

# ENERGY IN NORWAY

## Production and consumption of electric energy in 2007

	Preliminary figures	
	GWh	% change 2006/2007
Hydropower production	135289	13.0
+ Thermal power production	1519	
+ Wind power production	901	
= Total power production	137709	13.4
+ Imports	5284	
- Exports	15320	
= Gross consumption (total)	127673	4.4
- Non-priority power <sup>1)</sup>	8200	
- Pumped storage power	1578	
- Losses	10328	
= Net consumption, firm power	107567	1.2
Of which:		
Energy intensive industry	31221	
General consumption	76346	
Gross consumption, firm power	116138	0.1
Of which:		
Energy intensive industry	32158	-6.1
General consumption	83981	2.7
General consumption, gross, adjusted for temperature conditions	87182	1.7

<sup>1)</sup> Estimated by NVE

**2008 - EDITION**

The production of electric energy in 2007 was 137.7 TWh, an increase of 13.4% compared to 2006. 98.2% of the production was hydropower. Total inflow in 2007 was 118% of normal as against 92% in 2006. The energy content of the reservoirs at the end of 2007 was 64.9 TWh, which is 77.0% of the total capacity, an increase of 8.4 TWh from the end of previous year.

During the past 10 years (1997-2007) an average annual increase in production of 2.1% is observed.

At the end of 2007, the production from the Norwegian hydropower system is estimated at 121,8 TWh for years with average inflow.

Domestic gross consumption was 127.7 TWh, an increase of 4.4% compared to 2006. The gross general consumption increased by 2.7%. However, 2007 was considerable warmer than normal. Adjusted for temperature conditions, the general consumption increased by 1.7%. Average annual increase over the past 10 years has been 1.0%.

The maximum system power load in 2007 related to domestic consumption was 21588 MW.

In 2007, the power station installed capacity increased by 1006 MW, an increase of 3.4%. Average annual increase in installed capacity over the past 10 years has been 0.9%.

As of 31 December 2007, the total installed capacity of the Norwegian power system (hydro, wind and thermal power stations) was 30185 MW, of which 95.8% is hydropower.

Data in this folder concerning the electricity supply for 2006 and earlier years, are all taken from Norwegian Official Statistics (Electricity Statistics). Information about individual power stations and reservoirs is obtained directly by the Norwegian Water Resources and Energy Directorate. The figures for 2007 are based on preliminary data from Statistics Norway and other sources, and must be regarded as approximate values. The table on oil and gas resources is based on information from the Directorate of Petroleum.

Statistics Norway is also the source for the tables giving district heating, production of important forms of energy, domestic deliveries of petroleum products, final energy consumption and the energy balance.

Units for power:  
1 W (watt) = 1 Nm/s (newtonmeter/second)

Units for energy:  
1 J (joule) = 1 Nm

Units for electric energy:

Prefixes:

k	= kilo	= $10^3$
M	= mega	= $10^6$
G	= giga	= $10^9$
T	= tera	= $10^{12}$
P	= peta	= $10^{15}$
E	= exa	= $10^{18}$

1 kWh = 3.6 · 10<sup>6</sup> J

Eg.: 1 kWh = 3.6 · 10<sup>6</sup> J = 3.6 MJ

Energy content of selected fuels:

Coal	28.1 MJ/kg
Fuel wood	16.8 MJ/kg
Petrol	43.9 MJ/kg
Light fuel oil	43.1 MJ/kg
Heavy fuel oil	40.6 MJ/kg
Crude oil	36.0 GJ/Sm <sup>3</sup>
Natural gas	40.4 MJ/Sm <sup>3</sup>

### Hydropower potential as of 12.31.2007

(Mean annual production in GWh)

