

# Stakeholder Forum Brussels 24th June 2010

Roadmaps for achieving energy efficiency and  
environmental benefits by awarding:

## **The ECORails Guidelines**

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## Content

- 1) **Positive examples**
- 2) General aims of the Guidelines
- 3) Structure and approach of the Guidelines
- 4) Selected aspects chapter by chapter

## Positive examples (& some ideas)

- Energy efficiency was decisive at recent tender by Swiss SBB for new double-deck stock.
- Several TOCs use eco-driving, some of them systematically use software advices and technical equipment for this purpose.
- Recuperation (feeding braking energy into the grid) is already standard for new electric tractive units.
- Supercaps (storage of energy) already in every day operation on some tramway systems
- Recuperation is standard for new diesel equipment with electric transmission, but cannot be used yet for traction.
- New technologies for recuperation in diesel operations being developed or studied
- Life cycle assessment of energy consumption has already been made (EMUs for e.g. Stockholm suburban railways, metros of Oslo and Hamburg)

## Positive examples (& some ideas)

- Hamburg city and suburban railway uses only electricity from renewable sources (DC network).
- So do the Danish electric passenger trains (AC network; encouraged by Banedanmark).
- Biogas driven railcar in Sweden (local supply infrastructure)
- Operation with hydrogen propulsion under consideration (local supply infrastructure)

## Positive examples (& some ideas)

- New railway rolling stock usually 5-15 dB more silent than in the 1980s/1990s.
- Some classes of EMUs and diesel locos proved to be better than required by TSI Noise.
- Ambitious noise values required or encouraged by PTAs (e.g. LNVG, VBB)
- Val Venosta line and Ferrovia Circumvesuviana (FCV) use damped wheels in order to avoid noise. In case of FCV thus investments for protection walls could be avoided.

## Content

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# Guidelines to be the main output of ECORails

Guidelines for including ecological (mainly energy-efficiency) criteria into award procedures

- comprising the main economical, ecological and political arguments
- containing a comprehensive list of relevant criteria
- to be used to choose, to concretise and to evaluate energy efficiency criteria as well as noise and pollutant criteria (short: “EE/ENV”)
- showing present and future potentials and solutions for saving energy in regional passenger rail transport
- showing responsibilities of PTAs, TOCs, IMs and suppliers

# General aims of the Guidelines

- to convince the responsible persons in the PTAs to include energy efficiency criteria in their awarding procedures  
(political level, government, heads of departments / management units, persons who compile tender documents, contracts etc.)
- [to provide a toolbox and show how to use it](#)
- to help the Train Operating Companies (TOC's) to deal with the new requirements
- to show which achievements can be reached in regional passenger transport (short, middle and long-term perspective)

## Content

- 1) Positive examples
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- 3) **Structure and approach of the Guidelines**
- 4) Selected aspects

<u>Main phases at PTA in a typical award project:</u>		<u>Main associated actions at PTA:</u>	
Competitive Awarding	Direct Awarding / In-house provision	Competitive Awarding	Direct Awarding / In-house provision
A. Preparation		A. Definition of the award project: decision on award procedure; identification of needs, options and targets	
B. Elaboration		B. Elaboration of ITT / (direct) contract text plus planning of phases D-G; publication of tender documents	
C. Response to tender	C. + D. + E. Negotiation	C. Mainly bidding operators to work; PTA to answer bidders' questions	C. + D. + E. Agreement on the contractual clauses and on the economical and technical details of the contract
D. Evaluation and awarding		D. Evaluation, decision and justification; communication of the result	
E. Negotiation		E. Further negotiations and specifications; preparation of the contract	
F. Preparation of contract period		F. Verification of performance with selected operator; preparing of monitoring	
G. Follow up during the contract period		G. Monitoring and bonus/penalty awards on annual basis	

# Guideline structure (test version)

## Focussing on the 7 phases (+strategy) of awarding

### 4 Levels of description:

1st level: Chart with phases of awarding, actions by PTA and steps for including EE/ENV criteria

2nd level: Description of the process with references to further information (in the GL)

3rd level: Clear description of the single steps, criteria and technologies/operational measures

4th level: Additional background information (Annex and/or ECORails website, links)

# Guideline structure (test version)

1. Introduction
2. European law relevant for awarding and tendering
3. Strategic considerations for the successful application of EE/ENV criteria
4. Including EE/ENV criteria into the awarding process
  - 4.1 / 4.2 Diagrams
  - 4.3 Description of the process
5. EE/ENV Issues to be considered for the strategy and phase A (“Preparation”)
6. Detailed description of criteria, including legal aspects
7. Conclusion, further steps and open questions

Annexes

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- Annexes
- 1st level: Chart with 7 phases of awarding, actions by PTA and steps for including EE/ENV criteria
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## Content

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*Annexes*

## Relevant European Law for awarding

- **Non-discrimination**

No contracting entity may, for example, give preference to a local company simply because it is located in the municipality.

