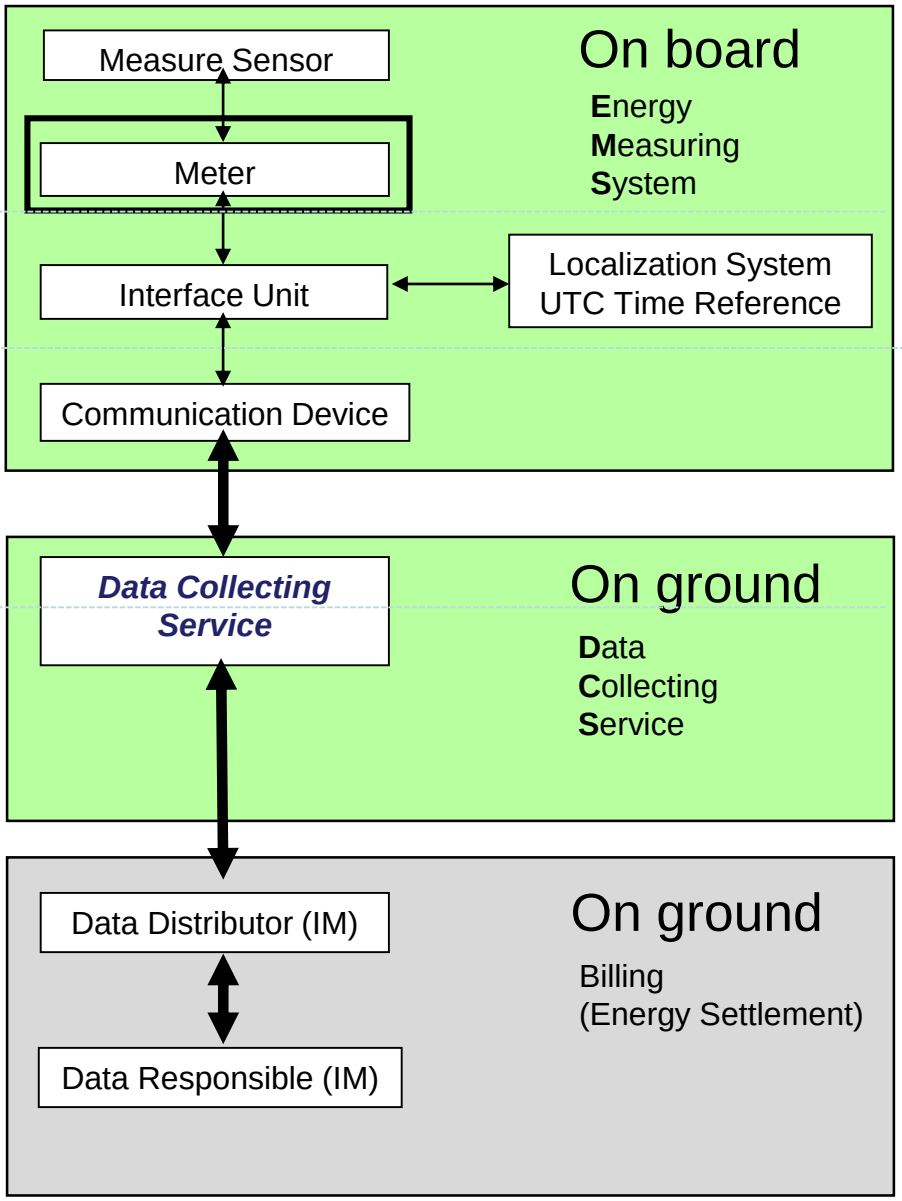
EN50463 CONFORMITY

EN 50463 part 2

EN 50463 part 3

EN 50463 part 4

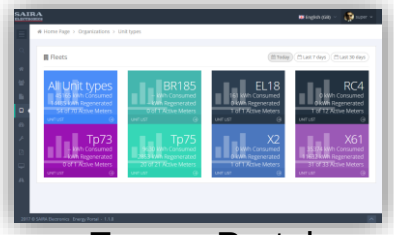
UIC leaflet 930 (Exchange of data for cross-border railway energy settlement)



Energy Meter

REM 102

DCS



Energy Portal

Energy Settlement systems

Erex billing

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GLOBAL MANAGEMENT OF THE ENERGY SYSTEM

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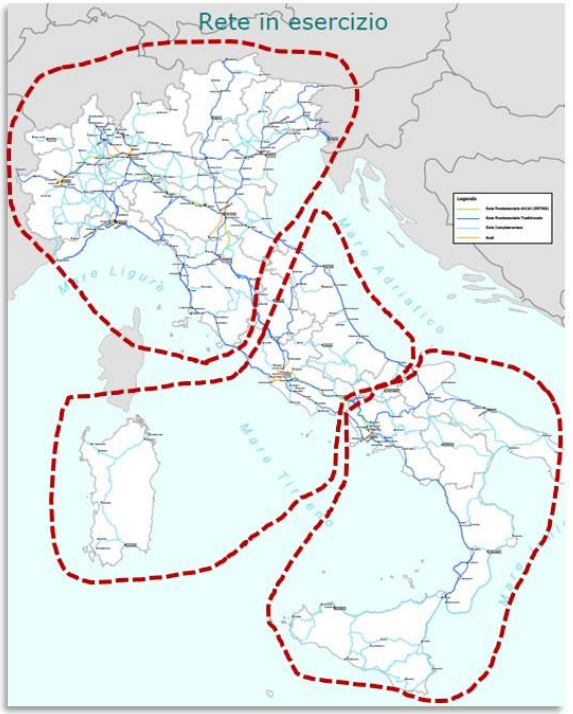
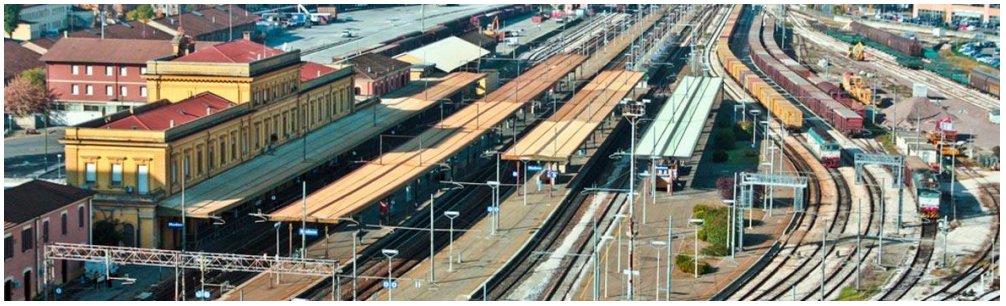
GLOBAL MANAGEMENT OF THE ENERGY SYSTEM

- The best result regarding the energy savings is got not focusing on the single consumption points, but applying an approach based on "*Macro Areas*" of Interoperable Railways Networks, taking into account different convoys running simultaneously on the same "*Macro Area*".

