Bombardier Energy Metering

UIC Energy Efficiency Days – 2014

You can only manage what you can measure

Enrique Vila, 17th, June 2014

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AGENDA

1 ABOUT BOMBARDIER

2 BOMBARDIER ENERGY METERING SYSTEM

3 REAL EXAMPLE. RENFE HST ENERGY REDUCTION PROGRAM

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BOMBARDIER
Overview

Bombardier is the world's only manufacturer of both planes and trains, with a worldwide workforce of 76,400* people.

Bombardier is headquartered in Montréal, Canada. Our shares are traded on the Toronto Stock Exchange (BBD) and we are listed on the Dow Jones Sustainability World and North America indexes. In the fiscal year ended December 31, 2013, we posted revenues of $18.2 billion USD.

* as at December 31, 2013 (includes 200 employees at our corporate office in Canada)

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OUR PRODUCTS AND SERVICES
The broadest portfolio in the rail industry

Rail Vehicles

- Light rail vehicles
- Metros
- Commuter trains
- Regional trains
- Intercity trains
- High speed trains
- Locomotives

Transportation Systems

- Driverless Systems: Monorails, Metros, People Movers
- Light rail systems
- Metro Systems
- Intercity Systems
- E-mobility Solutions
- Operations and Maintenance

Services

- Fleet Management
- Asset Life Management
- **Energy Management**
- Material Solutions
- Component re-engineering and overhaul

Rail Control Solutions

- Integrated control systems
- Automatic train protection and operation
- Interlocking systems
- Wayside equipment
- Services

Propulsion & Controls

- Traction converters
- Auxiliary converters
- Traction drives
- Control and communication

Bogies

- Portfolio to match entire range of rail vehicles
- Full scope of service over the lifetime of a bogie

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Bombardier Energy Metering System.

Features

- Valid to be used in the EU countries for billing purposes.
- Ready to communicate with ERESS, Soclee, Gefee or any protocol defined by the IM.
- Ready to interface with the vehicle TCMS.
- Valid to be used in vehicles of any manufacturer.
- Valid to be used with digital or analogical sensors.
- GPS positioning & 3G / GPRS communications.

System certified with the EN – 50463.

Benefits

- By installing an EMS, train operators only pay for actual energy consumption.
- Energy saving initiatives will have immediately effect.
- Compliant with the EU interoperability requirements.
- The first step for managing is measuring. Allows the operator to fully understand the energetic balance of the train.
- Maintenance benefits – Predictive maintenance of the traction equipment.
- Operational benefits – GPS positioning & online access to the locomotive parameters.

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BT EMS References

Operator	Fleet	Number	Voltage
RENFE	446 - EMU	141	$3KV_{cc}$
	447 - EMU	155	$3KV_{cc}$
	450 - EMU	36	$3KV_{cc}$
	269 - LOC Cargo	36	$3KV_{cc}$
	269 – Pass	30	$3KV_{cc}$
FGC	111 - EMU	19	$1,5\ KV_{cc}$
	112 - EMU	7	$1,5\ KV_{cc}$
	213 - EMU	6	$1,5\ KV_{cc}$
SNCF (BT PGR)	Regio2N - EMU	129	$25KV_{Ac}$/ $1,5KV_{cc}$
ADIF	HST – 350	1	$25KV_{Ac}$
SNCB	Traxx Loco	1 (Prototype)	$15KV_{Ac}$/ $1,5KV_{cc}$ /$3KV_{cc}$
RENFE	HST350	46	$25KV_{Ac}$/
RENFE	HST250	45	$25KV_{Ac}$/ $3KV_{cc}$
Metro Bilbao	S-500	1	$1,5KV_{cc}$

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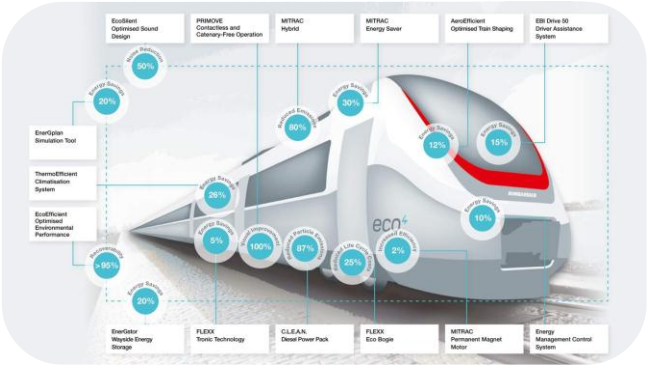
RENFE HST Energy Reduction Program.
Background.

