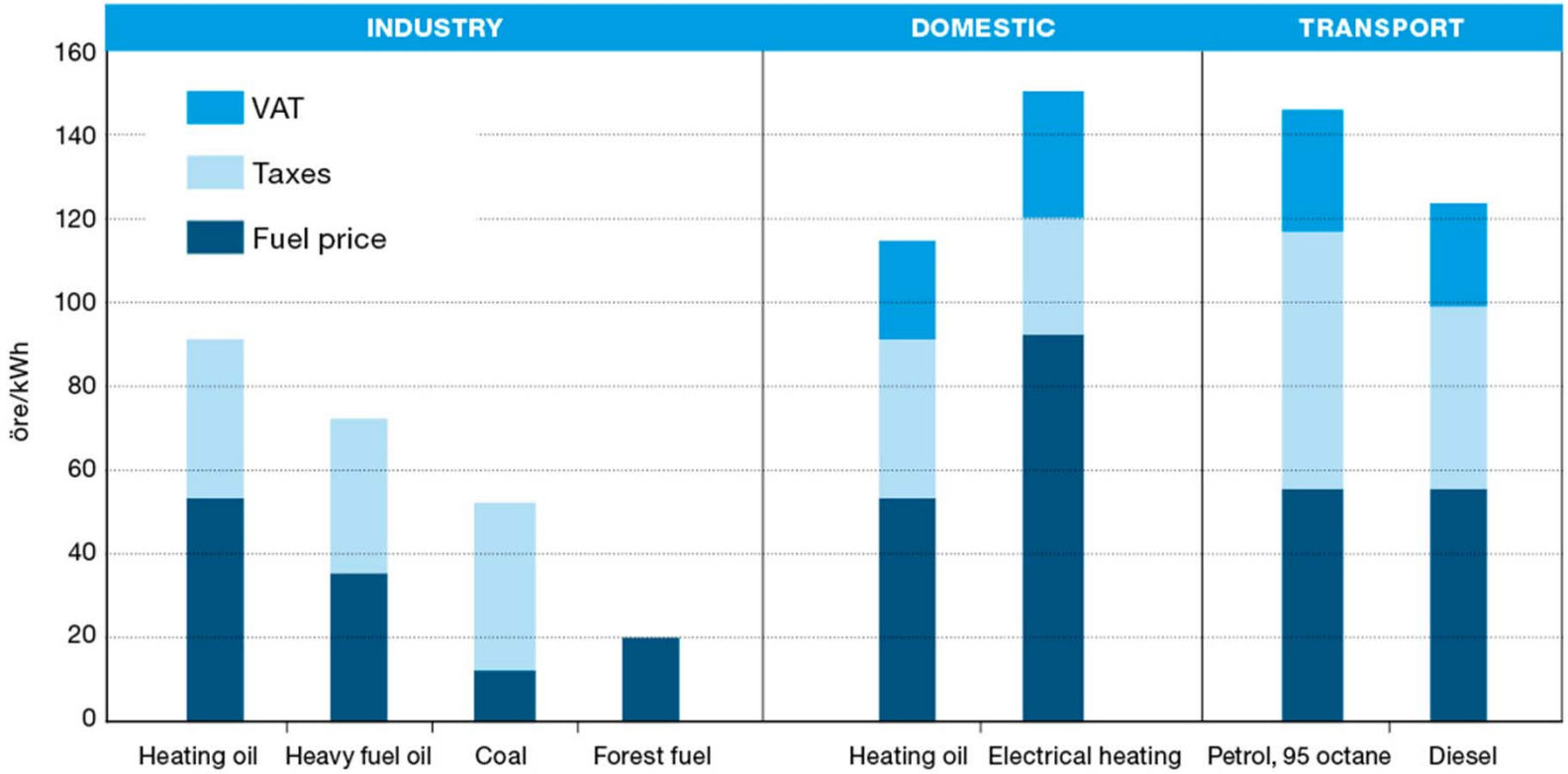
Energy in Sweden 2011

OH-pictures

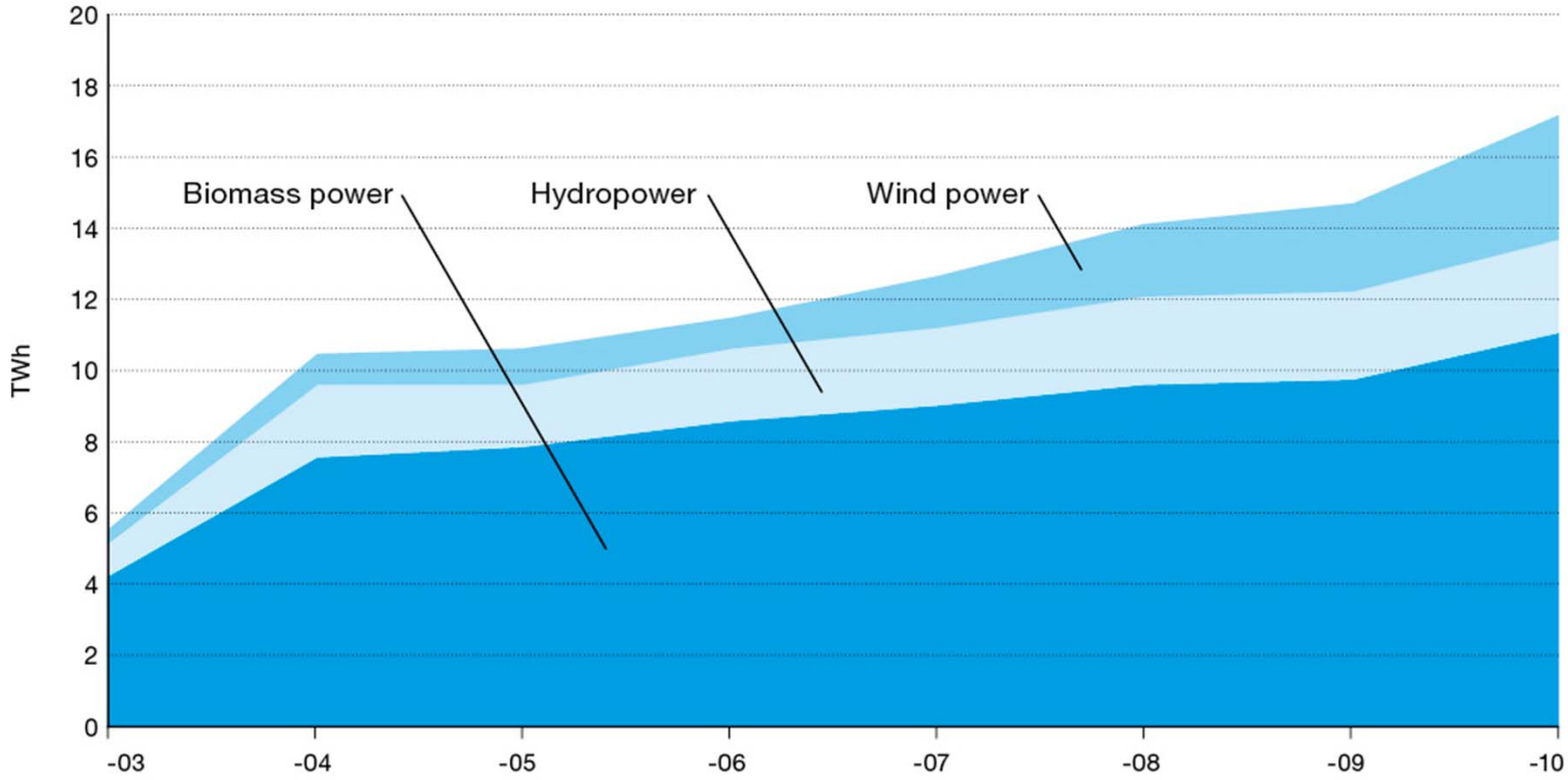
Swedish Energy Agency

Figure 1 Total energy price for various customer categories in 2010, in öre/kWh



Source: SPBI, Swedish Energy Agency, Statistics Sweden, Swedish Tax Agency, additional processing by the Swedish Energy Agency.
Note: Prices for industry do not include any volume discounts.

Figure 2 Renewable generation in the electricity certificate system by hydro-power, wind power and biomass power (excluding peat), 2003-2010, in TWh

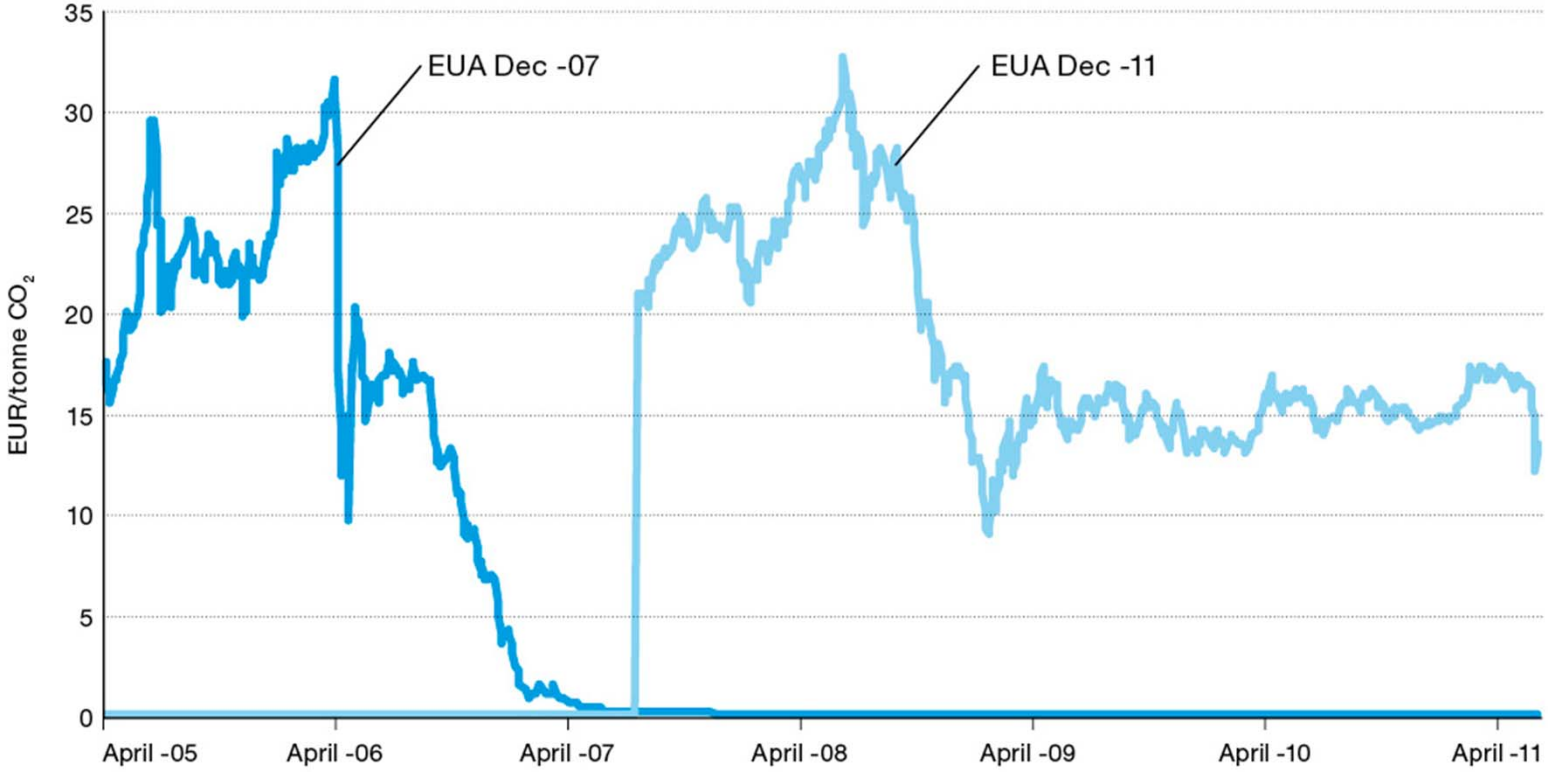


Source: Swedish Energy Agency.

Figure 3 Average spot price of electricity certificates, 2003–2010, in SEK/certificate

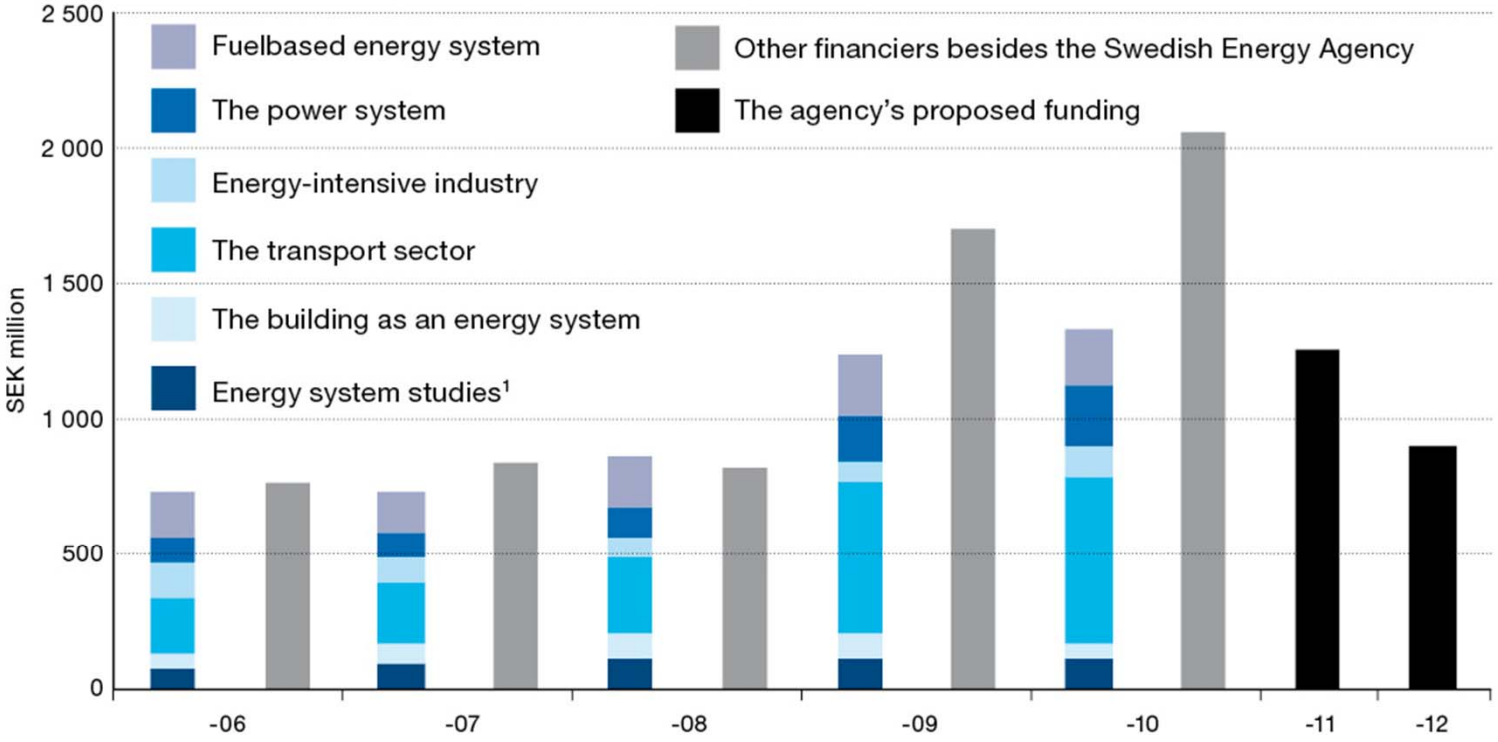
Source: Svensk Kraftmäkling AB.

Figure 4 Prices of European Union Allowances, April 2005–June 2011, in EUR/tonne CO_2



Source: www.pointcarbon.com

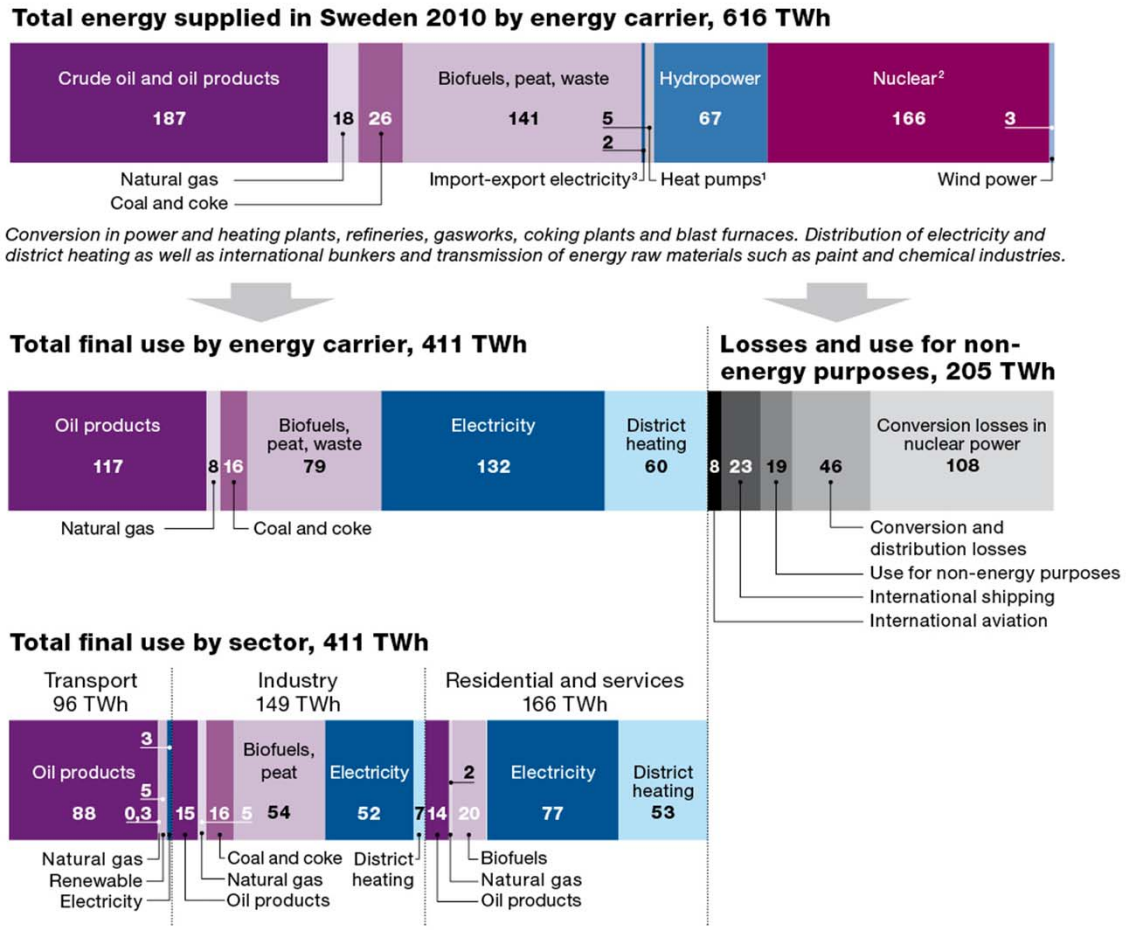
Figure 5 Energy research, development and demonstration funding, 2006–2012, in SEK million



Source: Energy in Sweden 2010 (ET 2010:45), the Swedish Energy Agency's Annual Report 2010 (ER 2011:01), Budget Bill 2009/10:1 category 21 Energy.

Note: For the period 2006–2010, actual figures are shown. 2011 and 2012 refers to expected funding. The figures are therefore not strictly comparable.

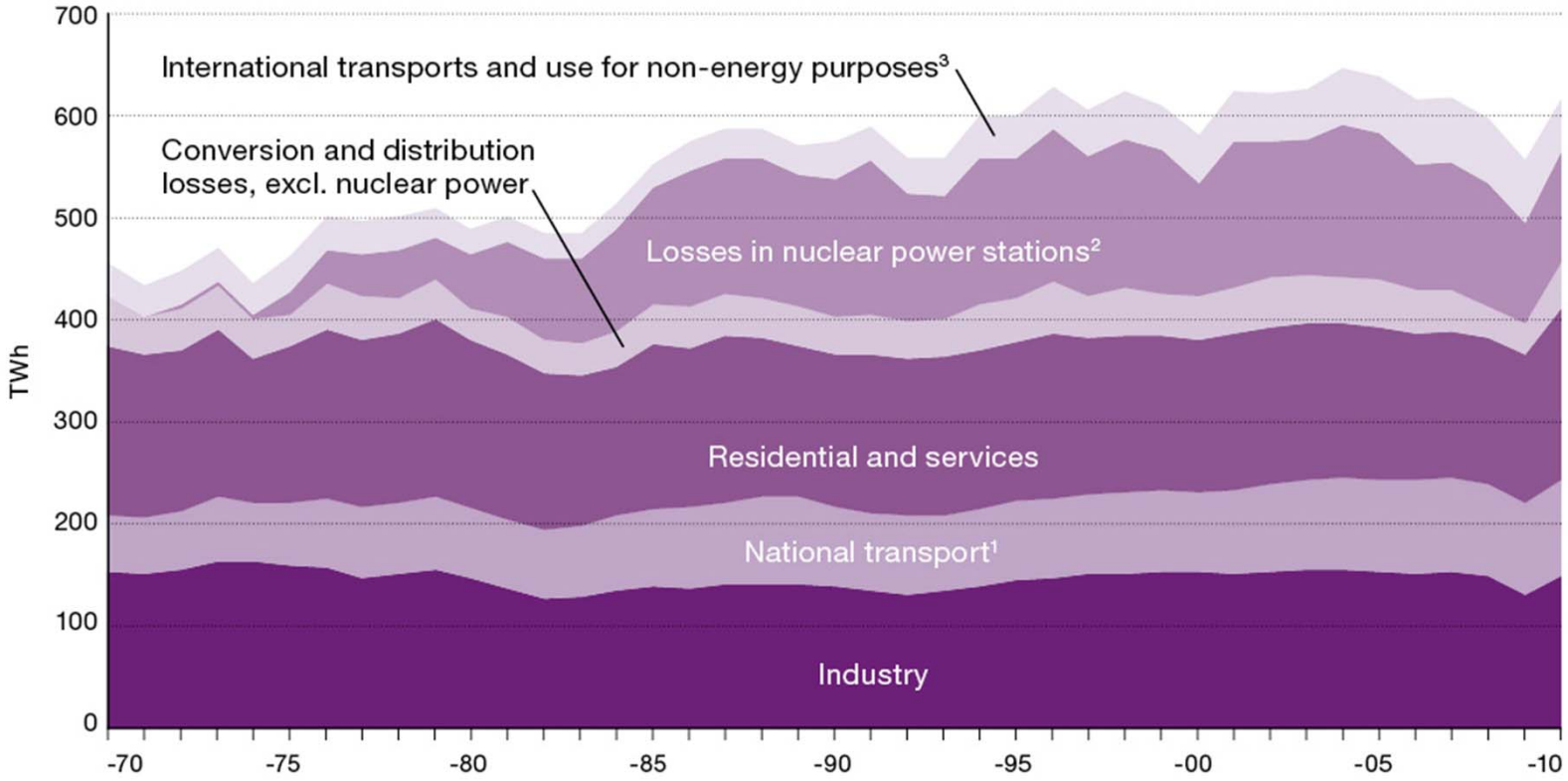
Figure 6 Energy supply and use in Sweden, 2010, in TWh



Source: Swedish Energy Agency and Statistics Sweden.

Note: 1. Heat pumps refer to large heat pumps for district heating.
2. Nuclear power is calculated gross in accordance with the UN/ECE method.
3. Net import of electricity is added to the total energy supply.

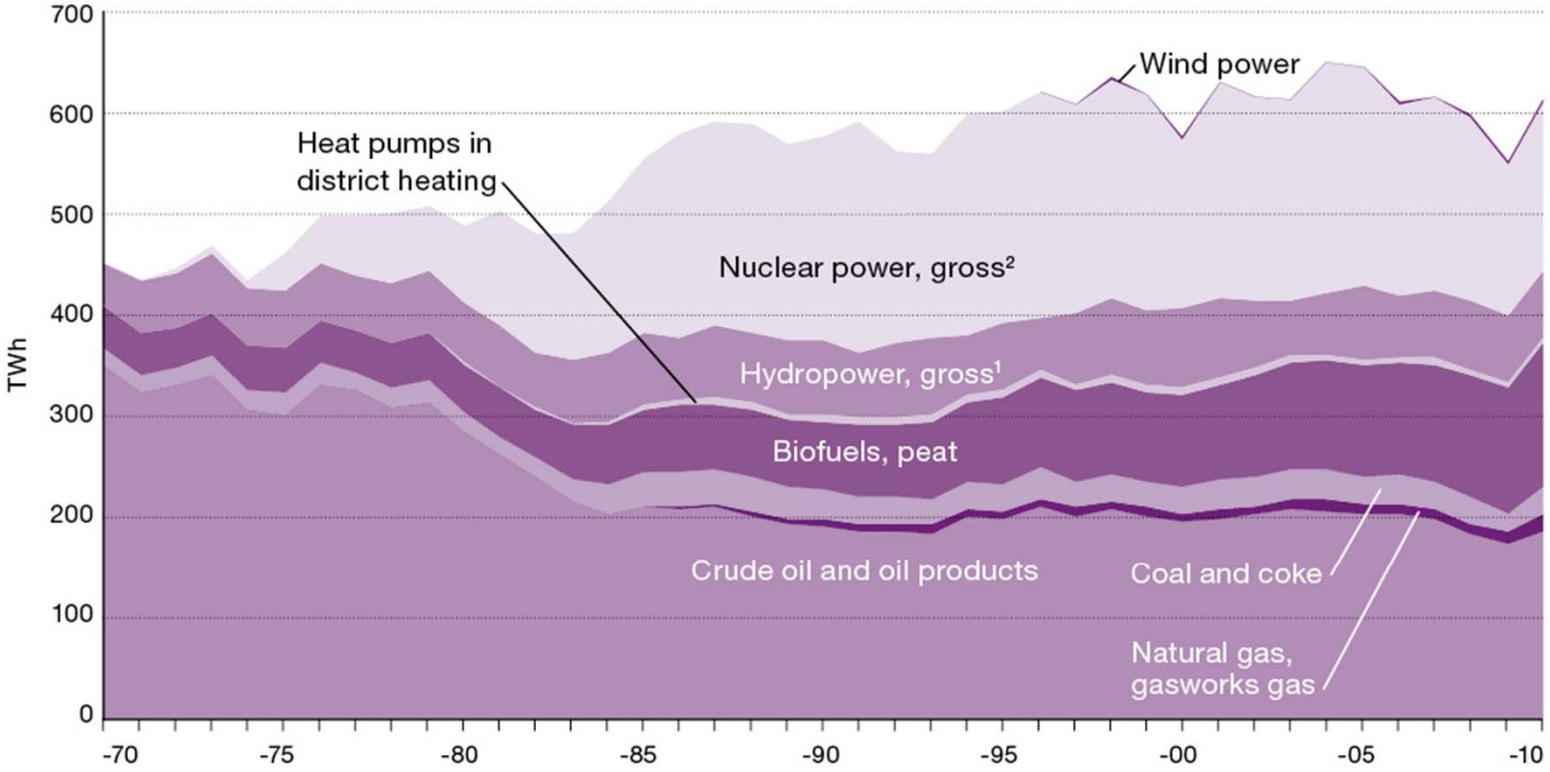
Figure 7 Total energy use in Sweden, 1970–2010, in TWh



Source: Swedish Energy Agency and Statistics Sweden.

