

Energy Statistics 1990 – 2015

2016 Report



Report prepared by

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Energy Policy Statistical Support Unit

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Sustainable Energy Authority of Ireland

The Sustainable Energy Authority of Ireland has a mission to play a leading role in transforming Ireland into a society based on sustainable energy structures, technologies and practices. To fulfil this mission SEAI aims to provide well-timed and informed advice to Government, and deliver a range of programmes efficiently and effectively, while engaging and motivating a wide range of stakeholders and showing continuing flexibility and innovation in all activities. SEAI's actions will help advance Ireland to the vanguard of the global green technology movement, so that Ireland is recognised as a pioneer in the move to decarbonised energy systems.

Energy Policy Statistical Support Unit (EPSSU)

SEAI has a lead role in developing and maintaining comprehensive national and sectoral statistics for energy production, transformation and end use. This data is a vital input in meeting international reporting obligations, for advising policy makers and informing investment decisions. Based in Cork, EPSSU is SEAI's specialist statistics team. Its core functions are to:

- Collect, process and publish energy statistics to support policy analysis and development in line with national needs and international obligations;
- Conduct statistical and economic analyses of energy services sectors and sustainable energy options;
- Contribute to the development and promulgation of appropriate sustainability indicators.

Highlights

Highlights – the year 2015

- Energy use grew for the first time to any great extent since 2010. In 2015, overall energy use increased by 4.9%, with the economy growing strongly.
- Energy-related CO₂ emissions increased by 5.8% in 2015. When compared with 2005, energy-related CO₂ emissions have fallen by 19%.
- Energy-related emissions account for approximately 60% of Ireland's total greenhouse gas (GHG) emissions.
- Consumption of all fuels increased in 2015 with the exception of peat, biomass and non-renewable wastes.
- Ireland's energy import dependency increased to 88% in 2015 (from 85% in 2014). The cost of all energy imports to Ireland was approximately €4.6 billion, down from €5.7 billion in 2014 due mainly to falling oil and gas import prices.

Electricity

- Final consumption of electricity increased by 2.9% to 29 TWh with a 3.1% increase in the fuel inputs.
- Renewable electricity generation, consisting of wind, hydro, landfill gas, biomass and biogas, increased to 27.3% of gross electricity consumption in 2015.
- In 2015, wind generation accounted for 22.8% of the electricity generated and was the second largest source of electricity generation after natural gas.
- The use of renewables in electricity generation in 2015 reduced CO₂ emissions by 3.2 Mt and avoided €286 million in fossil fuel imports.
- The carbon intensity of electricity fell by 49% after 1990, to a low of 456 g CO₂/kWh in 2014. However, in 2015 it increased by 2.5%, to 468 g CO₂/kWh, primarily as a result of the 19.6% increase in coal used for generation.

Progress towards Targets

- The contribution of renewables to gross final consumption (GFC) was 9.1% in 2015, compared to a 2020 target of 16%. This avoided 3.9 million tonnes of CO₂ emissions and €426 million of fossil fuel imports.

- In 2015, with five years to go, Ireland was just over halfway towards each of the separate targets for contributions of renewable energy in electricity, transport and heat.
- The average emissions of new cars purchased in 2015 was 114.9 g CO₂/km, which is below the 2015 EU target for car manufacturers of 130 g CO₂/km.
- Energy-related CO₂ emissions in those sectors outside the EU Emissions Trading Scheme (ETS), which covers transport, heating in households, buildings and small industry, were 17% below 2005 levels in 2015 but increased by 5.3% in 2015. The target for non-ETS CO₂ emissions is to be 20% below 2005 levels by 2020.

Sectoral Highlights

- Transport continues to dominate as the largest energy consuming sector, with a share of 42% in 2015.
- Transport energy use increased by 5.9% in 2015, with air travel showing the strongest growth in energy use of the transport modes, with a 25% increase on 2014.
- More than three quarters (78%) of all new private cars purchased to date in 2016 were in the A label emissions band.
- In 2015 industry energy use increased by 4.8%, and was 10% lower than the peak in 2006. Between 1990 and 2015, industrial energy consumption increased by 39% while value added increased by 506%.
- Residential energy use increased by 5.2% in 2015 relative to 2014. When corrected for weather effects – 2015 was a colder year than 2014 – the increase in energy use was 3.2%.
- In 2015 the average household emitted 5.5 tonnes of CO₂ of which 61% came from direct fuel use in the home and the remainder from electricity use.
- Final energy use in the commercial and public services sector increased by 0.7% in 2015 – on a weather corrected basis it decreased by 1.1%.

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1 Introduction

This annual publication from the Sustainable Energy Authority of Ireland (SEAI) presents national energy statistics on energy production and consumption in Ireland over the period 1990 – 2015. Specifically, the report presents energy trends and underlying drivers as well as discussing sectoral energy consumption and how energy trends relate to Government and EU renewable energy targets.

Timely and reliable energy statistics underpin evidence-based decision making. To this end, this publication presents a comprehensive overview of energy supply and demand in Ireland in order to inform Government policy and the wider energy debate.

The information in the report is based on an energy balance for the country which shows the flow of energy from production, transformation and energy sector own use through to final consumption in different sectors of the economy. The energy balance is the starting point for the construction of various indicators of energy consumption (for example consumption per unit of GDP), of energy efficiency and also of other areas of national interest such as energy-related greenhouse gas (GHG) emissions.

The data in the energy balance is based on monthly and annual surveys received from approximately 300 organisations including energy producers, import/export companies and energy supply companies. In addition, SEAI uses this data to fulfil Ireland's energy statistics reporting obligations to Eurostat, under the EU Energy Statistics Regulation (1099/2008 EC), and to the International Energy Agency (IEA) through the completion of upwards of 100 hundred annual, quarterly, monthly and ad hoc questionnaires each year.

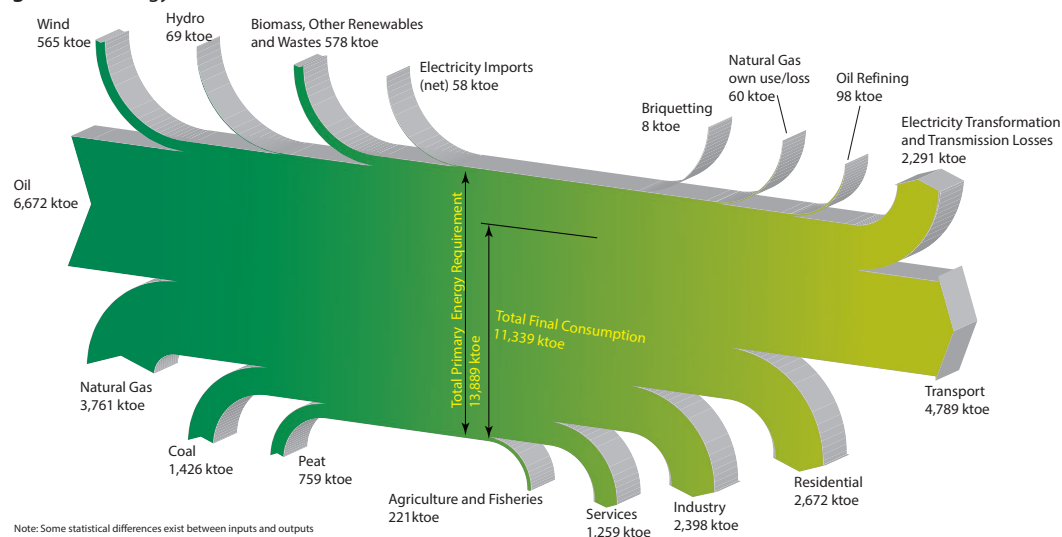
The energy balance develops continuously as new methods and methodologies become available. This ensures that the best information is available. The main changes related to the period 1990 – 2015 are presented in this report and are described later.

A companion publication, *Energy Statistics – 2016 Report*, is also available, presenting the background data for the analysis contained herein. Additionally, *Energy in Ireland Key Statistics* is available, which summarises Ireland's energy statistics in a concise pocket-sized booklet. It is intended that these publications serve as resources for policymakers, analysts and researchers with an interest in energy use in Ireland.

An energy data portal containing the background data that this report is based upon, together with energy forecast data, and an electronic version of this report, are available on SEAI's website at <http://www.seai.ie/Energy-Data-Portal/>.

Feedback and comment on this report are welcome and should be sent by post to the address on the back cover or by email to epssu@seai.ie.

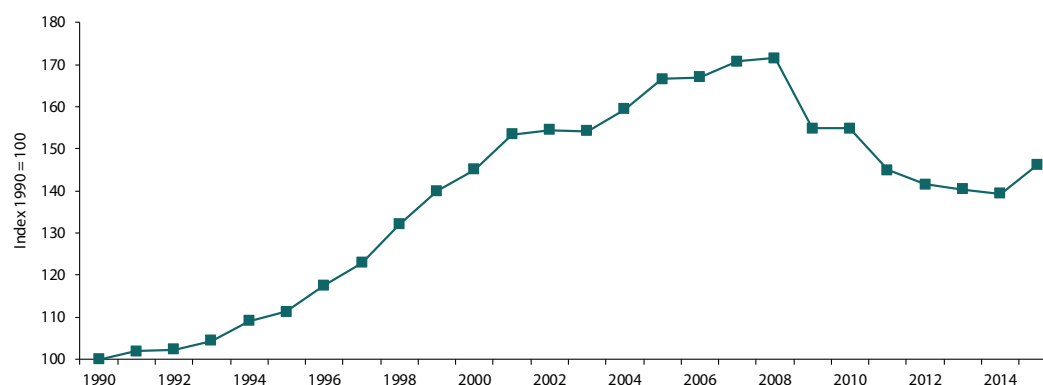
Figure 1 *Energy Flow 2015*



2 Energy Balance 2015

kilo tonnes of oil equivalent (ktoe)	COAL	PEAT	OIL	NATURAL GAS	RENEWABLES	NON-RENEWABLE	ELECTRICITY	TOTAL
Indigenous Production	-	762	-	107	1,026	62	-	1,957
Imports	1,481	-	9,120	3,629	124	-	151	14,505
Exports	11	7	1,777	-	0	-	93	1,889
Mar. Bunkers	-	-	160	-	-	-	-	160
Stock Change	-43	5	-303	24	1	-	-	-317
Primary Energy Supply (incl non-energy)	1,426	759	6,880	3,761	1,150	62	58	14,096
Primary Energy Requirement (excl. non-energy)	1,426	759	6,672	3,761	1,150	62	58	13,889
Transformation Input	1,127	639	3,502	1,943	115	25	56	7,406
Public Thermal Power Plants	1,127	547	77	1,620	107	25	-	3,503
Combined Heat and Power Plants	-	7	10	279	8	-	-	304
Pumped Storage Consumption	-	-	-	-	-	-	46	46
Briquetting Plants	-	85	-	-	-	-	-	85
Oil Refineries & other energy sector	-	-	3,415	43	-	-	11	3,469
Transformation Output	-	65	3,481	-	41	6	1,806	5,400
Public Thermal Power Plants	-	-	-	-	37	6	1,596	1,596
Combined Heat and Power Plants - Electricity	-	-	-	-	4	-	185	185
Combined Heat and Power Plants - Heat	-	-	-	-	-	-	-	-
Pumped Storage Generation	-	-	-	-	-	-	25	25
Briquetting Plants	-	65	-	-	-	-	-	65
Oil Refineries	-	-	3,481	-	-	-	-	3,481
Exchanges and transfers	15	-	-18	-	-635	-	635	-3
Electricity	-	-	-	-	-635	-	635	-
Heat	-	-	-	-	-	-	-	-
Other	15	-	-18	-	-	-	-	-3
Own Use and Distribution Losses	-	9	98	60	-	-	245	412
Available Final Energy Consumption	314	177	6,744	1,758	401	37	2,197	11,629
Non-Energy Consumption	-	-	208	-	-	-	-	208
Final non-Energy Consumption	-	-	208	-	-	-	-	208
Total Final Energy Consumption	312	201	6,493	1,722	415	37	2,156	11,337
Industry	106	1	464	767	174	37	847	2,397
Non-Energy Mining	-	-	30	12	-	-	61	102
Food, beverages and tobacco	22	1	127	105	30	-	180	465
Textiles and textile products	-	-	2	1	-	-	11	14
Wood and wood products	0	-	2	2	115	-	36	156
Pulp, paper, publishing and printing	0	-	3	3	-	-	20	26
Chemicals & man-made fibres	-	-	27	65	-	-	154	245
Rubber and plastic products	-	-	9	4	-	-	37	50
Other non-metallic mineral products	84	-	171	17	29	37	54	391
Basic metals & fabricated metal products	-	-	11	422	-	-	67	500
Machinery and equipment n.e.c.	-	-	5	5	-	-	22	32
Electrical and optical equipment	0	-	38	123	-	-	105	266
Transport equipment manufacture	-	-	4	2	-	-	18	24
Other manufacturing	0	-	36	6	-	-	82	125
Transport	-	-	4,657	0	128	-	4	4,789
Road Freight	-	-	603	-	23	-	-	625
Light Goods Vehicle (LGV)	-	-	289	0	11	-	-	300
Road Private Car	-	-	2,012	-	66	-	-	2,078
Public Passenger Services	-	-	132	-	5	-	-	137
Rail	-	-	36	-	-	-	4	39
Domestic Aviation	-	-	3	-	-	-	-	3
International Aviation	-	-	844	-	-	-	-	844
Fuel Tourism	-	-	456	-	17	-	-	473
Navigation	-	-	71	-	-	-	-	71
Unspecified	-	-	210	-	7	-	-	217
Residential	206	201	956	555	76	-	678	2,672
Commercial/Public Services	-	-	243	399	36	-	580	1,259
Commercial Services	-	-	156	175	31	-	416	777
Public Services	-	-	87	224	5	-	164	481
Agricultural	-	-	152	-	-	-	48	200
Fisheries	-	-	21	-	-	-	-	21
Statistical Difference	2	-24	43	36	-14	-	41	84

Figure 2 Primary Energy Growth 1990 – 2015 (Index)

