

PROVISIONAL DATA ON OPERATION
OF THE ITALIAN POWER SYSTEM

2006



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Introduction

Terna - Rete Elettrica Nazionale SpA - is the company in charge of electricity transmission and dispatching over the high and extra-high voltage grid throughout Italy. Its current ownership structure results from the acquisition (in November 2005) of part of GRTN's assets, as set forth in the Decree of the President of the Council of Ministers of 11 May 2004. Operation of the power system is one of Terna's core activities.

To ensure the reliability and quality of electricity supply under maximum security conditions, Terna must, instant by instant, collect data on the status of the power system. By processing these data, Terna develops yearly indicators of the performance of the power system.

This publication summarises the provisional data on operation of the Italian power system in 2006.

Among the 2006 highlights, it is worth mentioning the overall growth of electricity consumption, which was up by 2.2% on 2005.

In 2006, electricity demand reached 337.8 billion kWh. Of this figure, 86.8% was covered by domestic production allocated for consumption (+4.2% on 2005) and 13.2% by imports (-9% on 2005).

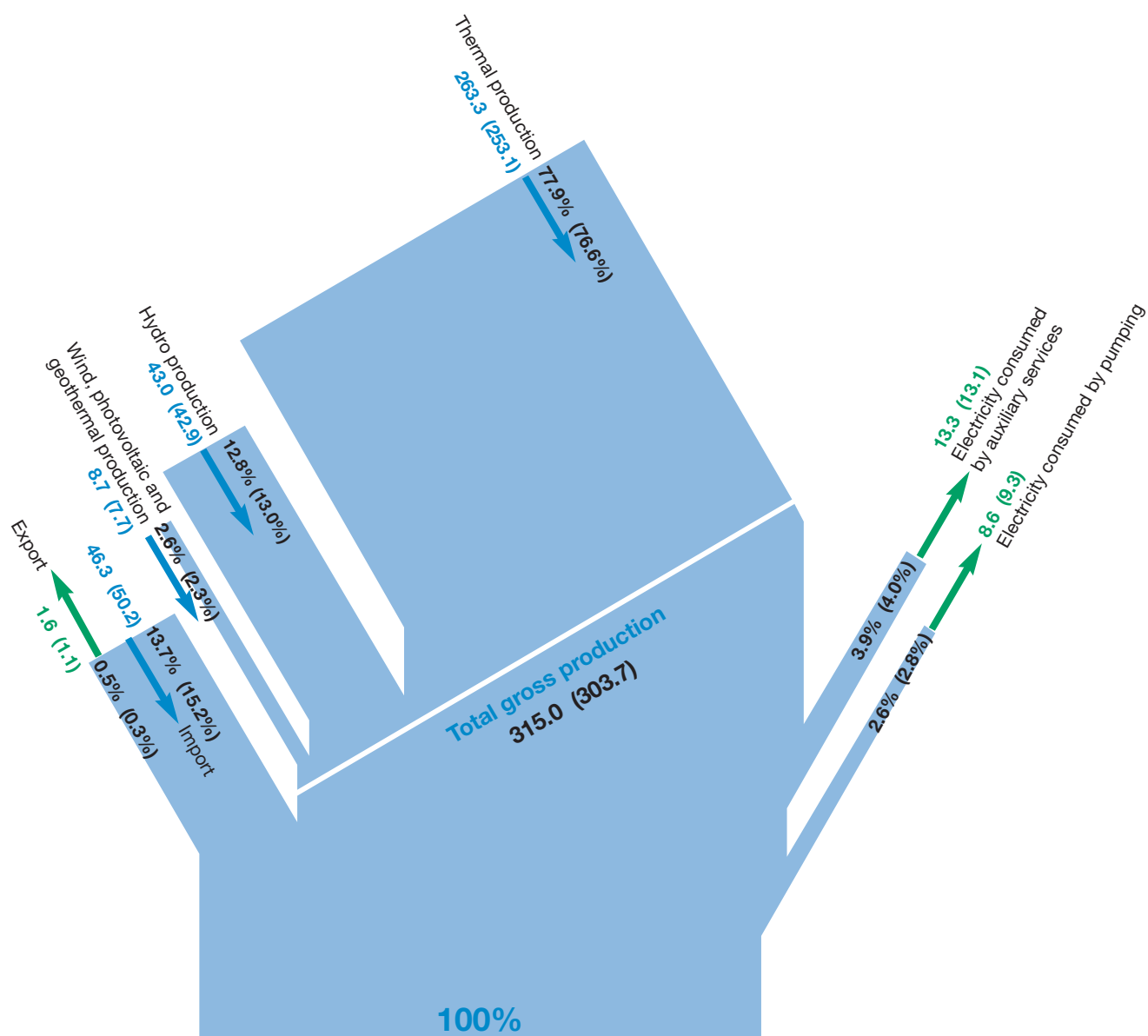
Numerous grid facilities went into operation in 2006, including the new 150 kV AC link between Sardegna and Corsica (SAR.CO.) and, in September, the new 380 kV Turbigo-Ospiate line.

In 2006, the national power grid recorded a new all-time peak load (55,619 MW on 27 June 2006 at 11:00, up by 1.1% on the previous year).

The following pages give more insight into these and other aspects of Terna's management & operation of the Italian power system.

Italian Electricity Balance

TWh (2005 data between parentheses)



Electricity supplied (consumption + losses) **337.8 (330.4)**

2006/2005 variation **+ 2.2%**

Electricity Balance by Regional Area and Total (GWh)