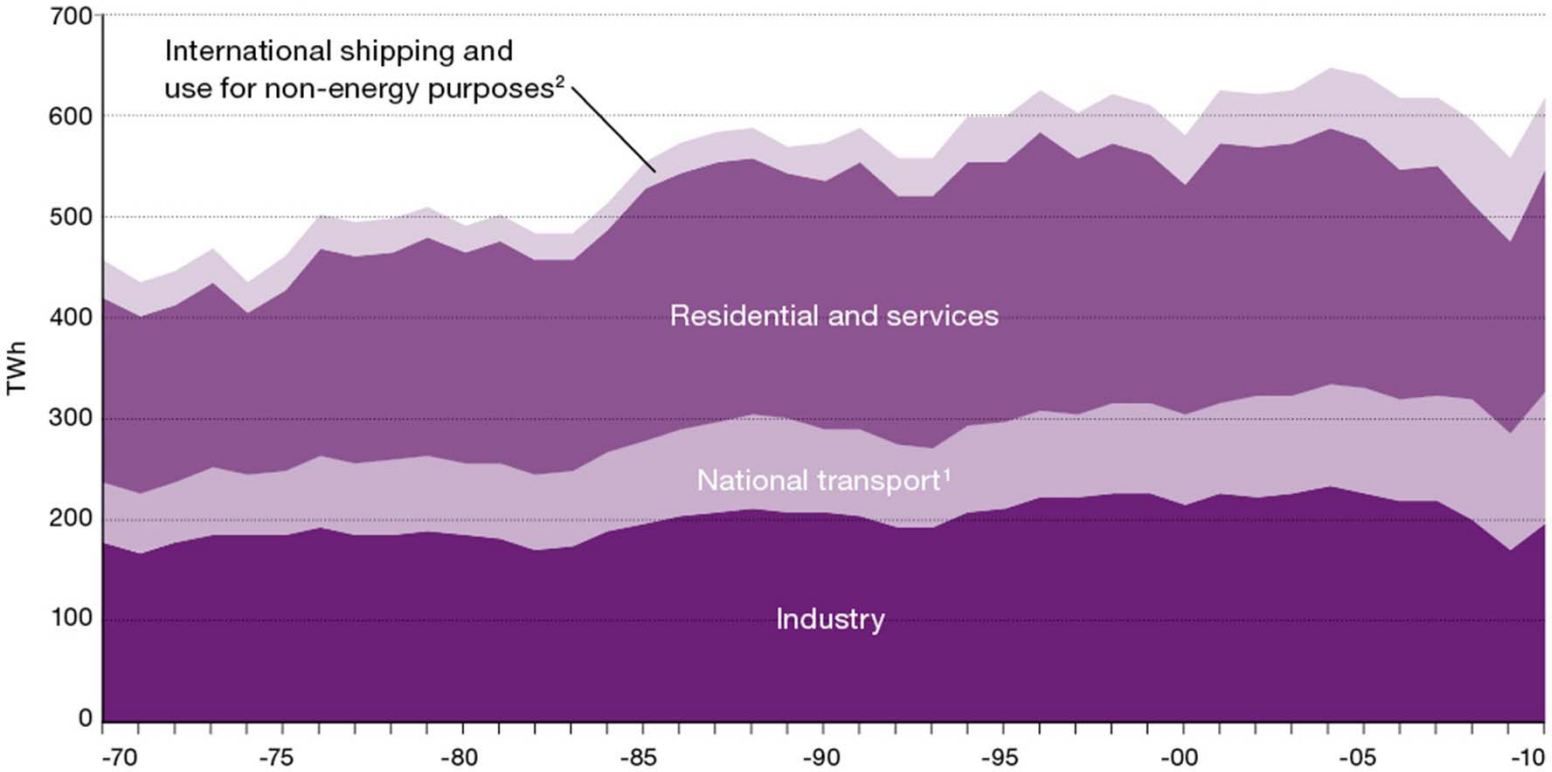
Note: 1. International aviation is included until year 1989.
2. In accordance with the method used by UN/ECE to calculate the nuclear fuel energy input.
3. International aviation is included since 1990.

Figure 8 Total energy supply in Sweden, excluding net electricity exports, 1970–2010, in TWh



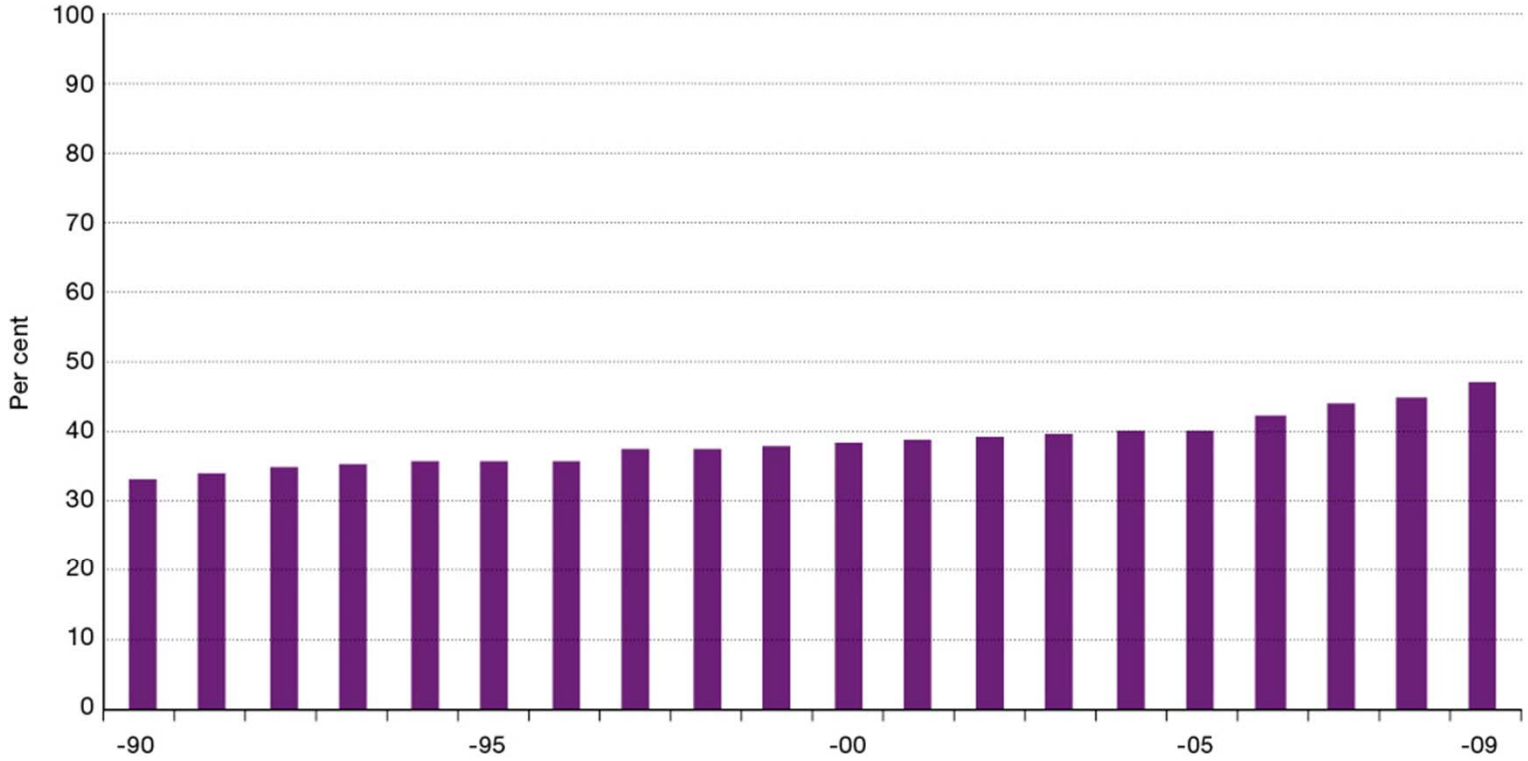
Source: Swedish Energy Agency and Statistics Sweden.
Note: 1. Including wind power up to and including1996.
2. In accordance with the method used by UNECE to calculate the nuclear fuel energy input.

Figure 9 Total energy use in Sweden, with losses in the energy conversion sector allocated to end users, 1970–2010, in TWh



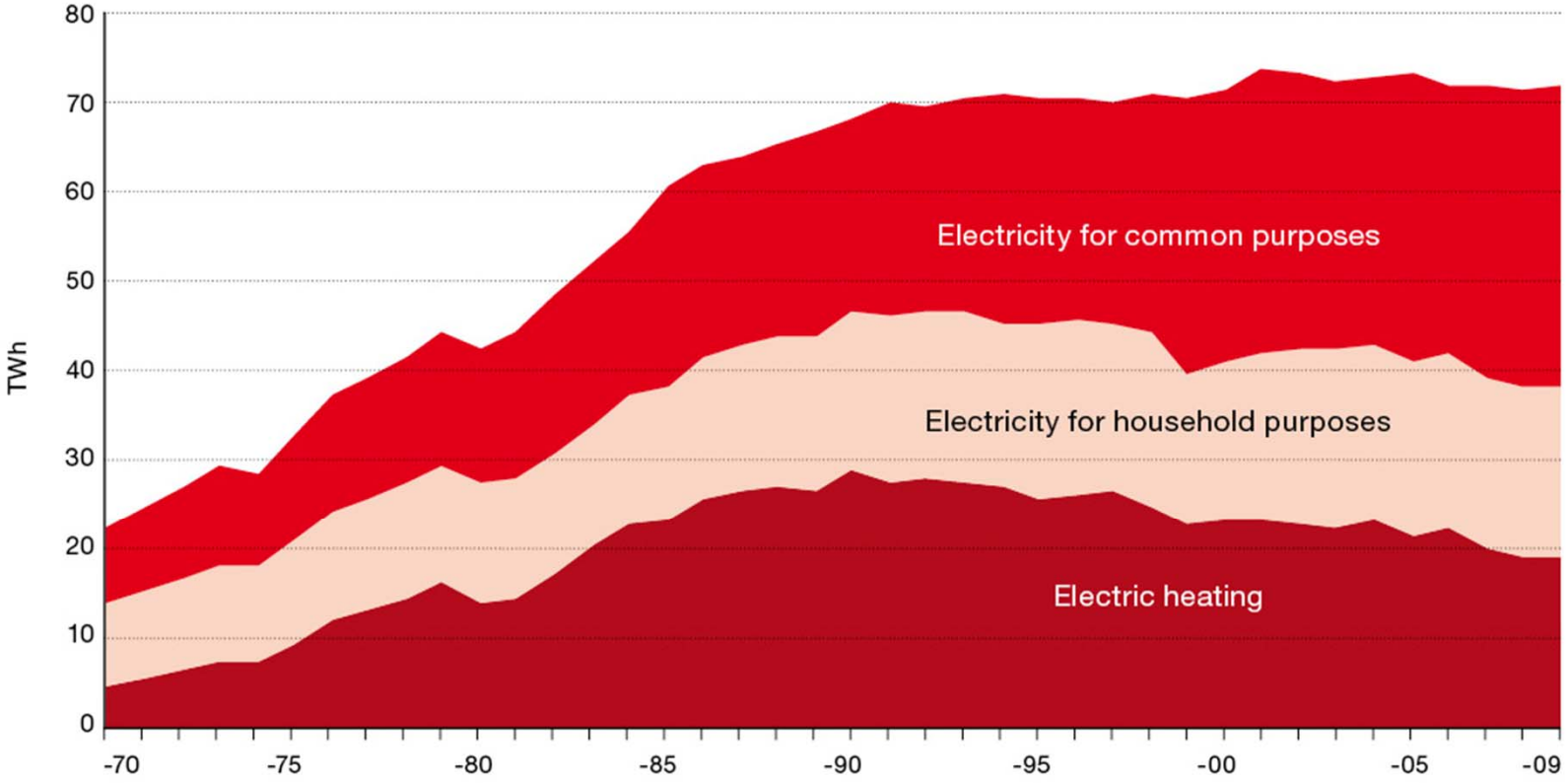
Source: Swedish Energy Agency and Statistics Sweden.
Note: 1. International avation are included until year 1989.
2. International aviation are included since 1990.

Figure 10 Share of renewable energy in Sweden, 1990-2009, in per cent



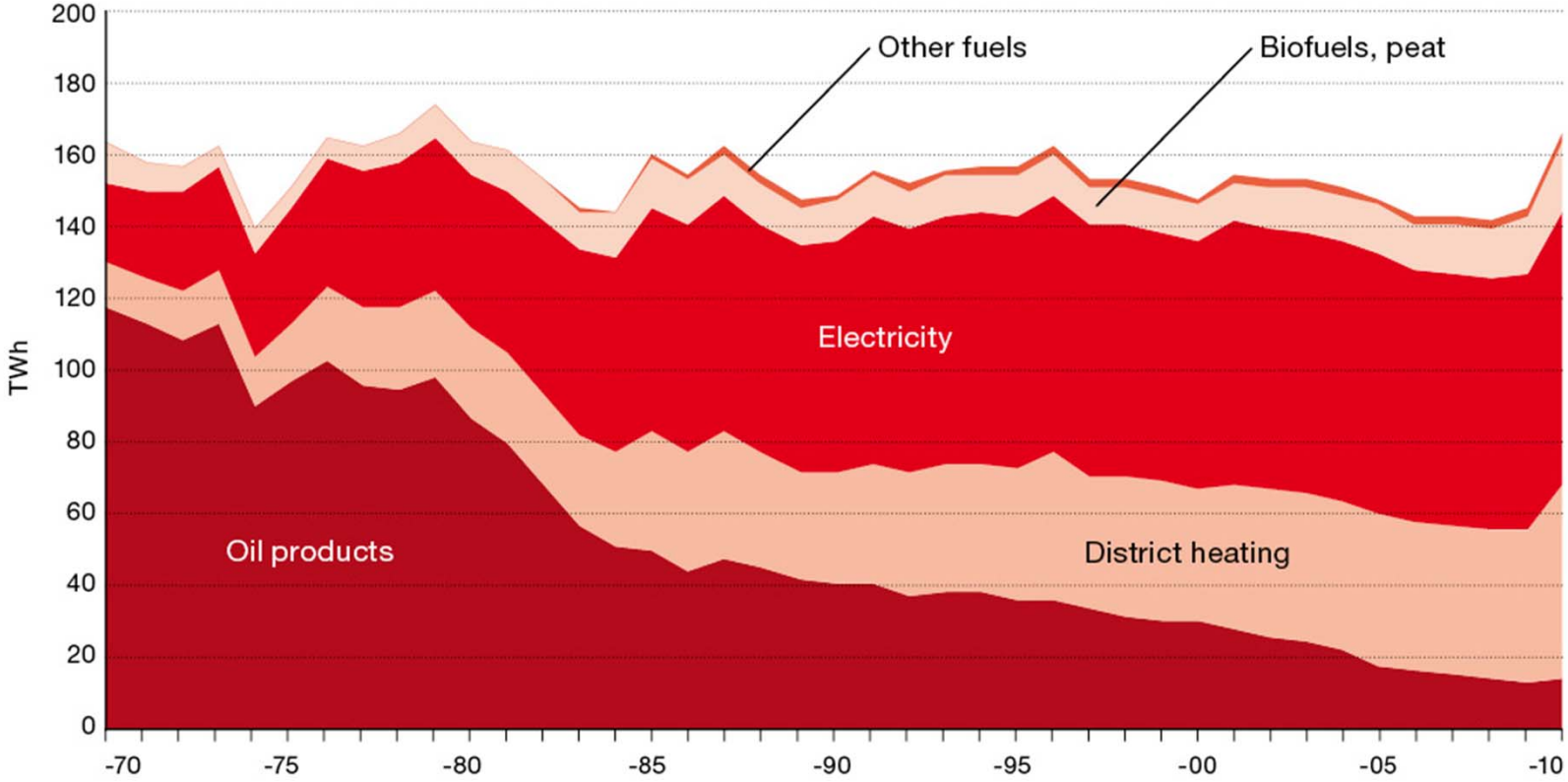
Source: Swedish Energy Agency and Eurostat.
Note: Calculations according to the RES directive. Data for 2005–2009 differ from the previous years.

Figure 11 Electricity use in the residential and services sector, 1970-2009, in TWh, temperature corrected



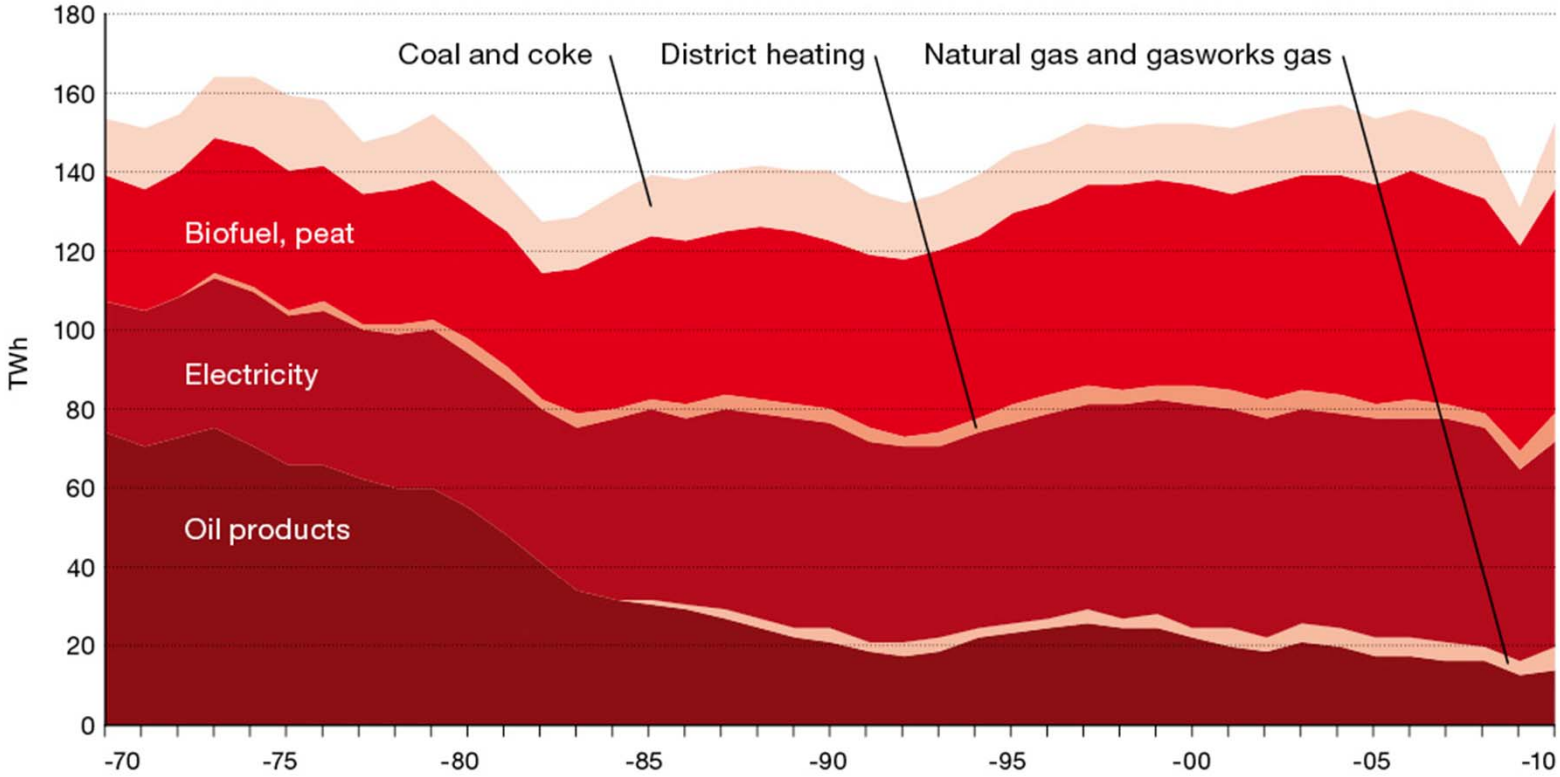
Source: Swedish Energy Agency and Statistics Sweden.

Figure 12 Final energy use in the residential and services sector, 1970–2010, in TWh



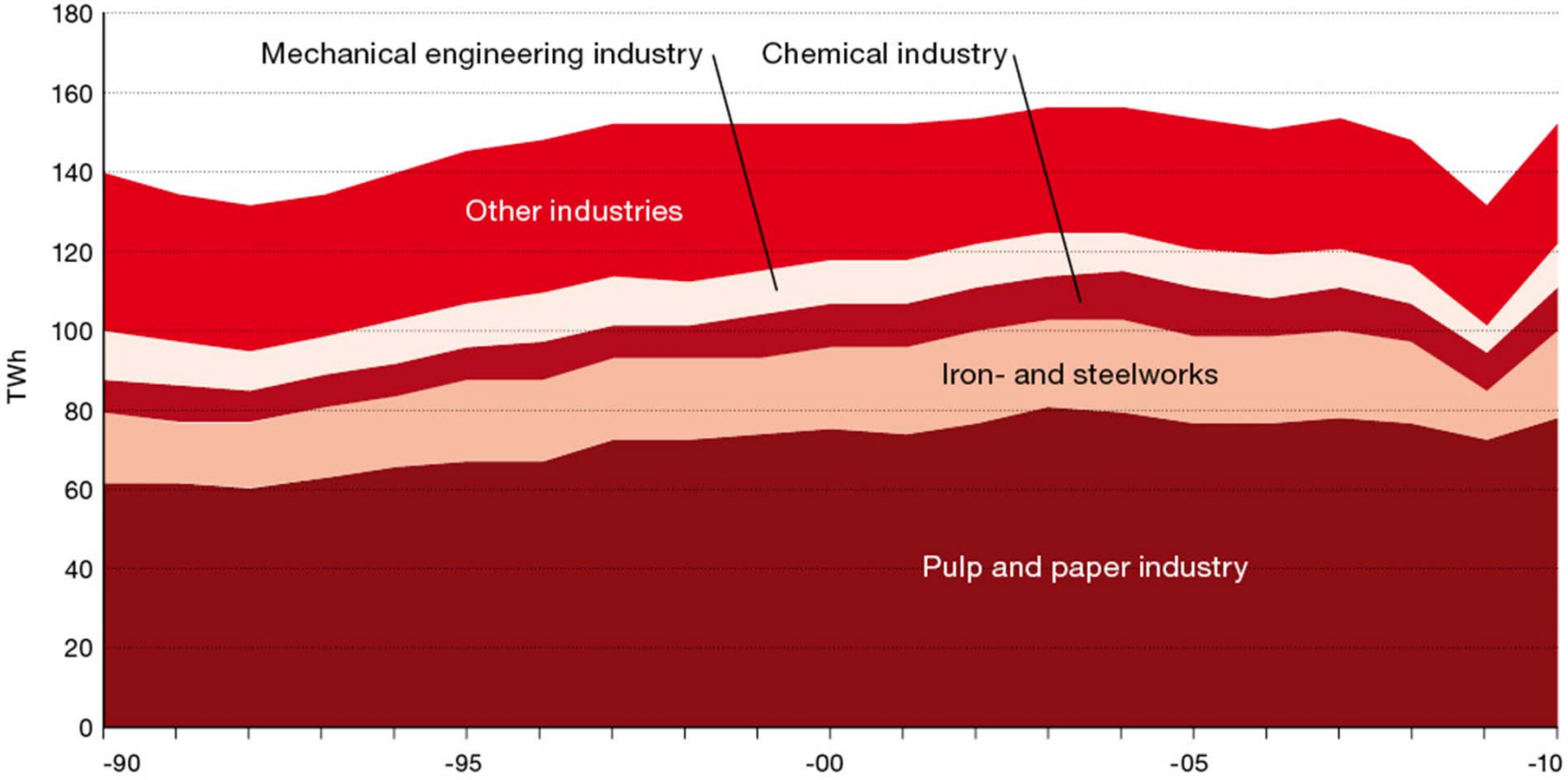
Source: Swedish Energy Agency and Statistics Sweden.

Figure 13 Final energy use in the industrial sector, 1970–2010, in TWh



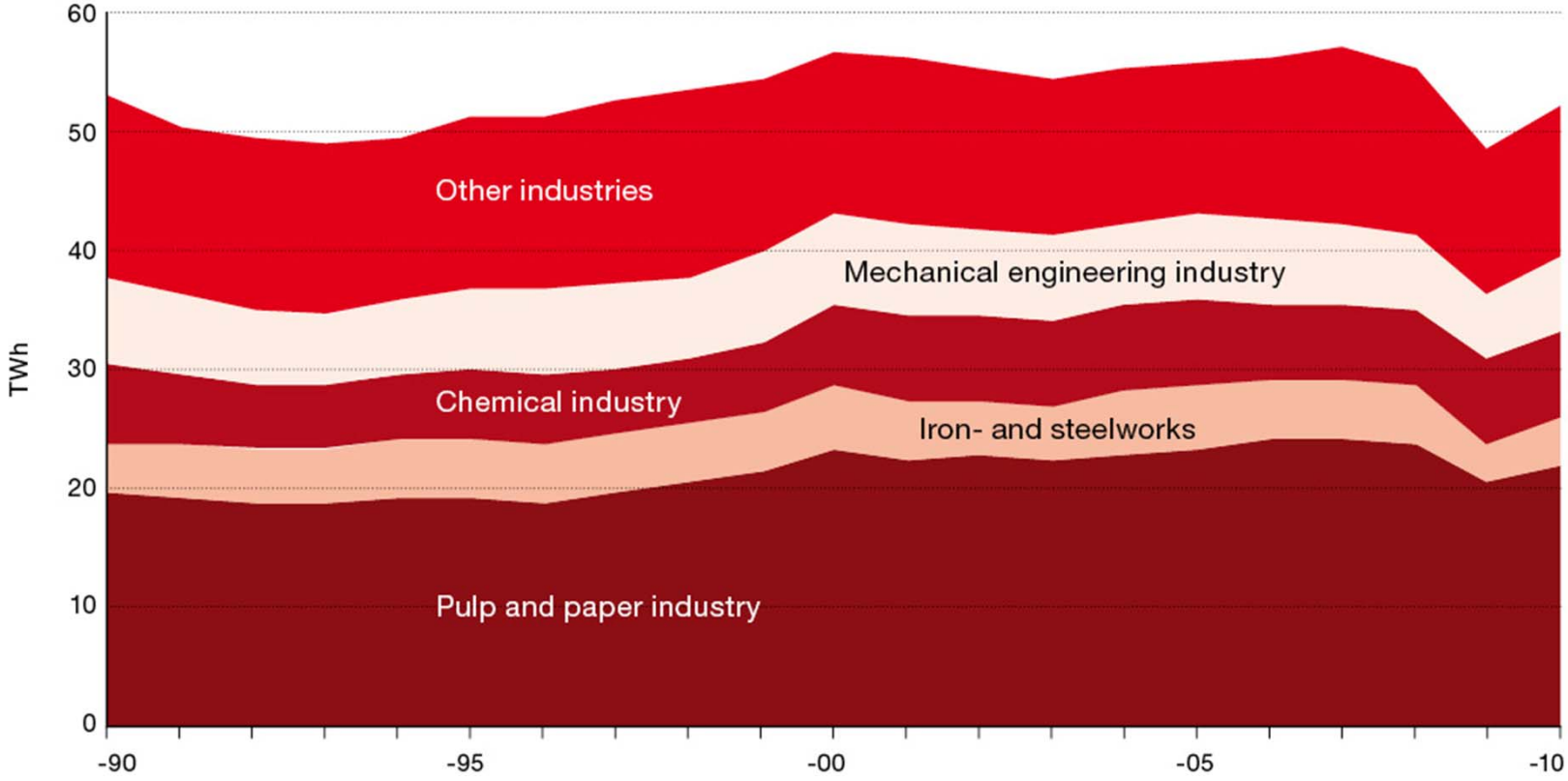
Source: Swedish Energy Agency and Statistics Sweden.
Note: The fuel used for the production of electricity and heating in industry is not included in this figure but is reported in the statistics for electricity and heating.

Figure 14 Energy use in industry per sector, 1990–2010, in TWh



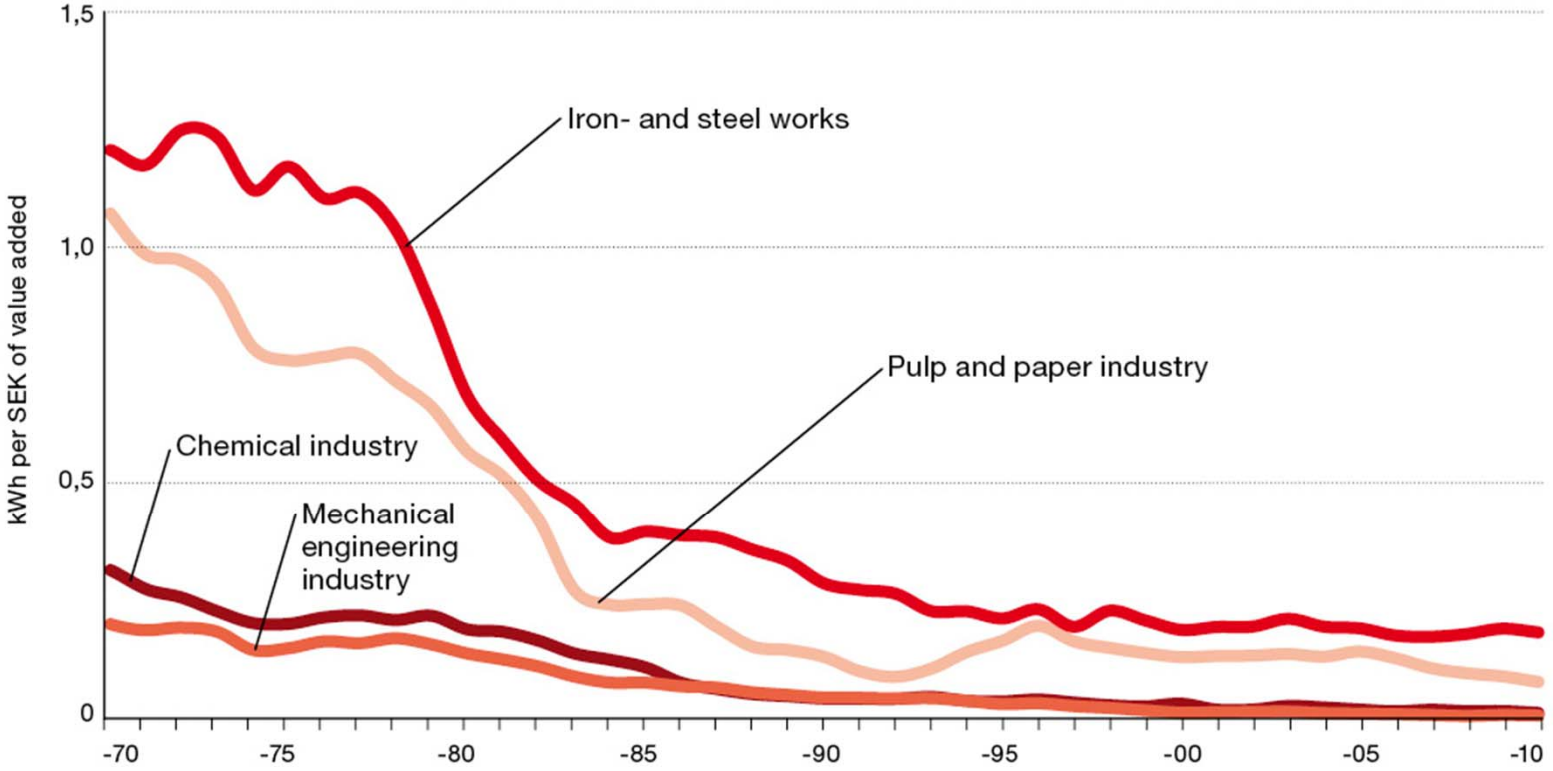
Source: Swedish Energy Agency and Statistics Sweden.

