

Statistics

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DEFINITIONS

Installed capacity (net capacity): Is given in MW and constitutes the arithmetic sum of the rated capacity of the unit installed, but excluding own consumption.

Transmission capacity: Is the rated capacity in MW of a line with due regard taken to the limits imposed by the transformers connected to it.

Electricity generation (net generation): Is usually given in GWh and represents the output ex works, i.e. excluding own production at power station.

Condense: Is defined as the output from a turbo-generator set operated by steam that is expanded in a cooling water condenser to enable the steam to be utilised exclusively for electric power generation.

Combined heat and power (CHP): Is the generation of electric energy by a generator set driven by steam which, when discharged from the turbine, is applied for a purpose irrelevant to power generation such as district heating (CHP District heating) or process steam for industry (CHP Industry). Previously designated Back-pressure generation.

Imports/Exports: Is given in GWh and represents the settled values which (inclusive of compensation of loss) are registered as purchases and sales of electricity between the individual countries. *Net imports:* Is the difference between imports and exports.

Notes:
The Norwegian share of Linnvassely is considered as exports from Sweden to Norway.
The German share of Enstedværket is considered as exports from Denmark to Germany.

Total consumption: Is given in GWh and is the sum of electricity generation and net imports.

Occasional power to electric boilers: Is given in GWh and is the supply of electricity to electric boilers on special conditions for the generation of steam or hot water, which is alternatively generated by firing with oil or other fuels.

Gross consumption (electricity available): Is usually given in GWh and is the calculated electricity consumption: the sum of domestic electricity generation and imports deducting exports and occasional power to electric boilers.

Losses: Are usually given in GWh and is the calculated expression of the difference between gross consumption and net consumption.

Pumped storage power: Is given in GWh and is the electrical energy consumed by the pumps in raising the water into the upper reservoir.

Net consumption: Is usually given in GWh and is the sum of power consumed by the consumers.

UNITS AND SYMBOLS

kW	kilowatt
MW	megawatt = 1,000 kW
J	joule
kJ	kilojoule
PJ	petajoule = 10^{15} J
kWh	kilowatt-hour = 3,600 kJ
MWh	megawatt-hour = 1,000 kWh
GWh	gigawatt-hour = 1,000,000 kWh
TWh	terawatt-hour = 1,000 GWh
~	Alternating current (AC)
=	Direct current (DC)
.	Data are nonexistent
..	Data are too uncertain
0	Less than 0.5 of the given unit
-	No value

EXAMPLE OF CALCULATION:

Electricity generation
+ Imports
- Exports
<hr/>
Total consumption
- Occasional power to electric boilers
<hr/>
Gross consumption
- Losses, pumped storage power etc.
<hr/>
Net consumption

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The present statistics were prepared before the 1994 official statistics for the individual countries have become available. Certain figures in the Annual Report may thus differ from the official statistics.

SI Installed capacity 31.12.1994, MW

	Denmark	Finland	Iceland	Norway	Sweden	Nordel
Total installed capacity 1994	10 342	14 525	1 046	27 426	35 037	88 376
Commissioned in 1994	92	209	2	202	203	708
Decommissioned in 1994	76	–	–	68	–	144
• Hydro power	10	2 802	875	27 144	16 502 ¹⁾	47 333
• Nuclear power	.	2 310	.	.	10 040	12 350
• Other thermal power	9 794	9 408	121	278	8 457	28 058
<i>Of which:</i>						
Condense	8 339 ²⁾	3 673	.	78	2 740	14 830
CHP District heating	701	2 867	.	.	3 143	6 711
CHP Industry	195	1 990	.	165	636	2 986
Gasturbine etc.	559	878	121	35	1 938	3 531
• Other renewable power	538	5	50	4	38	635
<i>Of which:</i>						
Wind power	538	5	.	4	38	585
Geothermal power	.	.	50	.	.	50

¹⁾ Incl Norwegian share of Linnvasselv (25 MW)

²⁾ Incl. German share of Enstedværket (300 MW)

S2 Average-year generation of hydro power 1994, GWh

	Denmark	Finland	Iceland	Norway	Sweden	Nordel
Average-year generation 1994	–	12 530	4 950	111 697	63 600	192 777
Average-year generation 1993	–	12 530	4 950	111 183	63 500	192 163
Change	–	–	–	514	100	614

S3 Changes in installed capacity 1994

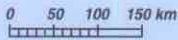
Power category	Power plant	Commissioned	Decommissioned	Change in average-year generation (Hydro power)	Type of fuel
		MW	MW	GWh	
Denmark					
• Condense	Masnedøværket		75		Coal/Oil
	Asnæsværket		1		Coal/Oil
• CHP District heating	Hanstholm	5			Natural gas
• Wind power	ELSAM	12			
Finland					
• Condense	Mussalo	91			Natural gas
• CHP District heating	Martinlaakso	8			Natural gas
Norway					
• Hydro power	Fossheimfoss	2		12	
	Nomeland	29	17	35	
	Ottedal	9	6	7	
	Fosse	18	18	3	
	Leinafoss	5	1	15	
	Meråker	87	20	295	
	Terla	41		114	
	Byafossen	3		25	
	Scheldeffoss	1		6	
	Kongsmarka	3	1	1	
	Skarsfjord	4	4	2	
Sweden					
• Hydro power	Klippen	27		97	
	Munkfors	11			
	Alfta	10			
	Div. ændringer	3			
• Nuclear power	Ringhals I	40			{ Wood waste/ Waste, refuse Wood waste Wood waste Wood waste Wood waste
• CHP District heating	Linköping	50			
	Enköping	23			
	Falun	9			
	Kristianstad	15			
	Värnamo	6			
• Wind power	Div. vindkraftv.	9			

S4 Decided power plants (larger than 10 MW)

Power category	Power plant	Capacity	Estimated commission.	Average-year generation	Type of fuel
		MW	Year	GWh	
Denmark					
• CHP District heating	Skærbækværket 3	394	1997		Natural gas
	Nordjyllandsværket 3	385	1998		Coal/Oil
	Silkeborg	102	1995		Natural gas
	Sønderborg	52	1996		Waste, refuse/Natural gas
	Avedøreværket	498	1999		Coal/Oil/Natural gas/Biomass
	Svanemølleværket	80	1995		Natural gas
	Næstved	38	1995		Waste, refuse/Natural gas
	Østkraft	37	1995		Coal
	Ringsted	12	1995		Natural gas
	Masnedøværket	10	1996		Straw
	Finland				
• Hydro power	Koivukoski	25	1995	20	
	Matarakoski	11	1995	32	
	Vuotos	37	2001	430	
• CHP Industry	Kyro	40	1995		Natural gas
	MB/Rauma	50	1996		
	Veitsiluoto	30	1996		
	Kirkniemi	80	1997		Natural gas
• CHP District heating	Toppila 2	105	1995		Peat
	Rovaniemi	30	1995		Peat
	Vuosaari B	450	1997		Natural gas
Norway					
• Hydro power	Frøystul	19	1995	74	
	Hekni	56	1995	230	
	Åsebotn	15	1995	85	
	Gravfoss	34	1996	78	
	Svartisen II	40	1998	251	
Sweden					
• CHP District heating	Nyköping	34	1995		Wood waste

