

External costs of transport in Flanders

-

Study for MIRA, 2010

Eef Delhaye, Griet De Ceuster, Sven Maerivoet

Scope

- 2000-2008
- Transport modes
 - Road transport: 15 types + extra
 - Bicycles
 - Rail: passenger (2), freight (1 type)
 - Inland shipping: 3 types
 - Maritime shipping: 7 types
 - No air
- Update of 2004 study

Overview

- Prices – user costs (€/100 vkm)
 - External costs (€/100 vkm)
 - Internalisation
-
- Price level 2009

Transport prices

- Road transport prices
 - Fuel prices
 - Purchase price
 - Yearly costs
 - (Company taxes)
 - Labour costs
 - Subsidies
- Rail
- IWW
- Maritime shipping

Fuel price

- Fuel consumption from MIMOSA
- Fuel prices
 - Gasoline, diesel, LPG
 - FOD Economie: maximum price + VAT
 - BPF: excise duties and other taxes
 - Gas and electricity
 - Price for average use including power mix

Purchase price

- Purchase price + VAT
 - Cars: Febiac
 - Light duty trucks: Febiac + website
 - Heavy duty trucks : Logghe ea 2006
 - Bus: De Lijn and Van Hool
- Purchase tax (Belasting op inverkehrsstelling)
- LPG subsidy: De Ceuster 2004
- License plate fee (up to 2006)
- Federal eco subsidy for cars
- (Tax reduction for electric cars)

Yearly costs

- Circulation tax (Verkeersbelasting)
- Extra tax for diesel cars (up to 2008)(Accijnscompenserende belasting)
- Eurovignet for trucks above 12 tonnes
- Radio tax (up to 2002)
- Maintenance + VAT
 - % of purchase price (TREMOVE and ANWB)
- Insurance + VAT
 - Household budget survey
- Technical inspection
 - Average number of checks/car/lifetime
- Permits for trucks (vervoervergunning)

Company taxes

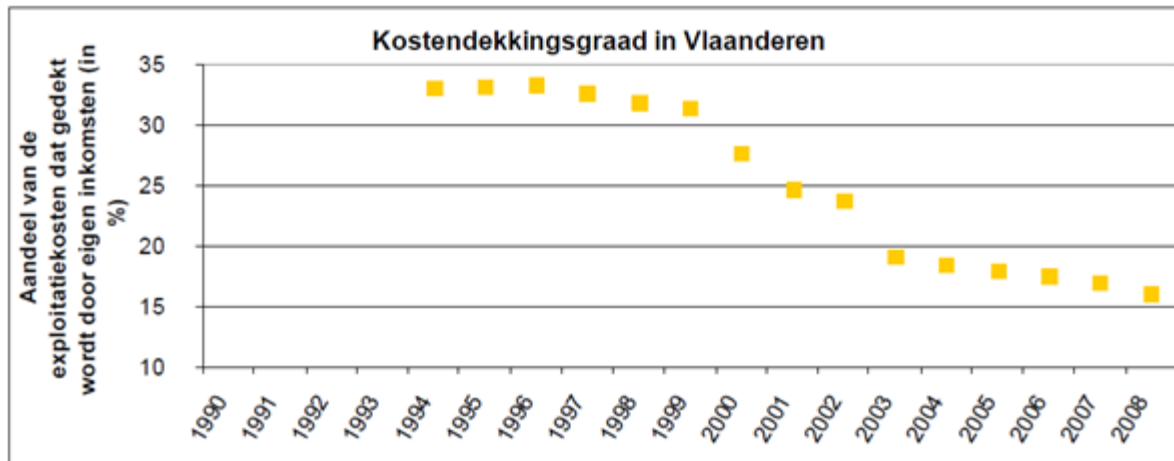
- Private labour taxes
 - Own car – tax deductible
 - Company car – private use
- Company taxes-deductibles
- Not taken into account

Labour costs & taxes

- For trucks and busses (taxi not)
- Labour costs
 - Gross hourly wage
 - “ARAB” fee: additional payment because the costs of driving is higher than if you have a fixed office space (coffee, sanitary,...)
 - Fee for accommodation (Verblijfsvergoeding)
 - Fee for nights (Nachtvergoeding)
 - Bonuses

Subsidies

- De Lijn price/cost
 - 2000: 30%
 - 2008: 15%



Figuur 66: Kostendeckingsgraad in Vlaanderen

Bicycles

- Purchase: 400€ (excl VAT) – 8 years
- Accessories: 100 euro – 5 years
- Maintenance: 50 euro/year
- Bicycle company bonus: 0.20 €/km
 - Not taken into account
- Yearly km: 642 km (based on OVV)

Trains

- Passengers: A wide range of tariffs: 12% paid full price in 2003
- Costs are derived from the NMBS accounts for passengers and freight
- Subsidies for NMBS passenger transport (difference in VAT is also considered as a subsidy)

Inland ships

- Ship types: Spits, European ship, Large cargo ship
- Fixed costs
 - Personnel, maintenance, repair, depreciation, insurances
- Variable costs
 - Fuel, permits (vaarrechten), fuel taxes (energiebelasting)

Maritime ships

- LoLo, RoRo, large and small RoPax, container, bulk and tanker
- Personnel, insurance, maintenance, repair, oil, administration, depreciation, taxes (havengelden), fuel
- € per day to €/km with hours on sea, very variable

Marginal external costs

- Types
 - Congestion
 - Emissions
 - Climate change
 - Air pollution (PM, SO_x, NO_x,..)
 - Accidents
 - Infrastructure
 - Health
- Not: nature, smell

Congestion Road transport

- = VOT * time losses * volume
- VOT: TREMOVE & SCENES
- Time losses: speed-flow functions for Flanders based on real data
- Much lower values than literature

