



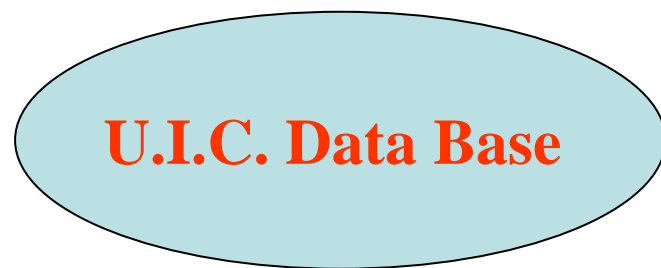
Railways Environmental Indicators and U.I.C. database

IEA, Paris, 29.01.2008

Raimondo Orsini, U.I.C.
(International Union of Railways)



Railway companies
input



1. Official Railway Statistics per country and operator: Pkm, Tkm, km of railway lines, rolling stock fleet, etc.

2. "Energy and Co2 database": yearly data start. 2005 +1990 baseline, specific and total energy consumption +Co2 emissions from railways.

Environmental indicators for railways (Env-Sustainability reports)

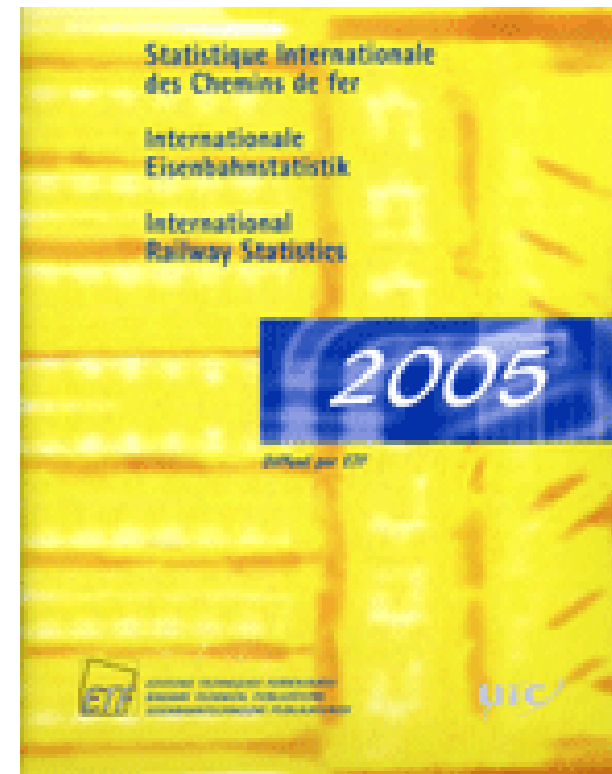
3. Transport Eco-comparison Internet tools: train, flight, car, trucks.



Official Railways statistics

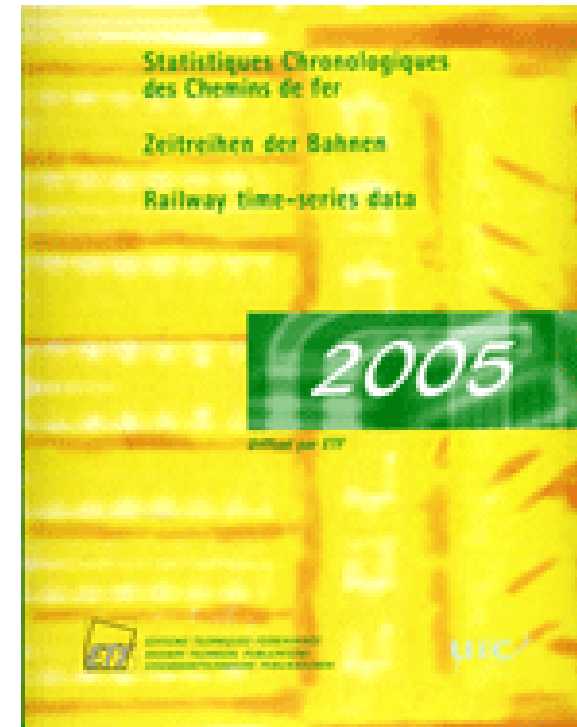
International Railway Statistics

- **Complete data set**
- **One year**
- **Worldwide**



Railway Time series

- **Main indicators**
- **Since 1970**
- **Worldwide**



Railisa Database

Publications

Links

UIC contact

On-line statistics

- [Synopsis](#)
- [Quarterly Statistics](#)
- [Graphs](#)
- [Archives](#)

Statistics Group

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- [Meetings 2007](#)

Financial Indicators Group

- [Meetings 2007](#)
- [Report 2006 : Executive summary](#)

SCHEDULE OF MEETINGS →

PRESS RELEASES

2006-03-15 UIC Statistics: A highly contrasting picture across t...

[all press releases](#) ⊖

LAST UPDATED ARTICLES

- [Synopsis 2007-09-17](#)
- [Quarterly Statistics 2007-09-17](#)
- [Archives 2007-01-23](#)
- [Links 2007-01-23](#)

INFORMATION DATABASES

- [Documentation Centre](#)
- [Timetable search](#)
- [Directory of acronyms](#)
- [ENEE](#)
- [ERNST](#)





Energy and CO₂ U.I.C. database

UIC Energy data collection method

Data collected:

- Data collected from 19 European railway companies: 80% of the total traffic.
- First data collected for year 2005. To be updated every year

Method aligned with

- Railenergy KPI's
- UIC leaflet 330
- UIC statistics database Railisa



UIC Energy data collected

Part I:

- Operational performance (train km, gross tkm hauled)
- Electricity mix
- Network efficiency AC/DC (infrastructure losses)
- Biofuels' share of diesel consumption

Part II:

- Production (pkm or tkm)
- Load factor (passenger only)
- Final traction energy consumption
- Average distance between stops
- Average commercial speed
- Average gross tonnes hauled per train
- Data quality (measured, calculated, estimated, billed, etc.)