S5 Maximum and minimum load on 3rd Wednesday in January and in July 1994

Installed net capacity	Maximum and minimum system load 1994							
	3rd Wednesday in January				3rd Wednesday in July			
	Local time	Max MW	Local time	Min MW	Local time	Max MW	Local time	Min MW
31.12.94, MW								
Denmark 10 342								
West of the Great Belt	17-18	3 325	03-04	1 822	10-11	2 312	04-05	1 446
East of the Great Belt	17-18	2 282	02-03	1 276	11-12	1 376	04-05	775
Finland 14 525	19-20	10 704	03-04	8 869	12-13	6 721	05-06	5 296
Iceland 1 046	10-11	602	03-04	480	11-12	472	05-06	374
Norway 27 426	08-09	18 045	02-03	14 798	10-11	9 135	04-05	7 193
Sweden 35 037	08-09	23 248	23-24	17 401	11-12	11 591	04-05	8 135
Nordel ¹⁾ 87 330	08-09	57 124	02-03	44 367	11-12	31 059	04-05	22 845
¹⁾ Excl. Island Greenwich Mean Time + 1 hour								



■	Vandkraft	DC	Jævnstrømsledning
▲	Termisk kraft	— —	DC line
●	Transf. eller kobl. station	==	Dobbeltledning
○	Substation	— —	Double line
—	750 kV ledning	○	Omformerstation
—	750 kV line	○	AC/DC/AC Back-to-back-station
—	400 kV ledning	— —	Samkøberforbindelse for lavere spænding end 220 kV
—	400 kV line	— —	Interconnection for voltage lower than 220 kV
—	300 kV ledning	()	Midlertidig driftsspænding
—	300 kV line	— —	Temporary voltage
—	220 kV ledning	— —	I drift
—	220 kV line	■▲●	In operation
—	132 kV ledning	□○	Bestlutede og planlagte udvidelser
—	132 kV line	— —	Decided and planned expansions

56 10 10 95



S6 Existing interconnections between the Nordel countries

Countries Stations	Rated voltage	Transmission capacity as per design rules ¹⁾		Total lines	Of which cable
	kV	MW		km	km
Denmark-Norway Tjele-Kristiansand	250/350	From Denmark 1 040	To Denmark 1 040	240/pol	127/pol
Finland-Norway Ivalo-Varangerbotn	220 ~	From Finland 100	To Finland 70	228	.
Denmark-Sweden Teglstrupgård-Mörarp 1 og 2 Hovegård-Söderåsen 1 Hovegård-Söderåsen 2 Vester Hassing-Göteborg Vester Hassing-Lindome Hasle (Bornholm)-Borrby	132 ~ 400 ~ 400 ~ 250 = 285 = 60 ~	From Sweden 350 ²⁾ 800 ²⁾ 800 ²⁾ 290 380 60	To Sweden 350 ²⁾ 800 ²⁾ 800 ²⁾ 270 360 60	23 91 91 176 149 48	10 8 8 88 87 43
Finland-Sweden Ossauskoski-Kalix Petäjäskoski-Letsi Keminmaa-Svartbyn Hellesby (Åland)-Skattbol Raumo-Forsmark	220 ~ 400 ~ 400 ~ 70 ~ 400 =	From Sweden] 900	To Sweden] 700	93 230 134 77 235	. . . 56 198
Norway-Sweden Sildvik-Tornehamm Ofoten-Ritsem Røssåga-Ajaure Linnvasselv, transformator Nea-Järpströmmen Lutufallet-Höljes Eidskog-Charlottenberg Hasle-Borgvik Halden-Skogssäter	132 ~ 400 ~ 220 ~ 220/66 ~ 275 ~ 132 ~ 132 ~ 400 ~ 400 ~	From Sweden 125 550 250 ³⁾ 50 450 ³⁾ 40 100] 1 800 ³⁾	To Sweden 125 550 250 ³⁾ 50 450 ³⁾ 20 100] 1 800 ³⁾	39 58 117 . 100 18 13 106 135

¹⁾ Maximum permissible exchange
²⁾ Thermal limit. The total transmission capacity is +/- 1 300 MW. It can be higher, however, if the practical possibilities of supply are limited, it is most often due to the import/export capacity of the Swedish or the Danish system
³⁾ The transmission capacity can in certain operating situations be lower due to bottlenecks in the Norwegian network. 1 800 MW implies a network protection system during operation (PDC = Production disconnection)

S7 Existing interconnections between the Nordel countries and other countries

Countries Stations	Rated voltage	Transmission capacity		Total lines	Of which cable
	kV	MW		km	km
Denmark-Germany Kassø-Audorf Kassø-Flensburg Ensted-Flensburg	2 x 400 ~ 220 ~ 220 ~	From Nordel] 1 400 ¹⁾	To Nordel] 1 400 ¹⁾	107 40 34	. . .
Finland-Russia Imatra-GES 10 Yllikkälä-Viborg Nellimö-Kaitakoski	110 ~ ±85 = 110 ~	From Nordel . . 60	To Nordel 100 900 60	20 . . 20	. . .
Norway-Russia Kirkenes-Boris Gleb	154 ~	From Nordel 50	To Nordel 50	10	.
Sweden-Germany Västra Kärrstorp - Herrenwyk	450 =	From Nordel 600 ²⁾	To Nordel 600 ²⁾	250	220

¹⁾ Transmission capacity alters between 1 200 and 1 500 MW due to operating conditions
²⁾ Due to limitations in the German network, the transmission capacity is limited to 250 MW from Nordel and 200 MW to Nordel for the present

