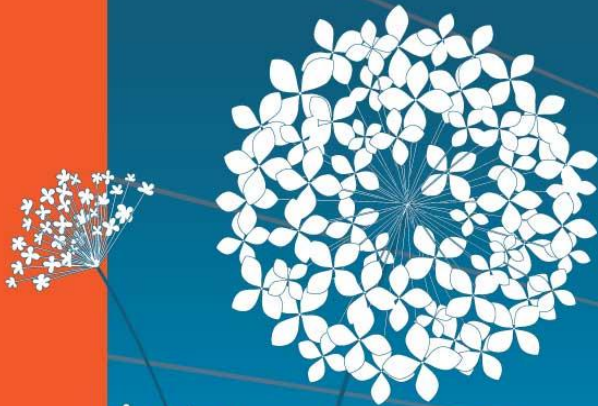




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The Voice of Members:

*Best practice in energy efficiency
from all over the world*

Moderator

Ian Papworth

WELCOME

The Voice of Members



Goedemiddag !

Bună Ziua !

Good Afternoon !

Boa Tarde!

Goddag!

¡buenas tardes

Добрый день !

Dobré Odpoledne !

こんにちは !

Buon Pomeriggio !

Dober Dan!

God Ettermiddag !

Hyvää Päivää !

Guten Tag !

مساء الخير !

Bonjour !



The Voice of Members

- FS (Italy): **Luca Carusi**, Energy Manager & Co-Chair UIC Energy & CO2 Expert Network 5 min
- JR-East (Japan): **Hitoshi Hayashiya**, Manager of Electric & Signal Network System Dept. 10 min
- IR (India): **Sanjay Kumar**, Dy. Chief Materials Manager, Northern Railway, Ministry of Railways 10 min
- NS (The Netherlands): **Frans Slats**, Programme Manager Energy & Environment 5 min
- NSB (Norway): **Marie Loe Halvorsen**, Energy Advisor 5 min
- ÖBB (Austria): **Harald Jony**, Director of Energy Sales, ÖBB-Infrastruktur AG 5 min
- RAI (Iran): **Saed Rasooli**, Vice President of Planning & Transport Economy 10 min
- RZD (Russia): **Alexei Averin**, Advisor to President 10 min
- SBB (Switzerland): **Arnold Truempi**, Head of Energy Management 5 min
- VR (Finland): **Janne Pusa**, Energy Efficiency Manager 5 min
- HR Rail (Belgium): **Christian Smets**, Expert Corporate Recruitment 5 min



The Voice of Members

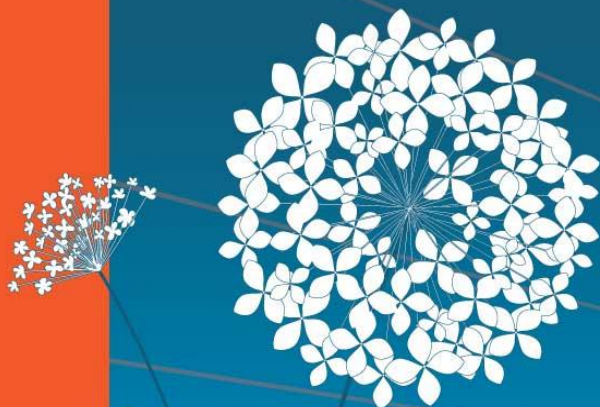




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*Luca Carusi
Ferrovie dello Stato Italiane*

MANAGING COMPLEXITY - EMBEDDING CULTURE

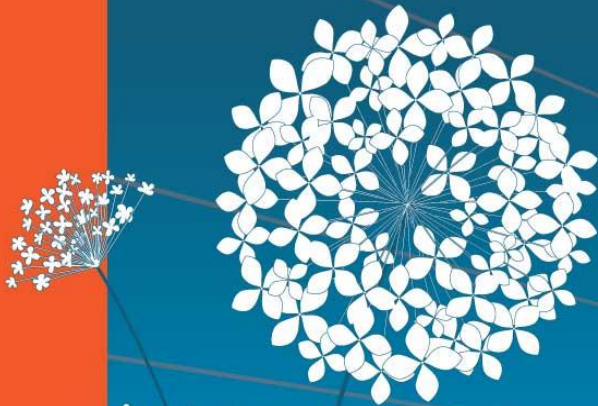




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**Hitoshi Hayashiya,
Manager of Electric & Signal Network system department,
JR-East**

Background -After the Earthquake-

- The Great East Japan Earthquake on March 11, 2011: M9.0, S.I.7
- Electricity consumption restriction and planned blackouts around Tokyo
- We are making effort to realize more eco-friendly railway transportation.



Fig.1 Total Energy Consumption in Japan

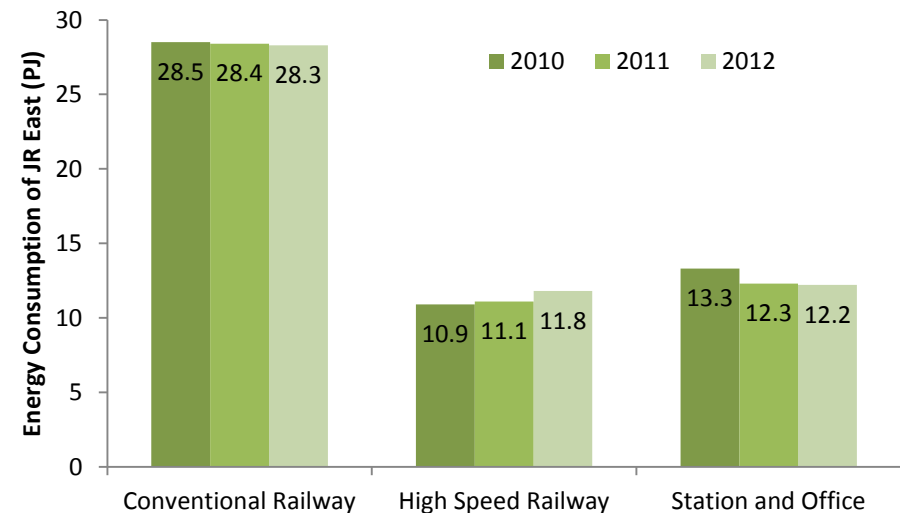


Fig.2 Energy Consumption of JR East

Eco-Friendliness of Railway Transportation

- CO₂ emission from railway was 1/9 of car, 1/6 of airplane in Japan (2007)
- Electric energy consumption of JR East group was 5.82TWh (2012)
- Japanese trend in traction power supply system (fixed installations)
 - Introduction of renewable energy
 - Utilization of regenerative power
 - Energy saving at station

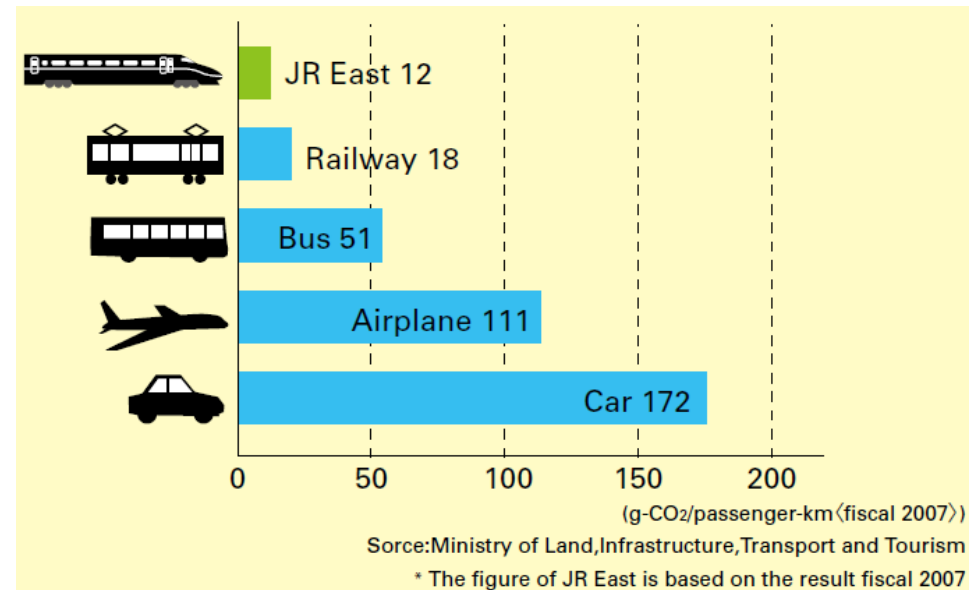
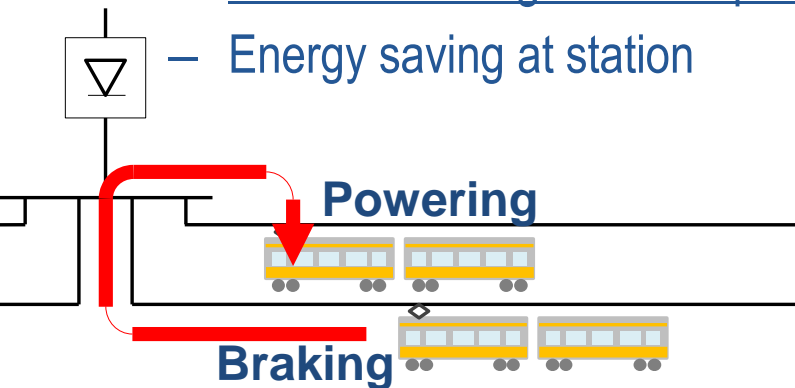


