INTERNATIONAL UNION
OF RAILWAYS

Rail statistics on energy consumption and emissions

- Data collection
- Traction energy and emission reporting
- Eco passenger

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Meeting UNECE – WP6 – April 24-26, 2024

❑ Data collection

Energy consumption and emissions

Data collected by:

- **Statistics platform**
  - ✓ General data on energy consumption (Diesel, Electricity)
  - ✓ Geographical scope: worldwide members
  - ✓ Period: since 1996

- **Energy Efficiency & CO2 Emissions** - Experts working group
  - ✓ More detailed data (energy consumption and emissions by type of service…)
  - ✓ Geographical scope: European members
  - ✓ Period: since 2005

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- **Statistics platform**

Data collected for:

- ✓ Energy consumption by rail tractive stock

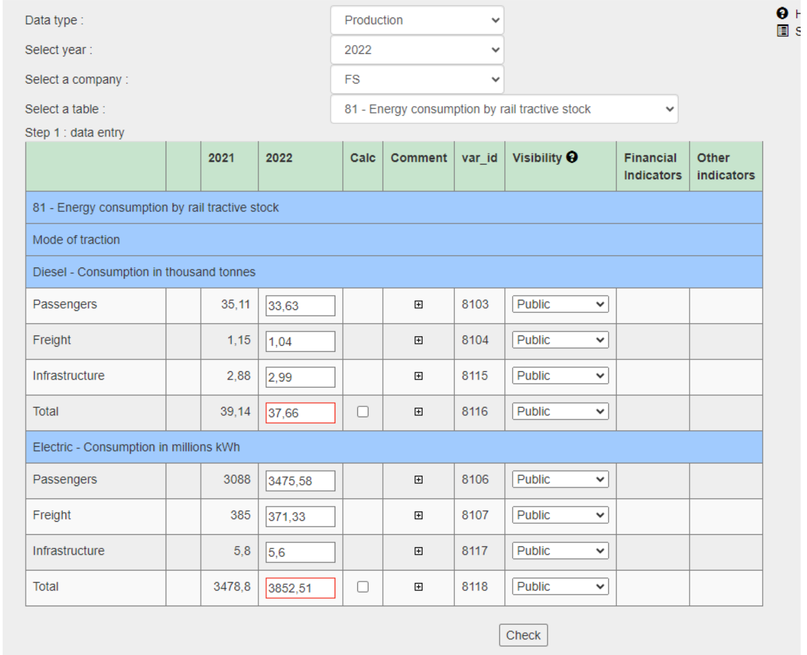
Diesel (tonnes and Electricity, GWh at the substation)

Data provided by railway undertakings

Passenger trains / Freight trains

- ✓ Operation data: Train km and gross tonne km of trains according to
  - energy of traction (Electricity / Diesel)
  - passenger trains / freight trains
  - passenger service (short/long distance trains)

Newly introduced: energy consumption by tractive vehicles for Infrastructure maintenance



Data type : Production
Select year : 2022
Select a company : FS
Select a table : 81 - Energy consumption by rail tractive stock
Step 1 : data entry

		2021	2022	Calc	Comment	var_id	Visibility	Financial indicators	Other indicators
81 - Energy consumption by rail tractive stock									
Mode of traction									
Diesel - Consumption in thousand tonnes									
Passengers		35,11	33,63			8103	Public		
Freight		1,15	1,04			8104	Public		
Infrastructure		2,88	2,99			8115	Public		
Total		39,14	37,66			8116	Public		
Electric - Consumption in millions kWh									
Passengers		3088	3475,58			8106	Public		
Freight		385	371,33			8107	Public		
Infrastructure		5,8	5,6			8117	Public		
Total		3478,8	3852,51			8118	Public		