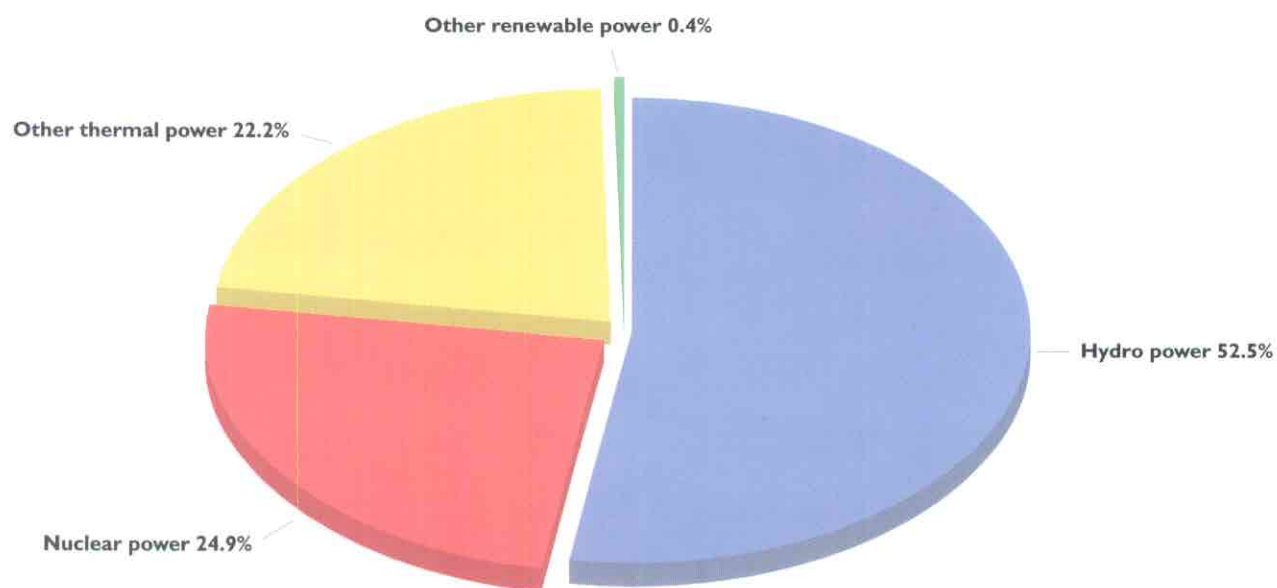
S8 Decided interconnections

Countries Stations	Rated voltage	Transmission capacity as per design rules	Total lines	Of which cable	Brought into service
	<i>kV</i>	<i>MW</i>	<i>km</i>	<i>km</i>	<i>Year</i>
Denmark-Germany Bjæverskov - Rostock	400 =	600	181	166	1995
Denmark-Denmark Elsam-Elkraft	400 =	500-600	approx 70	approx 70	1998
Norway¹⁾-The Netherlands²⁾	400 - 500 =	min 600	approx 550	approx 550	2001
Norway¹⁾-Germany³⁾	400 - 500 =	min 600	approx 550	approx 550	2003
¹⁾ Not decided: Lista, Feda or Tonstad ²⁾ Probably Eemshaven ³⁾ Probably Wilhelmshaven					

S9 Transmission lines 110 - 400 kV in service Dec. 31, 1994

	400 kV, AC and DC	220-300 kV, AC and DC	110, 132, 150 kV
	<i>km</i>	<i>km</i>	<i>km</i>
Denmark	1 109 ¹⁾	540 ²⁾	3 890 ³⁾
Finland	3 821 ⁴⁾	2 660	14 600
Iceland	.	492	1 315
Norway	2 110	5 782 ²⁾	10 300
Sweden	10 657 ⁴⁾	4 621 ²⁾	15 000
¹⁾ Of which 129 km in service with 150 kV and 46 km with 132 kV ²⁾ Of which 80 km in Denmark and 96 km in Sweden (Kontiskan), 89 km in Denmark and 382 km in Norway (Skagerrak) in service with 250 kV DC and 75 km in Denmark and 74 km in Sweden (Kontiskan 2) in service with 285 kV DC ³⁾ Of which 13 km in service with 60 kV and 105 km in service with 50 kV ⁴⁾ Of which 99 km in Finland and 99 km in Sweden DC submarine cable and 34 km in Finland and 2 km in Sweden DC land cable (Fenno-Skan)			

S10 Total electricity generation within Nordel 1994



S11 Electricity generation 1994, GWh

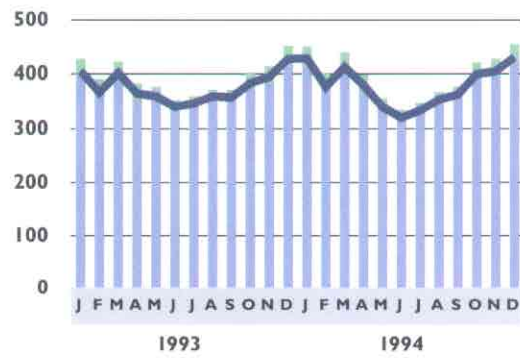
	Denmark	Finland	Iceland	Norway	Sweden	Nordel
Total generation 1994	38 044	62 108	4 774	113 528	137 656	356 110
• Hydro power	28	11 669	4 510	112 908	57 883	186 998
• Nuclear power	.	18 337	.	.	70 151	88 488
• Other thermal power	36 933	32 095	4	613	9 547	79 192
Of which:						
Condense	36 332 ¹⁾	12 010	.	119	850	49 311
CPH District heating	..	10 461	.	.	4 608	15 069
CPH Industry	601	9 615	.	341	4 007	14 564
Gasturbine etc.	—	9	4	153	82	248
• Other renewable power ²⁾	1 083	7	260	7	75	1 432
Total generation 1993	31 882	58 005	4 720	120 205	141 062	355 874
Change as against 1993	19.3 %	7.1 %	1.1 %	-5.6 %	-2.4 %	0.1 %

¹⁾ Incl. generation in combined heat and power stations
²⁾ Wind power. Iceland: Geothermal power

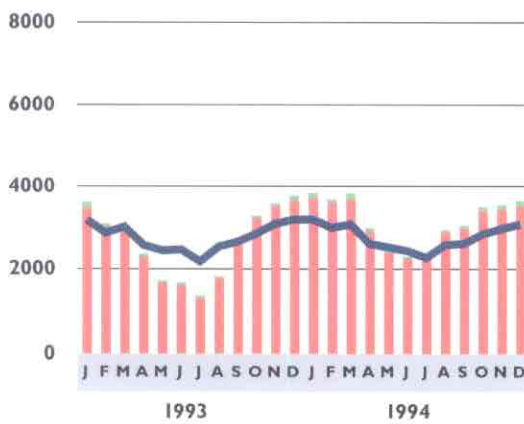
S12 Monthly electricity generation and gross consumption 1993-1994, GWh

- Gross consumption
- Generation by hydro power
- Generation by nuclear and other thermal power
- Generation by wind power or by geothermal power (Iceland)