									Total		
	TURIN	MILAN	VENICE	FLORENCE	ROME	NAPLES	PALERMO	CAGLIARI	2006	2005	% Var.
Hydro Production	9,021	10,273	11,520	1,788	5,311	3,702	689	718	43,022	42,929	0.2
Thermal Production	26,701	59,733	26,876	27,826	35,328	49,181	23,714	13,893	263,252	253,072	4.0
Wind, photovoltaic and geothermal production	12	0	0	5,535	339	1,779	456	621	8,742	7,671	14.0
Total gross production*	35,734	70,006	38,396	35,149	40,978	54,662	24,859	15,232	315,016	303,672	3.7
Electricity consumed by auxiliary services	1,168	2,706	1,577	1,366	1,489	2,875	1,193	916	13,290	13,064	1.7
Total net production*	34,566	67,300	36,819	33,783	39,489	51,787	23,666	14,316	301,726	290,608	3.8
Electricity consumed by pumping	1,682	2,979	251	390	180	1,826	834	506	8,648	9,319	- 7.2
Net production allocated for consumption	32,884	64,321	36,568	33,393	39,309	49,961	22,832	13,810	293,078	281,289	4.2
Import	18,004	20,614	6,766	0	0	938	0	1	46,323	50,264	- 7.8
Export	587	73	10	0	0	447	0	488	1,605	1,109	44.7
Net import/export balance	17,417	20,541	6,756	0	0	491	0	- 487	44,718	49,155	- 9.0
Balance of physical exchanges between regional areas	- 13,409	- 14,847	5,995	17,101	8,515	- 1,900	- 1,118	- 337			
Electricity supplied	36,892	70,015	49,319	50,494	47,824	48,552	21,714	12,986	337,796	330,444	2.2
Year 2005	36,373	67,082	48,391	50,608	47,110	46,858	21,411	12,611			
% variation	1.4	4.4	1.9	- 0.2	1.5	3.6	1.4	3.0			
*of which CIP-6 production	869	2,827	7,103	17,918	6,601	8,197	5,197	2,987	51,699	54,032	- 4.3

N.B. Net import/export balance excluding the Republic of San Marino and the Vatican City.

During the year, **electricity demand** reached 337.8 billion kWh (+2.2% on 2005), with a fairly variable monthly performance.

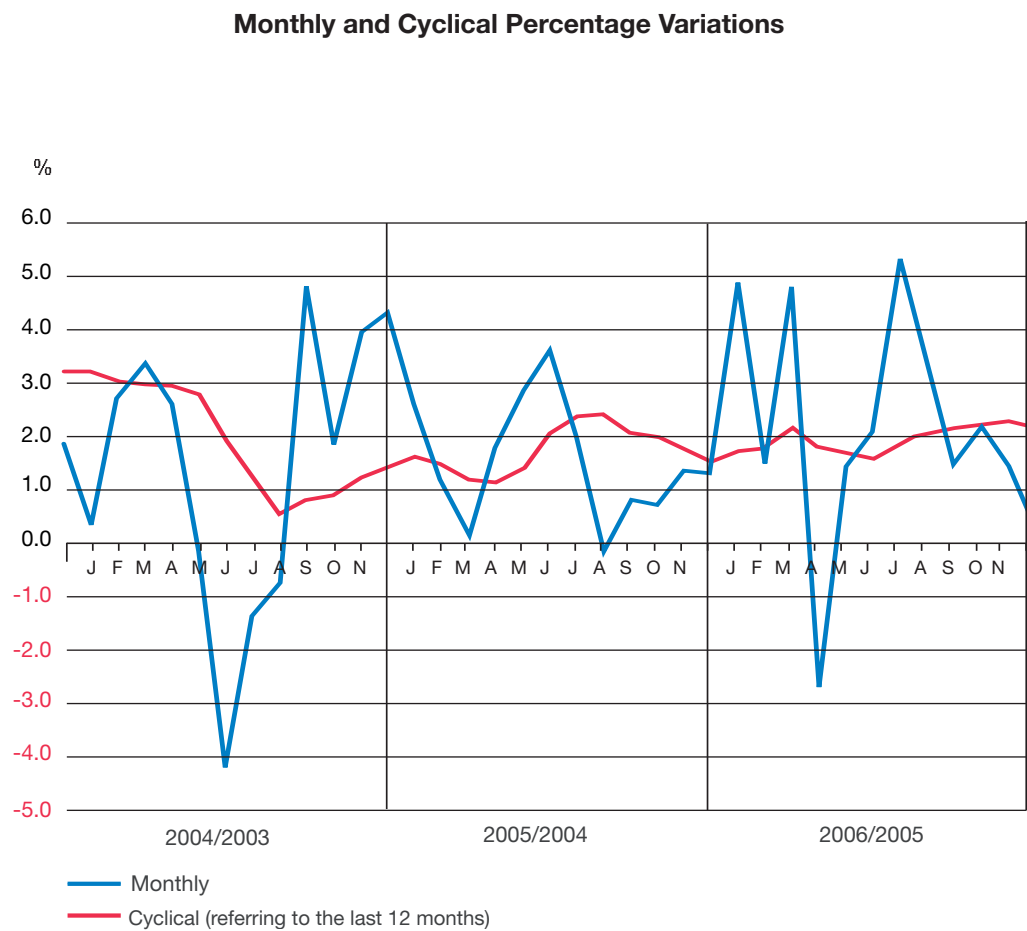
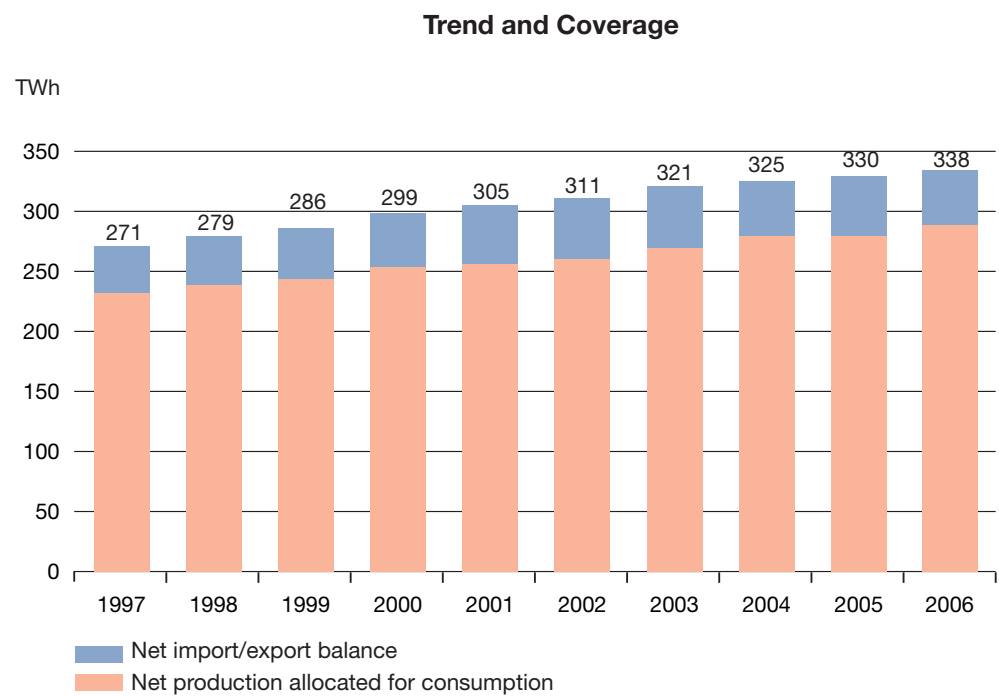
Net domestic production allocated for consumption rose by 4.2%, whereas the balance of physical exchanges of electricity with neighbouring countries fell by 9.0% on the previous year.