Figure 15 Use of electricity in industry, 1990–2010, in TWh



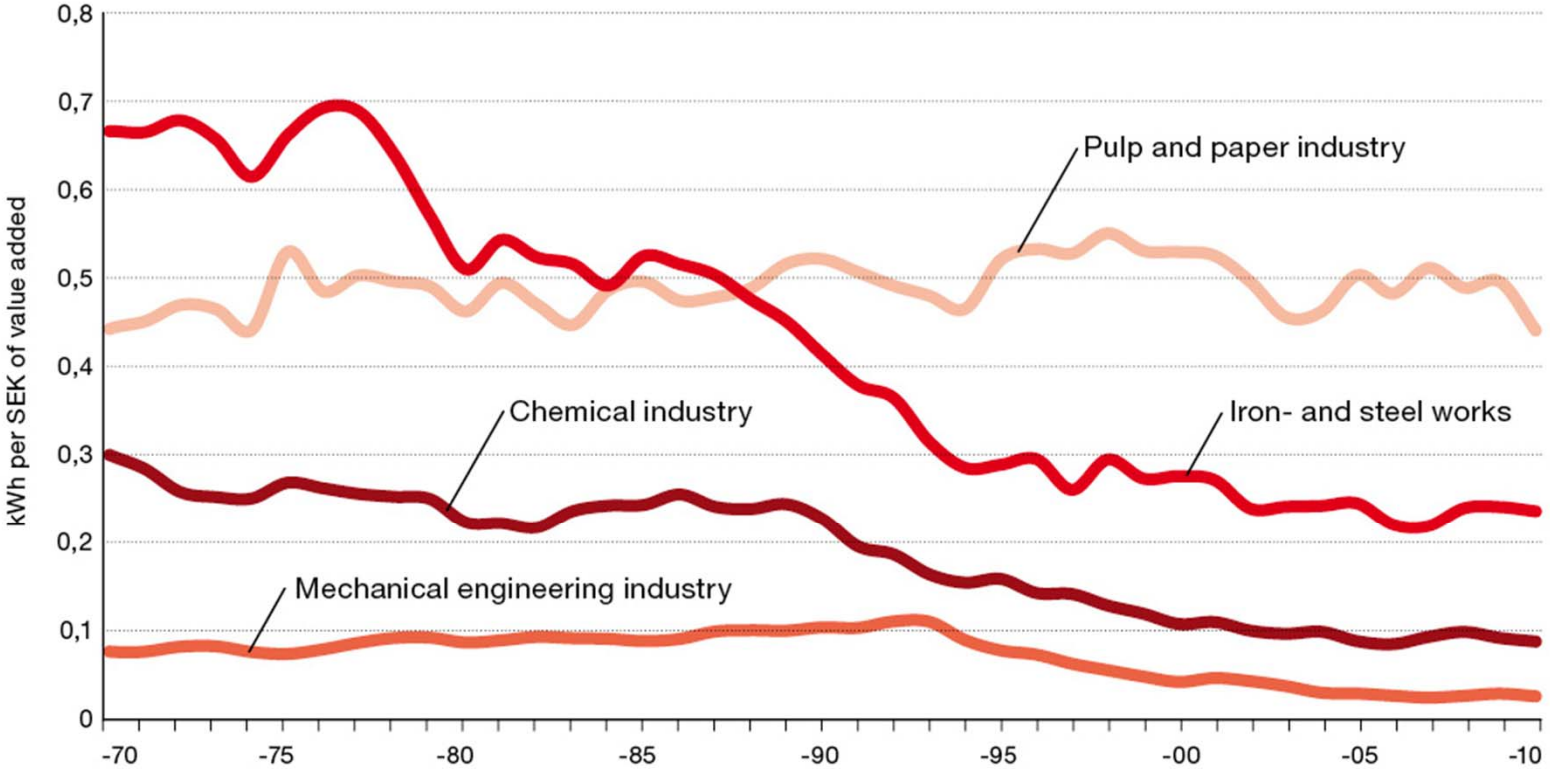
Source: Swedish Energy Agency and Statistics Sweden.

Figure 16 Specific use of oil in industry, 1970–2010, in 2005 price levels, in kWh per SEK of value added



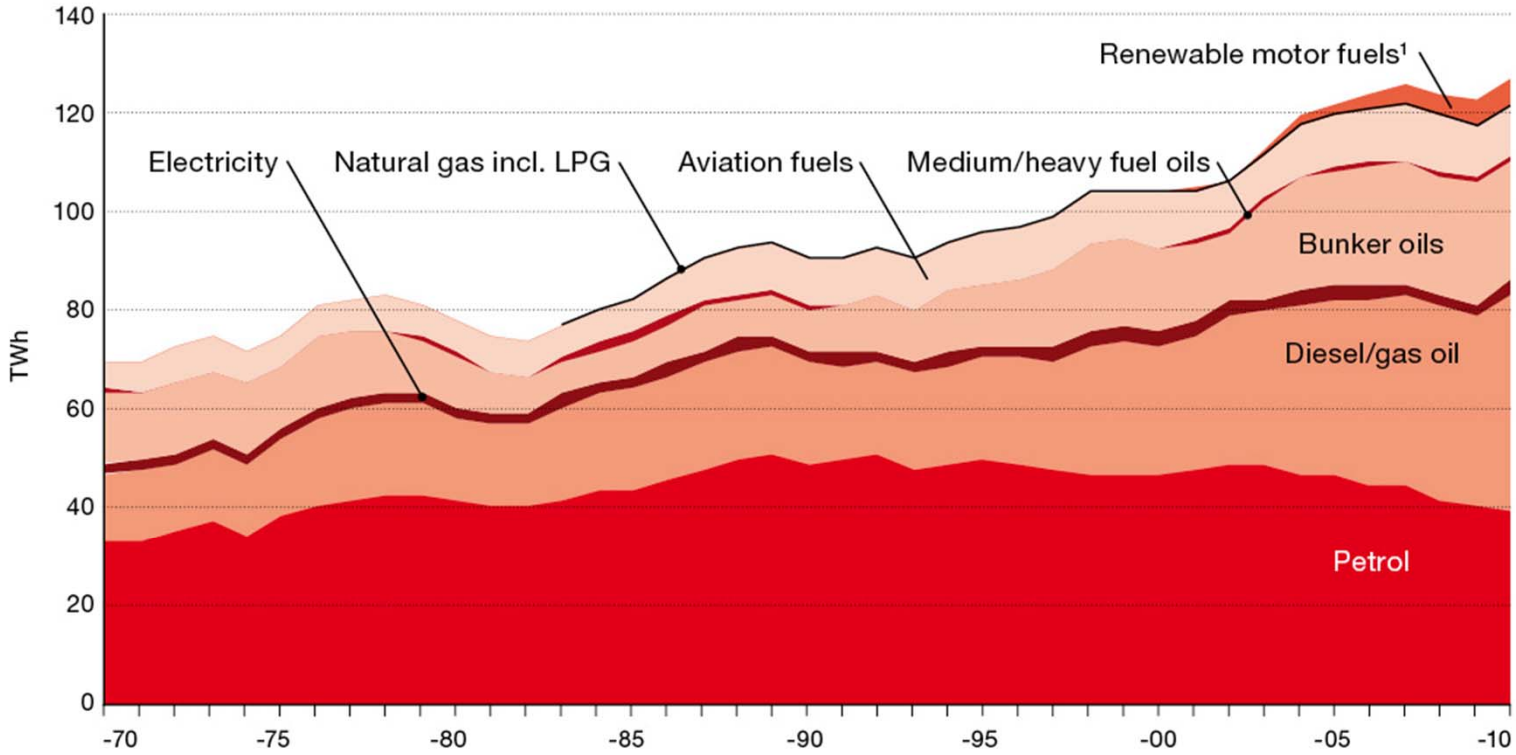
Source: Swedish Energy Agency and Statistics Sweden.

Figure 17 Specific electricity use in industry, 1970–2010, in 2005 price levels, in kWh per SEK of value added



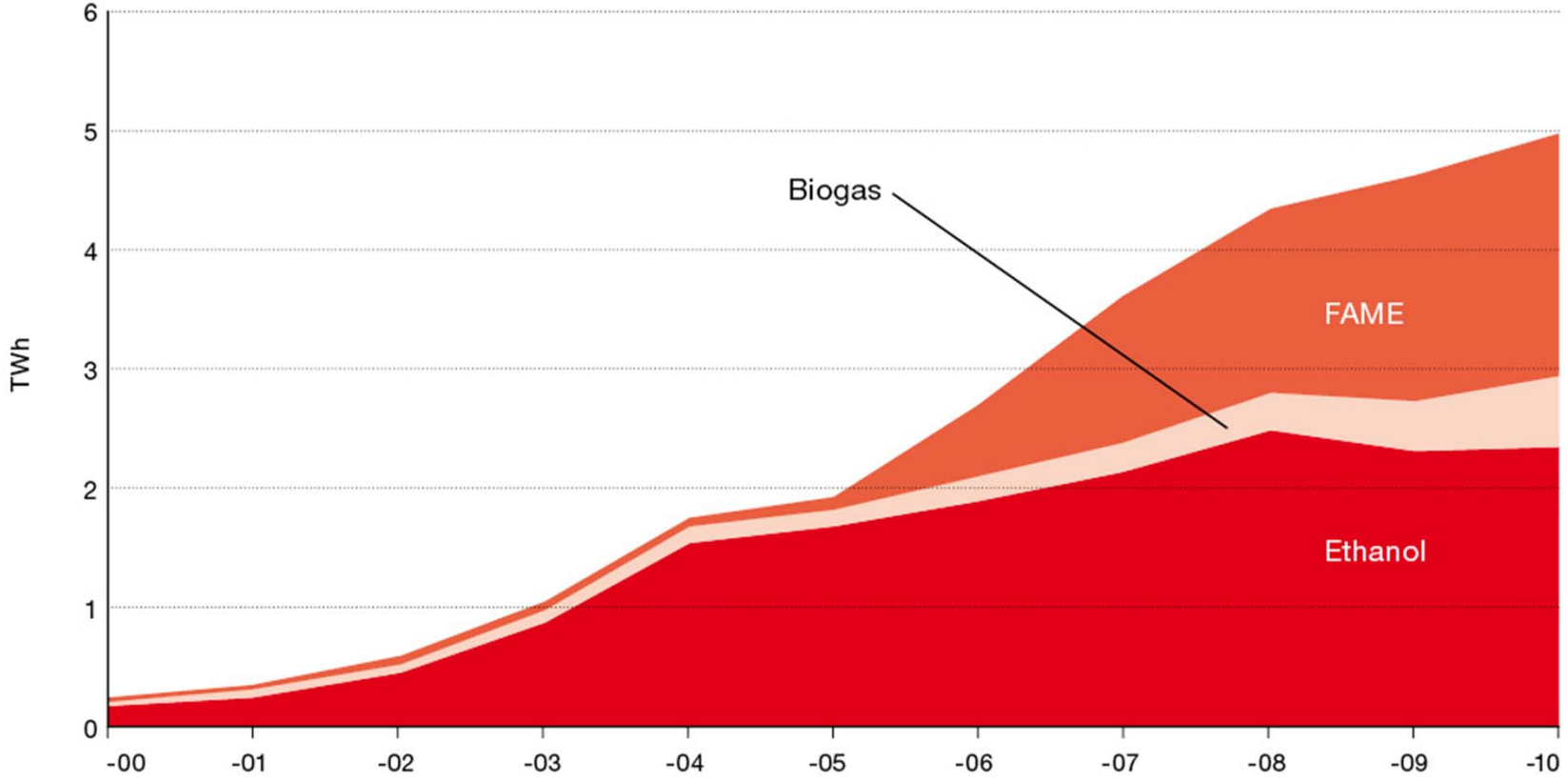
Source: Swedish Energy Agency and Statistics Sweden.

Figure 18 Final energy use in the transport sector, 1970–2010, including international transport, in TWh



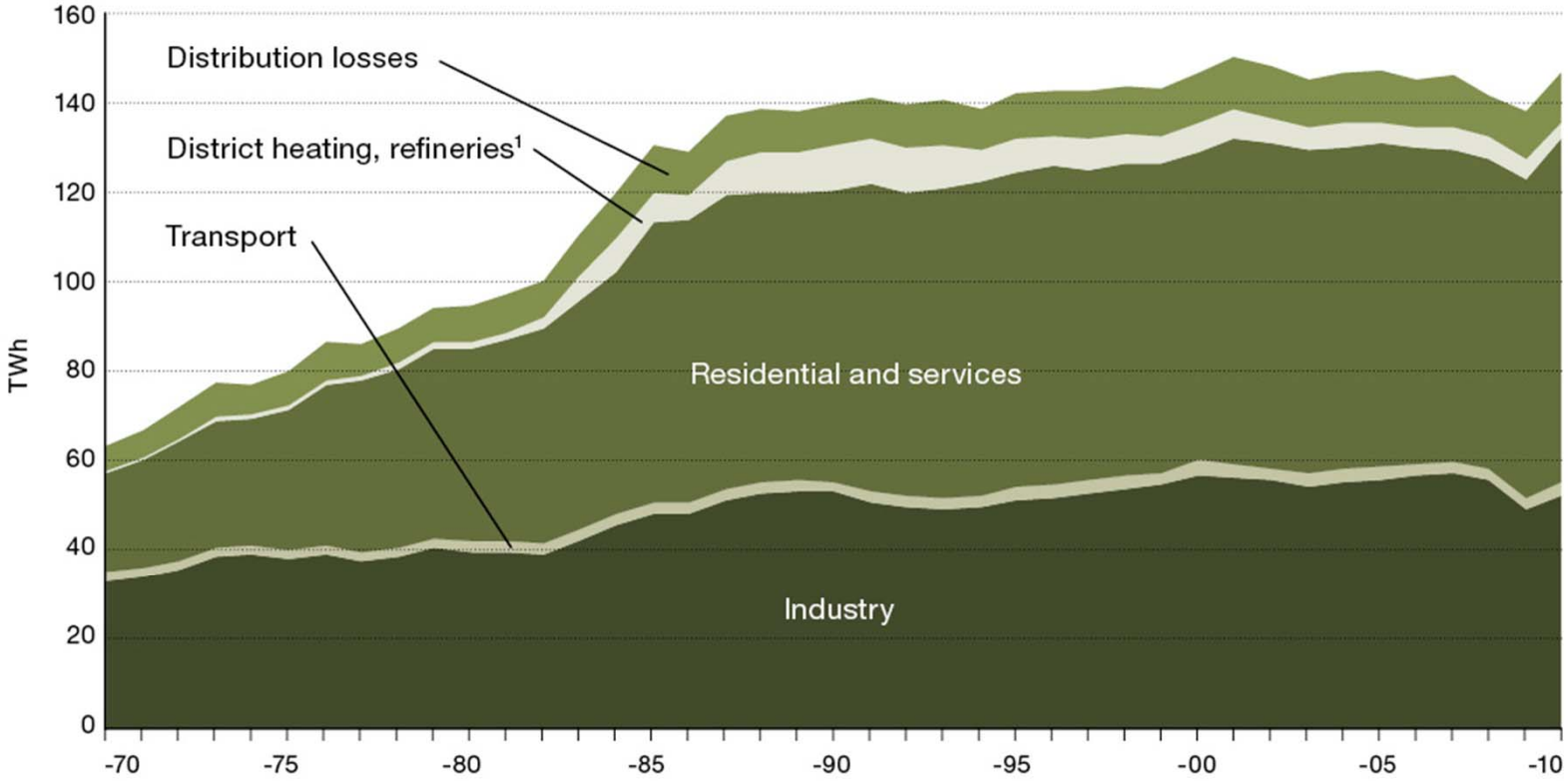
Source: Swedish Energy Agency, Statistics Sweden and the Swedish Gas Association.
Note: 1. In 1999, only ethanol was reported, the remaining years include ethanol, FAME and biogas.

Figure 19 Final energy use of renewable motor fuels, 2000–2010, in TWh



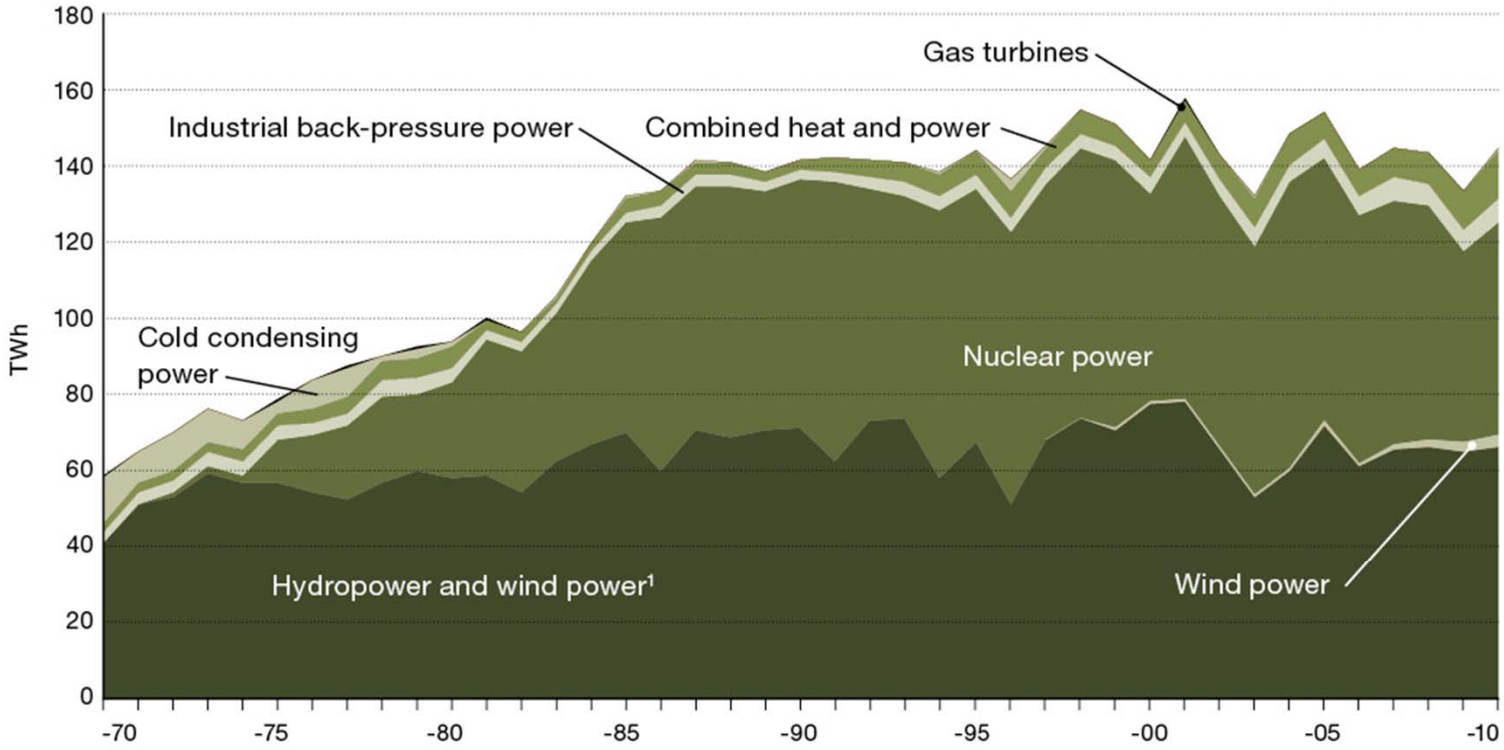
Source: Swedish Energy Agency, Statistics Sweden and the Swedish Gas Association.

Figure 20 Use of electricity in Sweden by sector, 1970–2010, in TWh



Source: Swedish Energy Agency and Statistics Sweden.
Note: 1. Includes gasworks.

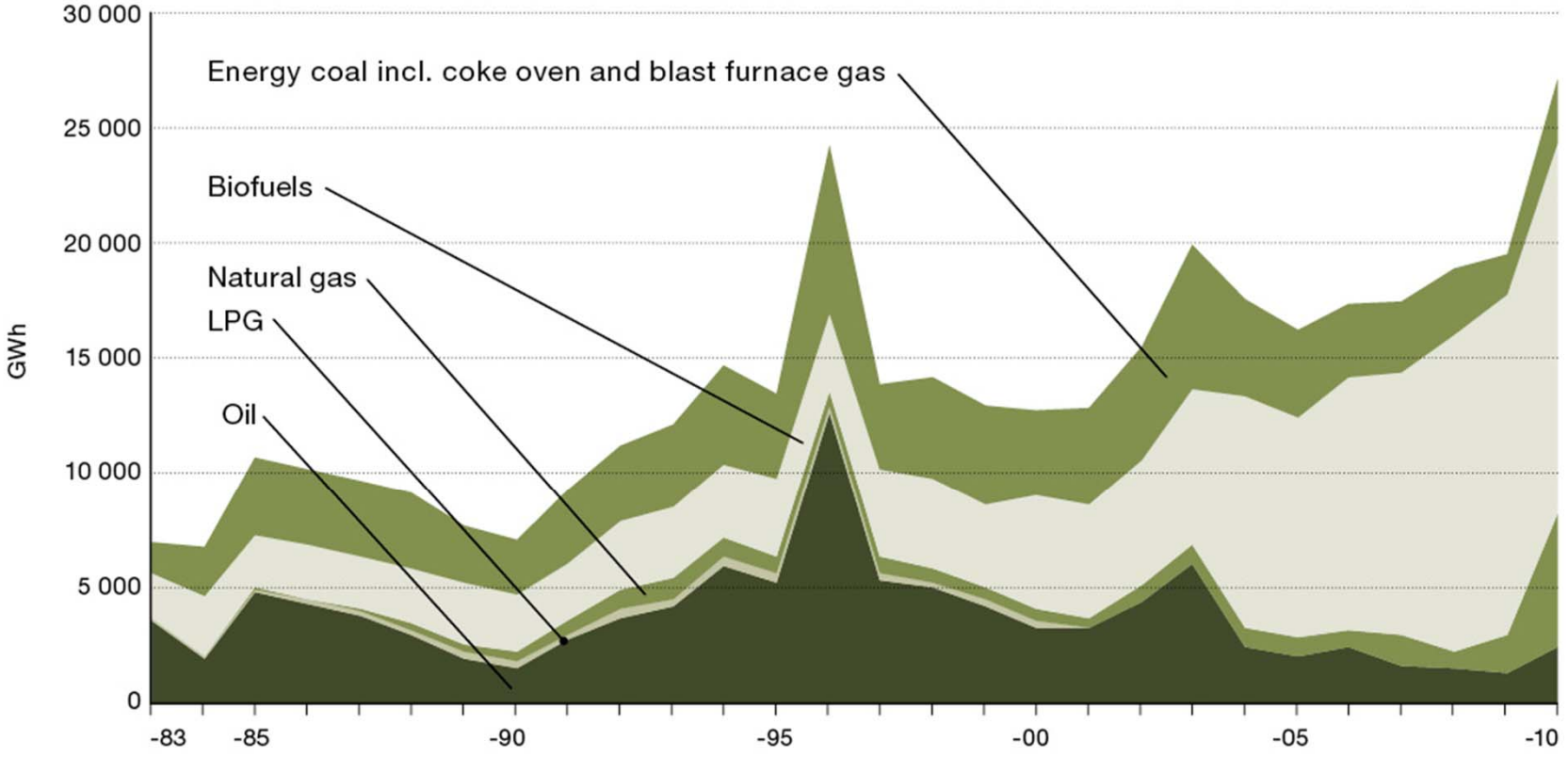
Figure 21 Electricity production in Sweden, 1970–2010, in TWh



Source: Swedish Energy Agency and Statistics Sweden.

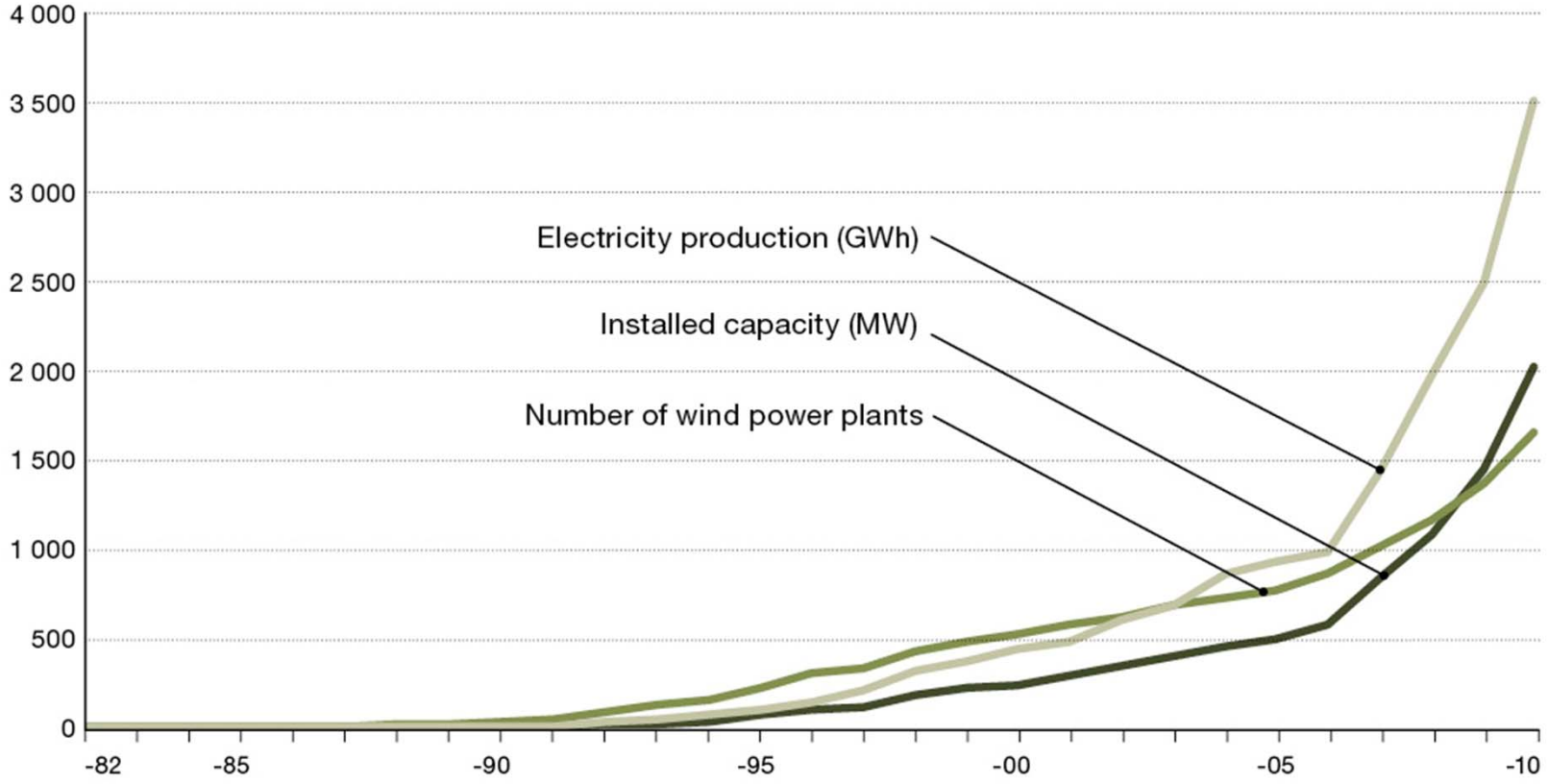
Note: 1. Hydropower and wind power were not reported separately until after 1996, when each was given its own category.

