ENERGY MANAGEMENT
SNCF MOBILITÉS – FRANCE

CHLOÉ LIMA-VANZELER – ENERGY EFFICIENCY PROGRAM MANAGER

AGENDA

GLOBAL ENERGY CONSUMPTION

TRACTION ENERGY CONSUMPTION

GLOBAL CONTEXT

ENERGY STRATEGY

TRACTION ENERGY EFFICIENCY PROGRAM

1 – ENERGY MEASUREMENT PROJECTS

2 – KNOWLEDGE MANAGEMENT

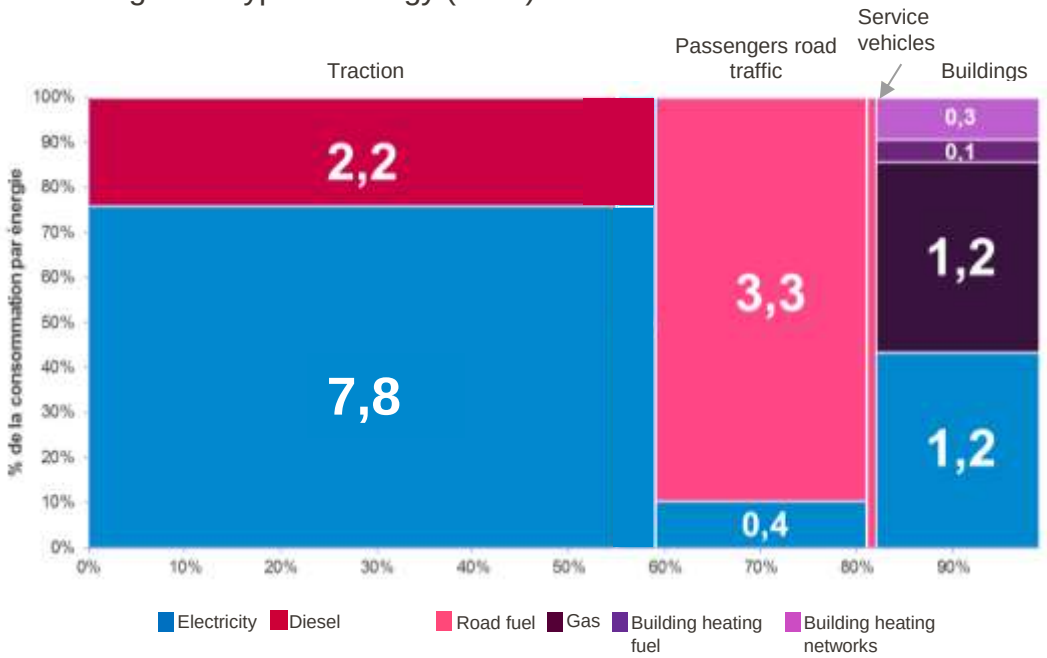
3 – ENERGY EFFICIENCY PROJECTS

Focus : Eco-driving / Eco-stabbling / Heat-pump Project / Hybrid Train

GLOBAL ENERGY CONSUMPTION

2015

Per usage and type of energy (TWh)



16,9 TWh

SNCF energy consumption in 2015.

1st

SNCF is the biggest industrial energy consumer in France with 10% of the industrial energy consumption and 3% of total national consumption.

The electrical consumption of SNCF (9TWh) represents the annual production of a nuclear plant.

60%

Of total energy consumption used for traction

TRACTION ENERGY CONSUMPTION

8,6 TWh

Electricity	81 %
Diesel	19%

790 kteqCO_2

Electricity	47%
Diesel	53 %

53 % of all emissions are from diesel traction though it represents only 19% of the consumption.

10 to 30% of all traction energy usage is made by parked trains.

GLOBAL CONTEXT

HIGH SPEED CHANGES IN ENERGY AND RAILWAY WITH IMPACT ON SNCF FUTURE BUSINESS STRATEGY

New business models in the energy sector with the valorization of new activities (Demand Side Management). → SNCF role ?

Energy prices fluctuations. Many external factors : oil prices, carbon prices, evolution of the nuclear program → difficult to forecast → Financial impact ?

New regulations regarding the use of diesel traction. → Impact on diesel trains operations ? Competition with new and cleaner transportation modes ?

New actors : new Infrastructure Manager, new Trains Operators in regions. → Consequences on energy settlement processes

ENERGY STRATEGY

MANAGING ENERGY AS A VALUE CREATION DRIVER AT THE GROUP LEVEL

5 STRATEGIC PRIORITIES

1- Improve the economical performance

2- Initiate Energy Transition

3- Make SNCF a influent actor of the energy sector

4- Innovate and seize new business opportunities

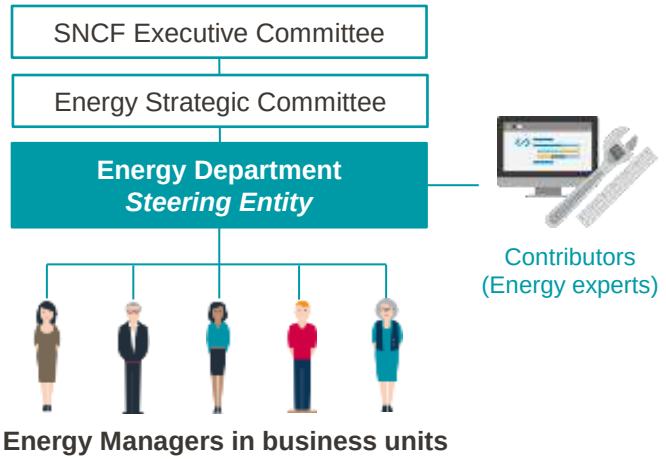
5- Organize and initiate a new dynamic inside SNCF