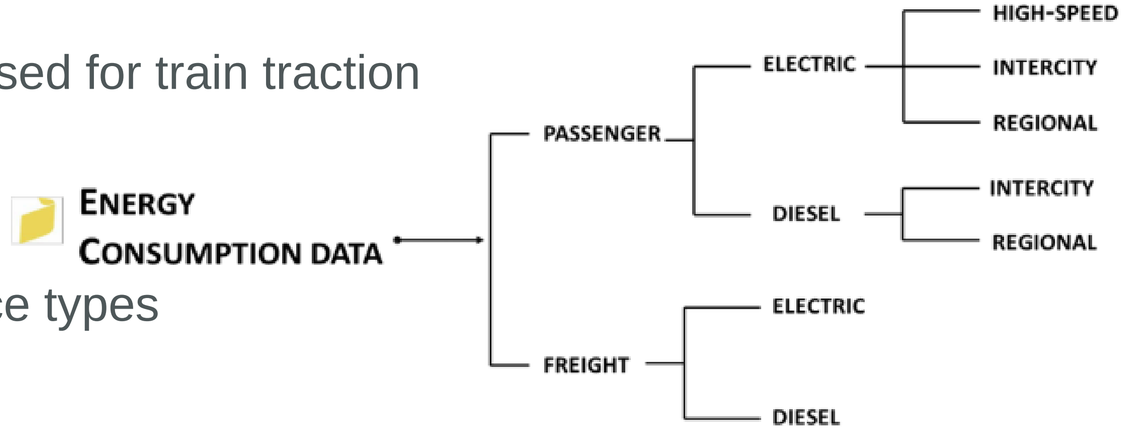
Check

trains								
thousands of train.km, diesel traction								
Total (41.31+34)		2095,56142	2147,62642			4130	Public	
of which passenger trains (41.31=41.32+33)		8,26108	37,07968			4131	Public	
of which passenger short distance		8,26108	37,07968			4132	Public	
of which passenger long distance (incl. HS)		0	0			4133	Public	
of which freight trains		732,71839	738,38636			4134	Public	
thousands of train.km - electric traction								
Total (41.40=41.41+44)		185760,3295	186982,360			4140	Public	
of which passenger trains (41.41=41.42+43)		151725,6958	154159,037			4141	Public	
of which passenger short distance		85419,05099	86589,5756			4142	Public	
of which passenger long distance (incl. HS)		66306,64483	67569,4618			4143	Public	
of which freight trains		34034,63368	32823,3226			4144	Public	

- **Energy Efficiency & CO2 Emissions** - Experts working group

Energy consumption

- ✓ Electricity (GWh, at the substation) and diesel consumption (tonnes)
- ✓ The data refer to the final energy consumption used for train traction
- ✓ To move goods and passengers only
  - Freight trains
  - Passenger trains split by passenger service types
  - local / regional, intercity, highspeed



- ✓ Data provided by railway undertakings only
- ✓ Electricity consumption at the substation
  - directly provided or calculated from data given at the pantograph + losses in catenary
- ✓ Diesel consumption
  - fuel tank logs

Operation data according to the traction energy type (Electricity / Diesel)

- ✓ Train-kilometres >>> passenger and freight trains
- ✓ Gross tonne-kilometres >>> passenger and freight trains
- ✓ Passenger-kilometres >>> total passenger transport services
  >>> different service types (local and regional, intercity and high- speed)
- ✓ Load factor of passenger transport services (total, local/regional, intercity, high speed)
- ✓ Net tonne-kilometres for freight transport services

Data should be consistent with the corresponding energy consumption data provided

Shunting activities are included

Empty trips are taken into account

GHG Emissions

- ✓ GHG emissions calculated are well-to-wheel (unit CO_2-eq)
- ✓ Total emissions are calculated from diesel traction and from electric traction
- ✓ Product of two factors multiplied: quantity of fuel consumption and emission factor
- ✓ Emission factor are quantity of CO_2-eq expressed in grams released per kWh of electricity or kg of diesel used for traction
- ✓ Emission factor for diesel used is given by the blend of diesel and biodiesel used
- ✓ Emission factor for electricity is given at market-based and location-based
- ✓ Market based value is provided by the company
- ✓ Location-based value is calculated by UIC