Data questionnaire – Part 1

Answering rate & type per group of questions

Questionnaires received	Part 1				
	Type of service (P, F or P+F)	Operational performance	Electricity mix	Network efficiency	Biofuels
ATOC	P+F	x	x	x	x
CD	P+F	x	x	x	x
CFR Marfa	F	x	x	x	x
CFR Calatori	P	x	x	x	x
DB AG	P+F	x	x	x	x
DSB	P				
FS Group	P+F	x	x	x	x
IE	P+F	x			x
MAV	P+F	x	x	x	x
NS	P		x	x	x
NSB	P	x		x	
PKP regional services	P				
SBB CFF FFS	P+F	x	x	x	x
SNCB	P+F	x	x	x	x
SNCF*	P+F	x	x	x	x
SZ	P+F	x			x
VEOLIA	P+F	x			x
VR	P+F	x	x		x

Data quality categories

- c calculated
- m measured
- e estimated
- o other
- not applicable
- * SNCF data not yet included

Answers reported	15	12	12	15
Potential total	18	18	18	18
Answer rate	83%	67%	67%	83%

Data questionnaire – Part 2 Passengers

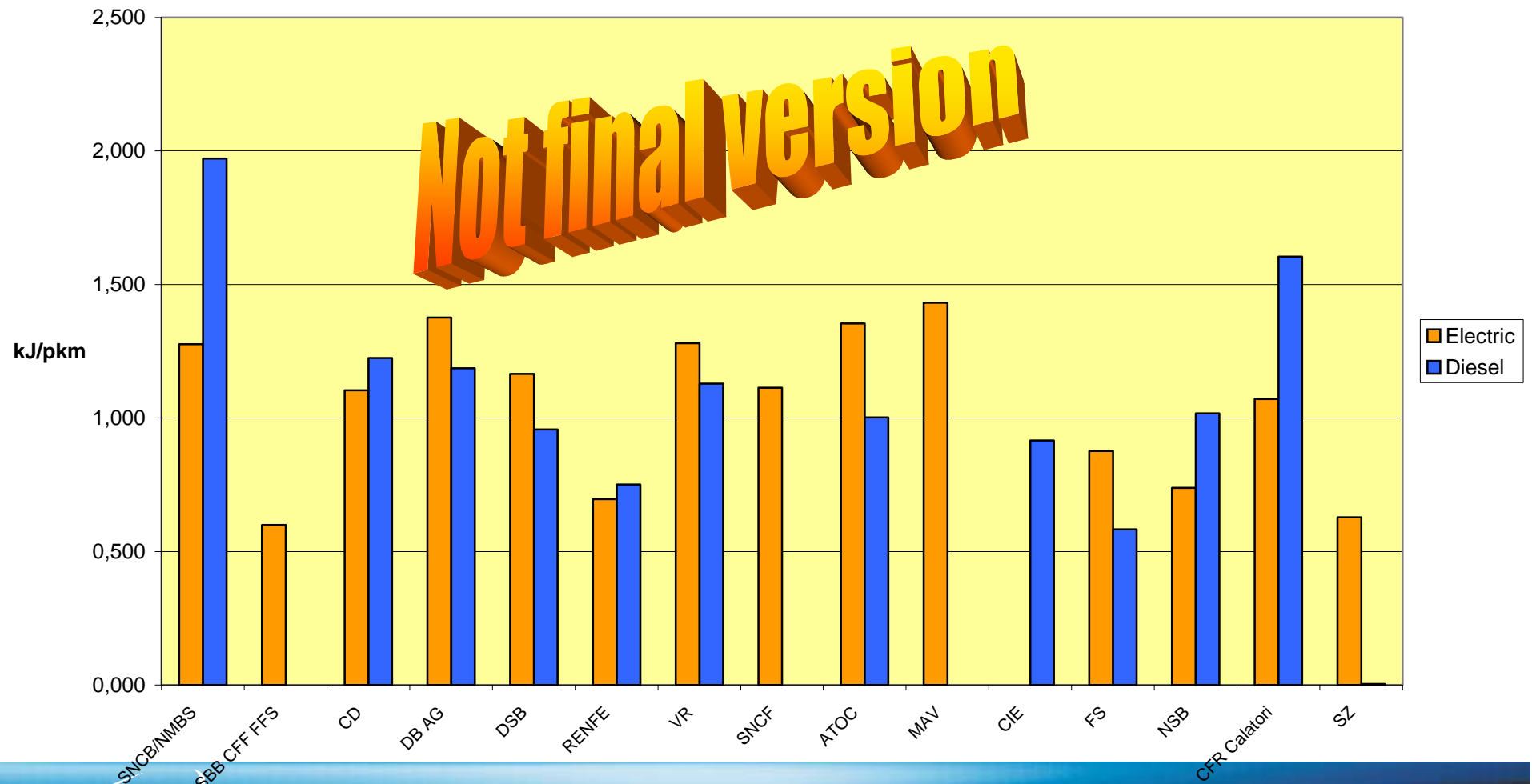
Questionnaires received	Service type	Part 2 - Passenger																							
		Total			Suburban					Regional					IC					HS					
		pkm	Load factor	Energy	pkm	Av. Dist	Av. Spd	Load factor	Energy	pkm	Av. Dist	Av. Spd	Load factor	Energy	pkm	Av. Dist	Av. Spd	Load factor	Energy	pkm	Av. Dist	Av. Spd	Load factor	Energy	
ATOC	P+F	x	x	m	x	x	x	x	c	x	x	x	x	c	x	x	x	x	c						
CD	P+F	x		c																					
CFR Marfa	F																								
CFR Calatori	P	x	x	c																					
DB AG	P+F	m	c	m	c	x	x	c	e,c	c	x	x	c	e,c	c	x	x	c	c	c	x	x	c	e,c	
DSB	P	m	m,c	m,c	m	x	x	m	m	m	x	x	m	m,c	m	x	x	m	m,c						
FS Group	P+F	x	x	c						x	x	x	x	c	x	x	x	x	c						
IE	P+F								m										m,e						
MAV	P+F			m																					
NS	P	x	x	m,c		x	x		m,c		x	x		c		x	x		c			x	x		c
NSB	P		e	c					e					e					e						
PKP regional services	P			m							x	x		m		x	x		m						
SBB CFF FFS	P+F	m	c	e						m	x	x	c	e	m	x	x	c	e						
SNCB	P+F	c	c	e,m	c	x	x	c	c	c	x	x	c	c	c	x	x	c	m,c	c	x	x	c	m,c	m,c
SNCF*	P+F	x		c,e	x				c,e	x	x			c,e	x				c,e	x	x				c,e
SZ	P+F	x	x	e,m		x	x				x	x				x	x								
VEOLIA	P+F	x		m,c																					
VR	P+F	x		m,c	x			x	m,c						x			x	m,c						
Answers reported		13	10	16	5	6	6	5	8	6	10	9	6	10	7	9	9	7	10	3	4	3	2	3	3
Potential total		17	17	17	12	12	12	12	12	17	17	17	17	17	17	17	17	17	17	17	5	5	5	5	5
Answer rate		76%	59%	94%	42%	50%	50%	42%	67%	35%	59%	53%	35%	59%	41%	53%	53%	41%	59%	60%	80%	60%	40%	60%	60%