Voertuigtype	hoofdwegennet Vlaamse ruit		Hoofdwegennet buiten VR		Regionaal wegennet		Stedelijk Wegennet		Alle wegen
	piek	dal	piek	dal	piek	dal	piek	dal	
Personenwagen	4.397	3.643	0.038	0.034	5.161	2.563	7.904	3.845	3.973
Motorfiets	2.198	1.822	0.019	0.017	2.581	1.281	3.952	1.923	1.987
Lichte vrachtwagen	4.397	3.643	0.038	0.034	5.161	2.563	7.904	3.845	3.973
Zware vrachtwagen	8.794	7.286	0.077	0.067	10.323	5.125	15.808	7.691	7.946
Bus	8.794	7.286	0.077	0.067	10.323	5.125	15.808	7.691	7.946

Congestion

Other modes

- Rail
 - Not calculated
- Inland shipping
 - Depending on route: locks and bridges
 - Not calculated
- Maritime shipping
 - In ports
 - Not calculated

Air pollution

Climate change

- Air pollution: SO₂, NO_x, NMVOS, heavy metals, PM_{2,5} and PM₁₀
- Climate change (CO₂, CH₄ and N₂O)
- Emissions in kg per vkm * cost emissions in € per kg
- Cost: VITO project
- Emissions:
 - Road: MIMOSA model
 - Rail and shipping: EMMOSS

Accidents

Depends on

- Accident risk
- Accident costs
- Risk elasticity: change in risk when volume changes
- Share of accident cost of vehicle type in total

Noise

- Threshold: hindrance above 65 dB(A)
- Calculation of number of hindered persons
- Valuation: 10 euro/person
- Marginal cost: increasing traffic volumes gives increasing noise hindrance but also increases mitigation measures

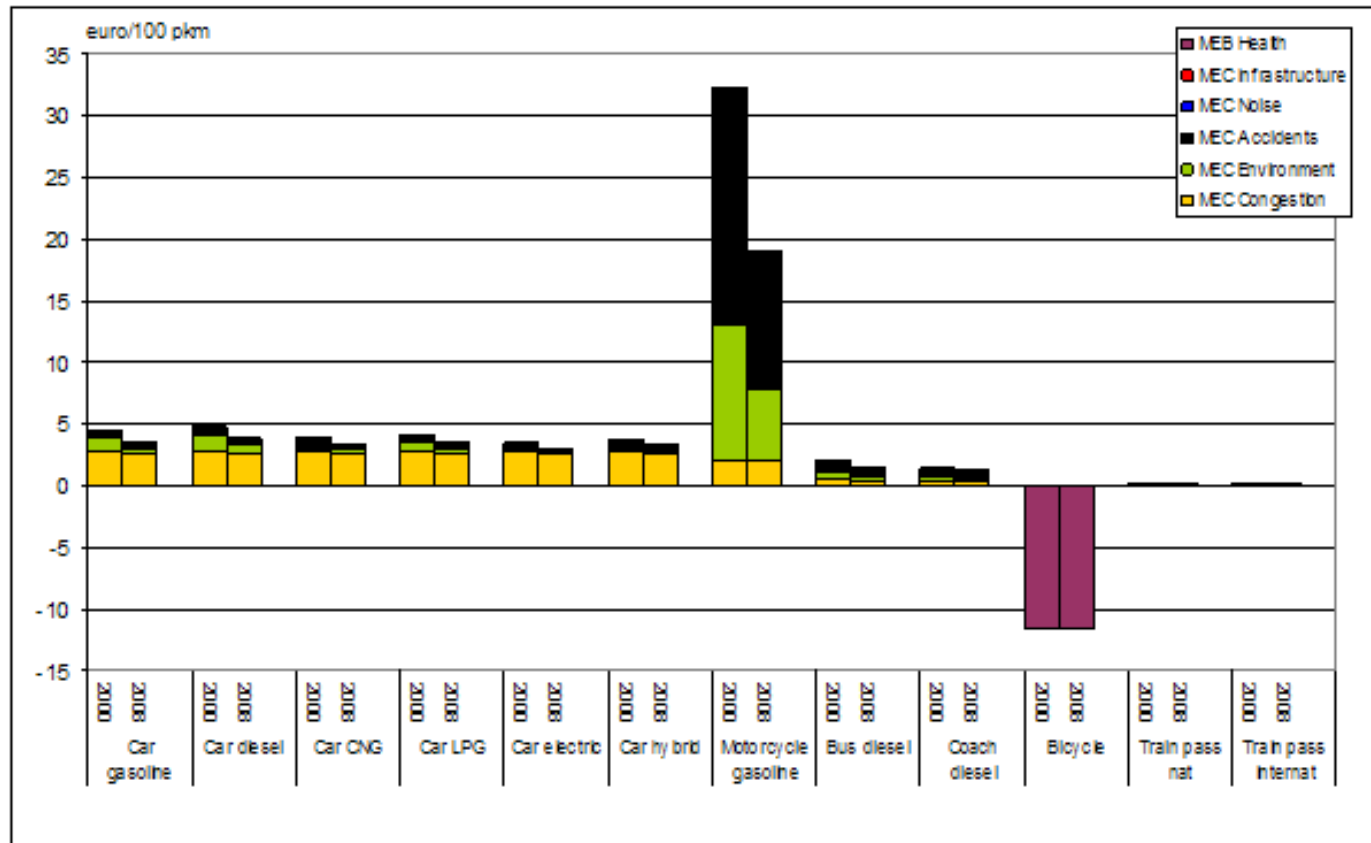
Infrastructure

- Includes: higher operating costs, maintenance cost, repair costs by the road/rail/canal/port operator due to extra vehicles.
- Road (trucks) and rail: marginal cost approach from the GRACE project
- Inland and maritime shipping: average cost.