- The management of consumption of single conveys is not sufficient: the optimization is obtained only by correlating the management of conveys with the management of energy distribution on the "*Macro Area*"





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GLOBAL MANAGEMENT OF THE ENERGY SYSTEM

- This approach allows:
  - ✓ The evaluation of losses optimization in the distribution network, in particular in the substations
  - ✓ An harmonization and a balance of energy consumption and generation within a “Macro Area”
  - ✓ The optimization of energy accumulation, both on board and on substations

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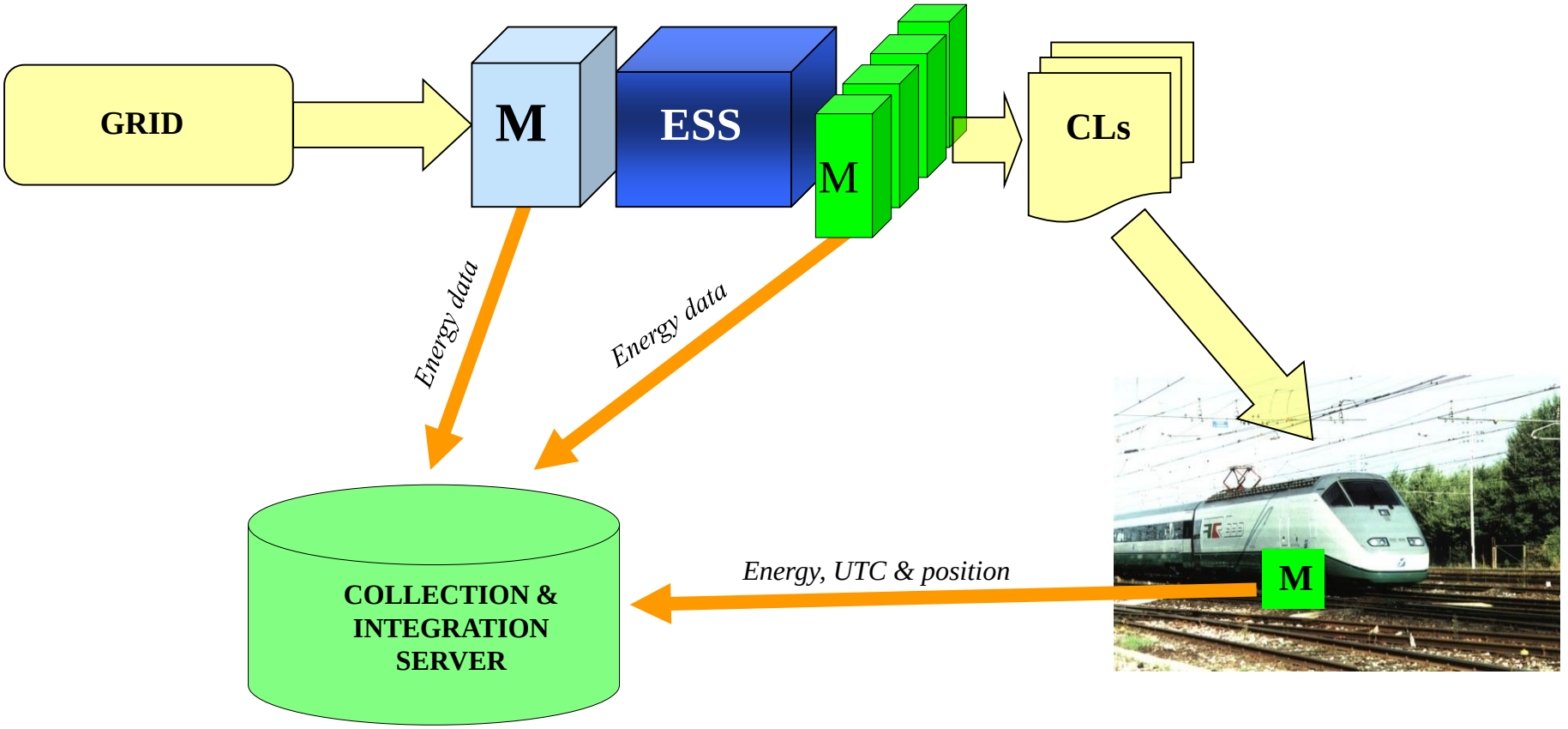
GLOBAL MANAGEMENT OF THE ENERGY SYSTEM



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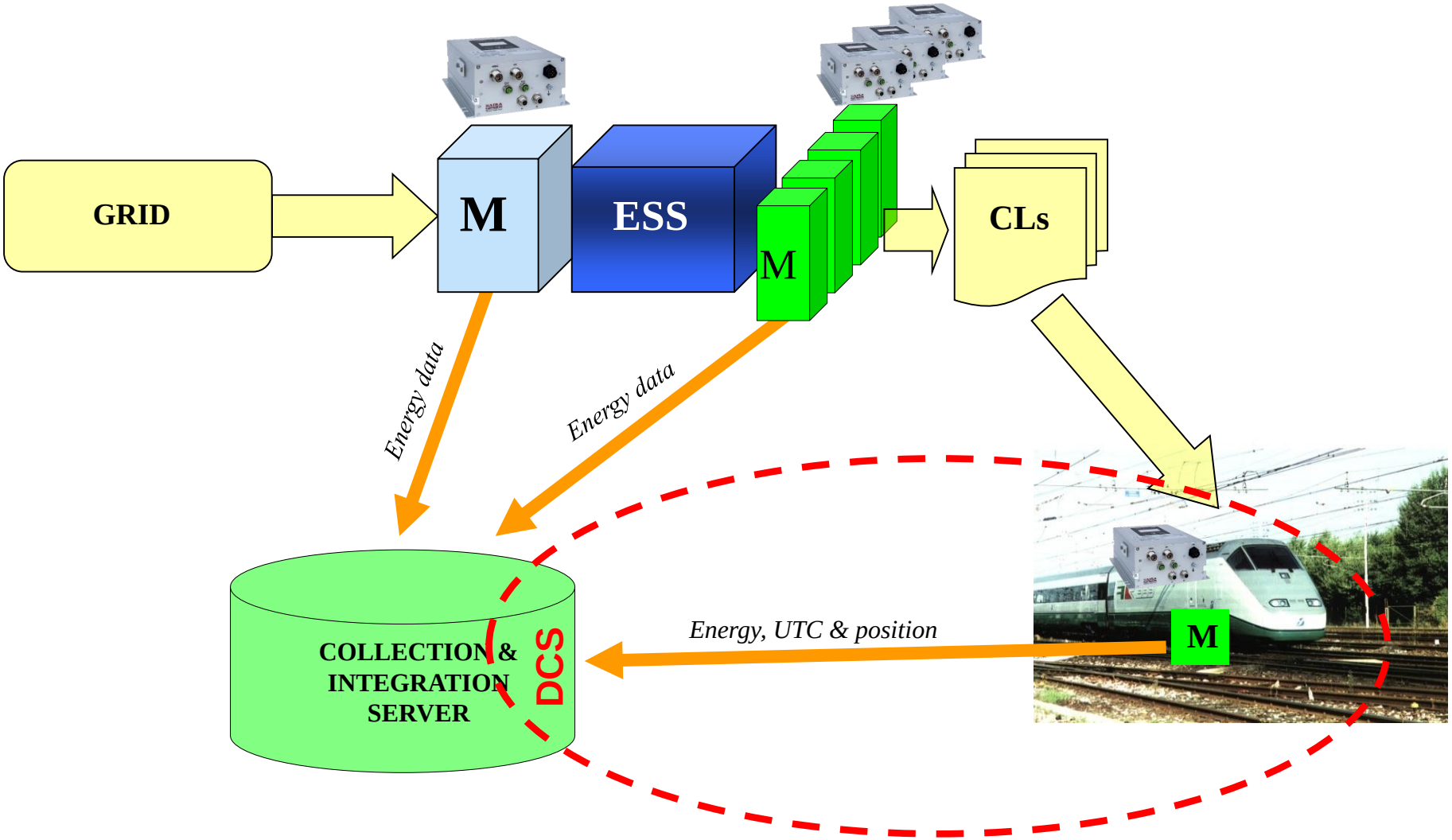