Data questionnaire – Part 2 Freight

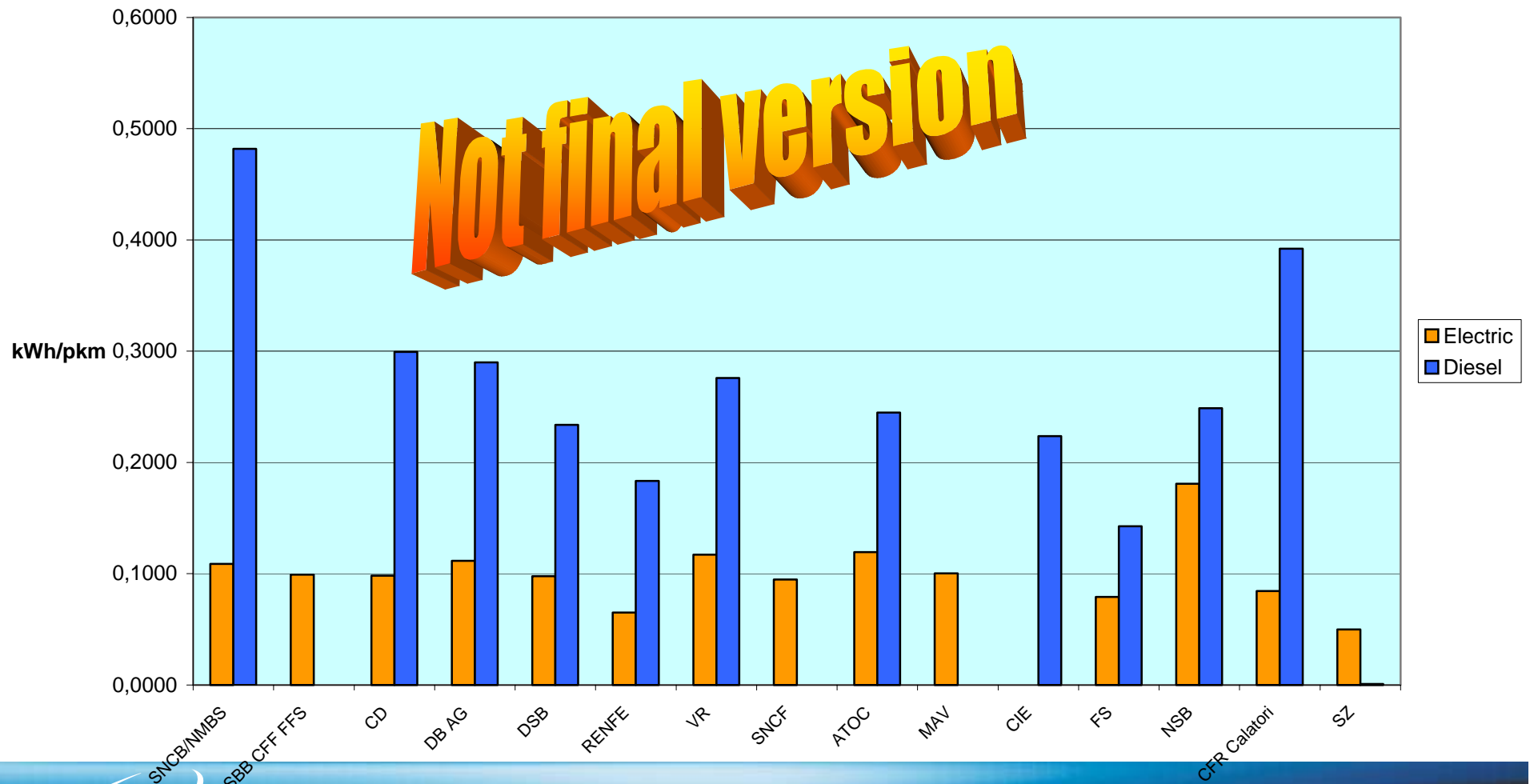
Questionnaires received	Service type	Part 2 - Freight															Shunting
		Total			Feeder			Wagon load			whole trains			inter-modal			
		Ave. load	tkm	Energy	Ave. load	tkm	Energy	Ave. load	tkm	Energy	Ave. load	tkm	Energy	Ave. load	tkm	Energy	
ATOC	P+F			m													
CD	P+F		x	c													
CFR Marfa	F	x		m													m
CFR Calatori	P																
DB AG	P+F	c	m	m	c	c	e	c	c	e	c	c	e	c	c	e	c
DSB	P																
FS Group	P+F		x	c													
IE	P+F	x		x							x		m				
MAV	P+F			m													
NS	P																
NSB	P																
PKP regional services	P																
SBB CFF FFS	P+F	c	m	m,c,e													
SNCB	P+F	c	c	e,m											x		
SNCF*	P+F	x	x	x			x			x			x			x	
SZ	P+F			e,m													
VEOLIA	P+F	x	x	m,c													
VR	P+F	x	x	m,c													m,c

Answers reported	8	8	13	1	1	2	1	1	2	2	1	3	1	2	2	3
Potential total	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Answer rate	62%	62%	100%	8%	8%	15%	8%	8%	15%	15%	8%	23%	8%	15%	15%	23%

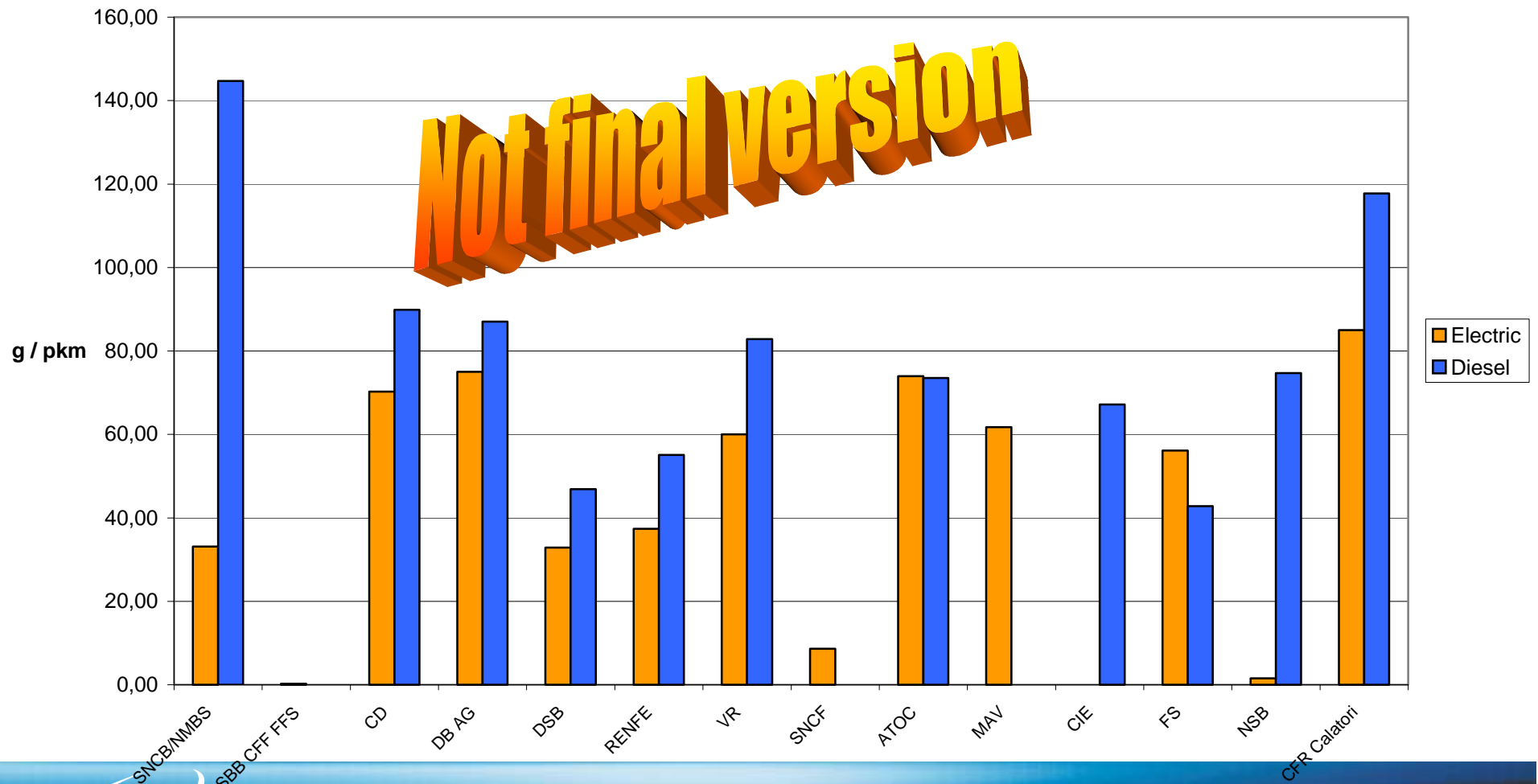
Passenger specific primary energy consumption per passenger km (including shunting)



