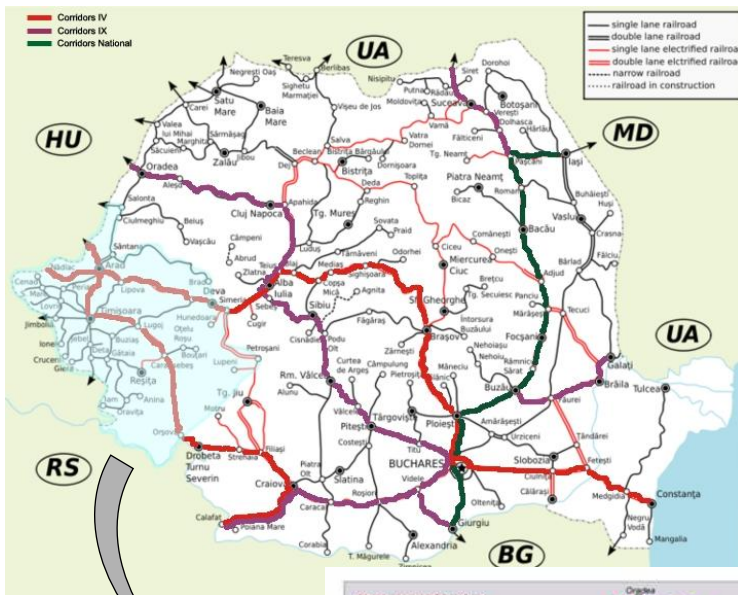


Timisoara Pilot Applications

- *Test objectives, methodology and results* -

General presentation of Timisoara region



This particular region was selected because:

- it contains some of the *most important Romanian cities* (Timisoara, Arad, Oradea, Deva)
- it includes one of the *most important national and international transport routes* (to Hungary, Serbia)
- it's connected to *the fourth Pan-European Corridor*, Berlin/ Nuremberg – Praga – Viena – Bratislava – Győr – Budapesta – Arad – Bucharest – Constanta/Craiova- Sofia – Thessaloniki – Istanbul, divided in Romania in two ramifications:



• Arad – Simeria – Braşov – Bucureşti – Constanţa

&

• Arad – Timişoara – Craiova – Calafat / Vidin – Sofia – Thessaloniki

Concept of the Pilot

ECORails proposes a new concept for awarding rail vehicles and services that promotes:

Energy Efficiency

Environmental Friendliness

Cost Efficiency

In a life cycle approach

by using

The ECORails Guidelines

WP4 Tests

Simulation of the awarding process based on the Guidelines

Verification of the Guidelines' manageability and quantitative targets

Test Sites

Berlin

Lombardy

Øresund

Timisoara

Objective of Timisoara Pilot Application

- Elaboration of an awarding documentation with the inclusion of EE and Env criteria with the view to procuring:
 - 10 DMU
 - 10 EMU

→ *This was considered as the minimum level of acquisitions needed in order to continue and to improve the rail passenger transportation*
- Testing the performance of the Guidelines and of the ECORails project

Steps of Timisoara pilot application

→ Simulation of a *competitive tendering procedure* for the acquisition of 10 DMU & 10 EMU:

- Step I
- Analysis of the current situation:
 - *Currently used rolling stock (10%)*
 - *Recent tenders - awarding documentation (5%)*
-
- Step II
- Preparation of the *acquisition project*:
 - *Awarding documentation without the ECORails concept/criteria*
 - *Awarding documentation drawn up using the ECORails Guide*
-
- Step III
- Draw up of *simplified offers for the new requests*
 - Evaluation of offers*
 - Result of the evaluation*
-
- Step IV
- Analysis and quantification of the results obtained through the new awarding procedure*
 - Recommendations with regard to the elaboration of the awarding documentation and to the offers' evaluation modality

Test methodology - Principles and stages

1. Draw up of Awarding Documentation:

– **Specification**

- Operational conditions
- User's technical requirements
- Reference to norms
- ECORails requirements and criteria
 - ✓ reduction of costs (LCC)
 - ✓ reduction of consumption
 - ✓ reduction of emission levels
- Technical data forms
 - ✓ measurable
 - ✓ comparable

– **Acquisition sheet**

- Calendar, including the period for clarifications for the tenderers
- Point rating grid (offers' evaluation)