- **Equal treatment**

All suppliers involved in a procurement procedure must, for example, be given the same information at the same time.

- **Transparency**

The contract document has to be clear and unambiguous and contain all the requirements made of the items to be procured.

- **Proportionality**

The subject matter of the contract must have a natural relation to the supplies, services or works which are being procured and not be disproportionate.

## European law relevant for awarding and tendering

### Main result:

- EU legislation explicitly encourages the application of environmental criteria!
- PTAs have freedom of manoeuvre WHAT to award and ...
- which quality criteria to apply
- There are restrictions HOW to award.
- Great flexibility (although not unlimited) in case of awarding rail passenger services: types of awarding procedures (tenders, direct awarding, in-house provision), contract duration, selection of TOC, definition of criteria
- At present no substantial additional limitations by national legislation
- If the PTA procures vehicles or when it comes to specifications about the rolling stock in tenders for rail services, the EU procurement directives have to be respected.

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- Great flexibility (although not types of awarding procedures)
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Legal restrictions are not the main obstacles, but technical expertise, analysis of markets and technologies and economic aspects

- If the PTA procures vehicles or when it comes to specifications about the rolling stock in tenders for rail services, the EU procurement directives have to be respected.

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Energy costs are one of the financial burdens of a TOC. Why should a PTA additionally request energy savings when contracting out passenger rail services?

- Transparency: At present, there is usually a lack of information about energy consumption.
- In some cases energy costs are born directly by the PTA and not by the TOC.
- In some cases energy is not charged according to the real consumption (e.g. fixed percentage of the track access fee).

*(Some institutional changes might be helpful!)*

## Why should a PTA request energy savings when contracting out passenger rail services?

- Actual energy prices do not sufficiently reflect the urgency of climate protection.
- Actual energy prices do not sufficiently reflect future shortages of energy supply.
- PTAs may accelerate innovations in terms of energy efficiency. This is reasonable with respect to the needs of transport and climate policy.
- Cost calculations of bidding TOCs focus on the first period of operation (usually not more than 1/3 of the vehicle's lifetime).
- If the PTA owns the rolling stock, EE means risk reduction (future usability, higher residual value, longer lifetime).

# Timeframe of awarding and EE/ENV criteria

## Options:

- Public announcements about ENV/EE criteria well in advance
- Clear environmental strategy
- Coordinated action with other PTAs
- Incentives instead of requirements
- “Postponed” requirements
- Incentives for later modernisation
- (Modernisation paths, flexibility for testing)