Fig.3 CO₂ emissions by mode of transportation

Regenerative Energy Utilization in d.c. Railway

- Purposes of energy storage system: voltage drop compensation, avoiding regenerative brake cancelling, emergency power source, and energy saving

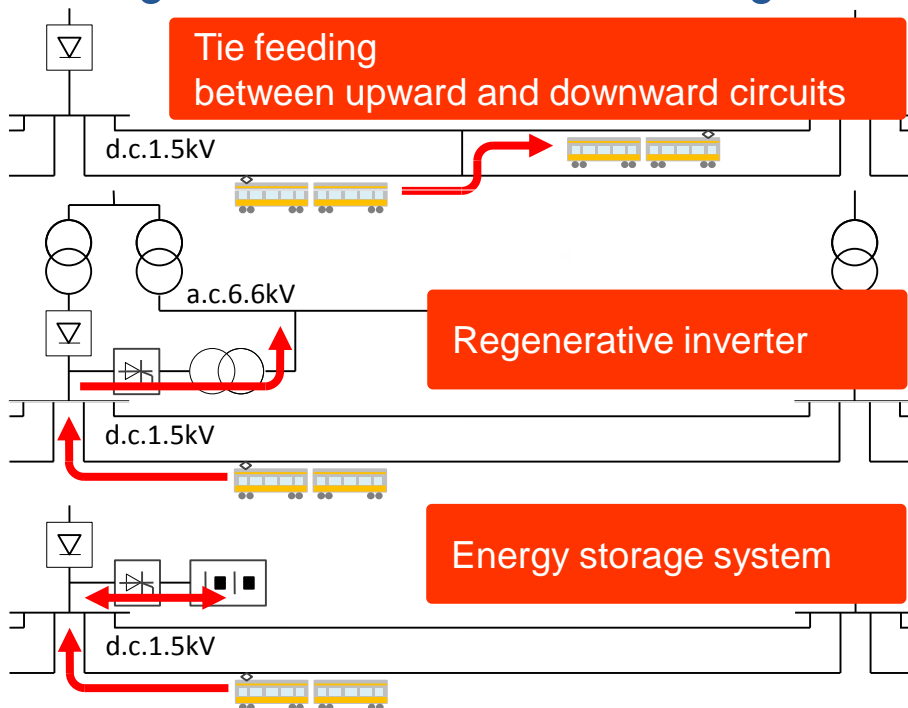


Fig.4 Solutions for regenerative energy utilization

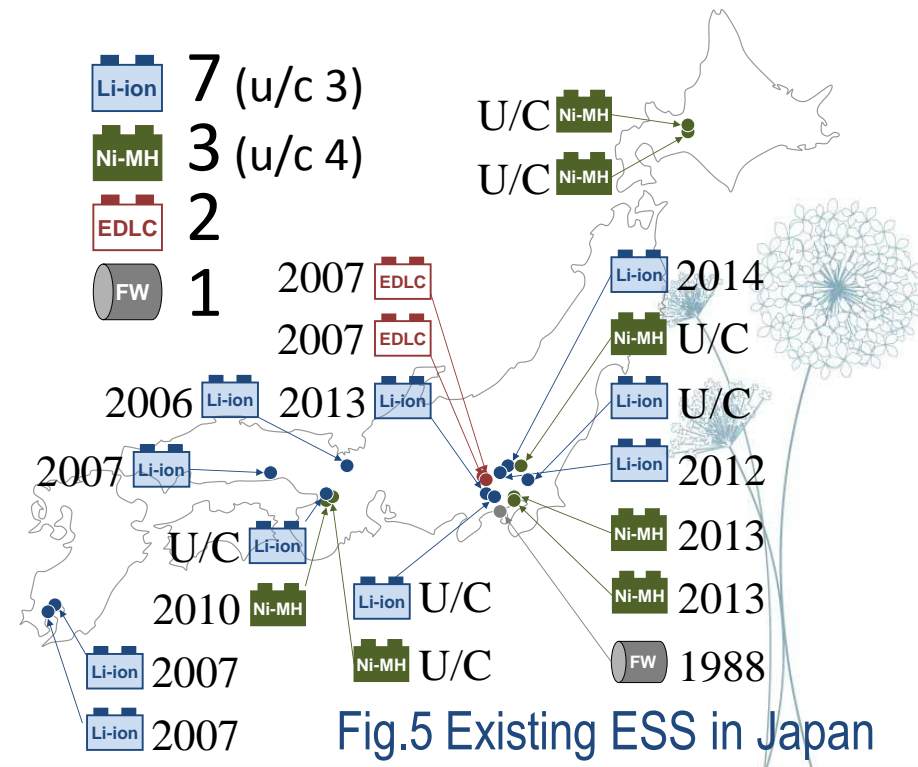


Fig.5 Existing ESS in Japan

Li-ion Battery at HAIJIMA

- Started operation on Feb. 20th, 2013 / Effect: 1MWh/day (5% of total)
- 2nd battery at OKEGAWA and 3rd battery under planning