– **Contract**

- Acceptance conditions/ field tests on the test track and in exploitation
- Clauses referring to the responsibilities and accountability of the contractor

Test methodology - Principles and stages

2. Simulation – Division by components method

→ *out of the 83 technologies and operational measures indicated in the ECORails project, 10 were selected and tested through the pilot application:*

1. Rolling stock configuration
2. Diesel Engine
3. Regenerative braking and utilization of the energy for auxiliaries supply
4. Regenerative braking and reusing of the regenerated energy at start-up
5. Train Control and Management System (TCMS)
6. Optimized control of equipment
7. Heating- Ventilation- Air Conditioning (HVAC) System Optimization
8. Driver Assistance System
9. Control of comfort functions in parked train
10. LCC analysis driven procurement

- Actual line tests with existing rolling stock
- Calculations and simulations
- Data from ECORails catalog, related projects, good practice examples, norms, manufacturer data, specialized literature, etc.

Analysis based on decisional matrices

Comparison with a large number of measurements and statistics related to train current service

Test methodology - Principles and stages

3. Comparison with current awarding and currently used rolling stock:

- Similar conditions
- Substantiation on the basis of calculations and statistical data processing
- Comparisons and simulations in accordance with the data from ECORails, Railenergy, Prosper, Event and other projects and specialized literature
- Conclusions

4. Prediction of the EE/Env potential by 2020

- Estimation of the increase in the volume of activity
- Estimation of the increase in market share
- Estimation of the increase in transport capacity
- Estimation of the EE on system level

Test methodology - Principles and stages

6. Recommendations

- ☛ Method for filling-in the documents
- ☛ Evaluation weights promoting the ECORails criteria
- ☛ Reference documents (ECORails Guidelines, EU Directives)
- ☛ Standard Forms allowing an easy comparison and evaluation of offers
- ☛ Methodology

7. Consultations

- ✓ At regional level
- ✓ At national level
- ✓ At European level

Test Results : Accomplishment of the ECORails performance indicators

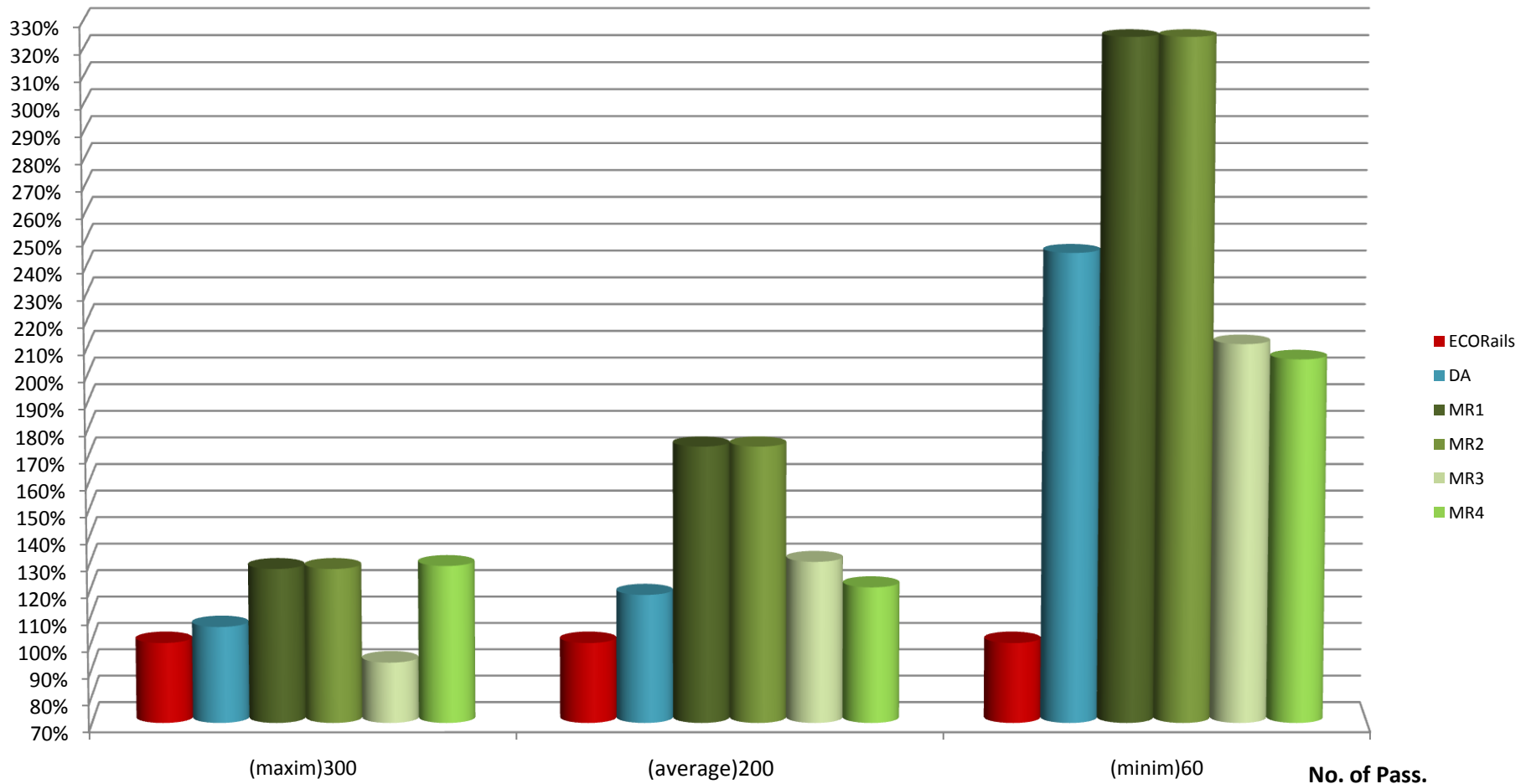
✓ Quantitative indicators:

- **10,5%** compared to current awarding
- **15,6%** compared to the currently used rolling stock
- **27,56%** at system level, by 2020

✓ Qualitative indicators - Manageability:

- Flexibility and adaptability to the needs and particularities of Timisoara test region
- Efficiency of the Guidelines for developing the awarding procedure in test site Timisoara
- Acceptability and participation by the Timisoara Site Stakeholders Group

Energy consumption vs. train configuration



Comparison of specific indicators for the analyzed diesel engines

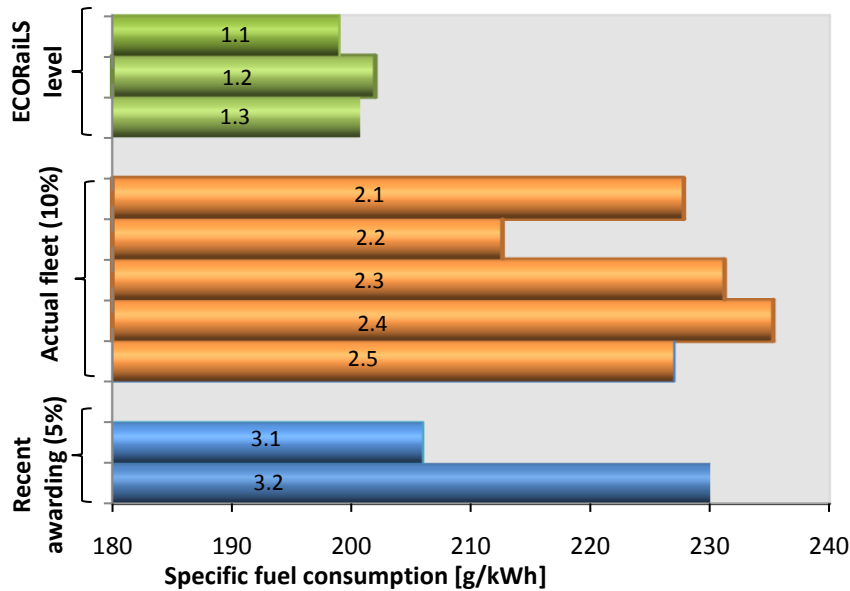


Fig.1 Distribution of specific fuel consumption over the analyzed engines

