

# Interoperable Locomotives for Central-Eastern Europe and main Corridors



## Locomotives for a changing Europe

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Infratrans 2007, Bucharest

**BOMBARDIER**

# Bombardier provides a large range of Platform Locomotives for the needs of the European Railways



# The TRAXX Platform of interoperable locomotives is the core business of Bombardier Division Locomotives



# TRAXX locomotives are used by an increasing number of Railways – throughout Europe

Die Bahn  HECTORRAIL  

 SBB CFF FFS Cargo   


>1050 TRAXX locomotives sold  
>700 TRAXX locomotives in operation








4 

# The TRAXX locomotives are available in 4 configurations, for the different catenary voltages

## TRAXX AC

15 + 25 kVAC



## TRAXX DC

3 kVDC



Italy, Spain,  
Poland

North-South  
& East – West  
corridors

## TRAXX MS

15/25 kVAC & 1.5/3 kVDC



Corridors to  
Benelux, Italy,  
Poland

## TRAXX DE

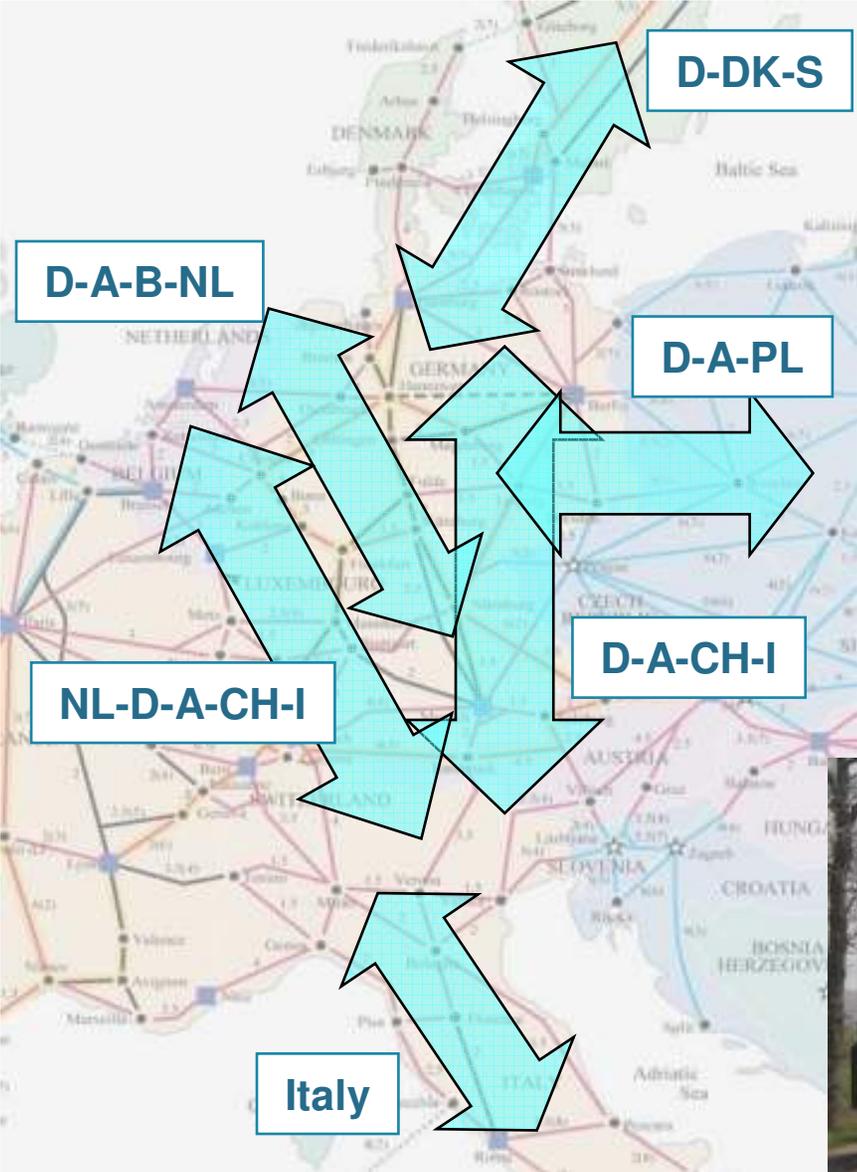
diesel-elektrisch



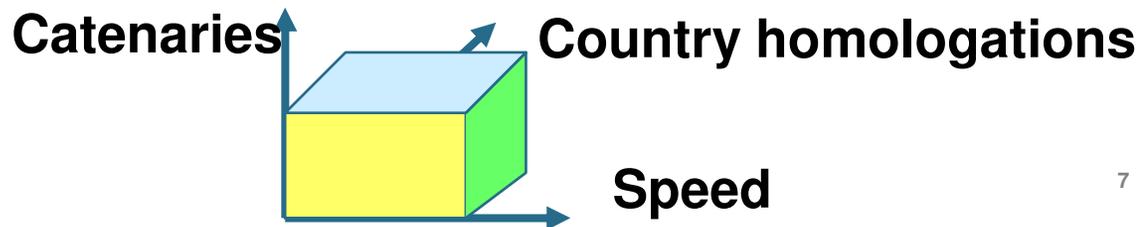
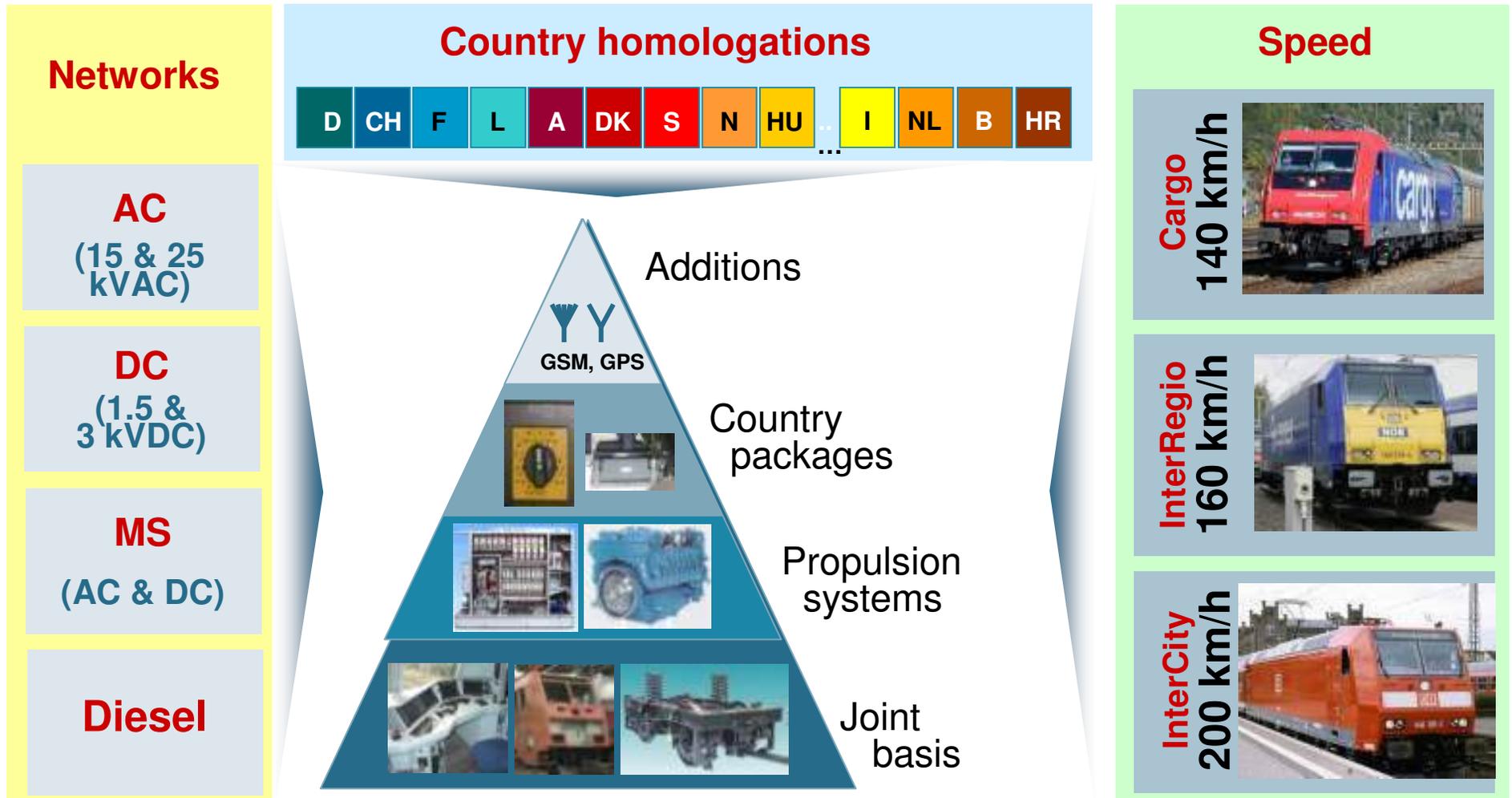
Non-electrified lines