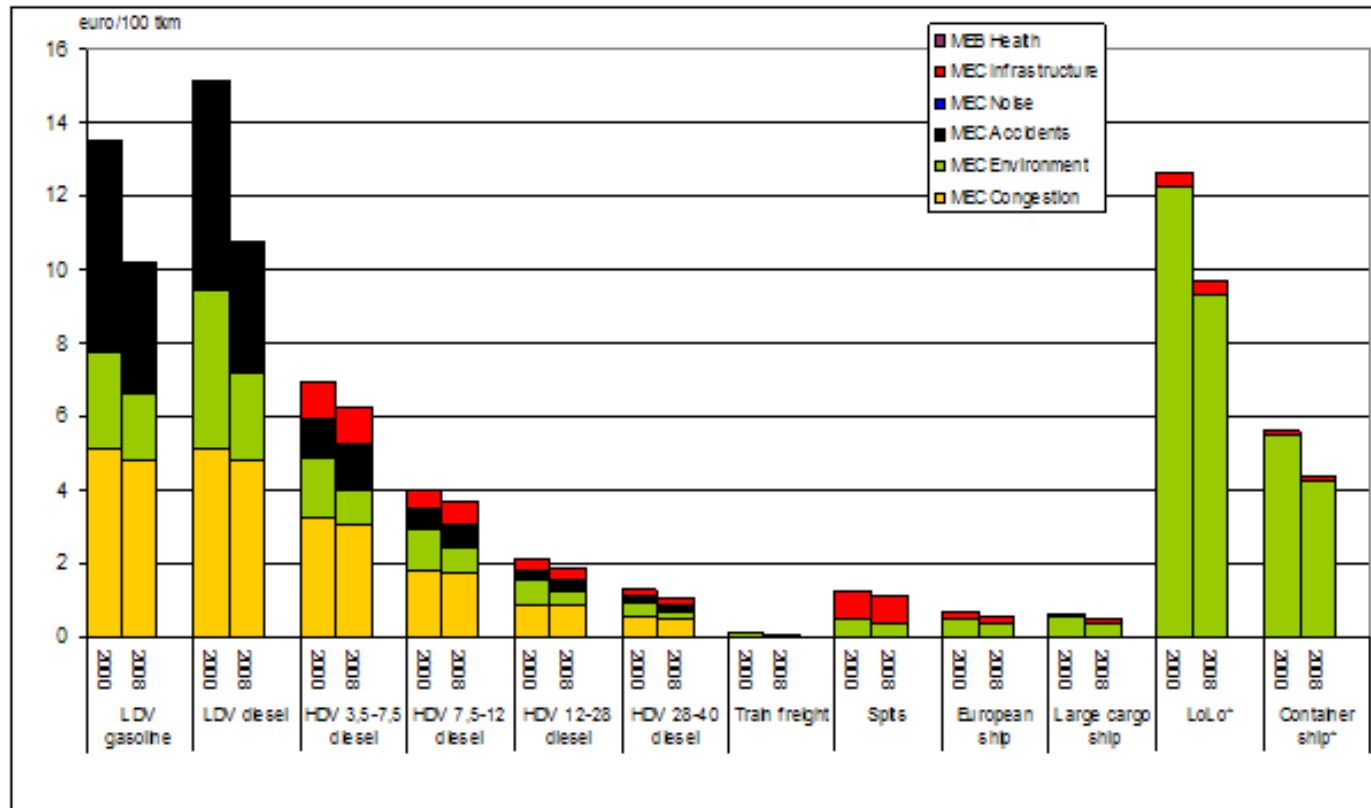
External benefits cycling

- Reduction in health care cost when people cycle more
- Reduction in obesity when people cycle more
- Better labour productivity when people cycle more
- 240 euro/year or 11,63 euro/100 vkm

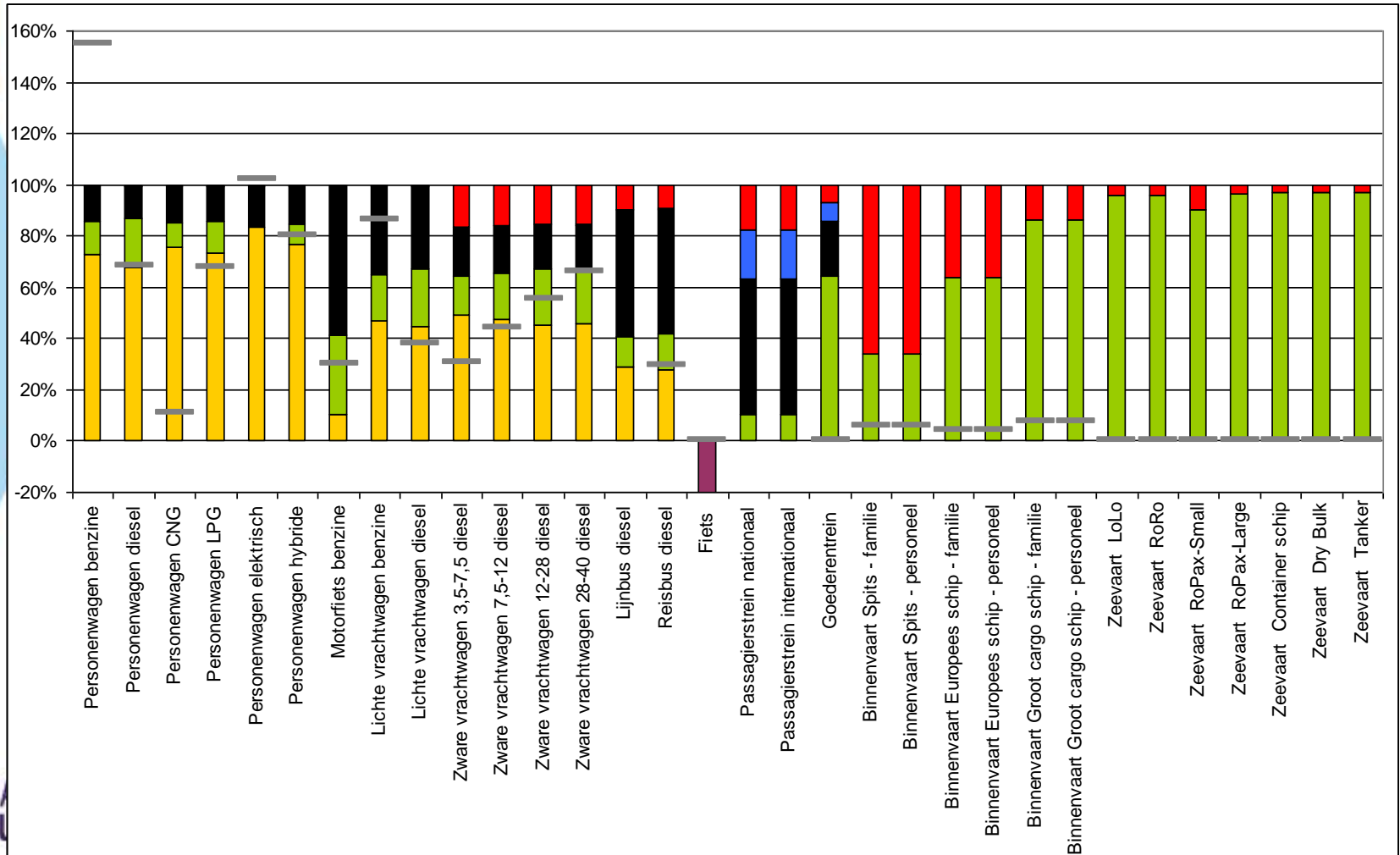
Marginal external costs passenger transport