With respect to 2005, production from thermal sources and renewables (geothermal, wind and photovoltaic) was up by 4.0% and 14.0%, respectively; conversely, production from hydro sources rose negligibly (+0.2%).

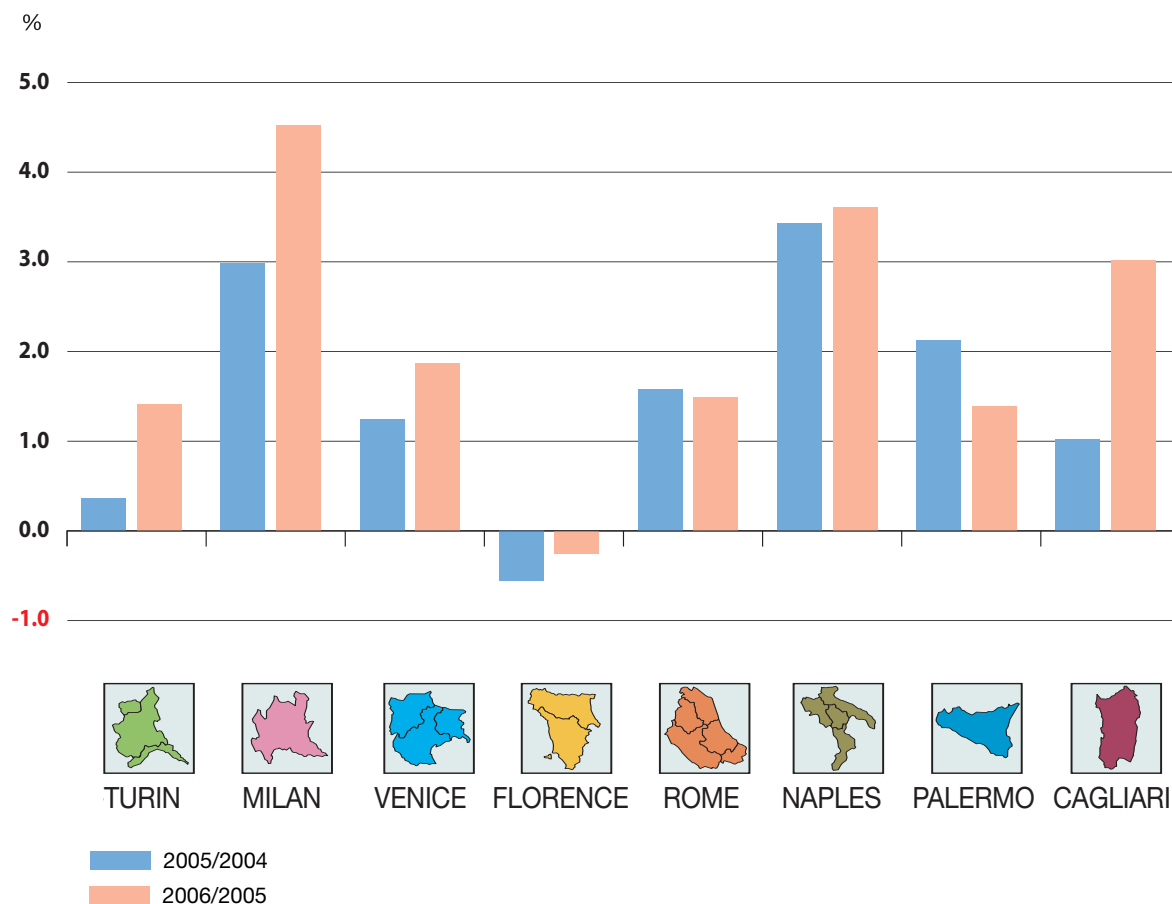
Imports of electricity from neighbouring countries were down by 7.8%, while exports were up by as much as 44.7%.

In the Summer period, extremely high temperatures caused electricity demand to hit record levels, reaching an all-time peak in terms of both load and energy requirements. These record peaks were not exceeded in the Winter period thanks, among others, to a fairly mild climate.