Figure 22 Supply of fuel in electricity production (excluding nuclear fuel), 1983-2010, in GWh



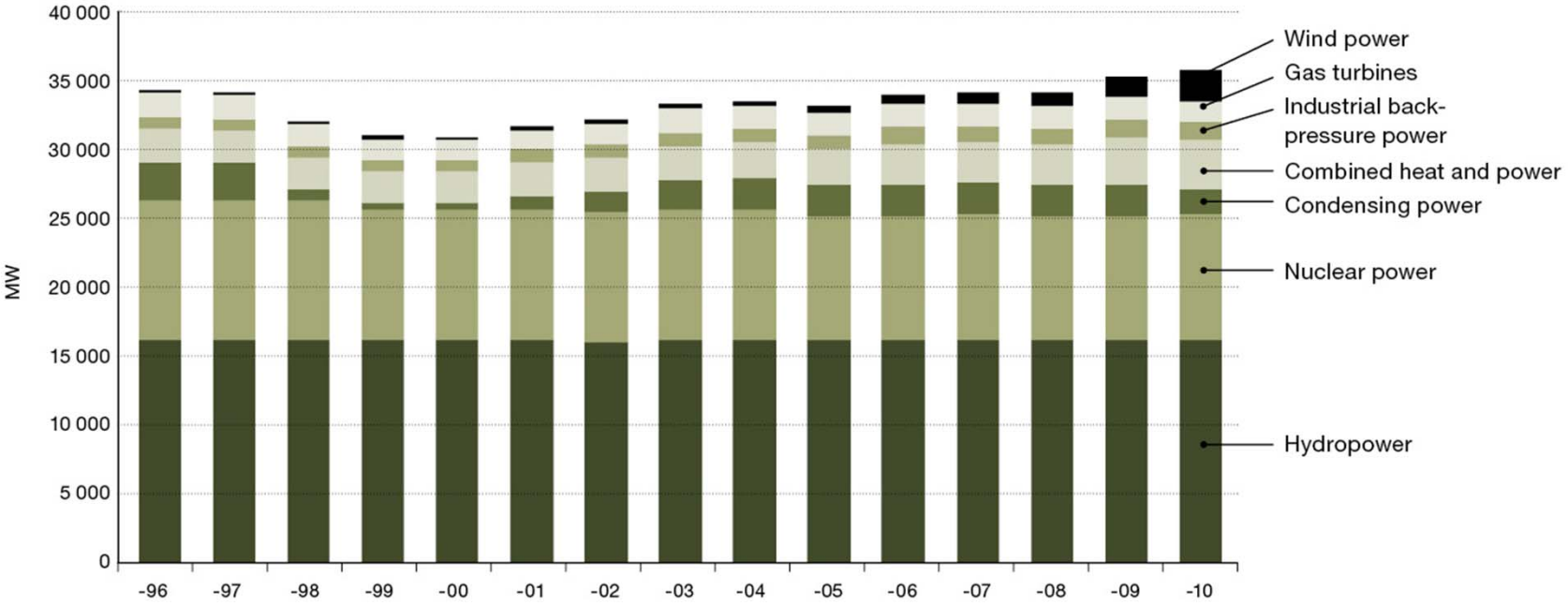
Source: Swedish Energy Agency and Statistics Sweden.

Figure 23 Wind power development, 1982–2010, number of wind power plants, installed capacity and electricity production



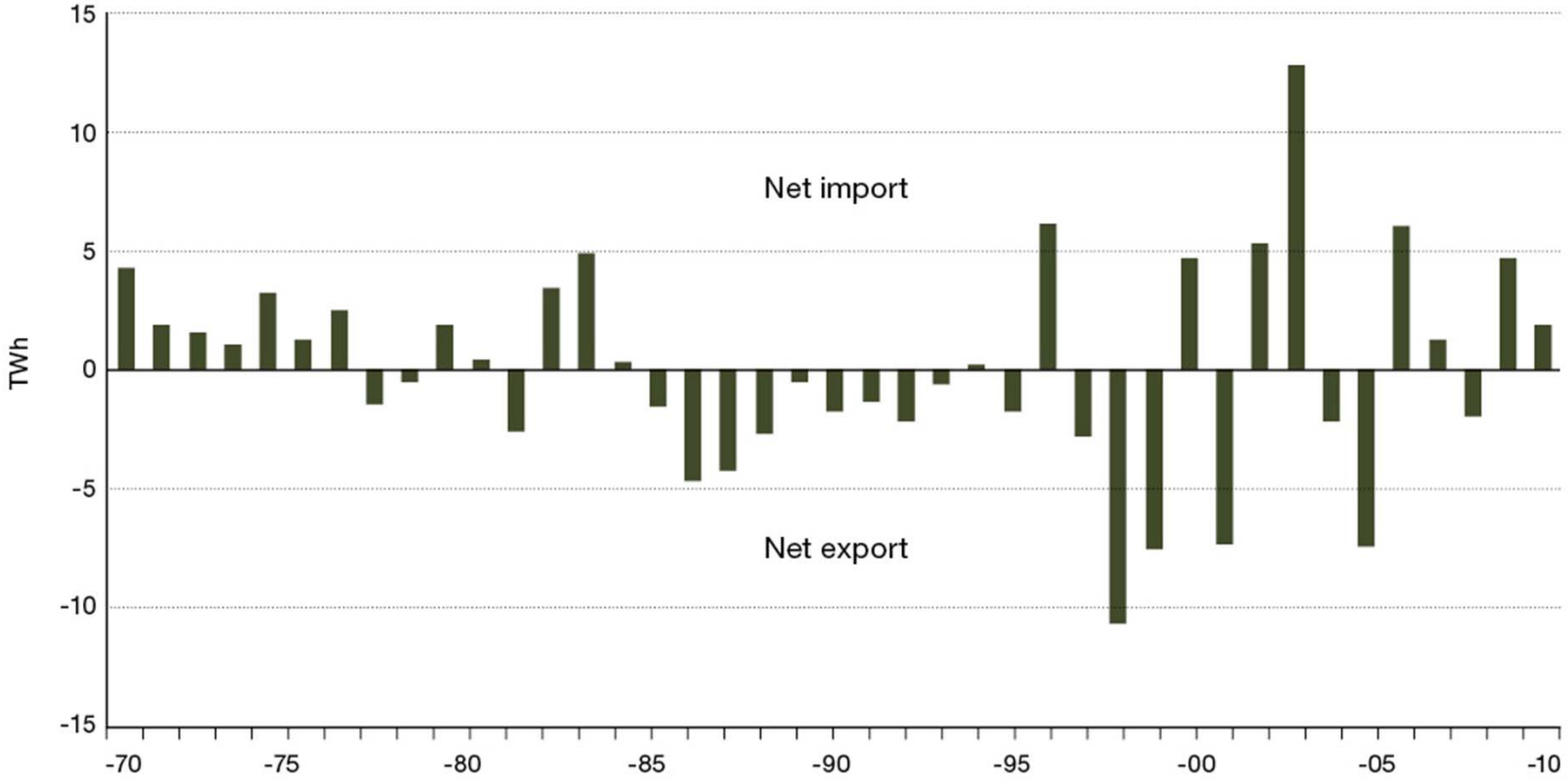
Source: Elforsk and Swedish Energy Agency.

Figure 24 Installed electricity production capacity in Sweden, 1996–2010, in MW



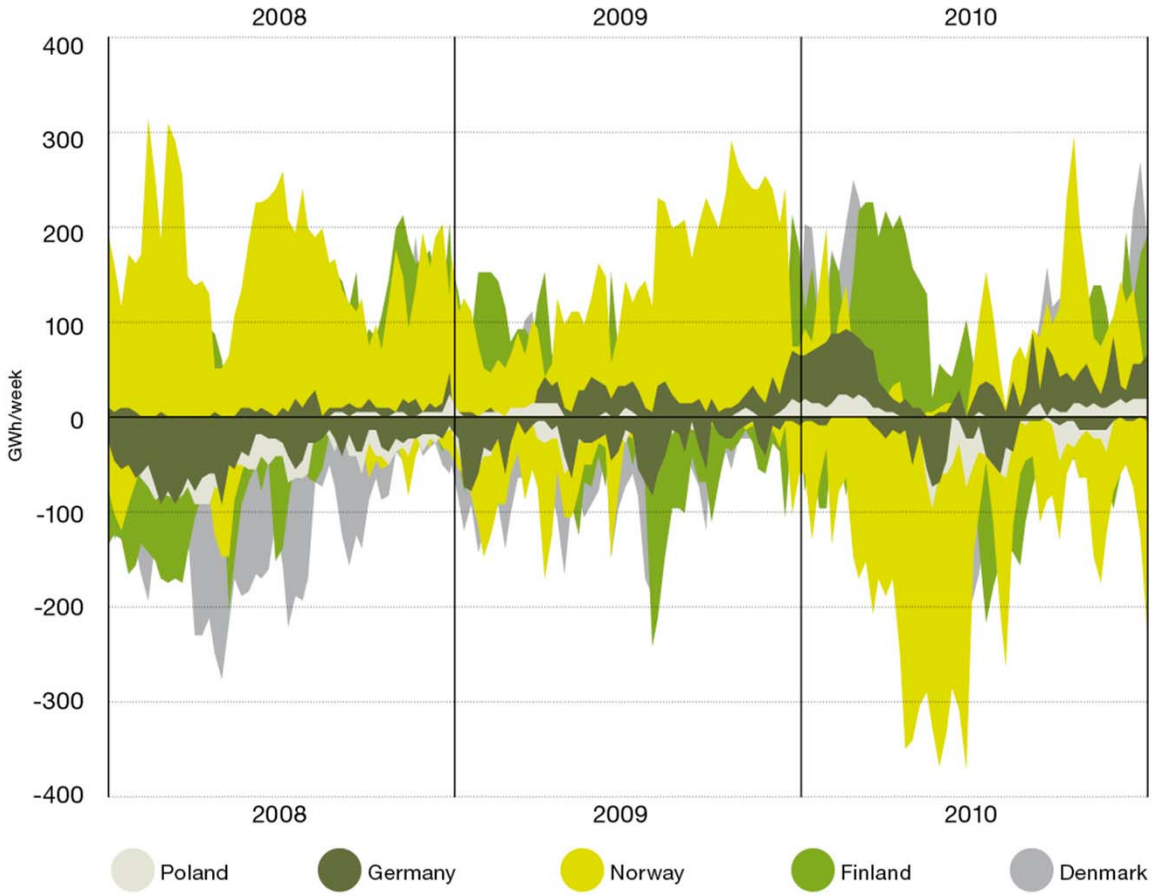
Source: Swedenergy.

Figure 25 Electricity net import (+) and net export (–) in Sweden, 1970-2010, in TWh



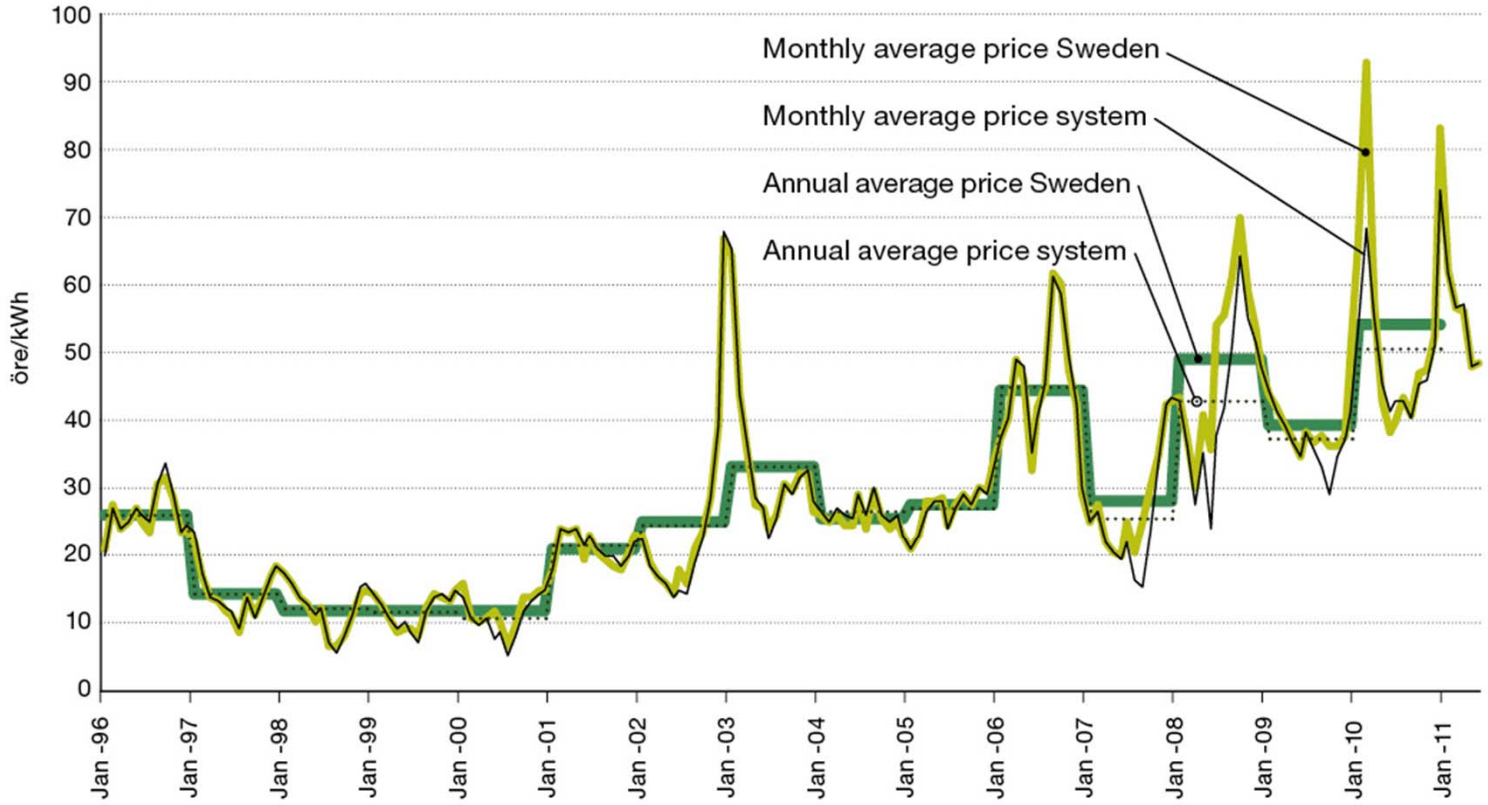
Source: Swedish Energy Agency and Statistics Sweden.

Figure 26 Electricity import (+) and export (–) in Sweden, January 2008–December 2010, in GWh/week



Source: Swedenergy, additional processing by the Swedish Energy Agency.

Figure 27 Spot prices on Nord Pool. Monthly and annual average prices for the system and for Sweden, January 1996–May 2011, in öre/kWh

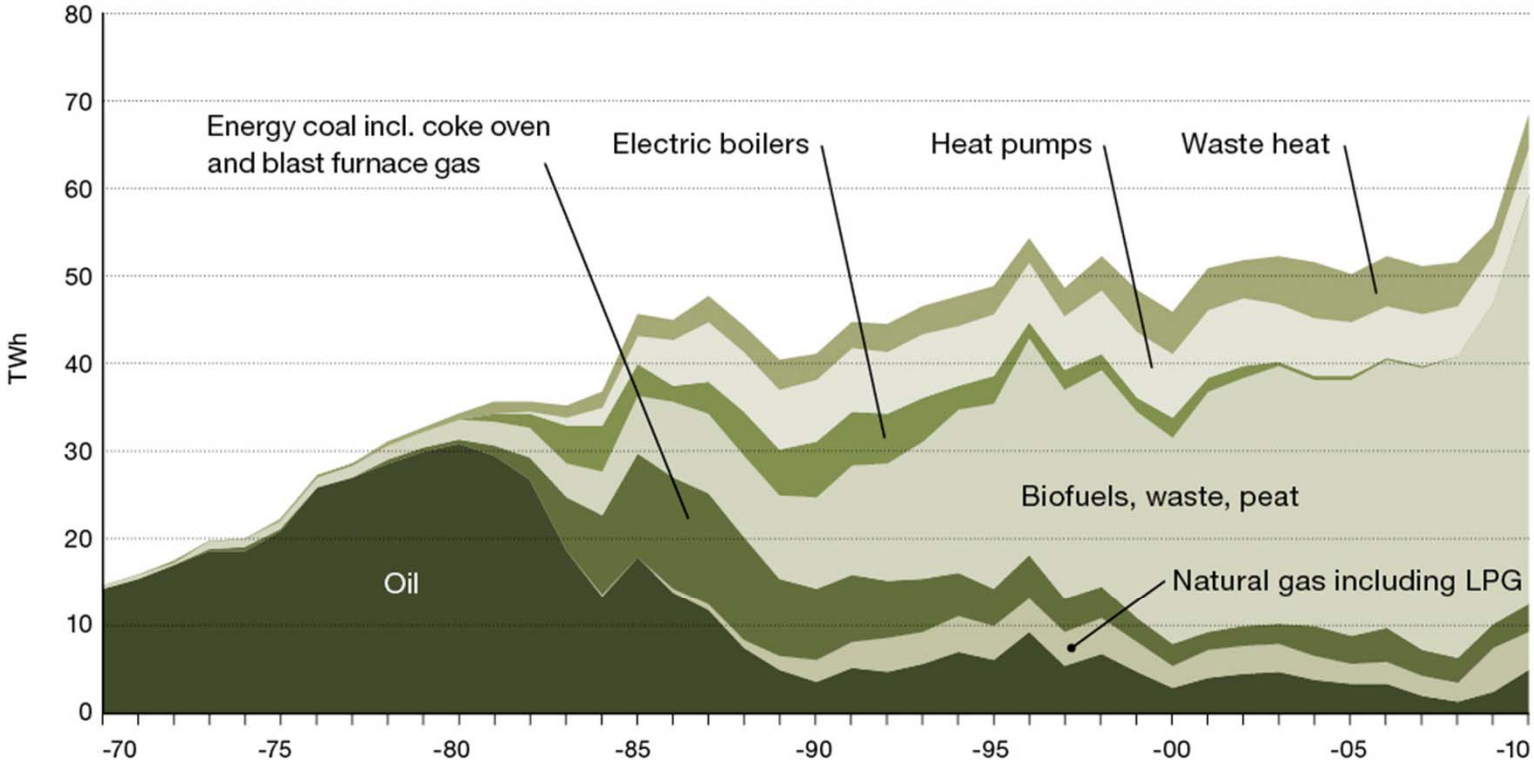


Source: Nord Pool Spot.

Figure 28 Use of district heating, 1970–2010, in TWh

Source: Swedish Energy Agency and Statistics Sweden.

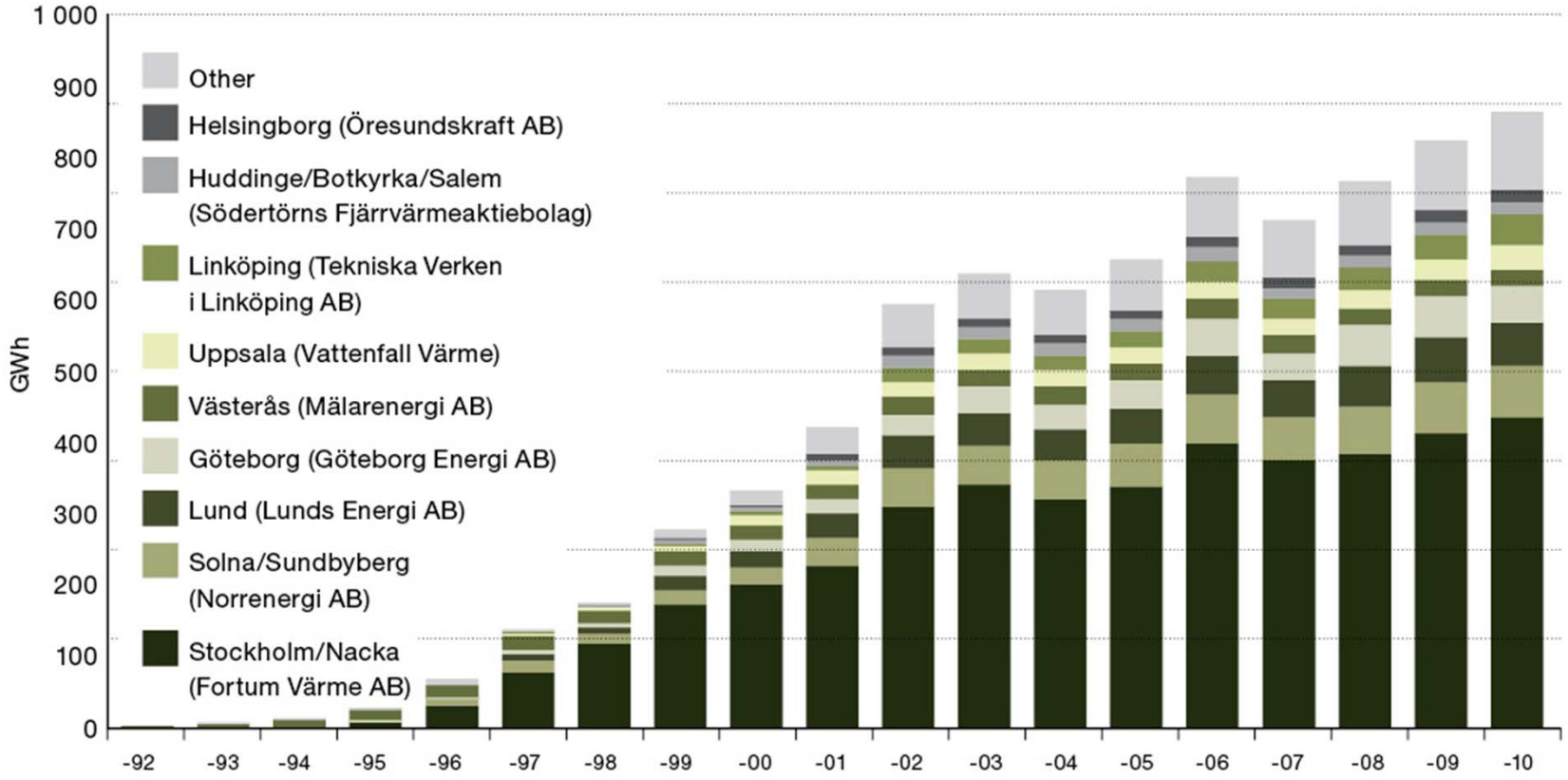
Figure 29 Energy supplied to district heating, 1970–2010, in TWh



Source: Swedish Energy Agency and Statistics Sweden.

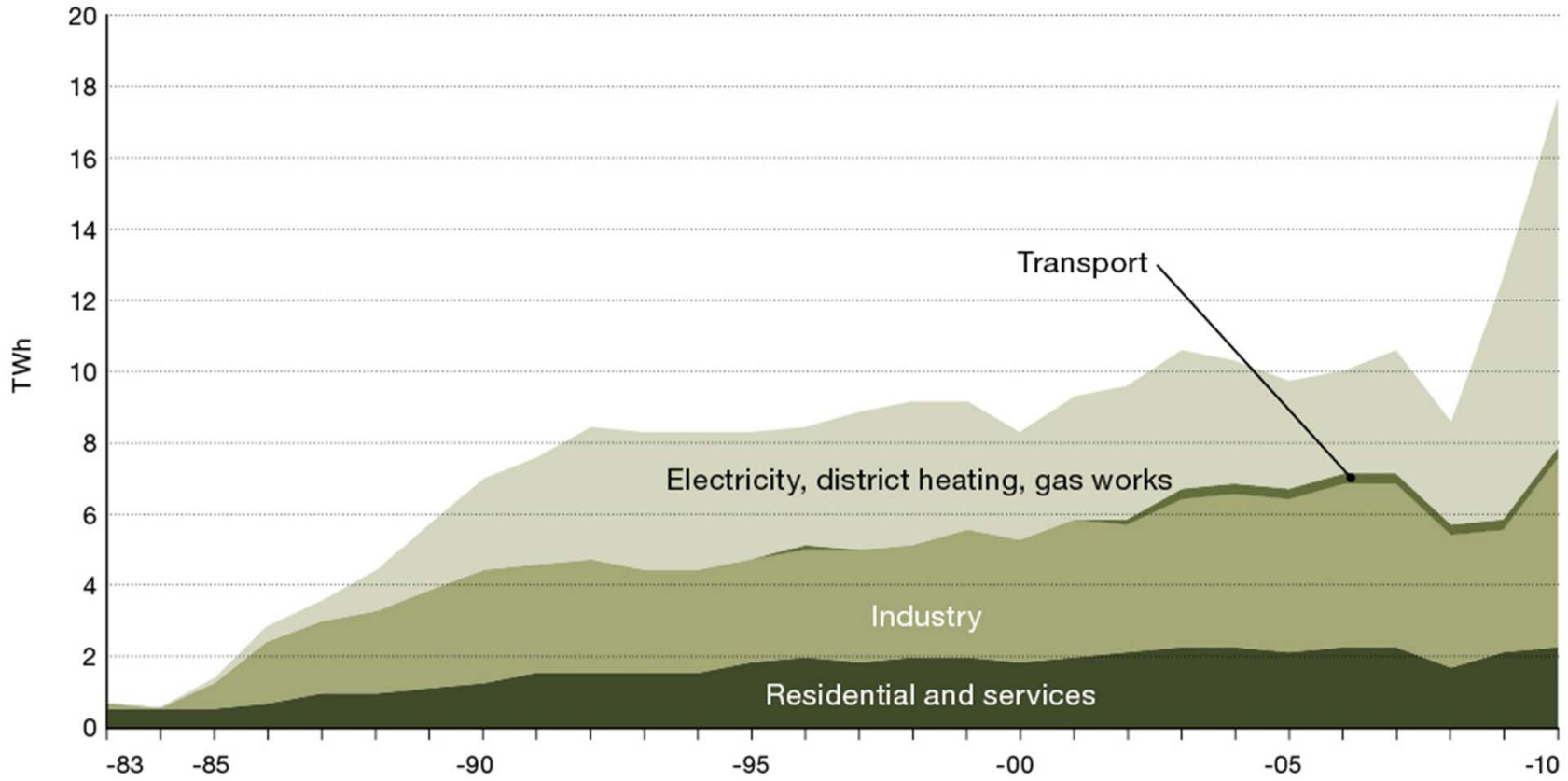
Note: Peat and biofuel are presented together, even if peat is not considered to be renewable. It should be noted that the development in the last two years is primarily a result of unusually cold winters. This is especially the case for 2010.

Figure 30 Supply of district cooling, 1992–2010, in GWh



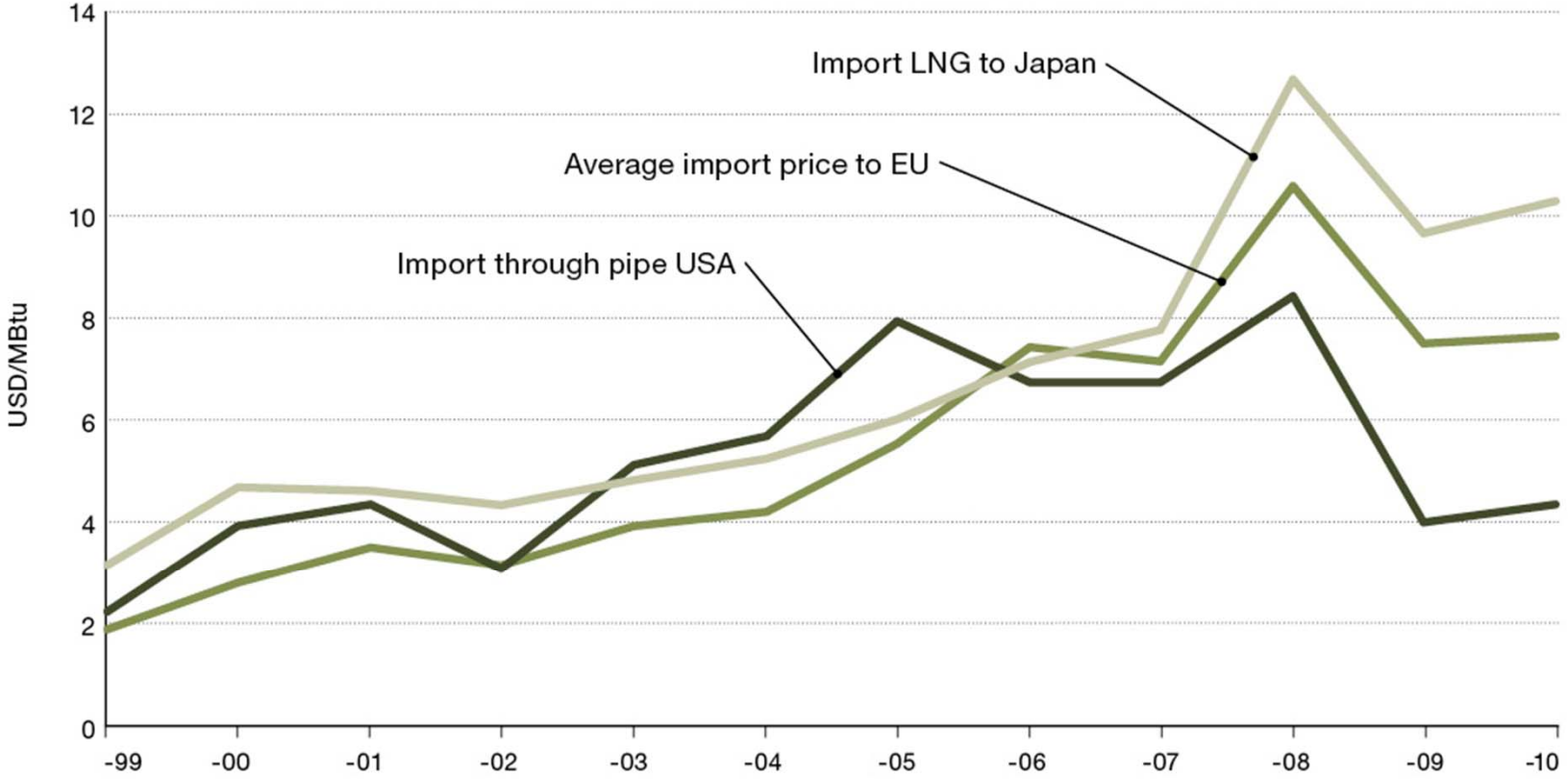
Source: Swedish District Heating Association.