TRAXX for cross-border

# New corridors are being opened in 2007 with the delivery of TRAXX AC, MS, DC & DE locomotives



# The TRAXX Platform is modular – in three dimensions



## The TRAXX locos are standard products

	TRAXX AC	TRAXX MS	TRAXX DC	TRAXX DE
Line voltage	15 + 25 kVAC	15 + 25 kVAC + 1.5 + 3 kVDC	3 kVDC	Diesel-electric
Mass	84 t	85.6 – 88 t	84 t	84 t
Length	18'900 mm			
Width	2'978 mm			
Height	4'280 mm			
Wheel base	2'600 mm			
Wheel diameter	1'250 / 1170 mm			
Power 15 & 25 kVAC	5'600 kW		--	2'200 kW diesel
Power 3 kVDC	--	5'600 kW		2'200 kW diesel
Power 1.5 kVDC	--	4'000 kW	--	2'200 kW diesel
Tractive effort	300 kN			270 kN
Braking effort	300 kN			150 kN
Driver's cab	air-conditionning & pressurization			
Speed	140 / 160 / 200 km/h			

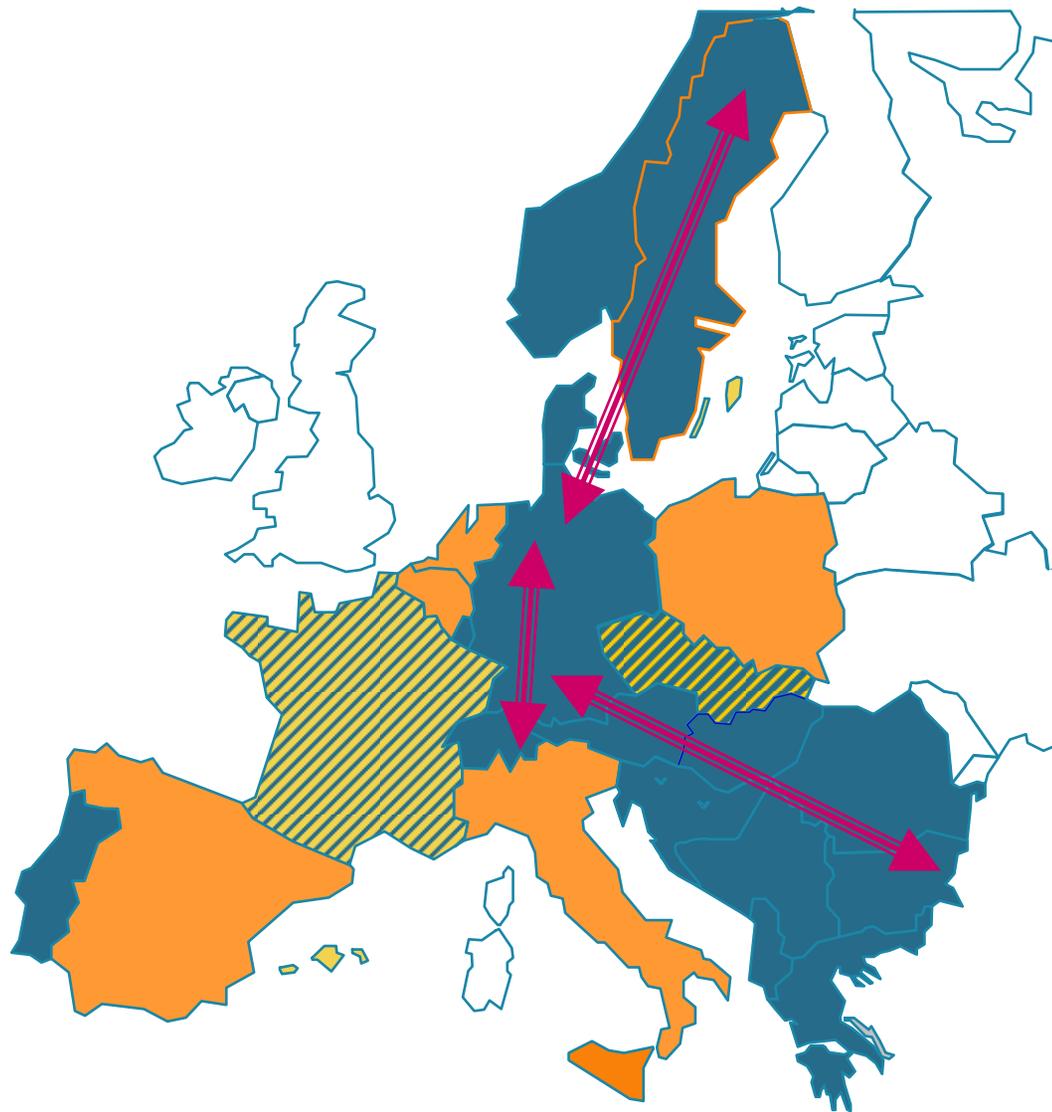
# The TRAXX diesel-electric loco has many advantages