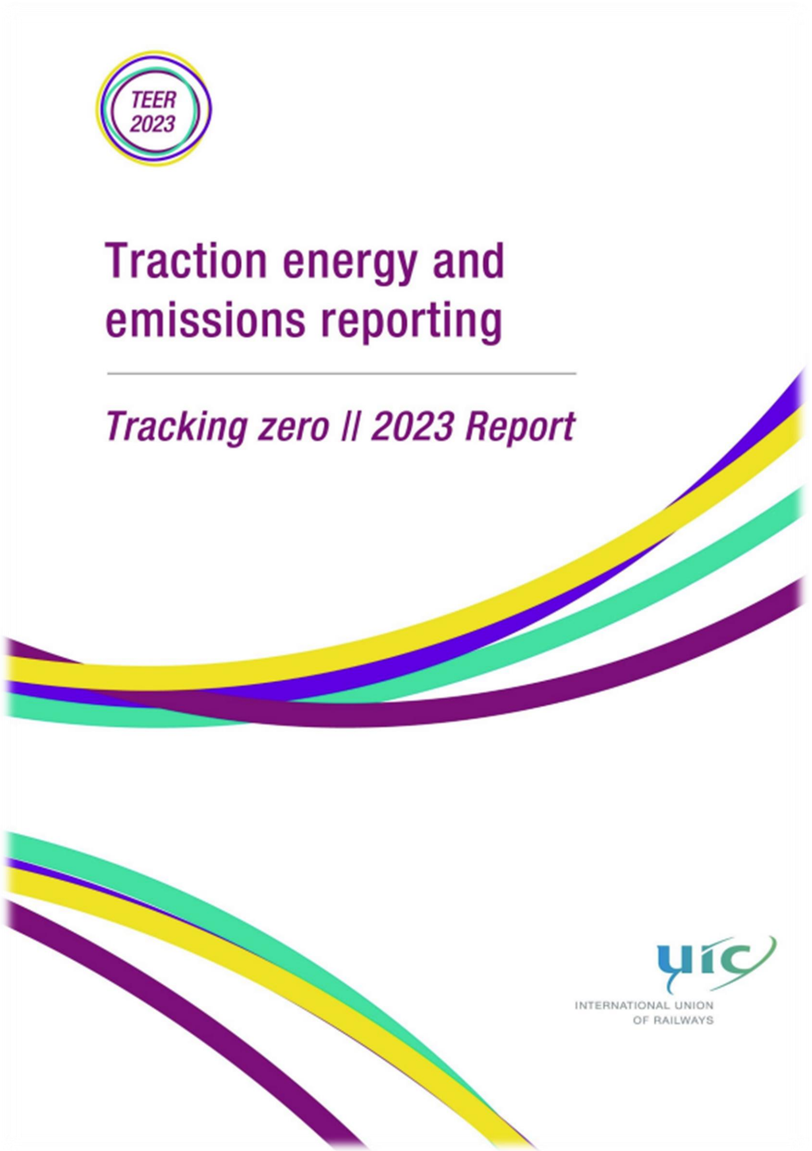
→

- ➢ Total CO_2-eq emissions
- ➢ Specific CO_2-eq emissions gCO_2-eq/pkm and gCO_2-eq/tkm