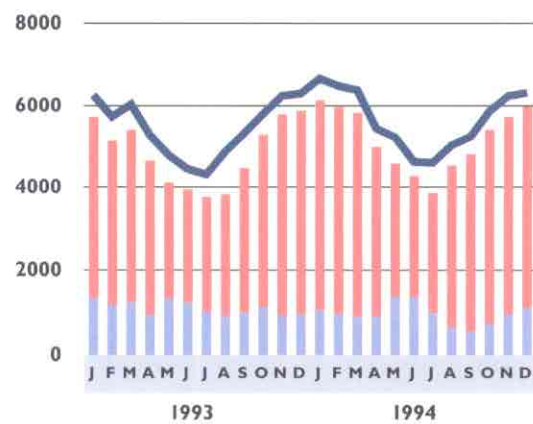
Iceland



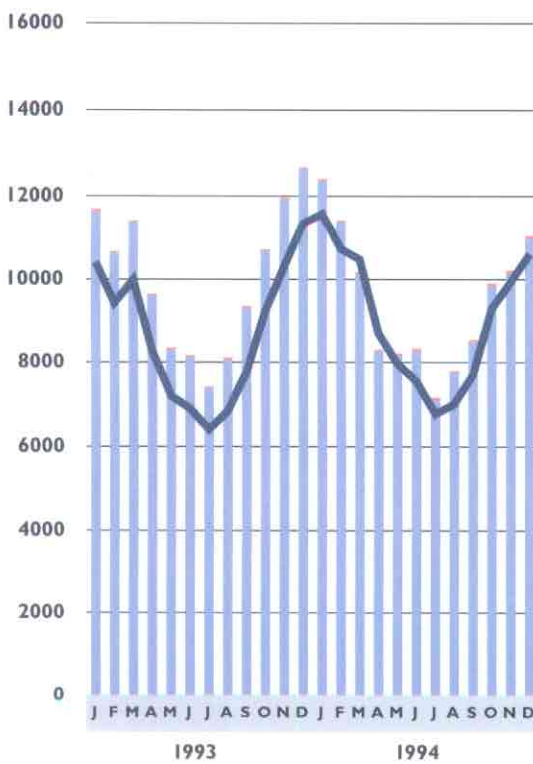
Denmark



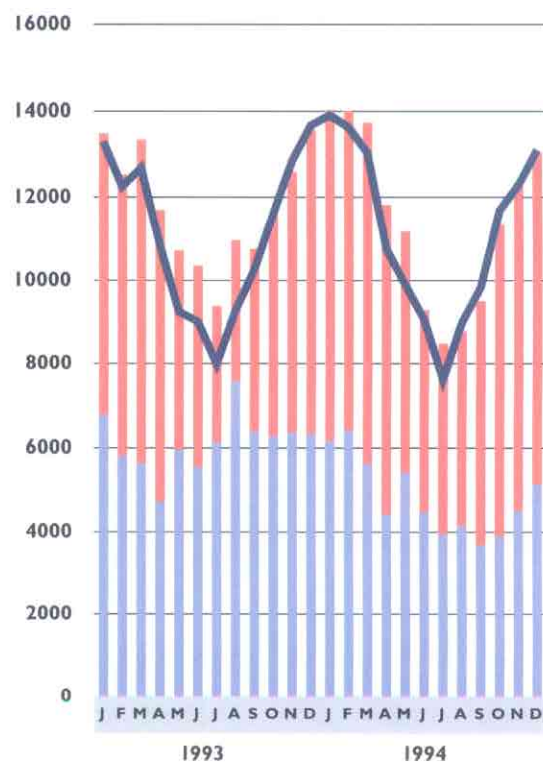
Finland



Norway



Sweden

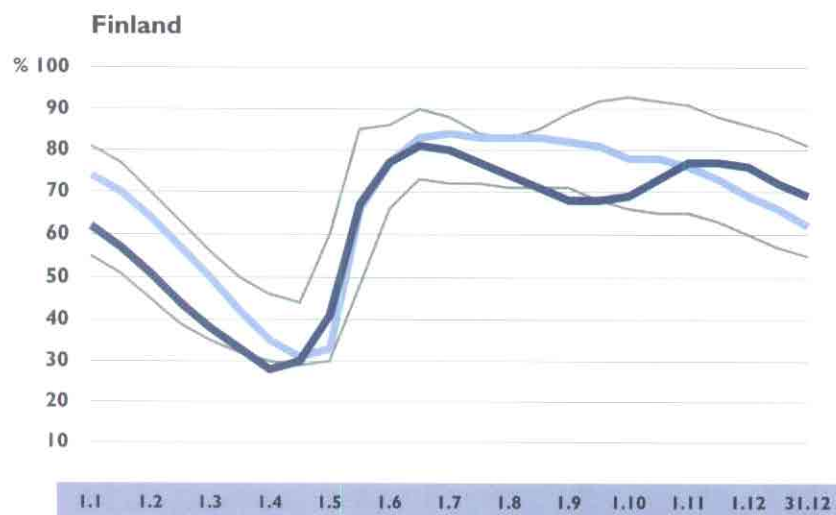


S13 Water reservoirs 1994

■ Water resevoirs 1994 shown in %
Norwegian data given from 31.7.1994

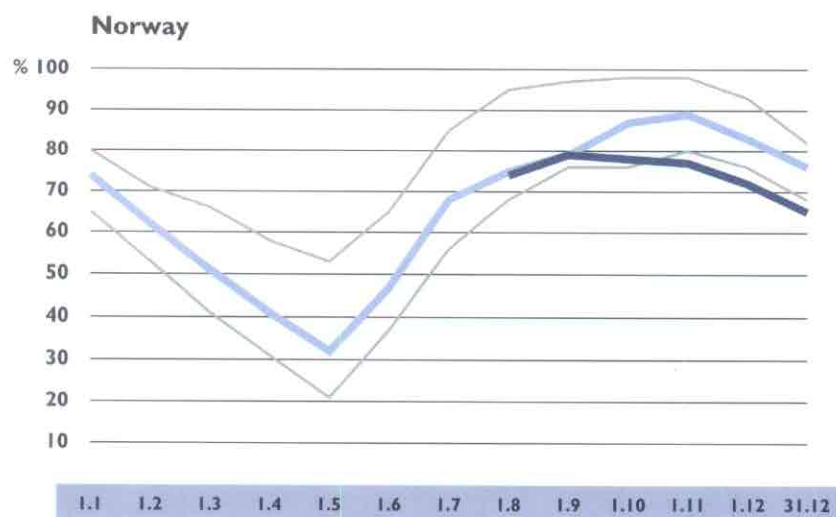
■ Water resevoirs 1993 shown in %
Norway: Average 1982-1991

■ Minimum and maximum in %
The values are given by data which have
been recorded the past 10-14 years



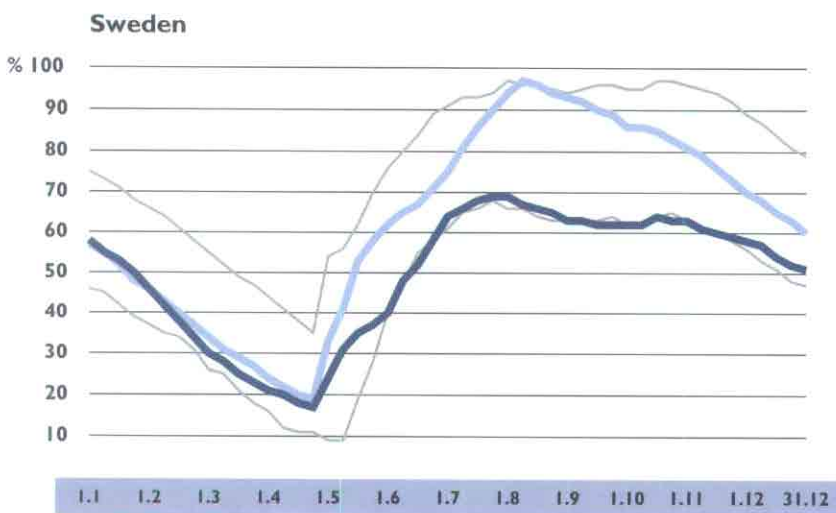
Reservoir capacity
01.01.1994: 4 900 GWh
31.12.1994: 4 900 GWh