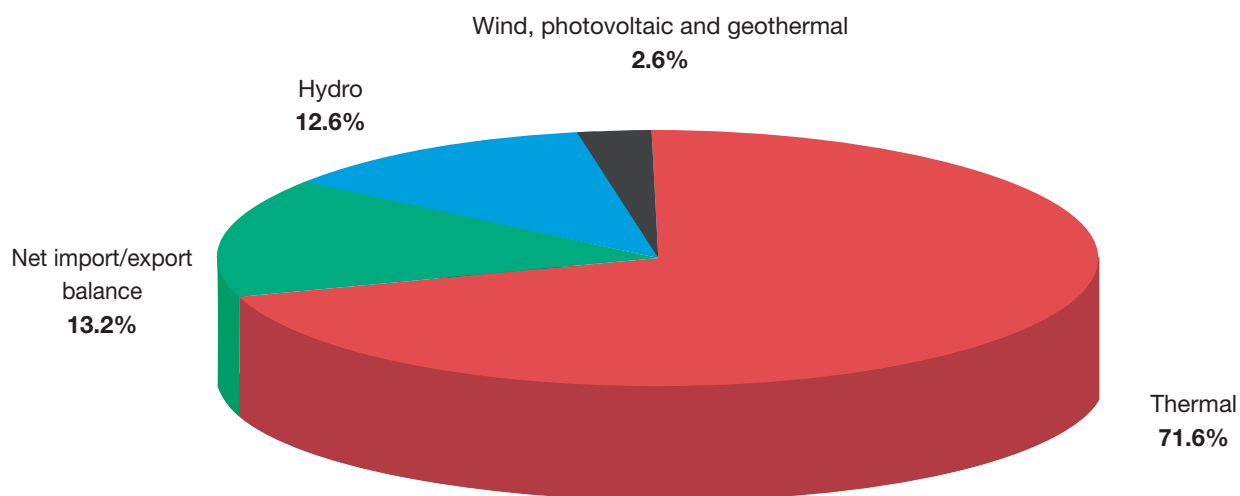
Electricity Demand on the Italian Grid



Percentage Variations by Regional Area



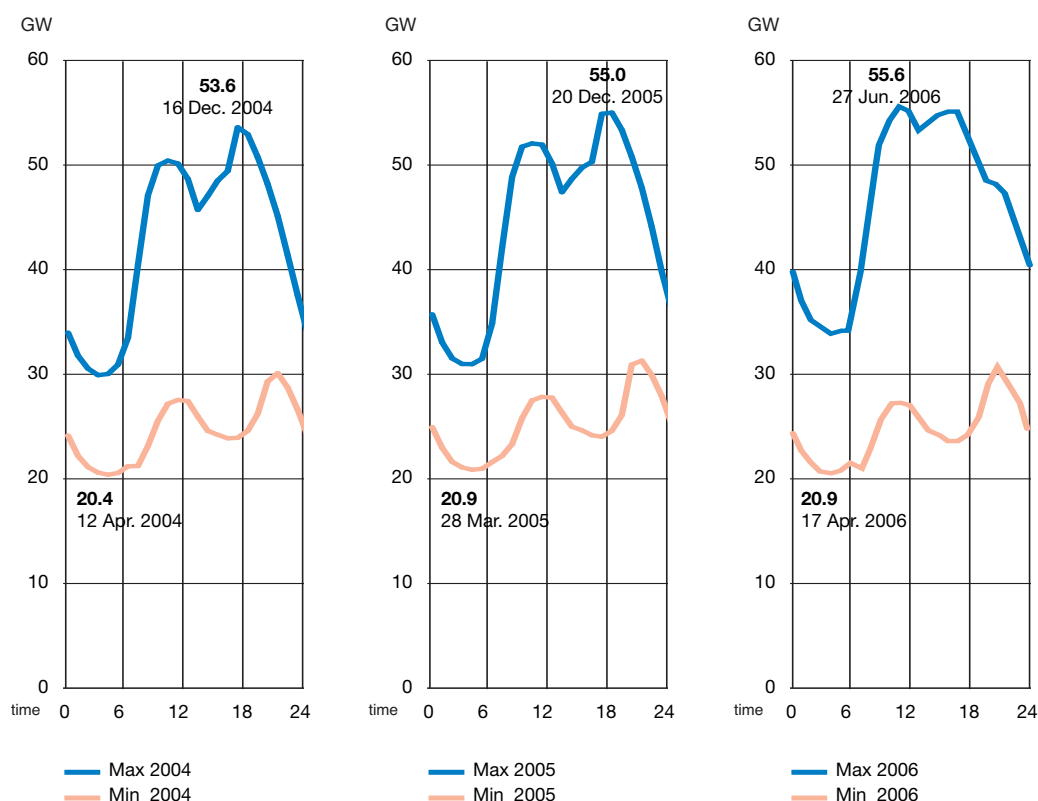
Components (%) of Electricity Supply Side*



*% net of electricity consumed by auxiliary services of the production and by pumping