## Specific features of the TRAXX DE

- It is very „quiet“; noise levels well below the TSI limits
- Driver's cab and machine room are spacious, uncluttered and a-typical of diesel locos
- It has a high tractive effort of 270 kN and high adhesion capability typical of E-locos
- It has a large tank of 4'000 liters and thus a larger operating range compared to other 4-axle D-locos
- Train heating functions flawlessly with DD and SD coaches (no problems with harmonics)
- It can operate on the whole German network, i.e. „Class C2“ and higher



## The TRAXX AC is for corridors in Europe with 15 and 25 kVAC catenaries. From Sweden to Romania.



- The TRAXX AC operates today in Germany, Austria, Switzerland, Luxembourg and France
- End 2007 it will begin operation in Denmark and Sweden
- It is ideal for Central and South-Eastern Europe.
- It can connect the Black Sea harbors with Western Europe

 DC catenary

 DC+AC catenary

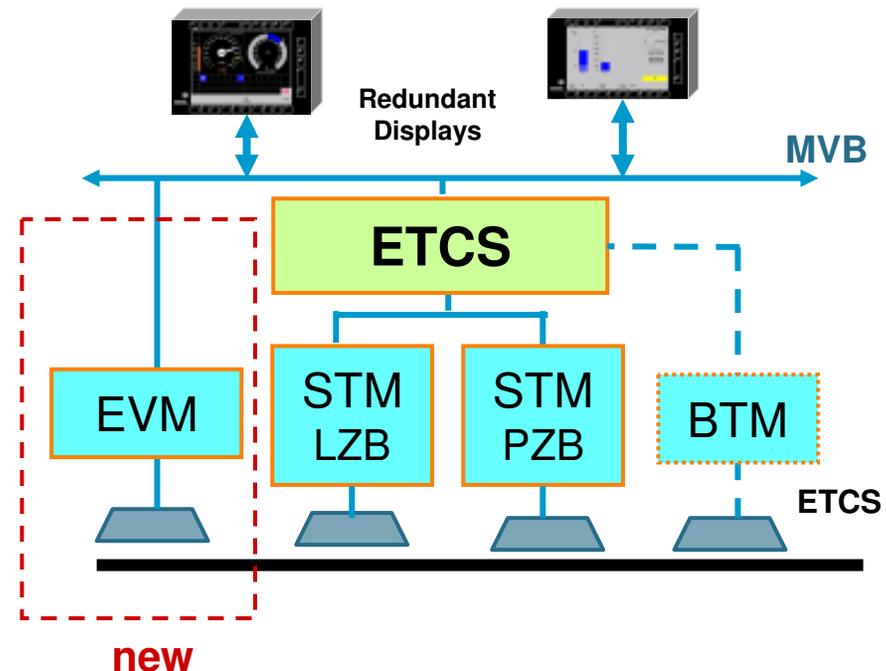
 AC catenary

# The TRAXX AC freight locomotives are now operating on Corridor 4: Germany – Austria – Hungary

- Operator: Floyd ZRt
- Direct trains from North German harbors to the Romanian border
- High quality services – reliable and punctual
- High performance with long and heavy trains