Marginal external costs freight transport

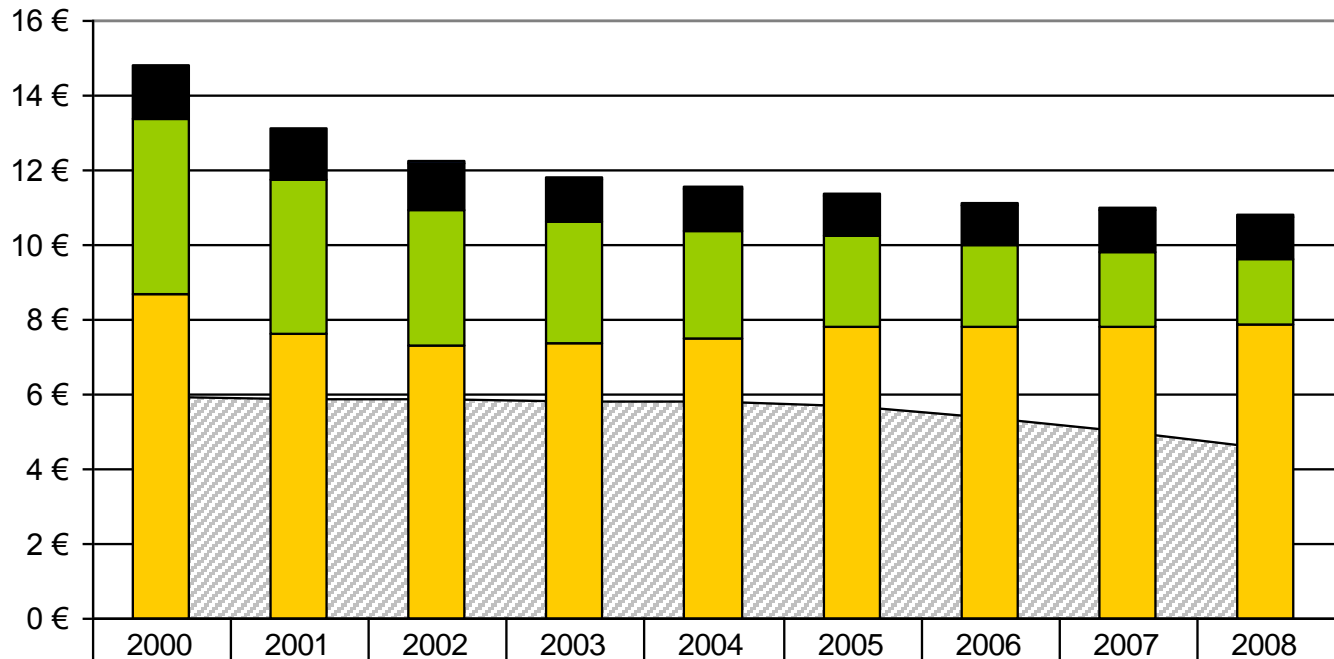


Internalisation Overview for 2008



Internalisation

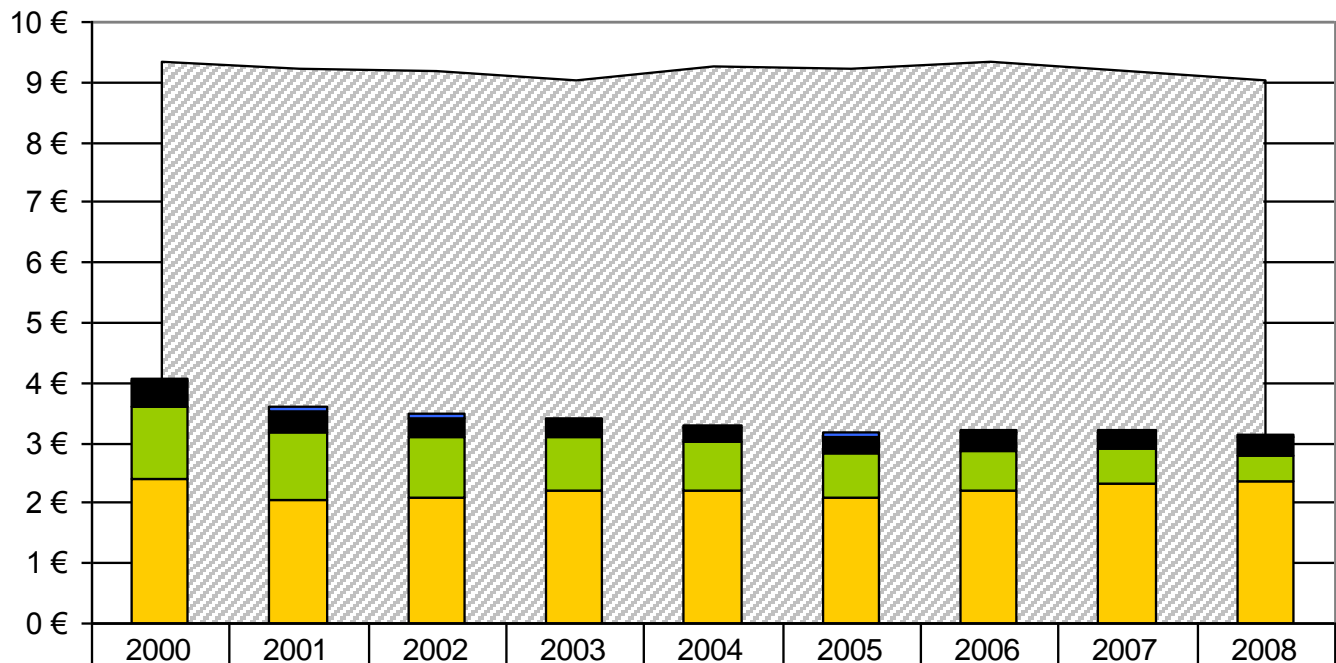
Diesel car, urban road, peak



■ Transportbelastingen	5,950	5,883	5,863	5,788	5,818	5,683	5,397	5,023	4,585
■ MEK congestie	8,661	7,640	7,316	7,379	7,473	7,836	7,789	7,791	7,904
■ MEK directe emissies	4,726	4,131	3,627	3,24	2,917	2,413	2,205	2,021	1,751
■ MEK ongevallen	1,403	1,331	1,237	1,160	1,090	1,094	1,099	1,117	1,080
■ MEK geluid	0,052	0,052	0,052	0,052	0,052	0,052	0,052	0,052	0,052
■ MEK infrastructuur	0	0	0	0	0	0	0	0	0