County	Developed	Development licence granted	Remaining *)	Protected	Total
Østfold	4 203	48	12	20	4 283
Akershus	923	0	0	72	995
Oslo	22	0	0	0	22
Hedmark	2 396	60	735	2 923	6 113
Oppland	5 879	34	2 811	4 100	12 825
Buskerud	8 322	183	1 347	1 108	10 959
Vestfold	16	0	166	34	217
Telemark	11 267	26	1 419	782	13 495
Aust-Agder	4 412	246	1 138	643	6 439
Vest-Agder	9 362	130	1 124	915	11 531
Rogaland	11 683	762	1 748	2 250	16 444
Hordaland	16 253	267	4 516	7 859	28 895
Sogn og Fjordane	14 042	492	6 540	6 392	27 467
Møre og Romsdal	6 376	240	2 190	4 629	13 435
Sør-Trøndelag	4 494	103	646	2 219	7 462
Nord-Trøndelag	3 172	98	623	3 144	7 038
Nordland	14 761	390	7 032	5 002	27 185
Troms	2 658	57	2 003	2 127	6 845
Finnmark	1 518	5	547	1 296	3 365
Total Norway	121 761	3 140	34 598	45 516	205 015

\*) Including the following: Under licencing, under planning and remaining.

### Oil and gas resources as of 12.31.2007

	Oil		Gas		Total	
	mill. Sm <sup>3</sup> o.e.	EJ	mill. Sm <sup>3</sup> o.e.	EJ	mill. Sm <sup>3</sup> o.e.	EJ
Originally reserves	4877	176	3545	127	8422	303
+ Resources in fields	372	13	166	6	538	19
+ Resources in discoveries	241	9	405	14	646	23
+ Increased extraction	145	5	77	3	222	8
+ Undiscovered	1525	55	1875	68	3400	123
- Sold	3579	129	1232	44	4811	173
= Remaining resources	3581	129	4836	174	8417	303

### Changes in production capacity in 2007 and 2008

Power station and county	Maximum capacity (MW)	Mean annual production (GWh)
Changes in 2007		
Kårstø (gas power), Rogaland	420	3400
Blåfalli Vik, Hordaland	152	94
Innvik, Sogn og Fjordane	16	55
Byrkjelo, Sogn og Fjordane	13	62
Bessakerfjellet (wind power), Sør-Trøndelag	28	75
Funna, Nord-Trøndelag	12	10
Hundhammerfjellet (wind power), Nord-Trøndelag	33	97
Melkøya (gas power), Finnmark	215	1700

Other changes	117	502
Net increase in production capacity in 2007	1006	5995
Expected changes in 2008		
Hunsfoss, Vest-Agder	14	65
Sønnå, Rogaland	174	450
Leirfossene, Sør-Trøndelag	23	43
Bessakerfjellet (wind power), Sør-Trøndelag	30	80
Hundhammerfjellet (wind power), Nord-Trøndelag	18	50
Other changes	117	483
Expected net increase in production capacity in 2008	376	1171

### The largest hydropower stations in Norway as of 12.31.2007

Power station	County	Max. capacity (MW)	Mean ann. production (GWh)
Kvilldal	Rogaland	1240	3517
Sima	Hordaland	1120	3441
Tonstad	Vest-Agder	960	4169
Aurland I	Sogn og Fjordane	840	2419
Saurdal <sup>1)</sup>	Rogaland	640	1300
Rana	Nordland	500	2123
Tokke	Telemark	430	2221
Tyin	Sogn og Fjordane	374	1398
Svartisen	Nordland	350	1996
Brokke	Aust-Agder	330	1407
Evanger	Hordaland	330	1380
Nedre Vinstra	Oppland	308	1206
Skjomen	Nordland	300	1164
Vinje	Telemark	300	1003
Kobbelv	Nordland	300	733
Aura	Møre og Romsdal	290	1774

<sup>1)</sup> Pumped storage power station

### The largest reservoirs in Norway as of 12.31.2007

Reservoir	County	Max. reservoir capacity	
		mill. m <sup>3</sup>	GWh
Storglomvatn	Nordland	3506	4589
Blåsjø	Aust-Agder/Rogaland	3105	7759
Tustervatn-Røsvatn	Nordland	2363	2063
Svartevatn	Vest-Agder/Rogaland	1398	2923
Mjøsa	Hedmark/Oppland/Akershus	1312	337
Akersvatn	Nordland	1276	1531
Vatnedalsvatn	Aust-Agder	1150	1967
Møsvatn	Telemark	1064	2270
Altevatn	Troms	1027	1145
Kalvatn	Nordland	706	847