Hourly Load Demand on the Italian Grid

Load Curve on Maximum and Minimum Peak Days

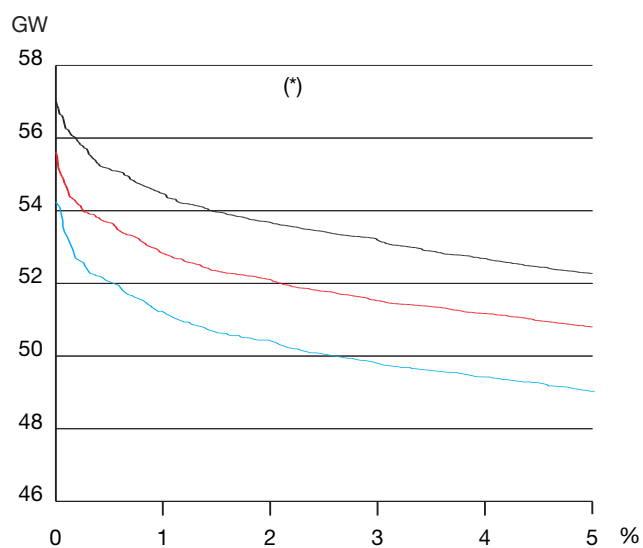
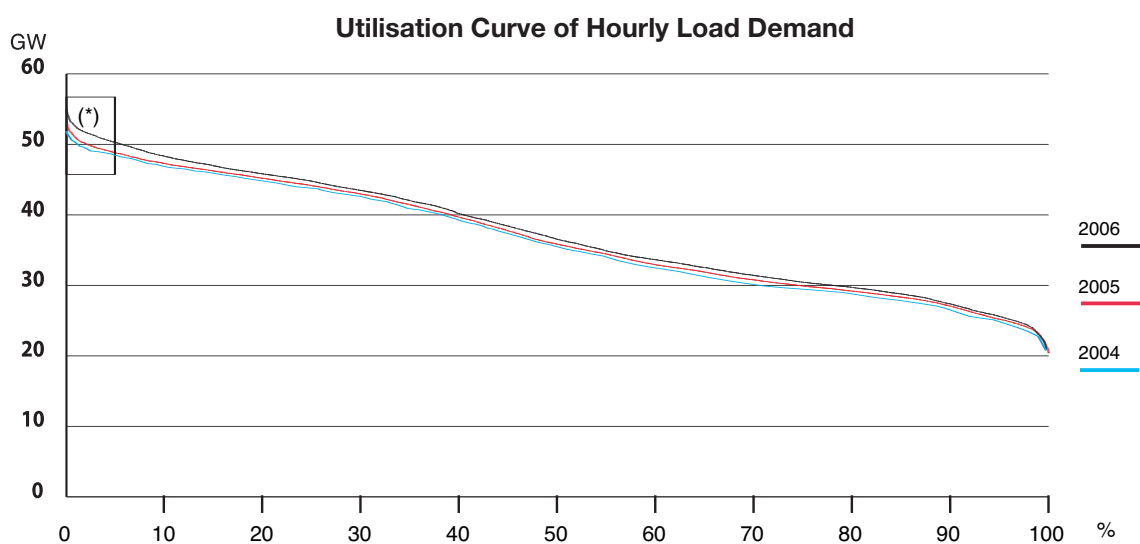
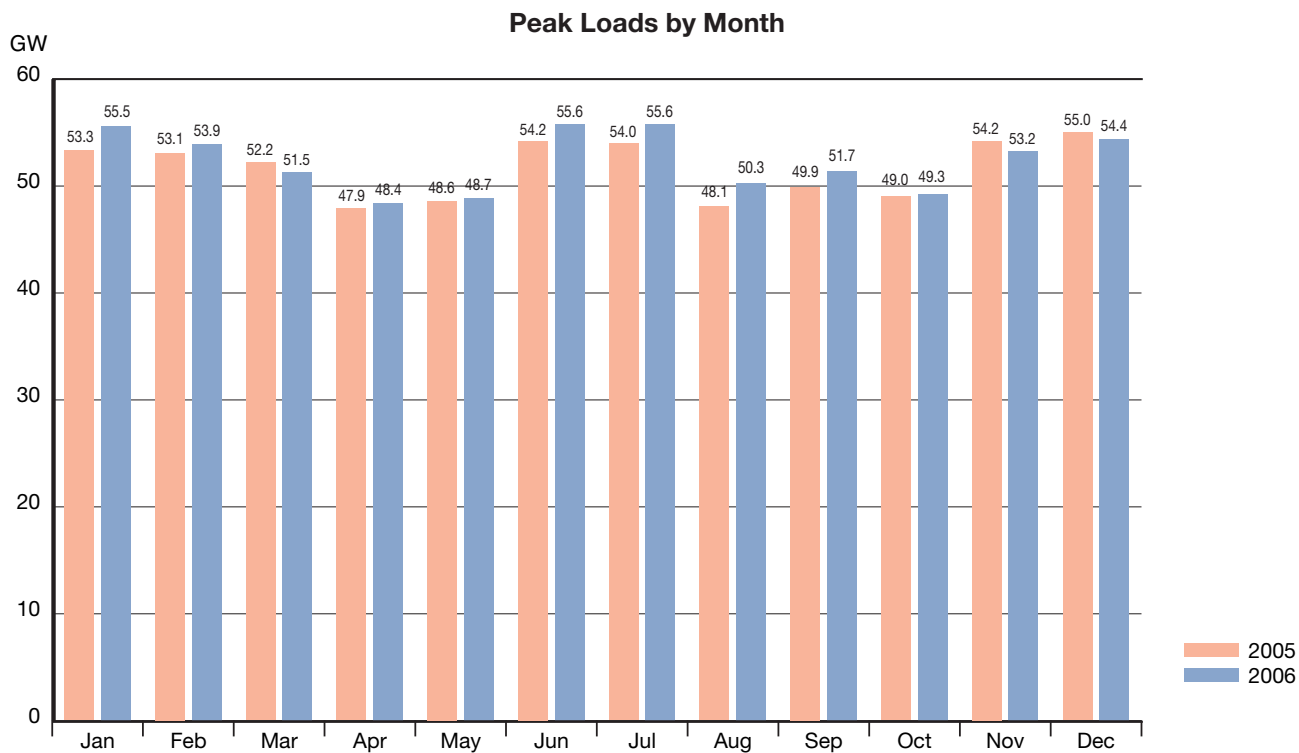


Daily Values – 2006

	MAX		MIN	
	GW	Date - Time	GW	Date - Time
LOAD				
Gross thermal production	43.6	24 January 18:00	16.4	17 April 3:00
Gross hydro production	12.8	25 July 17:00	1.3	31 December 4:00
Hourly peak load	55.6	27 June 11:00	20.9	17 April 4:00
ENERGY	GWh	Date	GWh	Date
Gross thermal production	974.9	25 January	415.7	16 April
Gross hydro production	185.2	26 July	54.2	3 December
Daily electricity demand	1,125.4	28 June	593.2	15 August