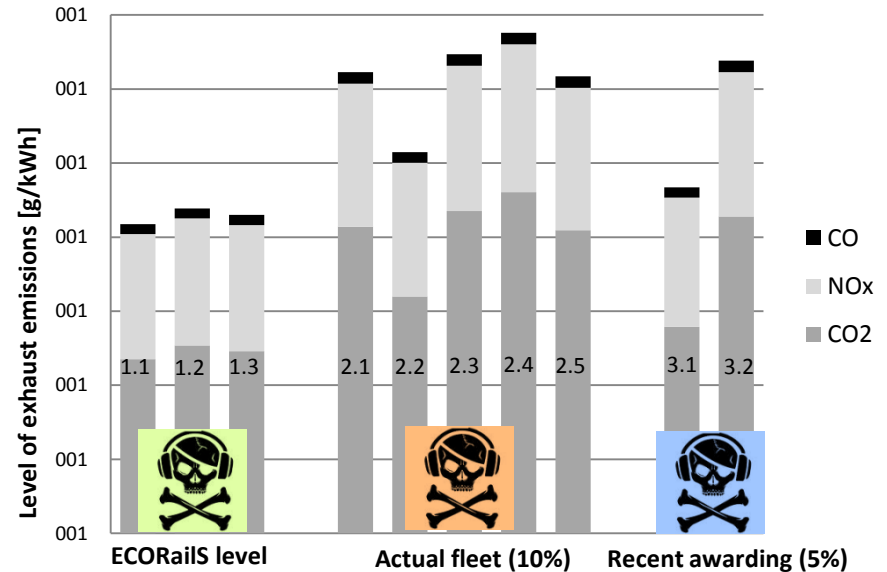


Fig.2 CO₂, NO_x and CO specific emissions of the analyzed engines

Conclusions regarding the analysis of the Diesel Engines

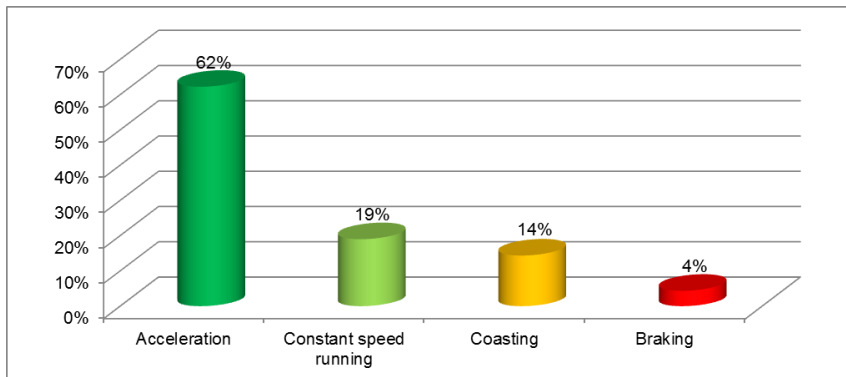
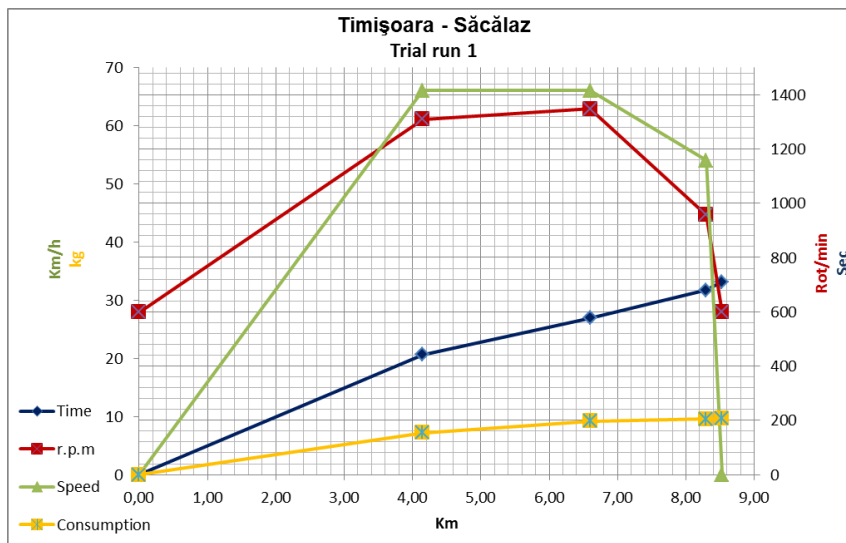
- 1) The fuel savings for Stage IIIB engines is between: 0 5% (Diesel Rail Study project)
- 2) Noise: the competitive diesel engines have features that recommend their fitting on rolling stock in accordance with: EU Directive 2006/66/EC , Directive 2002/49/EC and Commission Decision no. 2004/446/CE-TSI.
- 3) The maintenance costs for Stage IIIB engines are reduced by: 5 15% (Diesel Rail Study project)