Minimum and maximum values from data
which have been recorded 1984-1993



Reservoir capacity
31.07.1994: 77 032 GWh
31.12.1994: 77 073 GWh

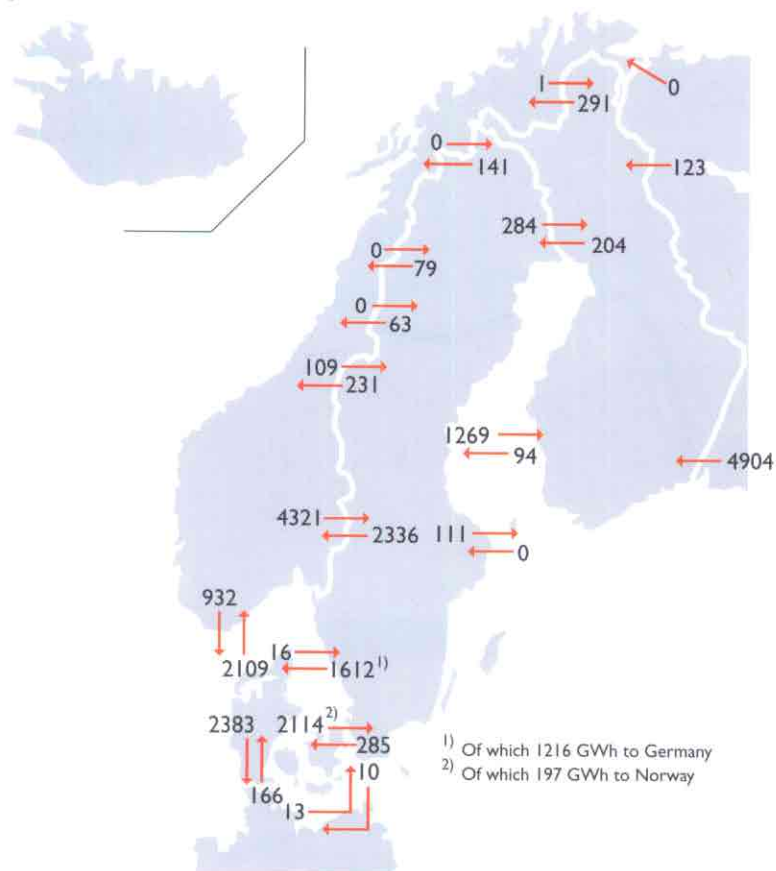
Minimum and maximum values from data
which have been recorded 1982-1991



Reservoir capacity
01.01.1994: 33 550 GWh
31.12.1994: 33 550 GWh

Minimum and maximum values from data
which have been recorded 1980-1993

SI4 Exchange of electricity 1994, GWh



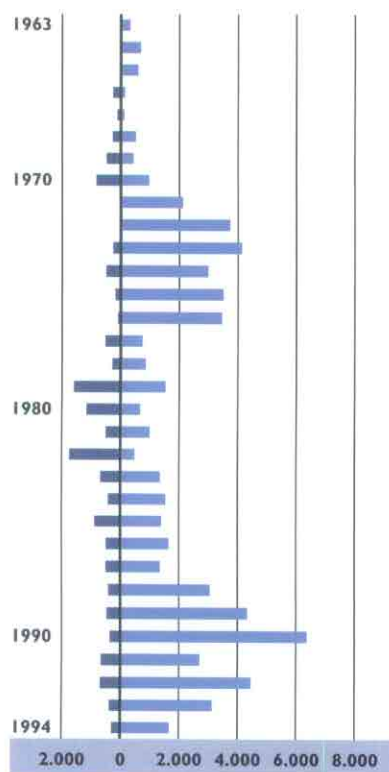
SI5 Imports/Exports 1994, GWh

Exports from:	Imports to:					Σ Exports
	Denmark	Finland	Norway	Sweden	Other countries ¹⁾	
Denmark	.	.	2 306	1 933	2 383	6 622
Finland	.	.	291	298	.	589
Norway	932	1	.	4 430	.	5 363
Sweden	681	1 664	2 850	.	1 226	6 421
Other countries ¹⁾	166	5 027	0	13	.	5 206
Σ Imports	1 779	6 692	5 447	6 674	3 609	24 201
	Denmark	Finland	Norway	Sweden	Nordel	
Total imports 1994	1 779	6 692	5 447	6 674	20 592	
Total exports 1994	6 622	589	5 363	6 421	18 995	
Net imports	-4 843	6 103	84	253	1 597	
Net imports/ Gross consumption	-14.6%	9.0%	0.1%	0.2%	0.5%	