### Investment, price indices (1998 =100) and prices

	1995	2000	2005	2006
Gross investment in electricity supply (mill. NOK)	4114	3915	7496	7990
Acquisition of fixed assets (mill. NOK)				
- production plants	1180	834	3818	3653
- transmission lines	365	269	369	1301
- distribution network	2140	2160	2364	2215
- other	987	1081	1254	1367
Gross investment in % of total domestic investment	2.2	1.4	2.1	2.0
Repair and maintenance in				

electricity supply (mill. NOK)	1481	-	-	-
Electricity price index, households	93	95	140	172
Oil price index, light fuel oil	86	150	208	243
Consumer price index	94	106	115	118
Price of electric energy to households (øre/kWh)	49.7	50.4	74.8	91.5
Price of useful energy <sup>*)</sup> for light fuel oil (øre/kWh)	37.0	64.9	89.5	104.4

<sup>\*)</sup> Efficiency rate 0.8

### Energy balance 2007 in PJ

	Total	Coal and coke	Crude oil	Petroleum products	Natural gas and other gases	Water-fall energy	Electricity	Other
Primary production	9493	112	4604	479	3675	573	-	50
Imports	264	42	58	137	-	-	19	2
Exports	8506	96	4114	795	3445	-	55	0
Bunkers and stock changes	8	16	-37	30	0	-	-	-
Primary energy supply	1243	43	584	-209	236	573	-36	51
Conversion	1305	2	603	112	4	573	2	10
Secondary production	1256	7	-	692	50	-	496	12
Energy sector own use	279	-	-	6	251	-	23	0
Non-energy use	68	-	-	47	20	-	-	-
Statistical differences and losses	37	6	-18	27	-15	-	36	2
Final energy consumption	809	42	-	292	26	-	399	51
Of which:								
Industry and mining	288	42	-	28	22	-	179	18
Transport	220	-	-	216	2	-	2	-
Other consumer groups	302	0	-	48	2	-	218	33

### District heating 1995 - 2007

	Unit	1995	2000	2005	2006	2007
Establishments	Number	21	25	38	40	40
Net production of district heating		4668	5777	9224	9883	11037
Losses	TJ	399	531	765	903	1109
Delivered consumer:	"					
Total	"	4269	5246	8460	8980	9927
Households	"	977	758	1422	1602	1842
Other	"	3292	4488	7038	7378	8085
Average price (excl. VAT)	øre/kWh	26.3	30.6	45.9	53.2	50.5
Investment	mill. NOK	75.6	236.0	750.0	893.7	820.2

**Domestic deliveries of petroleum products 1995 - 2007 in mill. liter**

Products	1995	2000	2005	2006	2007
Petrol	2204	2189	2138	2057	1950
Auto-diesel	1622	1862	2431	2650	2955
Kerosene	201	150	130	130	103
Marine gas oil	1323	1494	1348	1433	1482
Light fuel oil	736	564	542	571	488
Heavy fuel oil	344	193	283	451	421
Other petroleum products	1519	1654	1690	1829	1859
Total	7949	8106	8562	9121	9258

**Production of important forms of energy 1995 - 2007**

	Unit	1995	2000	2005	2006	2007
Coal	1000 t	292	632	1471	2395	3995
Crude oil	Mill. Sm <sup>3</sup>	156776	181181	148137	136577	128277
Natural gas	Mill. Sm <sup>3</sup>	27814	49748	84963	87613	89662
Electricity	GWh	123011	142816	137811	121400	137709

**Final energy consumption<sup>\*)</sup> 1995 - 2007 in PJ**

	1995	2000	2005	2006	2007
Coal and coke	57	54	44	40	42
Wood and black liquor	42	50	45	44	42
Gases	12	21	24	28	26
Petroleum products	257	268	279	291	292
Electricity	374	394	399	389	399
District heating	4	5	9	9	9
Total	746	791	799	801	809

<sup>\*)</sup> Consumption by energy producing industries, consumption for non-energy purposes and losses in transportation and distribution are not included in the figures.