# The TRAXX AC locomotive is “best fit” for Corridor 4

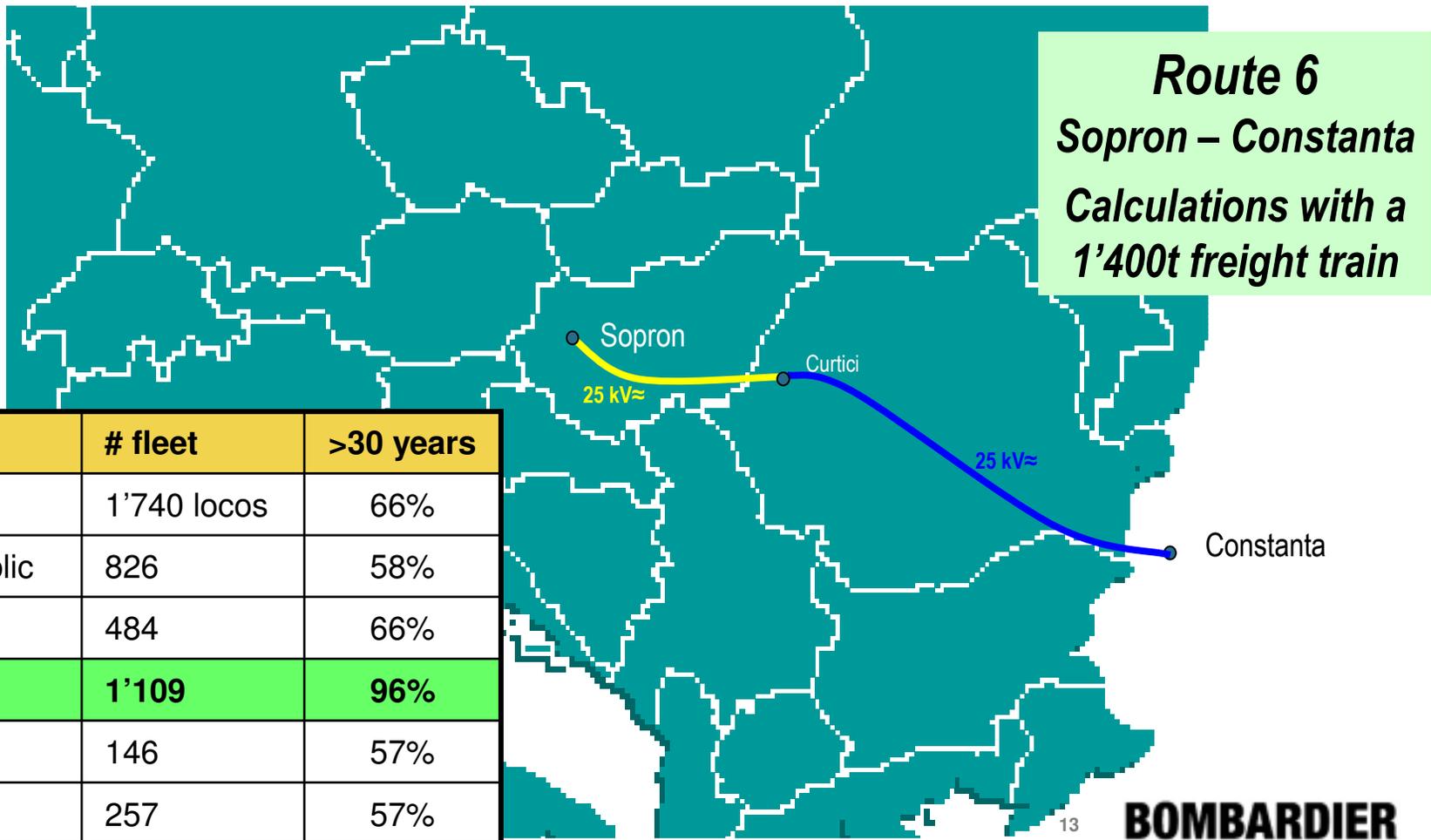


- **Corridor 4:** Main ATP systems are Indusi & EVM. Migration to ETCS is possible.
- Alternative Corridor 10 (D-A-SLO-HR-YU-BG-TR):
  - A more expensive multisystem locomotive is needed
  - Increased number of transit countries (EU regulations not fully implemented)