Figure 31 Use of natural gas in Sweden by sector, 1985–2010, in TWh



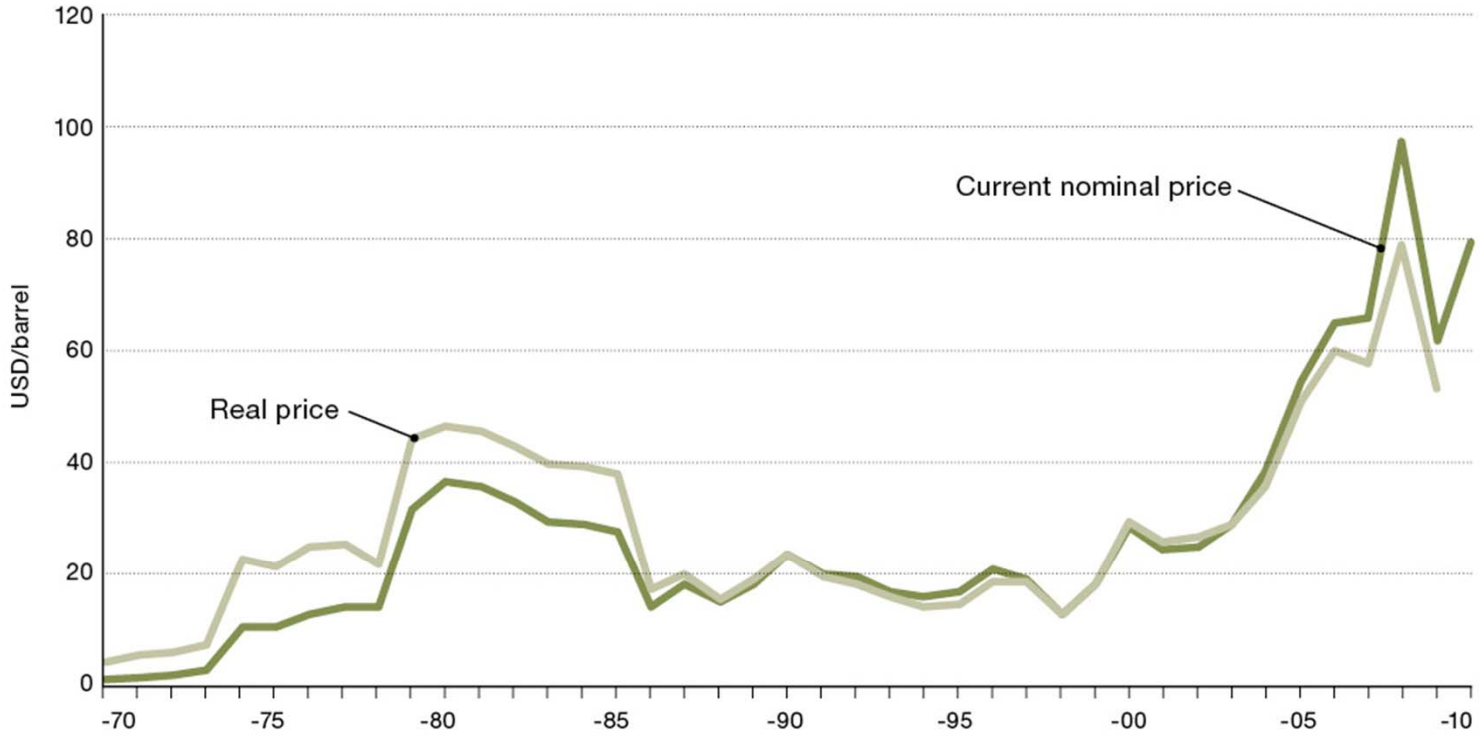
Source: Swedish Energy Agency and Statistics Sweden.

Figure 32 Import price of natural gas, 1999–2010, in USD/MBtu[1]



Source: IEA Energy Prices & Taxes, Quarterly Statistics, Second Quarter 2011.
Note: 1. Mega British Thermal Unit.

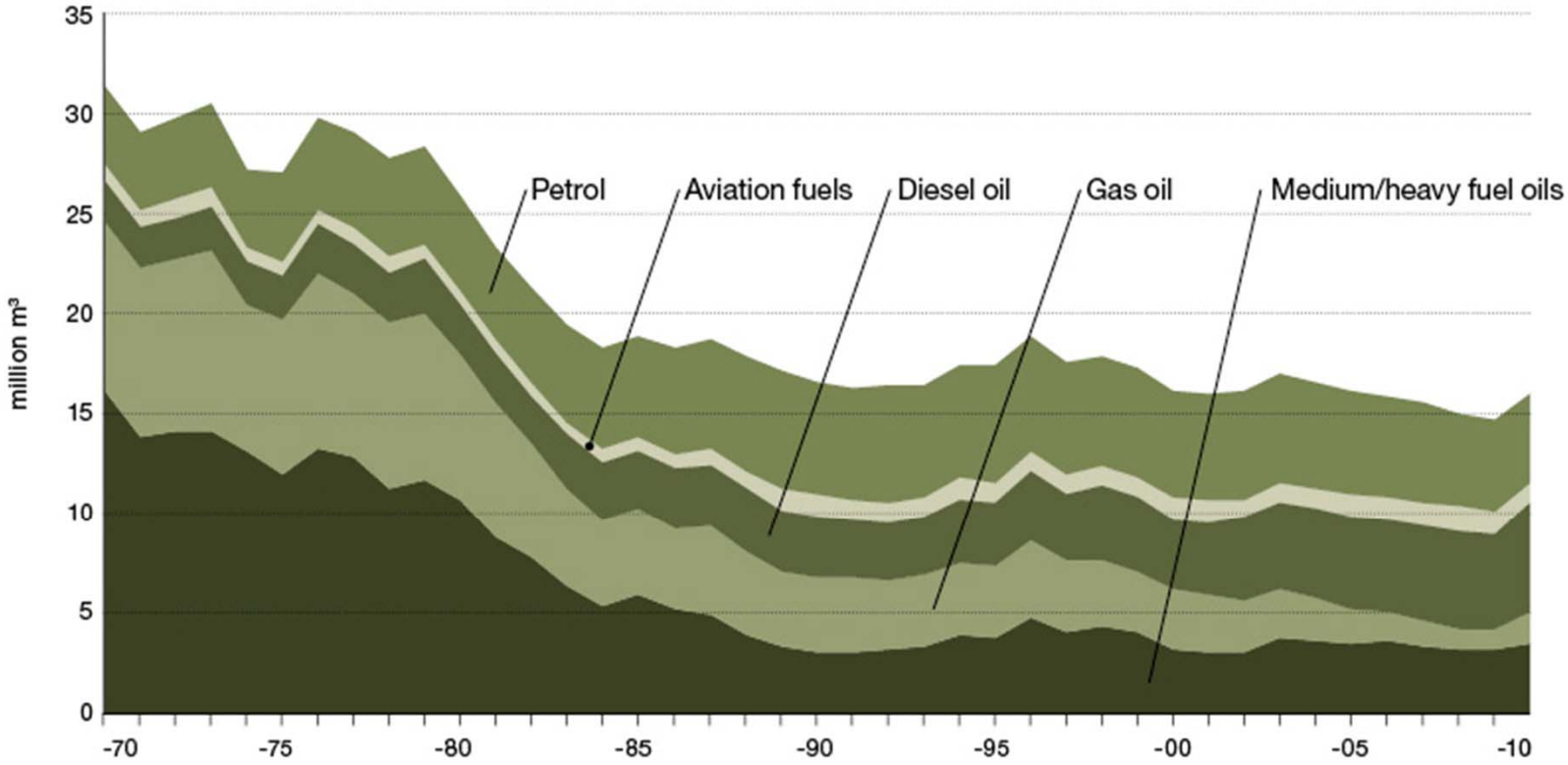
Figure 33 Current nominal and real prices of light crude oil, 1970–2010, in USD/barrel



Source: BP and the World Bank.

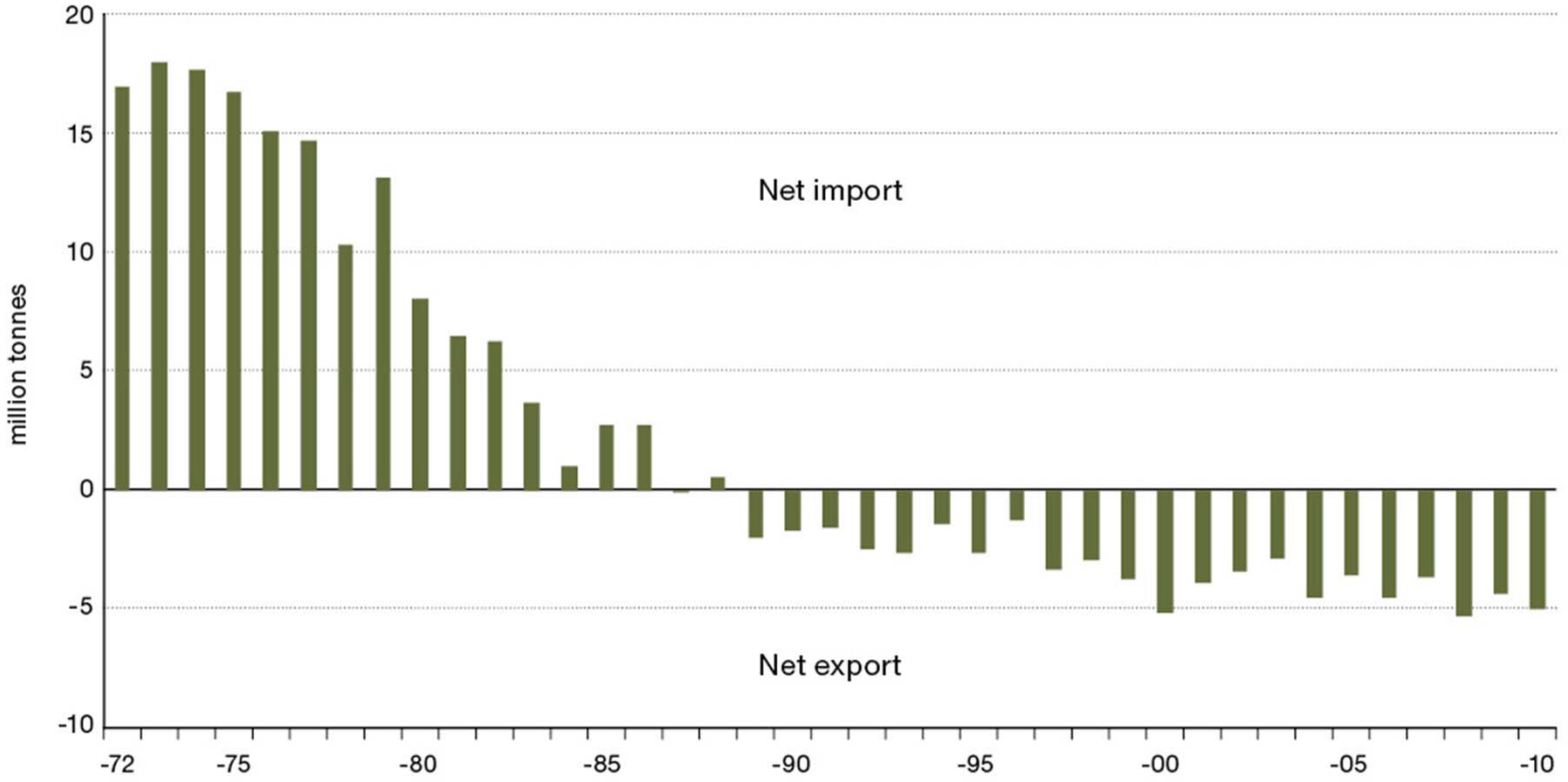
Note: 1. Due to revision of statistics at BP the timeseries have been revised back to 1984.
2. Global real prices deflated with MUV-index from the World Bank.

Figure 34 Use of oil products in Sweden, including international shipping and aviation, 1970–2010, in million m^3



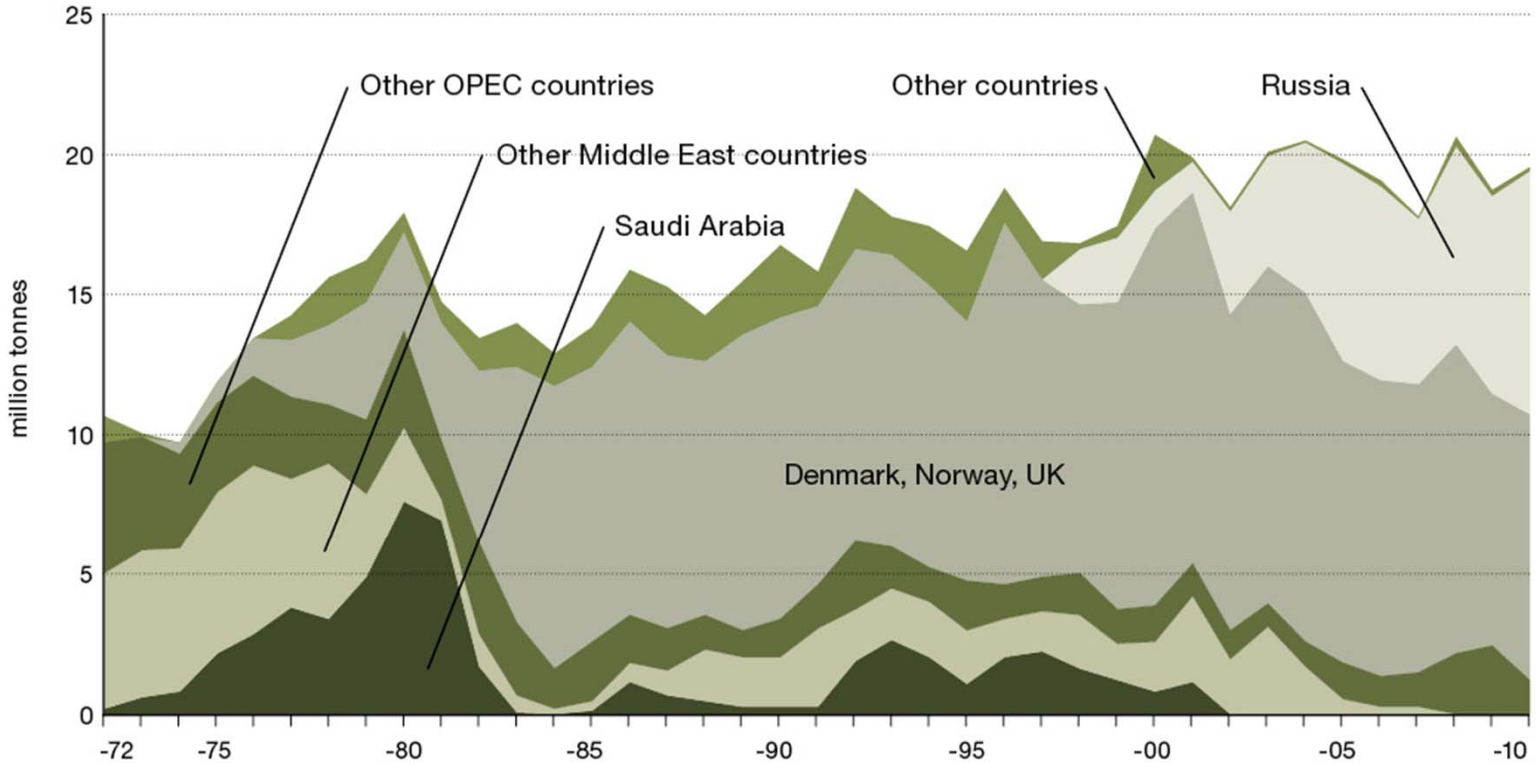
Source: Swedish Energy Agency and Statistics Sweden.

Figure 35 Net import (+) net export (–) of refinery products, 1972–2010, in million tonnes



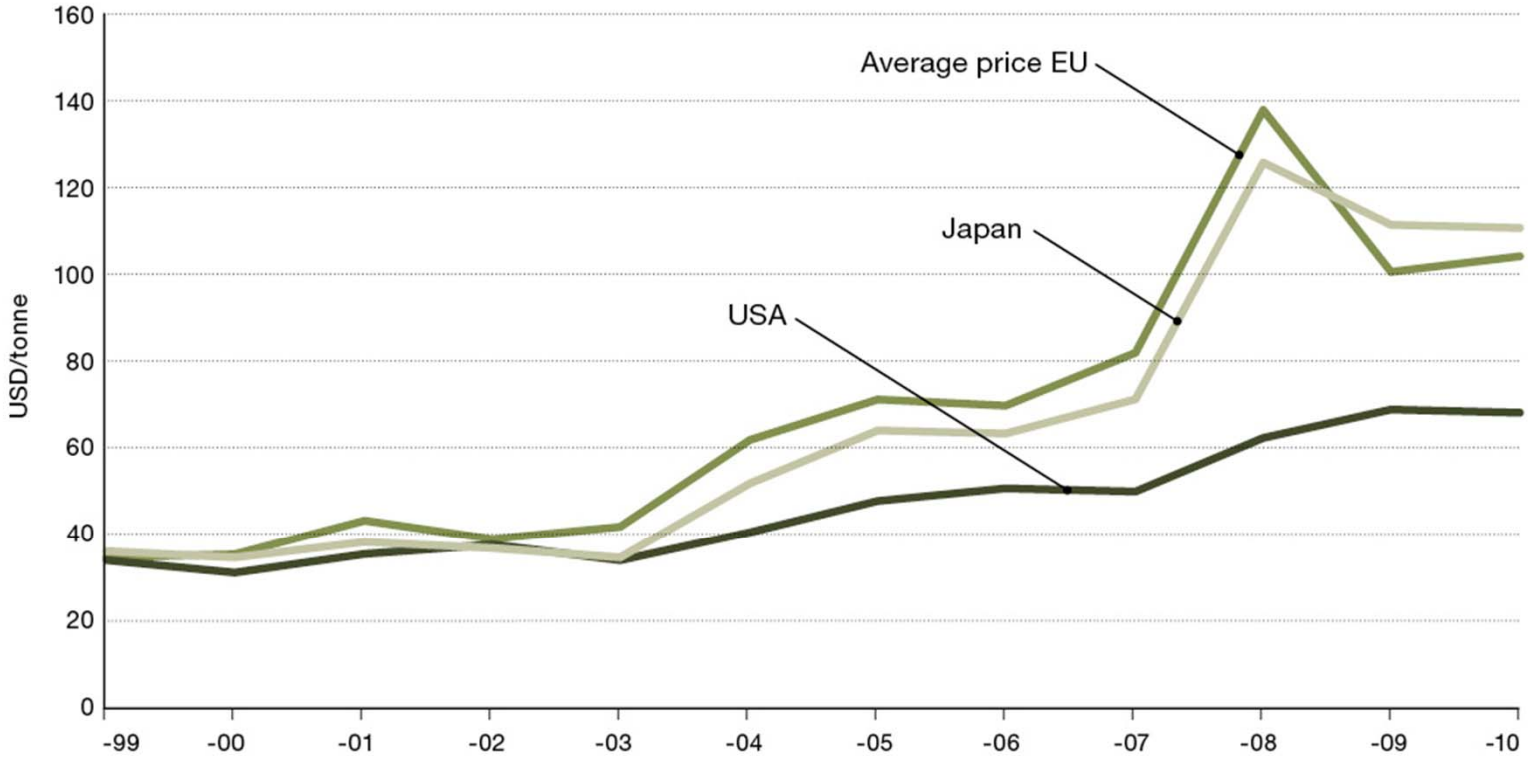
Source: Swedish Energy Agency and Statistics Sweden.

Figure 36 Swedish import of crude oil by country of origin, 1972–2010, in million tonnes



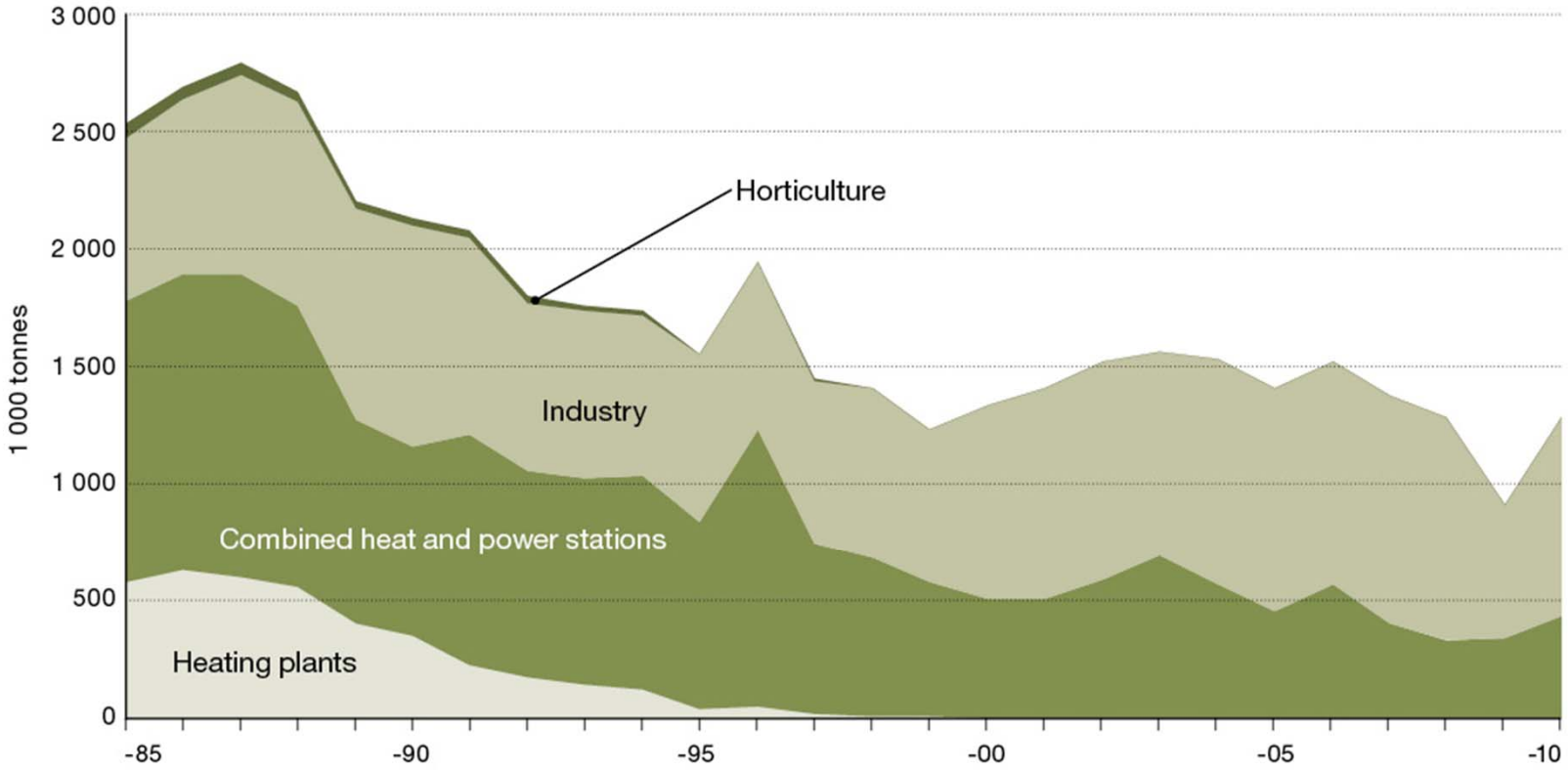
Source: Swedish Energy Agency and Statistics Sweden.
Note: Until 1997, imports from Russia are included in the category 'Other countries'.

Figure 37 Import prices of energy coal in EU, USA and Japan, 1999–2010, in USD/tonne



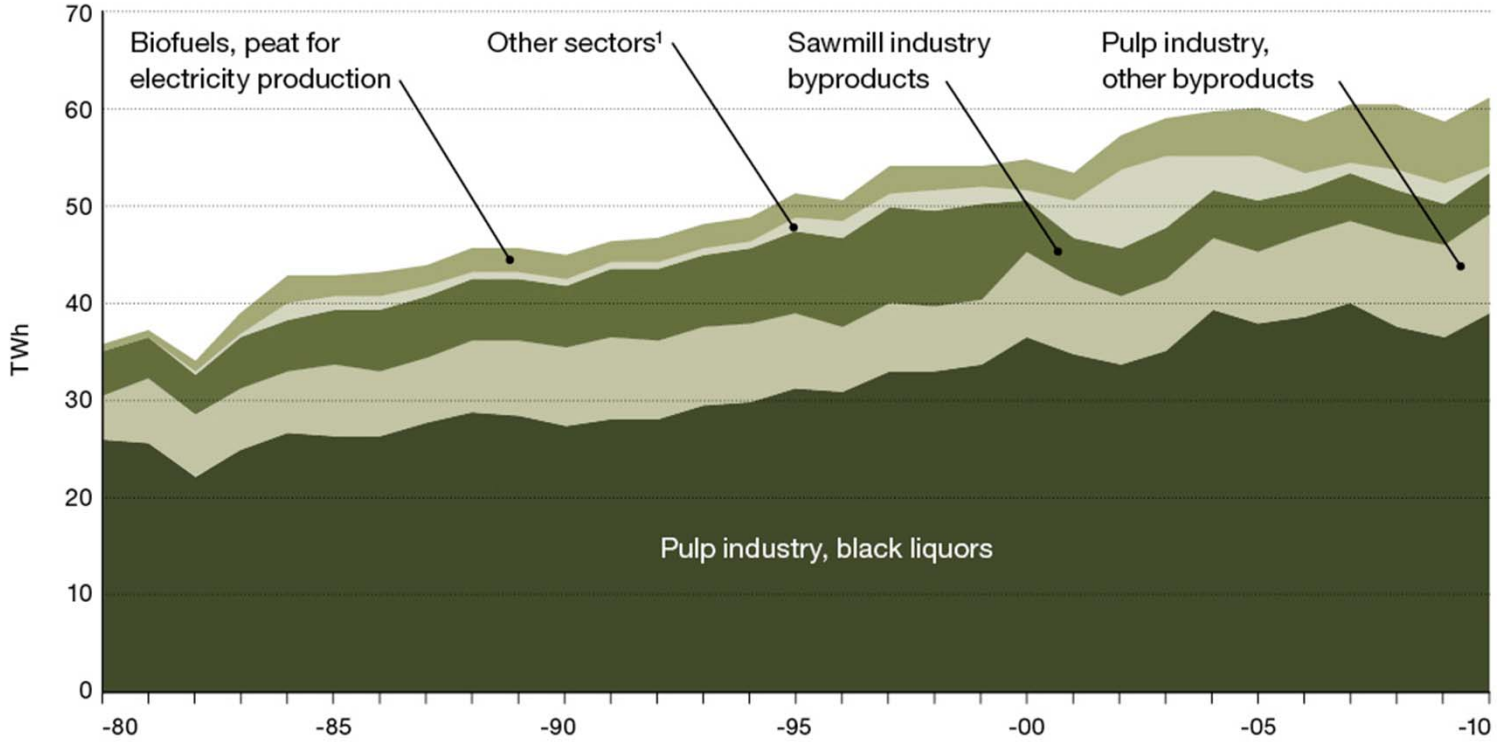
Source: IEA Energy Prices & Taxes, Quarterly Statistics, Second Quarter 2011.
Note: Including costs, insurance and freight (CIF).