EMS EN5043, for Billing

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TEMS: AN EXAMPLE OF IMPLEMENTATION

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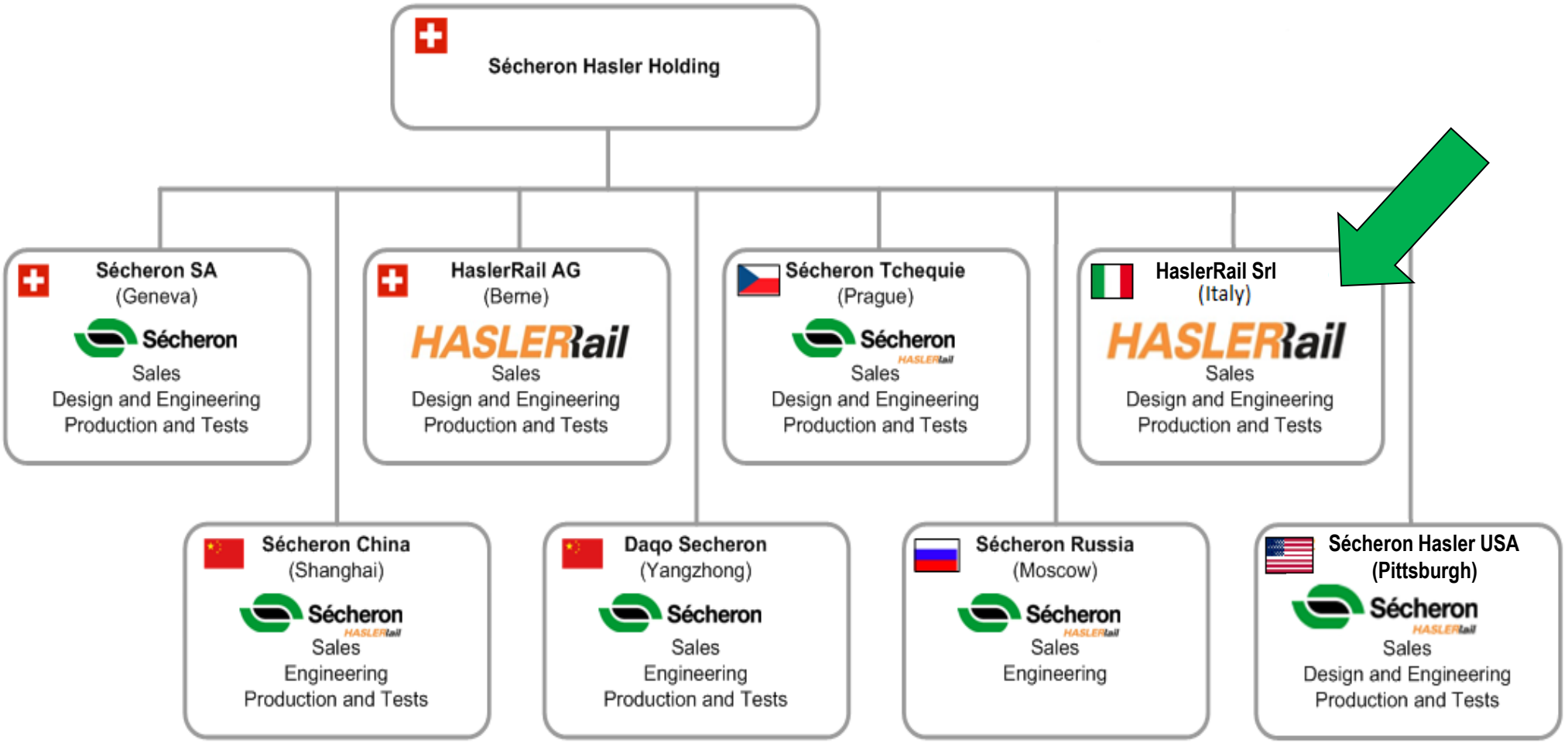

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SOME INFORMATION:

- HaslerRail AG product range:
  - ✓ Data recording
  - ✓ Speed Detection
- Italian subsidiary **HaslerRail Italia Srl** is Centre of Competence for :
  - ✓ Energy Metering
  - ✓ TCMS
- Present in Energy Metering Systems market since 2009
- Within Sécheron Hasler Group since 2016

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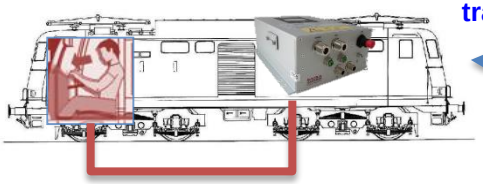
TEMS – TRAIN ENERGY MANAGEMENT SYSTEM

TEMS Overview

REM102

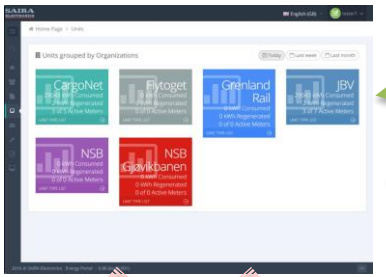
Driver 1



Data from train 1

DCS Data Collection Service

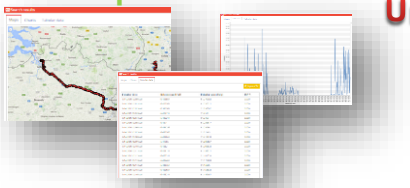
Energy profile/ Driving profile analysis



Infrastructure managers

Data export

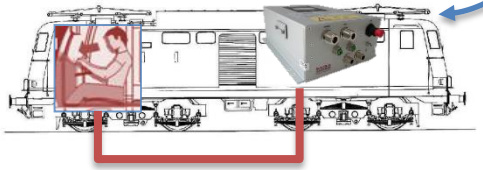
Graphics



Railway Undertakings

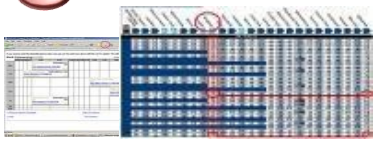
REM102

Driver 3



Data from train «n»

TIME TABLE Database



Train Controller

Dynamic Traffic network conditions

Updated infrastructure data

Settlement system

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HASLER RAIL PRODUCT&SERVICE FAMILY

Get
energy data according to European standard (EN 50463)

Railway Energy Meter
Railway Fuel Meter

First Certified EMS

New REM 102 EMS

Fuel EMS

Voltage Transducers
Current Transducers

Indoor 3kv transducer

Outdoor 3kv V&C transducer

Indoor 3kv transducer

25kv V&C transducer

Use
energy data to improve drive efficiency

Eco Driver Advisory System
Energy Saving System

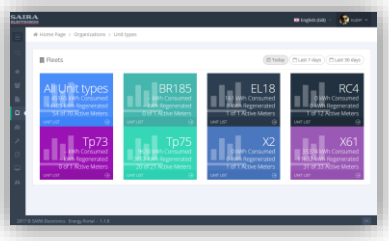
All-in-one

App

Integrated

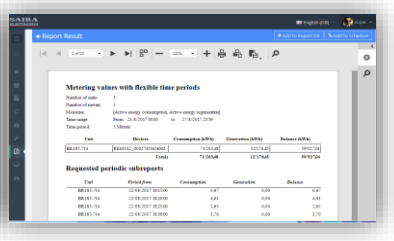
Transfer
energy data to analysis and billing tools