## The leading hydropower producing countries in 2006

(Source: IEA)

Country	Hydropower production		Total electricity production	
	TWh	Ann. change 1996-2006 (%)	TWh	Ann. change 1996-2006 (%)
China	436	8.8	2864	10.2
Canada	356	0.0	612	0.6
Brazil	349	2.8	419	3.7
USA	318	-1.0	4274	1.6
Russia	175	1.3	994	1.6
Norway	120	1.4	121	1.4
India	114	5.1	744	5.5
Japan	96	1.7	1091	0.9
Venezuela	79	3.9	120	4.8
Sweden	62	1.8	140	-0.1
World	3121	2.1	18930	3.3

## Energy and electricity consumption for selected countries in 2006

(Source: IEA)

Country	Total energy consumption <sup>*)</sup>		Electricity consumption <sup>**)</sup>	
	Per capita (GJ)	Ann. change 1996-2006 (%)	Per capita (kWh)	Ann. change 1996-2006 (%)
Canada	346	0.5	16766	-0.1
USA	324	-0.4	13515	0.3
Finland	298	1.3	17178	2.3
Australia	247	0.7	11309	2.2
Sweden	237	-0.6	15230	-0.1
Norway	234	0.4	24295	0.1
Russia	199	1.4	6122	2.0
France	180	-0.1	7585	0.7
Germany	177	-0.1	7175	1.1
New-Zealand	177	-0.4	9745	1.2
Japan	173	0.2	8220	0.6
Denmark	161	-1.2	6864	0.2
United Kingdom	160	-0.4	6192	0.9
Spain	137	2.4	6213	4.3
Italy	131	1.1	5762	2.2
South-Africa	115	0.5	4810	0.7
Poland	107	-0.9	3586	1.3
Argentina	74	0.6	2620	4.3
Thailand	68	2.2	2080	4.5
China	60	4.6	2040	9.2
Turkey	54	1.6	2053	5.0
Brazil	49	1.6	2060	1.8
Egypt	35	2.9	1382	5.4
Angola	26	0.7	153	8.9
Vietnam	26	2.6	598	12.6
Tanzania	22	1.4	59	0.0
India	21	0.6	503	2.8
Pakistan	21	1.1	480	3.2
Mosambique	18	-0.9	461	26.2
World	75	0.8	2659	1.7

<sup>\*)</sup> Total primary energy supply (excl. bunkers)

<sup>\*\*)</sup> Total domestic consumption (excl. losses in distribution system)

## Production and consumption of electric energy

County	Max. capacity	Production		Net consumption in 2006 incl. non-priority power					
	12.31.2007	2007	2006	Energy intensive industry	General consumption				
					Total	Other industries	Services and transport	Households and agriculture	
		(MW)	(GWh)		(GWh)	(GWh)	(GWh)	(GWh)	(GWh)
								(GWh)	(kWh)
Østfold	849	4788	4656	365	5 471	2 419	1 151	1 901	6564
Akershus	177	998	986	74	6 852	342	2 744	3 766	7159
Oslo	15	87	86	66	8 725	445	4 454	3 826	7090
Hedmark	528	2482	2339	-	2 936	514	965	1 457	6357
Oppland	1516	7424	5796	-	3 233	571	1 082	1 580	6668
Buskerud	1973	11171	9063	-	5 165	1 756	1 355	2 054	6911
Vestfold	3	20	15	38	3 416	542	1 102	1 772	7209
Telemark	2543	13041	12859	2 731	2 678	437	896	1 345	7331
Aust-Agder	1161	5141	4236	186	1 520	246	498	776	6721
Vest-Agder	2069	9749	9257	3 170	2 332	410	764	1 158	6573
Rogaland	3789	11664	11937	5 205	5 811	859	1 934	3 018	6701
Hordaland	4035	20380	14225	4 057	8 129	2 801	2 139	3 189	6589
Sogn og Fjordane	3755	15900	12603	5 230	1 565	258	520	787	6299
Møre og Romsdal	1495	7573	5847	6 049	3 587	662	1 184	1 741	6545
Sør-Trøndelag	1099	5357	4243	1 167	3 935	304	1 598	2 033	6341 <sup>1)</sup>
Nord-Trøndelag	760	3519	2570	203	3 596	1 961	626	1 009	6341 <sup>1)</sup>
Nordland	3246	14107	16192	5 319	4 154	686	1 370	2 098	8308
Troms	565	2387	2803	38	2 622	193	1 012	1 417	8715
Finnmark	609	1843	1617	-	1 450	109	604	737	9570
Svalbard	20	77	70	-	63	6	26	31	-
Total Norway	30205	137709	121400	33860	77240	15521	26024	35695	6960