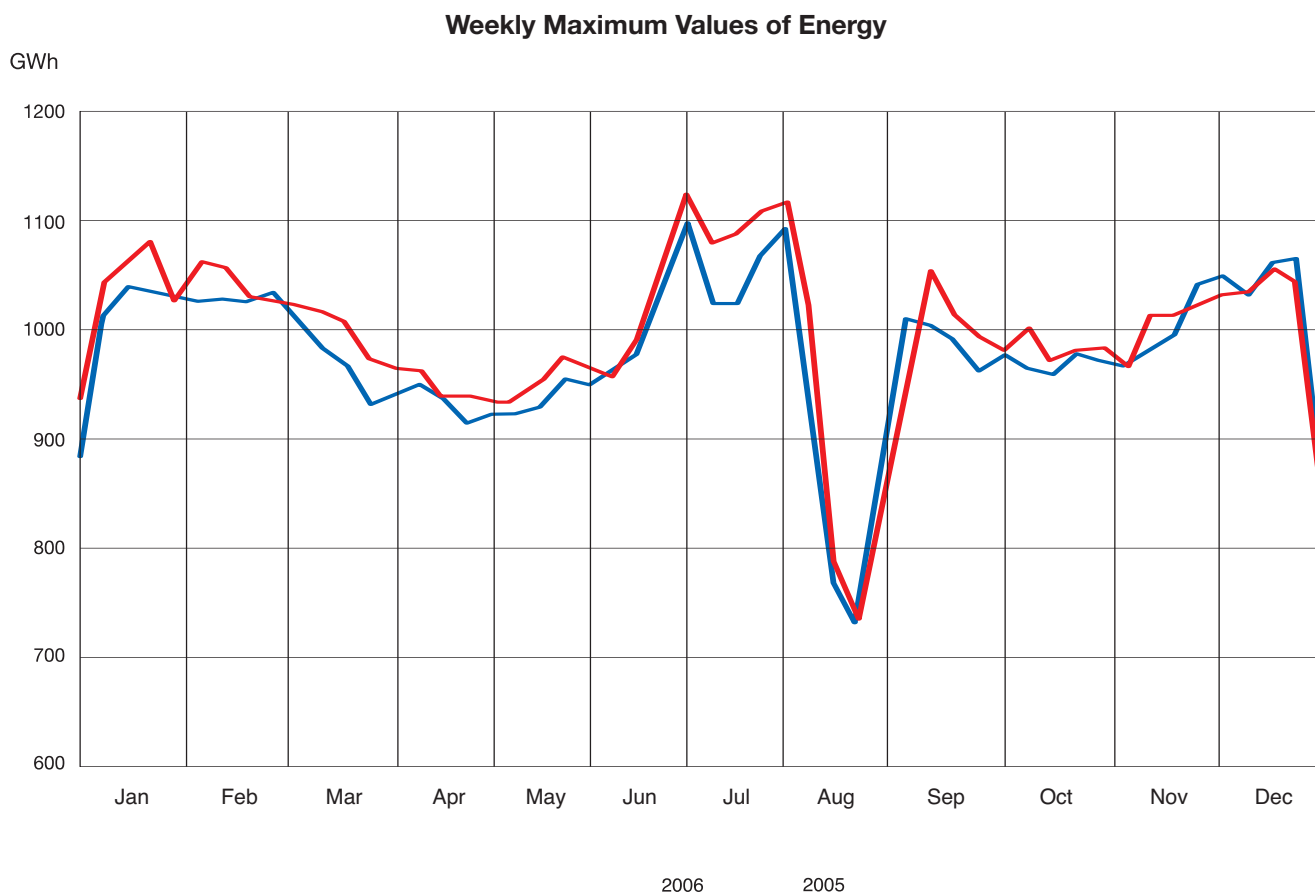
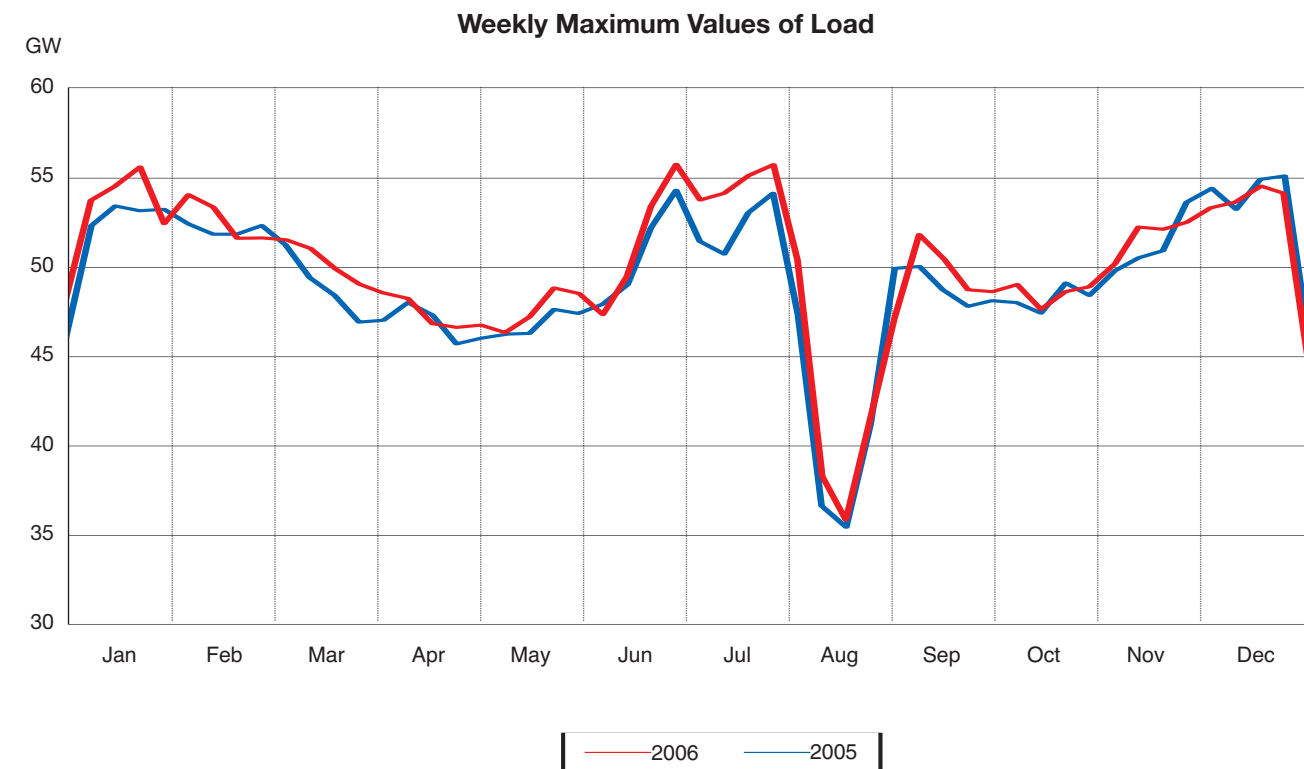
N.B.: Data are net of electricity consumed by auxiliary services and by pumping.

In 2006, **electricity demand on the national power system** had a new all-time peak of 55,619 MW at 11:00 of Tuesday, 20 June (up by 1.1% on the previous year, i.e. 55,015 MW at 18:00 of Tuesday, 20 December 2005). In the Summer period, owing to the torrid heat on some days of June, electricity demand on the national power grid had repeated peaks in various areas of the country.



N.B.: Data are net of electricity consumed by auxiliary services and by pumping.

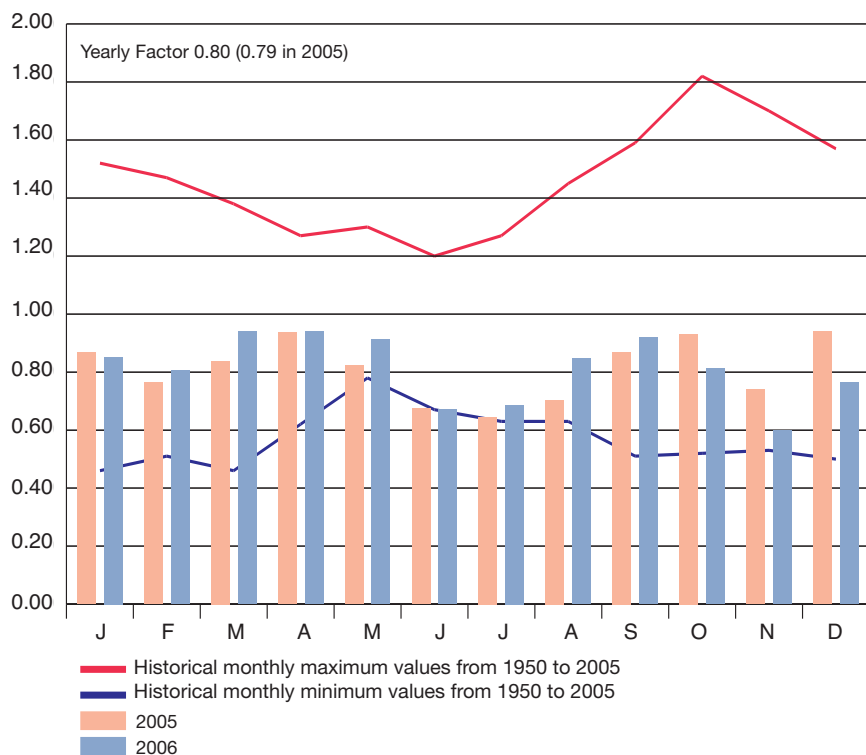
Weekly Maximum Values of Load and Energy