# In Romania there is an increasing need of fleet replacement.

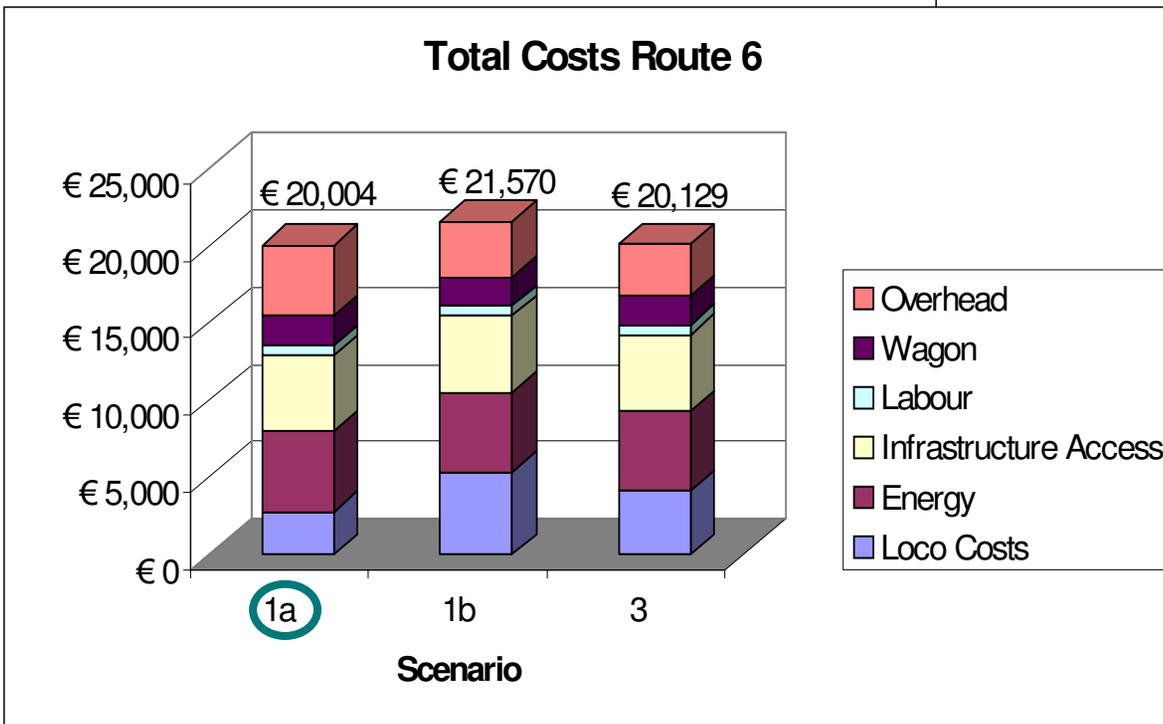
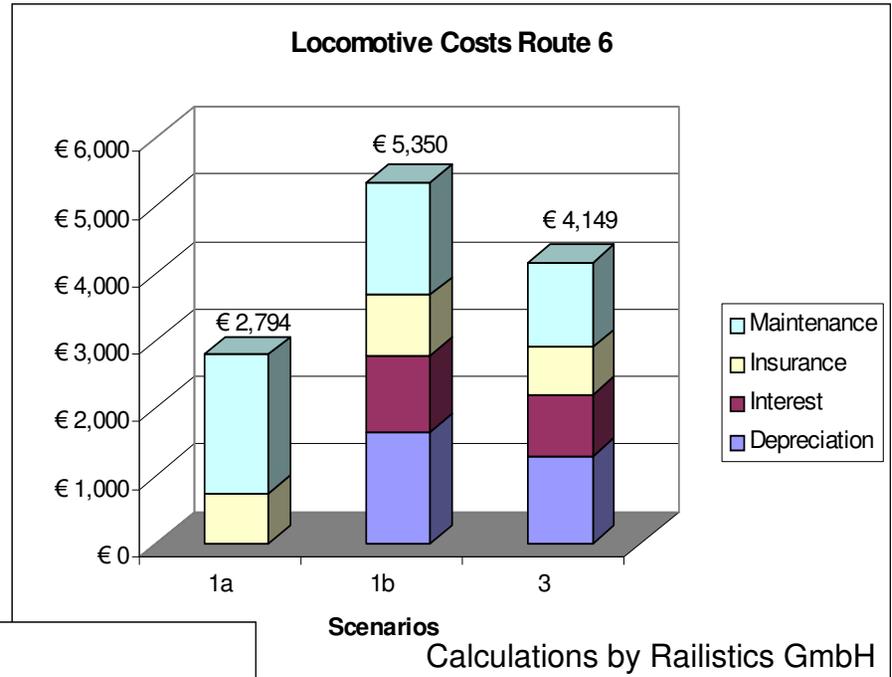
## Calculation of locomotive and total train costs for the variants ...