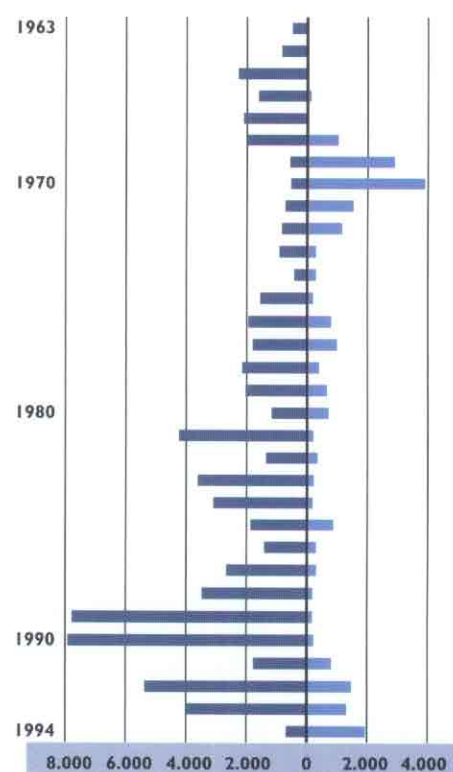
¹⁾ Russia and Germany

SI6 Exchange of electricity 1963 - 1994, GWh

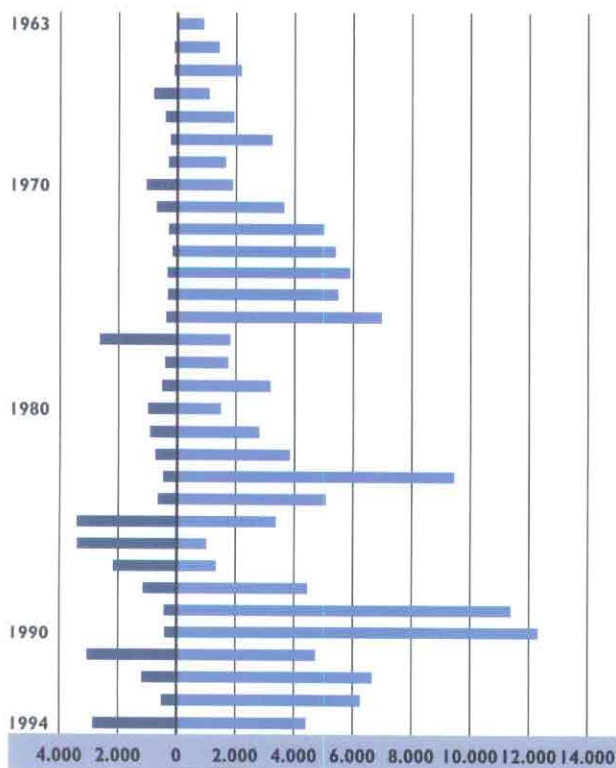
To Sweden ↔ To Finland



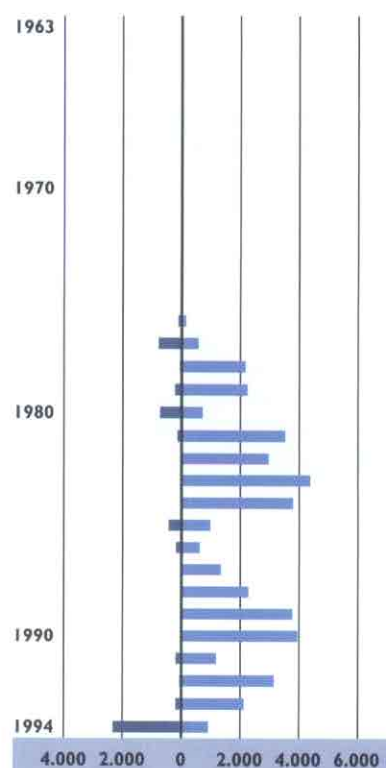
To Denmark ↔ To Sweden



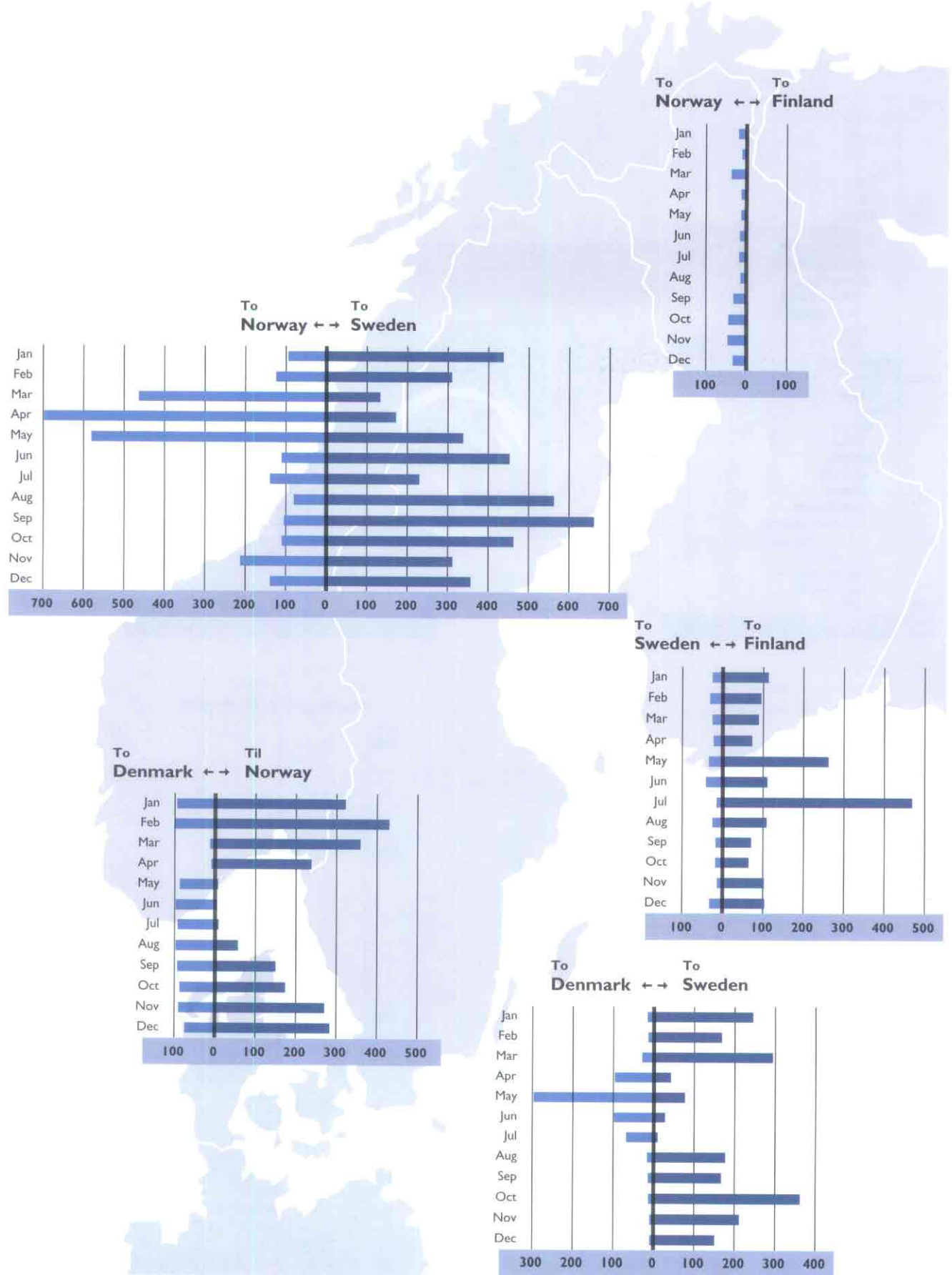
To Norway ↔ To Sweden



To Norway ↔ To Denmark

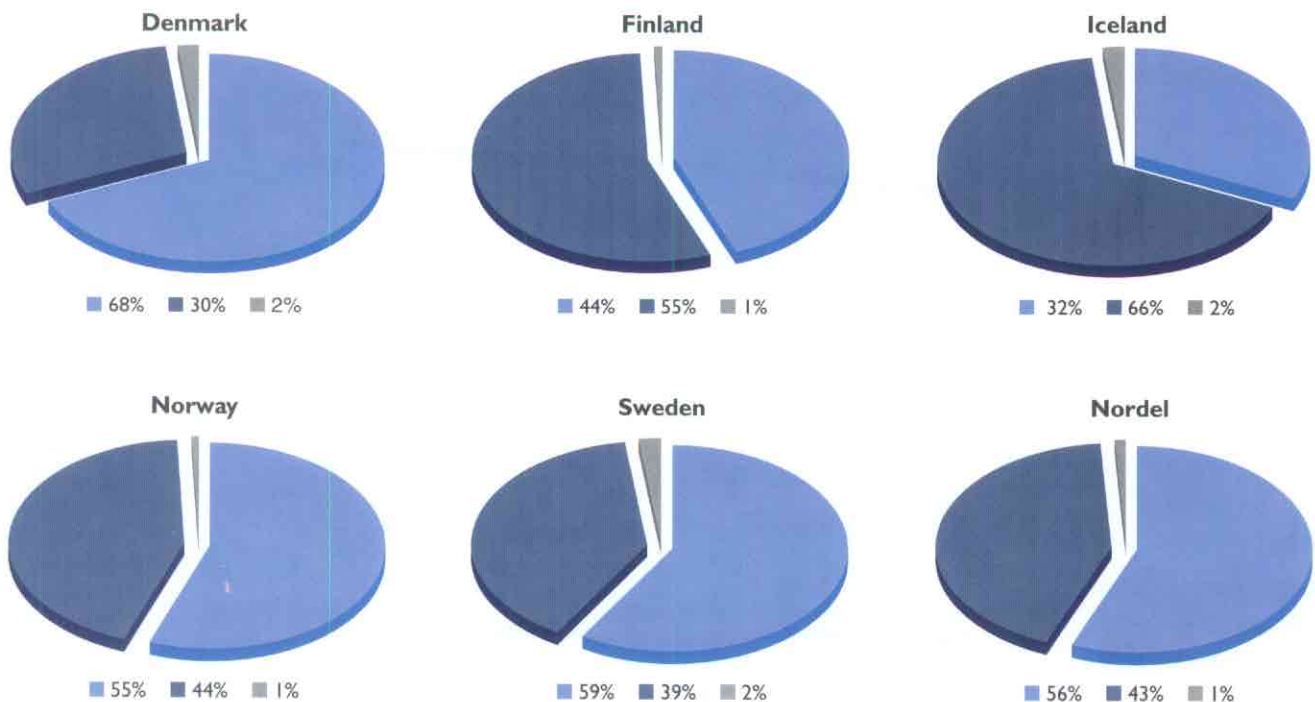


S17 Monthly exchange of electricity between the Nordel countries 1994, GWh



S18 Net consumption distributed on consumer groups in 1994

■ Domestic, commercial etc.
 ■ Industry
 ■ Traction



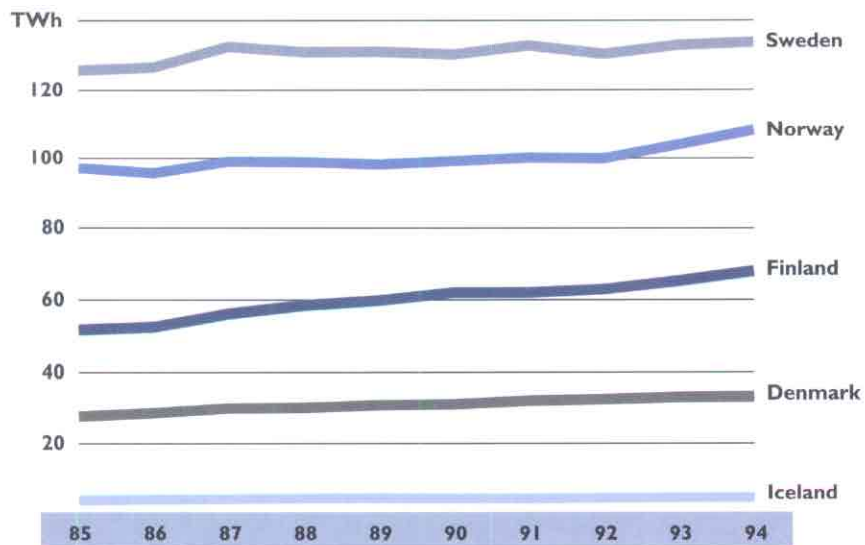
S19 Electricity consumption 1994, GWh

	Denmark	Finland	Iceland	Norway	Sweden	Nordel
Total consumption	33 201	68 211	4 774	113 612	137 909	357 707
Occasional power to electric boilers	.	82	237	5 315	4 081	9 715
Gross consumption	33 201	68 129	4 537	108 297	133 828	347 992
Losses, pumped storage power etc.	2 329	2 789	484	10 407 ¹⁾	8 248	24 257
Net consumption	30 872	65 340	4 053	97 890	125 580	323 735
Of which:						
Domestic, commercial etc.	21 069	28 870	1 296	54 377	73 490	179 102
Industry	9 206	35 990	2 677	42 853	49 513	140 239
Traction	597	480	80	660	2 577	4 394
Average population 1994, mill. inh.	5.2	5.1	0.3	4.3	8.8	23.7
Gross consumption per inh., kWh	6 385	13 359	15 123	25 185	15 208	14 683
Gross consumption 1993	33 071	65 398	4 501	104 103	133 017	340 090
Change in gross consumption as against 1993	0.4%	4.2%	0.8%	4.0%	0.6%	2.3%