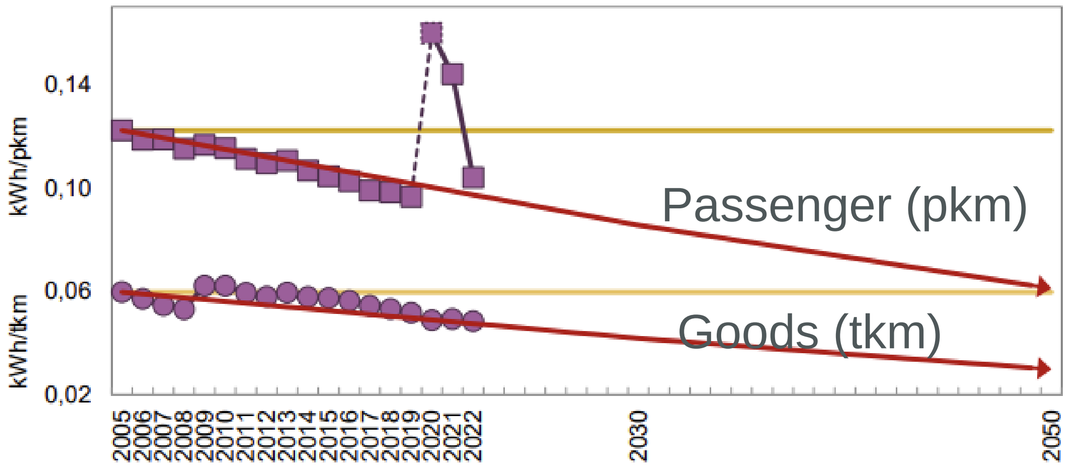
❑ Traction energy and emission reporting

Main railway undertakings in Europe provide data

FIGURE 1 RAILWAY COMPANIES INVOLVED IN THE UIC-CER COMMITMENT

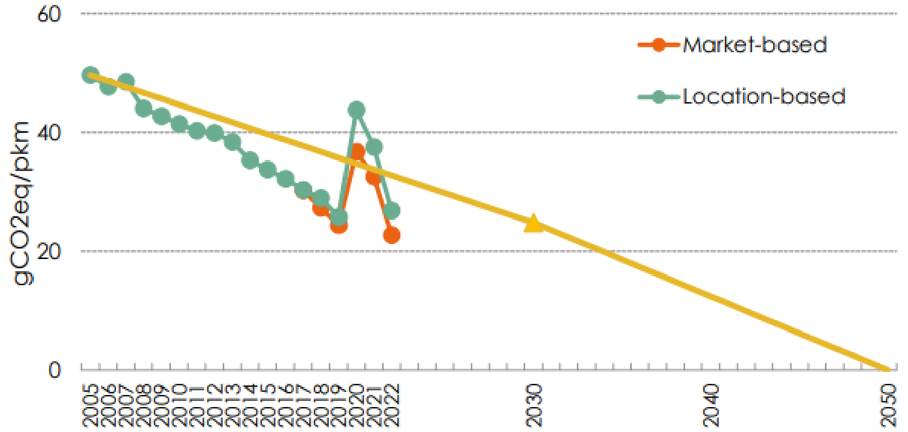


Specific energy consumption

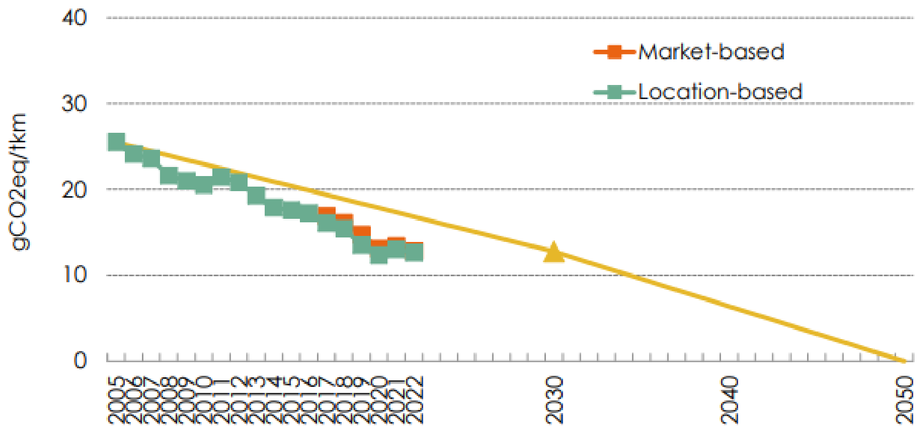


- ✓ Specific energy consumption and CO2Eq emissions generally decrease since 2005 both for passenger and goods transport
- ✓ Negative impact of COVID-19 epidemic on passenger transport performance due to low load factors
- ✓ Targets for specific CO2Eq emissions:
  - -50% 2030 vs 2005
  - carbon-free by 2050