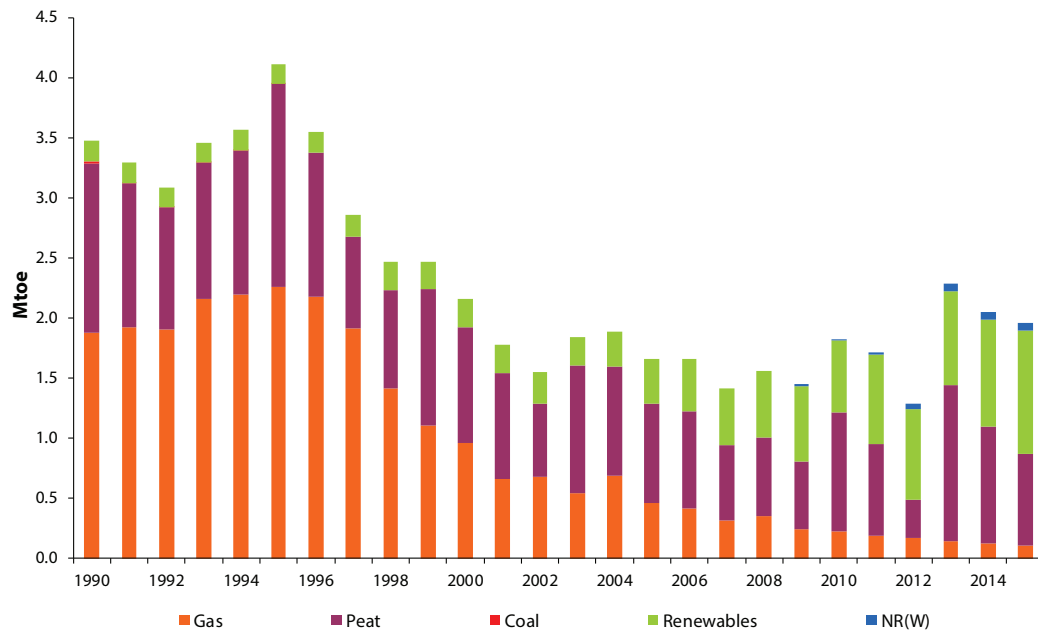


3 Energy Production

3.1 Primary Energy Production

Primary Production kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Indigenous Production	3,471	2,161	1,655	1,825	1,711	1,288	2,283	2,047	1,957
Coal	16	0	0	0	0	0	0	0	0
Peat	1,411	965	820	981	760	315	1,292	971	762
Natural Gas	1,877	960	462	228	188	171	144	123	107
Renewables	168	235	373	607	749	757	789	890	1,026
Hydro	60	73	54	52	61	69	52	61	69
Wind	0	21	96	242	377	345	391	442	565
Biomass	105	113	180	197	193	223	232	262	254
Landfill Gas	0	24	25	44	44	43	38	39	41
Biogas	2	4	9	14	14	13	11	13	14
Liquid Biofuel	0	0	1	26	24	24	22	22	24
Solar	0	0	0	8	9	10	11	12	13
Geothermal	0	0	7	26	28	30	33	38	45
Non-Renewable (Wastes)	0	0	0	9	14	44	58	63	62

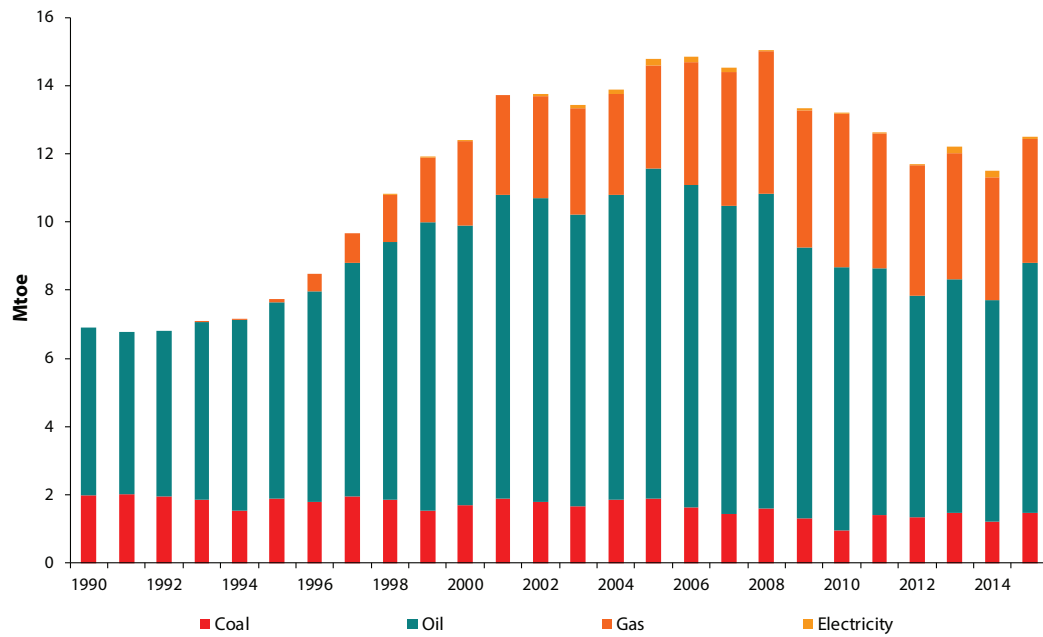
Figure 3 Indigenous Production by Fuel 1990 – 2015



3.2 Net Energy Imports

Net Energy Imports kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Net Imports	6,899	12,371	14,759	13,267	12,702	11,776	12,316	11,615	12,616
Coal	1,992	1,691	1,897	956	1,409	1,330	1,473	1,205	1,469
Bituminous Coal	1,974	1,641	1,839	921	1,366	1,286	1,395	1,147	1,419
Anthracite + Manufactured Ovoids	0	32	33	25	33	33	57	46	38
Lignite	18	18	25	10	10	12	21	13	12
Peat Briquettes	-4	-8	-10	-10	-9	-9	-9	-2	-7
Oil	4,912	8,198	9,680	7,712	7,214	6,494	6,827	6,504	7,343
Crude	2,035	3,010	3,342	3,019	3,038	3,005	2,997	2,759	3,725
Refinery Gas	0	0	0	0	0	0	0	0	0
Gasoline	586	1,059	1,085	1,061	950	646	659	615	436
Kerosene	96	357	390	508	628	527	489	379	427
Jet Kerosene	370	724	1,177	1,068	916	763	886	947	1,131
Fuel Oil	504	426	116	-592	-804	-766	-719	-786	-1,029
LPG	118	121	111	92	75	67	71	76	104
Gasoil / Diesel/ DERV	1,212	2,111	2,686	2,151	2,051	1,866	2,072	2,171	2,219
Petroleum Coke	65	220	318	99	84	125	112	159	148
Naphta	-75	-111	-7	-23	-21	-9	-28	-17	-26
Bitumen	0	167	362	299	264	238	256	167	173
White Spirit	0	2	2	1	1	1	1	2	1
Lubricants	0	114	97	27	31	30	31	32	33
Natural Gas	0	2,483	3,016	4,487	3,963	3,846	3,717	3,590	3,629
Electricity	0	8	176	40	42	36	193	185	58
Renewables	0	0	0	82	83	80	114	133	124
Biomass	0	0	0	11	12	15	36	42	27

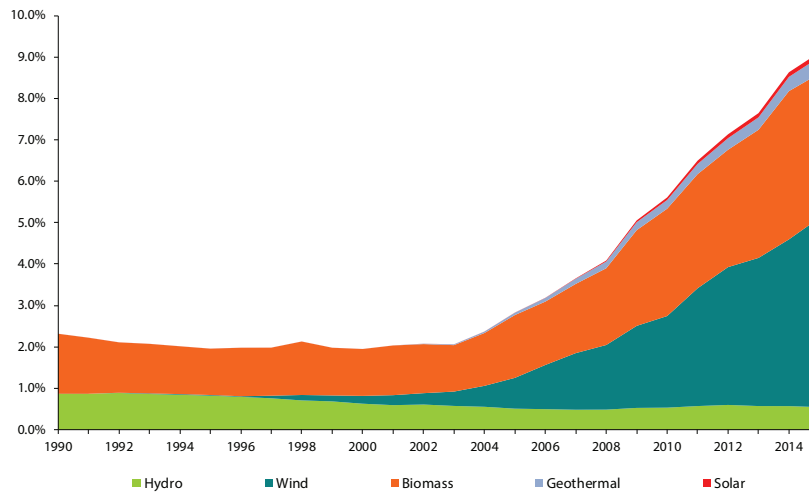
Figure 4 Net Imported Energy by Fuel 1990 – 2015



3.3 Renewable Production

Renewable Production kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Total Renewable Production	168	235	373	607	749	757	789	890	1,026
Hydro	60	73	54	52	61	69	52	61	69
Wind	0	21	96	242	377	345	391	442	565
Biomass	105	113	180	197	193	223	232	262	254
Landfill Gas	0	24	25	44	44	43	38	39	41
Biogas	2	4	9	14	14	13	11	13	14
Liquid Biofuel	0	0	1	26	24	24	22	22	24
Solar	0	0	0	8	9	10	11	12	13
Geothermal	0	0	7	26	28	30	33	38	45

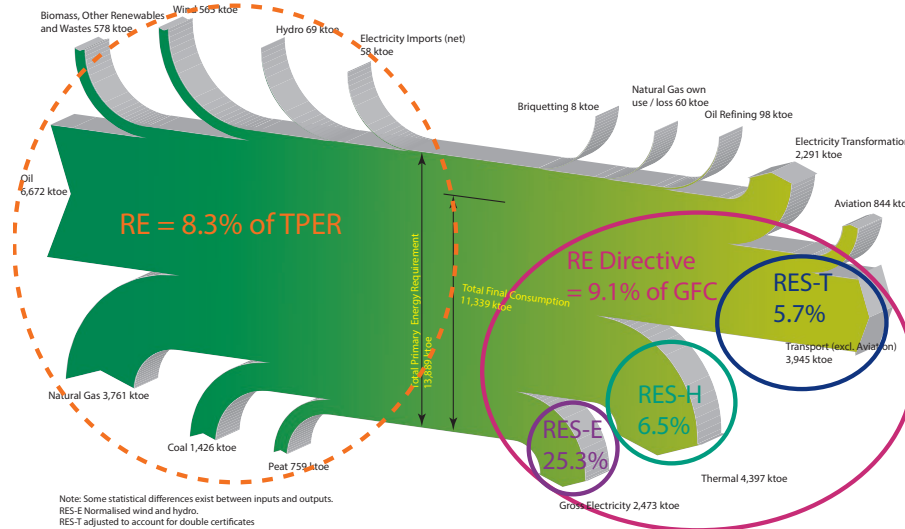
Figure 5 Renewable Energy Contribution to Final Consumption (Directive 2009/28/EC)



3.4 Renewable Energy Progress to Targets

% of each target	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2010	2020
RES-E (normalised)	5.3	4.6	4.8	7.2	14.6	17.4	19.7	21.0	22.9	25.3	15	40
RES-T	0.0	0.0	0.0	0.0	2.4	3.7	3.9	4.8	5.1	5.7	3	10
RES-H	2.6	2.1	2.4	3.5	4.5	4.9	5.1	5.5	6.6	6.5	5	12
Directive (2009/29/EC)	2.3	2.0	2.0	2.8	5.6	6.5	7.1	7.6	8.6	9.1		16

Figure 6 Progress to Targets 2015

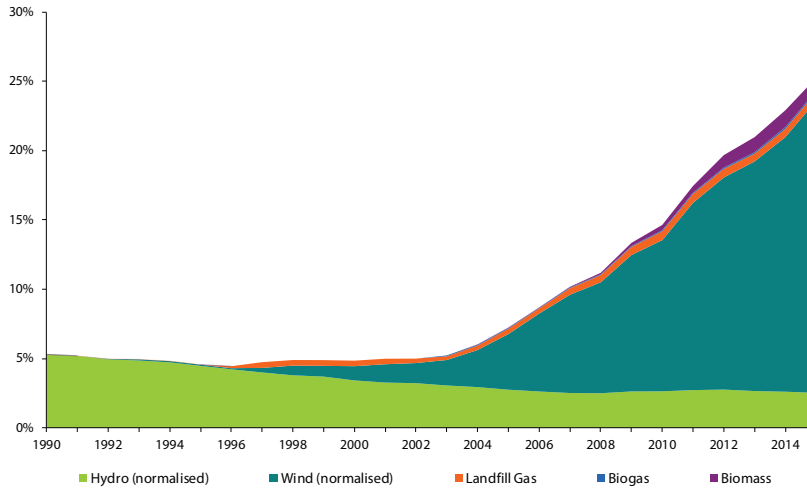


Note: Some statistical differences exist between inputs and outputs.
RES-E Normalised wind and hydro.
RES-T adjusted to account for double certificates

3.5 Renewable Electricity as percentage of Gross Electricity Consumption

	1990	2000	2005	2010	2011	2012	2013	2014	2015
Renewables % of Gross Electricity	5.3%	4.8%	7.2%	14.6%	17.4%	19.7%	21.0%	22.9%	25.3%
Hydro (normalised)	5.3%	3.4%	2.7%	2.6%	2.7%	2.8%	2.7%	2.6%	2.5%
Wind (normalised)	0.0%	1.0%	4.0%	10.9%	13.5%	15.3%	16.6%	18.4%	21.1%
Biomass	0.0%	0.0%	0.0%	0.4%	0.5%	0.9%	1.1%	1.2%	1.0%
Landfill Gas	0.0%	0.4%	0.4%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Biogas	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Solar	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

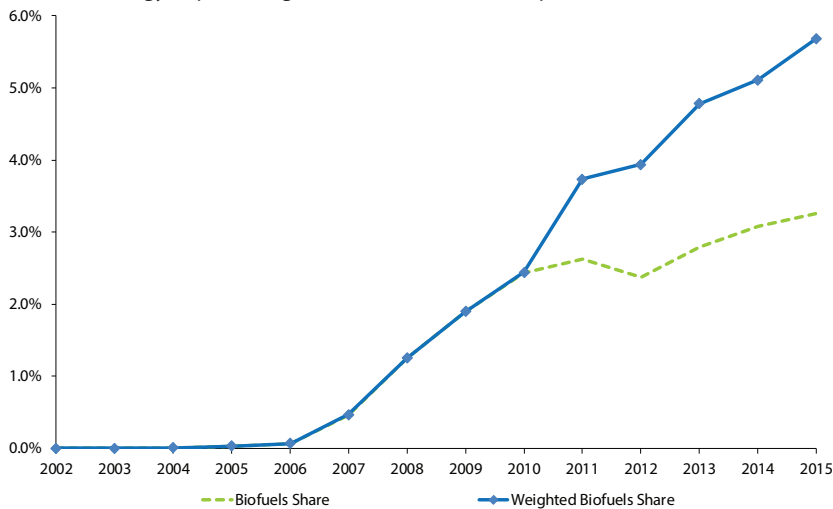
Figure 7 Renewable Energy Contribution to Gross Electricity Consumption (normalised) 1990 – 2015