- TRAXX AC for a) one country, b) two countries, and ...
- comparison with existing locomotives



# Route 6: Sopron - Constanta

- The total **operating** costs of new locomotives are similar to old written-off locos
- TRAXX locomotives have higher performance → Increased profitability
- Recommendation: TRAXX AC for Corridor 4



## Scenario 1a

- Single-system old locos

## Scenario 1b

- TRAXX AC single-system

## Scenario 3

- TRAXX AC 2-country loco

**In Hungary the TRAXX AC pulled a record train of load 2'328 t, length = 745 m, starting on steep grades**



**Yes, it is possible to pull heavier and longer trains than with older locos, e.g. V43 or V63!**

See: Schweizer Eisenbahn-Revue 3/2001, p. 124 – 125;  
„Probefahrten einer Lokomotive der BR 185 auf der GySEV/ROeEE“

## The new TRAXX MS locomotive hauling a 3'340 ton train load, length 570m, in Poland



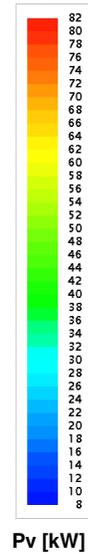
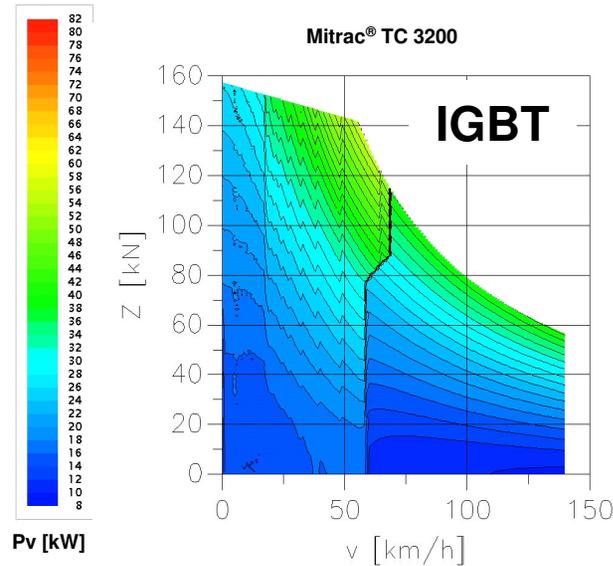
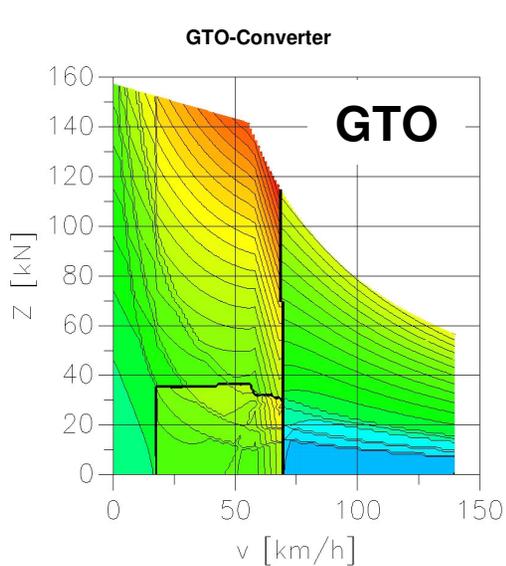
## The TRAXX locomotives are opening the corridors to the harbors in the Netherlands



### The TRAXX locomotive ...

- was first to operate on 25 kV, 50 Hz on the Betuweroute (16. Aug. 2005)
- pulled the inauguration train at the opening ceremony of the Betuweroute (16. June 2007)

