

PetroChem industry in The Netherlands

Data collection and calculating emission factors

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**Statistics
Netherlands**

Contents

- Overview of Dutch of PetroChem industry: data collection , processing and publication
- Methodology of calculating **Emission Factor** for Waste Gasses

Oil data collection by CBS: Questionnaire and registers

Questionnaire: full mass balance of oil energy products

- 5 types of companies (100): production, refineries, stockholding, traders, PetroChem industry
- No data from retail, pump stations: no regional data
- Checks: Sales and purchase of all 30+ products are monthly matched, import export country totals

Registers

- Import export: Customs data
- Obligated emergency stocks: Ministry Economics
- Fishing ships list, Excise duty register for motor fuels

Petrochemical Data collection

Data example for year data Petrochem

- Total **Use** of feedstock (13,8 Mt)
- Total **Production** of energy products (3,3 Mt)
- Total **Final use** of waste gasses (1.9Mt)
- Yield = (Production of chemical products (13,8-3.3))/ Total Use (Normally around 75%)

Allocation **Feedstocks based on Yield** to:

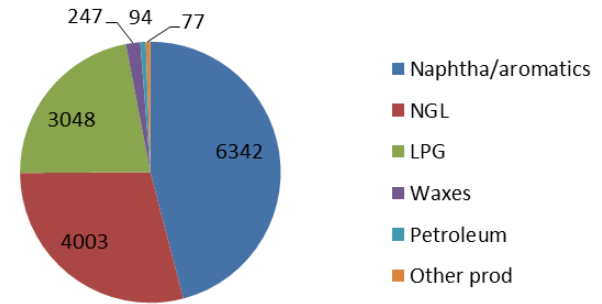
- Non energy use
- Input for transformation

Example (Yield = 75%)

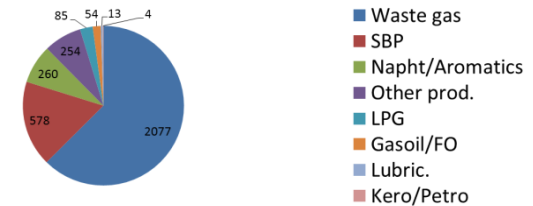
Use 4003 kton NGL: 25% 1072 kt transformation, 75 % 2930 kt final non energy use

Production 1900 ton Waste gasses: 1900 backflows, 1900 prim products received, Inland deliveries

Total use (13.800 ktons)



Total production (3.320 ktons)



PetroChem reporting

AOS: Petrochemical reporting methodology

– Table 3

- Final nonenergy use/industry sec/chem: 75% per feedstock
- Final energy cons/industry sec/chem: burning waste gasses
- Inland deliveries for energy use/transf sec/Pet chem: 25% per feedstock

– Table 2

- Backflows: production of energy products by Petrochem (no real transformation visible)
- Non energy use in petrochemical industry = table 3 data
- Energy use in in petrochemical industry = table 3 data (final energy use)

– Table 1 : totals

PetroChem CO2 emissions

Data sources

- **CBS Annual Energy Balance:** available November 30th
 - Final energy use in TJ (per company per energy product) (TJ product P1, TJ product P2, TJ Waste gasses, etc...)
- **Netherlands Emission Authority (NEA):** data on Emission Trade System (ETS) for every large company
 - Total CO2 emissions per company on website
 - Breakdown per energy product on request
- **IPCC:** Standard emission factors for defined energy products, for example natural gas (ton CO2/TJ Natural gas)
- **Unknown:** Emission factor of the burned Waste gasses

PetroChem Calculation

Emission Factor of waste gas (EF_{wg})

Total CO₂: emission for single PC company per energy product (ETS data)

must be equal to

Total CO₂: $SUM = ((TJ_{P1}) * (EF_{P1})) + ((TJ_{P2}) * (EF_{P2})) + \dots + ((TJ_{wg}) * (EF_{wg}))$

Final energy use in PetroChem (CBS energy balance data)

Calculation of Emission factor waste gas

TJ_{wg} = known from data collection PetroChem industry, data per company

EF_{wg} = can now be calculated

Typical EF_{wg} = between 55 and 70 depending on the type of PetroChem factory

Breaks in time series are investigated

AOS Table 1

		Crude Oil	Natural gas liquids	Refinery feedstocks	Additives / oxygenates	Of which Biofuels	Other hydrocarbons	TOTAL (A to F, excl. E)
		A	B	C	D	E	F	G
Indigenous production	(+) 1	957	291		323			1.571
Receipts from other sources	(+) 2				333	333		333
Backflows	(+) 3			3.787				3.787
Products transferred	(+) 4			3.381				3.381
Imports (Balance)	(+) 5	54.317	6.462		596			61.375
Exports (Balance)	(-) 6	326	61		405			792
Direct use	(-) 7	579	3.423	3.790	739	383		8.531
Stock changes	(+) 8	-557	-46		44	50		-559
Refinery intake (Calculated)	(=) 9	53.812	3.223	3.378	152	0	0	60.565
Statistical difference	(-) 10	0	0	0	0	0	0	0
Refinery intake (Observed)	(=) 11	53.812	3.223	3.378	152			60.565
MEMO ITEMS:								
Refinery losses	12	428						428
STOCK LEVELS:								
Opening stock level (National territory)	13	2.481	303		442	215		3.226
Closing stock level (National territory)	14	3.038	349		398	165		3.785
AVERAGE NET CALORIFIC VALUES:								
<i>Unit: kJ/kg</i>								
Production	15	42.700	44.000		43.934			
Imports	16	42.700	44.000		43.689			
Exports	17	42.700	44.000		44.000			
Average	18	42.700	44.000	44.000	38.670	31.978		