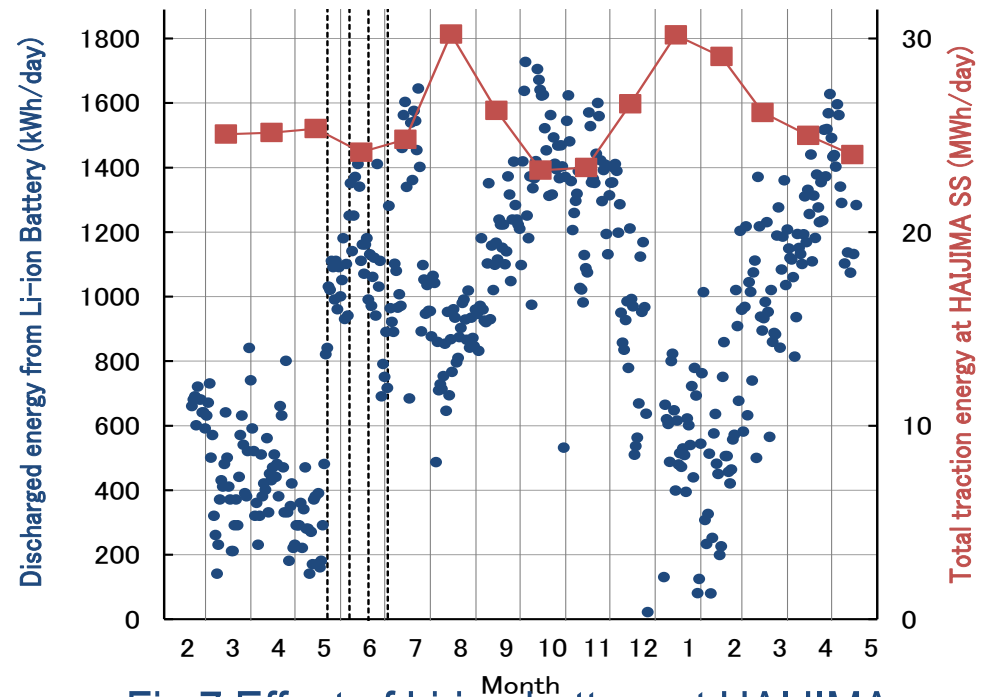
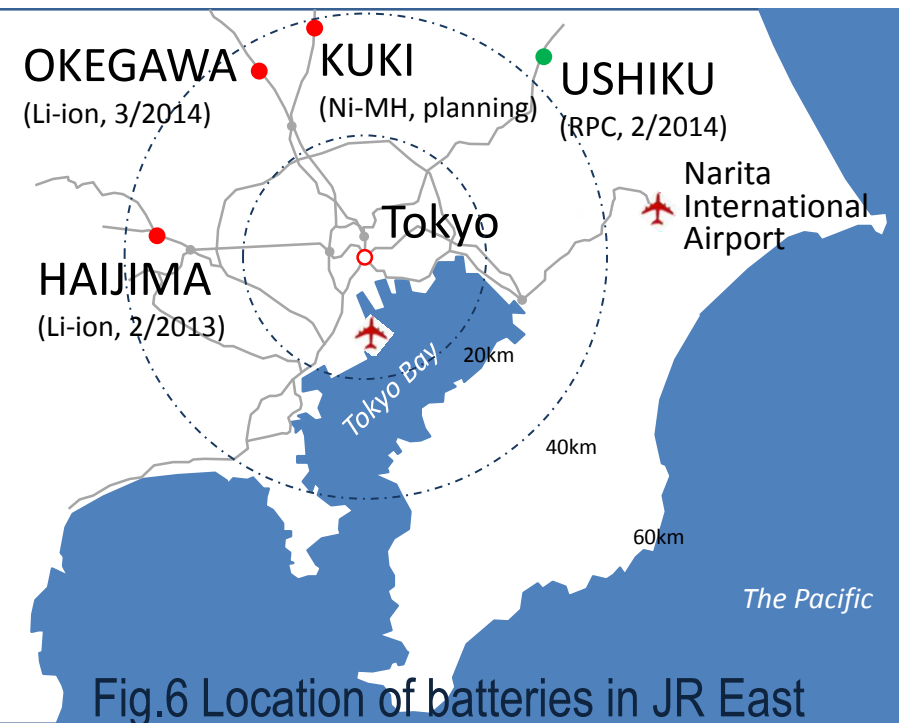


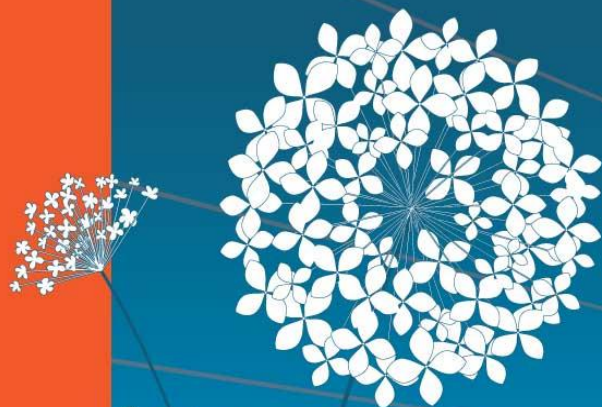
Fig.7 Effect of Li-ion battery at HAIJIMA



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Sanjay Kumar, Indian Railways, India

Antwerpen, Belgium on 17th June, 2014

THE THIRD LARGEST RAILWAY NETWORK!

- 64,015 kms route Kms
- 12,000 Passenger Trains per day
- 7,000 Freight Trains per day
- 23 million passenger per day
- 2.65 million tons of freight traffic per day
- 1.34 million employee
- Annual revenue base of more than \$22 Billion



BALLOONING ENERGY DEMANDS!



Estimated traffic growth at 8-9 percent in the next decade.



The development of the Western and Eastern dedicated freight corridors.



Increase in electrified route from 20059 kms in 2010 to 33000 kms by year 2020.



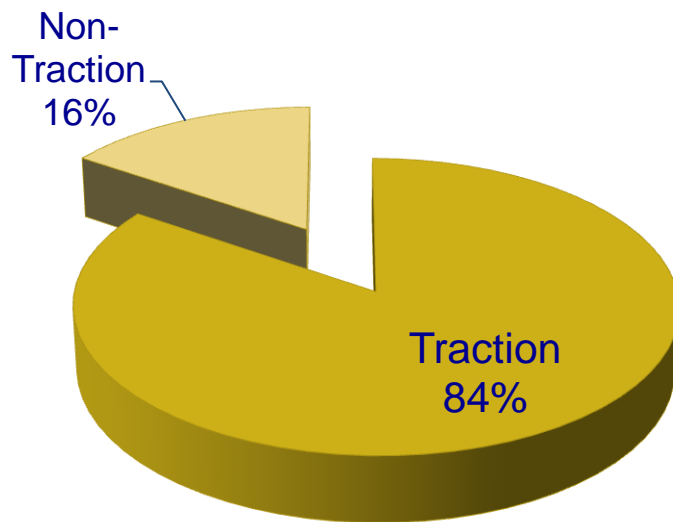
Increase in passenger KM at 10.8% per annum to 1,760.4 billion PKM by 2016–17.