# Bombardier TRAXX locomotives have IGBT propulsion → lower energy losses compared to GTO locos



**- 1% total energy costs**



- The driving style has a large influence on energy consumption
  - Energy consumption can be display to the driver
    - Consumed energy
    - Regenerated energy
- **Feed-back to the driver!**

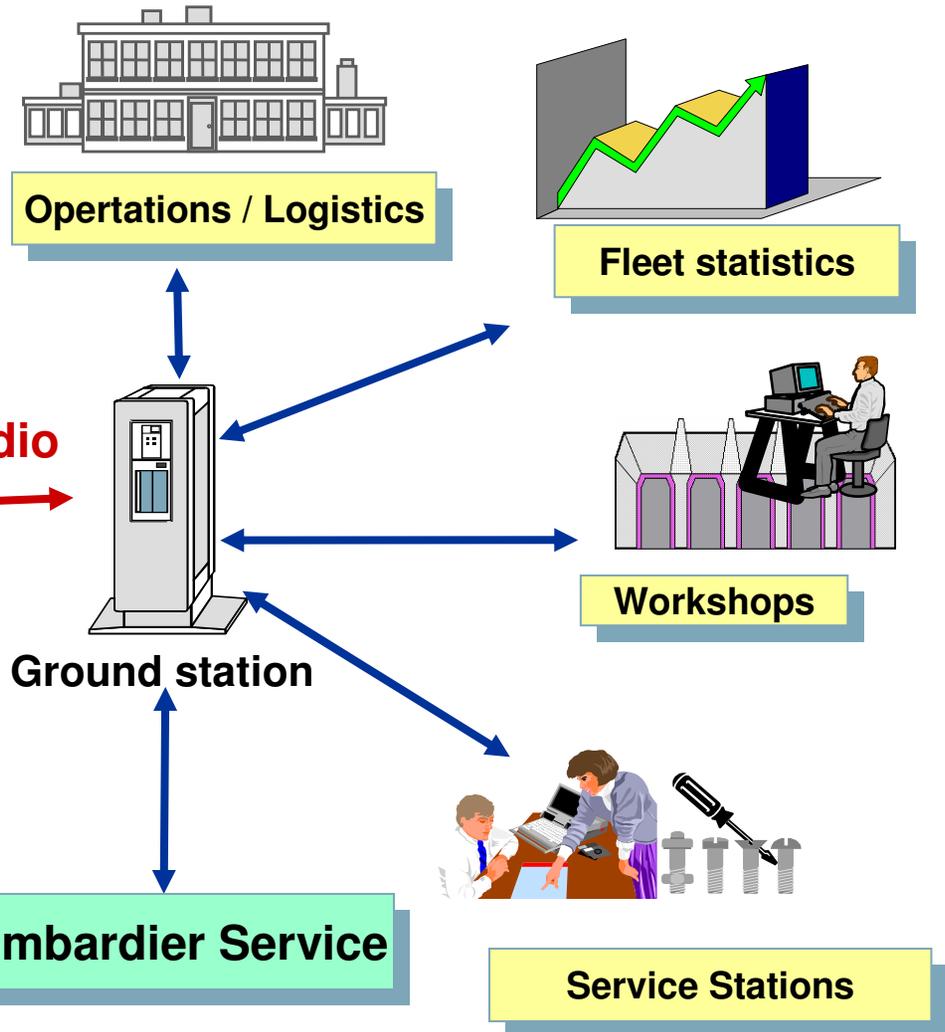


# Remote radio access lowers operating costs and improves operational logistics.

The TRAXX platform is equipped with GPS & GSM remote radio diagnosis.



GSM radio



# The TRAXX platform contributes to reducing operating costs and to increasing competitiveness

- **The TRAXX AC locomotive is best fit for Romania**
  - Technical performance and functionality
  - Standard and proven product
  - Short delivery schedules
- **High reliability and availability**
  - Service proven components and systems
- **High economical benefit over life time**
  - Large customer base provides opportunities for co-operations (in operation, maintenance, spare parts)
- **Strong market acceptance all over Europe**
  - Liquid market for buying, selling or renting
- **The railway has a choice of standard locomotive types based on the same technology for the networks: AC, MS, Diesel**
  - Flexibility for the future

# Thank you for your attention!



## TRAXX locomotives for Europe – and Romania