



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

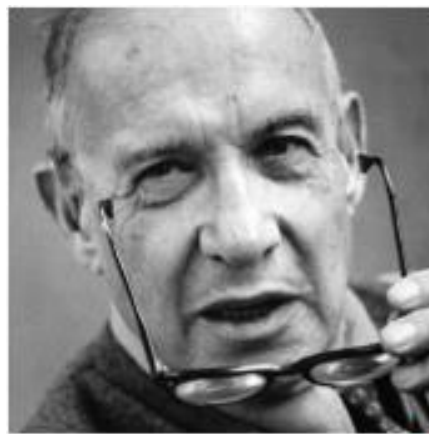
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HASLER RAIL ITALIA

**EMRailS 2019**

Museo Nazionale Ferroviario  
di Pietrarsa (Napoli)

February 21<sup>st</sup> , 2019



“What gets measured, gets managed.”

*Peter F. Drucker, Management Consultant  
(attributed to)*

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HASLER RAIL ENERGY PORTAL	20 ...31

# FRAMEWORK IN EUROPE

### 1. MEASUREMENT:

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



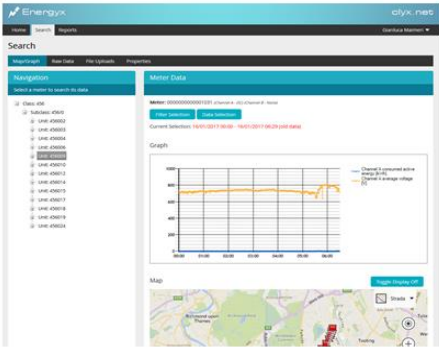
### 2. BILLING & INTEROPERABILITY:

→ *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*





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

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



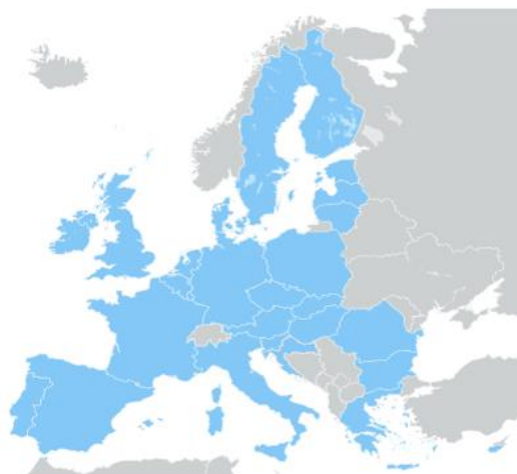
## EU Comm. Regulat. 1302 / 2014 (*LOC & PAS TSI*)

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

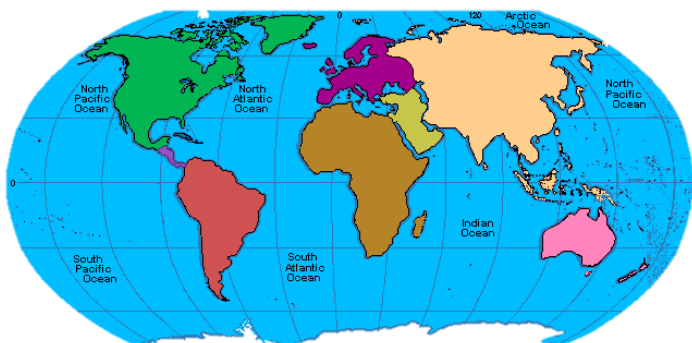
Each Member State shall have to be able to validate energy consumption and to correctly allocate it to the relevant railway undertaker.