3.6 Renewable Energy as percentage of (Petrol & Diesel) Transport

	2005	2010	2011	2012	2013	2014	2015
Liquid Biofuels (ktoe)	1.1	93	98	85	102	116	128
Weighted Biofuels (ktoe)	1.1	93	138	140	176	193	226
Renewable Electricity (ktoe)	0.3	0.4	0.5	0.6	0.6	0.7	0.7
Liquid Biofuels (%)	0.0%	2.4%	2.6%	2.4%	2.8%	3.1%	3.3%
Weighted Biofuel (%)	0.0%	2.4%	3.7%	3.9%	4.8%	5.1%	5.7%
Renewable Electricity (%)	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%

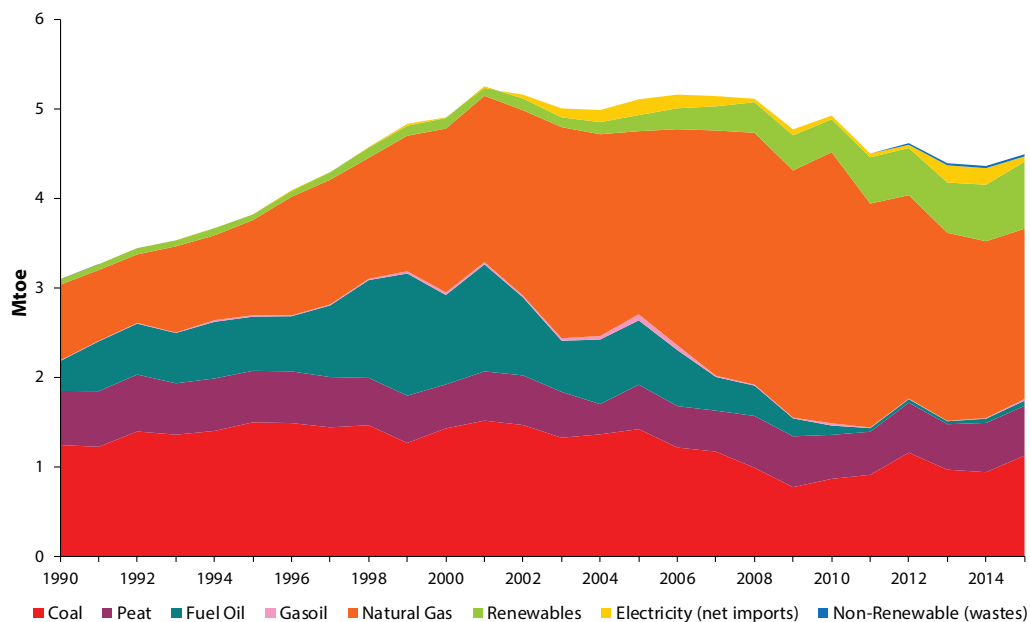
Figure 8 Renewable Energy as percentage of (Petrol & Diesel) Transport



3.7 Fuels used in Electricity Production

Electricity Inputs kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Coal	1,245	1,430	1,422	868	913	1,160	970	942	1,127
Bituminous Coal	1,245	1,430	1,422	868	913	1,160	970	942	1,127
Peat	604	491	496	491	480	557	507	550	554
Milled Peat	572	491	496	491	480	557	507	550	554
Sod Peat	32	0	0	0	0	0	0	0	0
Oil	343	1,039	794	137	55	56	43	60	87
Refinery Gas	1	12	8	7	6	9	5	5	10
Fuel Oil	334	998	718	104	40	39	33	47	58
Gasoil	7	29	68	26	8	7	4	8	19
Natural Gas	843	1,828	2,044	3,025	2,498	2,269	2,098	1,973	1,899
Renewables	60	117	180	368	516	527	561	631	749
Hydro	60	73	54	52	61	69	52	61	69
Wind	0	21	96	242	377	345	391	442	565
Biomass	0	0	2	24	30	66	77	84	69
Landfill Gas	0	24	25	44	44	43	38	39	41
Biogas	0	0	2	6	4	4	4	5	5
Electricity (net imports)	0	8	176	0	0	18	23	25	25
Total	3,094	4,914	5,112	4,929	4,505	4,623	4,396	4,365	4,500

Figure 9 Primary Fuel Mix for Electricity Generation 1990 – 2015

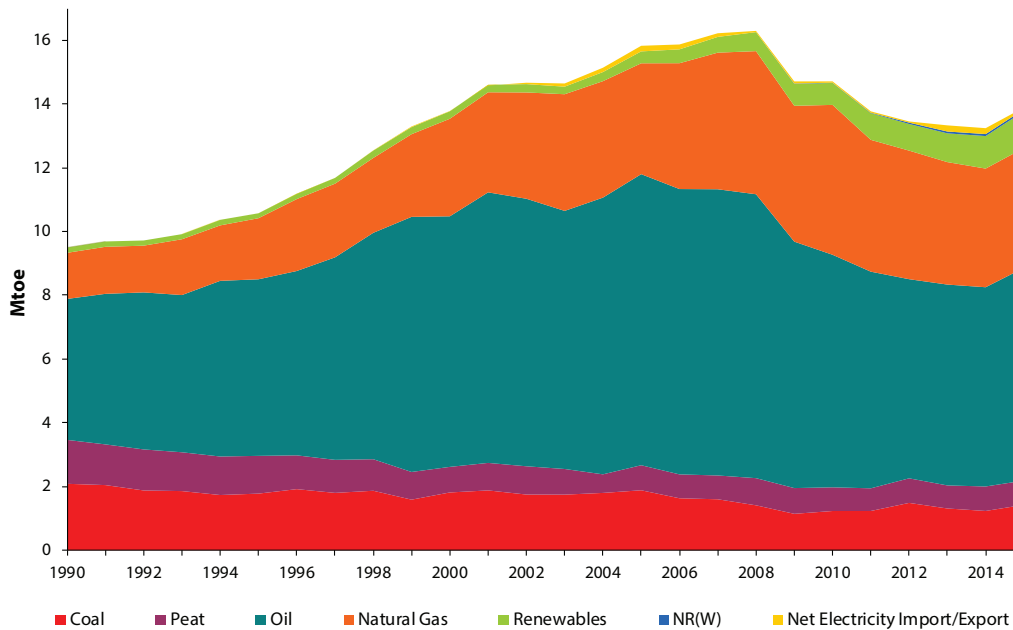


4 Consumption

4.1 Primary Energy Consumption

Primary Energy Consumption									
kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Primary Energy Supply (incl. non-energy)	9,928	14,444	16,284	15,035	14,063	13,719	13,615	13,440	14,096
Primary Energy Requirement (excl. non-energy)	9,497	13,778	15,823	14,707	13,767	13,450	13,327	13,239	13,889
Coal	2,085	1,813	1,882	1,231	1,232	1,485	1,310	1,233	1,426
Peat	1,377	803	786	743	711	771	723	768	759
Oil	4,422	7,859	9,130	7,294	6,795	6,246	6,300	6,249	6,672
Natural Gas	1,446	3,059	3,477	4,701	4,135	4,033	3,841	3,722	3,761
Renewables	168	235	373	688	837	835	902	1,020	1,150
Non-Renewable (Wastes)	0	0	0	9	14	44	58	63	62
Electricity Imports	0	8	176	40	42	36	193	185	58
Transformation Input	5,106	8,339	8,326	7,756	7,212	7,500	6,895	6,698	7,381
Coal	1,245	1,430	1,422	868	913	1,160	970	942	1,127
Peat	788	618	593	617	582	657	639	668	639
Oil	2,187	4,391	4,177	3,108	3,070	3,193	2,946	2,874	3,502
Natural Gas	843	1,828	2,044	3,045	2,549	2,328	2,154	2,027	1,943
Renewables	0	24	30	74	79	113	119	128	115
Electricity Pumped Storage	44	48	60	43	19	49	68	58	56
Exchanges & Transfers	0	-1	1	6	0	-1	-2	-2	-3
Own Use & Transmission Loss	288	410	503	437	368	364	388	389	412
Non Energy Use	430	666	461	328	296	269	288	201	208
Total Final Consumption (Observed)	7,249	10,814	12,607	11,894	11,103	10,689	10,878	10,828	11,337
Coal	843	398	484	367	328	339	355	326	312
Peat	757	303	274	254	242	215	218	201	201
Oil	3,952	7,047	8,196	7,162	6,552	6,093	6,209	6,170	6,493
Natural Gas	570	1,203	1,367	1,596	1,509	1,627	1,634	1,622	1,722
Renewables	108	118	191	321	319	311	345	396	415
Non-Renewable (Wastes)	0	0	0	9	14	25	35	38	37
Electricity	1,021	1,745	2,094	2,186	2,139	2,078	2,081	2,076	2,156

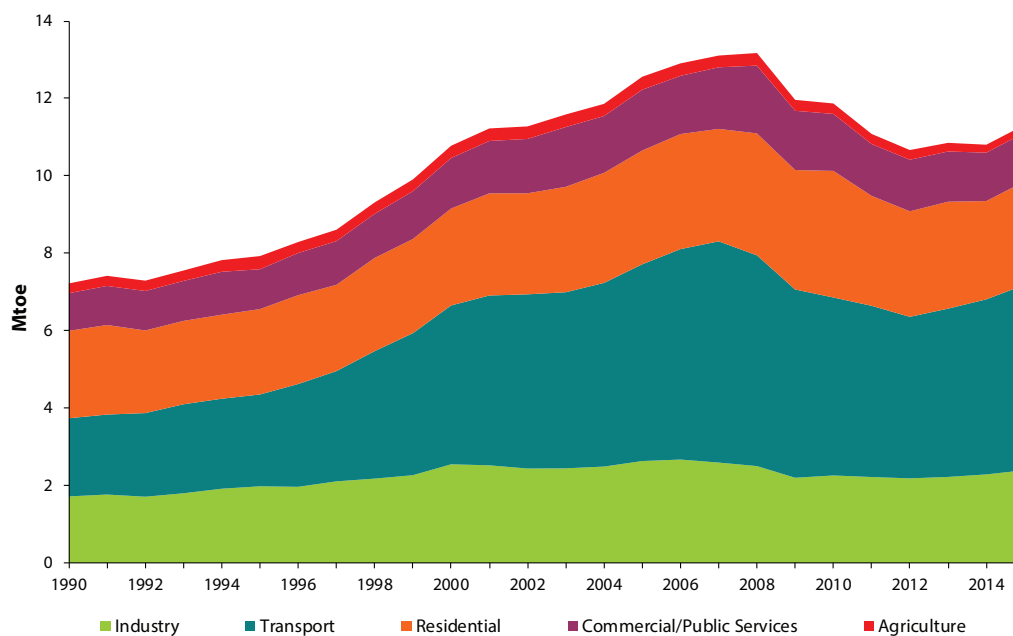
Figure 10 Primary Energy Consumption by Fuel 1990 – 2015



4.2 Total Final Consumption

Total Final Consumption kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Total Final Energy Consumption	7,249	10,814	12,607	11,894	11,103	10,689	10,878	10,828	11,337
Industry	1,720	2,549	2,633	2,261	2,220	2,186	2,223	2,288	2,397
Non-Energy Mining	37	178	170	109	109	104	101	99	102
Food, beverages and tobacco	426	640	587	492	448	412	435	441	465
Textiles and textile products	51	68	31	15	14	13	14	14	14
Wood and wood products	74	134	146	139	133	134	139	147	156
Pulp, paper, publishing and printing	18	67	42	26	26	24	25	24	26
Chemicals & man-made fibres	184	286	279	235	235	224	230	229	245
Rubber and plastic products	34	52	52	48	49	47	49	48	50
Other non-metallic mineral prods	301	263	568	319	304	335	327	378	391
Basic metals & fab. metal prods	316	504	406	464	478	486	481	492	500
Machinery and equipment n.e.c.	25	88	38	31	31	30	31	30	32
Electrical and optical equipment	63	206	261	230	248	238	247	245	266
Transport equipment manufacture	14	25	20	23	23	22	23	23	24
Other manufacturing	178	39	34	132	123	116	122	118	125
Transport	2,019	4,103	5,082	4,597	4,422	4,172	4,348	4,522	4,789
Road Freight	334	813	1,218	688	632	629	581	621	625
Light Goods Vehicle (LGV)				363	352	321	330	316	300
Road Private Car	926	1,562	1,887	2,008	2,030	2,026	2,060	2,094	2,078
Public Passenger Services	52	86	158	164	153	150	144	139	137
Rail	45	42	45	44	44	42	42	38	39
Domestic Aviation	17	25	22	14	6	4	3	3	3
International Aviation	358	606	837	774	694	583	673	746	844
Fuel Tourism	0	719	495	228	230	228	210	294	473
Navigation	7	24	50	65	56	59	58	72	71
Unspecified	279	226	371	250	225	131	247	198	217
Residential	2,258	2,504	2,940	3,270	2,841	2,726	2,762	2,539	2,672
Commercial/Public Services	1,001	1,341	1,569	1,472	1,339	1,332	1,297	1,250	1,259
Commercial Services	550	836	1,014	908	834	823	801	773	777
Public Services	450	505	556	564	505	509	496	478	481
Agricultural	252	317	336	270	261	251	224	205	200
Fisheries	0	0	47	25	20	23	25	24	21