We obtained a decrease of specific fuel consumption and exhaust emissions level:

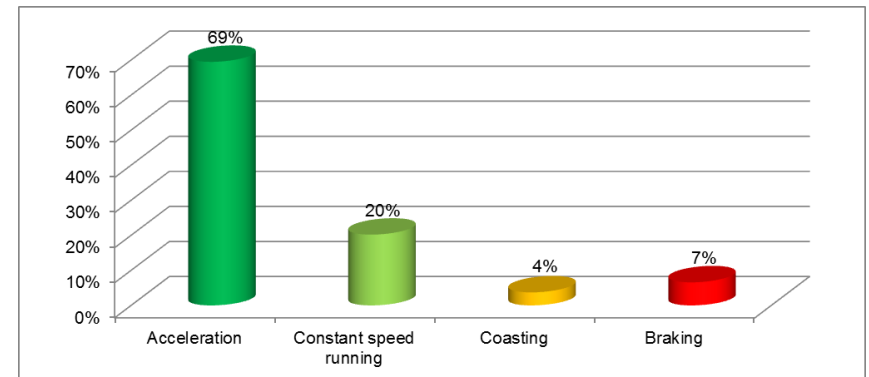
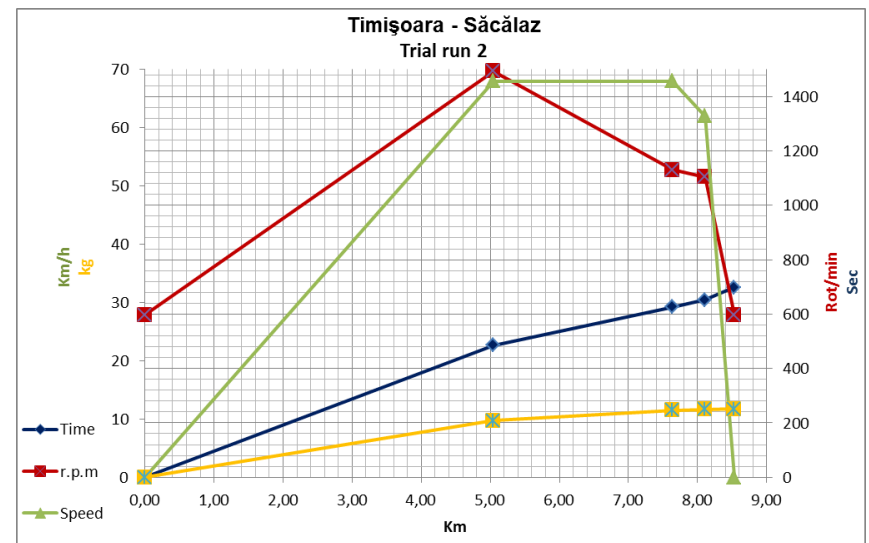
- in comparison with current awarding (ECORails objective: 5%) of 8,5 %
- in comparison with currently used rolling stock (ECORails objective:10%) of 12,0 %