CENELEC  
TC 9X

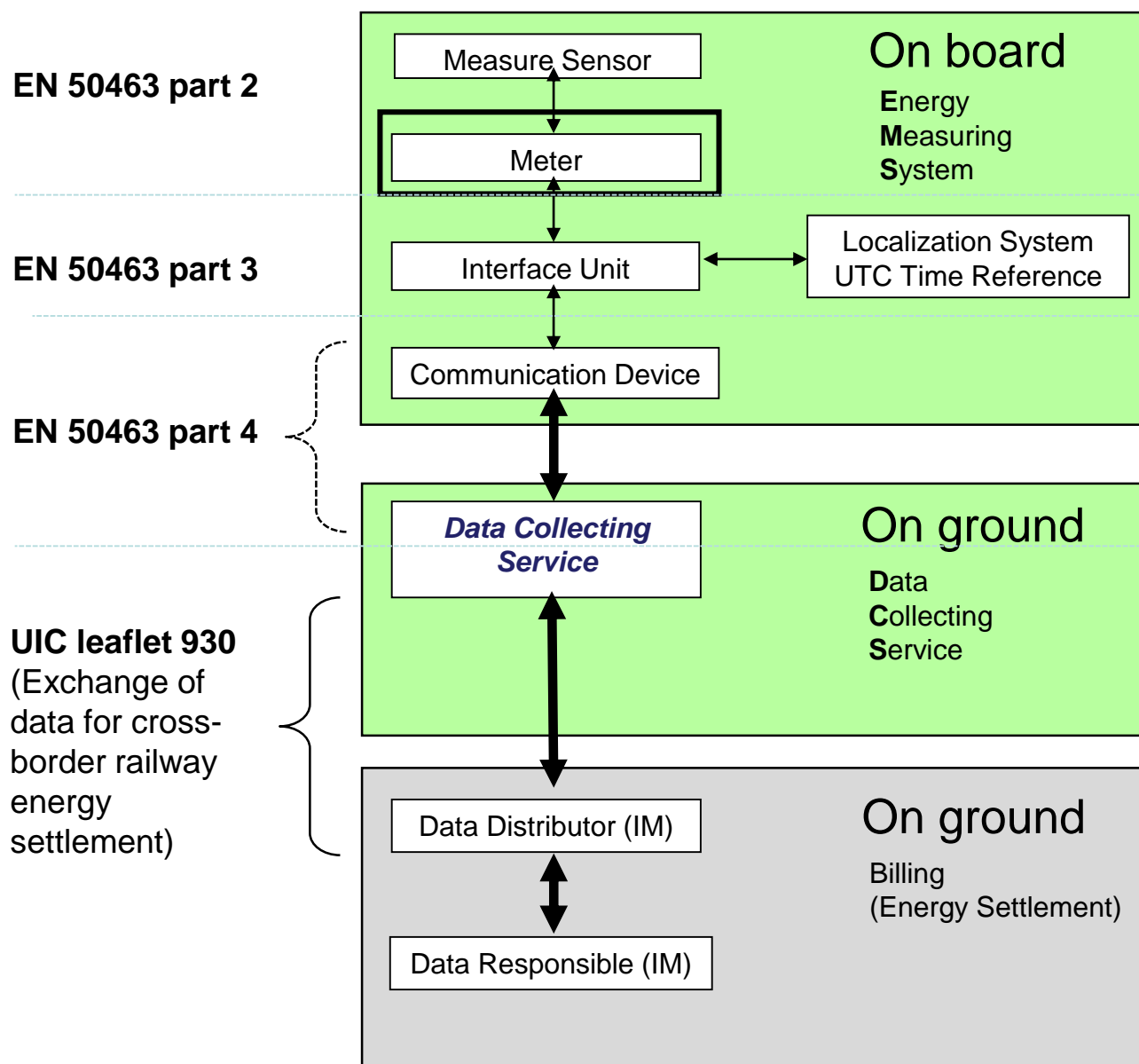
EN 50463-2012

EN 50463-2017

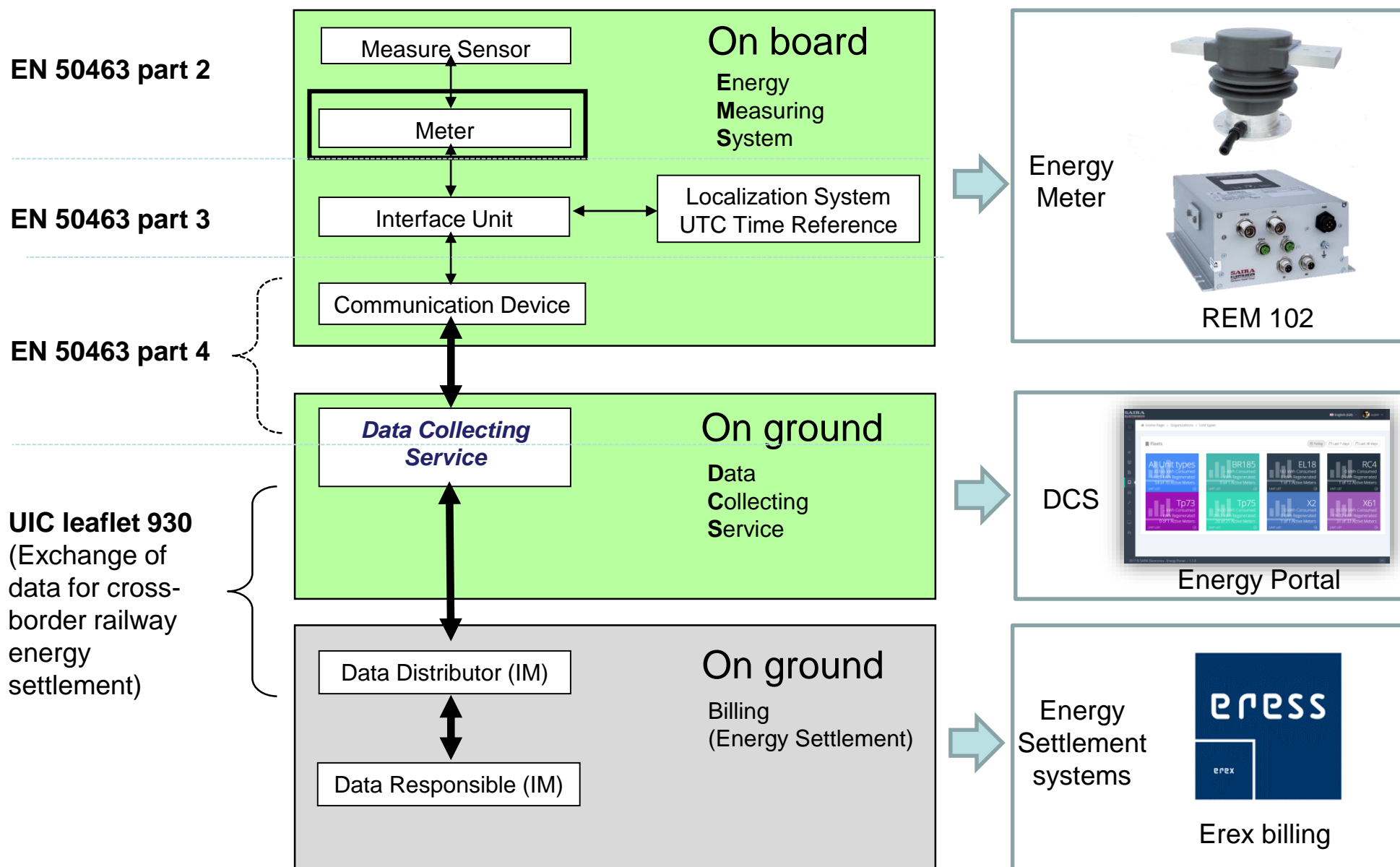


IEC  
TC 9

IEC 62888

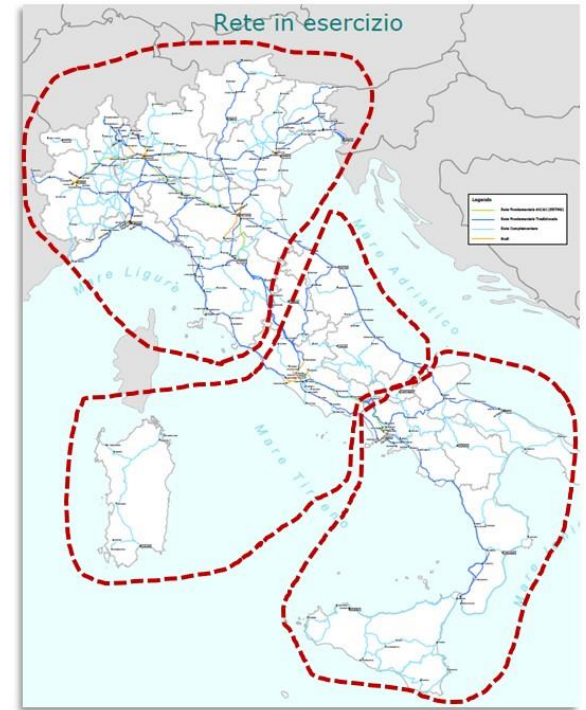






# GLOBAL MANAGEMENT OF THE ENERGY SYSTEM

- ❑ 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*”