Figure 11 Total Final Consumption by Sector 1990 – 2015

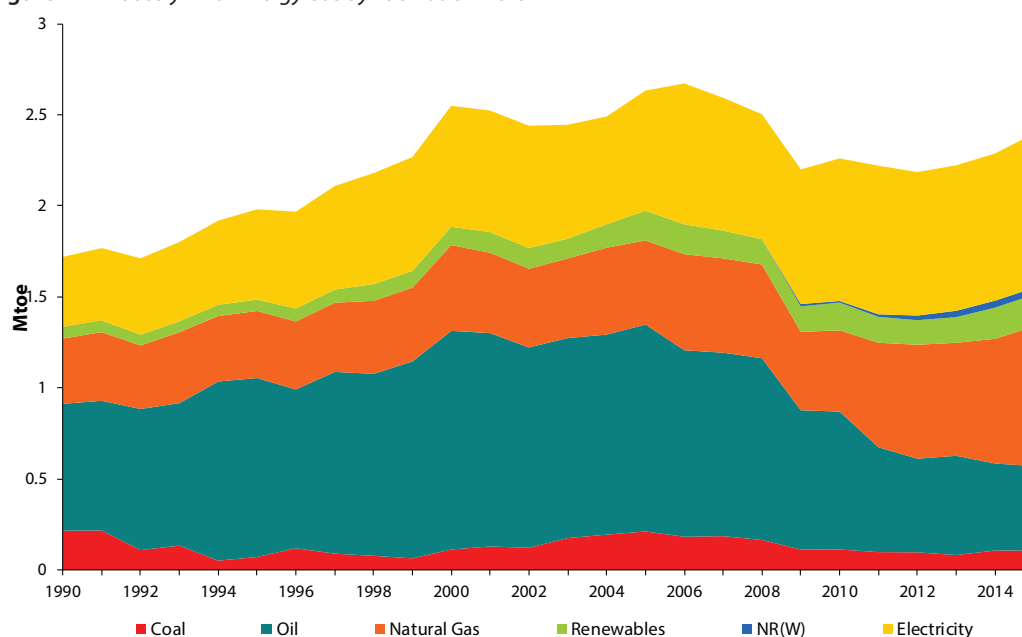


5 Sectoral Consumption of Fuels

5.1 Industry

Industry	1990	2000	2005	2010	2011	2012	2013	2014	2015
kilo tonnes of oil equivalent (ktoe)									
Coal	216	113	212	113	98	97	82	107	106
Bituminous Coal	216	113	212	113	98	97	82	107	106
Anthracite + Manufactured Ovoids	0	0	0	0	0	0	0	0	0
Coke	0	0	0	0	0	0	0	0	0
Lignite	0	0	0	0	0	0	0	0	0
Peat	0	0	0	0	0	1	1	1	1
Milled Peat	0	0	0	0	0	1	0	1	1
Sod Peat	0	0	0	0	0	0	0	0	0
Briquettes	0	0	0	0	0	0	0	0	0
Oil	696	1,201	1,136	757	576	514	545	478	464
Crude	0	0	0	0	0	0	0	0	0
Refinery Gas	0	0	0	0	0	0	0	0	0
Gasoline	0	0	0	0	0	0	0	0	0
Kerosene	17	90	124	112	89	76	78	74	86
Jet Kerosene	0	0	0	0	0	0	0	0	0
Fuel Oil	422	673	472	311	170	109	138	75	41
LPG	62	86	103	103	99	96	116	104	106
Gasoil / Diesel/ DERV	148	190	199	157	150	143	124	111	107
Petroleum Coke	47	161	237	73	68	91	88	113	124
Naphta	1	1	1	1	0	0	0	0	0
Bitumen	0	0	0	0	0	0	0	0	0
White Spirit	0	0	0	0	0	0	0	0	0
Lubricants	0	0	0	0	0	0	0	0	0
Natural Gas	358	471	462	446	574	626	621	685	767
Renewables	63	100	163	152	142	135	141	171	174
Hydro	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0
Biomass	61	96	159	148	137	130	138	168	171
Landfill Gas	0	0	0	0	0	0	0	0	0
Liquid Biofuels	2	4	4	5	5	5	3	3	3
Biogas	0	0	0	0	0	0	0	0	0
Solar	0	0	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0	0	0
Non-Renewable (Wastes)	0	0	0	9	14	25	35	38	37
Electricity	386	665	660	783	816	788	799	808	847
Total	1,720	2,549	2,633	2,261	2,220	2,186	2,223	2,288	2,397

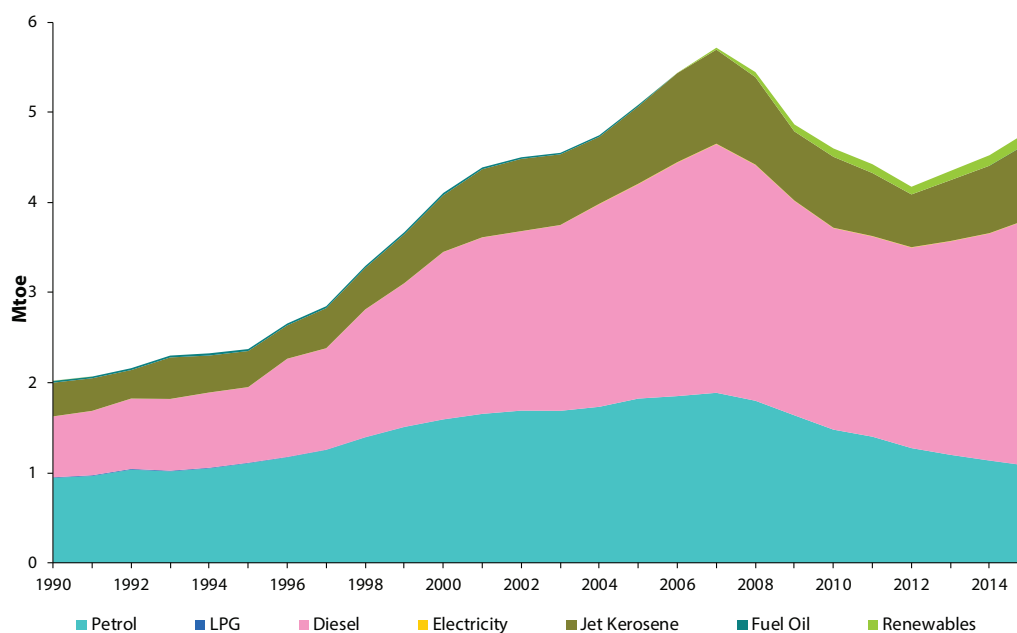
Figure 12 Industry Final Energy Use by Fuel 1990 – 2015



5.2 Transport

Transport kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Coal	0	0	0	0	0	0	0	0	0
Bituminous Coal	0	0	0	0	0	0	0	0	0
Anthracite + Manufactured Ovoids	0	0	0	0	0	0	0	0	0
Coke	0	0	0	0	0	0	0	0	0
Lignite	0	0	0	0	0	0	0	0	0
Peat	0	0	0	0	0	0	0	0	0
Milled Peat	0	0	0	0	0	0	0	0	0
Sod Peat	0	0	0	0	0	0	0	0	0
Briquettes	0	0	0	0	0	0	0	0	0
Oil	2,017	4,101	5,076	4,501	4,321	4,084	4,242	4,402	4,657
Crude	0	0	0	0	0	0	0	0	0
Refinery Gas	0	0	0	0	0	0	0	0	0
Gasoline	942	1,590	1,822	1,478	1,399	1,272	1,197	1,134	1,075
Kerosene	0	0	0	0	0	0	0	0	0
Jet Kerosene	374	629	857	787	699	586	675	748	846
Fuel Oil	20	25	18	0	0	0	0	0	0
LPG	7	2	1	1	1	1	1	2	3
Gasoil / Diesel/ DERV	674	1,855	2,378	2,236	2,221	2,224	2,368	2,519	2,733
Petroleum Coke	0	0	0	0	0	0	0	0	0
Naphta	0	0	0	0	0	0	0	0	0
Bitumen	0	0	0	0	0	0	0	0	0
White Spirit	0	0	0	0	0	0	0	0	0
Lubricants	0	0	0	0	0	0	0	0	0
Natural Gas	0	0	0	0	0	0	0	0	0
Renewables	0	0	1	93	98	85	102	116	128
Hydro	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0
Biomass	0	0	0	0	0	0	0	0	0
Landfill Gas	0	0	0	0	0	0	0	0	0
Biogas	0	0	0	0	0	0	0	0	0
Liquid Biofuels	0	0	1	93	98	85	102	116	128
Solar	0	0	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0	0	0
Non-Renewable (Wastes)	0	0	0	0	0	0	0	0	0
Electricity	1	2	5	4	4	4	4	3	4
Total	2,019	4,103	5,082	4,597	4,422	4,172	4,348	4,522	4,789

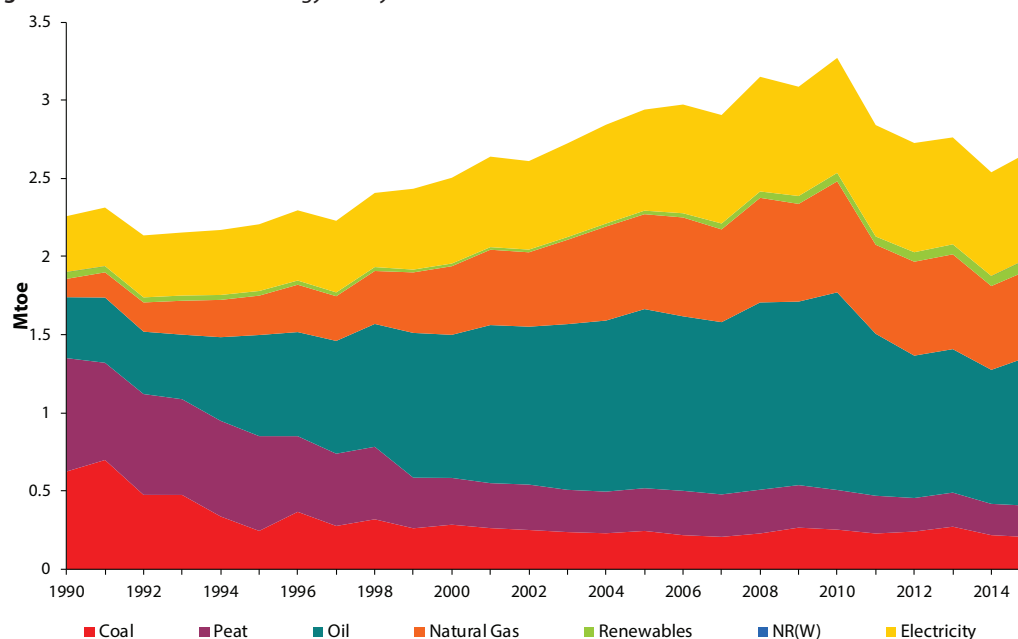
Figure 13 Transport Final Energy Use by Fuel 1990 – 2015



5.3 Residential

Residential kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Coal	626	286	246	254	230	242	273	219	206
Bituminous Coal	608	210	163	177	152	165	173	133	126
Anthracite + Manufactured Ovoids	0	59	59	67	67	65	83	73	68
Coke	0	0	0	0	0	0	0	0	0
Lignite	18	17	24	10	11	12	17	13	13
Peat	725	299	273	254	241	215	218	200	201
Milled Peat	0	0	0	0	0	0	0	0	0
Sod Peat	570	179	183	165	163	128	128	128	128
Briquettes	155	120	90	88	79	87	90	72	73
Oil	389	915	1,145	1,263	1,035	910	917	857	956
Crude	0	0	0	0	0	0	0	0	0
Refinery Gas	0	0	0	0	0	0	0	0	0
Gasoline	0	0	0	0	0	0	0	0	0
Kerosene	105	570	795	1,010	799	683	706	669	775
Jet Kerosene	0	0	0	0	0	0	0	0	0
Fuel Oil	0	0	0	0	0	0	0	0	0
LPG	69	57	53	37	34	33	40	36	37
Gasoil / Diesel/ DERV	197	244	256	202	194	185	160	143	138
Petroleum Coke	19	44	41	13	9	10	11	8	7
Naphta	0	0	0	0	0	0	0	0	0
Bitumen	0	0	0	0	0	0	0	0	0
White Spirit	0	0	0	0	0	0	0	0	0
Lubricants	0	0	0	0	0	0	0	0	0
Natural Gas	117	439	607	710	569	600	606	536	555
Renewables	45	17	23	54	53	61	64	65	76
Hydro	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0
Biomass	45	17	16	27	22	28	28	26	32
Landfill Gas	0	0	0	0	0	0	0	0	0
Biogas	0	0	0	0	0	0	0	0	0
Wastes	0	0	0	0	0	0	0	0	0
Solar	0	0	0	7	9	10	11	12	13
Geothermal	0	0	6	20	21	23	25	27	31
Non-Renewable (Wastes)	0	0	0	0	0	0	0	0	0
Electricity	356	548	646	735	712	698	684	663	678
Total	2,258	2,504	2,940	3,270	2,841	2,726	2,762	2,539	2,672

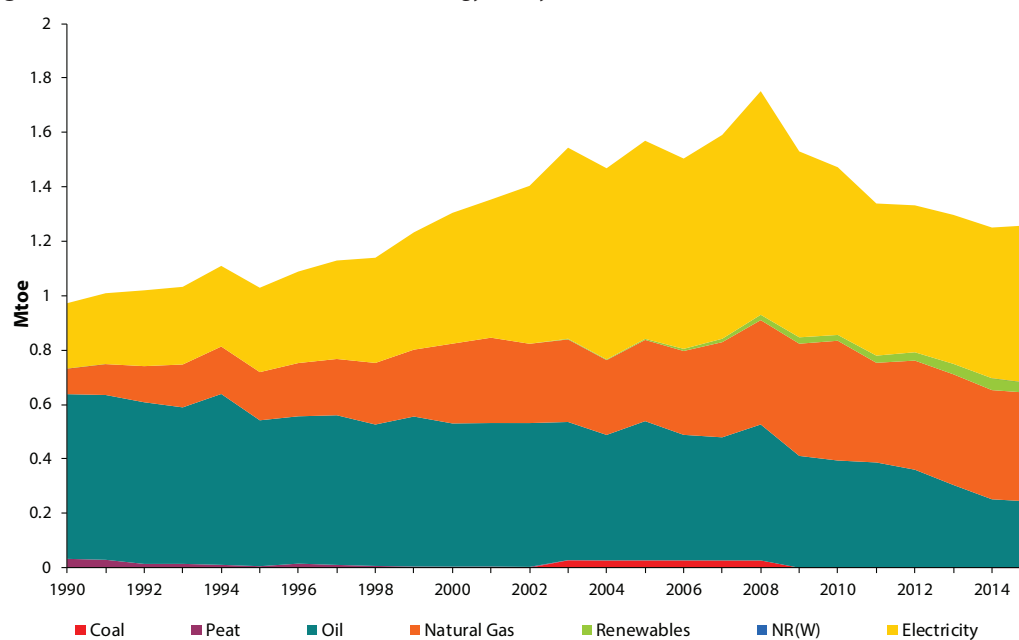
Figure 14 Residential Final Energy Use by Fuel 1990 – 2015