Projected electricity demand is estimated to grow at about 9 percent

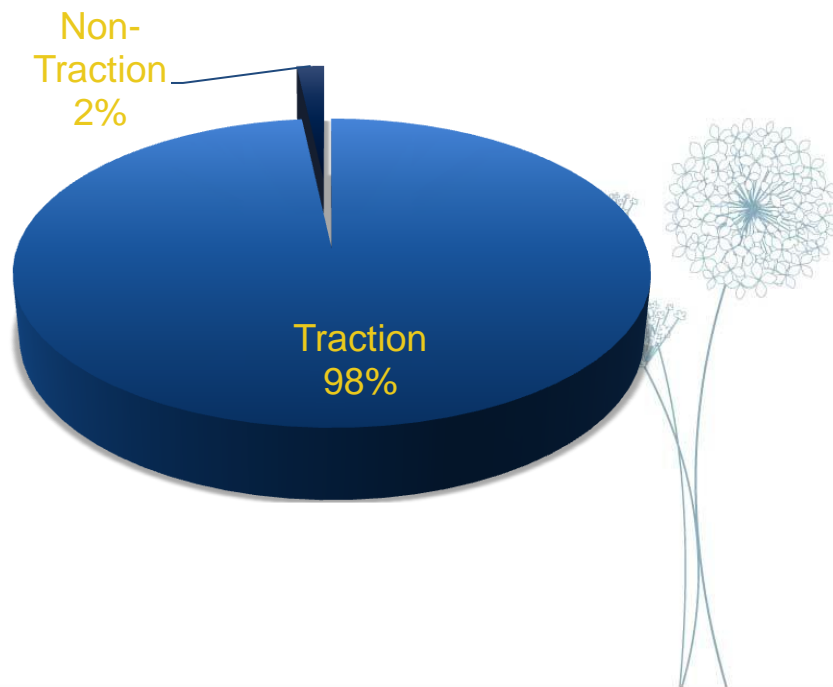
Energy Mix in Indian Railways

Electricity Consumption - 17 Billion Units

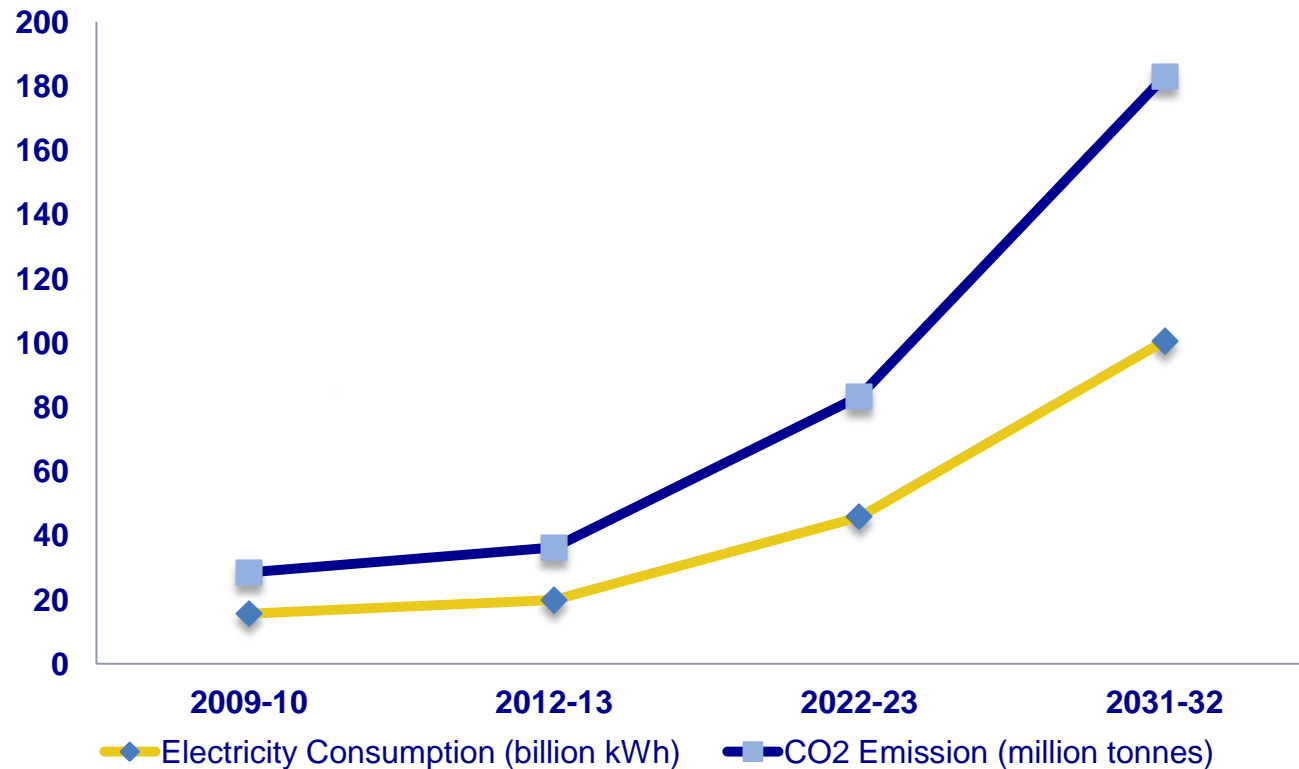
Fuel Consumption - 2567 Million liters



For Year 2012-13



BAU Not an Option!



Energy is the second biggest component of working expenses – Can we afford?

POLICY FRAMEWORK



Traction Applications



- ☐ Shift to three-phase locomotives from conventional locomotives.
- ☐ Shift to IGBT based 3 - phase locomotive .
- ☐ Promote use of train-sets with regenerating braking features.
- ☐ Promote use of Head On Generation System for train lighting and air-conditioning load
- ☐ Electrification as a tool to reduce fuel consumption

Non-Traction Applications



- ☐ Web based monitoring of electricity consumption (www.railsaver.gov.in)
- ☐ Procurement of Energy Efficient luminaries
- ☐ Use of renewable energy in place of fuel in non-traction applications
- ☐ Provision of solar panel sheets on roof of sheds, workshops etc.
- ☐ Energy Management System for stations, buildings etc.



THANK YOU FOR LISTENING!

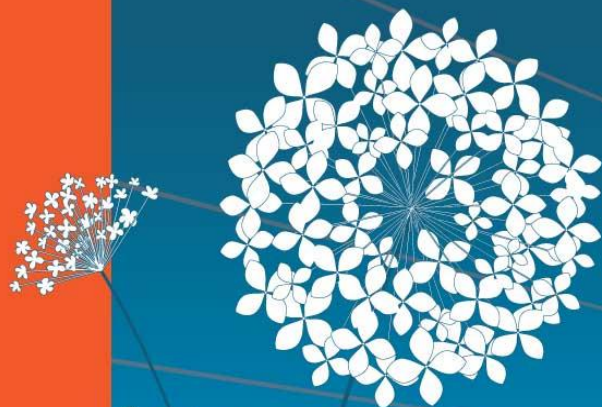




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NS

Frans Slats/Ralph Luijt

Since 2005 energy-efficiency improvement of 30% due to

- Replacing & improving Rolling Stock (LED, Heat pumps, Aerodynamics)
- Eco-driving
- Smart Stabling
- Improving load factor

2020 target: **50% improvement** compared to 2005 by:

- Introduction of new more efficient Rolling Stock
- 20% efficiency improvement of VIRM Rolling Stock (LED + ILC, CO2 regulation, Aerodynamics)
- DAS
- Efficiency improvements in timetable/planning
- Increasing the results of eco-driving and Smart stabling

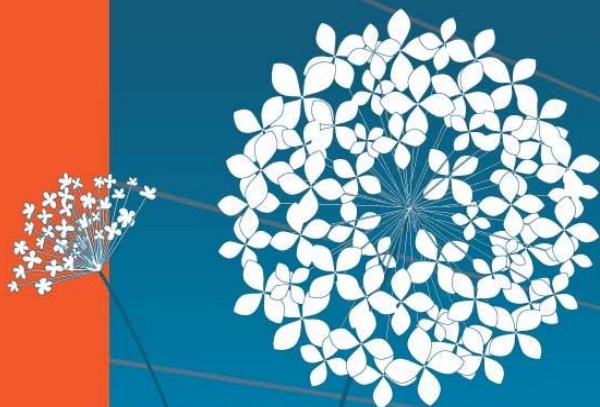




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Marie Loe Halvorsen
Energy Advisor, NSB

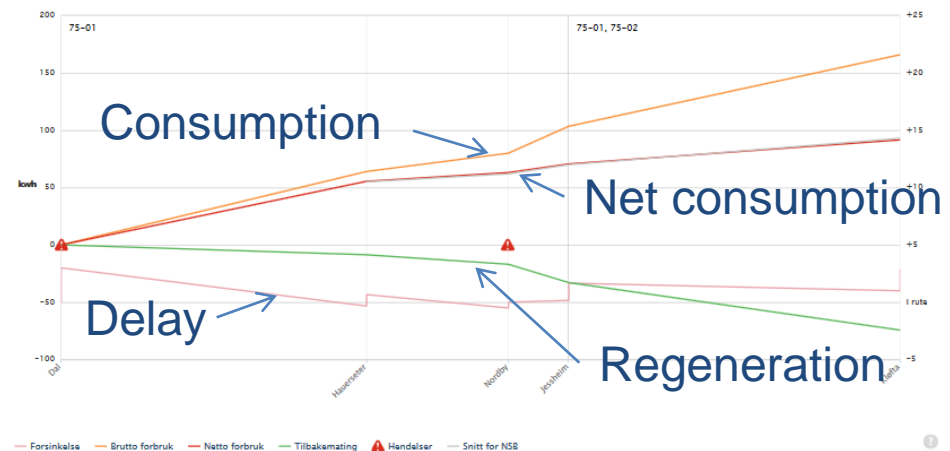
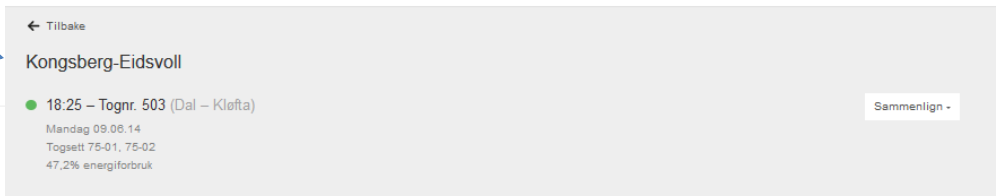
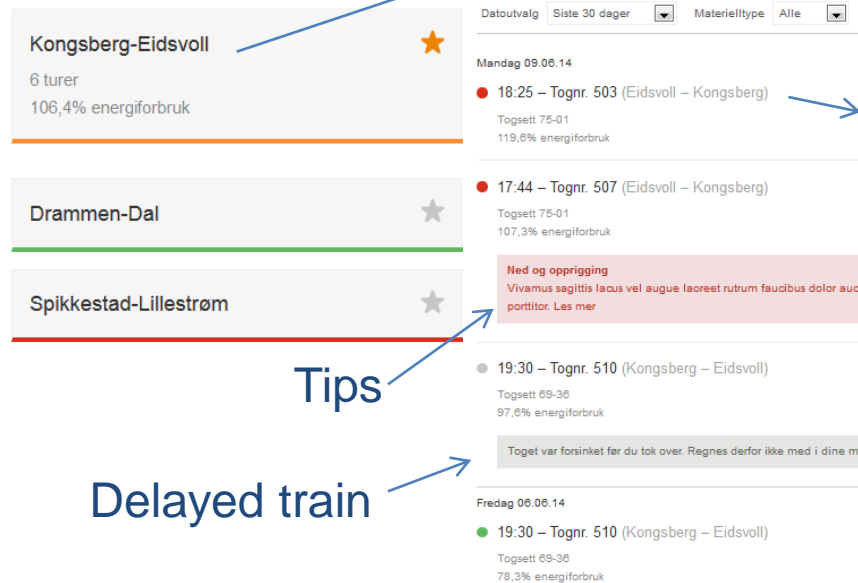
NSB: TRAIN DRIVER APP USING EREX DATA