■ MEB gezondheid	0	0	0	0	0	0	0	0	0

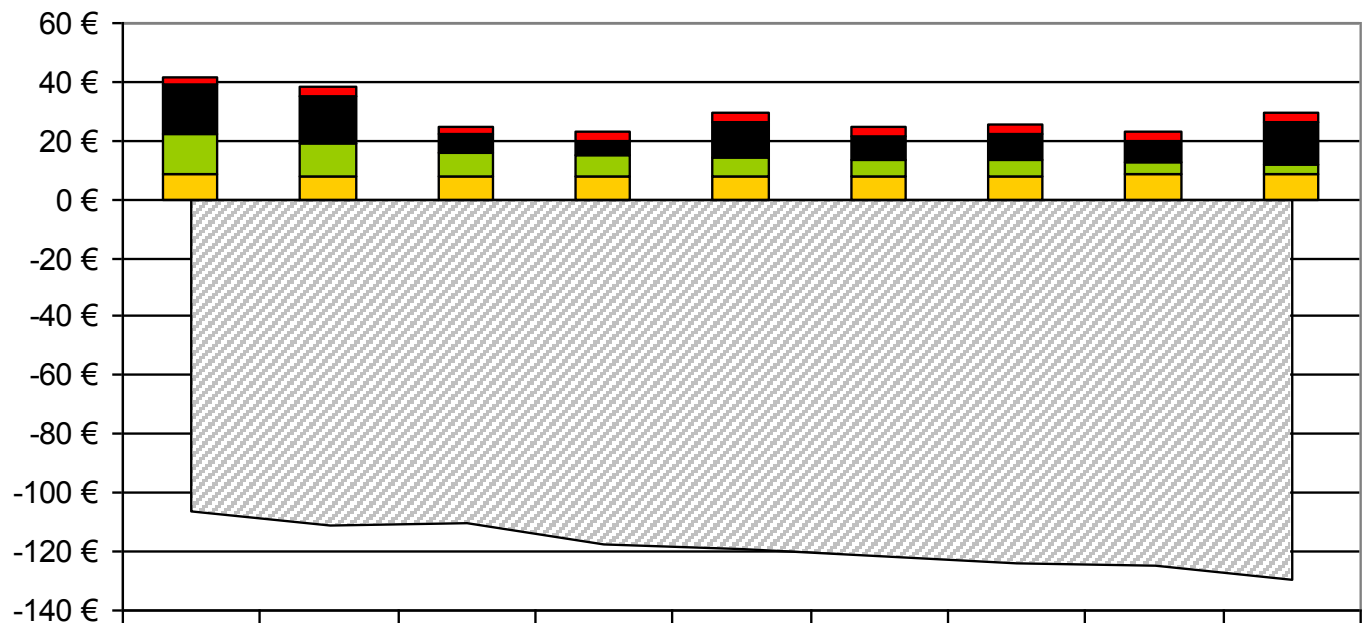
Internalisation

Gasoline car, motorway excl. 'Vlaamse Ruit', off-peak



■ Transportbelastingen	9,330	9,206	9,183	9,035	9,250	9,227	9,324	9,201	9,045
■ MEK congestie	2,391	2,056	2,110	2,201	2,203	2,107	2,216	2,326	2,379
■ MEK directe emissies	1,223	1,110	1,003	0,911	0,817	0,725	0,652	0,562	0,428
■ MEK ongevallen	0,400	0,368	0,305	0,249	0,234	0,276	0,299	0,282	0,294
■ MEK geluid	0,052	0,052	0,052	0,052	0,052	0,052	0,052	0,052	0,052
■ MEK infrastructuur	0	0	0	0	0	0	0	0	0
■ MEB gezondheid	0	0	0	0	0	0	0	0	0