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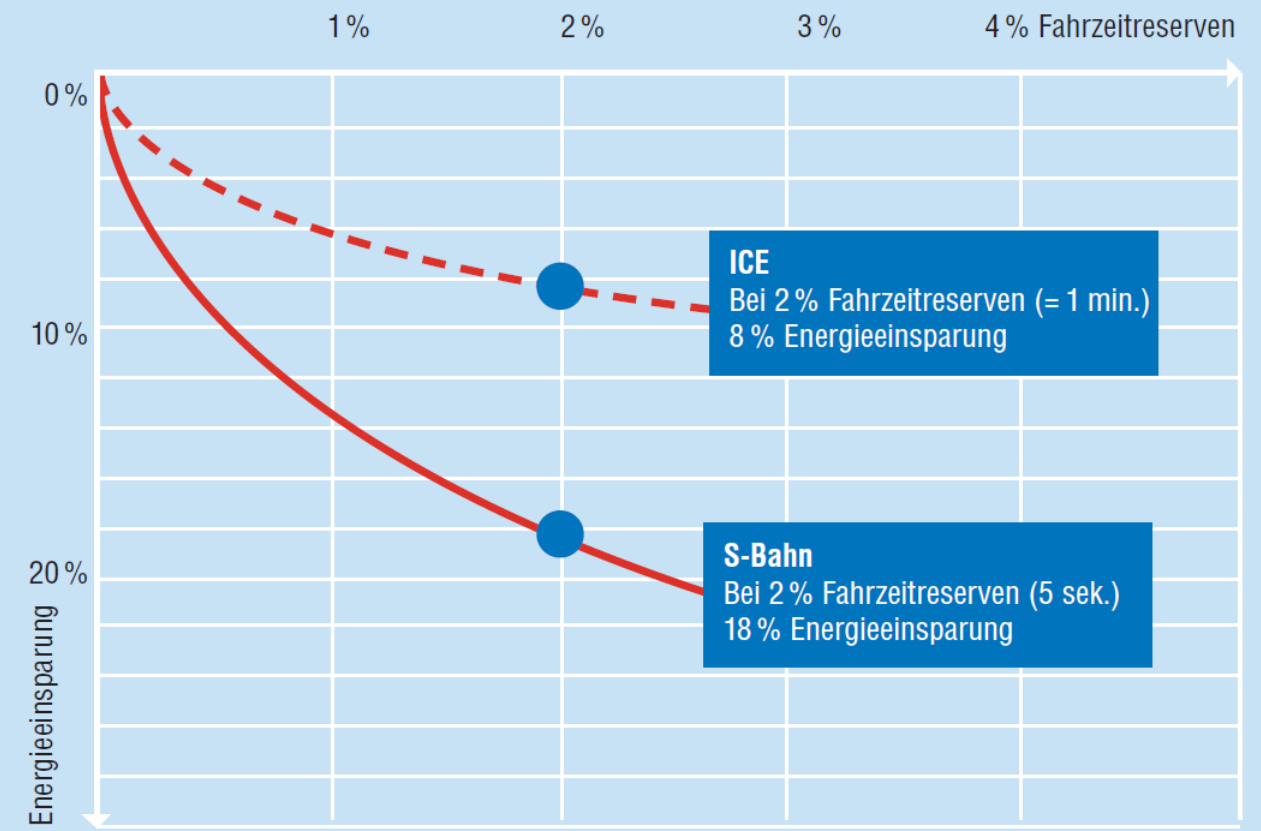
## Basic decisions of PTAs which could influence energy efficiency and environmental performance of rail passenger services (chapter 5.3 GL)

- Quality of infrastructure (tracks, level crossings, management of operations)
- Integral Regular Timetable
- Spare time in the timetable
- Stops on request
- Weakening and strengthening of trains
- Avoiding of empty running trains
- Vehicle concept
- Electrification
- Diesel under wire

spare time and saving energy  
1st priority: run on time  
2nd priority: in case of spare time drive energy-efficient

## Fahrzeitreserven und Einsparungen

- 1. Priorität: pünktlich fahren
- 2. Priorität: Bei verfügbaren Fahrzeitreserven: Energie sparend fahren



Quelle: DB AG



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## Main ways of including EE/ENV criteria

- Requirements
- Higher scoring for preferred solutions or better performance (→ weighting schemes)
- Penalties
- Incentives (bonus/malus (used during contract period but defined in the contract/awarding documents))

## Requirements:

- TOC/Manufacturer must fulfil the specified criteria.
- PTA needs to check before whether bidders can fulfil these requirements.
- Simple evaluation of offers (yes/no)
- Compliance must be checked → penalties if necessary.

Recommended for detailed monitoring system for energy consumption, eco-driving and driver training, parked train control systems, on-board equipment for energy recovery/storage (electric operation), maintenance procedures, emission limits (noise, pollutants).

## Higher scoring for preferred solutions or (promised) better performance

- Used in the evaluation of tenders (weighting schemes)
- additional scores for offers with good EE/ENV quality
- Useful instrument when availability, costs and reliability of technologies are unclear to the PTA

Recommended for advanced energy consumption limits/objectives and mainly for innovative technologies (e.g. onboard energy storage), also for ambitious noise or pollutant values.

## Penalties

- Penalties can be applied in case of non-compliance to requirements during contract period.
- Also in case of non-compliance with offered / agreed standards
- Can be used as negative incentive in order to avoid bad performance.