AOS Table 2a

Menu		Crude oil	Natural gas liquids	Refinery gas	Ethane	LPG	Naphtha
		A	B	C	D	E	F
Primary product receipts	(+) 1	579	3.423	2.319		146	376
Refinery gross output	(+) 2			2.243		1.640	10.133
Recycled products	(+) 3			280			
Refinery fuel	(-) 4			1.846		35	
Imports (Balance)	(+) 5					3.684	16.217
Exports (Balance)	(-) 6					1.935	12.674
International marine bunkers	(-) 7						
Interproduct transfers	(+) 8	-579	329			-258	-6.952
Products transferred	(-) 9						120
Stock changes	(+) 10					117	-117
Gross inland deliveries (Calculated)	(=) 11	0	3.752	2.996	0	3.359	6.863
Statistical difference	(-) 12			43	0	20	-87
Gross inland deliveries (Observed)	(=) 13	0	3.752	2.953	0	3.339	6.950
STOCK LEVELS:							
Opening stock level (National territory)	14					264	1.214
Closing stock level (National territory)	15					147	1.331
MEMO ITEMS: REFINERY FUEL USED FOR							
Electricity production	16						
CHP production	17						
Heat production (Heat sold)	18						
MEMO:							
Stock changes at main activity utilities	19						
Net calorific value - average	20			45196		45196	44000

AOS Table 2b

Menu		Crude oil	Natural gas liquids	Refinery gas	Ethane	LPG	Naphtha
		A	B	C	D	E	F
Gross inland deliveries (Observed)	1	0	3.752	2.953	0	3.339	6.950
<i>Of which: Petrochemical flows:</i>							
Gross deliveries to the petrochemical industry	2		3.752	2.234		3.019	6.950
Energy use in the petrochemical industry	3			2.234			
Non-energy use in the petrochemical industry	4		2.550			2.344	5.028
Backflows to refineries	5			2.319		146	376
Of which: backflows for direct export or sale	6						868
Net deliveries to the petrochemical industry	7						
Net deliveries of total products	8						

AOS Table 3a

Menu		Crude oil	Natural gas liquids	Refinery gas	Ethane	LPG	Naphtha
		A	B	C	D	E	F
Gross inland deliveries for energy use	1	0	1.202	2.953	0	989	1.922
Transformation sector	2	0	1.202	651	0	675	1.922
Main activity producer electricity plants	3						
Autoproducer electricity plants	4						
Main activity producer CHP plants	5			159			
Autoproducer CHP plants	6			116			
Main activity producer heat plants	7			93			
Autoproducer heat plants	8			133			
Gas works (Transformation)	9						
For blended natural gas	10			150			
Coke ovens (Transformation)	11						
Blast furnaces (Transformation)	12						
Petrochemical industry	13		1.202			675	1.922
Patent fuel plants (Transformation)	14						
Not elsewhere specified (Transformation)	15						
Energy sector	16	0	0	0	0	0	0
Coal mines	17						
Oil and gas extraction	18						
Coke ovens (Energy)	19						
Blast furnaces (Energy)	20						
Gas works (Energy)	21						
Own use in electricity, CHP and heat plants	22						
Not elsewhere specified (Energy)	23						
Distribution losses	24						
Total final energy consumption	25	0	0	2.302	0	314	0
Transport sector	26	0	0	0	0	167	0
International aviation	27						
Domestic aviation	28						
Road	29					167	
Rail	30						
Domestic navigation	31						
Pipeline transport	32						
Not elsewhere specified (Transport)	33						
Industry sector	34	0	0	2.302	0	52	0
Iron and steel	35						
Chemical (including petrochemical)	36			2.302		46	

AOS Table 3b

		Menu					
		Crude oil	Natural gas liquids	Refinery gas	Ethane	LPG	Naphtha
		A	B	C	D	E	F
Gross inland deliveries for non energy use	1	0	2,550	0	0	2,350	5,028
Transformation sector	2	0	0	0	0	0	0
Main activity producer electricity plants	3						
Autoproducer electricity plants	4						
Main activity producer CHP plants	5						
Autoproducer CHP plants	6						
Main activity producer heat plants	7						
Autoproducer heat plants	8						
Gas works (Transformation)	9						
For blended natural gas	10						
Coke ovens (Transformation)	11						
Blast furnaces (Transformation)	12						
Petrochemical industry	13						
Patent fuel plants (Transformation)	14						
Not elsewhere specified (Transformation)	15						
Energy sector	16	0	0	0	0	0	0
Coal mines	17						
Oil and gas extraction	18						
Coke ovens (Energy)	19						
Blast furnaces (Energy)	20						
Gas works (Energy)	21						
Own use in electricity, CHP and heat plants	22						
Not elsewhere specified (Energy)	23						
Distribution losses	24						
Total final non energy use consumption	25	0	2,550	0	0	2,350	5,028
Transport sector	26	0	0	0	0	0	0
International aviation	27						
Domestic aviation	28						
Road	29						
Rail	30						
Domestic navigation	31						
Pipeline transport	32						
Not elsewhere specified (Transport)	33						
Industry sector	34	0	2,550	0	0	2,350	5,028
Iron and steel	35						
Chemical (including petrochemical)	36		2,550			2,350	5,028