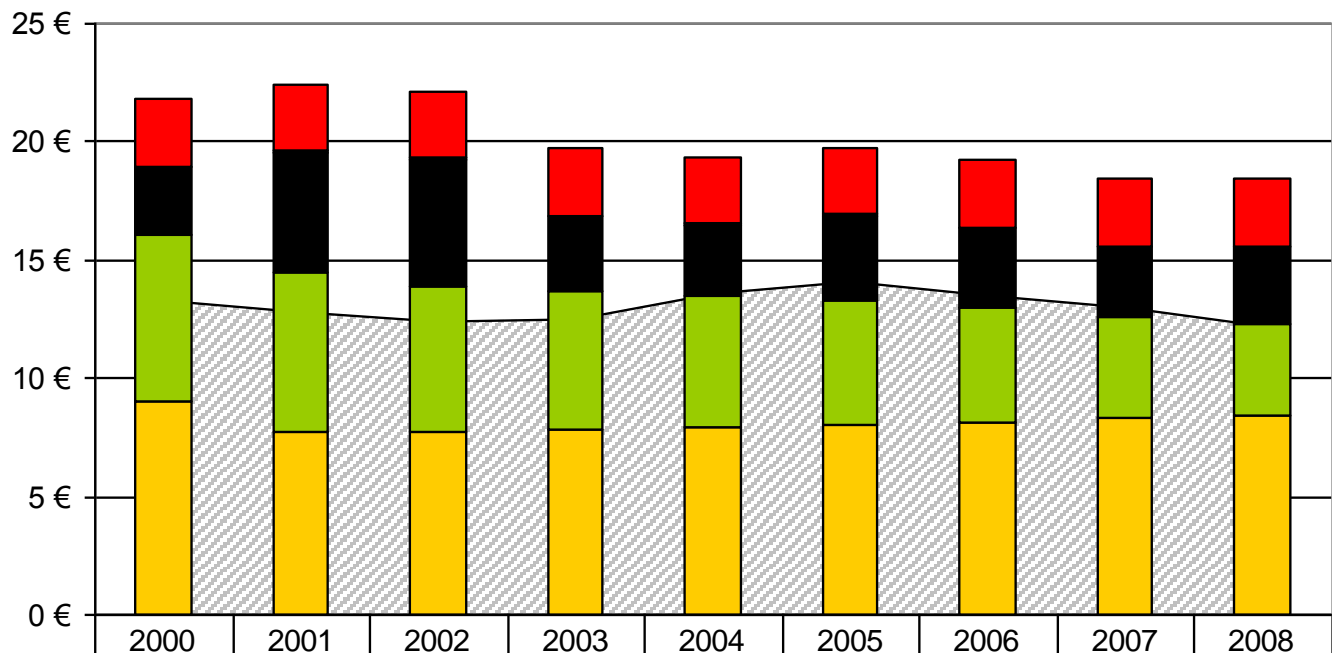
Internalisation Diesel bus 'De Lijn'



	2000	2001	2002	2003	2004	2005	2006	2007	2008
■ Transportbelastingen	-106,068	-110,946	-110,348	-117,500	-119,104	-121,887	-123,765	-124,380	-129,519
■ MEK congestie	8,994	7,724	7,710	7,868	7,962	8,018	8,110	8,326	8,449
■ MEK directe emissies	13,412	11,491	8,364	7,284	6,249	5,635	5,124	4,356	3,498
■ MEK ongevallen	16,340	16,093	5,841	4,634	12,006	7,986	9,087	7,266	14,606
■ MEK geluid	0,052	0,052	0,052	0,052	0,052	0,052	0,052	0,052	0,052
■ MEK infrastructuur	2,832	2,832	2,832	2,832	2,832	2,832	2,832	2,832	2,832
■ MEB gezondheid	0	0	0	0	0	0	0	0	0

Internalisation

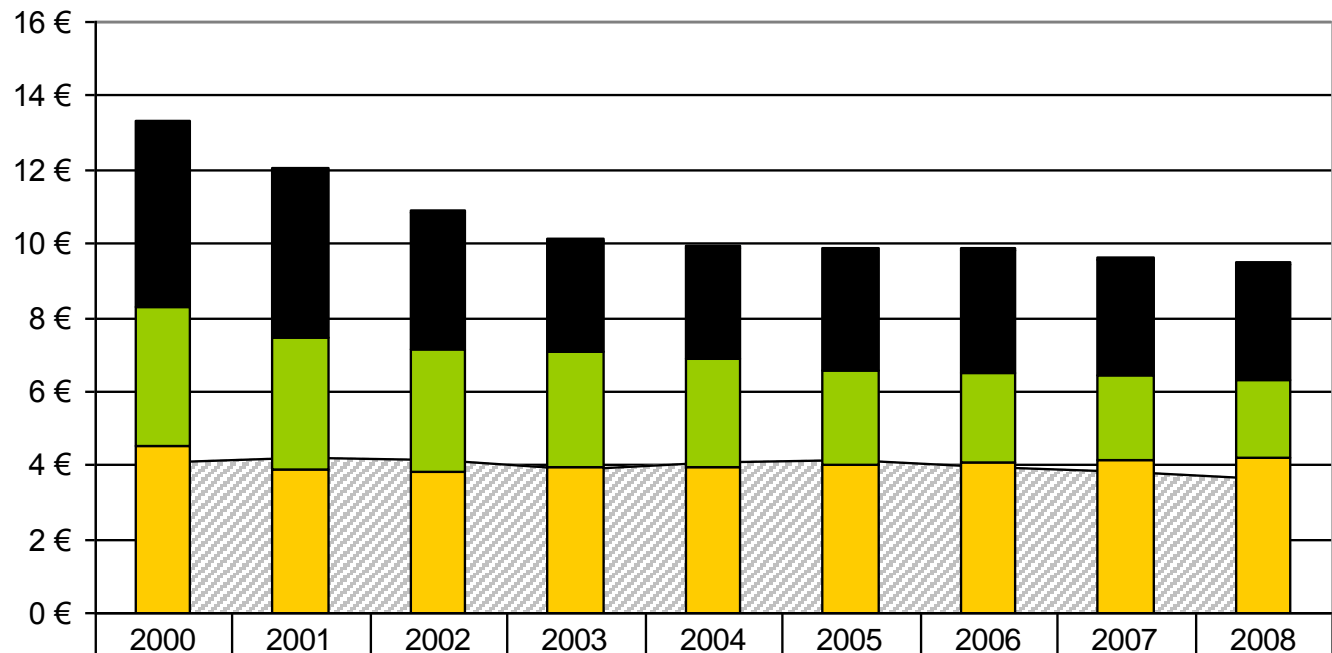
Diesel truck 28-40 tonnes



□ Transportbelastingen	13,244	12,755	12,389	12,489	13,608	14,038	13,526	12,978	12,212
■ MEK congestie	8,994	7,724	7,710	7,868	7,962	8,018	8,110	8,326	8,449
■ MEK directe emissies	7,123	6,774	6,187	5,816	5,524	5,254	4,884	4,297	3,845
■ MEK ongevallen	2,789	5,080	5,391	3,141	2,993	3,628	3,342	2,935	3,232
■ MEK geluid	0,052	0,052	0,052	0,052	0,052	0,052	0,052	0,052	0,052
■ MEK infrastructuur	2,832	2,832	2,832	2,832	2,832	2,832	2,832	2,832	2,832
■ MEB gezondheid	0	0	0	0	0	0	0	0	0