Train Energy Management System
(Data Collecting System)



Management

Analysis



Billing

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HASLER RAIL
ENERGY PORTAL

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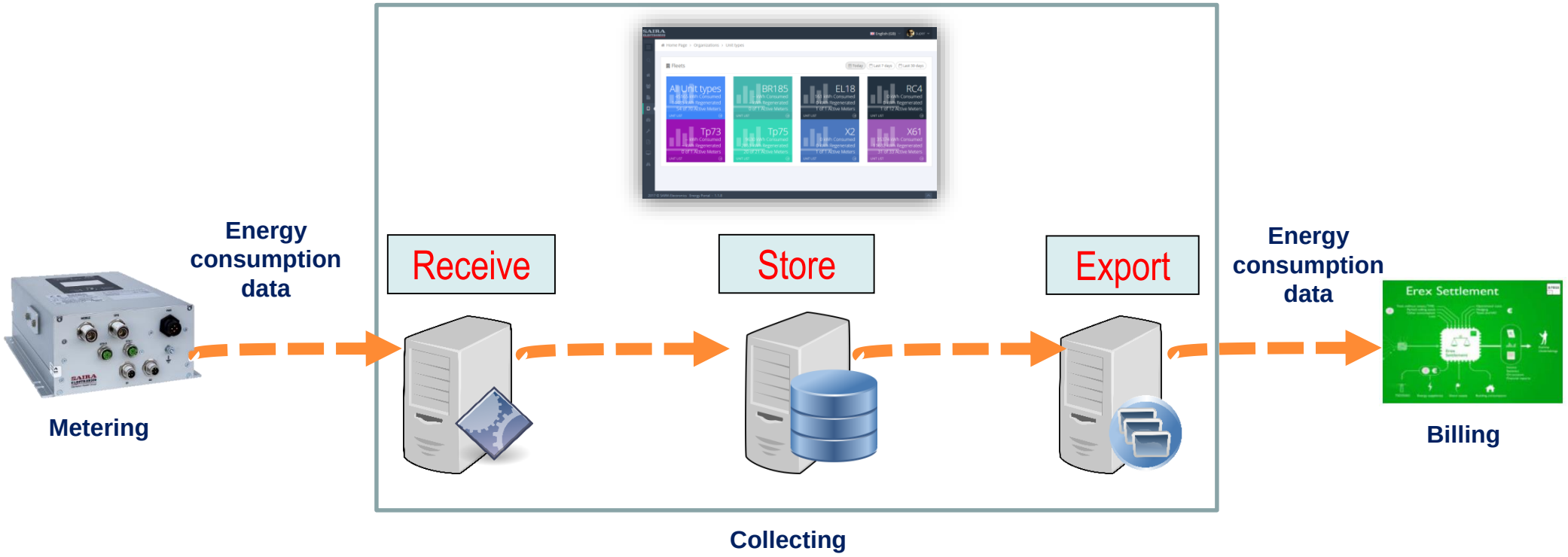
HASLERRAIL: FROM DCS …



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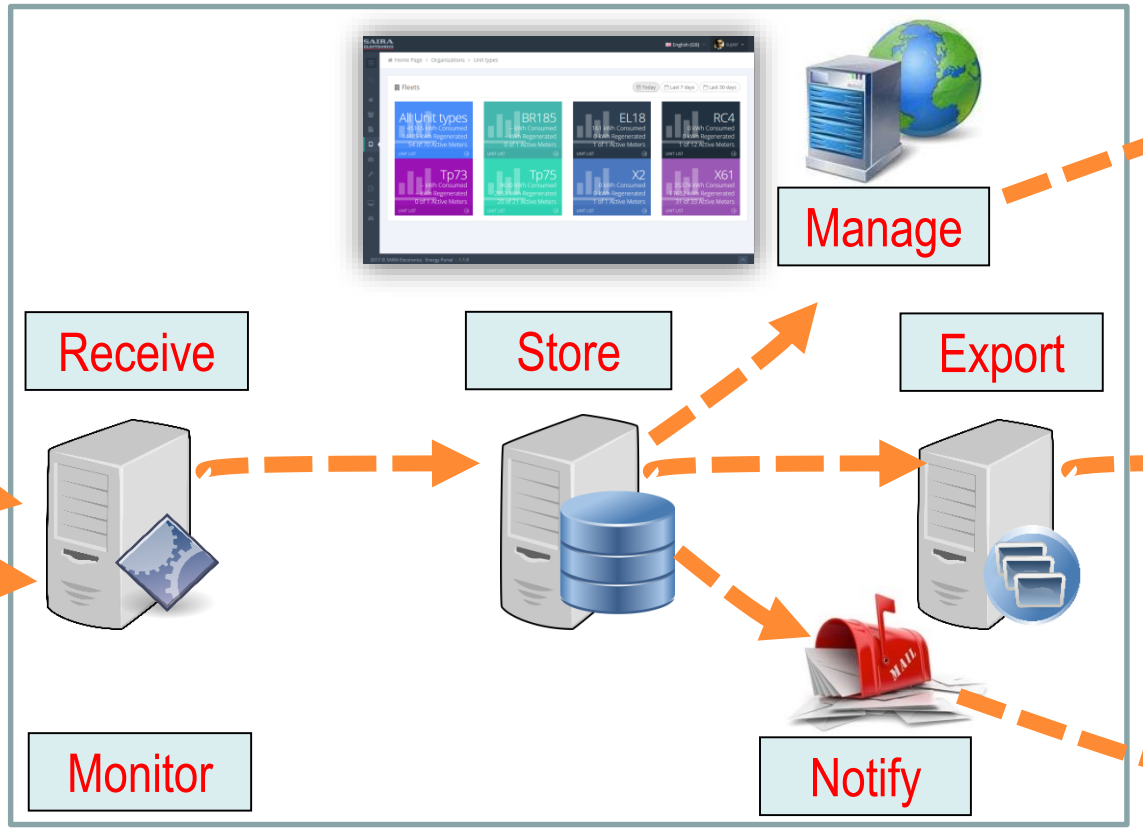
… TO ENERGY PORTAL

Metering

Energy consumption data

Monitoring

"Real-time" data according to Energy Portal API



Web based management tools

Managing

Energy consumption data

Billing

Notifications and reports

Maintaining

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Present experience of Energy Portal since 2014:

- ✓ # Organizations : +30 (inc. Railways Undert. and I. M.)
- ✓ # Class of trains : 60
- ✓ # Trains : +400
- ✓ # Energy Meters : +450
- ✓ # Countries : 4

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Energy Portal Features:

- DCS (according to EN 50463 and UIC Leaflet 930)
- Asset Management and Configuration
- Diagnostic Event Management
- Extended Energy Management
- Reporting
- Data Validation & Real Time Monitoring