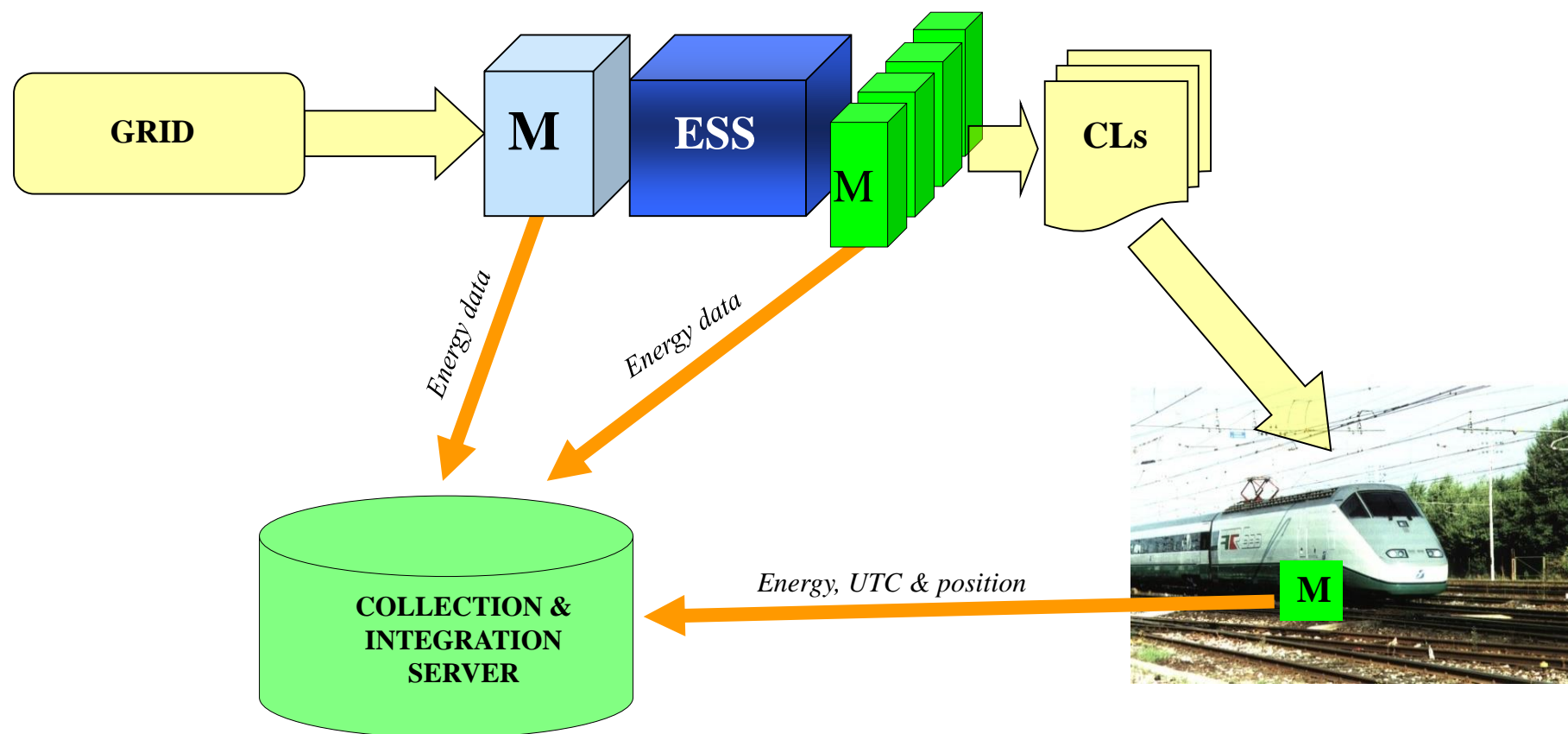


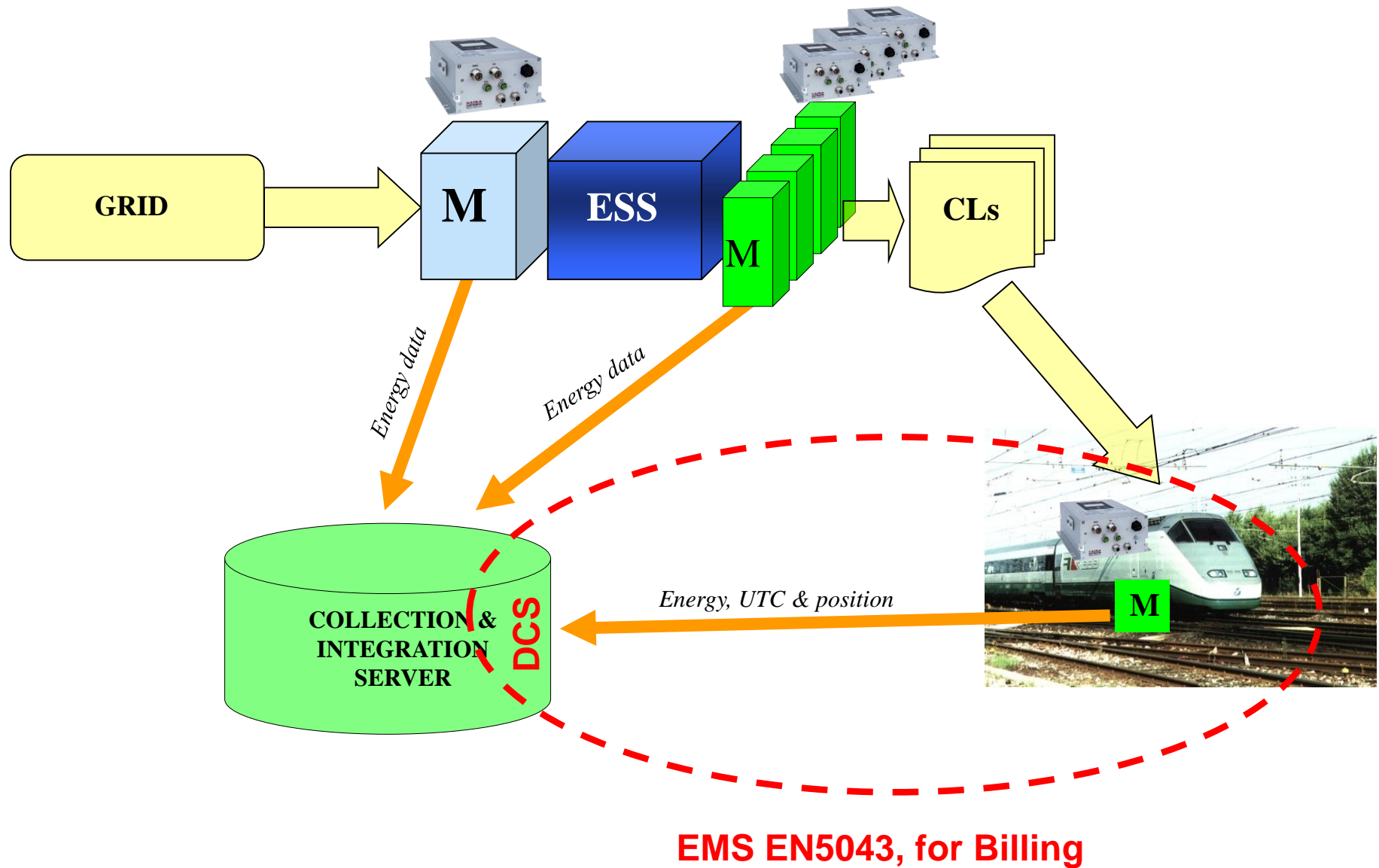
□ This approach allows:

- ✓ 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

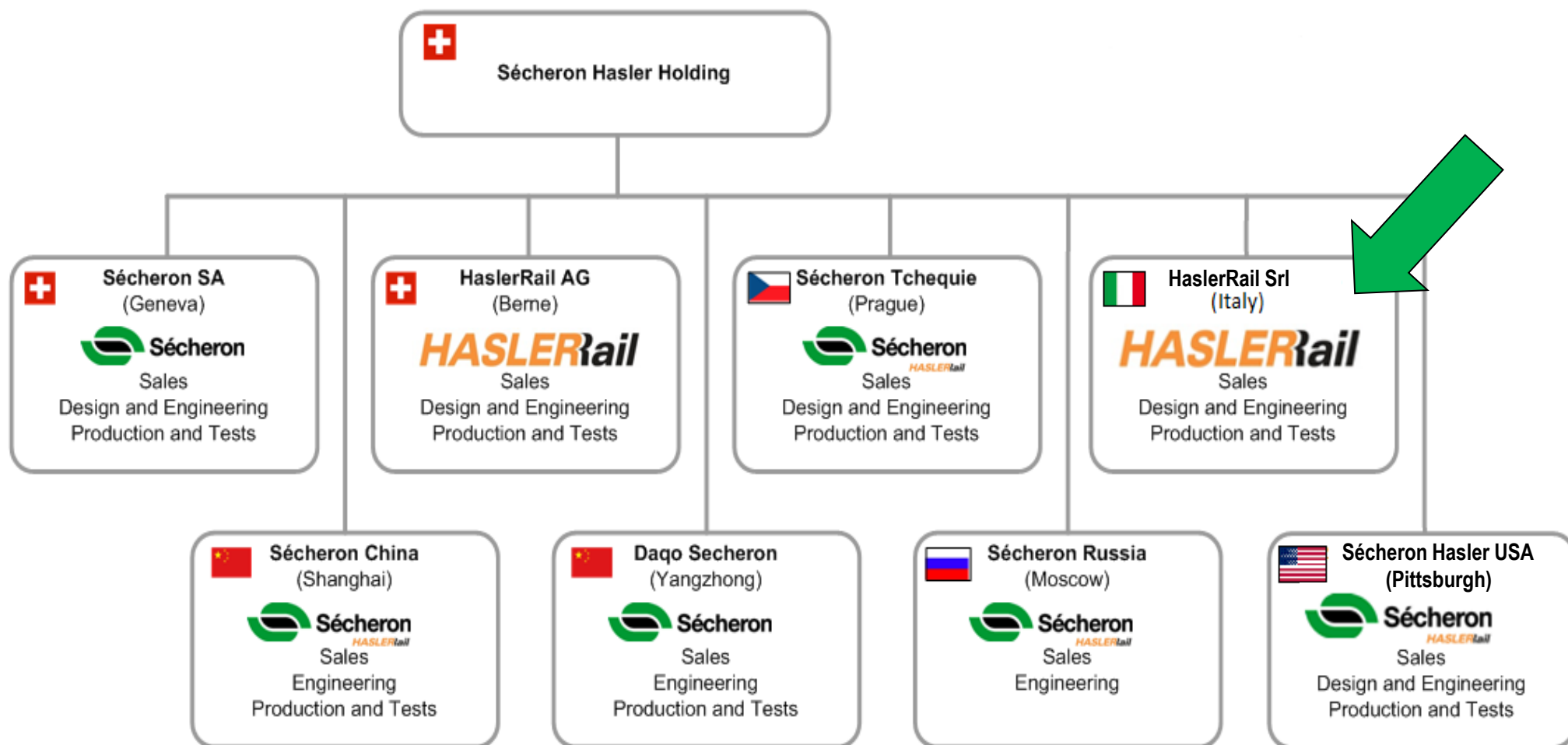








# ***TEMS:*** **AN EXAMPLE OF IMPLEMENTATION**

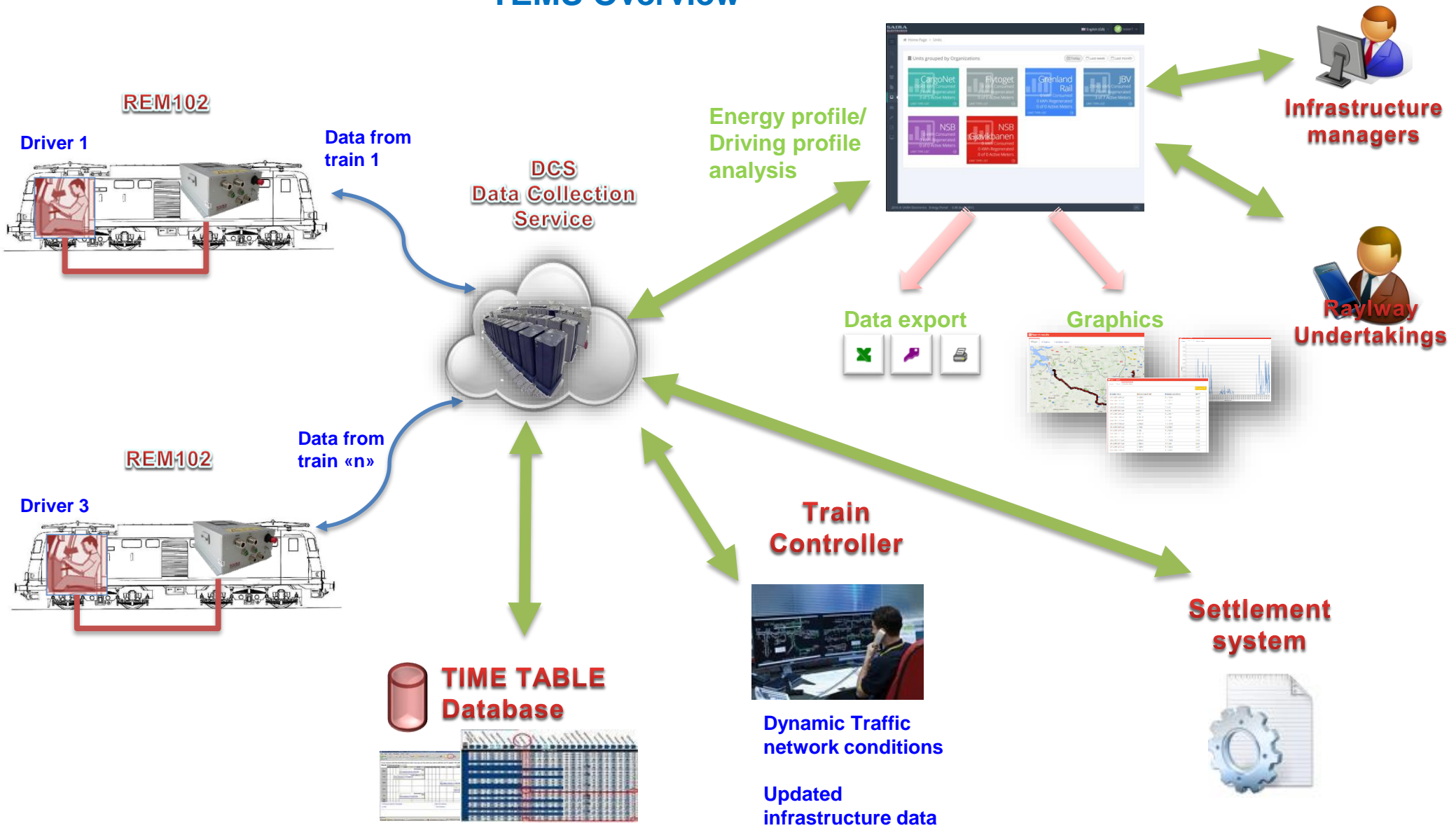




### SOME INFORMATION:

- ❖ 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

## TEMS Overview



**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



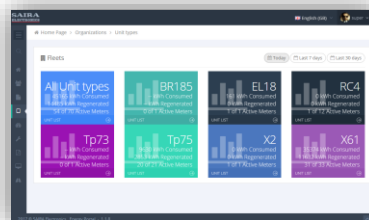
App



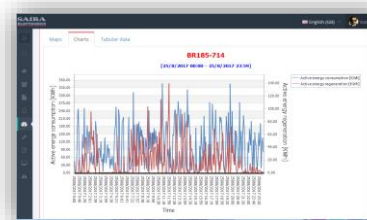
Integrated

**Transfer**  
energy data  
to analysis and  
billing tools

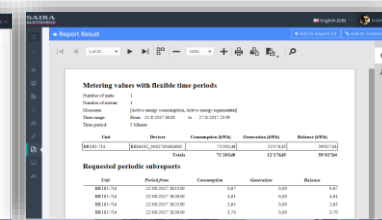
**Train Energy Management  
System  
(Data Collecting System)**