TARGETS 2015-2025 :

+20% Energy performance

+25% Carbon performance

A NEW GOVERNANCE



TRACTION ENERGY EFFICIENCY PROGRAM

STRATEGY

3 - ENERGY EFFICIENCY PROJECTS

2 - KNOWLEDGE MANAGEMENT

1 - ENERGY MEASUREMENT

1 - ENERGY MEASUREMENT PROJECTS

WHERE INDUSTRIAL & IT PROJECTS ARE CLOSELY LINKED !

SNCF MOBILITES

ON-BOARD EMS

- New trains equiped
- Retrofit of existing trains
  - Faiveley (high speed trains)
  - Mors Smitt (others)

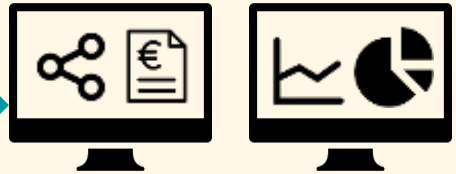
~4000 EMS by 2021

SNCF RESEAU (IM)

REMOTE-READING & SETTLEMENT

SNCF MOBILITES

ANALYSIS & INVOICING



- **2017** : Data visualization
- **2018** : Train energy big data system

2 - KNOWLEDGE MANAGEMENT

IMPROVE OUR KNOWLEDGE & SHARE IT TO SET PRIORITIES & COORDINATE

DETAILLED MEASUREMENT CAMPAIGNS

- On 3 different types of trains
- 100.000 km analysed

GATHERING AND SHARING KNOWLEDGE

- Collection and synthesis of all studies on energy consumption and energy efficiency projects
- Sharepoint creation
- Processing the data to check and/or re-define priorities for each Activity

3 – ENERGY EFFICIENCY PROJECTS

Zoom on 4 main projects :

Driver Advisory System

Eco-stabling

Heat pump project

Hybrid train

ECO-DRIVING

WORKING TOWARDS CONNECTED DRIVER ADVISORY SYSTEM

OPTI-DRIVING *(Optimal driving)*

This system is a **fully operating stand-alone DAS** integrated in the existing driver's interface.

1

Data updated every week in the inboard IPad

- Train information
- Infrastructure information
- Timetables

→ Algorithm =

2

\+

Real time GPS position of the train

3

Display to the driver

- Advised Speed
- Arrival time

Both information are updated in real time

NEXT STEPS

1. Achieve complete deployment of Opti-Driving on all high-speed trains (~1500 drivers).
2. Study and experiment the implementation on other trains.
3. Strategic cross-company study on Connected-DAS.

ECO-STABLING

REDUCING GLOBAL ENERGY CONSUMPTION OF PARKED TRAINS

1 1st SUCCESSFUL PROJECT : TGV ECO-PARK

Automatic light and heating/aic conditionning reduction according to specified conditions :

- Train parked > 30 minutes
- Specific geographic area
- External temperature

2 GLOBAL REFLEXION ON STRATEGY

0. Global practices overview and preliminary study of the issues
1. Top-management awareness-raising
2. Knowledge development on parked trains consumption
3. Technical clarification on material possibilities and restrictions.
4. Support local initiatives of eco-stabling and share good practices.

HEAT PUMP PROJECT WITH ALSTOM

IMPROVING THE EFFICIENCY OF AIR CONDITIONING SYSTEM
WITH NEW TECHNOLOGIES

CONCEPT

- Implementation of a heat pump on a regional train
- Reduce conditioning and heating consumption

RESULTS

- Successful test in real commercial service conditions during one year
- More than **30 % of energy savings on the conditioning system** + maintenance gains still to be quantified.

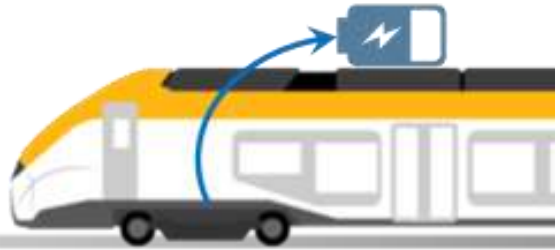
HYBRID TRAIN WITH ALSTOM

CONCEPT

- Installation of storage capacities in trains to bring a third source of energy to the train : diesel, catenary and battery.
- The battery can recover the braking energy.
- The energy stored in the battery can be used as a booster or to avoid the use of diesel when there are no catenaries available.

RESULTS

- Feasibility study, ROI realized.
- Awaiting for funding to realize a fully functioning train in a 4 years horizon.



THANK YOU FOR YOUR ATTENTION !

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