5.4 Commercial & Public Services

Commercial/Public Services									
kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Coal	1	0	27	0	0	0	0	0	0
Bituminous Coal	1	0	24	0	0	0	0	0	0
Anthracite + Manufactured Ovoids	0	0	2	0	0	0	0	0	0
Coke	0	0	0	0	0	0	0	0	0
Lignite	0	0	1	0	0	0	0	0	0
Peat	32	4	0	0	0	0	0	0	0
Milled Peat	0	0	0	0	0	0	0	0	0
Sod Peat	16	0	0	0	0	0	0	0	0
Briquettes	16	4	0	0	0	0	0	0	0
Oil	605	526	511	394	387	360	304	251	243
Crude	0	0	0	0	0	0	0	0	0
Refinery Gas	0	0	0	0	0	0	0	0	0
Gasoline	0	0	0	0	0	0	0	0	0
Kerosene	0	0	0	0	0	0	0	0	0
Jet Kerosene	0	0	0	0	0	0	0	0	0
Fuel Oil	148	17	10	10	10	10	10	10	10
LPG	10	8	9	8	7	7	9	8	8
Gasoil / Diesel/ DERV	447	501	493	376	370	343	286	234	226
Petroleum Coke	0	0	0	0	0	0	0	0	0
Naphta	0	0	0	0	0	0	0	0	0
Bitumen	0	0	0	0	0	0	0	0	0
White Spirit	0	0	0	0	0	0	0	0	0
Lubricants	0	0	0	0	0	0	0	0	0
Natural Gas	94	293	299	440	366	401	407	401	399
Renewables	0	0	4	21	26	31	38	44	36
Hydro	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0
Biomass	0	0	0	12	16	19	25	28	17
Landfill Gas	0	0	0	0	0	0	0	0	0
Biogas	0	0	3	4	4	4	4	5	5
Wastes	0	0	0	0	0	0	0	0	0
Solar	0	0	0	0	0	0	0	0	0
Geothermal	0	0	1	5	6	7	9	11	14
Non-Renewable (Wastes)	0	0	0	0	0	0	0	0	0
Electricity	240	481	728	616	559	540	547	554	580
Total	972	1,304	1,569	1,472	1,339	1,332	1,297	1,250	1,259

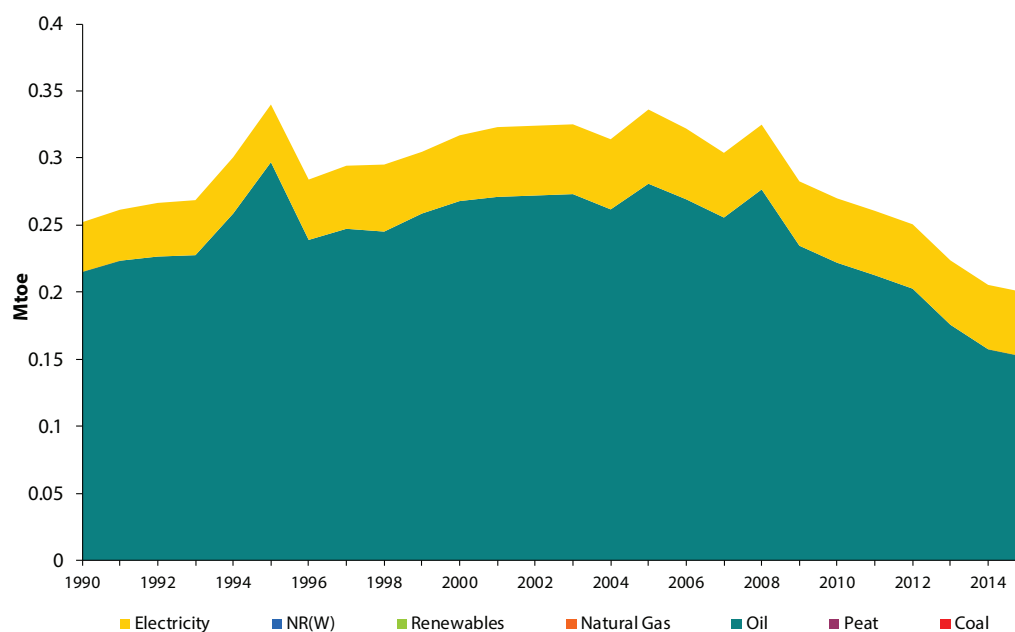
Figure 15 Commercial/Public Services Final Energy Use by Fuel 1990 – 2015



5.5 Agriculture

Agriculture kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Coal	0	0	0	0	0	0	0	0	0
Bituminous Coal	0	0	0	0	0	0	0	0	0
Anthracite + Manufactured Ovoids	0	0	0	0	0	0	0	0	0
Coke	0	0	0	0	0	0	0	0	0
Lignite	0	0	0	0	0	0	0	0	0
Peat	0	0	0	0	0	0	0	0	0
Milled Peat	0	0	0	0	0	0	0	0	0
Sod Peat	0	0	0	0	0	0	0	0	0
Briquettes	0	0	0	0	0	0	0	0	0
Oil	215	268	281	222	213	203	176	157	152
Crude	0	0	0	0	0	0	0	0	0
Refinery Gas	0	0	0	0	0	0	0	0	0
Gasoline	0	0	0	0	0	0	0	0	0
Kerosene	0	0	0	0	0	0	0	0	0
Jet Kerosene	0	0	0	0	0	0	0	0	0
Fuel Oil	0	0	0	0	0	0	0	0	0
LPG	0	0	0	0	0	0	0	0	0
Gasoil / Diesel/ DERV	215	268	281	222	213	203	176	157	152
Petroleum Coke	0	0	0	0	0	0	0	0	0
Naphta	0	0	0	0	0	0	0	0	0
Bitumen	0	0	0	0	0	0	0	0	0
White Spirit	0	0	0	0	0	0	0	0	0
Lubricants	0	0	0	0	0	0	0	0	0
Natural Gas	0	0	0	0	0	0	0	0	0
Renewables	0	0	0	0	0	0	0	0	0
Hydro	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0
Biomass	0	0	0	0	0	0	0	0	0
Landfill Gas	0	0	0	0	0	0	0	0	0
Biogas	0	0	0	0	0	0	0	0	0
Wastes	0	0	0	0	0	0	0	0	0
Solar	0	0	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0	0	0
Non-Renewable (Wastes)	0	0	0	0	0	0	0	0	0
Electricity	37	49	55	48	48	48	48	48	48
Total	252	317	336	270	261	251	224	205	200

Figure 16 Agriculture Final Energy Use by Fuel 1990 – 2015

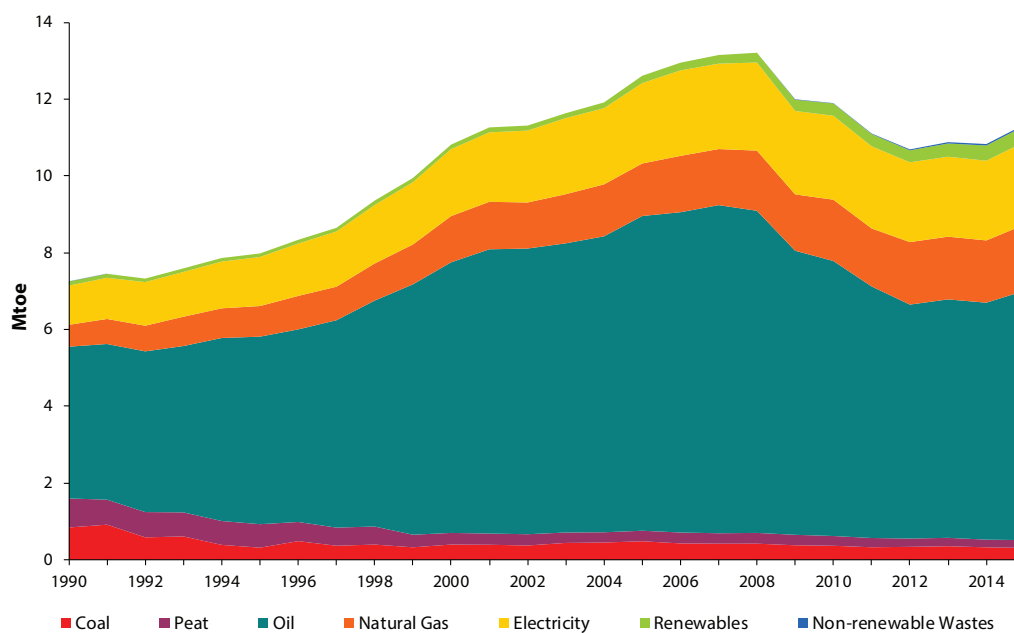


6 Fuels

6.1 Final Consumption of Fuels

Total Final Consumption									
kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Coal	843	398	484	367	328	339	355	326	313
Bituminous Coal	825	323	399	290	250	262	255	240	232
Anthracite + Manufactured Ovoids	0	59	61	67	67	65	83	73	68
Coke	0	0	0	0	0	0	0	0	0
Lignite	18	17	24	10	11	12	17	13	13
Peat	757	303	274	254	242	215	218	201	201
Milled Peat	0	0	0	0	0	1	0	1	1
Sod Peat	586	179	183	165	163	128	128	128	128
Briquettes	171	124	91	88	79	87	90	72	73
Oil	3,923	7,011	8,150	7,137	6,531	6,071	6,184	6,146	6,472
Crude	0	0	0	0	0	0	0	0	0
Refinery Gas	0	0	0	0	0	0	0	0	0
Gasoline	942	1,590	1,822	1,478	1,399	1,272	1,197	1,134	1,075
Kerosene	121	660	919	1,123	887	758	785	743	861
Jet Kerosene	374	629	857	787	699	586	675	748	846
Fuel Oil	589	714	500	321	180	118	148	85	51
LPG	148	153	166	148	142	137	166	150	153
Gasoil / Diesel/ DERV	1,681	3,059	3,606	3,193	3,148	3,098	3,114	3,165	3,356
Petroleum Coke	66	205	278	86	76	101	99	122	131
Naphta	1	1	1	1	0	0	0	0	0
Bitumen	0	0	0	0	0	0	0	0	0
White Spirit	0	0	0	0	0	0	0	0	0
Lubricants	0	0	0	0	0	0	0	0	0
Natural Gas	570	1,203	1,367	1,596	1,509	1,627	1,634	1,622	1,722
Renewables	108	118	191	321	319	311	345	396	415
Hydro	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0
Biomass	105	113	176	187	175	177	191	222	220
Landfill Gas	0	0	0	0	0	0	0	0	0
Biogas	2	4	7	8	9	9	7	8	9
Liquid Biofuels	0	0	1	93	98	85	102	116	128
Solar	0	0	0	7	9	10	11	12	13
Geothermal	0	0	7	26	28	30	33	38	45
Non-Renewable (Wastes)	0	0	0	9	14	25	35	38	37
Electricity	1,021	1,745	2,094	2,186	2,139	2,078	2,081	2,076	2,156
Total	7,221	10,777	12,560	11,870	11,083	10,667	10,853	10,804	11,316

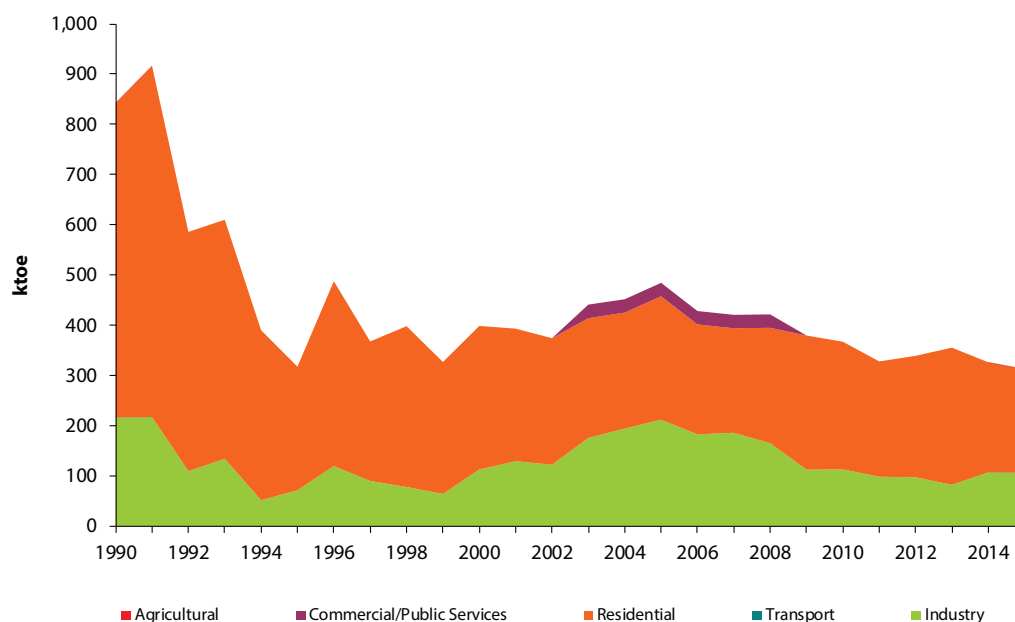
Figure 17 Total Final Energy Use by Fuel 1990 – 2015



