Supported by INTELLIGENT ENERGY EUROPE

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

Deliverable 23:
Training Module for the Guidelines
Annex 06
Part 3/Issue 05 – Direct performance indicators

Version:
V01
Status:
PU

Draft: **Function** **Approval**

Matthias Pippert
Allianz pro Schiene
+49 30 2462 599-60
+49 30 2462 599-29
matthias.pippert@allianz-pro-schiene.de

ECORailS

Supported by INTELLIGENT ENERGY EUROPE

Direct performance indicators

Matthias Pippert
Allianz pro Schiene

Overview of criteria

Performance indicators	Indirect indicator	Parked train mode	Technologies	operational measures
			most prominent	most prominent
kWh per • pass. km • seat km • train km • gross tkm	mass per seat	comfort functions	• braking energy / onboard equipment • braking energy / fixed installations (sub-stations, supercaps) • braking energy / diesel operations	• 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

ECORailS

Supported by INTELLIGENT ENERGY EUROPE

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

ECORailS

Supported by INTELLIGENT ENERGY EUROPE

Performance Indicators – which one for which occasion?

kWh / passenger km:

- The most relevant indicator in terms of climate protection and when comparing transport modes (including: political discusions)

Occupancy:

- Depends on timetable
- Depends on geographical, economic and political situation
- Depends on marketing concept of TOC, PTA and the Public Transport system in general

(Technical) energetic performance:

- Depends on vehicles
- Depends on operations
- Depends on infrastructure
- Depends on timetable

Responsibilities of the train operator (TOC)

ECORailS

Supported by INTELLIGENT ENERGY EUROPE

Performance Indicators – which one for which occasion?

kWh / passenger km:

- The most relevant indicator in terms of climate protection and when comparing transport modes (including: political discussions)

Occupancy:

- Depends on timetable
- Depends on geographical, economic and political situation
- Depends on marketing concept of TOC, PTA and the Public Transport system in general

(Technical) energetic performance:

- Depends on vehicles
- Depends on operations
- Depends on infrastructure
- Depends on timetable

ECORailS proposes to analyse and set incentives separately for

- occupancy (attracting passengers)
- energy efficiency (vehicles and operations)

ECORailS

Supported by INTELLIGENT ENERGY EUROPE

Performance Indicators – which one for which occasion?

kWh / seat km:

- 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
- Applicable for the assessment of operations

The ECORailS Guidelines focus mainly (but not exclusively) on kWh / seat km!

Side conditions need to be defined, e.g.:

- (minimum) seat pitch
- (minimum) width of seats
- calculation of multi-purpose areas, corridors, restrooms etc.

ECORailS

Supported by INTELLIGENT ENERGY EUROPE

Performance Indicators – which one for which occasion?

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 instead of kWh / seat km, e.g.:
  - very clear definition of train class and configuration
  - unified fleet, maybe owned by the PTA
  - clear calculation of multiple traction operations
  - No disproportionate increase of energy consumption in case of multiple traction

ECORailS

Supported by INTELLIGENT ENERGY EUROPE

Performance Indicators – which one for which occasion?

kWh per gross tonne km:

- the most relevant indicator for the assessment of locomotives
- gross tonne km: weight of the train (without the locomotive), multiplied with the distance the train is hauled
- In certain cases kWh / seat km may be used additionally
  - when awarding services and comparing different vehicle concepts of bidding TOCs
  - when comparing loco-hauled trains with multiple units.

ECORailS

Supported by INTELLIGENT ENERGY EUROPE

Performance Indicators – which one for which occasion?

Diesel fuel: calculated as kWh, l or kg?

- **kWh**: qualities of fuel may differ; re-calculation to kWh makes it easier to compare (but complicates the process)
- **l**: the most easiest way, especially when you focus on the taking of diesel at fuel stations, but ...
- **kg**: litres are a unit for the volume which may differ due to weather conditions; fuel is put under high pressure in the internal combustion process. Referring to the mass is therefore more reliable.

ECORailS

Supported by INTELLIGENT ENERGY EUROPE

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

Indirect indicators:

- mainly mass per seat (to be used for procurement or operation of loco-hauled carriages if to be assessed separately from locomotives)
- additionally relevant to compare different vehicle concepts (independent from interior design)

→ comfort definitions, calculation of multi-purpose areas

ECORailS
Supported by INTELLIGENT ENERGY EUROPE

Contact

Matthias Pippert

Allianz pro Schiene (ApS)

Reinhardtstrasse 18, 10117 Berlin, Germany
Tel: +49 30 2462 599-60
e-mail: matthias.pippert@allianz-pro-schiene.de

Website: www.allianz-pro-schiene.de