Specific CO2Eq emissions (Passenger - pkm)

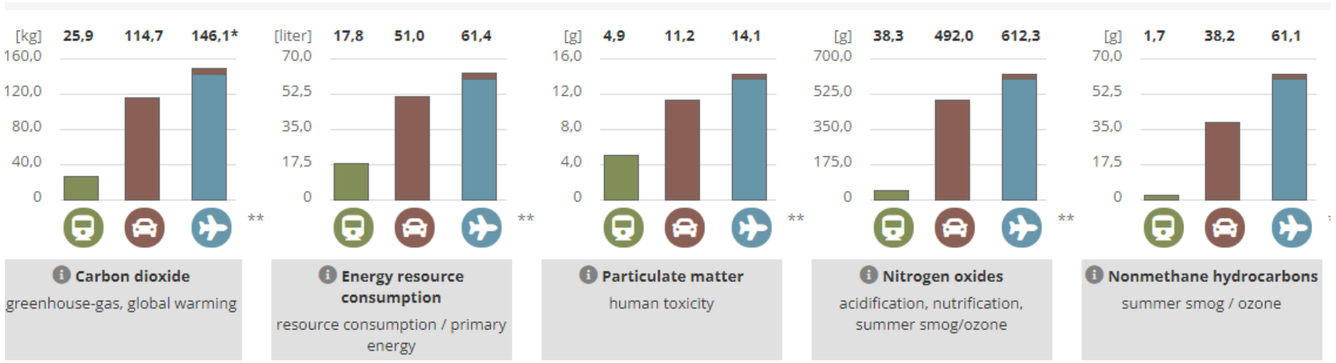


Specific CO2Eq emissions (Goods - tkm)



❑ Eco passenger

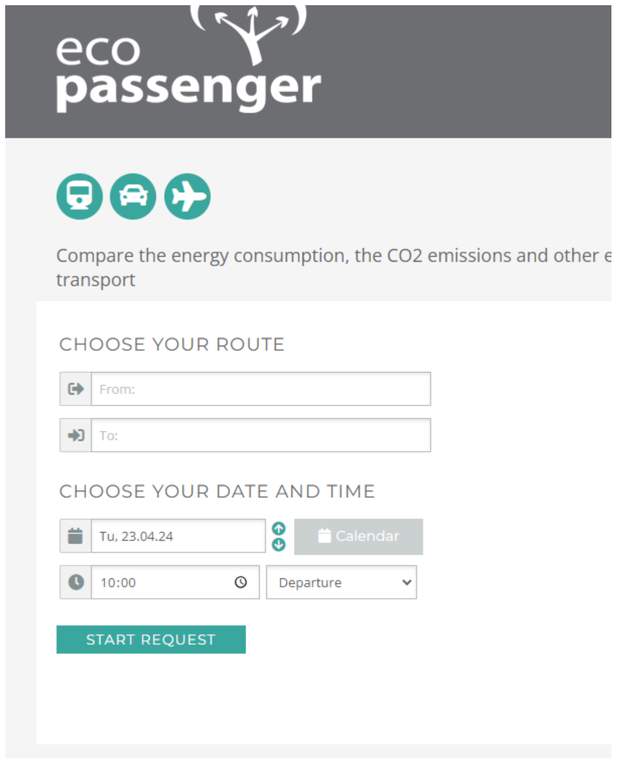
- ✓ A calculator for comparison of the energy consumption, CO2 and exhaust atmospheric emissions of planes, cars and trains for passenger transport
- ✓ Geographical scope: Europe
- ✓ A user-friendly online tool based on a sound scientific methodology
- ✓ Fed with the most accurate and latest available data for all transport modes