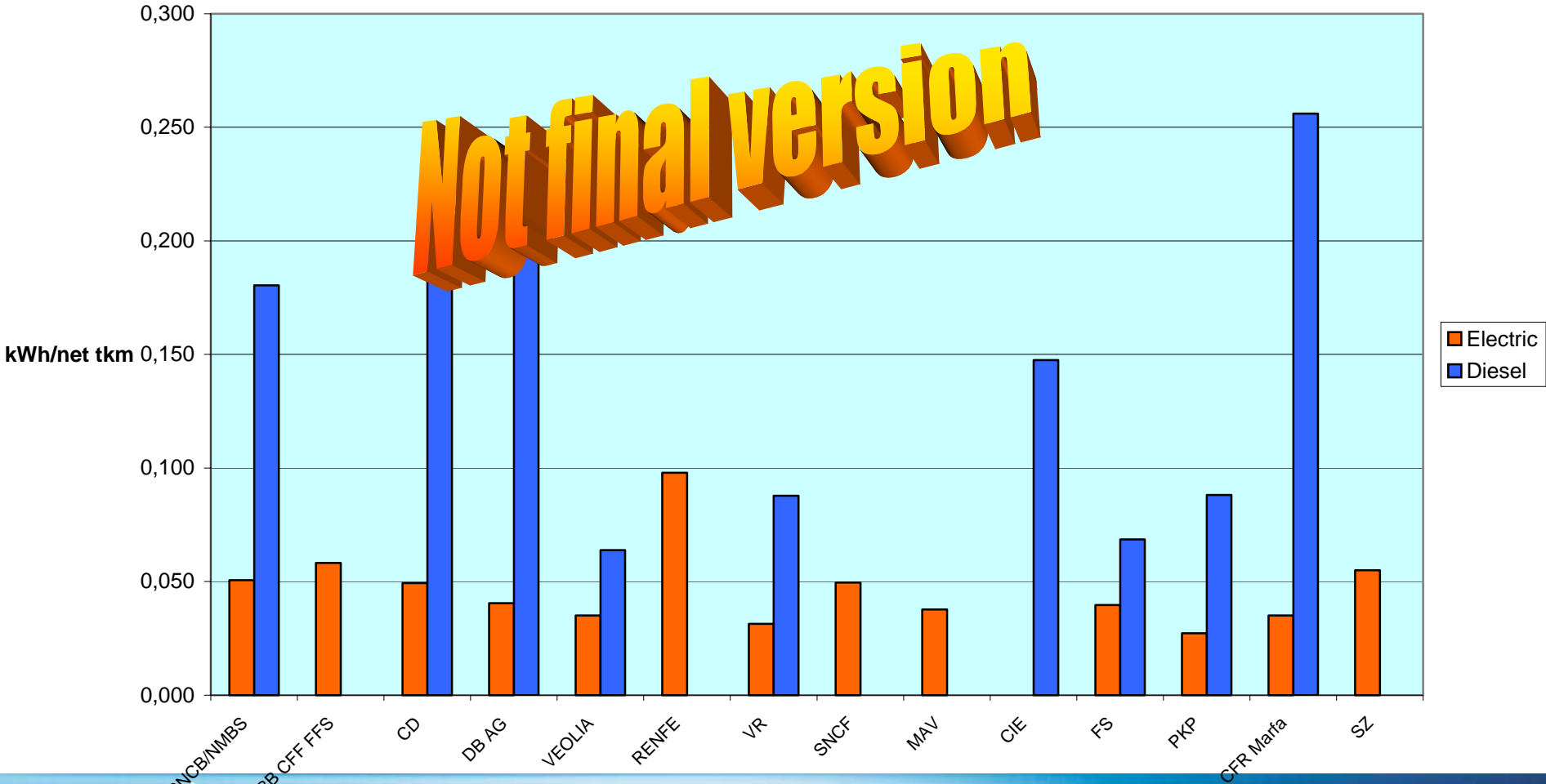
Passenger specific final energy consumption per passenger km (including shunting)