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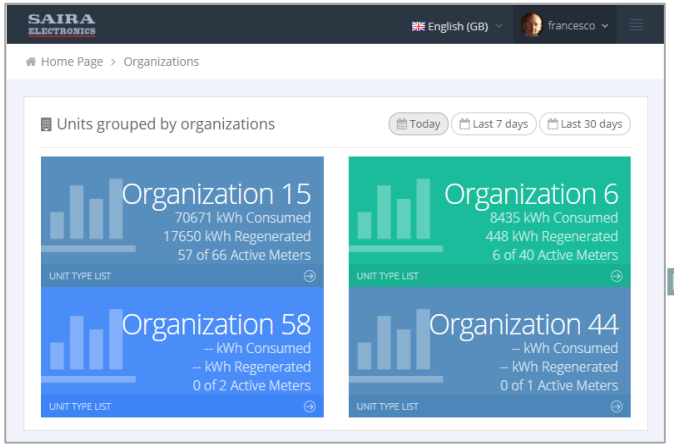
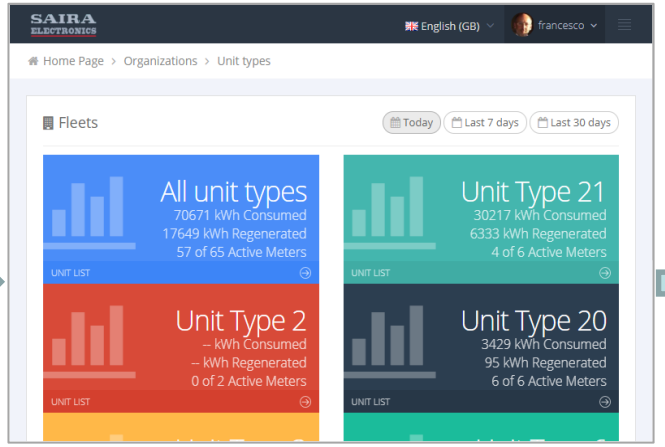
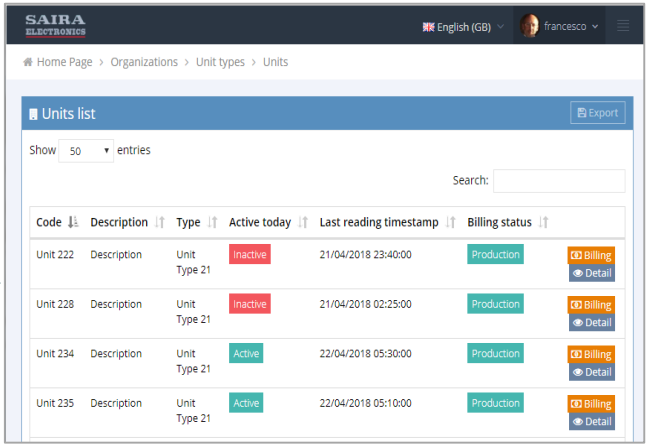
ASSET MANAGEMENT AND CONFIGURATION



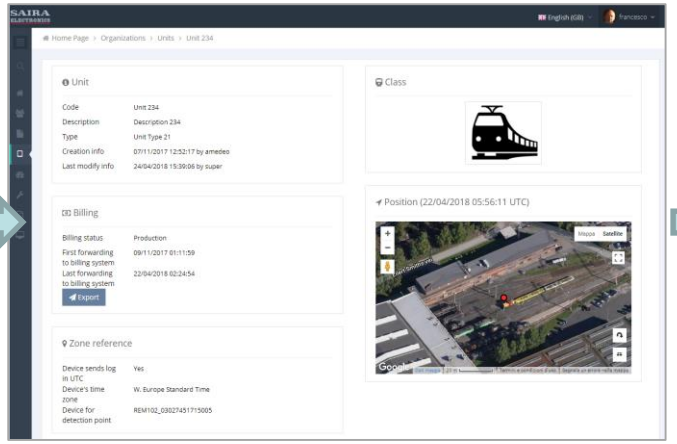
User's organizations



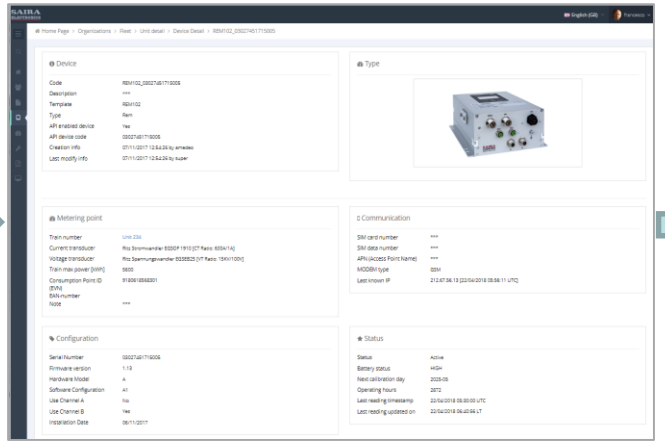
Organization's fleets



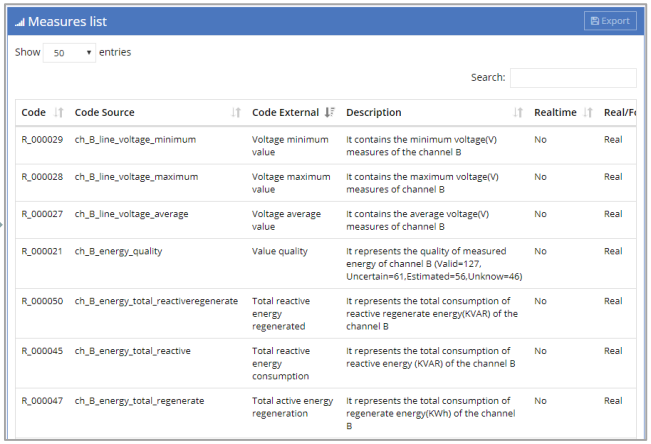
Fleet's unit list



Unit



Meter



Configured Measures

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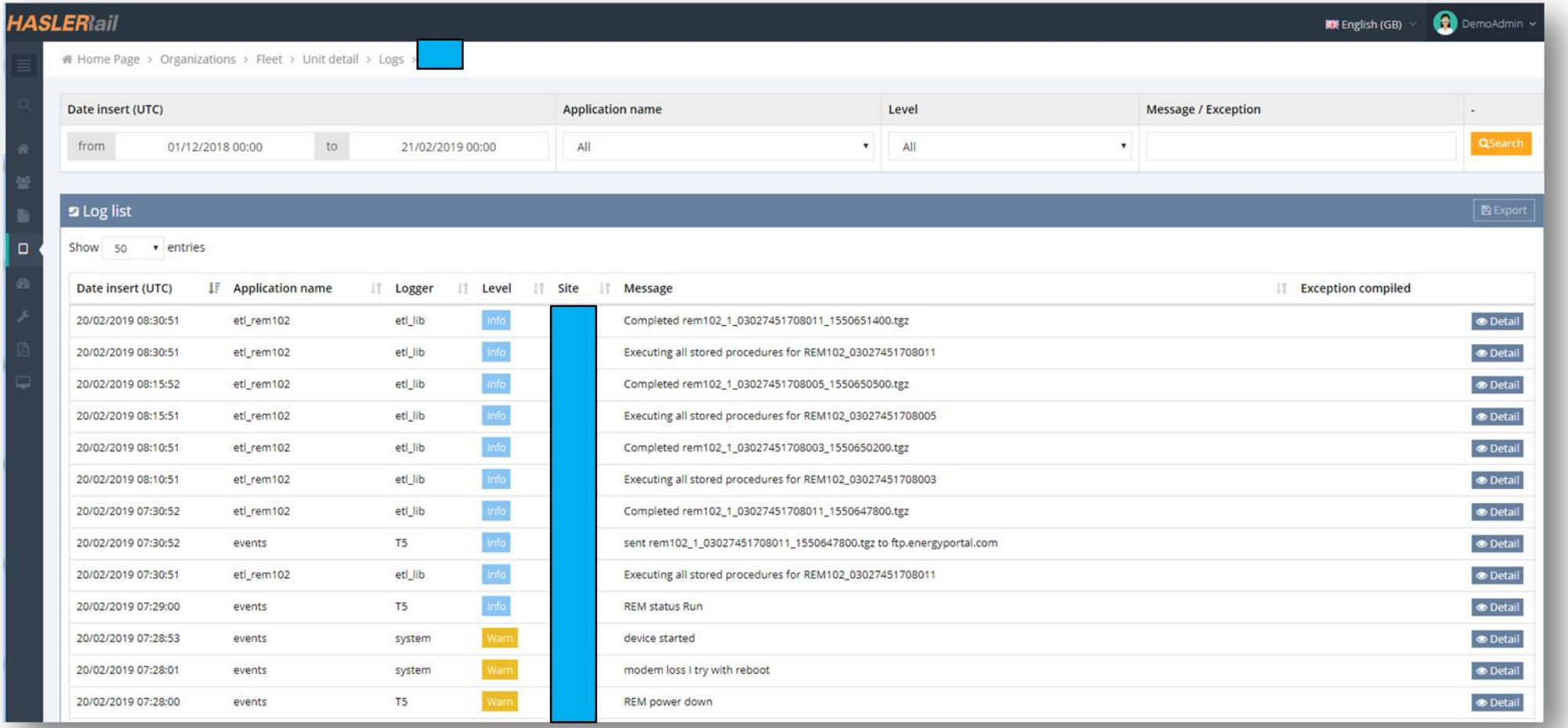
DIAGNOSTICS EVENT MANAGEMENT