Energy Efficient driving tests

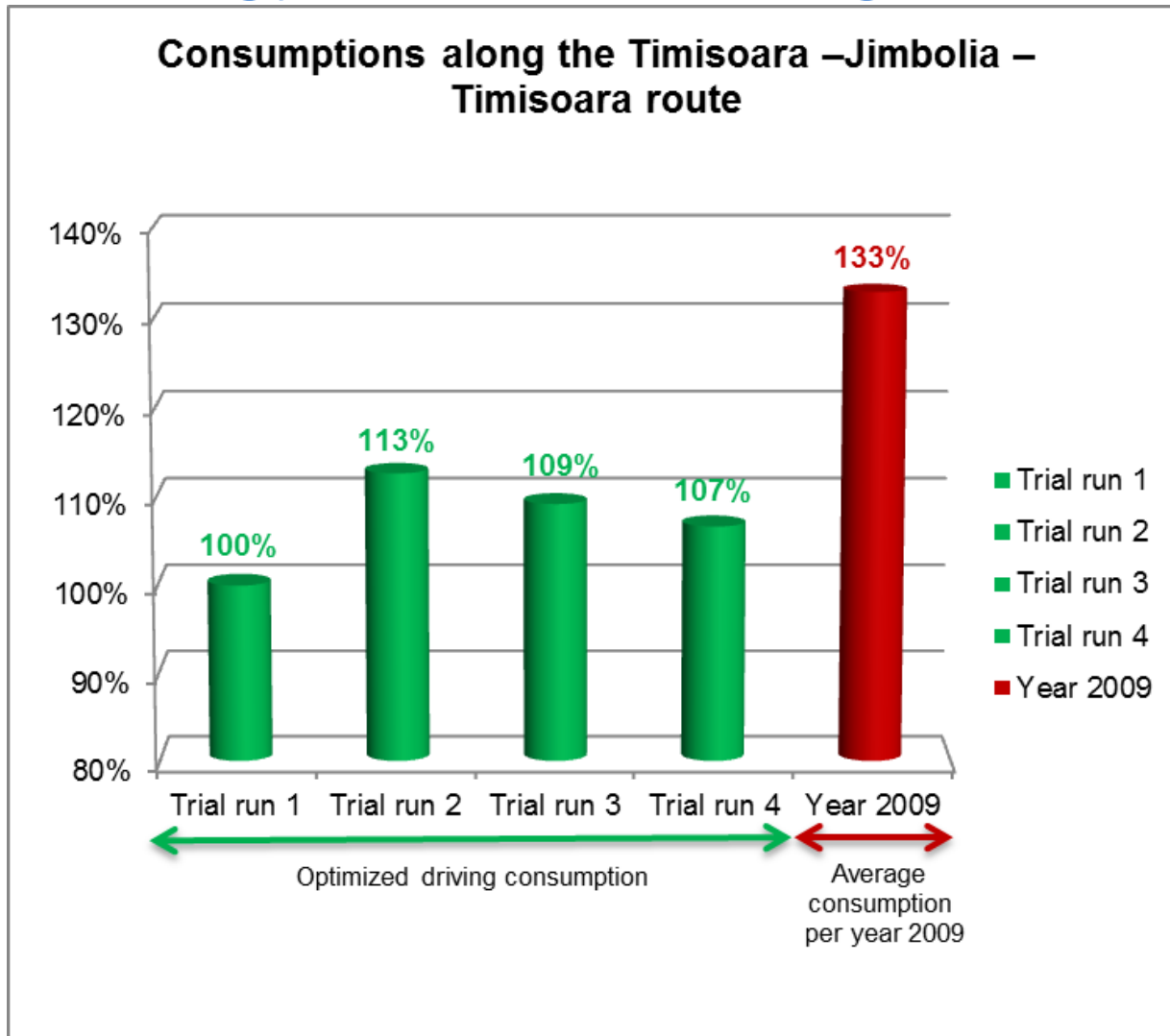
Trail run 1: consumption 9,6 kg



Trail run 2: consumption 11,7 kg



Energy Efficient driving tests



System wide improvement potential for 2020

Calculated energy efficiency potential for Timisoara (compared to currently used rolling stock)	15,85%			
Factors that lead to a system wide increase of energy efficiency	Indicator target	Additional energy efficiency by 2020		
		Pessimistic	Probable	Maximum
Increase in market share	5,16%	x	2,90%	2,90%
Increase in volume of activity (train-km)	49,96%	x	7,92%	7,92%
Average increase in capacity (seats)	5,62%	x	0,89%	0,89%
Fully applicable ECORails criteria (compared to current awarding)	10,91%	x	x	15,13%
Total		15,85%	27,56%	42,69%

Conclusions

- **The quantitative ECORails indicators can be exceeded**
- **The application of the ECORails methodology is advantageous for:**
 - ✓ **Users** – important economic effects over the life cycle
 - ✓ **Suppliers** –the suppliers of innovative solutions are in advantage, the long term partnership with the user
 - ✓ **Public**- the quality of life increases and assures the basis for a sustainable transportation
- **Conditions for the fast and efficient application of the ECORails methodology:**
 - ✓ National and EU level **political decision**
 - ✓ **Firm management** for the application and follow-up during exploitation and maintenance

Conclusions drawn from questionnaires

The Timisoara test showed that:

- the users are strongly convinced by the achievement of the quantitative targets
- the Guidelines can be successfully used to integrate energy efficiency criteria and environmental criteria in the awarding of rolling stock
- the users regard the awarding of rail vehicles based on energy efficiency, environment and cost criteria as difficult process but nonetheless important

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