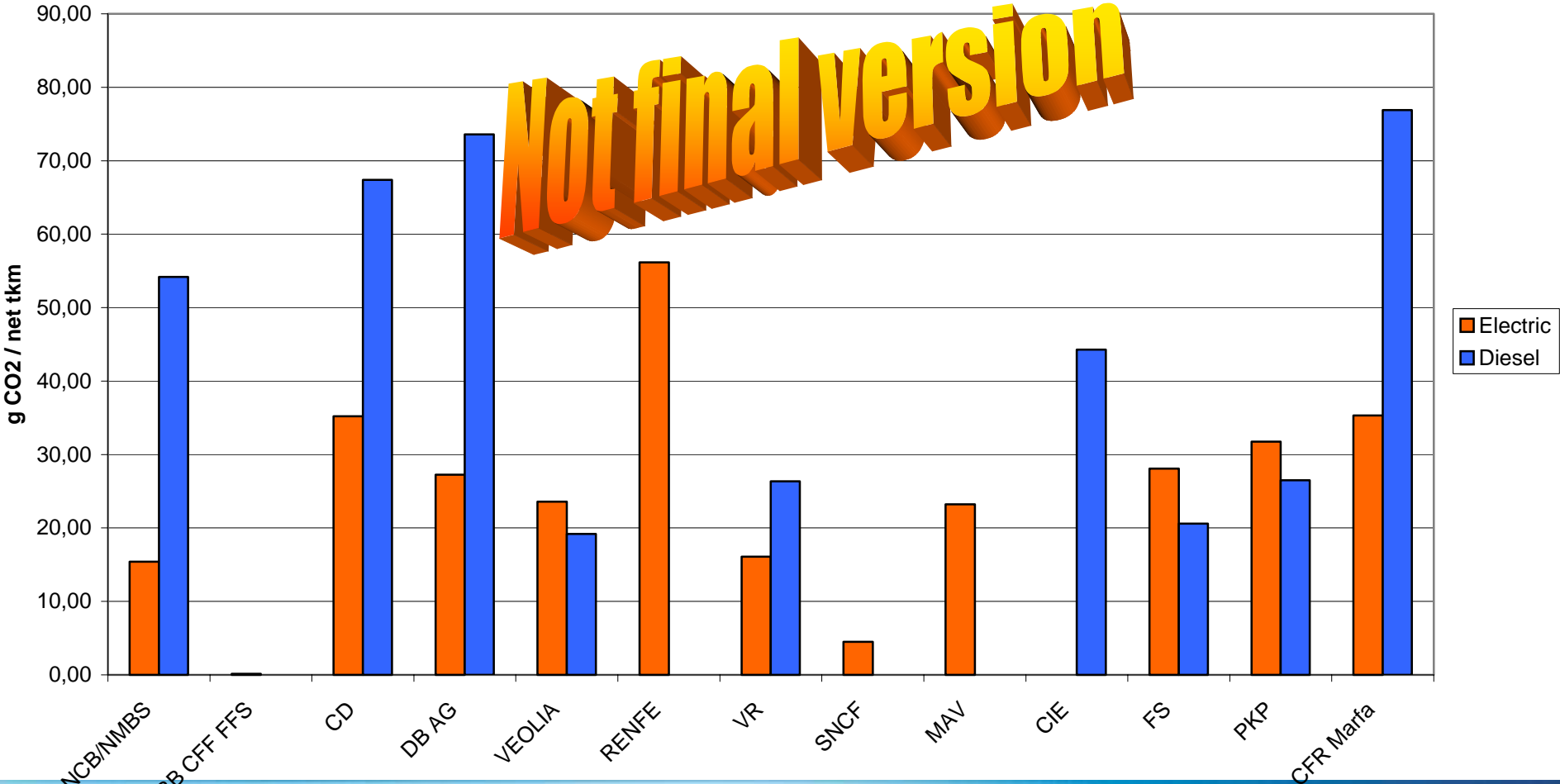
Passenger specific CO₂ emission per person-km (including shunting)



Freight specific final energy consumption per net tonnes-km (including shunting)



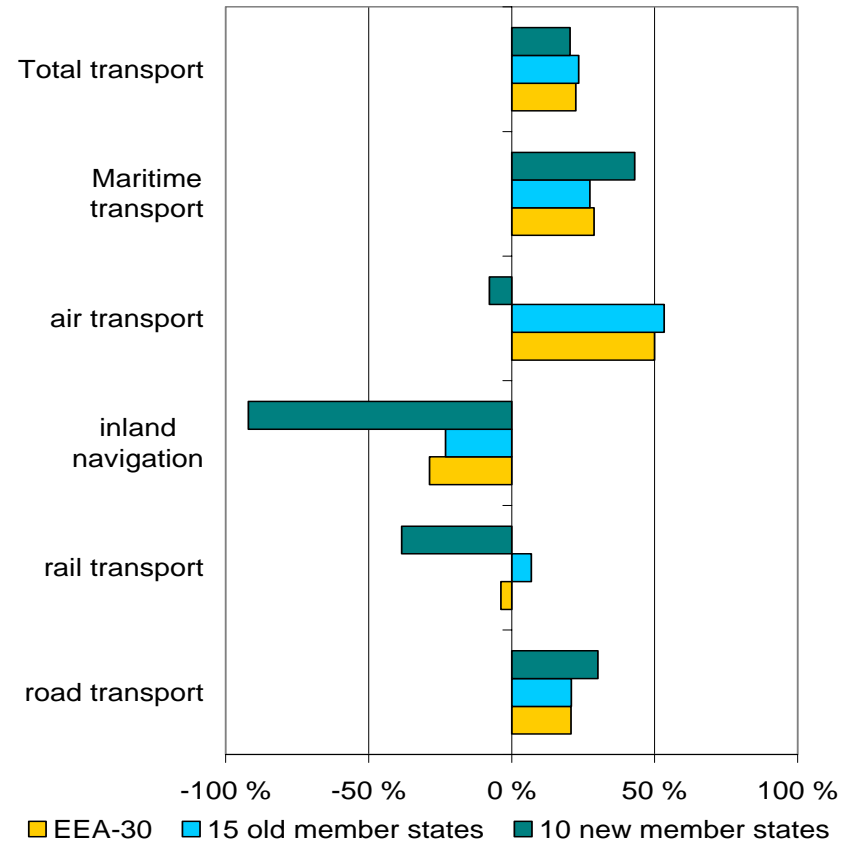
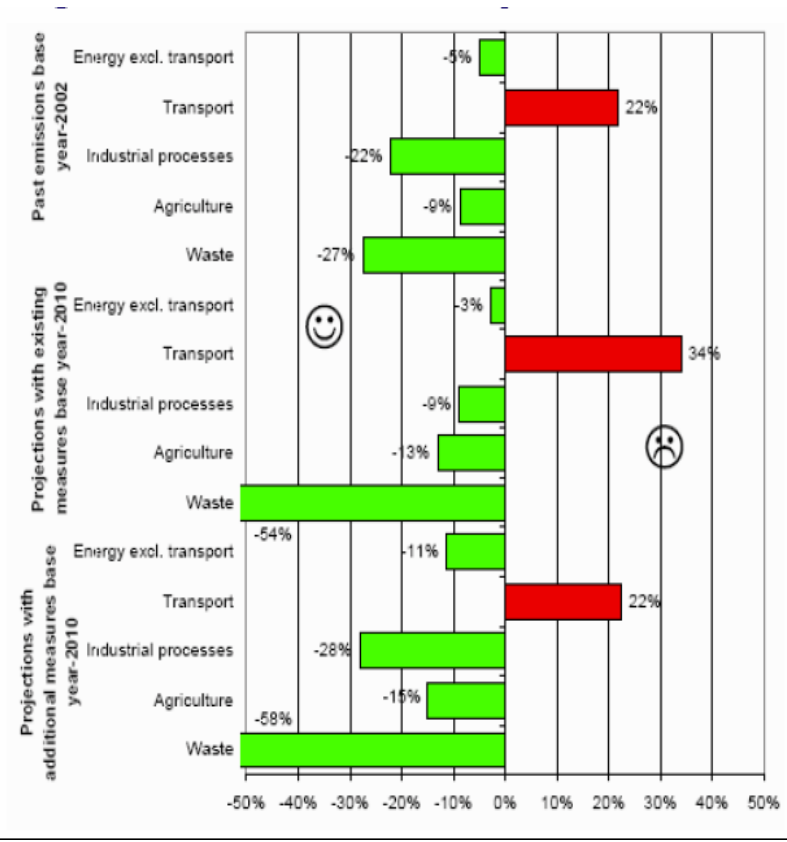
Freight specific CO₂ emission per net tonnes-km (including shunting)