Enka

My distances

Mine strekninger

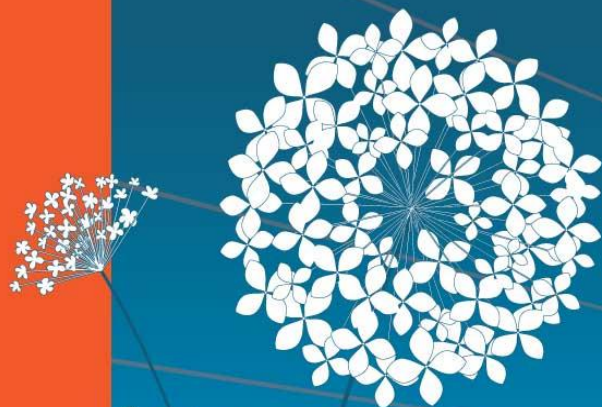




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Harald Jony

Director of Energy Sales, ÖBB-Infrastruktur AG

ÖBB-INFRASTRUKTUR AG

railpower

- **5,000 installed energy meters** since 2006 including **600 railpower boxes**
- **Green Energy** for railways since 2011 with **134 t CO₂** and **400 planted trees**
- **Energy Saving Project ÖBB** since 2011 with **cost reduction of 9,5 mil. €**
- Established **railpower** in 2013 with **300 mil. €** traction power volume and **2,5 TWh**
- **The Energy Service Provider for future railways in Europe**

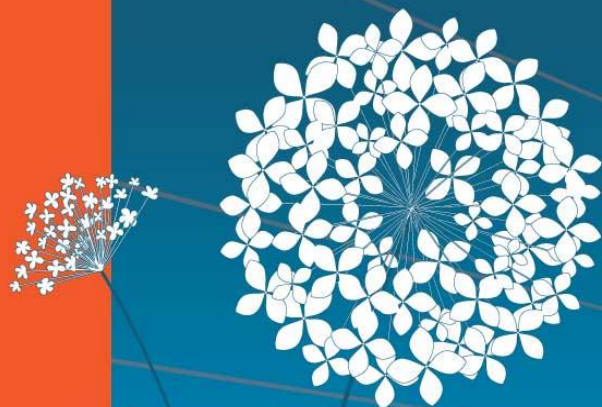




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**Saeed Rasooli,
Vice president of planning and transport economy
RAI - Iranian Railways**

Macro policies of the rail transportation

- a. Promotion of transport safety and workplace health;
- b. Improvement of service quality (speed, precision and welfare);
- c. Downsizing the organization governance undertaking;
- d. Improvement of manpower productivity, capital and production factors;
- e. Betterment and controlling of the activities and operational projects as per the standards of environment protection;
- f. Expansion of rail network to meet the demands for bulk transportation on long distance routes of the country;
- g. Development of the network capacity and rail fleet to meet increasing demand.



Key measures of railway in line with improvement of fuel consumption

a. Fuel consumption reduction in railway through:

Double-tracking of rail lines	0.19%
Reduction of fuel consumption due to removing the level-crossings	2.1%
Reduction of fuel consumption due to implementation of ATC	1.16%
Reduction of fuel consumption due to promotion of repair quality	0.6%
Reduction of fuel consumption due to modification of routes	3%
Reduction of fuel consumption due to combined and two-way loaded transport	0.98%
Impact of aerodynamic shape of fleet	0.98%
Change of transmission gear, AC-DC, AC-AC	0.8%
Adhesion coefficient of wheel - rail	0.76%
Reduction of fuel consumption due to renovation of fleet each 5 year	1%

a. Implemented projects in relation to improvement of fuel consumption:

No.	Title	Unit	Investment (billion Rial)	Annual capacity increase
1	Loco renovation	63	2010	5.6 (billion ton – km)
2	Loco engine renovation	18	8	4% Traction power capacity increase
3	Passenger coaches renovation	60	600	1.09 (billion person – km)
4	Development of lines (km)	600	10000	6% Transport capacity increase



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ANTWERPEN, 16-19 JUNE

ENERGY EFFICIENT SCHEDULES IN THE JSC "RUSSIAN RAILWAYS"



Экология
Энергосбережение
Энергоэффективность

Alexey AVERIN
Advisor to the President,
JSC "Russian Railways"

Antwerpen, 17 June 2014





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DEVELOPMENT OF AUTOMATIC LOCOMOTIVE OPERATION SYSTEM

1998



First generation of the automatic operation system (USAVP)

2002

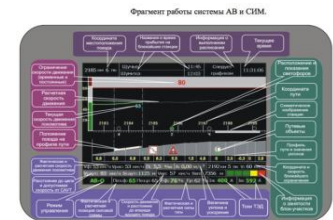
Second generation of automatic operation system (USAVPP(G)). Had link to the recording unit of locomotive movement parameters and displayed information on screen.



2009



Third generation of automatic operation system was integrated with the KLUB-U and BLOK locomotive safety systems.