## Incentives (bonus/malus)

- Optionally used as incentive for good real life performances during contract period
- Bonus and penalties requiring monitoring of operators' actual performances
- Applicable when including indicators (e.g. kWh/seat km)
- May also be used for investments during contract period (e.g. procurement of new rolling stock; retrofit).

## Preferred criterion: “kWh per seat km / train km”:

- train configuration has to be defined (→ train km)
- comfort definitions, calculation of multi-purpose areas (→ seat km)
- In railway operations the energy consumption highly depends a.o. on timetable, infrastructure conditions, train configuration, occupancy...
- Standard Service Profile (SSP, *Railenergy*) can be used (“Suburban”, “Regional”, “Intercity”)
- Specific service profile of the operation in question can be used.

## Bidders need information about (a.o.)

- Infrastructure: longitudinal profile, speed profile, curves, tunnels, electric power supply system
- Operational requirements: propulsion system (diesel/electric), timetable, pay load, regenerative braking, comfort functions (in-service)
- Environmental (ambient) conditions: ambient temperature, humidity, intensity of sunlight, average head wind
- Simulations of bidders and manufacturers should be carefully examined, because methodological inconsistencies could lead to wrong assessments!

# Overview of criteria

**Direct indicators (performance values)**

- kWh per
- train km
  - seat km
  - passenger km

**Indirect indicator**

mass per seat

**Parked train mode**

comfort functions

**Technologies**

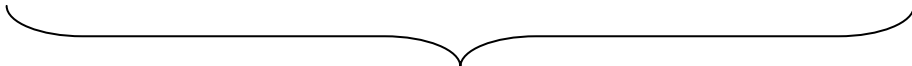
- most prominent
- recovery of braking energy
  - braking energy / onboard equipment
  - braking energy / fixed installations

**operational measures**

- most prominent
- energy-efficient driving



traction energy consumption



- assessment of risks and costs (LCC, CBA)
- state of the art
- availability on the market
- future availability on the market



# Overview of criteria

**Direct indicators (performance values)**

**Indirect indicator**

**Parked train mode**

**Technologies**

**operational measures**

- Estimate overall potential
- Weight the criteria within the field of EE/EF
- Weight the criteria against other quality criteria
- Weight the criteria against costs

- traction
- energy
- consumption

- assessment of risks and costs (LCC, CBA)
- state of the art
- availability on the market
- future availability on the market



# Overview of criteria

Direct indicators (performance values)

Indirect indicators

Parked train

Technologies

operational

Nevertheless: The analysis of technologies has, although it is essential, merely complementary functions in the ECORails context.

- Estimate overall potential
- Weight the criteria within the field of EE/EF
- Weight the criteria against other quality criteria
- Weight the criteria against costs

- traction
- energy
- consumption

- assessment of risks and costs (LCC, CBA)
- state of the art
- availability on the market
- future availability on the market



A first selection (“shortlist”) of indicators and single solutions/clusters was agreed by the consortium (Copenhagen, Oct. 2009).

- Direct indicators (“performance values”), e.g. kWh/train km etc.
- Weight per seat as indirect indicator
- Eco-Driving
- Parked trains (stand-by functions)
- Energy recovery (both diesel and electric)
- Energy storage

The real performance of the operator should be monitored

- TOC (or manufacturer) should keep to its promises.
- PTA gets important information about energy consumption and energy costs which is helpful for future awarding and long-term strategic planning.
- Requirements and pre-conditions for monitoring must be announced in tenders and confirmed in contracts.
- Necessary equipment and resources must be required and calculated.
- Malperformance may lead to →penalties.
- Very good performance may lead to bonus payment.

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**Thank you for your attention!**

<u>Main phases at PTA in a typical award project:</u>		<u>Main associated actions at PTA:</u>	
Competitive Awarding	Direct Awarding / In-house provision	Competitive Awarding	Direct Awarding / In-house provision
A. Preparation	Details in Chapter 5	A. Definition of the award project: decision on award procedure; identification of needs, options and targets	
B. Elaboration		B. Elaboration of ITT / (direct) contract text plus planning of phases D-G; publication of tender documents	
C. Response to tender	C. + D. + E. Negotiation	C. Mainly bidding operators to work; PTA to answer bidders' questions	C. + D. + E. Agreement on the contractual clauses and on the economical and technical details of the contract
D. Evaluation and awarding		D. Evaluation, decision and justification; communication of the result	
E. Negotiation		E. Further negotiations and specifications; preparation of the contract	
F. Preparation of contract period		F. Verification of performance with selected operator; preparing of monitoring	
G. Follow up during the contract period		G. Monitoring and bonus/penalty awards on annual basis	