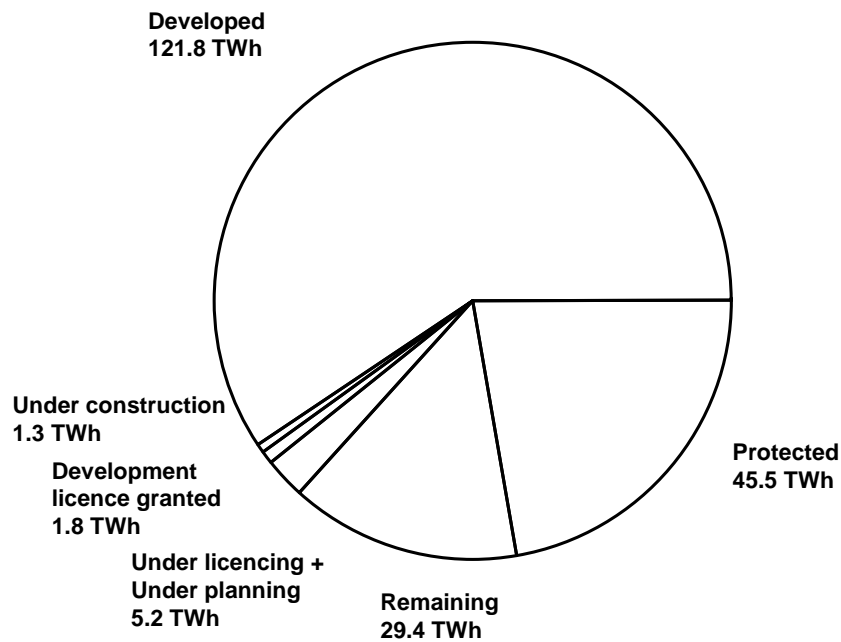
<sup>1)</sup> Total Sør- and Nord-Trøndelag

## Production and consumption of electric energy 1985 - 2006 in GWh

	1985	1990	1995	2000	2005	2006	Ann. change 1996-2006 (%)
Hydropower production	102946	121382	122487	142289	136452	119729	1.4
+ Thermal power production	346	466	514	496	860	1035	
+ Wind power production	-	-	10	31	499	636	
= Total production	103292	121848	123011	142816	137811	121400	1.5
+ Imports	4083	334	2300	1474	3653	9802	
- Exports	4627	16241	8962	20529	15695	8947	
= Gross consumption (total)	102748	105941	116349	123761	125769	122255	0.7
- Pumped storage power	804	339	1367	673	1091	515	
- Electric boilers	4821	6670	7514 <sup>1)</sup>	10518 <sup>1)</sup>	5592 <sup>1)</sup>	4763 <sup>1)</sup>	
- Losses	10013	7894	10018	10732	10633	10640	
= Net consumption, firm power	87110	91038	97450	101838	108453	106337	0.6
- Energy intensive industry	30030	29584	28369	30521	34984	33243	1.7
= General consumption	57080	61454	69081	71317	73469	73094	0.2
Of which:							
Households and agriculture	29960	30864	35587	35685	35404	35100	- 0.5
Pulp and paper industry, mining and other industry, construction site power	12488	13903	14115	14172	15512	15020	0.1
Services and transport	14632	16687	19379	21460	22553	22974	1.4
General consumption adjusted for temperature conditions	54973	64565	69557	75406	76670	76634	0.8

<sup>1)</sup> Non-priority power

# Hydropower potential as of 12.31.2007 (mean annual production)



## Useful energy excluding energy intensive industry and transport