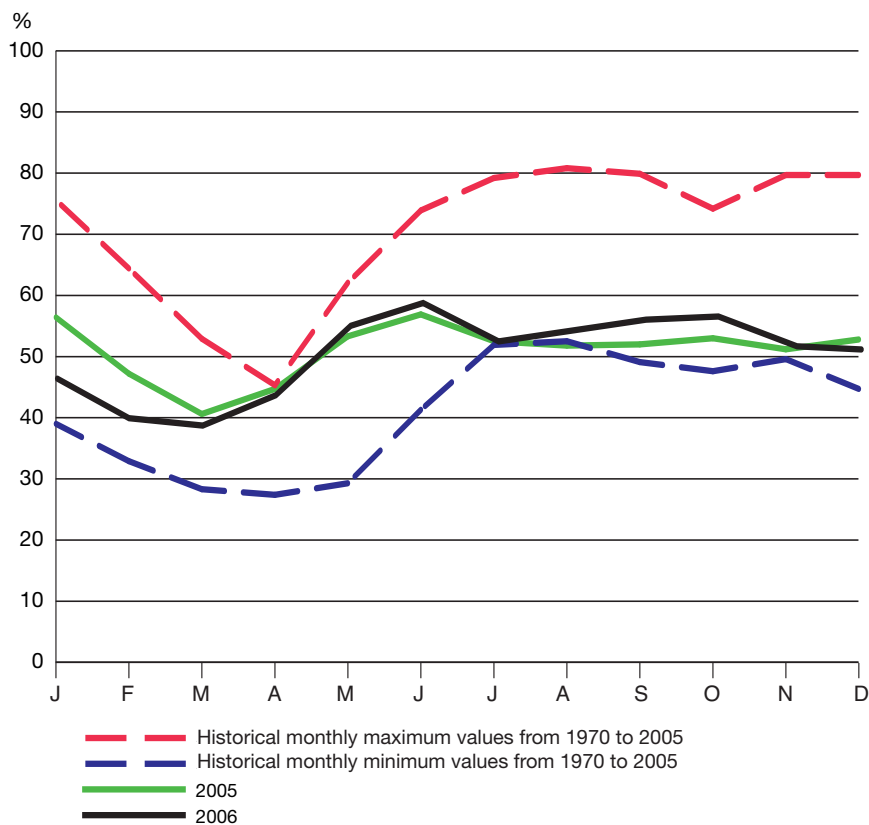
The **weekly load curve of electricity supplied** shows the maximum values of load and energy recorded on the Italian power grid in each of the 52 weeks of 2006. The diagrams clearly show low demand values during the Easter, August and year-end holidays.

Hydro Power Plants

Energy Capability Factor



Fullness Factor of Hydro Reservoirs at the end of Each Month



The **monthly energy capability factor** had a fairly variable performance: values below the multi-year average were recorded in many months of 2006, confirming a year of scarce rainfall.

In June, this factor had an all-time minimum vs. its multi-year average.

The **yearly energy capability factor** (ratio of the energy capability in the current year to the average multi-year reference value) was more or less equal to the corresponding value of the previous year.

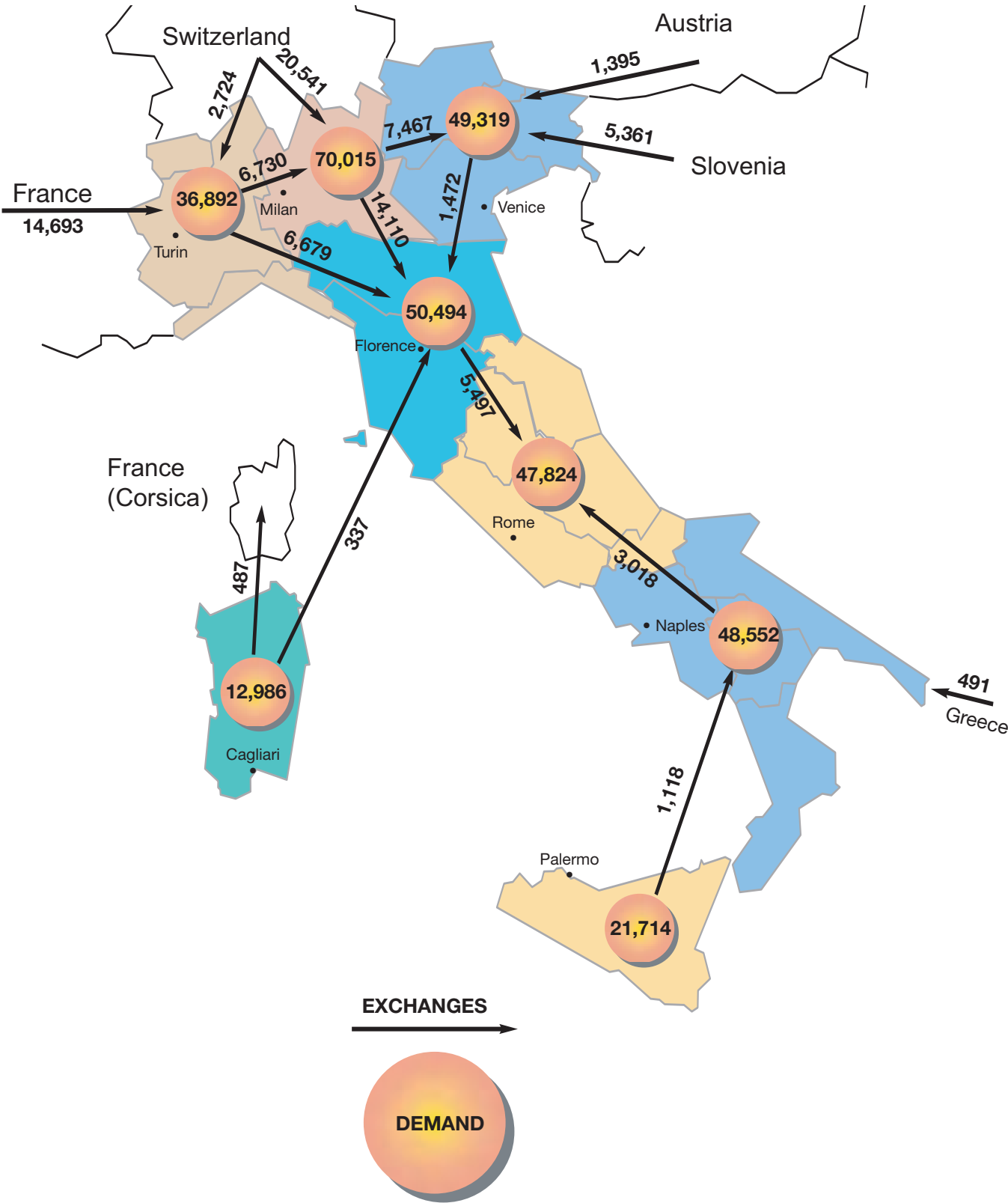
Energy not Supplied (MWh) to the 380-220-150-132 kV Grid