6.2 Coal

Coal kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Total Final Energy Consumption	843	398	484	367	328	339	355	326	312
Industry	216	113	212	113	98	97	82	107	106
Non-Energy Mining	0	0	0	0	0	0	0	0	0
Food, beverages and tobacco	70	29	53	16	16	18	21	21	22
Textiles and textile products	3	10	8	0	0	0	0	0	0
Wood and wood products	0	0	0	0	0	0	0	0	0
Pulp, paper, publishing and printing	0	0	0	1	0	0	0	0	0
Chemicals & man-made fibres	18	0	0	0	0	0	0	0	0
Rubber and plastic products	0	0	2	0	0	0	0	0	0
Other non-metallic mineral products	124	70	148	93	80	77	61	86	84
Basic metals and fabricated metal prods	1	0	0	0	0	0	0	0	0
Machinery and equipment n.e.c.	0	0	1	0	0	0	0	0	0
Electrical and optical equipment	0	4	0	0	0	0	0	0	0
Transport equipment manufacture	0	0	0	0	0	0	0	0	0
Other manufacturing	0	0	0	4	2	1	0	0	0
Transport	0	0	0	0	0	0	0	0	0
Road Freight	0	0	0	0	0	0	0	0	0
Light Goods Vehicle (LGV)	0	0	0	0	0	0	0	0	0
Road Private Car	0	0	0	0	0	0	0	0	0
Public Passenger Services	0	0	0	0	0	0	0	0	0
Rail	0	0	0	0	0	0	0	0	0
Domestic Aviation	0	0	0	0	0	0	0	0	0
International Aviation	0	0	0	0	0	0	0	0	0
Fuel Tourism	0	0	0	0	0	0	0	0	0
Navigation	0	0	0	0	0	0	0	0	0
Unspecified	0	0	0	0	0	0	0	0	0
Residential	626	286	246	254	230	242	273	219	206
Commercial/Public Services	1	0	27	0	0	0	0	0	0
Commercial Services	1	0	27	0	0	0	0	0	0
Public Services	0	0	0	0	0	0	0	0	0
Agricultural	0	0	0	0	0	0	0	0	0
Fisheries	0	0	0	0	0	0	0	0	0

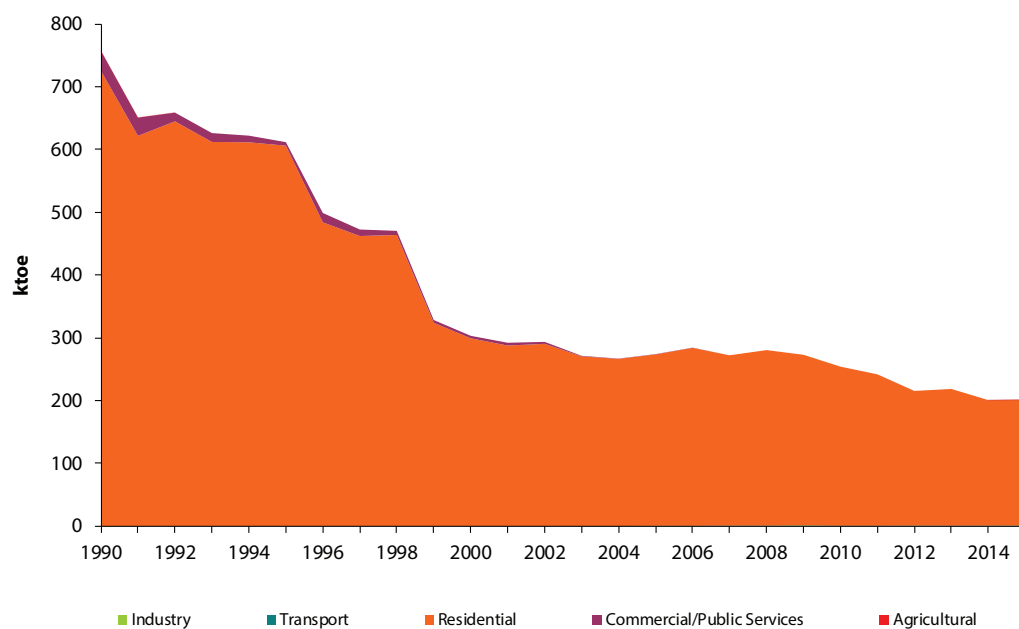
Figure 18 Coal Use by Sector 1990 – 2015



6.3 Peat

Peat kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Total Final Energy Consumption	757	303	274	254	242	215	218	201	201
Industry	0	0	0	0	0	1	1	1	1
Non-Energy Mining	0	0	0	0	0	0	0	0	0
Food, beverages and tobacco	0	0	0	0	0	1	0	1	1
Textiles and textile products	0	0	0	0	0	0	0	0	0
Wood and wood products	0	0	0	0	0	0	0	0	0
Pulp, paper, publishing and printing	0	0	0	0	0	0	0	0	0
Chemicals & man-made fibres	0	0	0	0	0	0	0	0	0
Rubber and plastic products	0	0	0	0	0	0	0	0	0
Other non-metallic mineral products	0	0	0	0	0	0	0	0	0
Basic metals and fab. metal prods	0	0	0	0	0	0	0	0	0
Machinery and equipment n.e.c.	0	0	0	0	0	0	0	0	0
Electrical and optical equipment	0	0	0	0	0	0	0	0	0
Transport equipment manufacture	0	0	0	0	0	0	0	0	0
Other manufacturing	0	0	0	0	0	0	0	0	0
Transport	0	0	0	0	0	0	0	0	0
Road Freight	0	0	0	0	0	0	0	0	0
Light Goods Vehicle (LGV)	0	0	0	0	0	0	0	0	0
Road Private Car	0	0	0	0	0	0	0	0	0
Public Passenger Services	0	0	0	0	0	0	0	0	0
Rail	0	0	0	0	0	0	0	0	0
Domestic Aviation	0	0	0	0	0	0	0	0	0
International Aviation	0	0	0	0	0	0	0	0	0
Fuel Tourism	0	0	0	0	0	0	0	0	0
Navigation	0	0	0	0	0	0	0	0	0
Unspecified	0	0	0	0	0	0	0	0	0
Residential	725	299	273	254	241	215	218	200	201
Commercial/Public Services	32	4	0	0	0	0	0	0	0
Commercial Services	0	0	0	0	0	0	0	0	0
Public Services	32	4	0	0	0	0	0	0	0
Agricultural	0	0	0	0	0	0	0	0	0
Fisheries	0	0	0	0	0	0	0	0	0

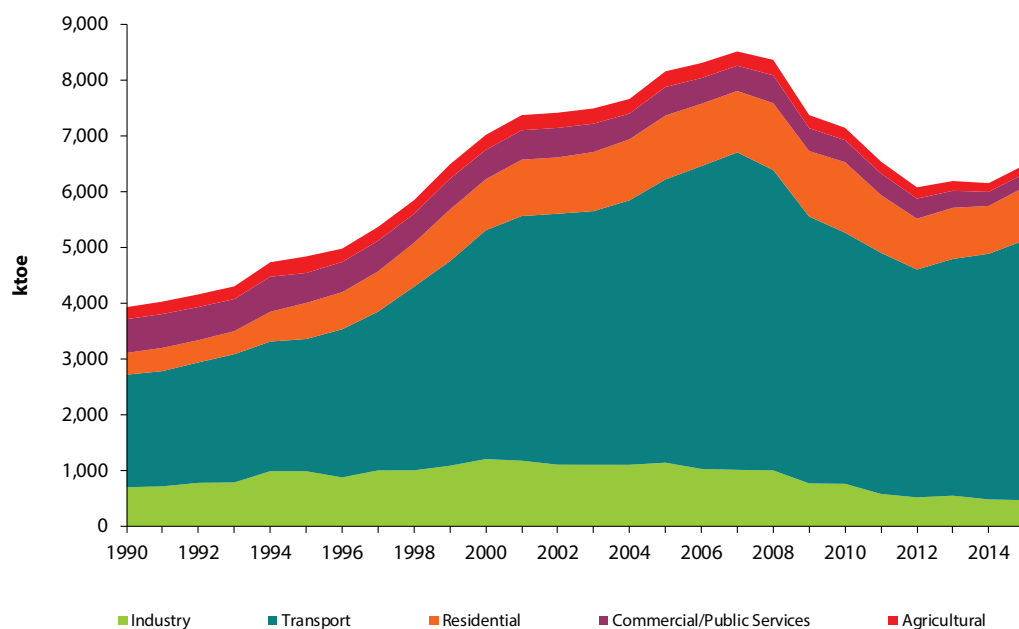
Figure 19 Peat Use by Sector 1990 – 2015



6.4 Oil

Oil kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Total Final Energy Consumption	3,952	7,047	8,196	7,162	6,552	6,093	6,209	6,170	6,493
Industry	696	1,201	1,136	757	576	514	545	478	464
Non-Energy Mining	25	93	97	44	40	37	34	30	30
Food, beverages and tobacco	138	292	160	187	129	118	137	121	127
Textiles and textile products	28	38	14	4	3	2	3	2	2
Wood and wood products	4	9	5	3	3	3	3	2	2
Pulp, paper, publishing and printing	9	10	9	4	3	3	3	3	3
Chemicals & man-made fibres	42	72	51	42	28	25	29	25	27
Rubber and plastic products	16	14	8	10	9	9	10	9	9
Other non-metallic mineral products	89	94	297	143	127	146	141	160	171
Basic metals and fab. metal prods	242	447	357	224	152	94	96	45	11
Machinery and equipment n.e.c.	15	57	9	6	6	5	6	5	5
Electrical and optical equipment	32	62	112	38	37	35	42	38	38
Transport equipment manufacture	10	6	5	5	4	4	5	4	4
Other manufacturing	46	7	13	47	35	33	39	34	36
Transport	2,017	4,101	5,076	4,501	4,321	4,084	4,242	4,402	4,657
Road Freight	334	813	1,218	669	612	613	562	598	603
Light Goods Vehicle (LGV)				353	341	313	320	305	289
Road Private Car	926	1,562	1,887	1,960	1,980	1,978	2,004	2,033	2,012
Public Passenger Services	52	86	158	160	149	146	140	135	132
Rail	43	40	40	40	40	38	38	35	36
Domestic Aviation	17	25	22	14	6	4	3	3	3
International Aviation	358	606	837	774	694	583	673	746	844
Fuel Tourism	0	719	495	222	223	222	203	283	456
Navigation	7	24	50	65	56	59	58	72	71
Unspecified	279	226	371	244	220	129	240	192	210
Residential	389	915	1,145	1,263	1,035	910	917	857	956
Commercial/Public Services	634	563	511	394	387	360	304	251	243
Commercial Services	336	363	333	255	251	233	196	161	156
Public Services	297	200	178	139	136	127	108	90	87
Agricultural	215	268	281	222	213	203	176	157	152
Fisheries	0	0	47	25	20	23	25	24	21

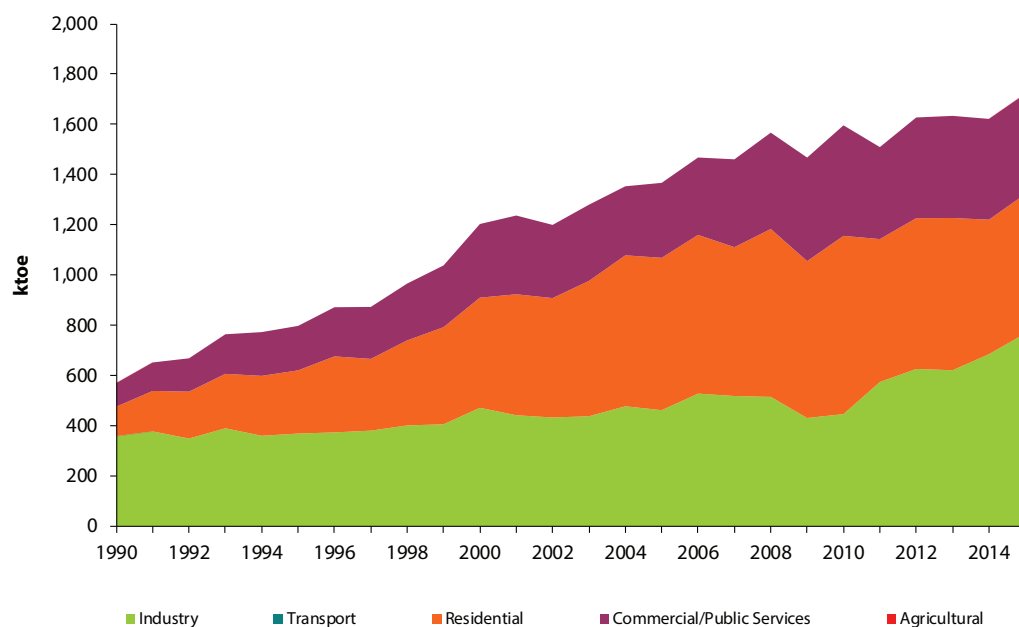
Figure 20 Oil Use by Sector 1990 – 2015



6.5 Natural Gas

Natural Gas									
kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Total Final Energy Consumption	570	1,203	1,367	1,596	1,509	1,627	1,634	1,622	1,722
Industry	358	471	462	446	574	626	621	685	767
Non-Energy Mining	4	46	24	9	11	10	10	10	12
Food, beverages and tobacco	110	158	178	81	94	90	91	91	105
Textiles and textile products	0	2	1	1	1	1	1	1	1
Wood and wood products	0	0	3	2	2	2	2	2	2
Pulp, paper, publishing and printing	0	30	9	3	3	3	3	3	3
Chemicals & man-made fibres	88	99	119	50	58	55	56	56	65
Rubber and plastic products	4	5	8	3	4	4	4	4	4
Other non-metallic mineral products	57	48	59	13	15	14	15	15	17
Basic metals and fabricated metal prods	17	11	7	177	262	329	321	383	422
Machinery and equipment n.e.c.	0	13	12	4	5	5	5	5	5
Electrical and optical equipment	0	39	33	95	111	106	107	107	123
Transport equipment manufacture	0	9	6	1	2	2	2	2	2
Other manufacturing	79	10	2	5	6	6	6	6	6
Transport	0	0	0	0	0	0	0	0	0
Road Freight	0	0	0	0	0	0	0	0	0
Light Goods Vehicle (LGV)	0	0	0	0	0	0	0	0	0
Road Private Car	0	0	0	0	0	0	0	0	0
Public Passenger Services	0	0	0	0	0	0	0	0	0
Rail	0	0	0	0	0	0	0	0	0
Domestic Aviation	0	0	0	0	0	0	0	0	0
International Aviation	0	0	0	0	0	0	0	0	0
Fuel Tourism	0	0	0	0	0	0	0	0	0
Navigation	0	0	0	0	0	0	0	0	0
Unspecified	0	0	0	0	0	0	0	0	0
Residential	117	439	607	710	569	600	606	536	555
Commercial/Public Services	94	293	299	440	366	401	407	401	399
Commercial Services	41	129	131	193	161	176	178	176	175
Public Services	53	165	168	247	206	225	229	225	224
Agricultural	0	0	0	0	0	0	0	0	0
Fisheries	0	0	0	0	0	0	0	0	0