Eco-comparison Internet tools

Rail and Co2



Source: European Environment Agency

Ecotransit: Freight

EcoTransIT

Calculates the environmental impacts of freight routes in Europe

EcoTransIT Environmental Load Calculation

Deutsch English Française Italiano Svenska

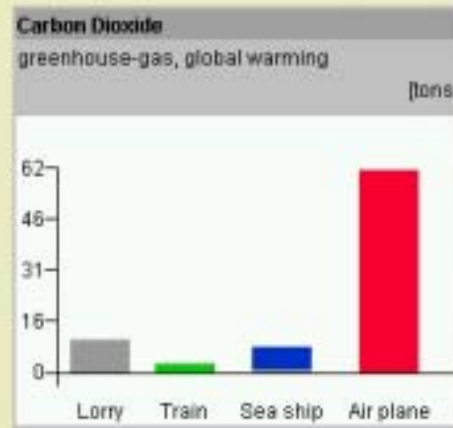
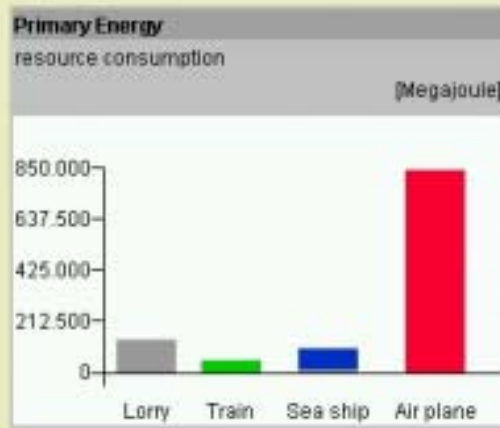
Origin: Hamburg

Destination: Milano

Settings: Lorry: 40 tons, EURO2; Train: average train, electrified; Feeder Lorry: 7.5 tons, EURO1; Feeder Train: short train, diesel;

Display options: Primary energy and carbon dioxide

Train Air plane Inland ship
Lorry Sea ship Feeder



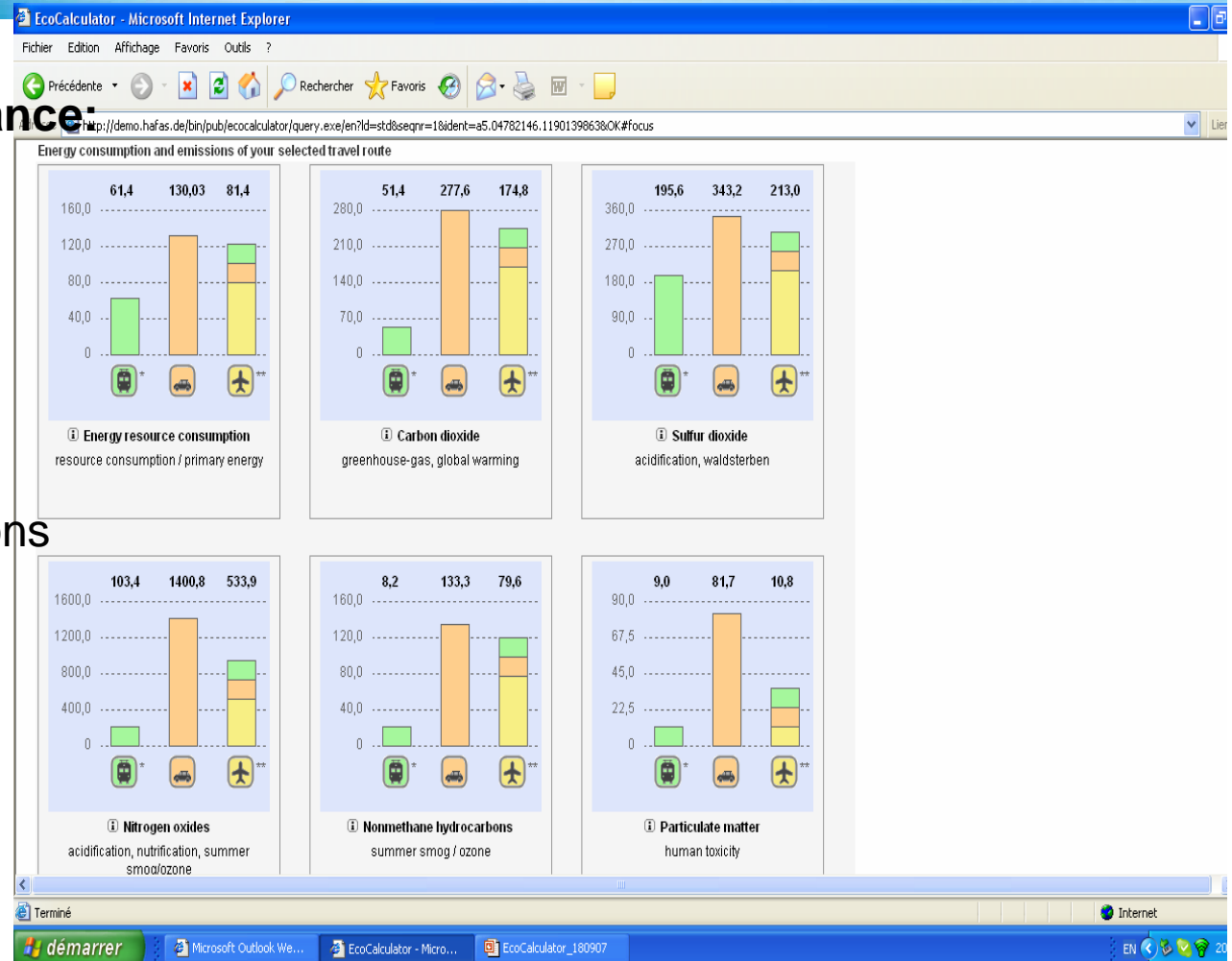
www.ecotransit.org

EcoTransit compares the energy consumption and pollutant emissions of trains, lorries, ships and aircraft, in the process also covering intermodal transport.