Figure 38 Use of energy coal in Sweden, 1985–2010, in 1000 tonnes



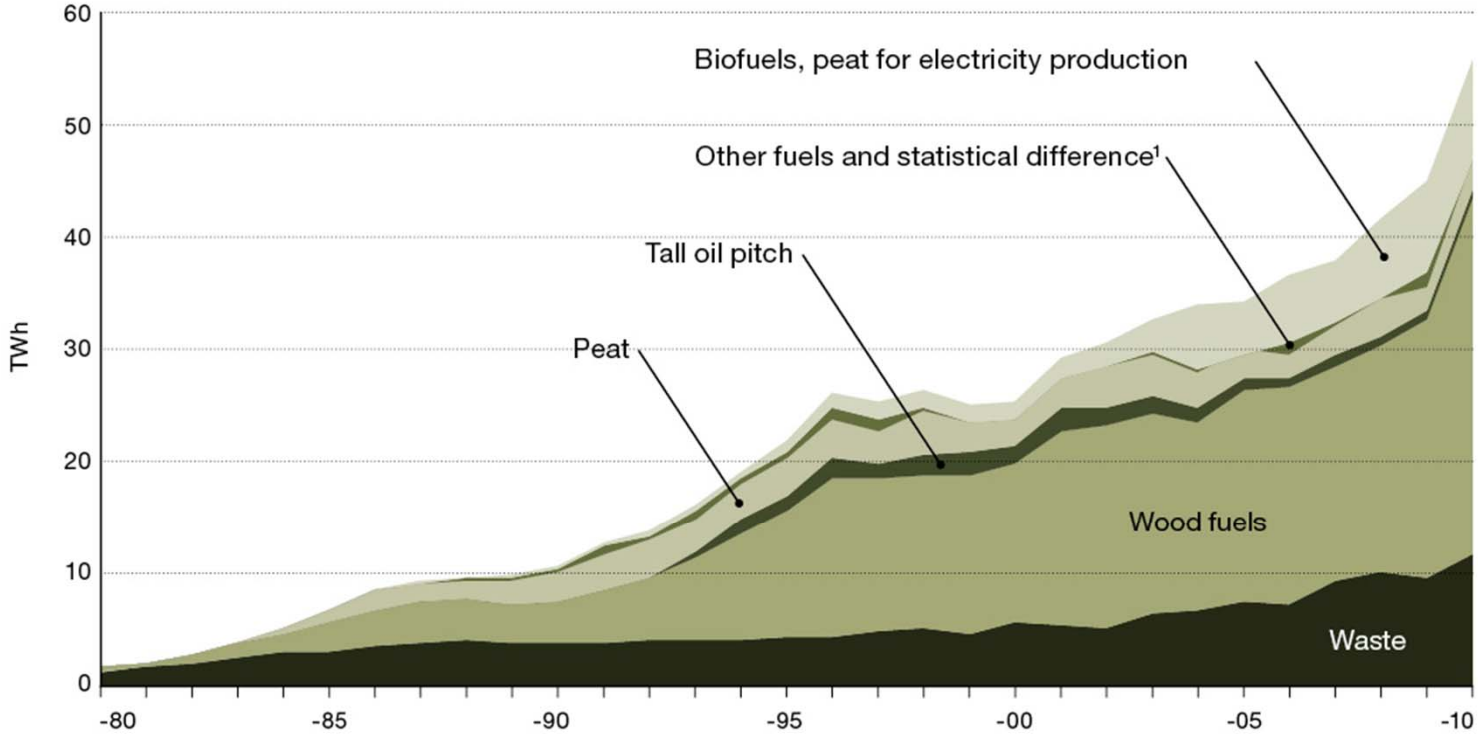
Source: Swedish Energy Agency and Statistics Sweden.

Figure 39 Use of biofuels, peat and waste in industry, 1980–2010, in TWh



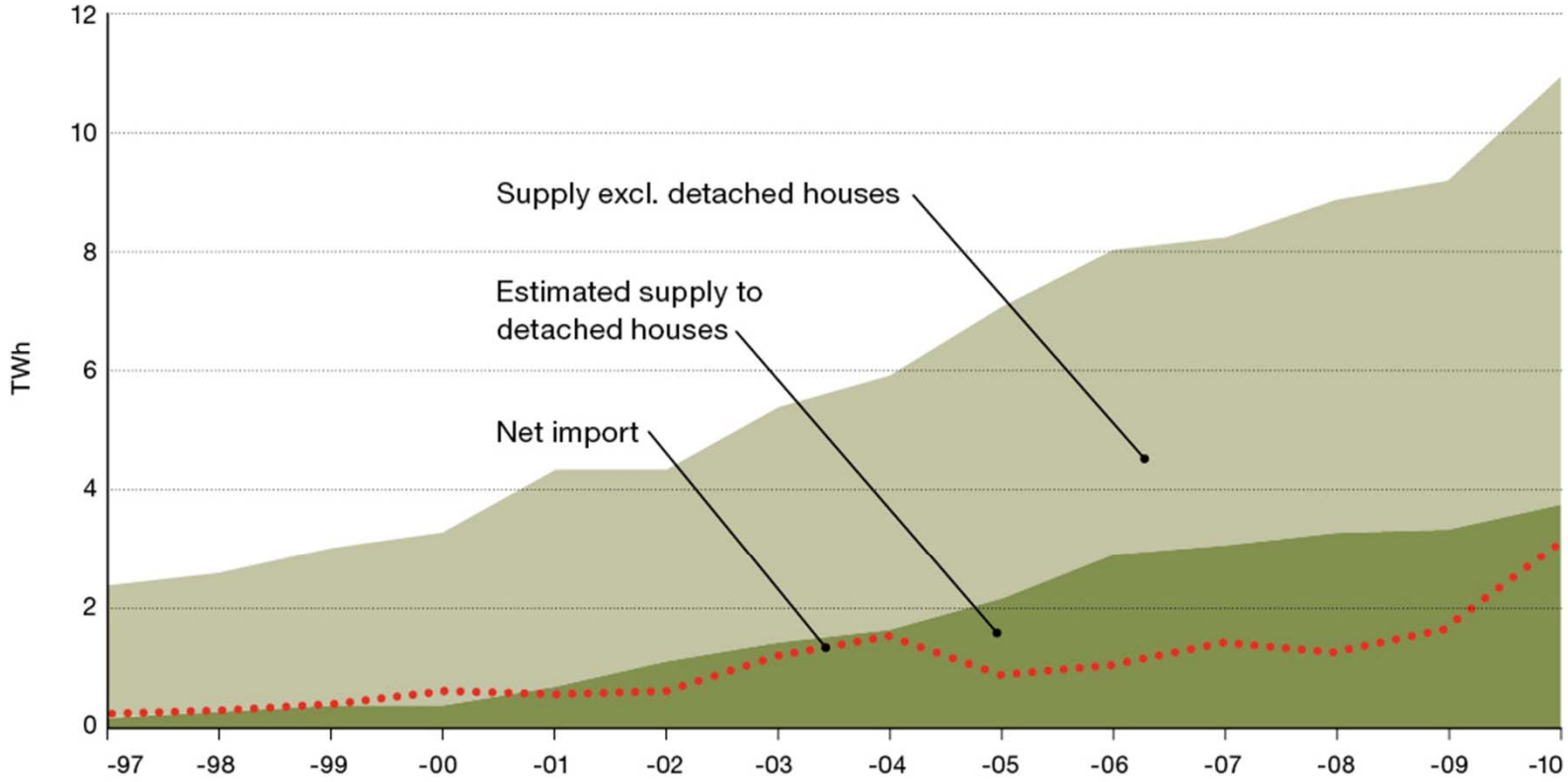
Source: Swedish Energy Agency and Statistics Sweden.
Note: 1. Other sectors includes the food sector, the chemical industry and the manufacturing (engineering) industry among others.

Figure 40 Use of biofuels, peat and waste in district heating plants, 1980–2010, in TWh



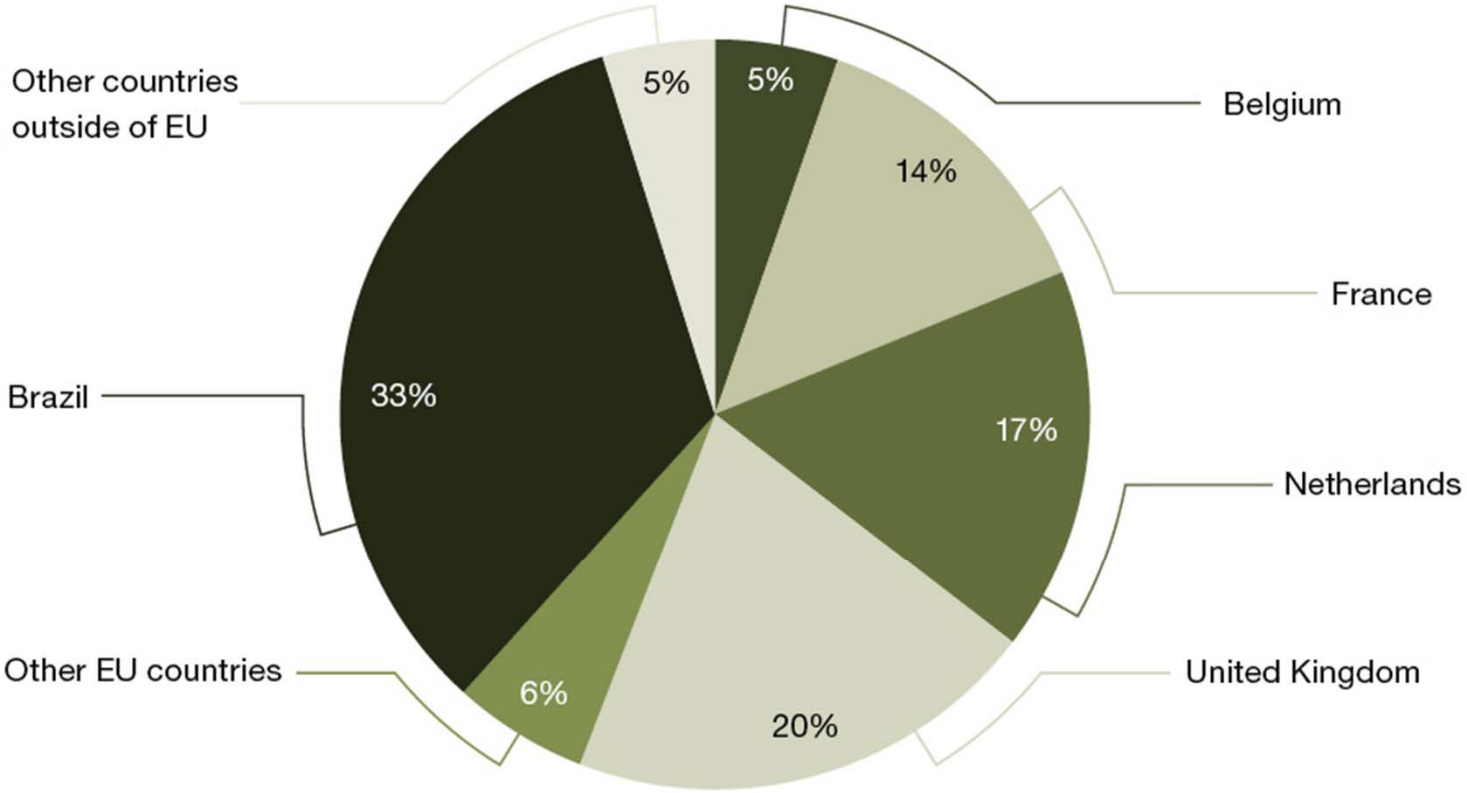
Source: Swedish Energy Agency and Statistics Sweden.
Note: 1. The difference is due to two different statistical sources.

Figure 41 Supply of pellets to the Swedish market, 1997–2010, in TWh



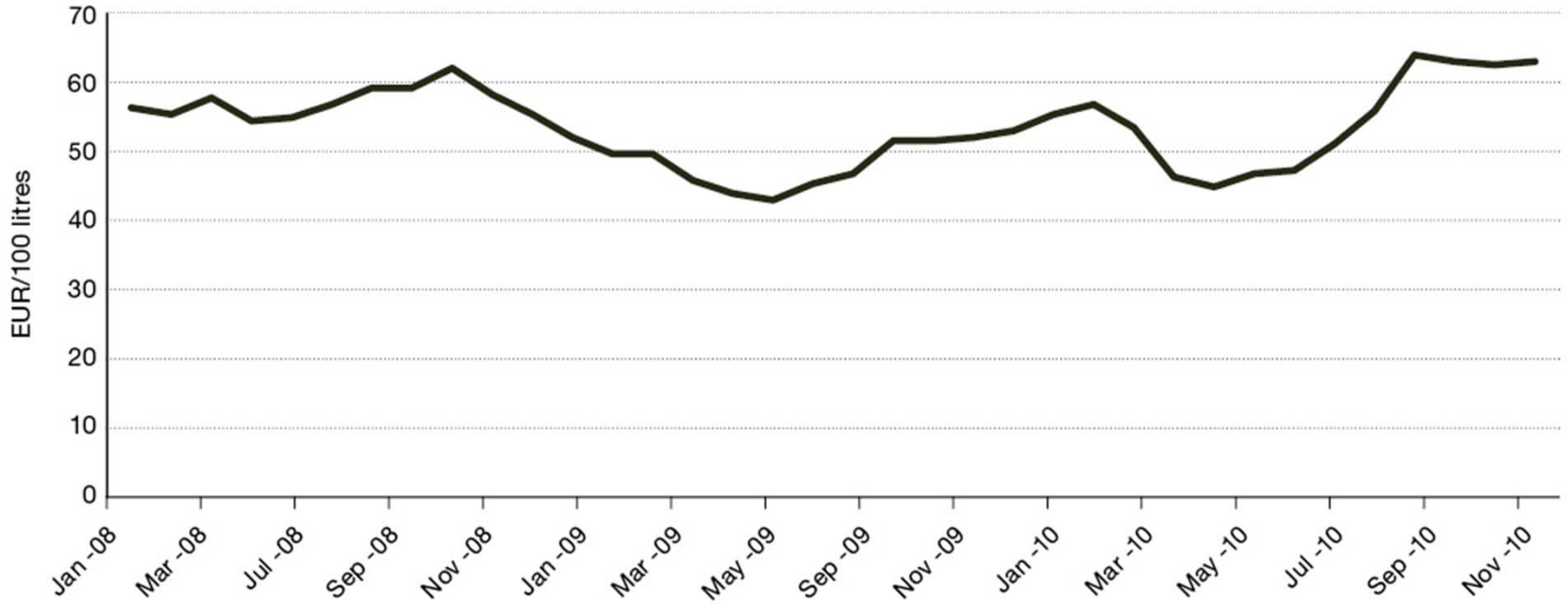
Source: The Swedish Association of Pellet Producers.

Figure 42 Import of undenatured and denatured ethanol, in total 243,253 m³ in 2010, by country, in per cent



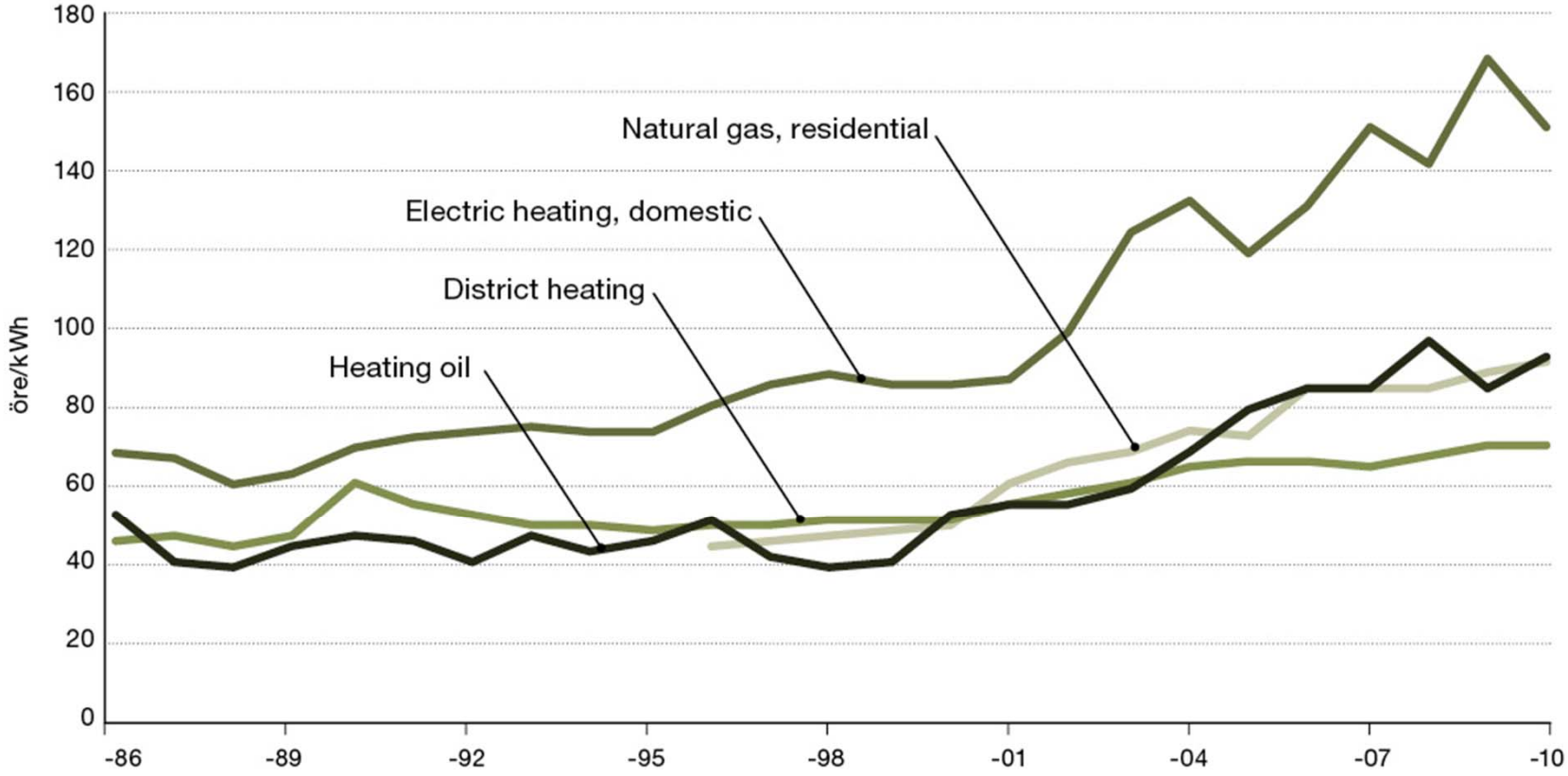
Source: Statistics Sweden.
Note: Included here are fuel ethanol, ethanol for industrial use and beverage ethanol.

Figure 43 Ethanol price on the European market, January 2008 – December 2010, in EUR per 100 litres



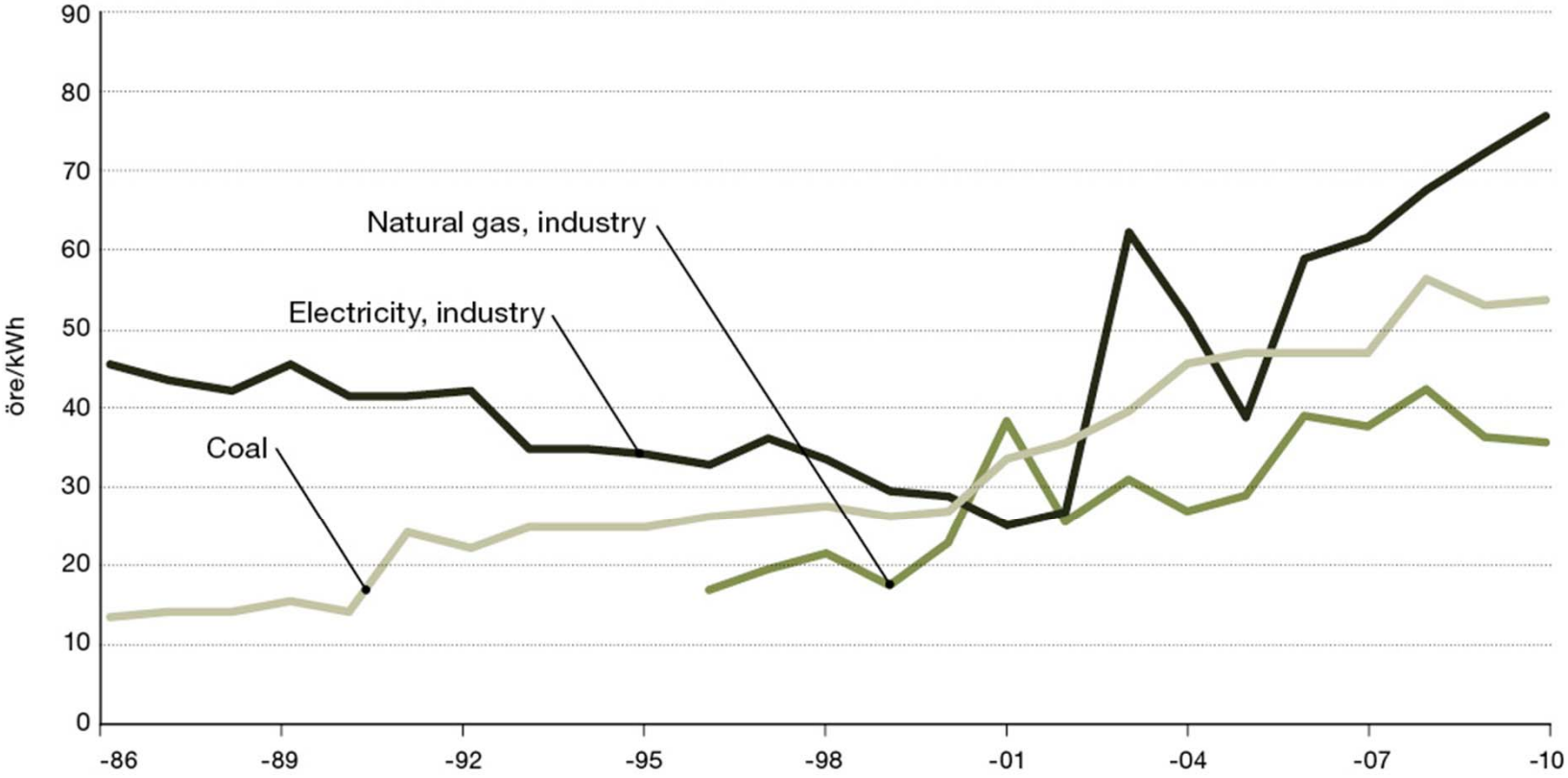
Source: FO Licht, World Ethanol Price Report, 3 May 2011.

Figure 44 Real energy prices for households in Sweden including energy taxes and VAT, 1986–2010, in öre/kWh



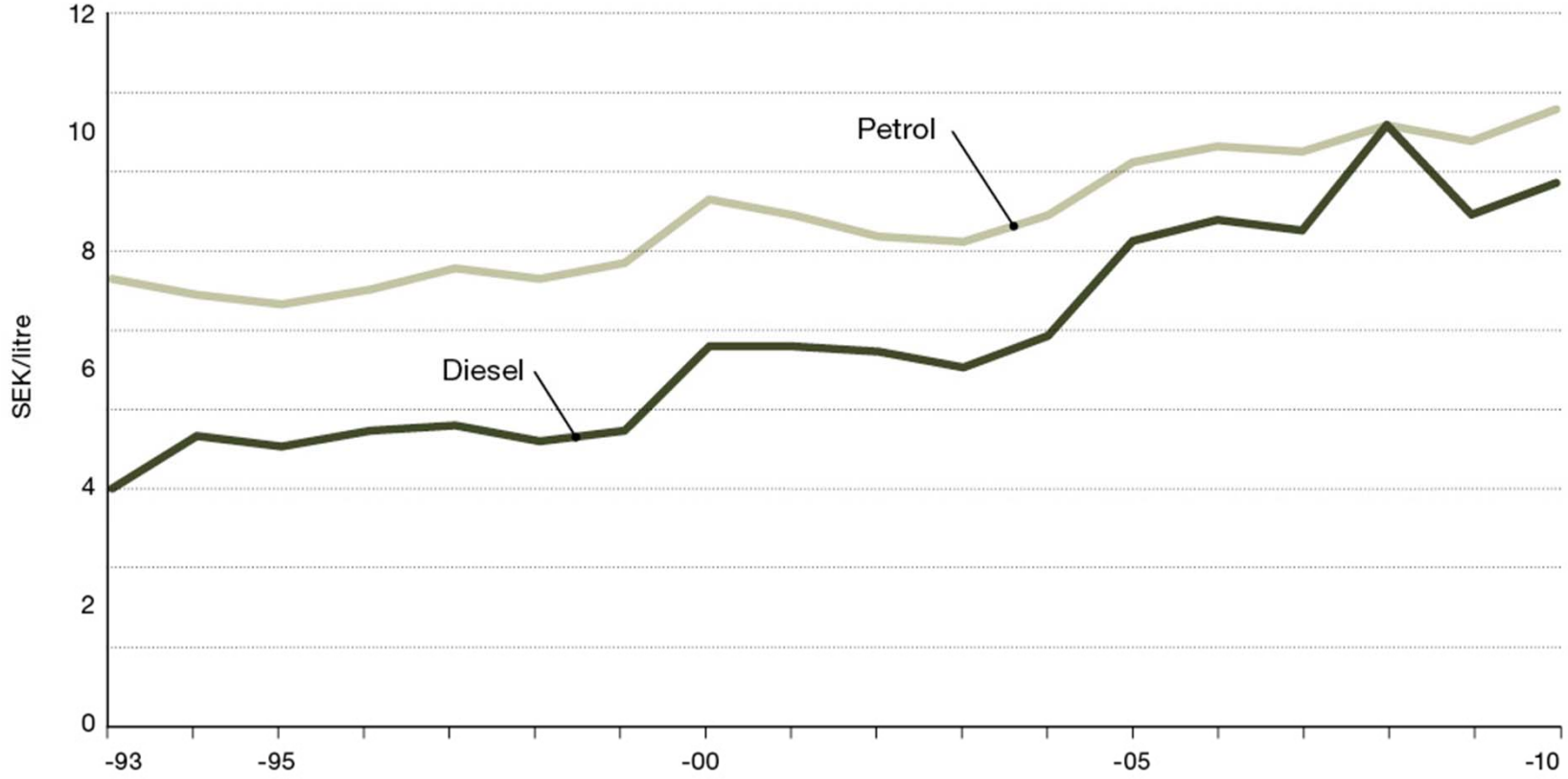
Source: Swedish Energy Agency and Statistics Sweden.