Management

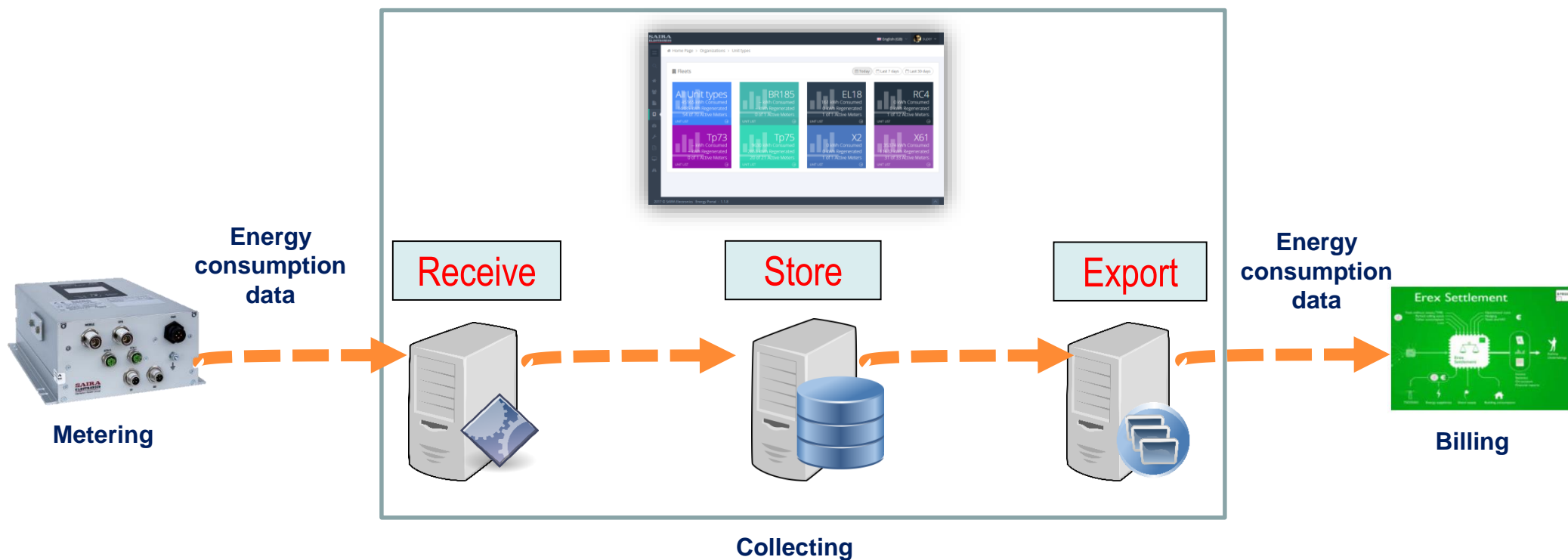


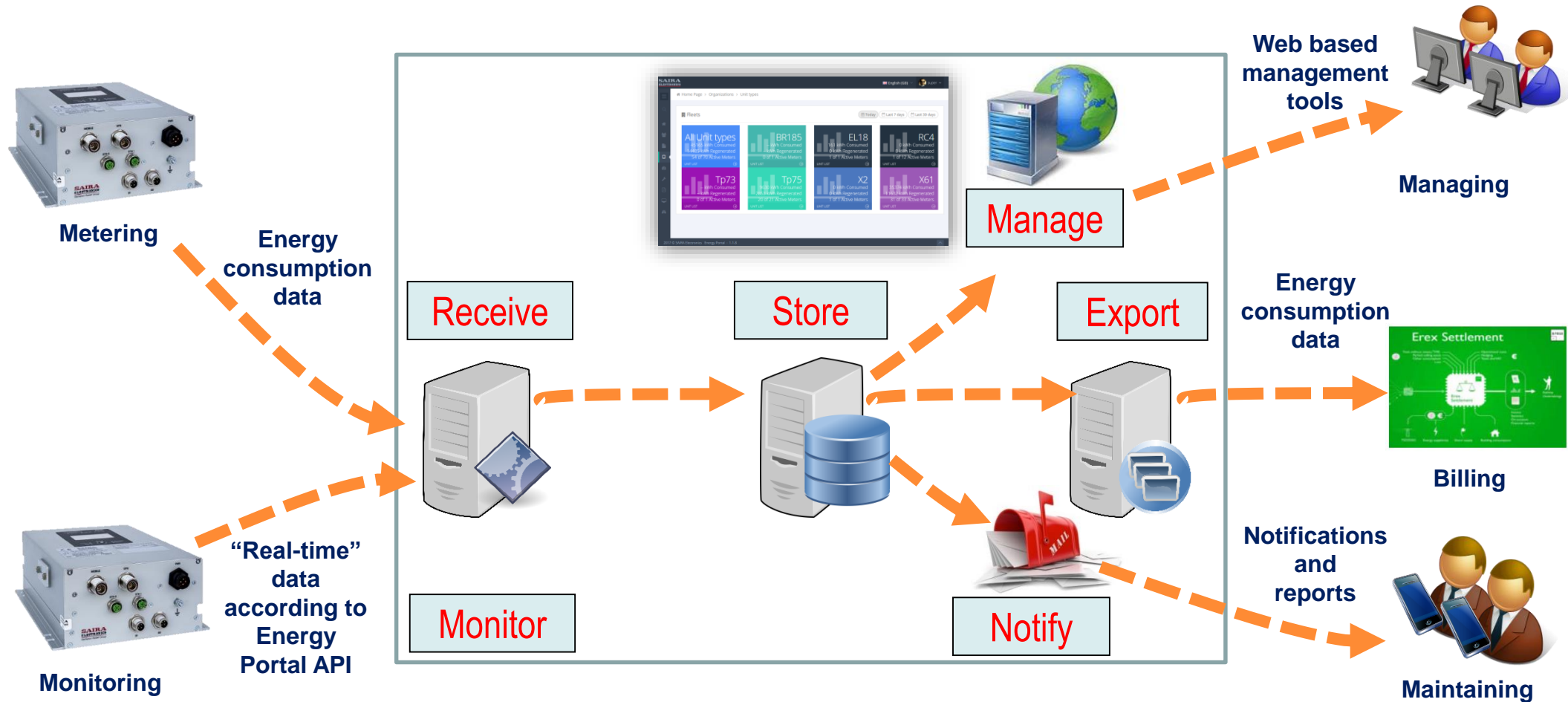
Analysis



Billing

# HASLER RAIL *ENERGY PORTAL*





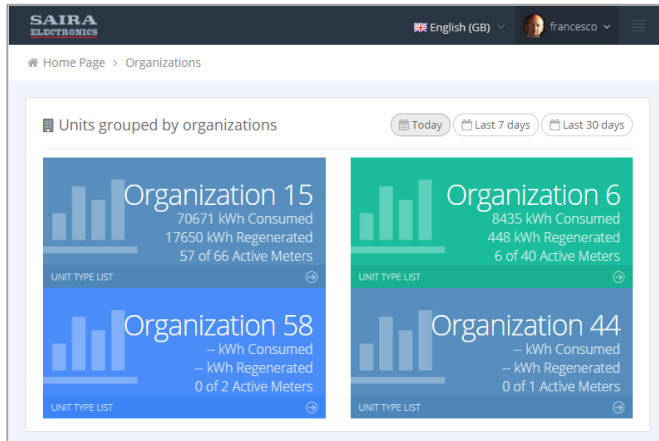
## Present experience of Energy Portal since 2014:

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

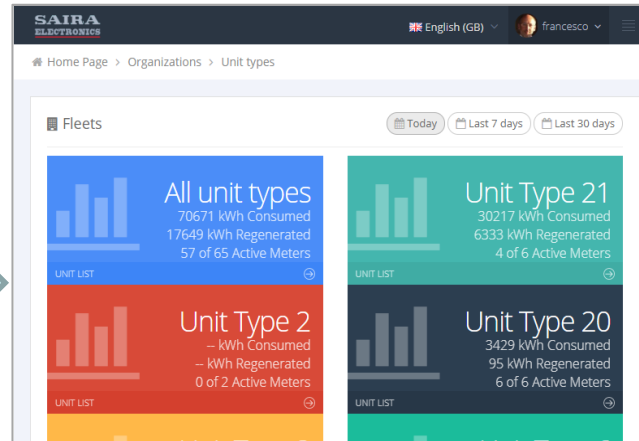
## Energy Portal Features:

- 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





User's organizations

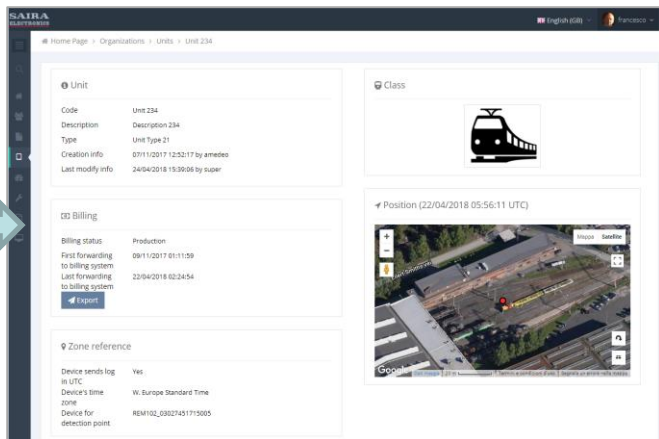


Organization's fleets

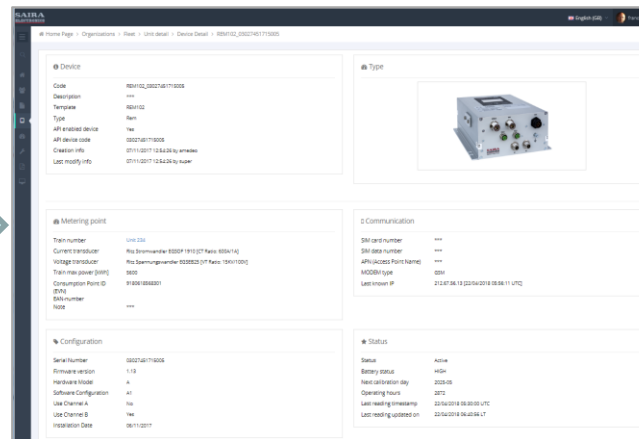
**Units list**

Code	Description	Type	Active today	Last reading timestamp	Billing status
Unit 222	Description	Unit Type 21	Inactive	21/04/2018 23:40:00	Production
Unit 228	Description	Unit Type 21	Inactive	21/04/2018 02:25:00	Production
Unit 234	Description	Unit Type 21	Active	22/04/2018 05:30:00	Production
Unit 235	Description	Unit Type 21	Active	22/04/2018 05:10:00	Production

Fleet's unit list



Unit



Meter

**Measures list**

Code	Code Source	Code External	Description	Realtime	Real/Fr
R_000029	ch_B_line_voltage_minimum	Voltage minimum value	It contains the minimum voltage(V) measures of the channel B	No	Real
R_000028	ch_B_line_voltage_maximum	Voltage maximum value	It contains the maximum voltage(V) measures of channel B	No	Real
R_000027	ch_B_line_voltage_average	Voltage average value	It contains the average voltage(V) measures of channel B	No	Real
R_000021	ch_B_energy_quality	Value quality	It represents the quality of measured energy of channel B (Valid=127, Uncertain=61, Estimated=56, Unknown=46)	No	Real
R_000050	ch_B_energy_total_reactive regenerate	Total reactive energy regenerate	It represents the total consumption of reactive regenerate energy(KVAR) of the channel B	No	Real
R_000045	ch_B_energy_total_reactive	Total reactive energy consumption	It represents the total consumption of reactive energy (KVAR) of the channel B	No	Real