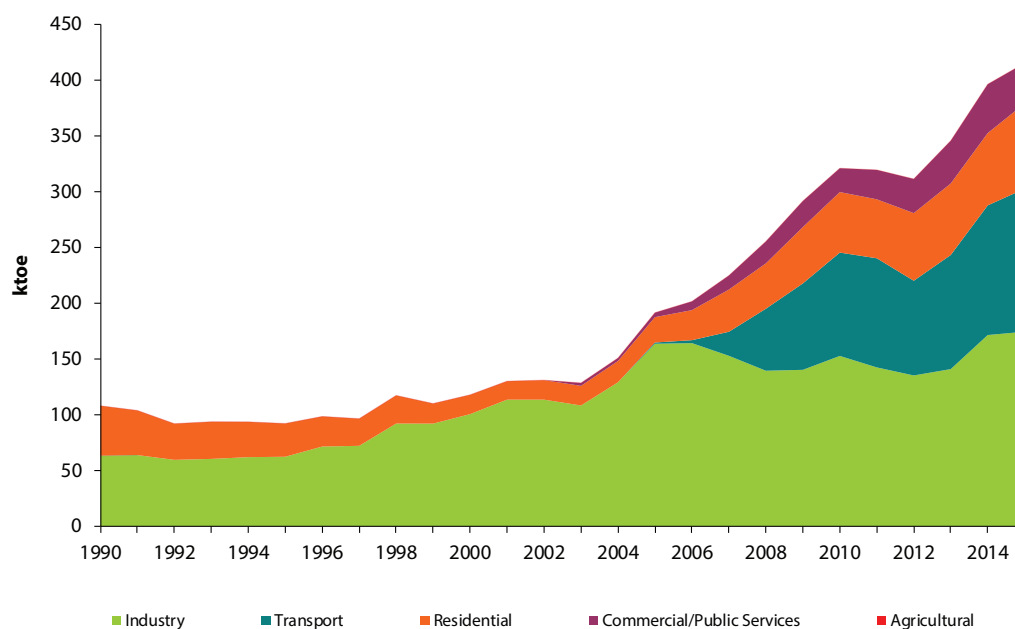
Figure 21 Natural Gas Use by Sector 1990 – 2015



6.6 Renewables

Renewables kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Total Final Energy Consumption	108	118	191	321	319	311	345	396	415
Industry	63	100	163	152	142	135	141	171	174
Non-Energy Mining	0	0	0	0	0	0	0	0	0
Food, beverages and tobacco	2	4	54	40	34	18	16	35	30
Textiles and textile products	0	0	0	0	0	0	0	0	0
Wood and wood products	61	96	109	100	93	95	100	108	115
Pulp, paper, publishing and printing	0	0	0	0	0	0	0	0	0
Chemicals & man-made fibres	0	0	0	0	0	0	0	0	0
Rubber and plastic products	0	0	0	0	0	0	0	0	0
Other non-metallic mineral products	0	0	0	12	16	21	25	28	29
Basic metals and fab. metal products	0	0	0	0	0	0	0	0	0
Machinery and equipment n.e.c.	0	0	0	0	0	0	0	0	0
Electrical and optical equipment	0	0	0	0	0	0	0	0	0
Transport equipment manufacture	0	0	0	0	0	0	0	0	0
Other manufacturing	0	0	0	0	0	0	0	0	0
Transport	0	0	1	93	98	85	102	116	128
Road Freight	0	0	0	19	20	16	18	22	23
Light Goods Vehicle (LGV)	0	0	0	10	11	8	10	11	11
Road Private Car	0	0	0	48	50	48	56	62	66
Public Passenger Services	0	0	0	4	4	4	4	5	5
Rail	0	0	0	0	0	0	0	0	0
Domestic Aviation	0	0	0	0	0	0	0	0	0
International Aviation	0	0	0	0	0	0	0	0	0
Fuel Tourism	0	0	0	6	7	6	7	10	17
Navigation	0	0	0	0	0	0	0	0	0
Unspecified	0	0	0	6	5	3	7	6	7
Residential	45	17	23	54	53	61	64	65	76
Commercial/Public Services	0	0	4	21	26	31	38	44	36
Commercial Services	0	0	1	18	22	27	34	39	31
Public Services	0	0	3	4	4	4	4	5	5
Agricultural	0	0	0	0	0	0	0	0	0
Fisheries	0	0	0	0	0	0	0	0	0

Figure 22 Renewables Use by Sector 1990 – 2015



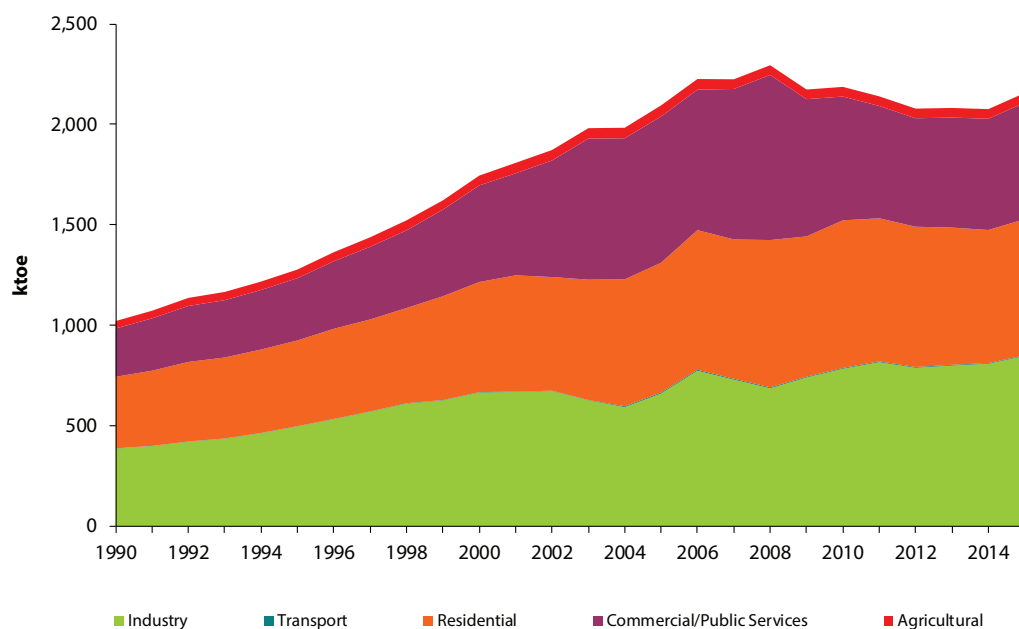
6.7 Non-Renewable (wastes)

Electricity kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Total Final Energy Consumption	0	0	0	9	14	25	35	38	37
Industry	0	0	0	9	14	25	35	38	37
Non-Energy Mining	0	0	0	0	0	0	0	0	0
Food, beverages and tobacco	0	0	0	0	0	0	0	0	0
Textiles and textile products	0	0	0	0	0	0	0	0	0
Wood and wood products	0	0	0	0	0	0	0	0	0
Pulp, paper, publishing and printing	0	0	0	0	0	0	0	0	0
Chemicals & man-made fibres	0	0	0	0	0	0	0	0	0
Rubber and plastic products	0	0	0	0	0	0	0	0	0
Other non-metallic mineral products	0	0	0	9	14	25	35	38	37
Basic metals and fab. metal prods	0	0	0	0	0	0	0	0	0
Machinery and equipment n.e.c.	0	0	0	0	0	0	0	0	0
Electrical and optical equipment	0	0	0	0	0	0	0	0	0
Transport equipment manufacture	0	0	0	0	0	0	0	0	0
Other manufacturing	0	0	0	0	0	0	0	0	0
Transport	0	0	0	0	0	0	0	0	0
Road Freight	0	0	0	0	0	0	0	0	0
Light Goods Vehicle (LGV)				0	0	0	0	0	0
Road Private Car	0	0	0	0	0	0	0	0	0
Public Passenger Services	0	0	0	0	0	0	0	0	0
Rail	0	0	0	0	0	0	0	0	0
Domestic Aviation	0	0	0	0	0	0	0	0	0
International Aviation	0	0	0	0	0	0	0	0	0
Fuel Tourism	0	0	0	0	0	0	0	0	0
Navigation	0	0	0	0	0	0	0	0	0
Unspecified	0	0	0	0	0	0	0	0	0
Residential	0	0	0	0	0	0	0	0	0
Commercial/Public Services	0	0	0	0	0	0	0	0	0
Commercial Services	0	0	0	0	0	0	0	0	0
Public Services	0	0	0	0	0	0	0	0	0
Agricultural	0	0	0	0	0	0	0	0	0
Fisheries	0	0	0	0	0	0	0	0	0

6.8 Electricity

Electricity kilo tonnes of oil equivalent (ktoe)	1990	2000	2005	2010	2011	2012	2013	2014	2015
Total Final Energy Consumption	1,021	1,745	2,094	2,186	2,139	2,078	2,081	2,076	2,156
Industry	386	665	660	783	816	788	799	808	847
Non-Energy Mining	8	40	50	56	59	56	57	58	61
Food, beverages and tobacco	105	156	142	167	174	168	170	172	180
Textiles and textile products	19	18	8	10	10	10	10	10	11
Wood and wood products	10	29	28	34	35	34	34	35	36
Pulp, paper, publishing and printing	9	27	24	18	19	18	19	19	20
Chemicals & man-made fibres	36	115	108	142	148	143	145	147	154
Rubber and plastic products	13	33	33	34	36	35	35	35	37
Other non-metallic mineral products	31	50	64	50	52	50	51	51	54
Basic metals and fab. metal prods	56	46	42	63	64	64	64	64	67
Machinery and equipment n.e.c.	10	18	16	20	21	20	20	21	22
Electrical and optical equipment	31	101	117	97	101	97	99	100	105
Transport equipment manufacture	4	10	9	17	17	17	17	17	18
Other manufacturing	53	22	18	76	79	76	78	78	82
Transport	1	2	5	4	4	4	4	3	4
Road Freight	0	0	0	0	0	0	0	0	0
Light Goods Vehicles (LGV)	0	0	0	0	0	0	0	0	0
Road Private Car	0	0	0	0	0	0	0	0	0
Public Passenger Services	0	0	0	0	0	0	0	0	0
Rail	1	2	5	4	4	4	4	3	4
Domestic Aviation	0	0	0	0	0	0	0	0	0
International Aviation	0	0	0	0	0	0	0	0	0
Fuel Tourism	0	0	0	0	0	0	0	0	0
Navigation	0	0	0	0	0	0	0	0	0
Unspecified	0	0	0	0	0	0	0	0	0
Residential	356	548	646	735	712	698	684	663	678
Commercial/Public Services	240	481	728	616	559	540	547	554	580
Commercial Services	172	345	522	442	401	387	392	397	416
Public Services	68	136	206	174	158	153	155	157	164
Agricultural	37	49	55	48	48	48	48	48	48
Fisheries	0	0	0	0	0	0	0	0	0

Figure 23 Electricity Use by Sector 1990 – 2015



Glossary of Terms

Product Definitions

Bituminous Coal and Anthracite:

Other bituminous coal is used for steam raising and space heating purposes and includes all anthracite coals and bituminous coals not included under coking coal. Its gross calorific value is greater than 23 865 kJ/kg, but usually lower than that of coking coal.

Manufactured Ovoids:

A composition fuel manufactured from hard coal fines by shaping with the addition of a binding agent. Note that the amount of patent fuel produced can be slightly higher than the amount of coal consumed in the transformation process because of the addition of a binding agent.

Coke:

The solid product obtained from carbonization of coal, principally coking coal, at high temperature, it is low in moisture and volatile matter. Coke oven coke is used mainly in the iron and steel industry acting as energy source and chemical agent.

Lignite:

Lignite/brown coal is a non-agglomerating coal with a gross calorific value of less than 17 435 kJ/kg, and greater than 31% volatile matter on a dry mineral matter free basis.

Peat:

Combustible soft, porous or compressed, fossil sedimentary deposit of plant origin with high water content (up to 90% in the raw state), easily cut, of light to dark brown colour. Peat used for non-energy purposes is not included.

Milled Peat:

Milled peat is the term used to describe air dried peat in powder or crumb form. This description is derived from the cutting operation which results in the loose crumb-like structure.

Sod Peat:

Traditional use of peat as a fuel in Ireland. It is a rectangular shaped hand cut sod dried in the open air. Can be machine cut also.

Peat Briquettes:

Small blocks of highly compressed dry peat.

Crude Oil:

Crude oil is a mineral oil of natural origin comprising a mixture of hydrocarbons and associated impurities, such as sulphur. It exists in the liquid phase under normal surface temperature and pressure and its physical characteristics (density, viscosity, etc.) are highly variable. This category includes field or lease condensate recovered from associated and non-associated gas where it is commingled with the commercial crude oil stream.

Refinery Gas:

Refinery gas includes a mixture of non-condensable gases mainly consisting of hydrogen, methane, ethane and olefins obtained during distillation of crude oil or treatment of oil products (e.g. cracking) in refineries. This also includes gases which are returned from the petrochemical industry.

Motor Gasoline:

Motor gasoline consists of a mixture of light hydrocarbons distilling between 35°C and 215°C. It is used as a fuel for land based spark ignition engines. Motor gasoline may include additives, oxygenates and octane enhancers, including lead compounds such as TEL (Tetraethyl lead) and TML (tetramethyl lead). Unleaded Motor Gasoline: motor gasoline where lead compounds have not been added to enhance octane rating. It may contain traces of organic lead. Leaded Motor Gasoline: motor gasoline with TEL (tetraethyl lead) and/or TML (tetramethyl lead) added to enhance octane rating. This category includes motor gasoline blending components (excluding additives/oxygenates), e.g. alkylates, isomerate, reformate, cracked gasoline destined for use as finished motor gasoline.

Aviation Gasoline:

This is motor spirit prepared especially for aviation piston engines, with an octane number suited to the engine, a

freezing point of -60°C and a distillation range usually within the limits of 30°C and 180°C.

Kerosene:

Kerosene comprises refined petroleum distillate and is used in sectors other than aircraft transport. It distils between 150°C and 300°C.

Kerosene Type Jet Fuel:

This is a distillate used for aviation turbine power units. It has the same distillation characteristics between 150°C and 300°C (generally not above 250°C) and flash point as kerosene. In addition, it has particular specifications (such as freezing point) which are established by the International Air Transport Association (IATA). This category includes kerosene blending components.