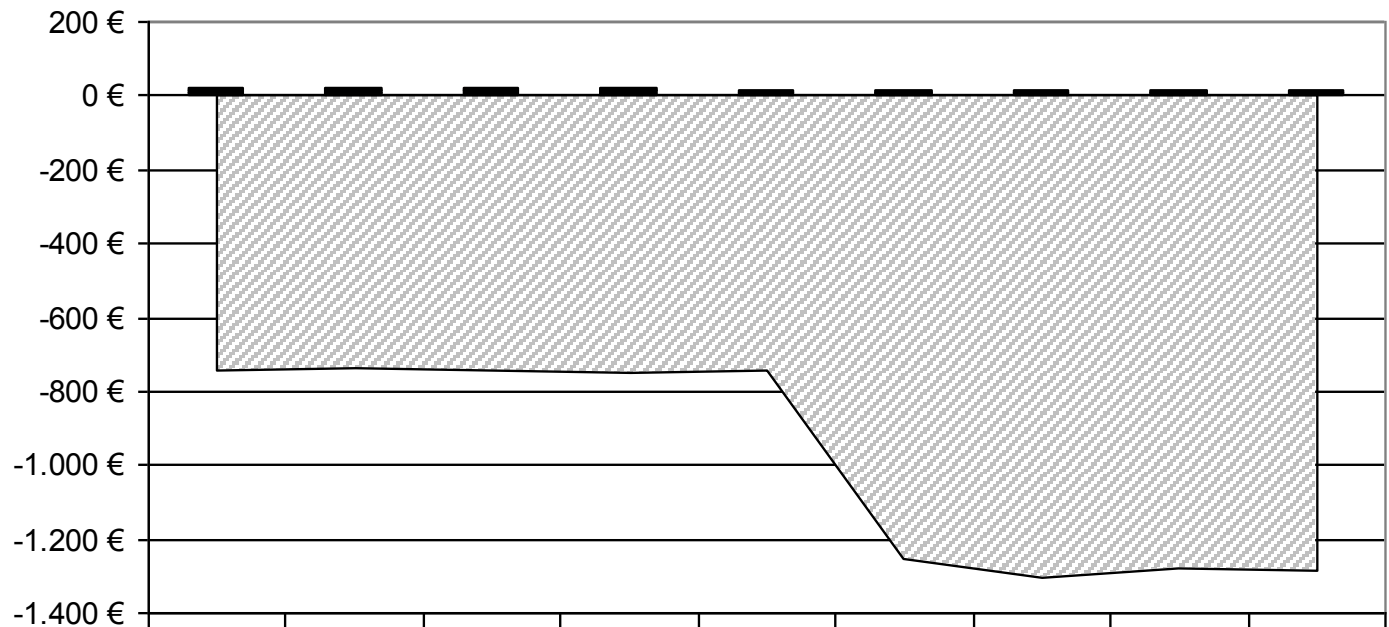
Internalisation

Diesel truck 1-3.5 tonnes



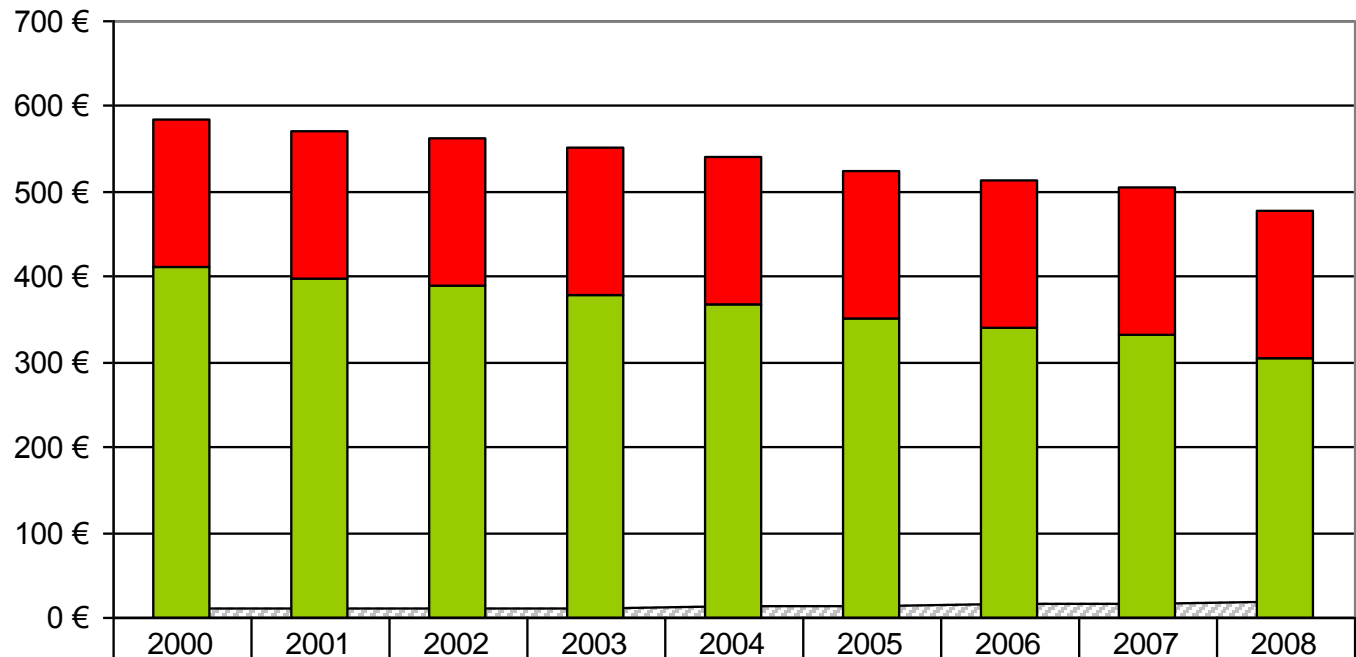
	2000	2001	2002	2003	2004	2005	2006	2007	2008
Transportbelastingen	4,095	4,223	4,138	3,886	4,108	4,126	3,982	3,856	3,609
MEK congestie	4,497	3,862	3,855	3,934	3,981	4,009	4,055	4,163	4,224
MEK directe emissies	3,808	3,582	3,315	3,112	2,916	2,572	2,436	2,264	2,117
MEK ongevallen	4,988	4,557	3,669	3,011	2,969	3,269	3,344	3,151	3,073
MEK geluid	0,052	0,052	0,052	0,052	0,052	0,052	0,052	0,052	0,052
MEK infrastructuur	0	0	0	0	0	0	0	0	0
MEB gezondheid	0	0	0	0	0	0	0	0	0