EcoCalculator: Passenger

Comparing the performance:

- Energy Consumption
- CO2-emissions
- Sulfur dioxide
- Nitrogen oxides
- Nonmethane hydrocarbons
- Particulate matter



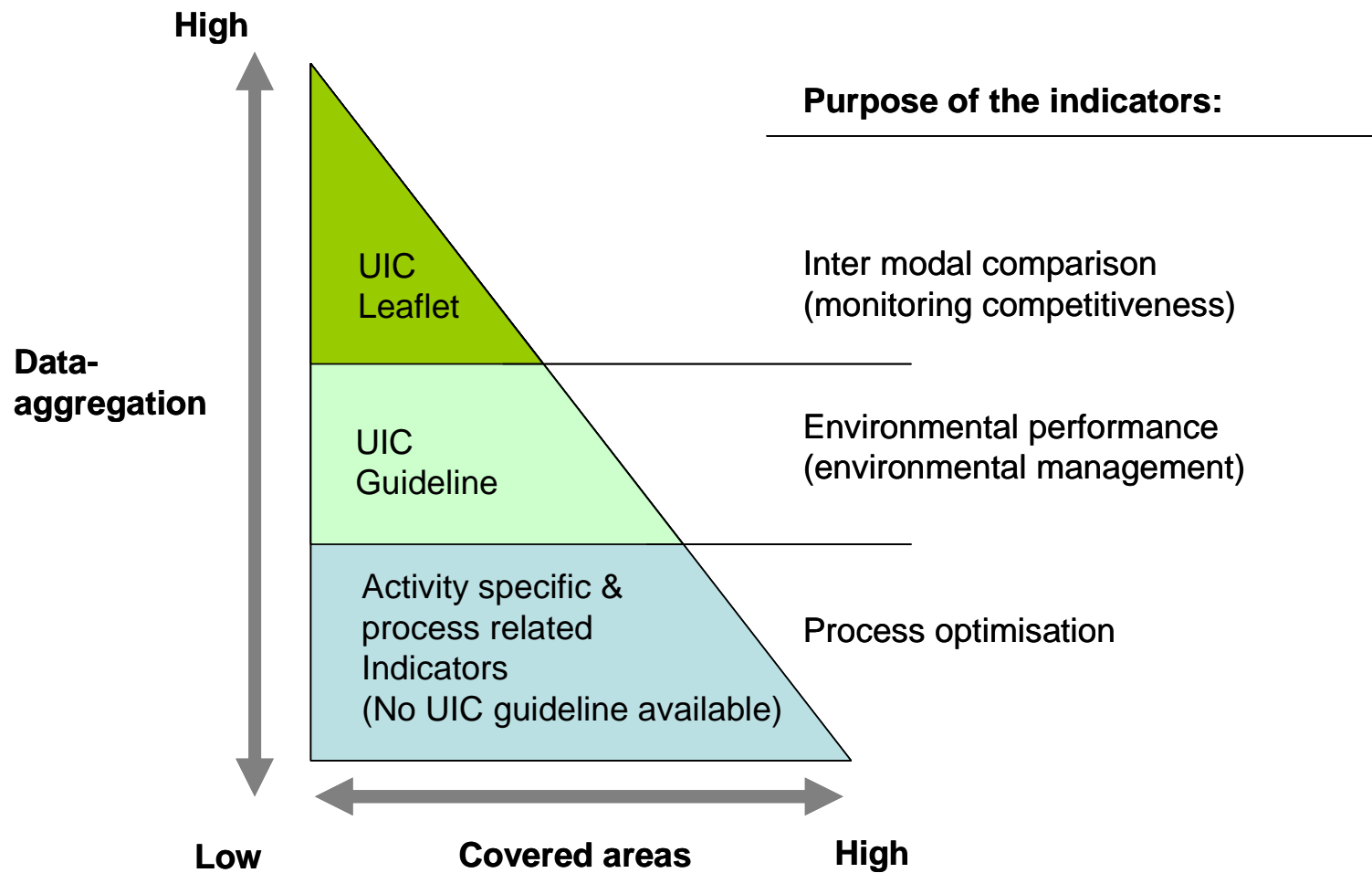
UIC Environmental indicators

History:

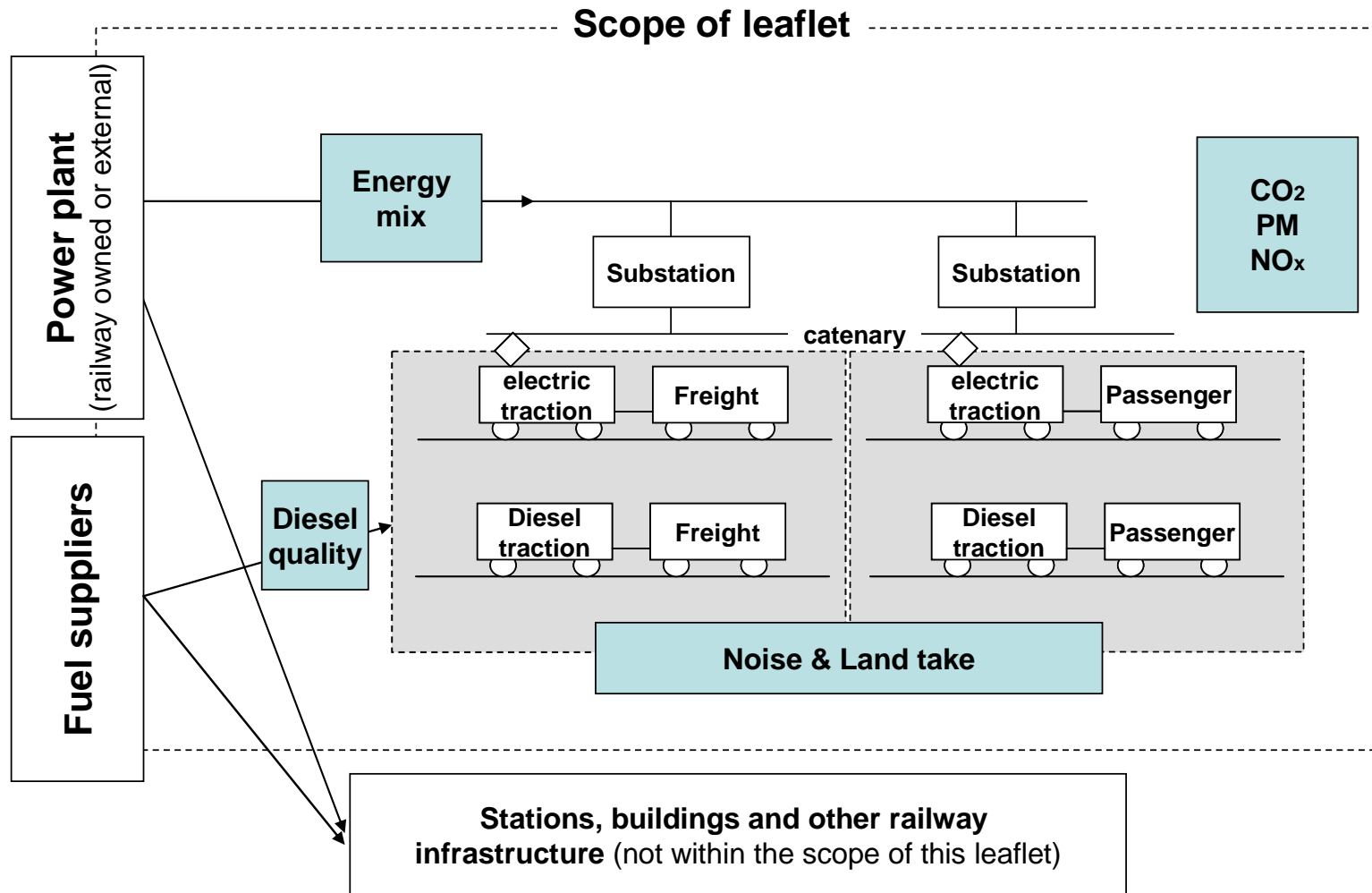
- 1993: UIC and its member railways began working with environment and environmental indicators
- 2001: UIC hosted the first conference on environmental indicators
- 2002: Draft guideline and leaflet have been elaborated and used in practice
- 2008: UIC to publish its leaflet 330 on environmental performance indicators covering these six core environmental themes:
 - Energy consumption
 - Local air pollution
 - Electric energy mix
 - Noise
 - CO2
 - Land take