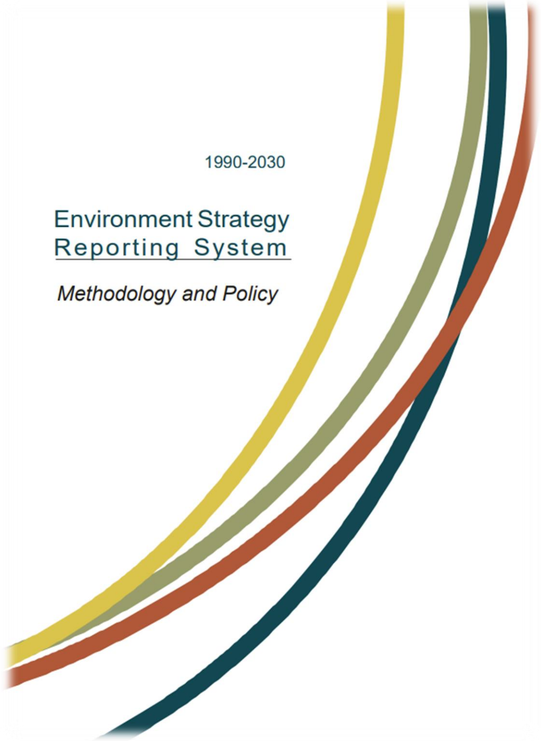
Developed through cooperation between UIC, the Sustainable Development Foundation, ifeu (German Institute for Environment and Energy) and HaCon (software)

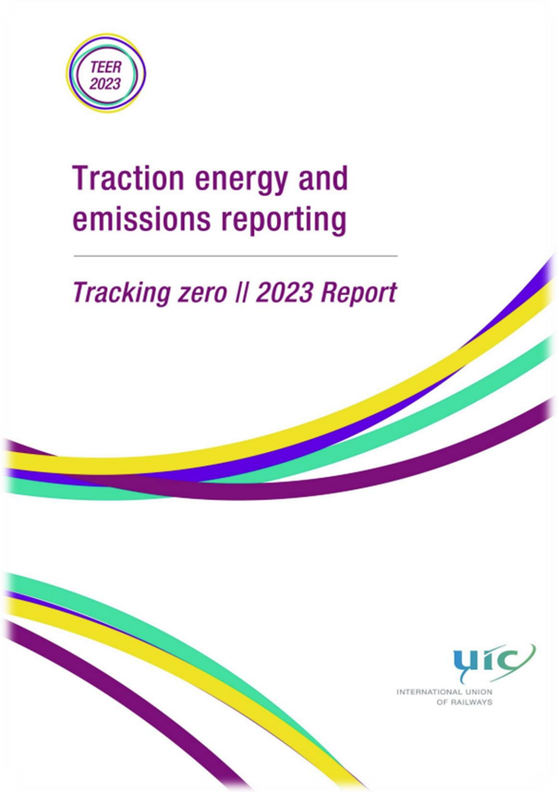
https://uic.org/sustainability/energy-efficiency-and-co2-emissions/article/ecopassenger

http://www.ecopassenger.org/



Resource: reports and datasets





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https://uic.org/sustainability/energy-efficiency-and-co2-emissions/
https://uic.org/IMG/pdf/202102_uic_1990-2030_environment_strategy_reporting_system.pdf
https://uic.org/com/enews/article/uic-s-traction-energy-emissions-database-tracking-progress-in-the-rail-sector

https://uic-stats.uic.org/select/

https://uic.org/support-activities/statistics/

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Thank you!

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