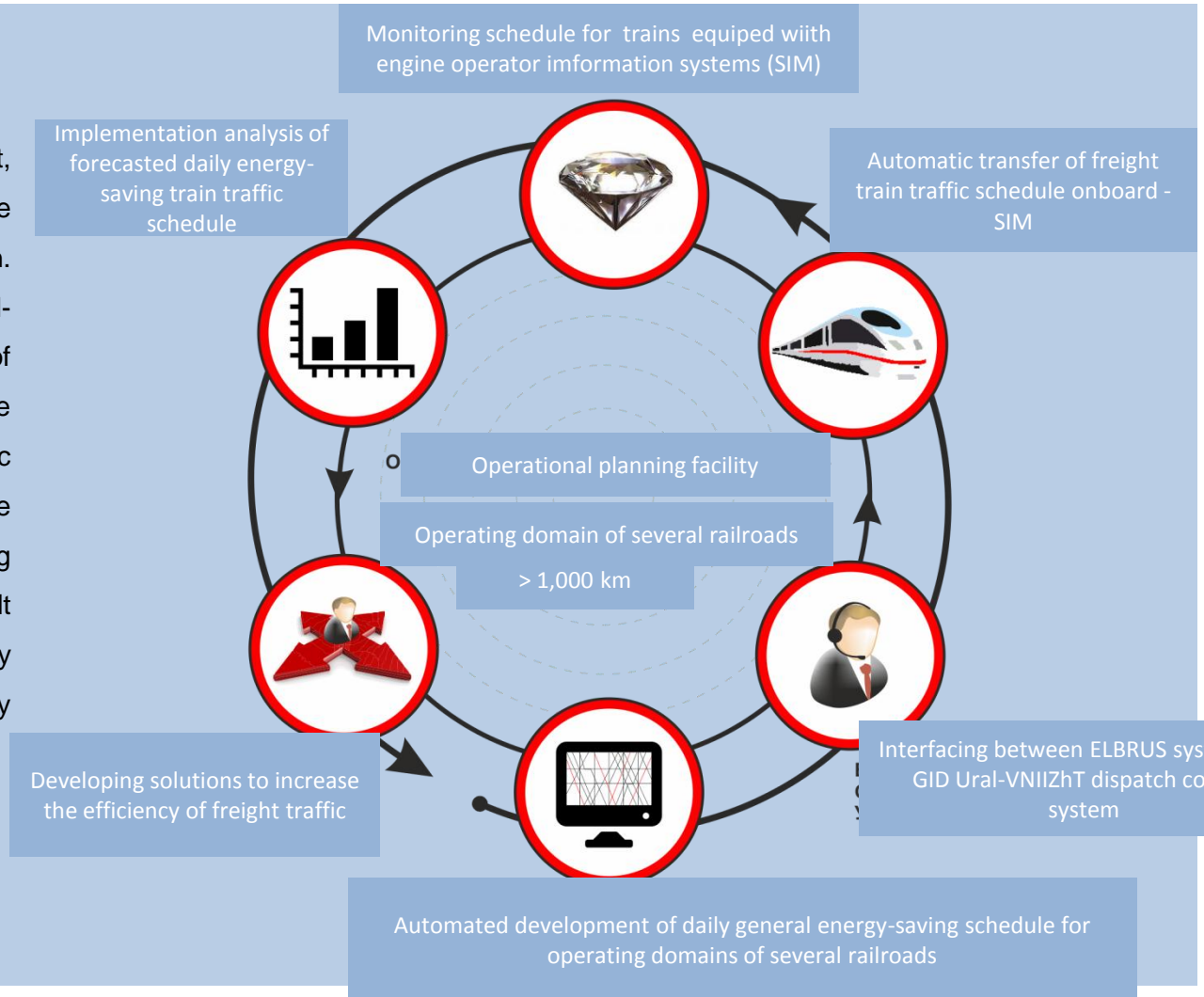
2013-2012

Admission of electric locomotives 2EC5K, 2EC6, 2EC10 and EP20 into the MPSUiD with functions for automatic train operation, energy supply monitoring, safety control, monitoring performance of locomotive units and engine operator information system of train traffic schedules.



ORGANIZING RAIL TRAFFIC ACCORDING TO ENERGY-SAVING ROUTE SCHEDULES

Under current conditions of heavy transport, it is impossible to effectively organize the transport process without automation. Information systems created by the All-Russian Scientific Research Institute of Railway Transport allow for more effective implementation of Russian Railways' rail traffic organization strategy according to a schedule with firm time slots in extended operating domain networks, resolve the most difficult issues with shift-day planning, thereby reducing operating costs on the primary heavy-traffic routes.



AUTOMATED SYSTEM OF FORECASTED DAILY ENERGY- SAVING RAIL TRAFFIC SCHEDULES – ELBRUS SYSTEM

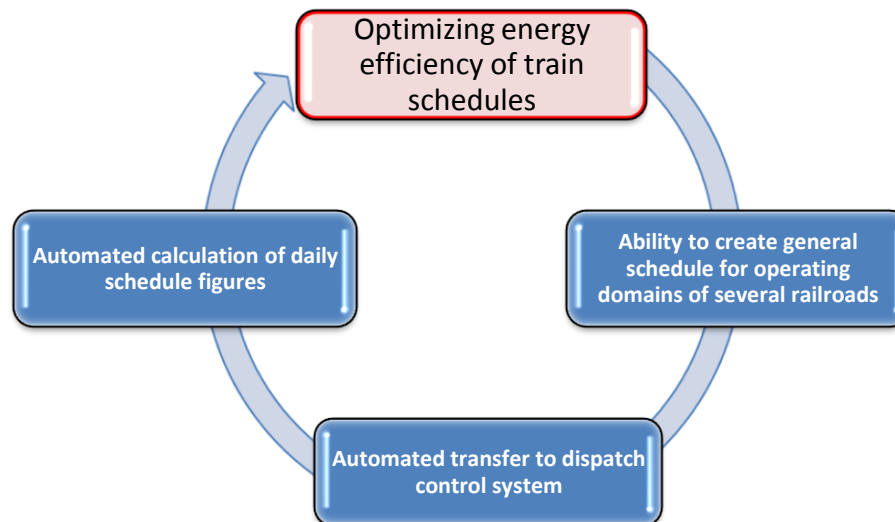
Tasks performed by ELBRUS system

Creates a forecasted daily
energy-saving schedule for rail
traffic

Connecting varying schedules
between operating domains of
adjacent railroads. Forming a
general schedule for train traffic

Automated transfer of
forecasted daily energy-saving
schedules to a dispatch control
system

Automated calculation of
varying schedule parameters



Parameters accounted for when composing varying schedules

Length of the train

Intervals between trains

Priority passage of separate
categories of trains

Number of receiving and
departure tracks at the station
and their specializations

"Windows" and "windows"
systems

Speed limits

Regaining speed

Number of main tracks in routes

EFFECTIVENESS

Savings in operational expenses,
including:

Increase in service speed of transit cargo train traffic

Reducing expenses on electric power to haul trains

Up to 5%

2-4%

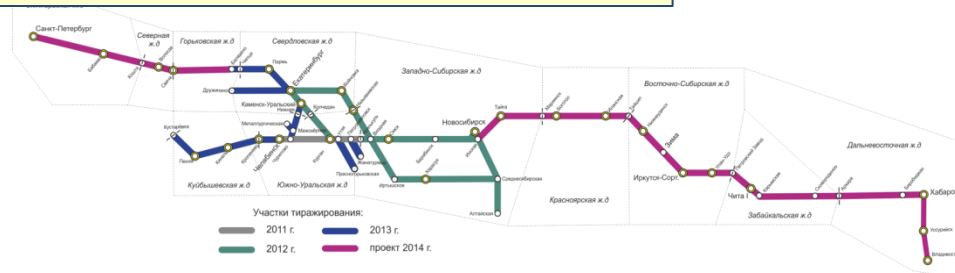
2-5%

ELBRUS implementation plan 2011-2015

2011-2012 – South Urals, West Siberian railways

2013 – Sverdlovsk, Kuybyshevskaya, West Siberian and South Urals
railways

2014-2015 – Gorkovskaya, Northern, Otkvabrskaya, Krasnoyarsk, East
Siberian, Trans-Baikal, Far Eastern railways





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PROCESS FOR CREATING FORECASTED ENERGY-SAVING RAIL TRAFFIC SCHEDULES WITH THE ELBRUS SYSTEM

Ural-VNIIZhT train schedule



Planned "windows"
for upcoming days

Tight run profile
(target schedule)