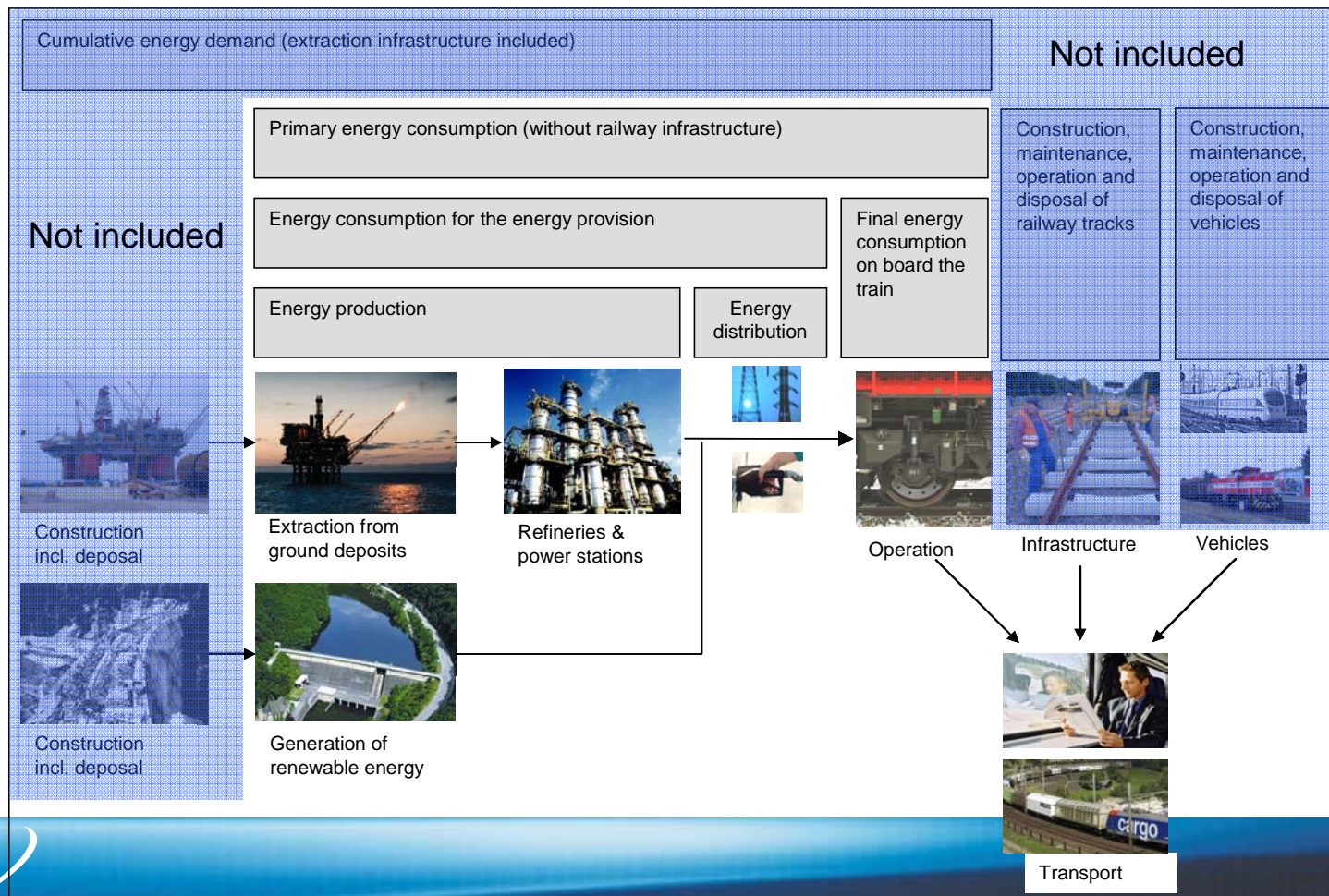
Overview of UIC leaflet 330 (1/2)



Scope of UIC leaflet



Methodology for inclusion of upstream effects



List of energy KPI's (from EU-Railenergy)

KPI's characterizes the energy performance on system level

- **KPIs for the operation of rolling stock**
 - KPI 1: Final Energy consumption per traction effort (kWh/gross tkm)
 - KPI 2: Final Energy consumption per offered traffic (kWh/seat km)
 - KPI 3: Primary Energy consumption per traffic output (KJ/Pkm;tkm)
 - KPI 4: Final Energy consumption per traffic output (kWh/Pkm;tkm)
 - KPI 5: Share of energy consumption for parked trains (%)
 - KPI 6: Systemwide realised energy recuperation rate (%)
- **KPI for the operation of railway infrastructure**
 - KPI 7: Efficiency of the railway distribution grid (%)

KPI's and service types

KPIs will be measured/calculated per service type.

➤ For passenger transport

- High speed transport
- Intercity/mainline transport
- Regional transport
- Suburban transport

➤ For freight transport

- Block train transport
- Single wagon transport
- Short feeder freight
- Combined freight (intermodal)

Characterised by Set of parameters

- Average commercial speed
- Average load factor
- Average specific mass
- Network characteristics (supply system, topography, no of stops)
- Operation (time table, driving style..)

www.uic.asso.fr
www.railway-mobility.org
www.railenergy.org

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