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Search Filters

Unit, time and devices

Unit types: Unit Type 21

Unit: Unit 234 — Detail

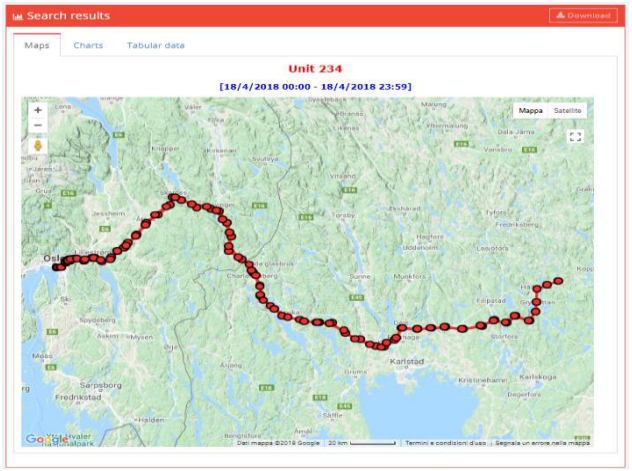
Devices: [REM102_030274517715005]

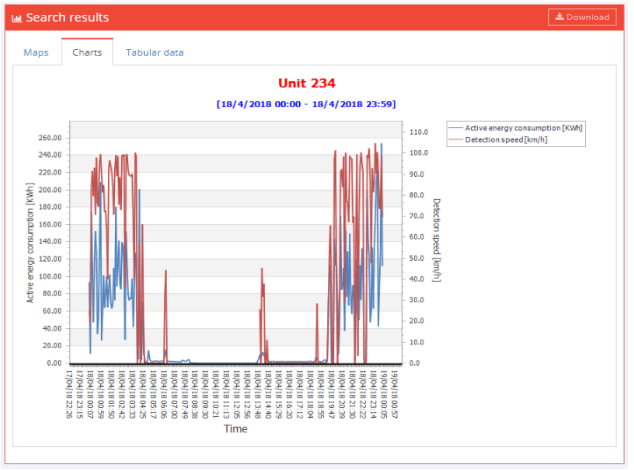
Filter period: APRIL 18, 2018 - APRIL 18, 2018

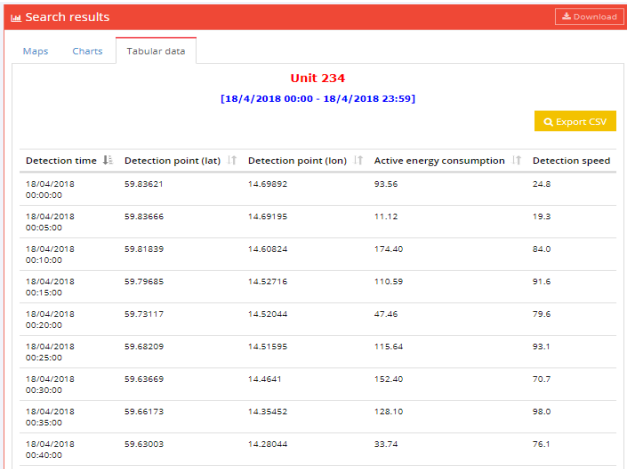
Search

Measures selection

- [x] Active energy consumption
- [ ] Active energy regeneration
- [ ] Altitude
- [ ] Calibration
- [ ] Compiled Energy Billing Data ID
- [ ] Condition flags
- [ ] Current average value
- [ ] Current maximum value
- [ ] Current minimum value
- [x] Detection speed
- [ ] Insertion timestamp
- [ ] Operating hours
- [ ] Original file
- [ ] Position quality
- [ ] Power factor
- [ ] Reactive energy consumption
- [ ] Reactive energy regeneration
- [ ] Satellites in view
- [ ] Total active energy consumption
- [ ] Total active energy regeneration







Detection time	Detection point (lat)	Detection point (lon)	Active energy consumption	Detection speed
18/04/2018 00:00:00	59.83621	14.69892	93.56	24.8
18/04/2018 00:05:00	59.83666	14.69195	11.12	19.3
18/04/2018 00:10:00	59.81839	14.60824	174.40	84.0
18/04/2018 00:15:00	59.79685	14.52716	110.59	91.6
18/04/2018 00:20:00	59.73117	14.52044	47.46	79.6
18/04/2018 00:25:00	59.68209	14.51595	115.64	93.1
18/04/2018 00:30:00	59.63669	14.4641	152.40	70.7
18/04/2018 00:35:00	59.66173	14.35452	128.10	98.0
18/04/2018 00:40:00	59.63003	14.28044	33.74	76.1

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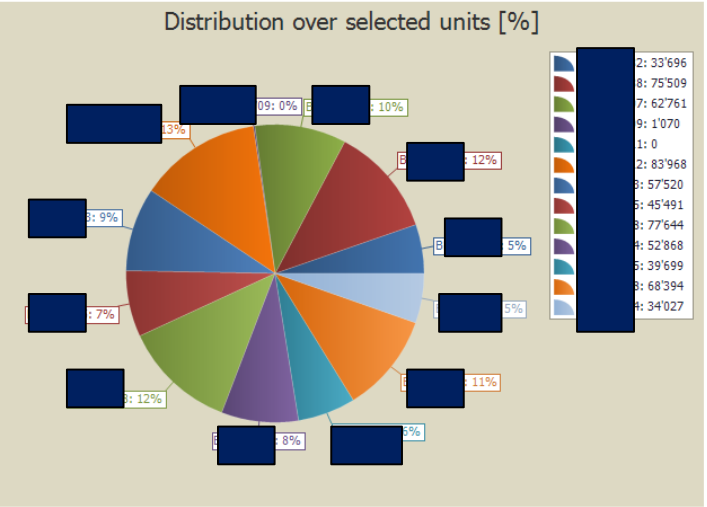
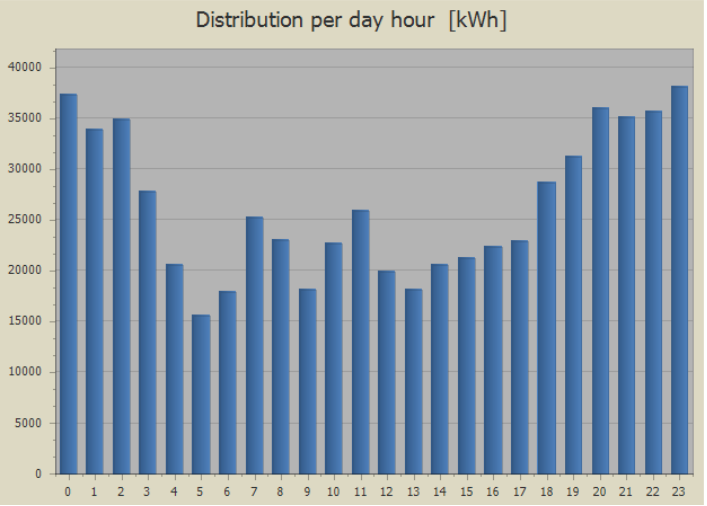
Energy summary chart