Bombardier is the manufacturer of part of the RENFE´s High Speed fleet. RENFE has the necessity of reducing energy consumption.

Bombardier is a leader in the Rail sector and has developed many energy saving initiatives, grouped under the ECO4 program.

Under this framework, Bombardier & RENFE established a collaboration to reduce RENFE´s energy expenditure.

Bombardier COMMITS to achieve a reduction of 4% of the total energy consumption.



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RENFE HST Energy Reduction Program.
Fleets & Savings technologies.

Fleet	Nr. of trains	Type of service	Rated Voltage
S-102	16	High Speed	25 kVac
S-112	30	High Speed	25 kVac
S-130	30	Intercity	25 kVac / 3 kVdc
S-730	15	Intercity	25 kVac / 3 kVdc / Diesel

- Energy savings to be generated by:
  - Driving Advisory systems (Energy savings from traction)
  - Smart – Stabling (Energy savings from auxiliaries)
- ***A Energy Meter compliant with the EN – 50463 is fitted in the trains to certified the savings achieved and to allow RENFE to get billed according the real energy consumption.***

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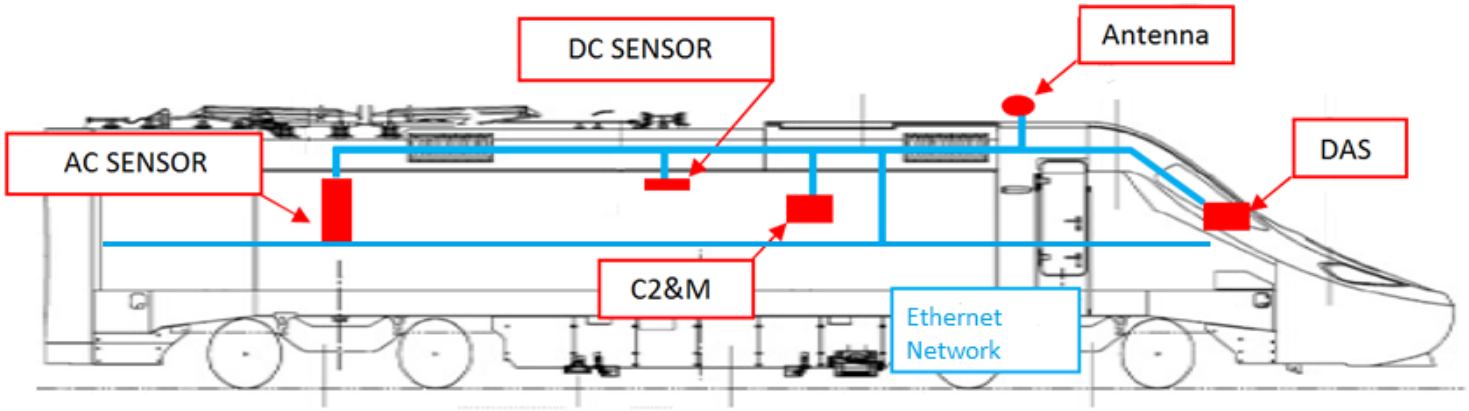
RENFE HST Energy Reduction Program.
On board System architecture.



- All the components of the Energy Metering System and the Driving Advisory System are connected through an Ethernet network.

- For enhancing the functionality of the EMS and the DAS, they are fully integrated in the TCMS of the vehicle.

- All the communications train – ground are managed through one single gateway.