RR's Main Computer Center

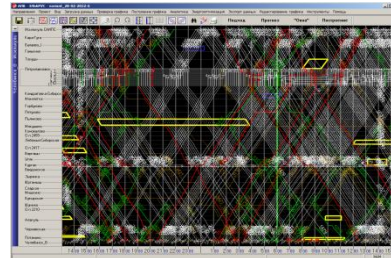


Schedule of
passenger trains

Schedule of
commuter trains

ELBRUS

Automated schedule
creation



ELBRUS

Energy optimization

Coordination and
approval of schedule

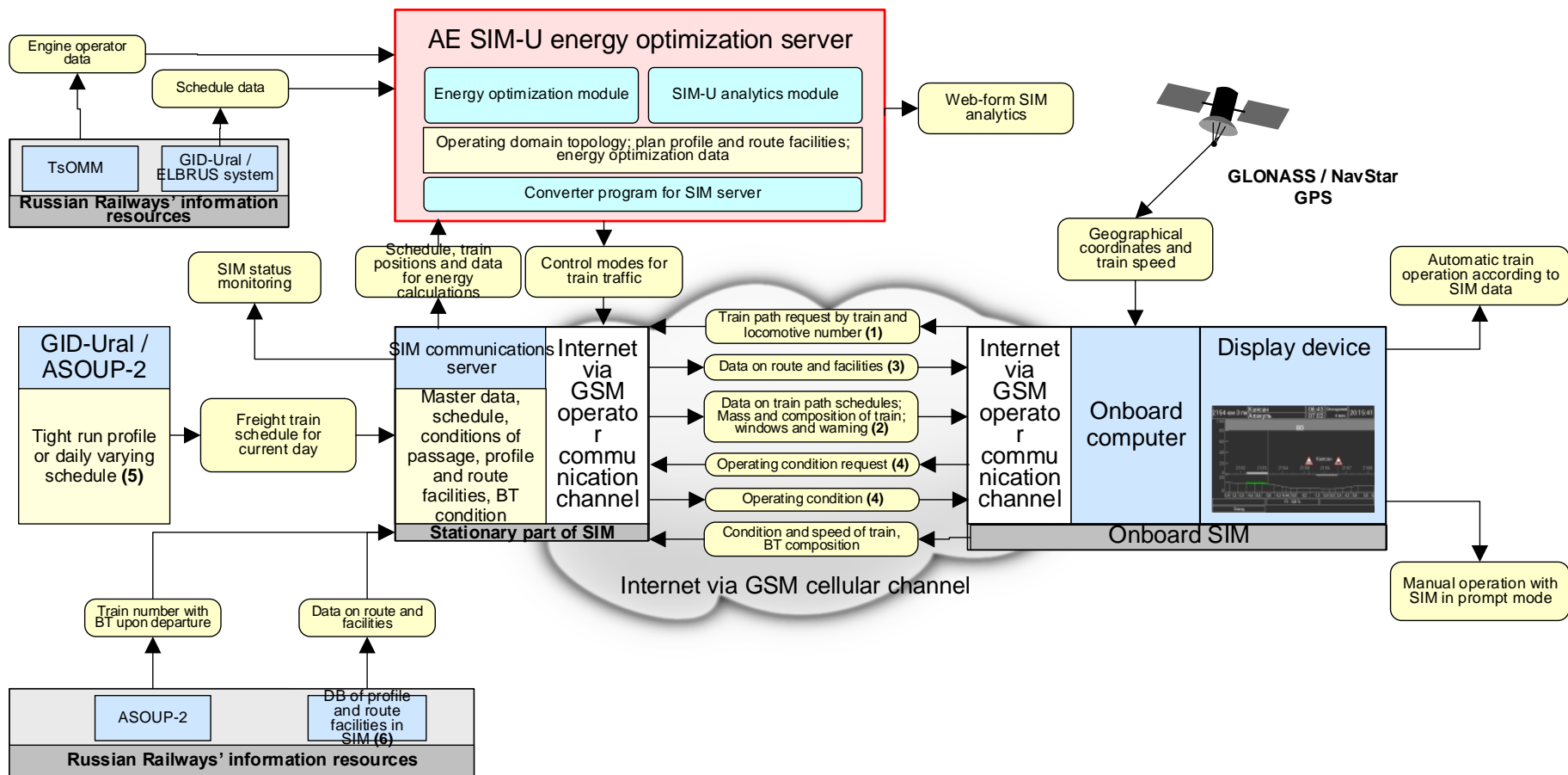
Ural-VNIIZhT
train schedule



POLYGON ACS



DIAGRAM OF TRANSFERRING ENERGY-SAVING SCHEDULES ONBOARD LOCOMOTIVES: “SIM” ENGINE OPERATOR INFORMATION SYSTEM

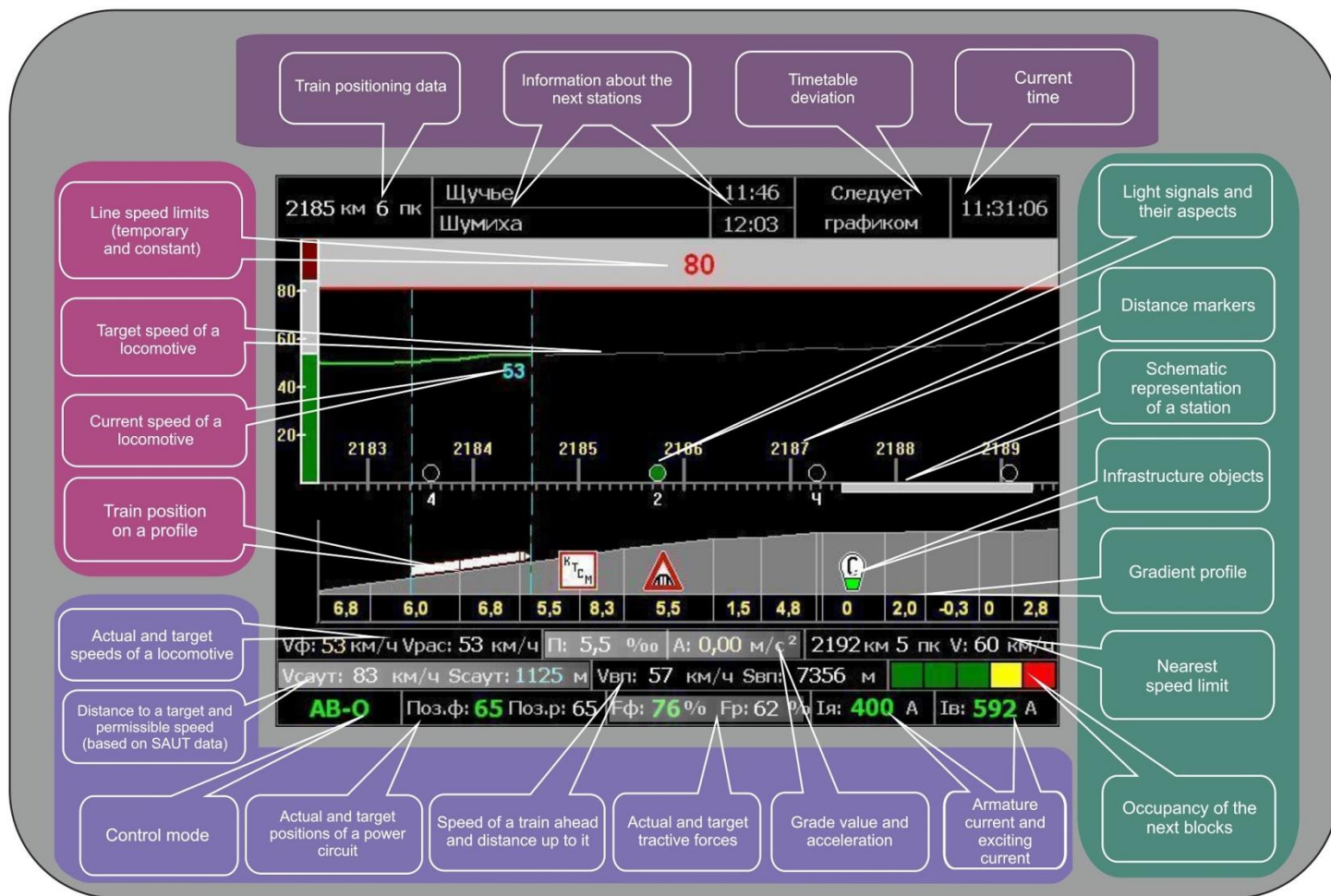




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ONBOARD DISPLAY ON LOCOMOTIVE CONSOLE OF OPTIMAL ENERGY TARGET AND ITS IMPLEMENTATION DURING TRAIN TRAVEL

