

**ECORails –
Energy efficiency and environmental criteria in the awarding of regional rail transport
vehicles and services**

ECORails

**Deliverable 23:
Training Module for the Guidelines
Annex 01:
Part 1 - The Guidelines in a glance**

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Approval

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The Guidelines in a glance

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Content

- **Concept of the Guidelines**
- Strategic considerations and basic decisions
- Main types of criteria and instruments
- Evaluation of rolling stock
- Monitoring operations
- Pollutants
- Noise
- Publication of the Guidelines and additional documents

Concept of the Guidelines

- Enable PTAs to make good strategic decisions on service, timetable and operations in terms of energy efficiency
- Extend awareness for “green” technologies and information on ecology-oriented strategies for procurement
- Provide detailed specification of energy efficiency and environmental matters for rolling stock and services related to regional passenger rail transport
- Provide standardised methods but not invent own standards competing with UIC 345 or TEC REC 100 001

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**Provide a toolbox and
show how to use it**

Guideline structure

In the final version, the structure will be focused on target groups and divided into two parts:

I. WHY to include EE/ENV criteria

1. Introduction
2. Political considerations
3. Legal framework

II. HOW to include EE/ENV criteria

4. Contracting and awarding with EE/ENV issues
5. Application of EE/ENV criteria and specifications

Legal Annex

Technical Annex (not printed)

Annex text modules (not printed)

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Strategic considerations (chapter 2.3.1)

- (1) Overall transport policy including targets
- (2) Clear financial relations between government and TOC; sufficient duration of contracts
- (3) Quality of infrastructure
- (4) Quality of energy supply infrastructure
- (5) Electrification
- (6) Timetable
- (7) Integrated strategy for noise protection
- (8) Fleet strategy (new/old/modernised)



How to trigger the innovation process

The timeframe of tendering is often too short for making substantial steps forward in innovation. It should be embedded in a more comprehensive innovation strategy (chapter 2.3.2):

- (1) Clear environmental strategy
- (2) Coordinated action with other PTAs
- (3) Stimulation instead of binding requirements
- (4) „Postponed“ requirements
- (5) Incentives for later modernisation
- (6) Modernisation paths



Issues when defining a concrete award project (chapter 4.1)

- Identification of lines or networks; definition of lots
- Timetable and service concepts
- Identification of main environmental problems
- Analysis of energy prices, charging and supply system
- Analysis of the actual situation in terms of energy consumption and CO2 emissions



Issues when defining a concrete award project (chapter 4.1)

- Draft definition of targets in terms of energy efficiency
- (pollutants, noise)
- New, refurbished or existing rolling stock?
- Vehicle concept and comfort for passengers
- Locations for parked trains and maintenance facilities



Basic decisions of PTAs which could influence energy efficiency and environmental performance of rail passenger services (chapter 2.3 GL)

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



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Overview of criteria

Performance indicators	Indirect indicator	Parked train mode	Technologies	operational measures
kWh per • pass. km • seat km • train km • gross tkm	mass per seat	comfort functions	most prominent • braking energy / onboard equipment • braking energy / fixed installations (sub-stations, supercaps) • braking energy / diesel operations	most prominent • energy-efficient driving (timetable, training, technical advices)
traction energy consumption		• assessment of risks and costs (LCC, CBA) • state of the art • availability on the market • future availability on the market		

- Evaluation of vehicles?
- Evaluation of operations?
- Estimation of standard energy costs

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Instruments

- Requirements
- Weighting and scoring
- Penalties (if a defined quality is not realised during the contract duration)
- Incentives (bonus/malus) for good performance or improvements during the contract period



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How to include in award procedure (rolling stock)

- 1) Analyse the data situation
- 2) Decide whether new vehicles will be required or existing ones will be accepted
In the latter case: Decide about consumption levels or technological standards to be accepted
- 3) Decide upon instrument:
a) Requirement; b) weighting & scoring; c) combination
- 4) Select the relevant indicator (e.g. kWh per seat km)
- 5) Define maximum/reference levels; define scoring method

How to include in award procedure (rolling stock)

- 6) Decide upon service profile
- 7) Describe selected service profile(s) according to the standardised methodology
- 8) Require declaration of traction energy consumption from the manufacturer
 → according to the defined methodology
- 9) Define requirements for verification
- 10) Integrate text modules and documents in the tender documents

Relevant indicators

- **kWh / passenger km:**
 Main overall objective but within award procedures, measures for improved occupancy and improved EE should clearly be separated from each other.
- **kWh / seat km:**
 Most relevant indicator; applicable for awarding services and procurement of vehicles; applicable for assessment of MUs, loco-hauled trains (as a whole) and for comparing MUs with loco-hauled trains
- **kWh per train km:**
 Technical basis (in terms of measurement) for calculating kWh per seat km; in certain (very few) cases helpful to simplify the process when used as such
- **kWh per gross tonne km:**
 the most relevant indicator for the assessment of locomotives

Performance Indicators – challenges and restraints

- Clear definition of train configuration and interior design
- Service profiles to be clearly defined
- Clear definition of secondary conditions
- Technology for monitoring the energy consumption required (e.g. energy meters)
- Comfort functions for passengers to be analysed separately
- Parked train modes to be analysed separately