R_000047	ch_B_energy_total_regenerate	Total active energy regeneration	It represents the total consumption of regenerate energy(KWh) of the channel B	No	Real

Configured Measures

Home Page > Organizations > Fleet > Unit detail > Logs

Date insert (UTC)

from01/12/2018 00:00to21/02/2019 00:00

Application name

All

Level

All

Message / Exception

Search

Log list

Export

Show50entries

Date insert (UTC)	Application name	Logger	Level	Site	Message	Exception compiled
20/02/2019 08:30:51	etl_rem102	etl_lib	Info		Completed rem102_1_03027451708011_1550651400.tgz	<a href="#">Detail</a>
20/02/2019 08:30:51	etl_rem102	etl_lib	Info		Executing all stored procedures for REM102_03027451708011	<a href="#">Detail</a>
20/02/2019 08:15:52	etl_rem102	etl_lib	Info		Completed rem102_1_03027451708005_1550650500.tgz	<a href="#">Detail</a>
20/02/2019 08:15:51	etl_rem102	etl_lib	Info		Executing all stored procedures for REM102_03027451708005	<a href="#">Detail</a>
20/02/2019 08:10:51	etl_rem102	etl_lib	Info		Completed rem102_1_03027451708003_1550650200.tgz	<a href="#">Detail</a>
20/02/2019 08:10:51	etl_rem102	etl_lib	Info		Executing all stored procedures for REM102_03027451708003	<a href="#">Detail</a>
20/02/2019 07:30:52	etl_rem102	etl_lib	Info		Completed rem102_1_03027451708011_1550647800.tgz	<a href="#">Detail</a>
20/02/2019 07:30:52	events	T5	Info		sent rem102_1_03027451708011_1550647800.tgz to ftp.energyportal.com	<a href="#">Detail</a>
20/02/2019 07:30:51	etl_rem102	etl_lib	Info		Executing all stored procedures for REM102_03027451708011	<a href="#">Detail</a>
20/02/2019 07:29:00	events	T5	Info		REM status Run	<a href="#">Detail</a>
20/02/2019 07:28:53	events	system	Warn		device started	<a href="#">Detail</a>
20/02/2019 07:28:01	events	system	Warn		modem loss I try with reboot	<a href="#">Detail</a>
20/02/2019 07:28:00	events	T5	Warn		REM power down	<a href="#">Detail</a>