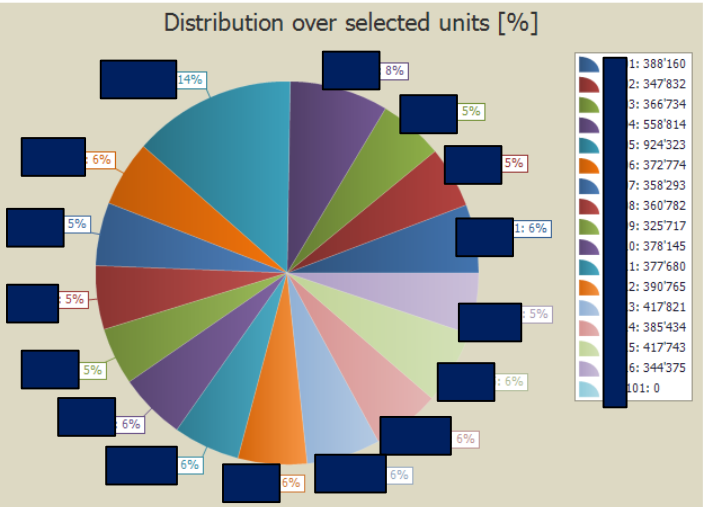
Period: 11/02/2019 - 17/02/2019 Total energy consumption: 632.6 MWh

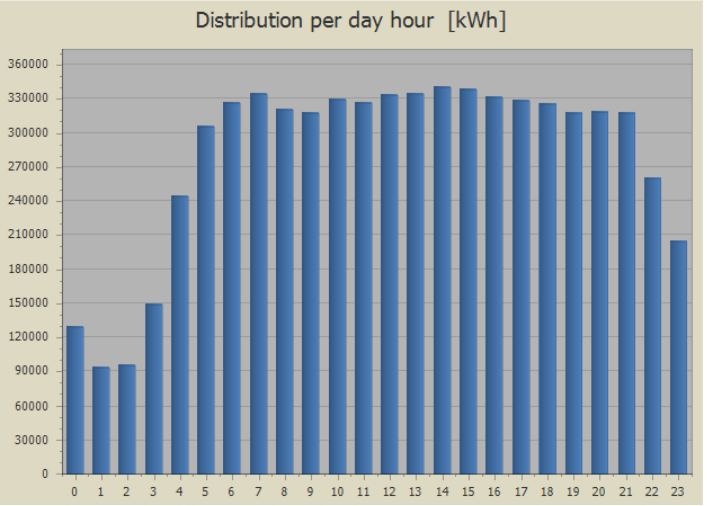




Energy summary chart

Period: 21/01/2019 - 20/02/2019 Total energy consumption: 6.7 GWh





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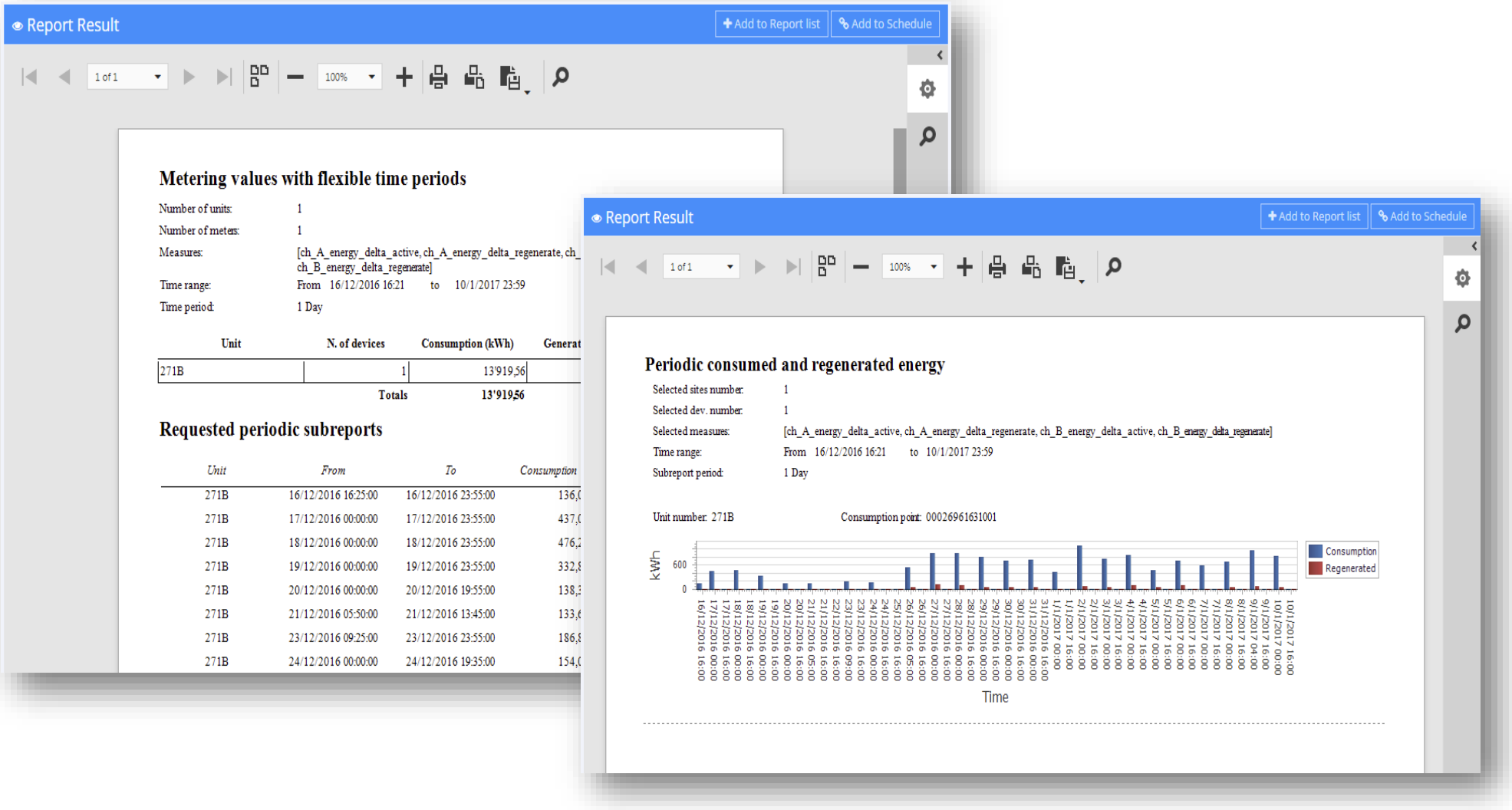