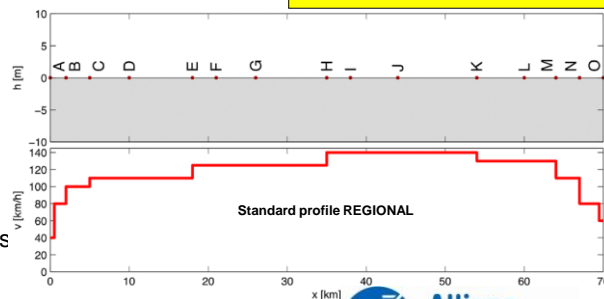


Relevant service profiles

The PTA (or TOC) may define a specific service profile which

- is representative for the own network;
- can easily be used for testing.
- Relevant parameters need to be described:
 - Infrastructure
 - Diesel fuel specifications
 - Operational requirements
 - Environmental (ambient) conditions

**Most relevant reference:
 UIC/UNIFE
 TEC REC 100 001**



Options for Verification

- (1) Simulation by the manufacturer:
 - Reliability too limited for verification
 - Should be required for plausibility check of offers
- (2) Certified documentation of test runs by the manufacturer:
 - Future availability expected with reference to SSPs
 - Independent certification compulsory
- (3) Test runs under auspices of PTA
 - Compulsory for verification with reference to specific service profiles
 - On the real line or on dedicated test facilities
 - Who will bear the costs of the test campaign?

If verification fails

- Set an appropriate deadline for a new verification attempt, allowing the manufacturer or TOC to apply corrective measures.
- Define a penalty for every train km or seat km which is performed by non-compliant rolling stock.
- Shorten the contract duration.
- Terminate the contract (LAST OPTION).

The appropriate action depends on:

- the degree of failure;
- the potential for (short-term) improvement;
- the bidder's (non-)compliance with other requirements or agreements;
- the quality, price and plausibility of the competing offers;
- legal positions of the competing bidders;
- alternatives available;
- urgency of starting operation with the non-compliant rolling stock.

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Rationale for monitoring operations

- Relevant if services are awarded (rolling stock from PTA or TOC)
- Prerequisite for
 - Political reporting about the environmental effects of the railways
 - Better calculation of reference values for future contracts
 - Identifying potentials for improvement (joint effort by PTA, TOC and Infrastructure Manager)

Rationale for monitoring operations

- Basis for incentives
 - Motivate the TOC to apply all feasible operational measures in order to save energy
 - Even modernisation may be induced in certain cases
 - Bonus/malus would be related to the performance compared to the reference value
 - Methods for monitoring to be defined in tender and contract documents



Main challenges

- (1) Calculating the reference value
- (2) Unstable infrastructure and operation conditions
- (3) Improved infrastructure and operation conditions
- (4) Incentives for low energy consumption must not outweigh penalties for bad punctuality.
- (5) Changes of energy supply and energy market conditions

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Pollutants: Environmental law (chapter 3.1)

Directive 2004/26/EC of 21 April 2004 („NRMM-Dir.“):

- regulates emission limits for CO, HC, Nox, PM
- binding for new diesel locos and DMUs
- and replacement engines
- Stage IIIA valid since 2006/2008/2009
- Stage IIIB from 2012 onwards

Directive 2008/50/EC of 21 May 2008 („Air Quality Dir.“)

- EU-wide limit values for the concentration of harmful pollutants (mainly PM₁₀, NO_x, PM_{2,5})
- Air quality planning

Pollutants: (chapter 5.5)



Options:

- Requiring or encouraging Stage IIIB
- Requiring or encouraging Stage IIIA
- Requiring or encouraging Stage IIIA but PM limits of IIIB
- Excluding locos and DMUs with outdated standards
- Modernisation of the fleet during the contract period
- Incentives for intensified use of better vehicles
- Maintenance quality

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Noise: Environmental law

Decision 2011/229/EU of 4 April 2011 („TSI Noise“):

- Regulates emission limits for stationary, starting and passing-by noise
- Binding for new rolling stock on the Trans European Network
- → binding (or important relevance) for regional trains
- Second step envisaged for 2016/2018
- Upon refurbishment, noise emissions must not be increased



Directive 2002/49/EC of 25 June 2002 („Env. Noise Dir.“)

- Strategic noise maps
- Noise action planning (no targets set by END)

Noise

How to include noise criteria in the awarding procedure

- 1) Analyse the relevance of noise emissions on your network.
- 2) Analyse available data about noise emissions of relevant rolling stock.
- 3) Require that newly procured vehicles fulfil the emission limits of TSI Noise.
- 4) Decide whether stricter emission limits shall be required or encouraged.
- 5) If existing vehicles are going to be accepted, decide
 - which emission limits to be fulfilled;
 - noise remediation to be required and which targets to set;
 - about stimulations for modernisation or replacement
 - about incentive schemes for intensified use of silent vehicles;
 - which method of verification to be required.
- 6) Require documentation of type-approvals in terms of noise emission.
- 7) Require a monitoring system which allows for the application of the defined incentive system.

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Ways of publication

- Printed version English: available
- Printed version German: available
- Printed versions Swedish, Danish, Hungarian, Italian, Romanian: currently being printed
- Technical Annex: Will be available for download (www.ecorails.eu)
- Annex M (text modules from the pilot applications): Will be available for download (www.ecorails.eu)



Technical Annex

- T-1: Background information on strategic issues (a.o. timetable issues)
- T-2: Additional information on instruments of awarding
- T-3: Details on technologies and operational measures
- T-4: Details on LCC and CBA application
- T-5: Additional information on pollutants
- T-6: Additional information on noise

Further relevant documents

- D 8: “Technological overview with regard to energy efficiency and environmental performance, ready to be integrated into the final Guidelines version”
- D 11: “Legal and economical input for the final Guidelines version”
- D 14: “Pilot applications”
- D 17: “Validation report including tests and recommendations”
- (WP about technologies and LCC analyses)

Contact

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