Search Filters

Unit, time and devices

Unit types

Unit Type 21

Unit

Unit 234

Detail

Devices

☒ [REM102\_03027451715005]

Filter period

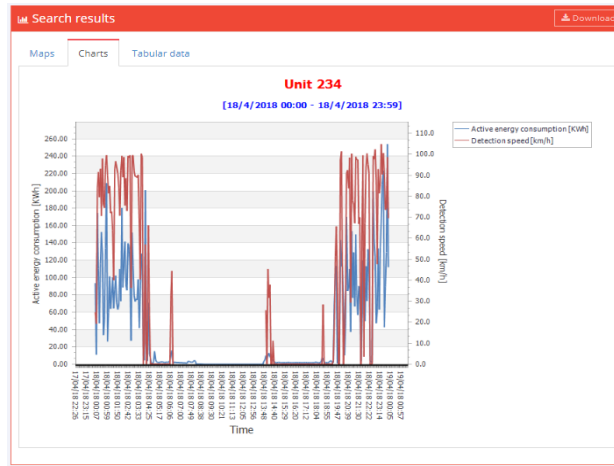
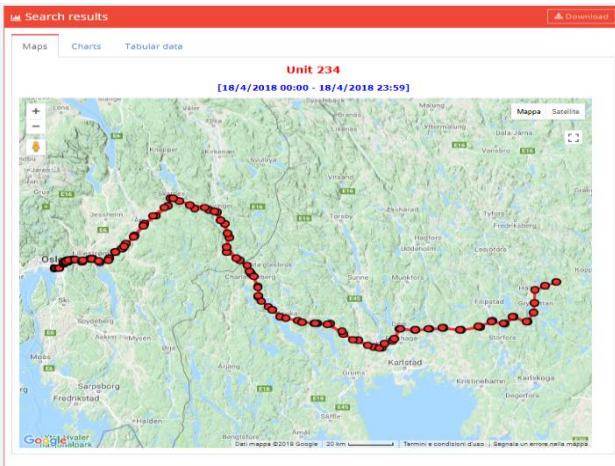
APRIL 18, 2018 - APRIL 18, 2018

Search

Measures selection

☒ Active energy consumption  
☐ Altitude  
☐ Compiled Energy Billing Data ID  
☐ Current average value  
☐ Current minimum value  
☐ Insertion timestamp  
☐ Original file  
☐ Power factor  
☐ Reactive energy regeneration  
☐ Total active energy consumption

☐ Active energy regeneration  
☐ Calibration  
☐ Condition flags  
☐ Current maximum value  
☒ Detection speed  
☐ Operating hours  
☐ Position quality  
☐ Reactive energy consumption  
☐ Satellites in view  
☐ Total active energy regeneration



Search results

Maps

Charts

Tabular data

Unit 234

[18/4/2018 00:00 - 18/4/2018 23:59]

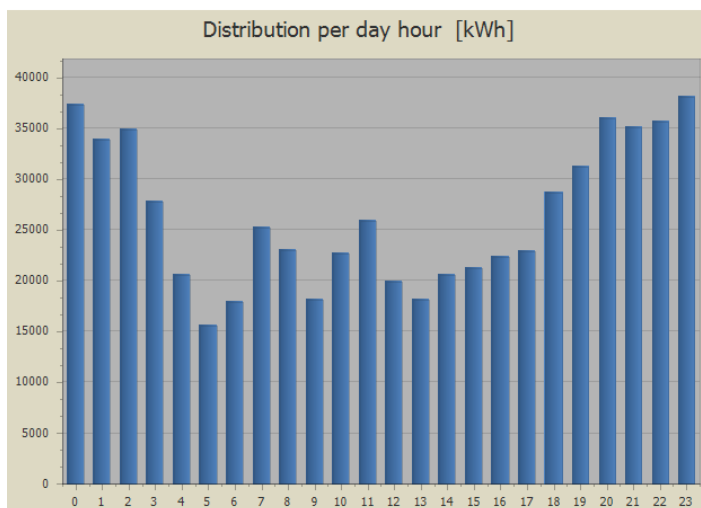
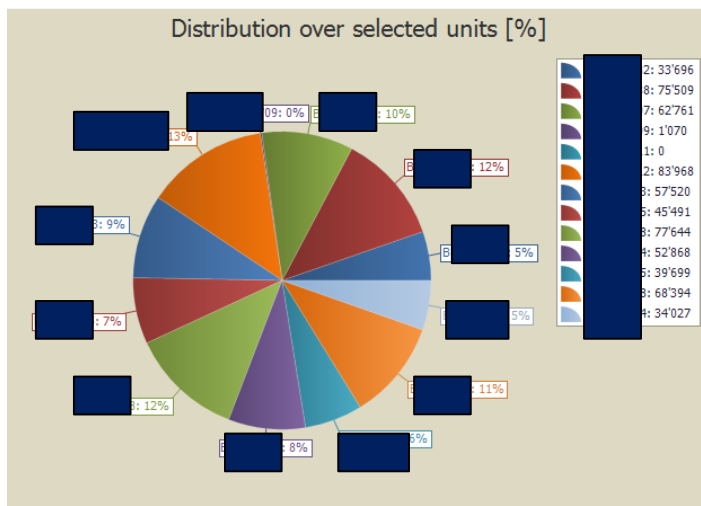
Export CSV