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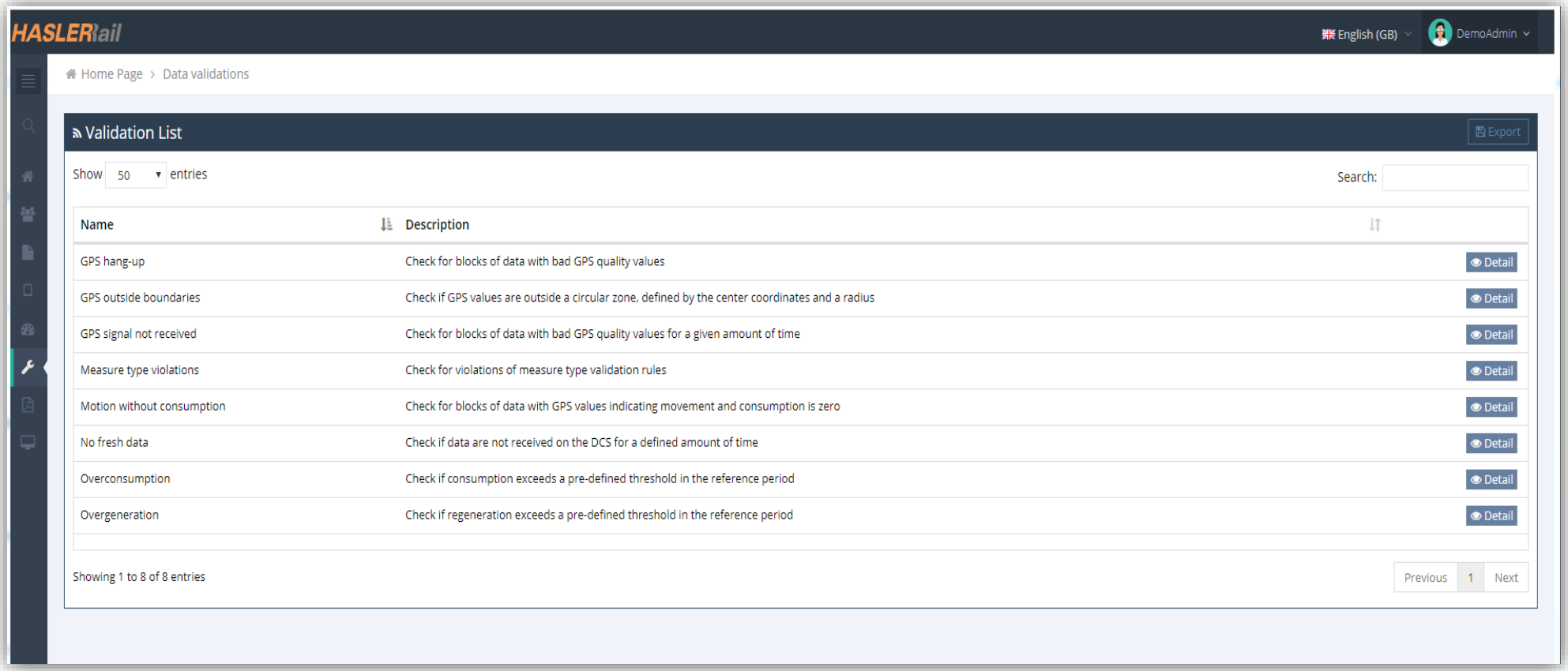
DATA VALIDATION



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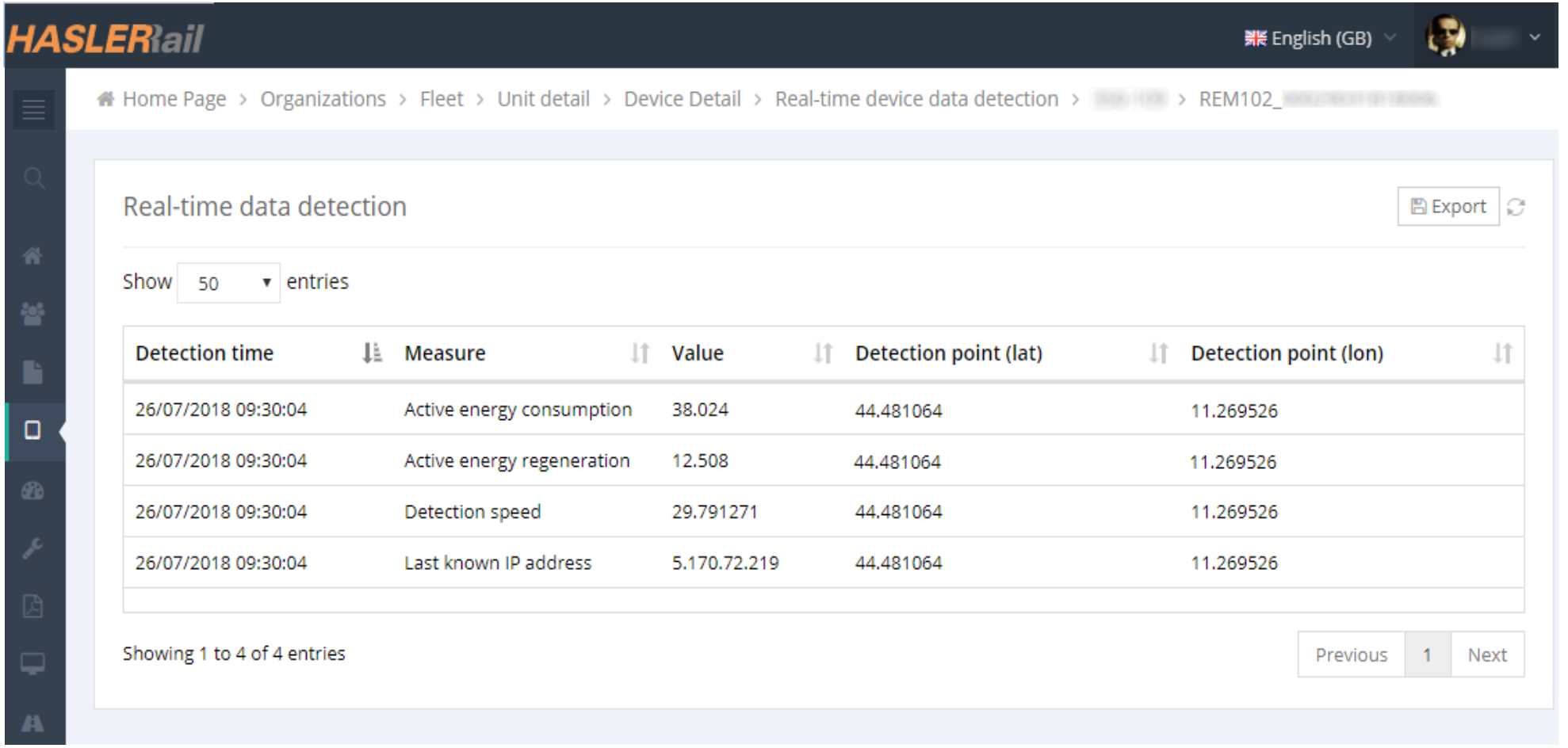
REAL-TIME MONITORING



Energy consumption can be monitored on real-time

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