	<u>Main awarding phases:</u>	<u>Main associated actions at PTAs:</u>	<u>Actions at PTA concerning energy efficiency and further environmental criteria</u>
<b>A</b>	<b>Preparation</b>	Definition of the award project; decision on award procedure; Identification of needs, options and targets	<ul style="list-style-type: none"> <li>• Analysis of the actual situation (environmental performance, “baseline”)</li> <li>• Identification of main environmental problems</li> <li>• Identification of mandatory and non-mandatory target levels for energy consumption, noise and pollutants</li> <li>• Market analysis (technological potentials, economic and legal restraints)</li> <li>• Draft definition of targets in terms of energy efficiency, noise and pollutants</li> <li>• Draft prioritisation and weighting</li> <li>• Decisions concerning new, refurbished or existing rolling stock</li> </ul>

	<u>Main awarding phases:</u>	<u>Main associated actions at PTAs:</u>	<u>Actions at PTA concerning energy efficiency and further environmental criteria</u>
<b>B</b>	<b>Elaboration</b>	Elaboration of ITT / (direct) contract text plus planning of phases D-G; publication of tender documents	<ul style="list-style-type: none"> <li>• Analysis whether and how the criteria can be evaluated, validated and monitored</li> <li>• Clear definition of environmental criteria (requirements, target values, performance specifications, penalties, incentives...)</li> <li>• Definition of priorities and weighting against other criteria</li> <li>• Definition of how to monitor the compliance</li> </ul>

	<b><u>Main awarding phases:</u></b>	<b><u>Main associated actions at PTAs:</u></b>	<b><u>Actions at PTA concerning energy efficiency and further environmental criteria</u></b>
<b>C</b>	<b>Response to tender / quote request</b>	Mainly bidding operators to work; PTA to answer bidders' questions	

	<u>Main awarding phases:</u>	<u>Main associated actions at PTAs:</u>	<u>Actions at PTA concerning energy efficiency and further environmental criteria</u>
<b>D</b>	<b>Evaluation and awarding</b>	Evaluation, decision and justification; communication of the result	<ul style="list-style-type: none"> <li>• Evaluation of offers in terms of environmental criteria</li> <li>• Assessment whether the selected offer is realistic and reliable in terms of environmental performance</li> </ul>

	<u>Main awarding phases:</u>	<u>Main associated actions at PTAs:</u>	<u>Actions at PTA concerning energy efficiency and further environmental criteria</u>
<b>E</b>	<b>Negotiations</b>	Further negotiations and specifications; preparation of the contract	<ul style="list-style-type: none"><li>• Definition of more detailed specifications if necessary</li><li>• Definition of verification and monitoring procedures</li><li>• Detailed definition of incentive or bonus / penalty regimes according to the performance offered by the bidder</li></ul>

	<u>Main awarding phases:</u>	<u>Main associated actions at PTAs:</u>	<u>Actions at PTA concerning energy efficiency and further environmental criteria</u>
F	<b>Preparation of contract period</b>	Verification of performance with selected operator; preparing of monitoring	<ul style="list-style-type: none"> <li>• Verification of environmental performance as far as it is possible before starting the operation (especially vehicle design)</li> <li>• Test runs for the verification of energy consumption</li> </ul>

	<u>Main awarding phases:</u>	<u>Main associated actions at PTAs:</u>	<u>Actions at PTA concerning energy efficiency and further environmental criteria</u>
<b>G</b>	<b>Follow up during the contract period</b>	Monitoring and bonus / penalty awards on annual basis	<ul style="list-style-type: none"> <li>• Monitoring of real-life energy consumption / environmental performance (application of bonus/penalty if necessary)</li> <li>• Verification and monitoring of operational measures</li> <li>• Verification measures as in phase F if further procurement or refurbishment is foreseen during the contract period</li> <li>• Verification and monitoring if environmental performance is affected by maintenance or vehicle quality</li> <li>• Identification and overcoming of obstacles for better environmental performance (in co-operation with the bidder when appropriate)</li> </ul>