Internalisation National passenger train



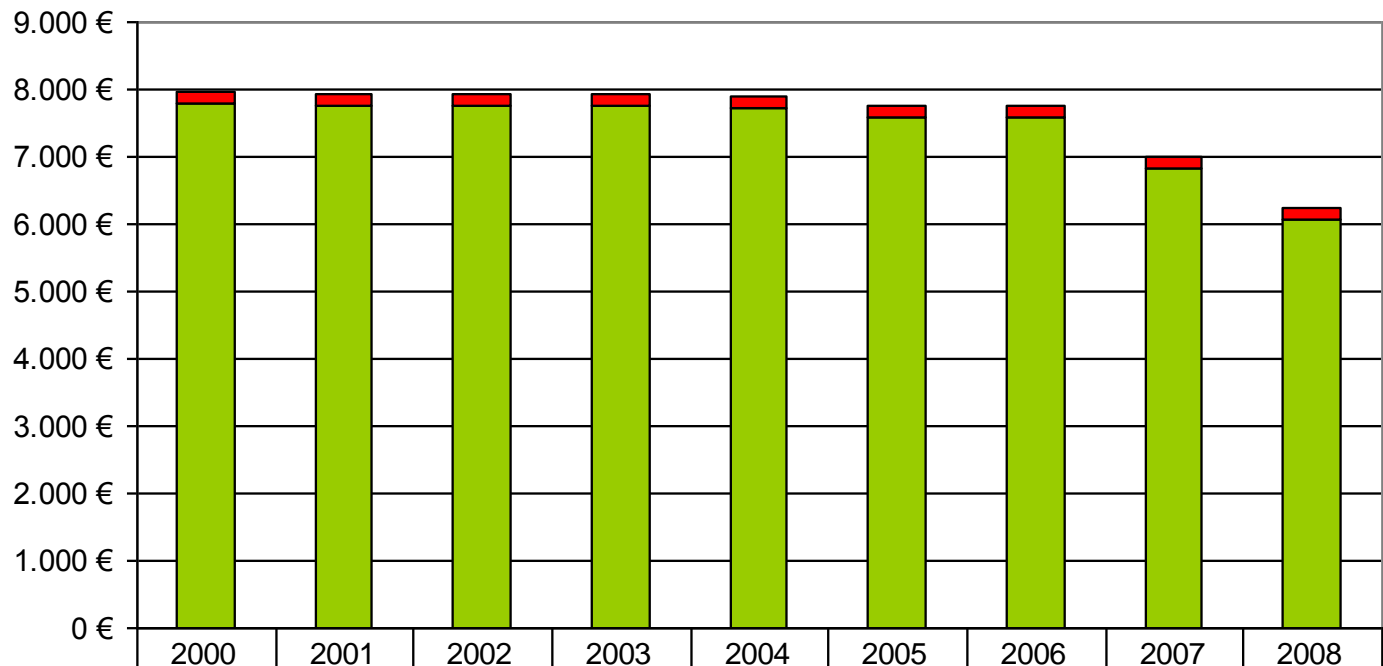
	2000	2001	2002	2003	2004	2005	2006	2007	2008
■ Transportbelastingen	-745,754	-738,639	-741,575	-747,485	-743,082	-1252,395	-1303,403	-1281,579	-1285,846
■ MEK congestie	0	0	0	0	0	0	0	0	0
■ MEK directe emissies	6,549	5,603	4,347	3,386	2,753	2,003	1,914	1,880	1,839
■ MEK ongevallen	9,043	9,189	9,120	9,110	9,042	9,278	9,037	8,771	9,310
■ MEK geluid	3,303	3,303	3,303	3,303	3,303	3,303	3,303	3,303	3,303
■ MEK infrastructuur	3,133	3,133	3,133	3,133	3,133	3,133	3,133	3,133	3,133
■ MEB gezondheid	0	0	0	0	0	0	0	0	0

Internalisation Inland European ship



▣ Transportbelastingen	11,840	11,840	11,840	11,840	12,500	13,626	15,791	17,811	18,789
▣ MEK congestie	0	0	0	0	0	0	0	0	0
▣ MEK directe emissies	410,711	398,966	389,884	379,306	369,165	350,440	339,351	331,335	304,781
▣ MEK ongevallen	0,001	0,001	0,001	0,001	0,001	0,001	0,001	0,001	0,001
▣ MEK geluid	0	0	0	0	0	0	0	0	0
▣ MEK infrastructuur	172,935	172,935	172,935	172,935	172,935	172,935	172,935	172,935	172,935
▣ MEB gezondheid	0	0	0	0	0	0	0	0	0

Internalisation Maritime container ship



■ Transportbelastingen	0	0	0	0	0	0	0	0	0
■ MEK congestie	0	0	0	0	0	0	0	0	0
■ MEK directe emissies	7797,449	7774,76	7759,368	7743,956	7725,045	7592,672	7575,402	6817,37	6059,79
■ MEK ongevallen	0,001	0,001	0,001	0,001	0,001	0,001	0,001	0,001	0,001
■ MEK geluid	0	0	0	0	0	0	0	0	0
■ MEK infrastructuur	172,935	172,935	172,935	172,935	172,935	172,935	172,935	172,935	172,935
■ MEB gezondheid	0	0	0	0	0	0	0	0	0



Thank you!