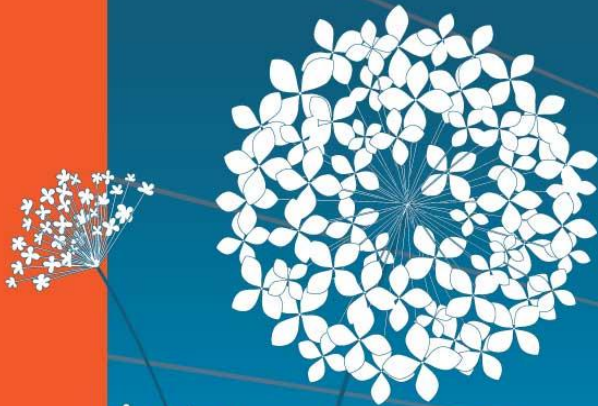




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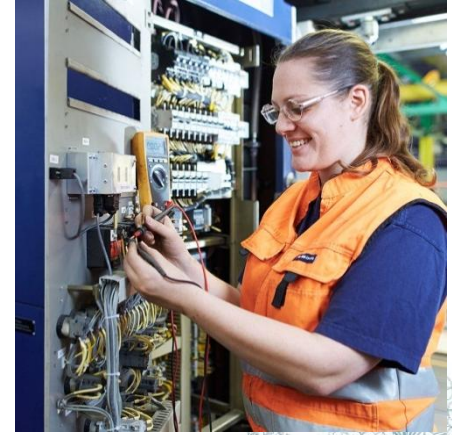
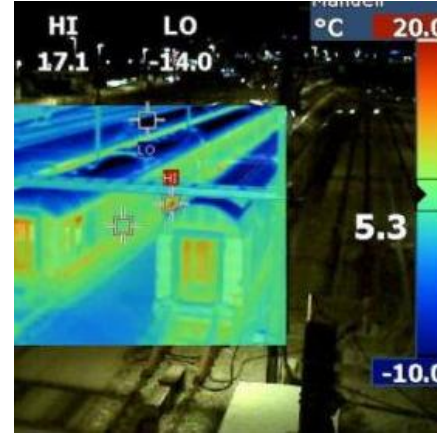
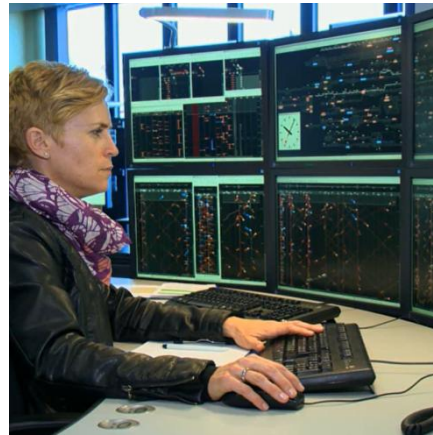


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**Arnold Truempi,
Head of Energy Management SBB**

ENERGY EFFICIENCY @ SBB

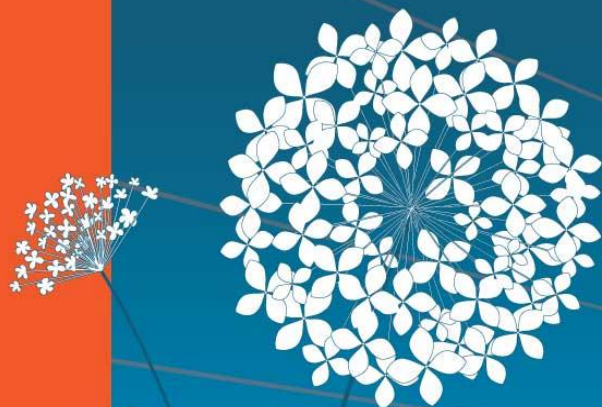




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**Janne Pusa,
Energy Efficiency Manager, VR**

VR-GROUP ENERGY EFFICIENCY PROGRAM

- Target in 2020 environmental pledge, 20%
 - Achievable by driving strategy, improvements in traffic planning, co-operation with dispatcher, new rolling stock, load factor, reduction in shunting and increase in electric traction.
- EcoDrive program since 2008
- Energy metering project
- DAS project

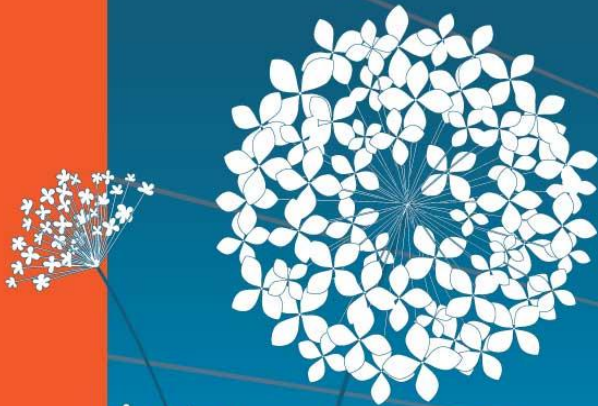




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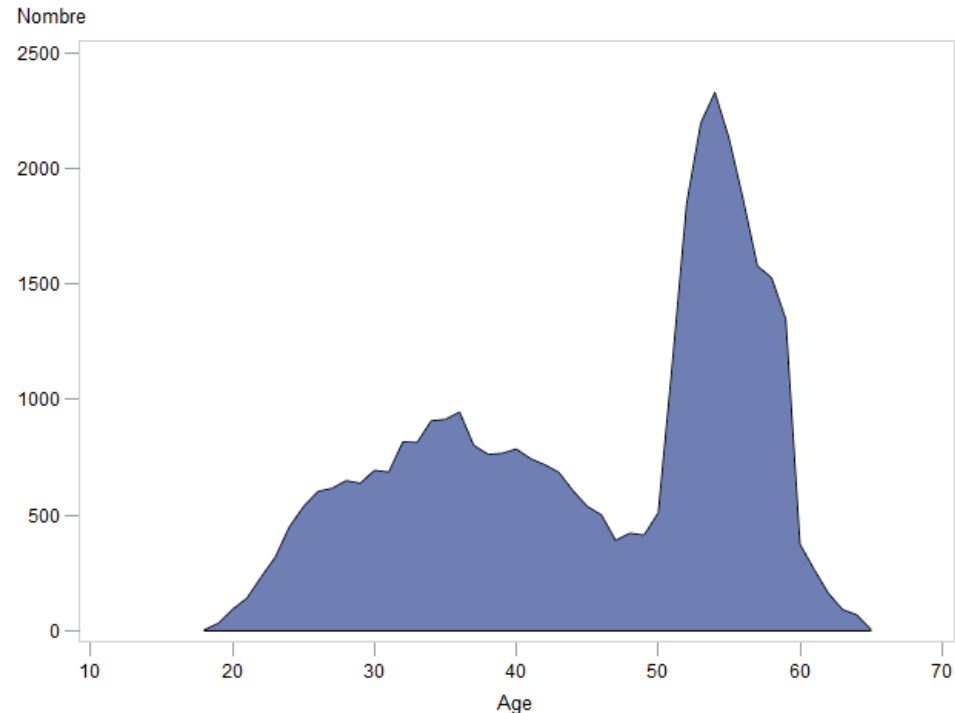
**Christian Smets,
Expert Corporate Recruitment, HR Rail**

USING A TRAIN SIMULATOR WITH AN
ECO-DRIVING MODULE TO ATTRACT
COMPETENT PEOPLE NEEDED BY
THE RAILWAY SECTOR



The Voice of Members

- 50% of our personnel will retire between 2014 -2022
- This year we will recruit +/- 1500 people, of which 360 train drivers
- We need 20 CV's to have 1 train driver start successfully



HRRail engage pour

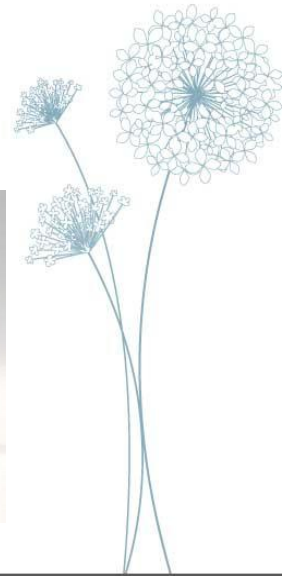
INFR/ABEL



Transurb Simulation → Railway Vehicles **Simulator** Specialist

- Light Rail Vehicle
- Metro
- Passenger Train
- Freight Train

Our solutions:



Challenges we faced:

- to develop a simulator that is self-explanatory to everybody
- to find the right balance between entertainment and instruction
- to show a tool that sets forward railway technology and ecological performance

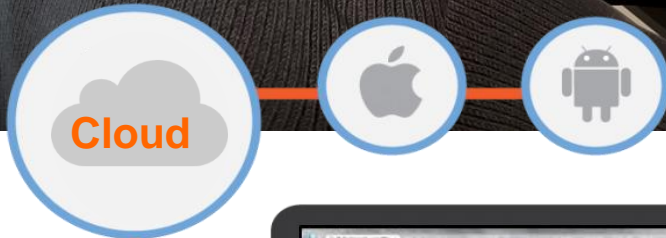


Scoring on:

- punctuality
- respect of signalisation
- Respect for speed limits
- Comfort driving style for customers
- Eco-drive principle



The Voice of Members



Web Player



Mobile applications

Video



Future

- September 2014: online version
- December 2014: mobile app
- 2015: Infrabel simulator to attract train drivers for work trains



The Voice of Members



HRail werft aan voor

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