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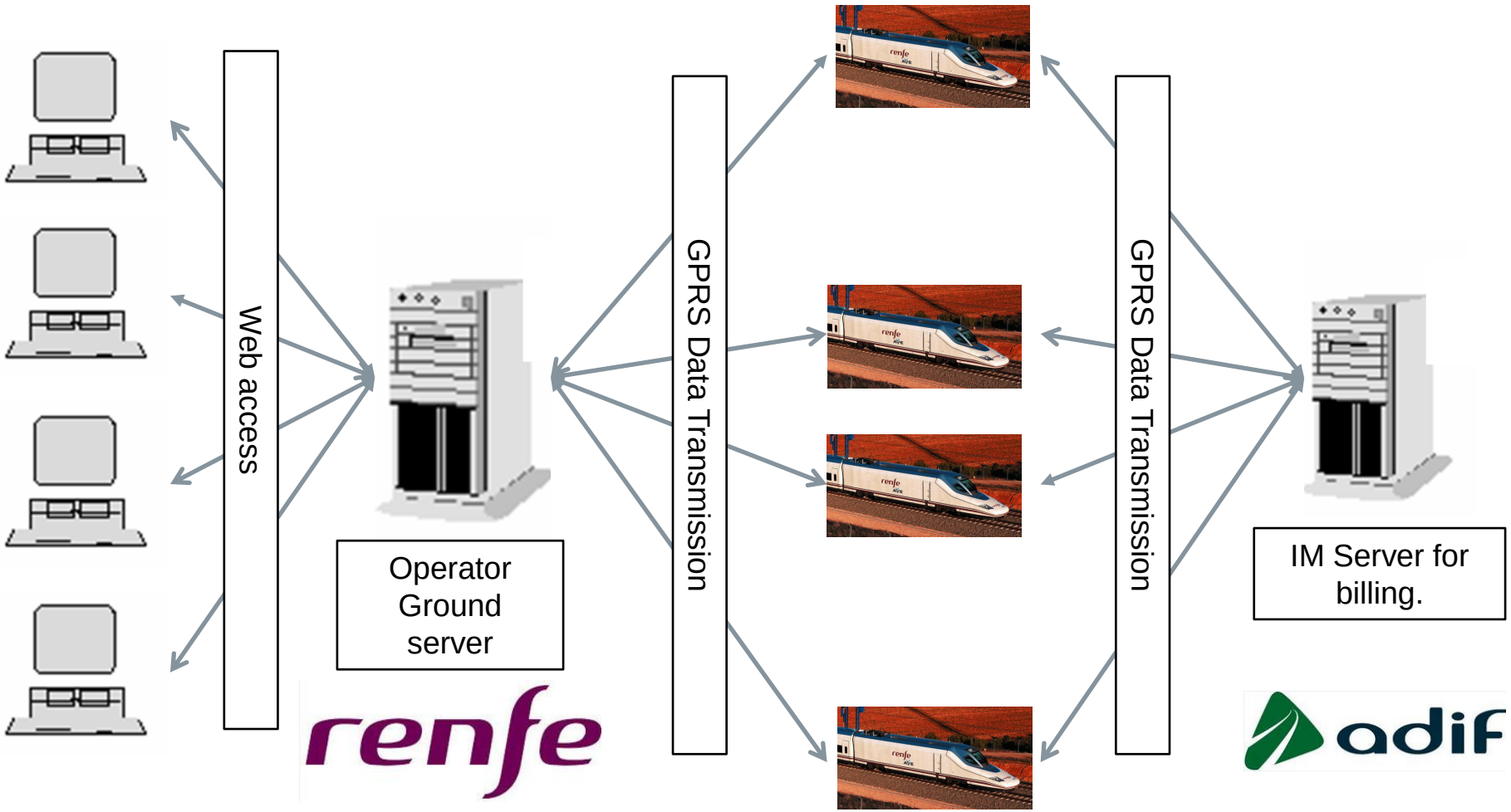
RENFE HST Energy Reduction Program.
Ground Server architecture.



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Conclusion.

There is a need in the rail industry for measuring energy consumption, for two main reasons:

- Real Energy Billing
- Energy Consumption Reduction

Using Energy Meters as a base, Bombardier is helping rail operators in reducing their energy consumption.

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Q&A

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