Fuel Oil:

This covers all residual (heavy) fuel oils (including those obtained by blending). Kinematic viscosity is above 10 cSt at 80°C. The flash point is always above 50°C and density is always more than 0.90 kg/l. **Low sulphur content:** heavy fuel oil with sulphur content lower than 1%. **High sulphur content:** heavy fuel oil with sulphur content of 1% or higher.

Liquefied Petroleum Gases (LPG):

LPG is light paraffinic hydrocarbons derived from the refinery processes, crude oil stabilisation and natural gas processing plants. They consist mainly of propane (C₃H₈) and butane (C₄H₁₀) or a combination of the two. They could also include propylene, butylene, isobutene and isobutylene. LPG is normally liquefied under pressure for transportation and storage.

Gas/Diesel Oil/ DERV (Distillate Fuel Oil):

Gas/diesel oil is primarily a medium distillate distilling between 180°C and 380°C. Several grades are available depending on uses: **Transport Diesel (DERV):** • on road diesel oil for diesel compression ignition (cars, trucks etc.), usually of low sulphur content; **Heating and other Gasoil:** • light heating oil for industrial and commercial uses; • marine diesel and diesel used in rail traffic; • other gas oil including heavy gas oils which distil between 380°C and 540°C and which are used as petrochemical feedstocks. This category includes blending components.

Petroleum Coke:

Petroleum coke is a black solid by-product, obtained mainly by cracking and carbonising petroleum derived feedstock, vacuum bottoms, tar and pitches in processes such as delayed coking or fluid coking. It consists mainly of carbon (90 to 95%) and has a low ash content. It is used as a feedstock in coke ovens for the steel industry, for heating purposes, for electrode manufacture and for production of chemicals. The two most important qualities are "green coke" and "calcinated coke". This category also includes "catalyst coke" deposited on the catalyst during refining processes; this coke is not recoverable and is usually burned as refinery fuel.

Naphtha:

Naphtha is a feedstock destined for either the petrochemical industry (e.g. ethylene manufacture or aromatics production). Naphtha comprises material in the 30°C and 210°C distillation range or part of this range.

Bitumen:

Bitumen is a solid, semi-solid or viscous hydrocarbon with a colloidal structure, being brown to black in colour, obtained as a residue in the distillation of crude oil, by vacuum distillation of oil residues from atmospheric distillation. Bitumen is often referred to as asphalt and is primarily used for construction of roads and for roofing material. This category includes fluidized and cut back bitumen.

White Spirit and SBP:

White Spirit and SBP are defined as refined distillate intermediates with a distillation in the naphtha/kerosene range.

Lubricants:

Lubricants are hydrocarbons produced from distillate by product; they are mainly used to reduce friction between bearing surfaces. This category includes all finished grades of lubricating oil, from spindle oil to cylinder oil, and those used in greases, including motor oils and all grades of lubricating oil base stocks.

Natural Gas:

Natural gas comprises gases, occurring in underground deposits, whether liquefied or gaseous, consisting mainly of methane. It includes both "non-associated" gas originating from fields producing only hydrocarbons in gaseous form, and "associated" gas produced in association with crude oil as well as methane recovered from coal mines (colliery gas).

Hydro-power:

Potential and kinetic energy of water converted into electricity in hydroelectric plants. Pumped storage is treated separately in the balance.

Wind Energy:

Kinetic energy of wind exploited for electricity generation in wind turbines.

Solid Biomass:

Covers organic, non-fossil material of biological origin which may be used as fuel for heat production or electricity generation. It comprises: **Charcoal:** covers the solid residue of the destructive distillation and pyrolysis of wood and other vegetal material and **Wood, wood wastes, other solid wastes:** Covers purpose-grown energy crops (poplar, willow etc.), a multitude of woody materials generated by an industrial process (wood/paper industry in particular) or provided directly by forestry and agriculture (firewood, wood chips, bark, sawdust, shavings, chips, black liquor etc.) as well as wastes such as tallow, straw, rice husks, nut shells, poultry litter, crushed grape dregs etc. Combustion is the preferred technology for these solid wastes. The quantity of fuel used is reported on a net calorific value basis.

Landfill Gas:

A gas composed principally of methane and carbon dioxide produced by anaerobic digestion landfill wastes.

Biogas:

A gas composed principally of methane and carbon dioxide produced by anaerobic digestion of biomass, comprising: **Sewage sludge gas**, produced from the anaerobic fermentation of sewage sludge and **Other biogas**, such as biogas produced from the anaerobic fermentation of animal slurries and of wastes in abattoirs, breweries and other agro-food industries.

Liquid Biofuel:

cover the fuels listed below: **Bioethanol:** ethanol produced from biomass and/or biodegradable fraction of waste; **Biodiesel:** a diesel quality liquid fuel produced from biomass or used fried oils; **Biomethanol:** methanol produced from biomass and/or the biodegradable fraction of waste; **Biodimethylether:** a diesel quality fuel produced from biomass and/or the biodegradable fraction of waste; **Other Liquid Biofuel:** liquid biofuels, used directly as a fuel, not included in biogoline or biodiesels.

Geothermal energy:

Energy available as heat emitted from within the earth's crust, usually in the form of hot water or steam. It is exploited at suitable sites: for electricity generation using dry steam or high enthalpy brine after flashing or directly as heat for district heating, agriculture etc. Ground source geothermal energy is also included in the category.

Solar Energy:

Solar radiation exploited for hot water production and electricity generation, by: flat plate collectors, for domestic hot water or for the seasonal heating of swimming pools; photovoltaic cells; solar thermal-electric plants. Passive solar energy for the direct heating, cooling and lighting of dwellings or other buildings is not included.

Electricity:

Gross electricity production is measured at the terminals of all alternator sets in a station; it therefore includes the energy taken by station auxiliaries and losses in transformers that are considered integral parts of the station. The difference between gross and net production is amount of own use of electricity in the generation plants.

Heat:

In recent years, the production of heat for sale has been increasing in importance. To reflect this, heat production represents all heat production from public CHP and heat plants as well as heat sold by autoproducer CHP and heat plants to third parties. Corresponding fuels to produce quantities of heat for sale are being recorded in the transformation sector under the rows CHP plants and Heat plants. The use of fuels for heat which is not sold is recorded under the sectors in which the fuel use occurs.

Flow Definitions

Production:

Production refers to the quantities of fuels extracted or produced, calculated after any operation for removal of inert matter or impurities (e.g. sulphur from natural gas). It refers only to indigenous production of fuels in Ireland.

Imports and Exports:

Imports and exports comprise amounts having crossed the national territorial boundaries of the country whether or not customs clearance has taken place. **a) Coal** Imports and exports comprise the amount of fuels obtained from or supplied to other countries, whether or not there is an economic or customs union between the relevant countries. Coal in transit should not be included. **b) Oil and Gas** Quantities of crude oil and oil products imported or exported under processing agreements (i.e. refining on account) are included. Quantities of oil in transit are excluded. Crude oil, NGL and natural gas are reported as coming from the country of origin; refinery feedstocks and oil products are reported as coming from the country of last consignment. Re-exports of oil imported for processing within bonded areas are shown as an export of product from the processing country to the final destination. **c) Electricity** Amounts are considered as imported or exported when they have crossed the national territorial boundaries

International Marine Bunkers:

International marine bunkers cover those quantities delivered to sea-going ships of all flags, including warships. Consumption by ships engaged in transport in inland and coastal waters and by fishing vessels in all waters is not included.

Stock Changes:

Stock changes (opening stock minus closing stock) reflect the difference between opening stock levels on the first day of the year and closing levels on the last day of the year of stocks on national territory held by producers, importers, energy transformation industries and large consumers. Oil and gas stock changes in pipelines are not taken into account. With the exception of large users mentioned above, changes in final users' stocks are not taken into account. A stock build is shown as a negative number, and a stock draw as a positive number.

Primary Energy Supply (including non-energy):

Primary energy supply is defined as production + inputs from other sources + imports - exports - international marine bunkers ± stock changes. This includes any energy source that may be used for non-energy purposes such as natural gas as a feedstock for fertilizer production.

Primary Energy Supply (excluding non-energy):

Total primary energy supply (TPES) is made up of production + imports - exports - international marine bunkers ± stock changes but excluding non-energy uses.

Statistical Differences:

Statistical difference is defined as deliveries to final consumption + use for transformation and consumption within the energy sector + distribution losses – domestic supply – transfers. Statistical differences arise because the data for the individual components of supply are often derived from different data sources by the national administration. Furthermore, the inclusion of changes in some large consumers' stocks in the supply part of the balance introduces distortions which also contribute to the statistical differences.

Transformation Input:

This section details the energy inputs into the conversion of primary forms of energy to secondary and further transformation (e.g. coking coal to coke, crude oil to petroleum products, heavy fuel oil to electricity).

Public Thermal Power Plants:

Public thermal power plants refer to plants which are designed to produce electricity only from the combustion of fuels. Public supply undertakings generate electricity and/or heat for sale to third parties, as their primary activity. They may be privately or publicly owned. Note that the sale need not take place through the public grid.

Combined Heat & Power plants:

Combined heat and power (CHP) plants (refers to plants which are designed to produce both heat and electricity). CHP plants may be autoproducer (generating for own use only) or third party ownership selling electricity and heat on-site as well as exporting electricity to the grid. Public supply undertakings generate electricity and/or heat for sale to third parties, as their primary activity. They may be privately or publicly owned. Note that the sale need not take place through the public grid.

Gross Electricity Consumption:

Defined as total electricity generated plus net imports.

Pumped Storage:

Electricity consumed in, and generated from hydro-electric storage plants.

Briquetting plants:

This category covers the use of fuels for the manufacture of patent fuels & briquettes.

Oil Refineries:

Petroleum refineries (covers the use of hydrocarbons for the manufacture of finished petroleum products).

Transformation Output:

This section details the outputs from the conversion of primary forms of energy into secondary and further transformation (e.g. coking coal to coke, crude oil to petroleum products, heavy fuel oil to electricity).

Exchanges & Transfers:

Transfers comprise inter-product transfers, products transferred and recycled products. Inter-product transfers result from reclassification of products either because their specification has changed or because they are blended into another product, e.g. kerosene may be reclassified as gasoil after blending with the latter in order to meet its winter diesel specification. The net balance of inter-product transfers should be zero. Products transferred reference is intended for petroleum products imported for further processing in refineries. For example, fuel oil imported for upgrading in a refinery is transferred to the feedstock category. Recycled products are finished products which pass a second time through the marketing network, after having been once delivered to final consumers (e.g. used lubricants which are reprocessed). Exchanges are used to exchange say electricity produced from hydro to the electricity column.

Own Use & Distribution Losses:

Own use covers use of energy in refineries, power generation stations etc. Distribution losses include losses in gas distribution and electricity transmission. It may also include unaccounted for use of crude oil and petroleum products.

Non-Specified Energy:

Includes non-specified energy sector's use.

Total Final Energy Consumption:

The term final consumption (equal to the sum of end-use sectors' consumption) implies that energy used for transformation and for own use of the energy producing industries is excluded. Final consumption reflects for the most part deliveries to consumers (see note on stock changes).

Industry sector:

Consumption of the industry sector is specified in the sub-sectors (energy used for transport by industry is not included here but is reported under transport). Covers NACE categories 13 – 37 excluding energy mining and oil refining.

Transport Sector:

Consumption in the Transport sector covers all transport activity (in mobile engines) regardless of the economic sector to which it is contributing.

Commercial and Public Services:

Services sector including government and public services.

Residential:

All consumption by households, excluding fuels used for transport. Includes households with employed persons (ISIC Division 95) which is a small part of total residential consumption.

Agriculture:

Includes energy consumed by such users whether for traction (excluding agricultural highway use), power or heating (agricultural and domestic).

Energy Conversion Factors

From:	To:	toe	MWh	GJ
	Multiply by			
toe		1	11.63	41.868
MWh		0.086	1	3.6
GJ		0.02388	0.2778	1

Energy Units:

joule (J): Joule is the international (S.I.) unit of energy.

kilowatt hour (kWh): The conventional unit of energy that electricity is measured and charged for commercially.

tonne of Oil Equivalent (toe): This is a conventional standardized unit of energy and is defined on the basis of a tonne of oil having a net calorific value of 41686 kJ/kg. A related unit is the *kilogram of oil equivalent (kgoe)*, where 1 kgoe = 10^{-3} toe.

Decimal Prefixes

deca (da)	10^1	deci (d)	10^{-1}
hecto (h)	10^2	centi (c)	10^{-2}
kilo (k)	10^3	milli (m)	10^{-3}
mega (M)	10^6	micro (μ)	10^{-6}
giga (G)	10^9	nano (n)	10^{-9}
tera (T)	10^{12}	pico (p)	10^{-12}
peta (P)	10^{15}	femto (f)	10^{-15}
exa (E)	10^{18}	atto (a)	10^{-18}

Calorific Values

Fuel	Net Calorific Value toe/t	Net Calorific Value MJ/t
Crude Oil	1.0226	42,814
Gasoline (petrol)	1.0650	44,589
Kerosene	1.0556	44,196
Jet Kerosene	1.0533	44,100
Gasoil / Diesel	1.0344	43,308
Residual Fuel Oil (heavy oil)	0.9849	41,236
Milled Peat	0.1860	7,787
Sod Peat	0.3130	13,105
Peat Briquettes	0.4430	18,548
Coal	0.6650	27,842
Liquefied Petroleum Gas (LPG)	1.1263	47,156
Petroleum Coke	0.7663	32,084
	Conversion Factor	Conversion Factor
Electricity	86 toe/GWh	3.6 TJ/GWh

Emission Factors

	t CO ₂ /TJ (NCV)	g CO ₂ /kWh (NCV)
Liquid Fuels		
Motor Spirit (Gasoline)	70.0	251.9
Jet Kerosene	71.4	257.0
Other Kerosene	71.4	257.0
Gas/Diesel Oil	73.3	263.9
Residual Oil	76.0	273.6
LPG	63.7	229.3
Naphta	73.3	264.0
Petroleum Coke	92.9	334.5
Solid Fuels and Derivatives		
Coal	94.6	340.6
Milled Peat	116.7	420.0
Sod Peat	104.0	374.4
Peat Briquettes	98.9	355.9
Gas		
Natural Gas	56.9	204.7
Electricity		
(2015)	129.9	467.8