Figure 45 Real energy prices for the industry in Sweden including energy taxes, 1986–2010, in öre/kWh



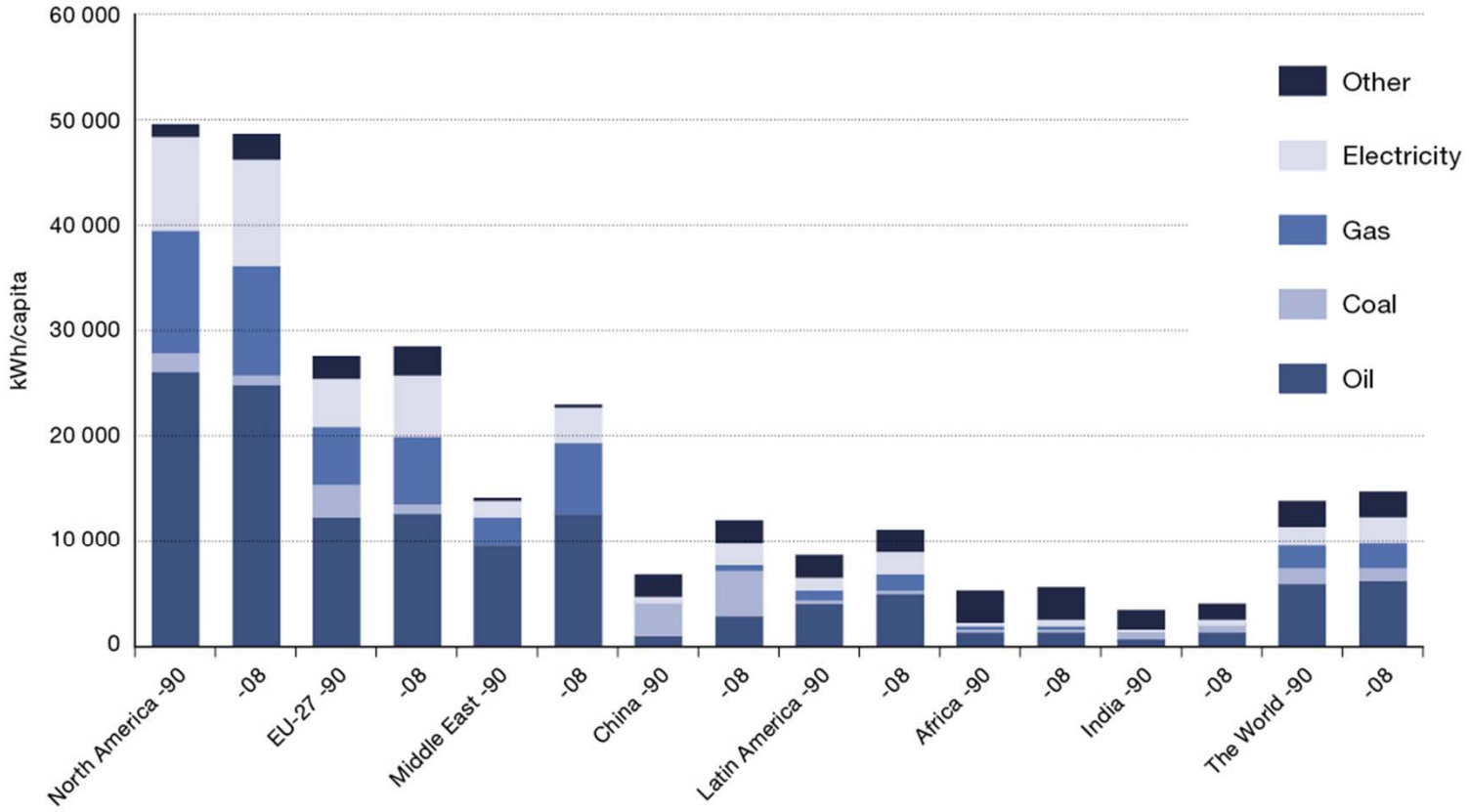
Source: Swedish Energy Agency and Statistics Sweden.

Figure 46 Real annual average energy prices for motor fuels in Sweden including energy taxes but excluding VAT, 1993–2010, in SEK/litre



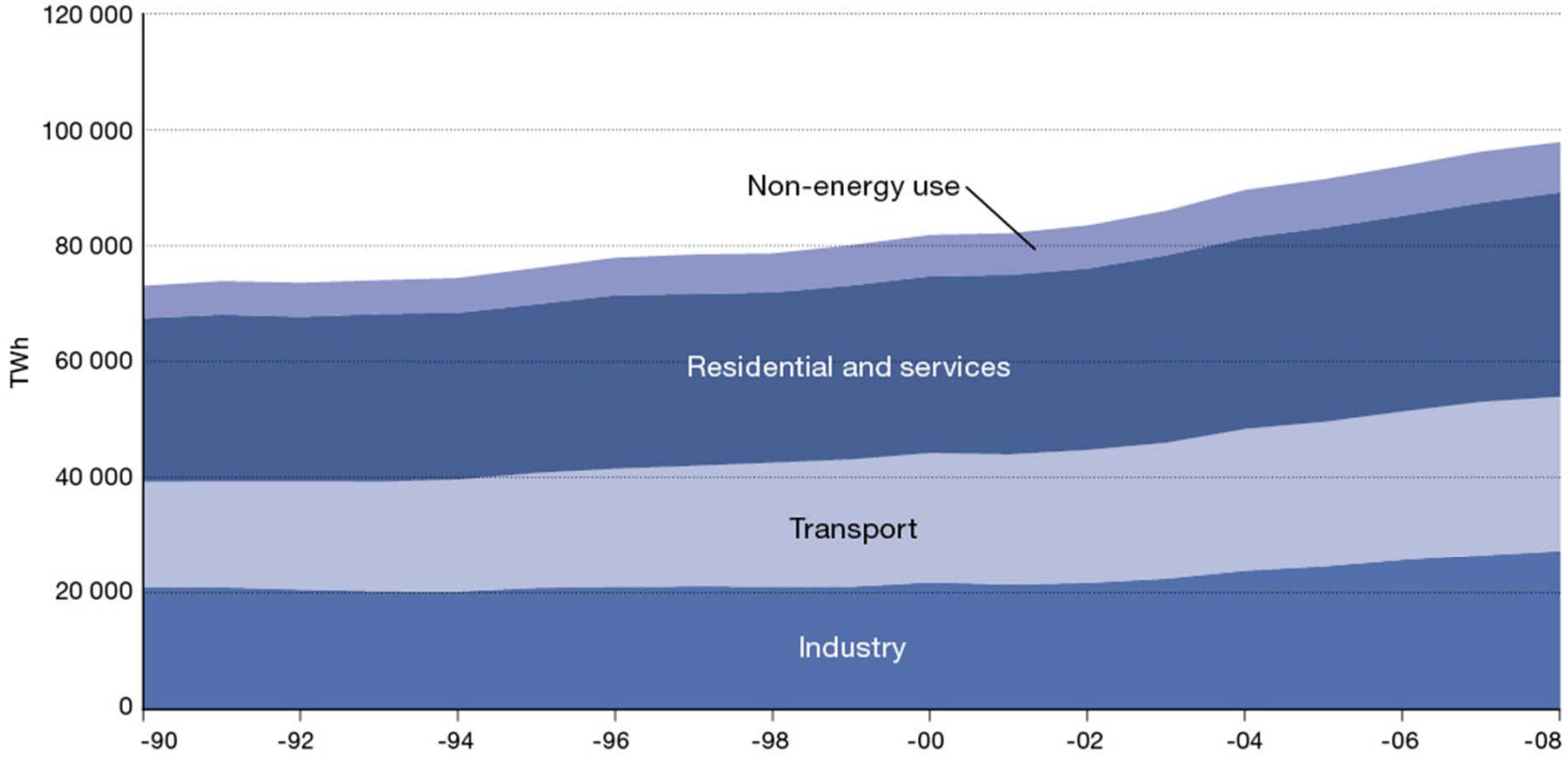
Source: SPBI, the Swedish Energy Agency and Statistics Sweden.

Figure 47 Regional energy use in the world by energy source, 1990 and 2008, in kWh/capita



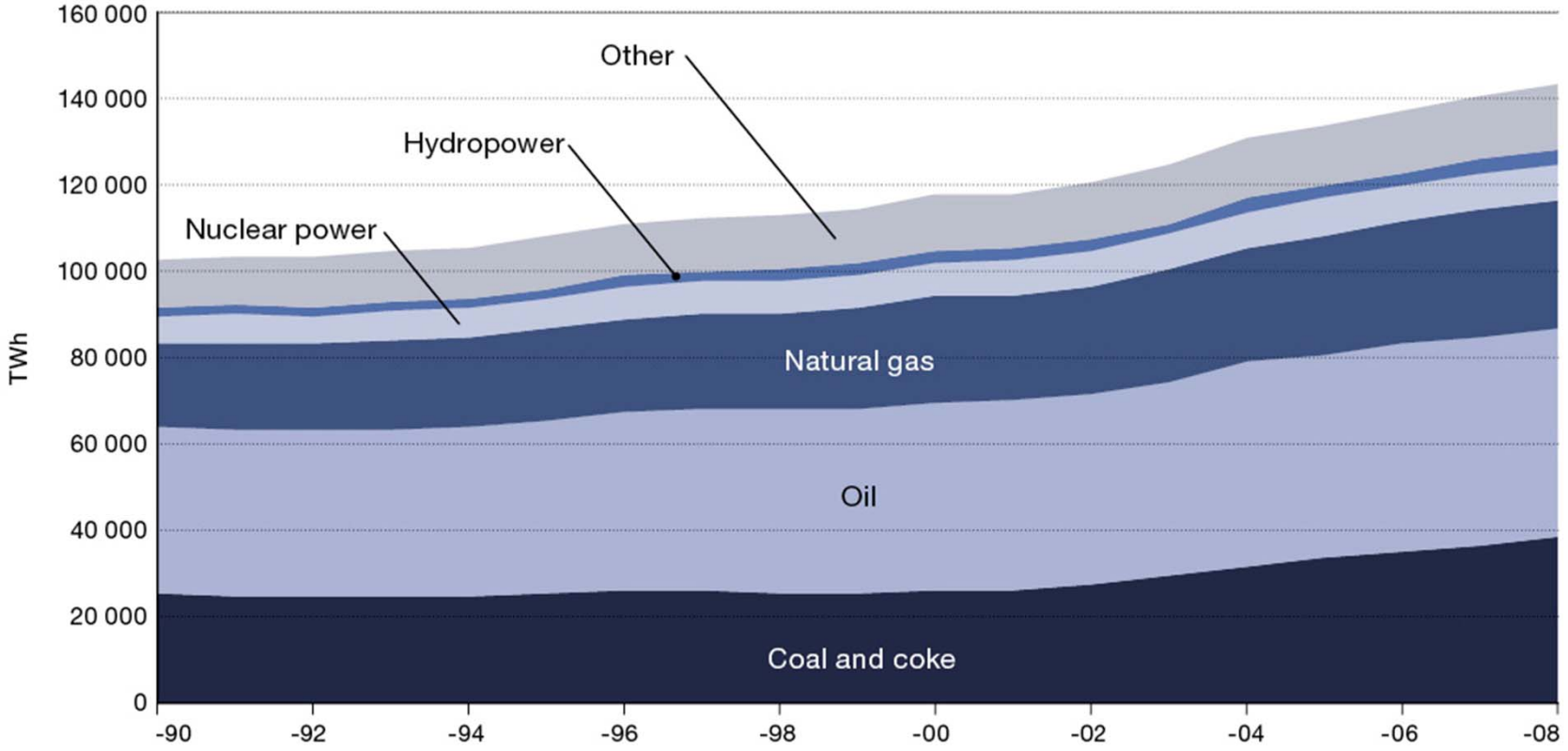
Source: IEA Energy balances of Non-OECD Countries 2010, IEA Energy Balances of OECD Countries 2010.

Figure 48 The world's energy use by sector, 1990-2008, in TWh



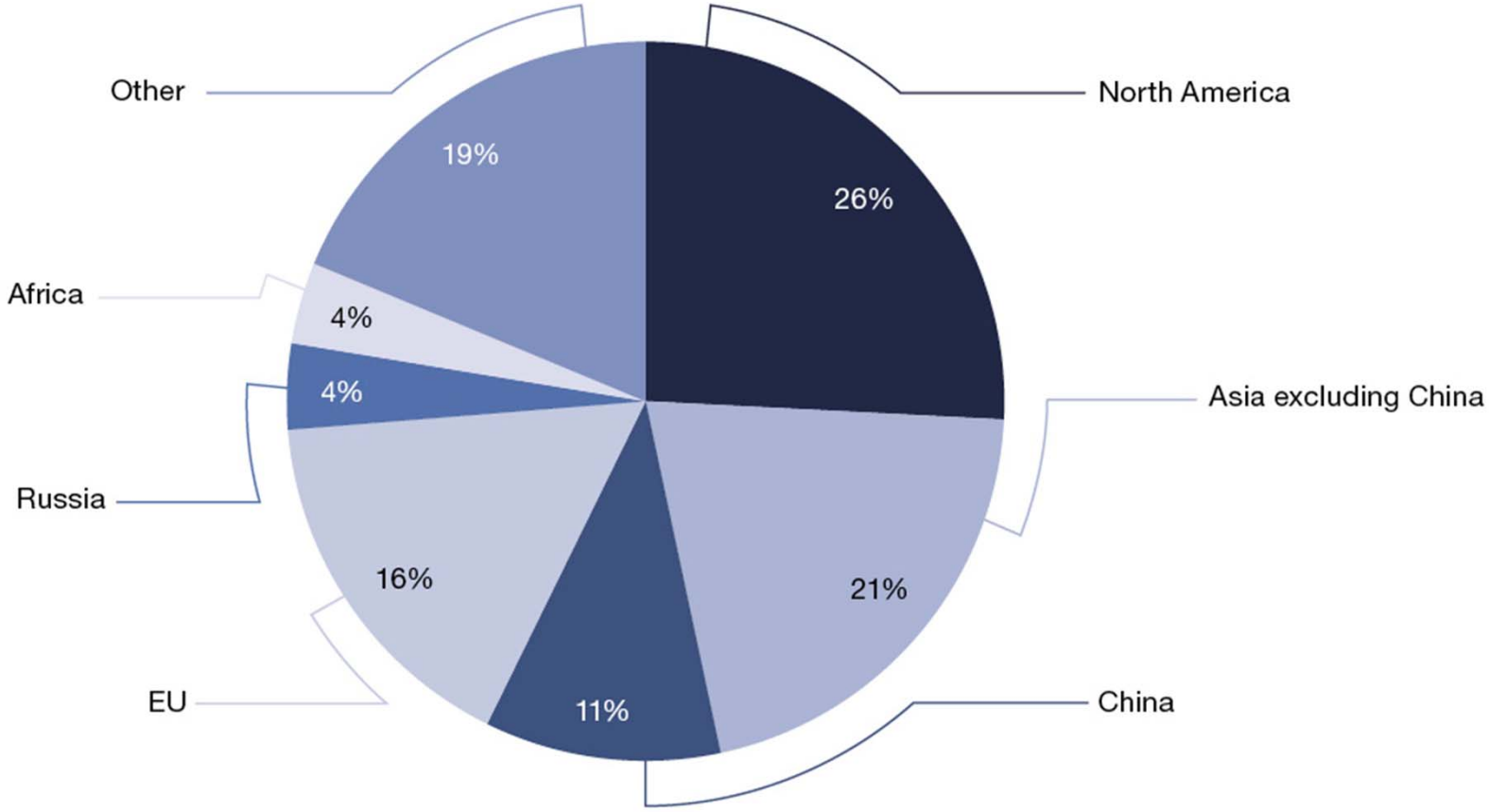
Source: IEA Energy Balances of Non-OECD Countries 2010.

Figure 49 Global energy supply, 1990–2008, in TWh



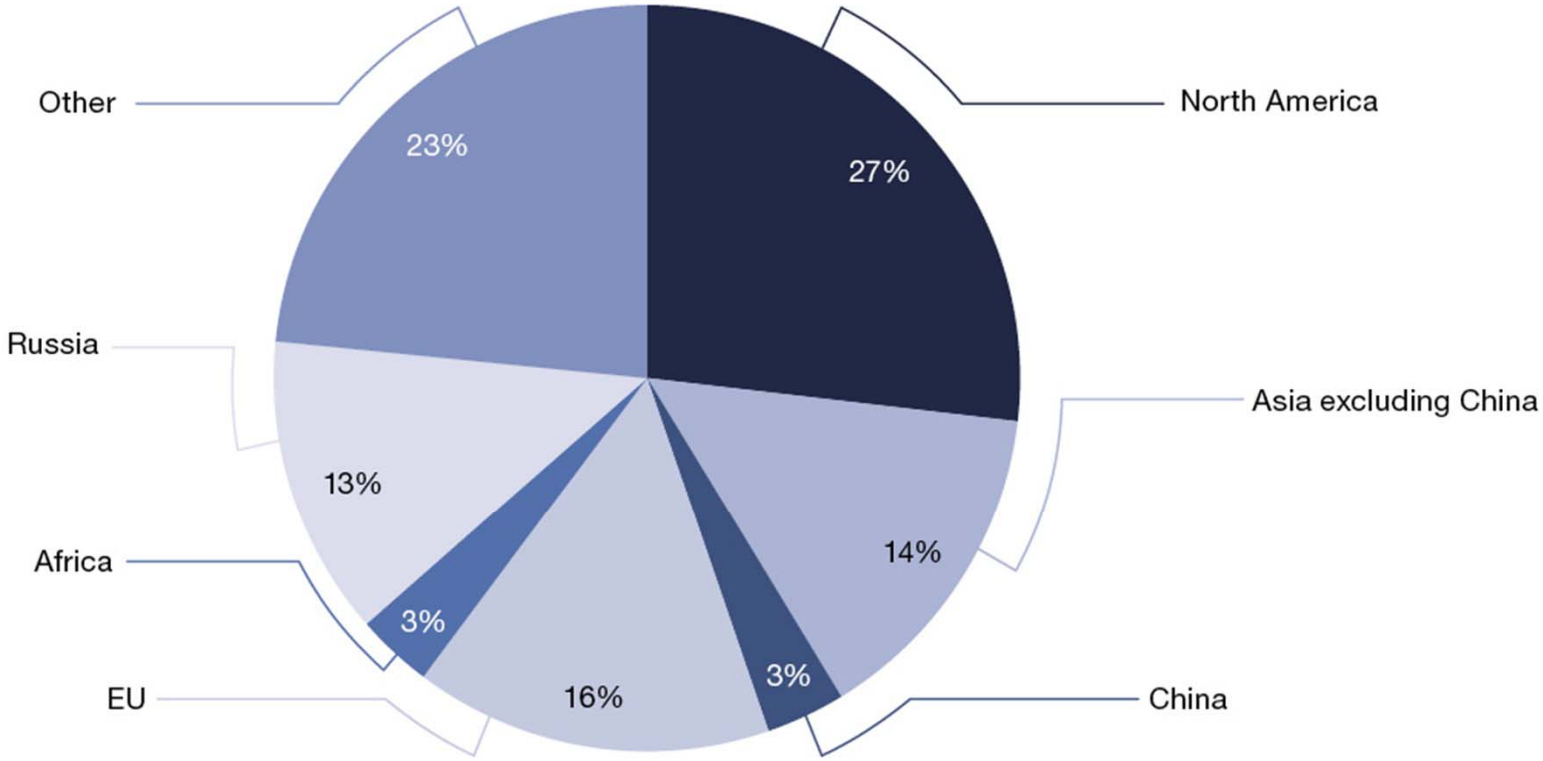
Source: IEA Energy Balances of Non-OECD Countries 2010.

Figur 50 Global supply of oil in 2010, in total 46 847 TWh, by region in per cent



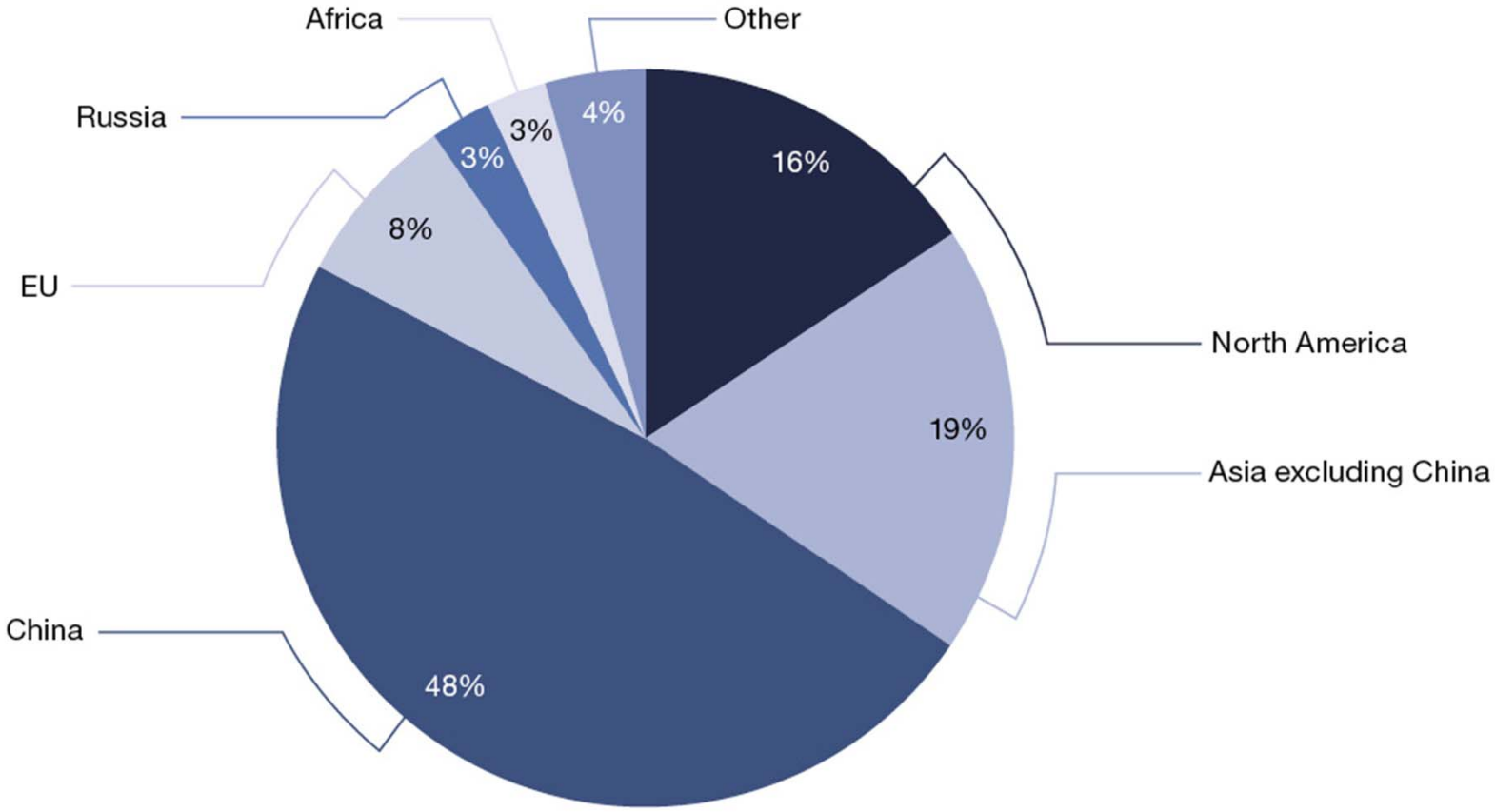
Source: BP Statistical Review of World Energy, 2011.

Figure 51 Global supply of gas in 2010, in total 33 240 TWh, by region in per cent



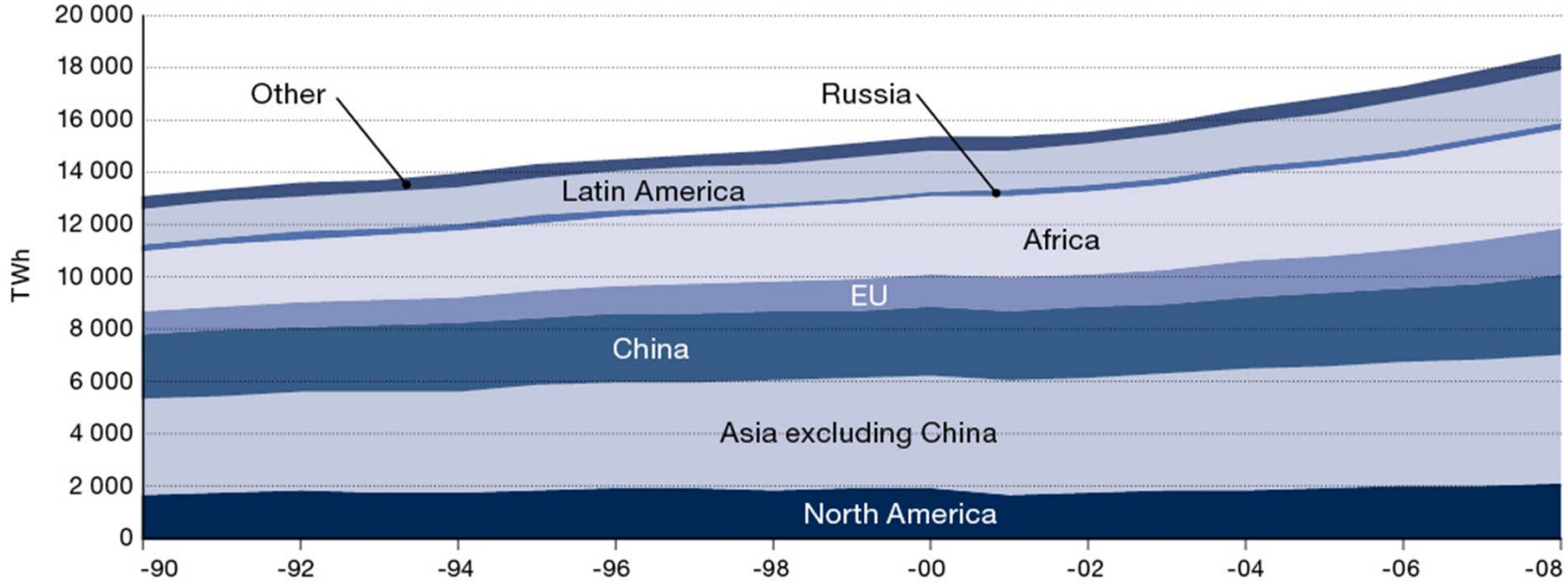
Source: BP Statistical Review of World Energy, 2011.

Figure 52 Global supply of coal in 2010, in total 41 354 TWh, by region in per cent



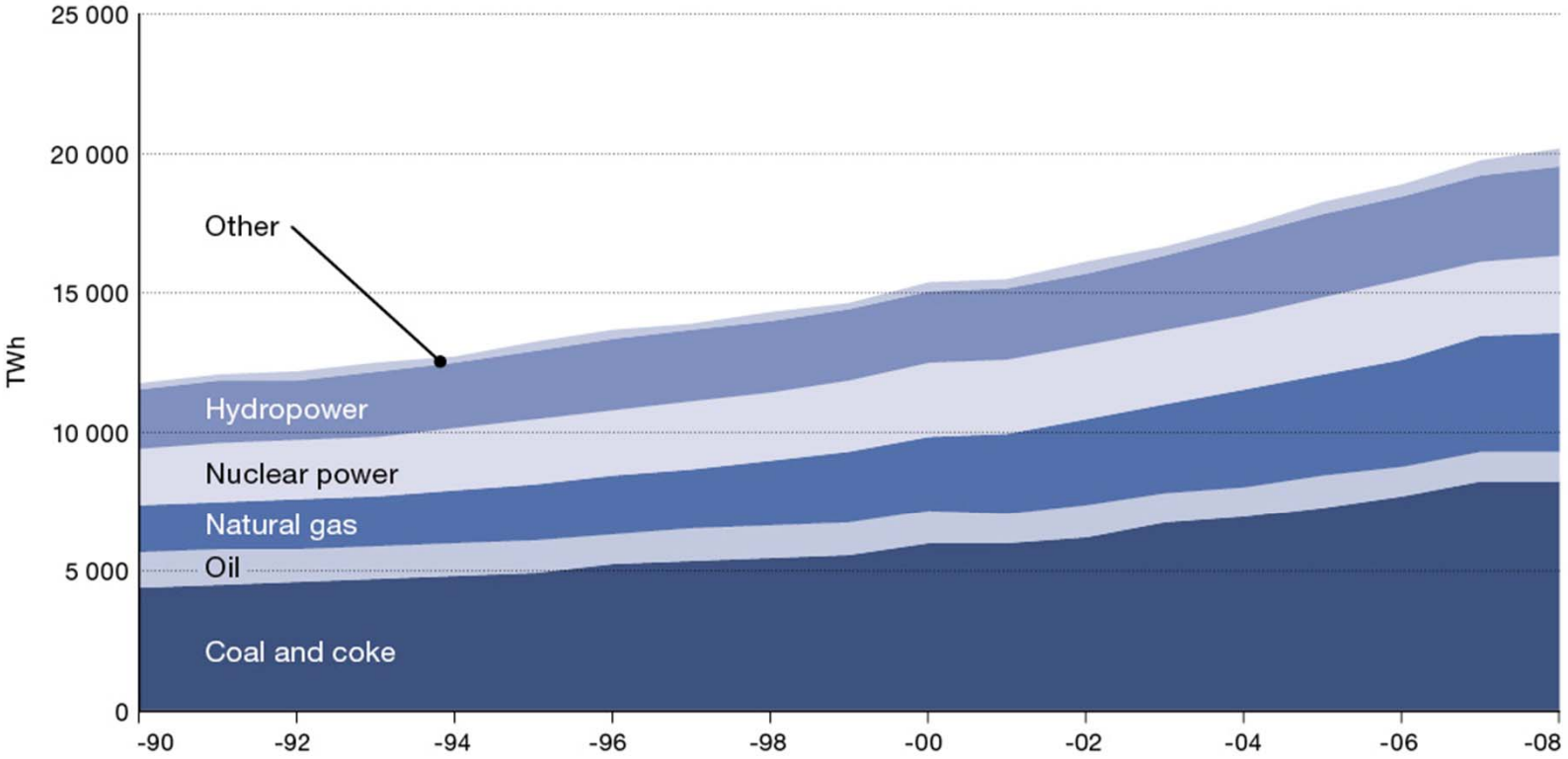
Source: BP Statistical Review of World Energy, 2011.