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

Energy summary chart

Period: 11/02/2019 - 17/02/2019

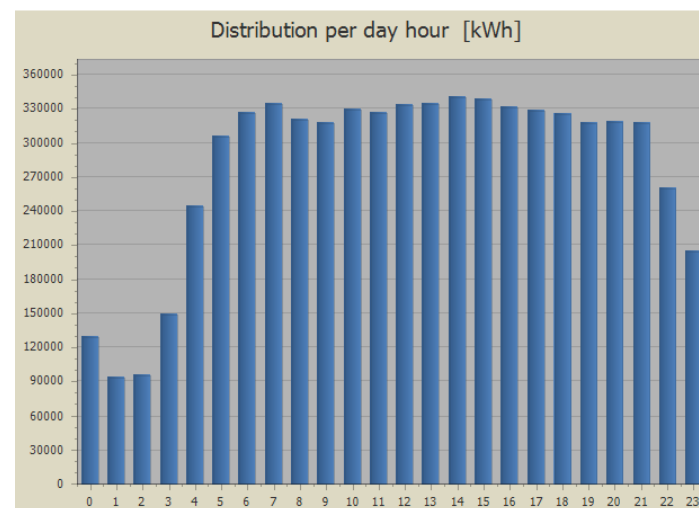
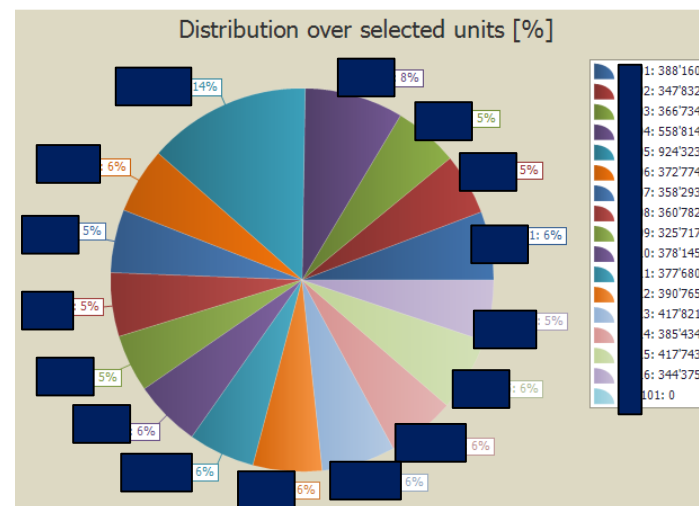
Total energy consumption: 632.6 MWh

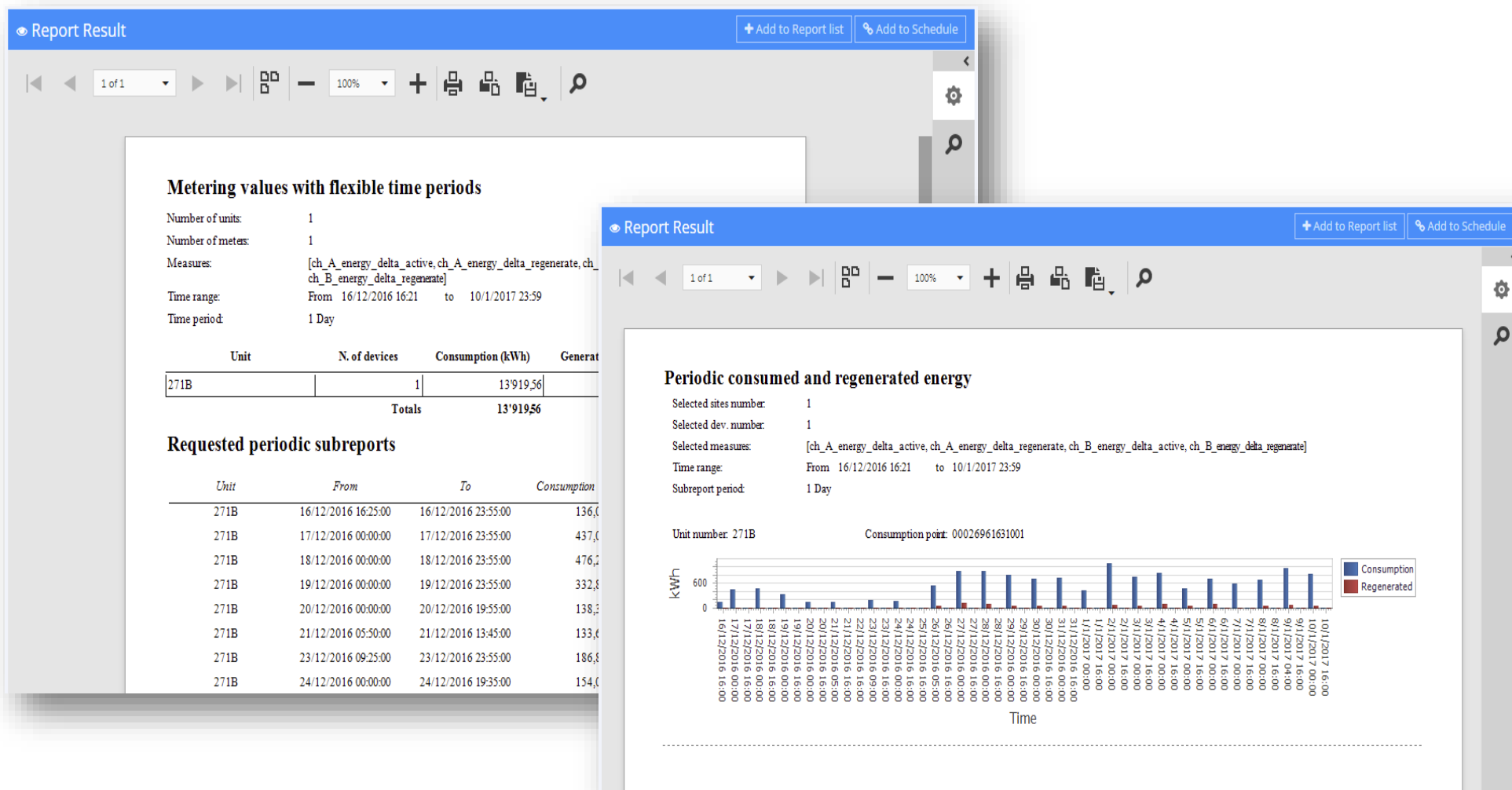


Energy summary chart

Period: 21/01/2019 - 20/02/2019

Total energy consumption: 6.7 GWh





English (GB)
DemoAdmin

Home Page > Data validations

Validation List

Show 50 entries

Search:

Name	Description	
GPS hang-up	Check for blocks of data with bad GPS quality values	<a href="#">Detail</a>
GPS outside boundaries	Check if GPS values are outside a circular zone, defined by the center coordinates and a radius	<a href="#">Detail</a>
GPS signal not received	Check for blocks of data with bad GPS quality values for a given amount of time	<a href="#">Detail</a>
Measure type violations	Check for violations of measure type validation rules	<a href="#">Detail</a>
Motion without consumption	Check for blocks of data with GPS values indicating movement and consumption is zero	<a href="#">Detail</a>
No fresh data	Check if data are not received on the DCS for a defined amount of time	<a href="#">Detail</a>
Overconsumption	Check if consumption exceeds a pre-defined threshold in the reference period	<a href="#">Detail</a>
Overgeneration	Check if regeneration exceeds a pre-defined threshold in the reference period	<a href="#">Detail</a>

Showing 1 to 8 of 8 entries

Previous

1

Next

English (GB)

Home Page > Organizations > Fleet > Unit detail > Device Detail > Real-time device data detection > REM102\_

### Real-time data detection

Show
50
entries

Export

Detection time	Measure	Value	Detection point (lat)	Detection point (lon)
26/07/2018 09:30:04	Active energy consumption	38.024	44.481064	11.269526
26/07/2018 09:30:04	Active energy regeneration	12.508	44.481064	11.269526
26/07/2018 09:30:04	Detection speed	29.791271	44.481064	11.269526
26/07/2018 09:30:04	Last known IP address	5.170.72.219	44.481064	11.269526

Showing 1 to 4 of 4 entries

Previous
1
Next

Energy consumption can be monitored on real-time





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