¹⁾ Of which pumped storage power: 1542 GWh

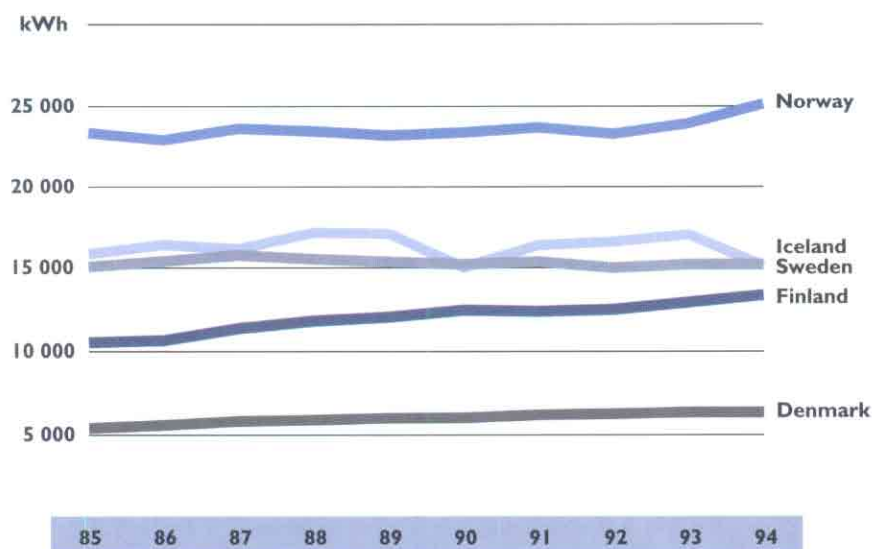
S20

Gross consumption
1985-1994, TWh



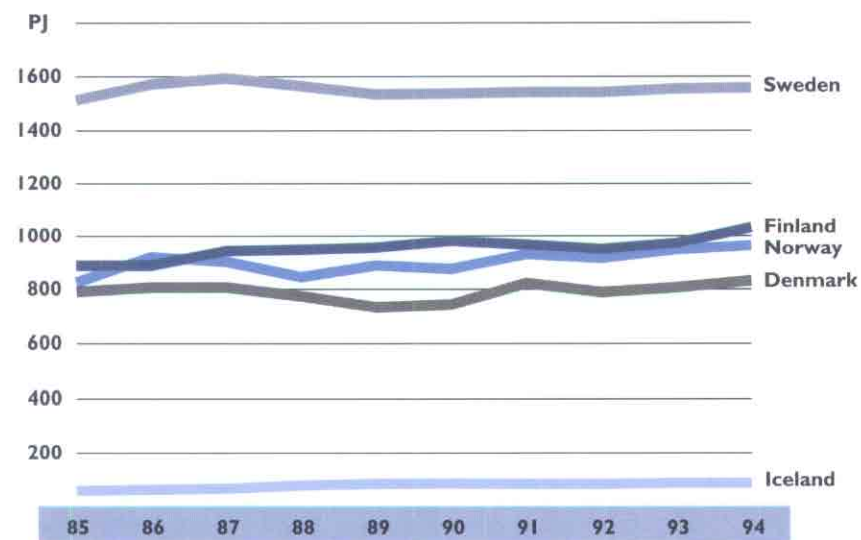
S21

Gross consumption
per inhabitant
1985-1994, kWh



S22

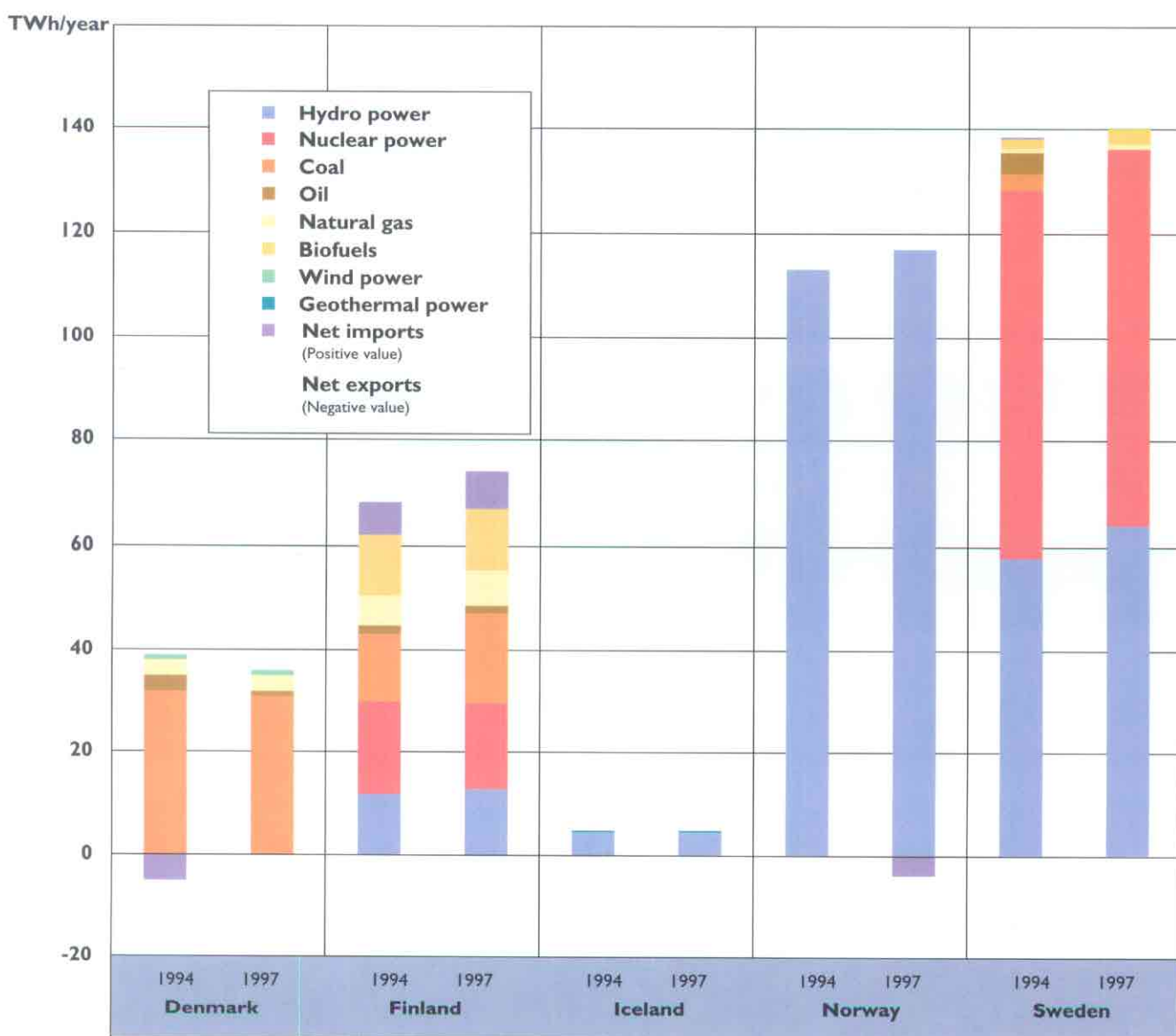
Total energy supply
1985-1994, PJ



S23 Total consumption 1994, GWh

	Denmark	Finland	Iceland	Norway	Sweden	Nordel
Generation 1994	38 044	62 108	4 774	113 528	137 656	356 110
Net imports 1994	-4 843	6 103	.	84	253	1 597
Total consumption 1994	33 201	68 211	4 774	113 612	137 909	357 707
Generation 1993	31 882	58 005	4 720	120 205	141 062	355 874
Net imports 1993	1 189	7 540	.	-7 791	-621	317
Total consumption 1993	33 071	65 545	4 720	112 414	140 441	356 191
Change in total consumption	0.4%	4.1%	1.1%	1.1%	-1.8%	0.4%

S24 Distribution of total consumption on energy sources 1994 and prognosis for 1997, TWh



S25 Gross consumption in 1994 and prognoses for 1997 and 2000, TWh

Year	Denmark	Finland	Iceland	Norway	Sweden	Nordel
1994	33	68	4.5	108	134	347.5
1997	36	74	4.6	108	140	362.6
2000	38	79	4.7	112	146	379.7

S26 Peak load demand in 1994 and prognoses for 1997 and 2000, MW

Year	Denmark	Finland	Iceland	Norway	Sweden	Nordel
1994	7 426	11 270	729	19 786	24 400	63 611
1997	7 854	13 000	751	20 660	28 000	70 265
2000	8 251	13 900	783	21 500	29 100	73 534

S27 Installed capacity in 1994 and prognoses for 1997 and 2000, MW

Year	Denmark	Finland	Iceland	Norway	Sweden	Nordel
1994	10 342	14 525	1 046	27 426	35 037	88 376
1997	10 084 ¹⁾	15 400	1 042	27 565	35 600	89 691
2000	10 675 ¹⁾	16 200	1 072	27 605	35 900	91 452

¹⁾ Excl. capacity of autoproducers

Environmental information

In the Nordic countries' objectives for the energy field, and especially the electrical energy field, a great and still increasing importance is being attached to the concern for the environment.

The reduction of the air pollution caused by the fossil-fired power stations has for several years been given a high priority in Denmark, Finland and Sweden, among other measures by reducing the emission of sulphur dioxide (SO₂).

The figure below shows the emission of SO₂ per produced kWh in the mentioned 3 countries. Much work has been and is still being done to reach very low values, and in Denmark, where fossil fuels constitute the major part of the electricity

generation, a successful result has been a significant reduction of the SO₂ emission

The means by which a reduction of the SO₂ emission, among other things, has been obtained, are listed below:

- Desulphurization plants at large coal-fired power stations
- Use of low-sulphur coal and low-sulphur oil at small power plants
- Increased use of natural gas and renewable energy sources

Similarly, the power stations are working on reductions of NO_x emission and other emissions.

S28 SO₂- emission 1980 - 1993 and prognoses for 1994 – 2000



In Denmark, Finland and Sweden the power stations cooperate on the generation of electricity and heat. The curves shown above appear by distributing the emissions on electricity and heat on the basis of the energy content of the two products: Annual SO₂ emission divided by the sum of the produced kWh electricity and kWh heat.