

Panel 1:

Methodology, Results & Calculator

Railenergy Final Conference

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Assessment Methodology

How to measure & analyse energy consumption in railway systems?



Real railway operations

Simulated railway operations



What energy is simulated?





Technology assessment approach

Servicetype Energy supply type	suburban	regional	intercity	high-speed	freight mainline
DC 1.5 kV					
DC 3 kV	10,0%	3,5%	5,0%		2,0%
AC 15 kV 16.7 Hz					
AC 25 kV 50 Hz					
Diesel					



Transparent baseline definition is key









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Strategic assessment approach





Strategic Assessment Reports

- 1. Summary
- 2. Scope and status today
- 3. Technical Performance
- 4. Economic Performance
- 5. Strategic Assessment
- 6. Recommendations





RAILENERGY CALCULATOR

Developed by





In cooperation with



IZT Institut für Zukunftsstudien und Technologiebewertung Institute for Futures Studies and Technology Assessment

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What is the Railenergy Calculator?



- Web-based decision support tool for the European rail industry to align energy calculations, methodology and common understanding sectorwide
- A business to business screening tool for R&D, procurement and upgrade projects
- Analysis & prediction of energy savings, CO₂ emissions and simplified life cycle costs
- The Railenergy Calculator is <u>NOT</u> a comparison tool between transport modes like Ecotransit or Ecopassenger!

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Railenergy Calculator – for whom?

Technicians, procurement, energy and

management staff from:

- Railway operators
- Infrastructure managers
- Leasing companies
- Railway manufacturers & suppliers
- Rail traffic authorities & transport agencies
- Consultants and academia





Why the Railenergy Calculator?





Accessing the Calculator – It is so easy!

- 1) Start your PC (Internet connected)
- 2) Open your normal browser (IE or Firefox)
- 3) Go to <u>www.railenergy.eu</u> (online very soon)
- 4) Click the Railenergy Calculator button:





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Getting started... Three options



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Quick start

- New inquiry
- Examples and saved inquiries
- <u>Quick start:</u> If you have no rail data or just want a "quick test" of options
- 2) <u>New inquiry:</u> If you have some rail data or want a detailed configuration
- 3) Examples & saved inquiries: If you want to start from predefined examples or retrieve own data from previous sessions



The Calculator has 9 steps



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			A DATA POPULA	
L:315	3111308	11535		

i Step 1

1000000

Welcome!

INQUIRY START

The **Railenergy Calculator** is a decision support tool based on the results of the EU Railenergy project. It will help you make investment decisions by analysing different configurations of new energy efficient technologies and operational measures with regard to their energy, CO₂ and economic performance.

How does it work?

The Calculator comprises 9 steps. Enter information on your location, present operational setup, energy saving technologies, operational measures and energy prices to find out saving potentials. Perform a sensitivity analysis with your results in the last step. Technical aspects are covered in steps 1 to 6. Step 7 is for filling out economic data, if you wish to continue the analysis. You can save your inquiry for later use anytime. Additionally, a PDF report can be generated.

- Choose how you want to start by opening one of the sections below

¥	Quick start					i
	Country	Germany	*	*	*	
	Energy supply	AC 15 kV 16 2/3Hz	•	*	*	
	Service type	intercity	•	*	*	
	Energy / CO ₂ target	5%	•			
					start inquiry	
>	New inquiry					i
•	Examples and saved in	quiries				i

Inquiry Start

Scope & targets

Saving potentials

Energy & CO2 performance

Energy pricing & LCC

Sensitivity analysis

Economic performance

Present setup

5 Energy sources

1

2

3

4

6

7

8

9











						1	Step 5			
	ENERGY SOURCES						_	l.		
	→ Please provide cour	trv/enerov car	rier data							
Inquiry Start							4	show in	nquiry his	itory
Scope & targets	Current energy mi	x								
Present setup	Country specific	mix of primar	y energy carrie	rs					1.10	in .
Saving potentials	Germany							100 Energ	y mix [9	6]
Energy sources	Solid fuels	Oil	Gas	Nuclear	Panawablas	Other		90		
Energy & CO2 performance	45,9 %	0,0 %	8,8 %	29,9 %	14,0 %	1,4 %		80		
Energy pricing & LCC								70		
Economic performance	Company specif	c mix of prima	ary energy carr	iers				50		
Sensitivity analysis	Solid fuels	Oil	Gas	Nuclear	Renewables	Other		40		-
	%	%	%	%	%	%		30		
								10		-
	Company specif	ic CO ₂ intensit	Y					0		
	g CO2/kWh								DE	EU
						-		S S	olidFuels	Nuclear
					→ check you	r input 🔟				Cthor
									as	Other
	· •									

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				i Step 7		
	ENERGY PRICING & LCC					
	Current energy mix					
Inquiry Start Scope & targets	Energy price	75,00 EUR/MWh	* 🐔		My inquiry New inquiry	
Present setup	Price development scenario	B - IEA Crude oil reference scenario	•		Scope	
Saving potentials	Life cycle costs			i	CO2 target	5%
Energy & CO2 performance	Additional time horizon	7 year(s)			Country Energy supply type A	Germany IC 15 kV 16 2/3Hz
Economic performance	 Basic mode 	6 %	* 🕅		Transport volume S	108 mio seat-km/a
Sensitivity analysis	Payback time	5 year(s)	* 🗲		In service Out of service	4,87 GWh 0,00 KWh
	Variable costs	0			Energy mix & CO2	507 - (Kurk
			→ check your input	refresh butto	n for page results before	11-2010
	Advanced mode					
	Investment costs	EUR	* 👽 calculate value			
	Variable costs	EUR/year				
	Disposal costs	EUR/year	*			
			\rightarrow check your input			
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TEST THE CALCULATOR YOURSELF IN THE HALL

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Recommendations (1)

- Eco-driving is always recommended:
 - Level 1 driver training
 - Level 2 onboard device
 - Level 3 fluid traffic management
- Management of onboard energy consumption (software/standards):
 - o in service (with passengers/load)
 - o out of service (parked trains)



Recommendations (2)

Start using our Railenergy common language:

- UIC/UNIFE TecRec 100_001: Specification and verification of energy consumption of railway rolling stock
 - > For procurement and major upgrades
- Railenergy online Calculator <u>www.railenergy.eu</u>
 - > For clarification and screening of options before decision making
- Railenergy Key Performance Indicators
 - > For system benchmarking and comparisons



Thank you very much for your attention!

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