Figure 53 Global supply of renewable energy, 1990-2008, in TWh



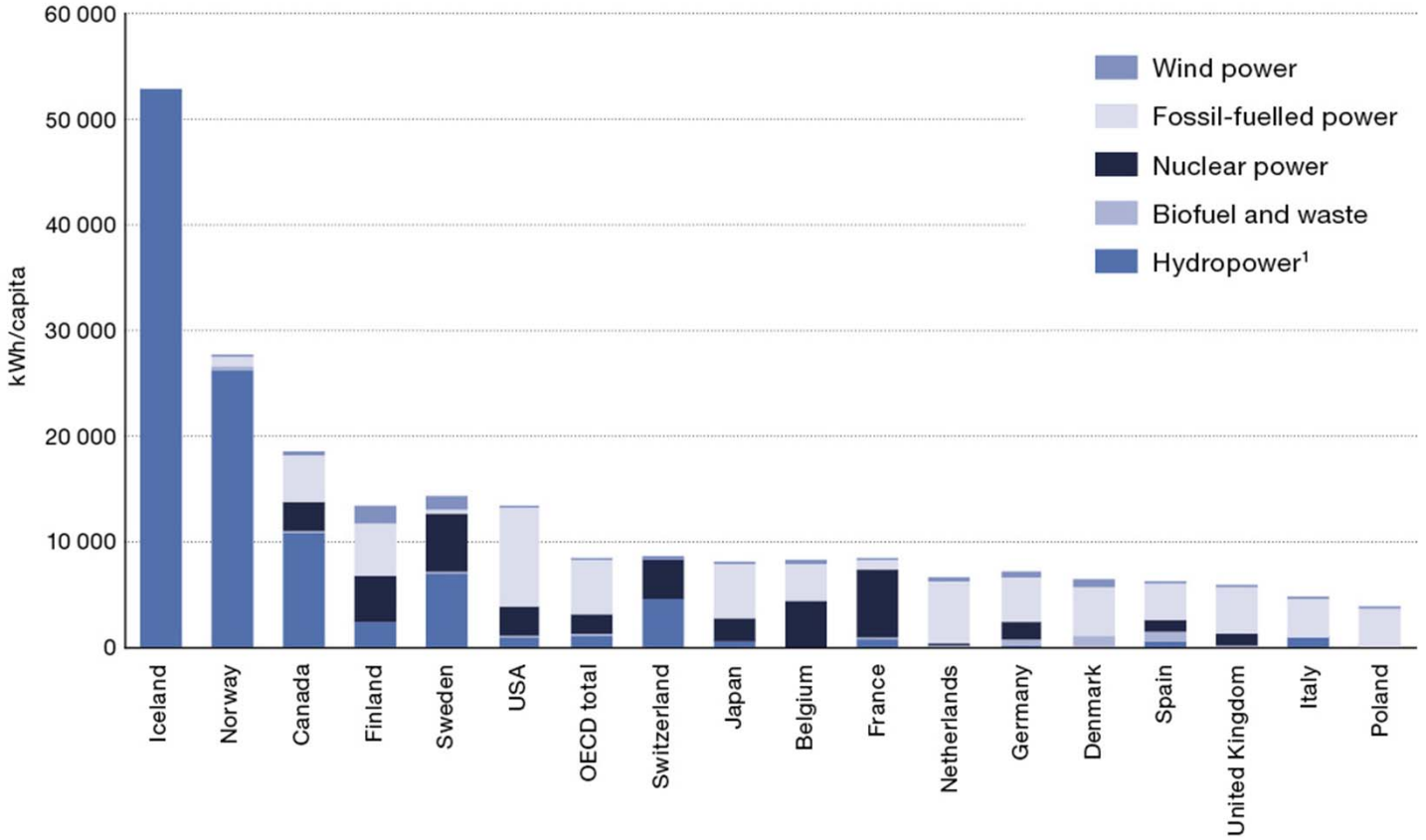
Source: IEA Energy Balances of Non-OECD Countries 2010. IEA Energy Balances of OECD Countries 2010.
Note: Includes energy from hydro, solar, wind and geothermal power as well as biofuels.

Figur 54 Electricity production in the world by energy resource, 1990-2008, in TWh



Source: IEA Energy Balances of Non-OECD Countries 2010.

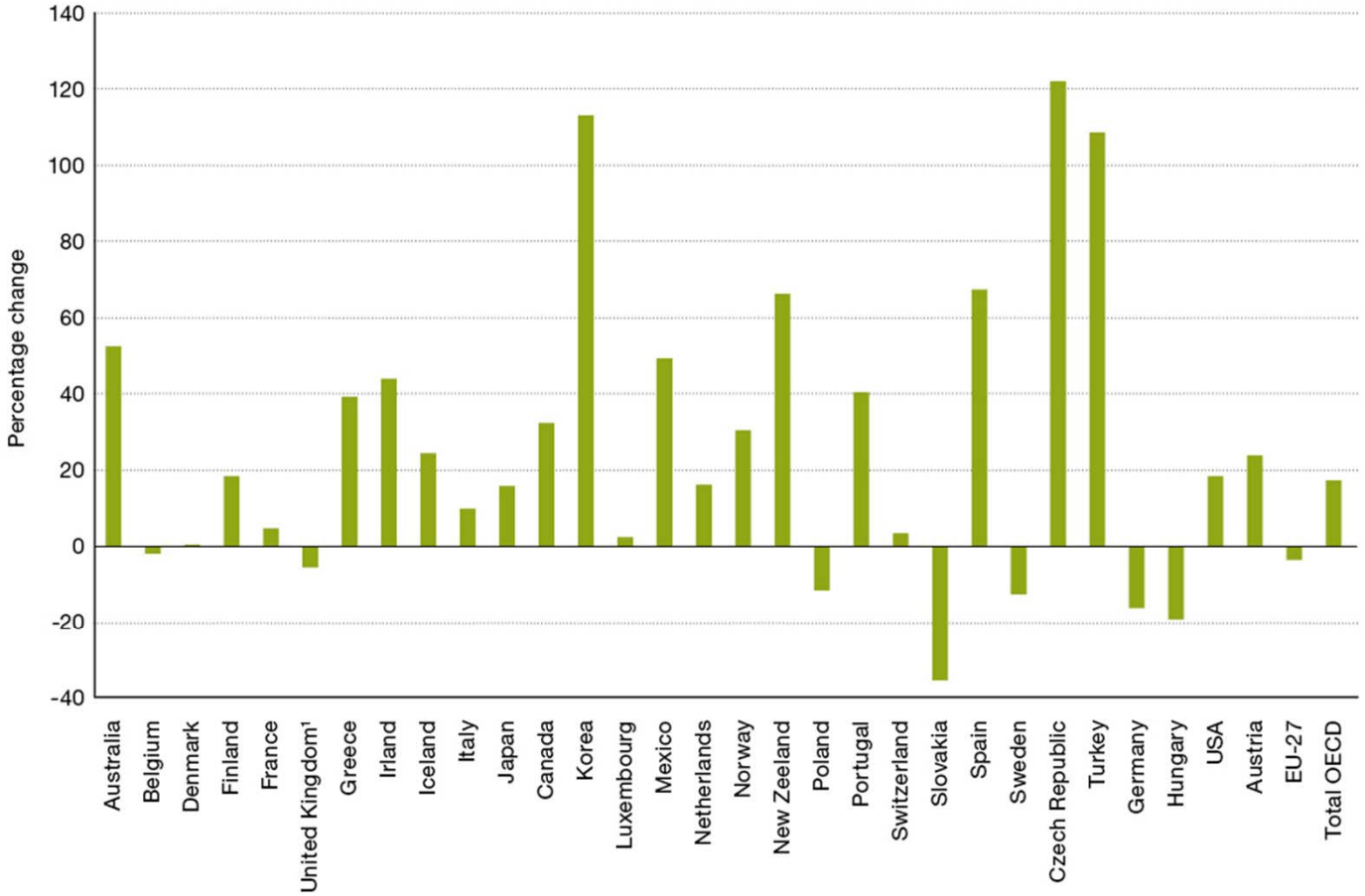
Figure 55 Electricity production by power source 2009, in kWh/capita



Source: Electricity Information 2010 IEA/OECD.

Note: 1. The figures for hydropower include solar electricity and geothermal electricity.

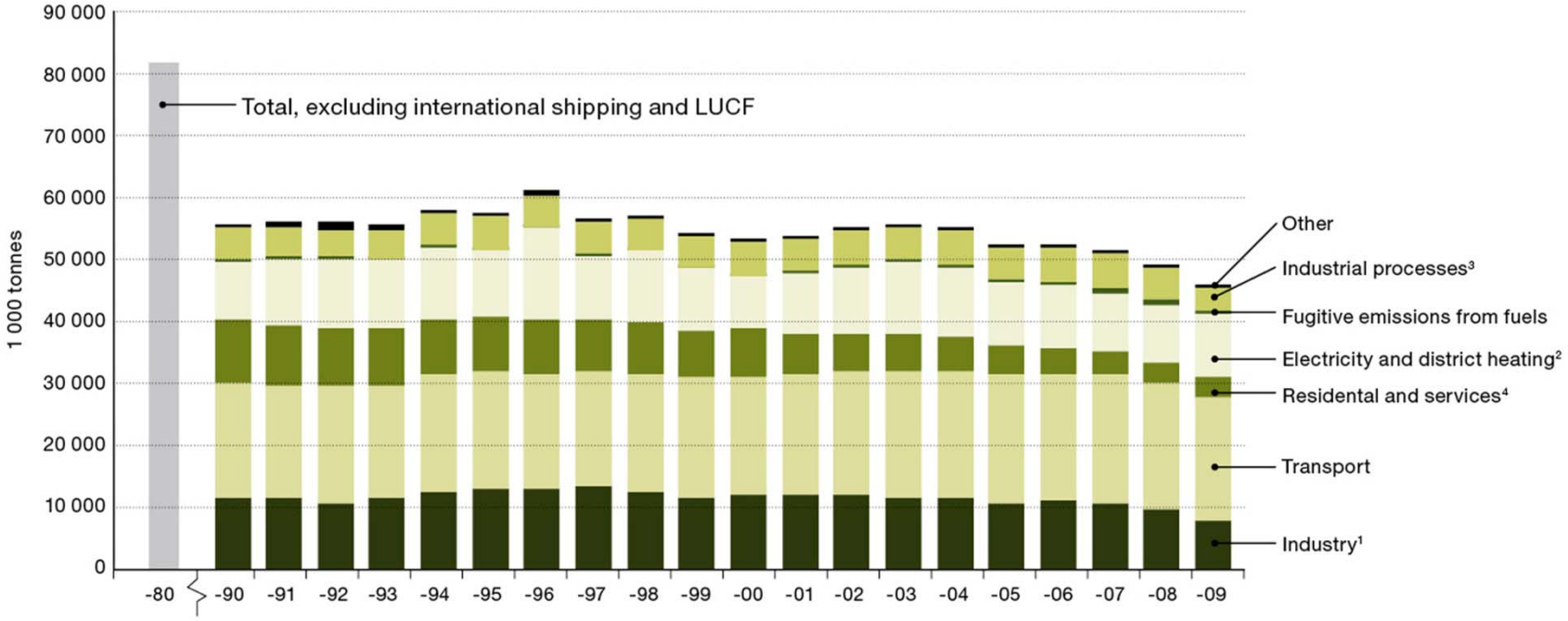
Figure 56 Changes in carbon dioxide emissions in 2007 compared to the levels in 1990, in EU and OECD countries, in percentage change



Source: OECD in Figures 2009

Note: 1. Great Britain and Northern Ireland

Figure 57 Emissions of carbon dioxide in Sweden in 1980, 1990–2009, in 1000 tonnes



Source 1980: Statistics Sweden. Source 1990–2009: Sweden's National Inventory to UNFCCC year 2010.
Note: Revised figures for all years compared with previous editions.

1. Including industrial back-pressure production.
2. Including coking plants, refineries and hazardous waste incineration.
3. Including the use of solvents and products.
4. Including agriculture, forestry and fisheries.

Figure 58 Emissions of sulphur dioxide in Sweden, 1990–2009, in 1 000 tonnes

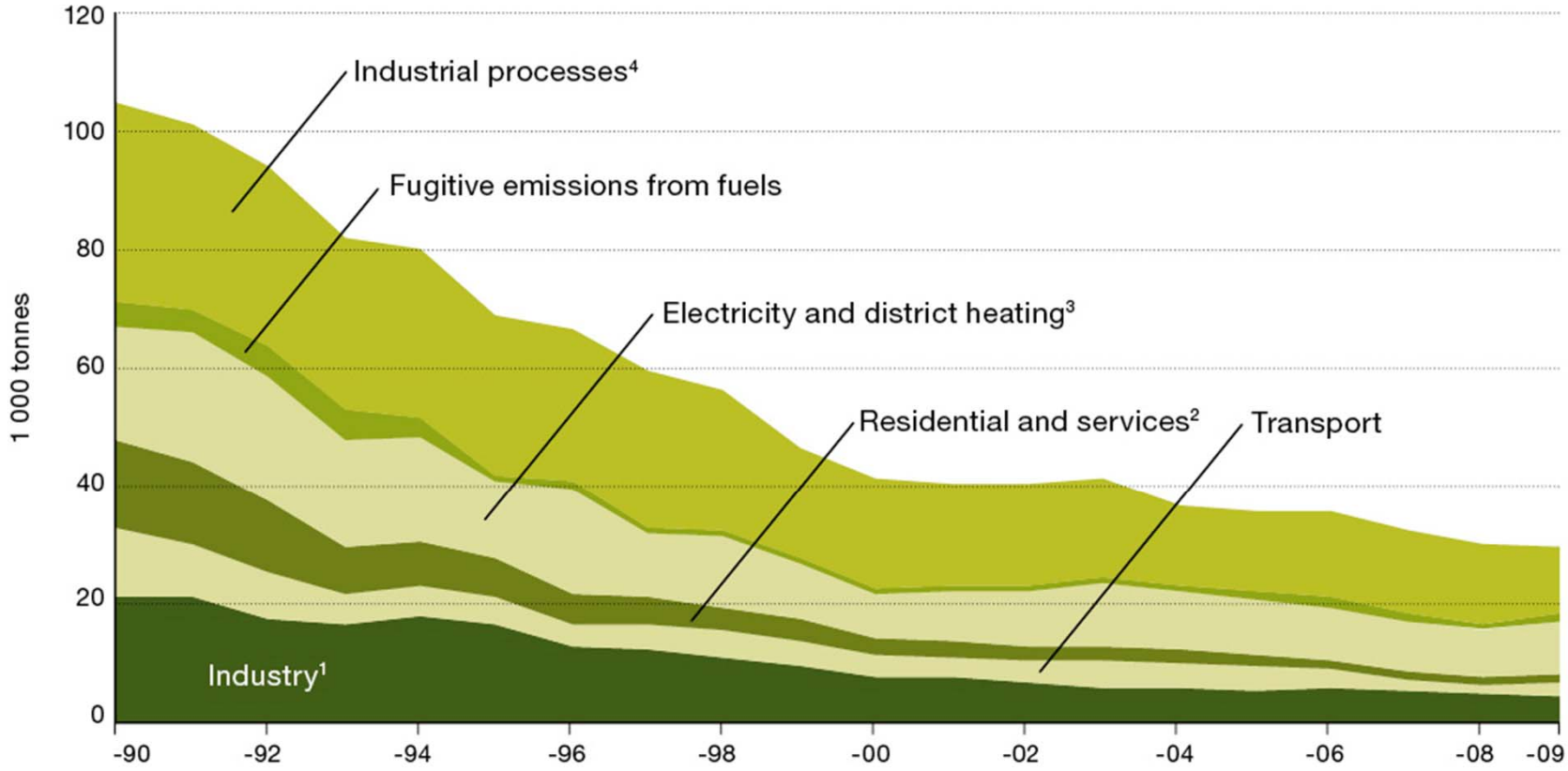
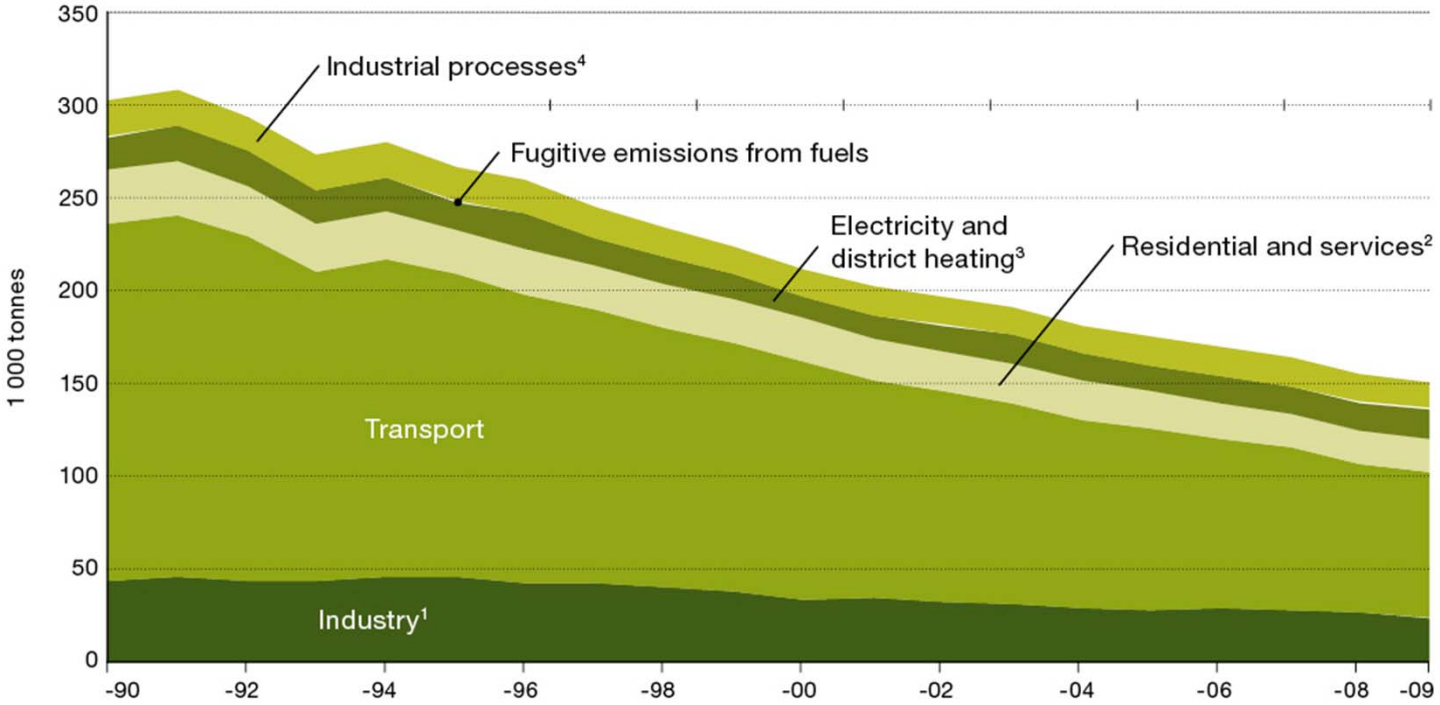


Figure 59 Emissions of nitrogen oxides (calculated as NO2) in Sweden, 1990–2009, in 1 000 tonnes



Source: Sweden's submission in accordance with the UN Convention on Long-range Transboundary Air Pollution (CLRTAP), the Swedish Environmental Protection Agency, additional processing by the Swedish Energy Agency.

Note: Revised figures for all years compared with previous editions.
1. Including industrial back-pressure production and hazardous waste incineration.
2. Including agriculture, forestry and fisheries.
3. Including coking plants and oil refineries.
4. Including use of solvents and other products.

Table 1 Main groups of policy instruments with some examples

Administrative	Economic	Information	Research
Regulations	Taxes	Information	Research
Limit values (emissions)	Subsidies, grants	Advisory services	Development
Long-term agreements	Emissions trading scheme	Training	Commercialization
Environmental classification	Certificate trading		Procurement
Requirements for types of fuel and energy efficiency	Sureties		Demonstration

Table 2 Energy tax revenues, 2010, million SEK

Energy source or carrier	Energy tax	Carbon dioxide tax	Sulphur tax	Total
Petrol	13 479	10 671	-	24 150
Oil products[1]	6 524	15 304	-	21 828
Crude tall oil[2]	0	-	-	0
Other fuels	88	1 360	-	1 448
All fuels[3]	-	-	48	48
Electricity	21 061	-	-	21 061
Waste[4]	-	-	-	289
Production tax, nuclear power[4]	-	-	-	3 997
Total	**41 152**	**27 334**	**48**	**72 821**
Proportion of national tax revenue				*9.3%*
Proportion of GDP				*2.2%*

Source: Swedish National Financial Management Authority, Statistics Sweden.

Note:
1. Diesel is included in oil products. The same tax rates apply for both heating oil and diesel oil, and so these are reported together.
2. Projected tax revenue foregone is reported as 0. Dashes mean that there is no taxation for the category in question.
3. The sulphur tax is calculated for all fuels.
4. For these types of energy, the tax is not broken down into energy-, carbon dioxide- and sulphur tax, but are calculated as a total tax.

Table 3 General energy and carbon dioxide taxes from 1 January 2011, excluding VAT

	Energy tax	Carbon dioxide tax	Sulphur tax	Total tax	Tax öre/kWh
Fuels					
Heating oil, SEK/m^3 (<0.05% sulphur)	797	3 017	–	3 814	38.3
Heavy fuel oil, SEK/m^3 (<0.4% sulphur)	797	3 017	108	3 922	37.0
Coal, SEK/tonne (0.5% sulphur)	605	2 625	150	3 380	44.7
LPG, SEK/tonne	1 024	3 174	–	4 198	32.8
Natural gas, SEK/1000m^3	880	2 259	–	3 139	28.5
Crude tall oil, SEK/m^3	3 814	–	–	3 814	38.9
Peat, SEK/tonne, 45% moisture content (0.3% sulphur)	–	–	50	50	1.8
Motor fuels					
Petrol, unleaded, environmental class 1, SEK/l	3.06	2.44	–	5.50	60.8
Diesel, environmental class 1, SEK/l	1.52	3.02	–	4.54	45.6
Natural gas/methane, SEK/m^3	–	1.58	–	1.58	14.4
Electricity use					
Electricity, northern Sweden, öre/kWh	18.7	–	–	18.7	18.7
Electricity, rest of Sweden, öre/kWh	28.3	–	–	28.3	28.3
Industry					
Electricity use, industrial processes, öre/kWh	0.5	–	–	0.5	0.5

Source: Swedish Tax Agency, additional processing by the Swedish Energy Agency.

Table 4 Energy and environmental taxes on industry, agriculture, forestry, aquaculture and heat production in CHP plants not in the European Emissions Trading Scheme, from 1 January 2011

	Energy tax	Carbon dioxide tax	Sulphur tax	Total tax	Tax öre/kWh
Heating oil, SEK/m^3	239	905	–	1 144	11.5
Heavy fuel oil, SEK/m^3	239	905	108	1 252	11.8
Coal, SEK/tonne	182	788	150	1 119	14.8
LPG, SEK/tonne	307	952	–	1 259	9.9
Natural gas, SEK/1000m^3	264	678	–	942	8.6
Crude tall oil, SEK/m^3	1 144	–	–	1 144	11.7
Peat, SEK/tonne, 45% moisture content (0.3% sulphur)	–	–	50	50	1.8

Source: Swedish Tax Agency, additional processing by the Swedish Energy Agency.

Table 5 Number of plants, production and installed capacity, by type of production, 2003–2010

	2003 May-Dec	2004	2005	2006	2007	2008	2009	2010
Number of plants[1]	1 597	1 759	1 848	1 909	2 075	2 219	2 419	2 711
Hydro	966	1 040	1 060	1 075	1 094	1 120	1 144	1 164
Wind	543	613	668	706	846	948	1 108	1 371[3]
Biofuels, peat	87	105	118	125	131	142	156	163
Solar	1	1	2	3	4	9	11	13
Installed capacity, [MW][2]	4 049	4 161	4 471	4 765	5 066	5 123	5 935	6 674
Hydro	491	504	517	540	558	598	602	620
Wind	401	472	530	583	831	1 074	1 440	1 998
Biofuels, peat	3 157	3 185	3 424	3 643	3 676	3 451	3 892	4 056
Solar	0.008	0.008	0.011	0.036	0.043	0.309	0.369	0.575
Electricity production – renewable and peat [GWh]	5 638	11 048	11 298	12 157	13 256	15 037	15 570	18 053
Hydro	964	1 968	1 799	2 019	2 195	2 607	2 442	2 611
Wind	456	865	939	988	1 432	1 996	2 490	3 486
Biofuels	4 218	7 671	7 926	8 594	9 049	9 599	9 766	11 163
Peat	-	545	634	556	580	834	871	792
Solar	0.004	0.006	0.005	0.020	0.019	0.129	0.212	0.275

Source: Swedish National Grid and the Swedish Energy Agency.
Note: 1. Number of plants allocated one or more electricity certificates for the year in question.
2. For plants allocated one or more certificates.
3. 1,371 wind farms consisting of 1,606 wind power turbines.

Table 6 Total cost of electricity for different customer categories including electricity certificates, network charges, taxes and VAT, in öre/kWh. The table relates to contracts with a variable rate and a current rate.

	Small-scale industry[1]		Det. house with electric heating[2]		Det. house without electric heating[3]		Apartment	
	Variable	Current	Variable	Current	Variable	Current	Variable	Current
1 January 2002, total price[4]	40.5	43.8	84.1	87.9	108.5	111.3	122.3	122.8
1 January 2003, total price[4]	78.6	59.9	139.4	111.4	164.0	135.4	178.3	148.4
1 January 2004, total price[4]	47.1	62.6	99.0	118.1	125.8	144.3	140.8	157.3
1 January 2005, total price[4]	41.0	55.2	92.0	109.9	118.9	135.9	134.8	150.5
1 January 2006, total price[4]	57.1	61.3	113.1	117.4	139.9	144.3	155.9	159.3
1 January 2007, total price	48.1	82.1	102.1	144.4	129.3	171.3	145.9	187.5
1 January 2008, total price	67.8	78.8	127.1	140.6	155.3	168.6	172.0	185.0
1 January 2009, total price	71.4	97.8	133.3	165.3	164.0	195.9	181.3	213.0
1 January 2010, total price	96.0	86.2	164.4	151.1	196.4	183.0	214.6	201.0
1 January 2011, total price	91.4	106.8	159.4	180.6	193.4	214.9	211.9	234.1

Source: Swedish Energy Agency and Statistics Sweden, additional processing by the Swedish Energy Agency.

Note: 1. Annual use 350 MWh, capacity 100 kW or 160 A.
2. Annual use 20,000 kWh, 20 A main supply fuse (3-phase).
3. Annual use 5 000 kWh, 16 A main supply fuse (3-phase).
4. Excluding price of electricity certificates.

Table 7 Prefixes used with energy units in Energy in Sweden

Prefix		Factor	
k	Kilo	10^3	thousand
M	Mega	10^6	million
G	Giga	10^9	billion
T	Tera	10^{12}	trillion
P	Peta	10^{15}	quadrillion

Table 8 Conversion factors for energy units used in Energy in Sweden

	GJ	MWh	toe	Mcal
GJ	1	0,28	0,02	239
MWh	3.6	1	0.086	860
toe	41.9	11.63	1	10 000
Mcal	0.0419	0.00116	0.0001	1

Table 9 Calorific values in MWh and GJ per physical quantity

Fuel	Physical quantity	MWh	GJ
Wood chips	1 tonne	2.00-4.00	7.20-14.4
Peat	1 tonne	2.50-3.00	9.00-11.0
Pellets, briquettes	1 tonne	4.50-5.00	16.0-18.0
Coal	1 tonne	7.56	27.2
Coke	1 tonne	7.79	28.1
Nuclear fuel	1 toe	11.6	41.9
Crude oil	1 m^3	10.1	36.3
Topped crude oil	1 m^3	11.1	40.1
Petroleum coke	1 tonne	9.67	34.8
Asphalt, road dressing oil	1 tonne	11.6	41.9
Lubricating oils	1 tonne	11.5	41.4
Road fuel petrol	1 m^3	9.10	32.7
Aviation gasoline	1 m^3	9.08	32.7
Light virgin naphtha	1 tonne	8.74	31.5
White spirit	1 m^3	9.34	33.6
Aviation kerosene and intermediate distillates	1 tonne	9.58	34.5
Other kerosene	1 m^3	9.54	34.3
Diesel and domestic heating oil	1 m^3	9.80	35.3
Heavy fuel oils	1 m^3	10.6	38.1
Liquefied petroleum gas	1 tonne	12.8	46.0
Gasworks gas and coke oven gas	1 000 m^3	4.64	16.7
Natural gas[1]	1 000 m^3	11.0	39.6
Blast furnace gas	1 000 m^3	0.93	3.35
Ethanol	1 m^3	5.90	21.2
Biogas	1 000 m^3	9.70	34.9
FAME	1 m^3	9.17	33.0

Note: Conversion factors are given with three significant digits. In the calculations more significant digits is used.

1. Natural gas is in effective calorific value or net calorific value.