Regional Area	YEAR 2006	YEAR 2005
Turin	156.67	80.68
Milan	160.95	47.07
Venice	192.20	216.07
Florence	140.92	125.27
Rome	372.07	838.45
Naples	252.35	397.18
Palermo	848.70	279.23
Cagliari	199.77	117.98
Total	2,323.63	2,101.93

Maximum Load Flows between Geographical Areas (MW)

	FRANCE	SWITZER.	AUSTRIA	SLOVENIA	GREECE	NORTH ▼ FLORENCE	FLORENCE ▼ ROME	ROME ▼ NAPLES	PALERMO ▼ NAPLES	FLORENCE ▼ CAGLIARI
	28 Nov. 2006 19:00	22 Dec. 2006 15:00	29 Jul. 2006 9:00	03 Apr. 2006 18:00	21 Aug. 2006 12:00	28 Jun. 2006 12:00	27 Jan. 2006 18:00	28 Feb. 2006 7:00	05 Feb. 2006 24:00	21 Jun. 2006 7:00
FRANCE	3,082	1,648	1,791	2,237	1,471	1,885	1,533	966	199	2,174
SWITZERLAND	3,615	4,691	3,362	3,051	2,263	3,205	2,800	844	- 46	2,690
AUSTRIA	209	225	301	0	157	148	143	115	56	148
SLOVENIA	495	684	624	1,392	509	533	815	198	309	714
GREECE	176	54	0	474	- 519	0	97	117	0	0
NORTH ► FLORENCE	4,716	3,418	4,047	2,395	4,481	6,096	6,065	- 617	- 343	3,065
FLORENCE ► ROME	1,195	1,195	1,419	596	1,875	2,422	2,995	- 2,430	- 936	759
ROME ► NAPLES	- 246	- 526	- 2	- 361	532	354	1,284	- 2,533	- 1,417	- 731
PALERMO ► NAPLES	249	119	6	119	1	60	- 66	386	705	38
FLORENCE ► CAGLIARI	119	- 168	194	- 191	- 144	153	- 165	- 166	- 177	280

Balance of Physical Exchanges of Electricity (GWh)



The **balance of physical exchanges of electricity** shows the energy flows between the various areas of the Italian power system. Note the high flows going from Lombardia towards Triveneto (Trentino-Veneto-Friuli Venezia Giulia) and then converging, in part, towards central Italy. A 380 kV transmission link between Sicilia and mainland Italy ensures the operation of the Sicilia and Calabria power system under security conditions.

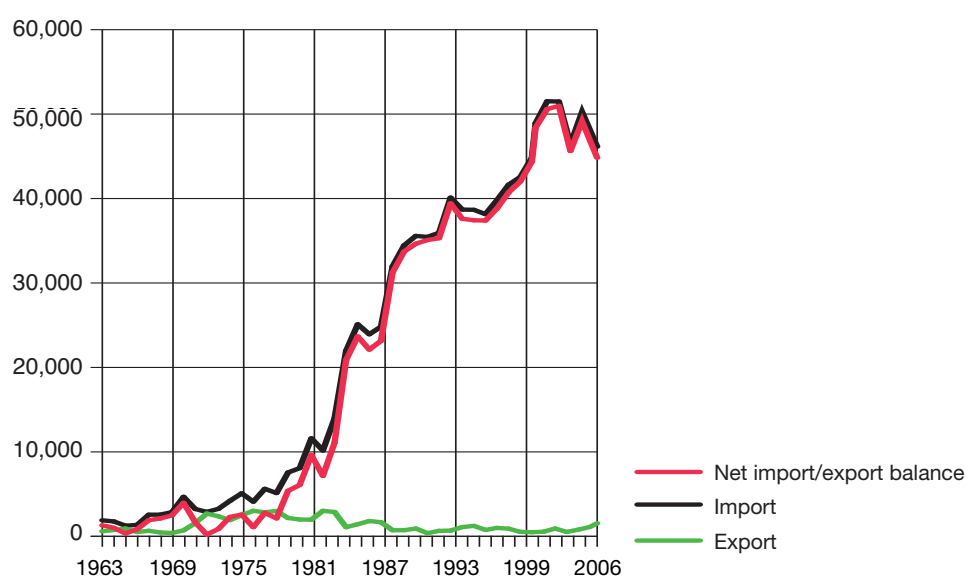
Physical Exchanges of Electricity between Italy and Neighbouring Countries

(GWh)

2005	Electricity imported to Italy from						Electricity exported from Italy to						Net import/export balance
	France	Switzerland	Austria	Slovenia	Greece	TOTAL	France	Switzerland	Austria	Slovenia	Greece	TOTAL	
January	1,441.9	2,242.6	143.1	787.0	119.4	4,734.0	90.2	0.0	0.0	0.0	0.0	90.2	4,643.8
February	1,153.0	2,430.9	123.9	724.5	71.6	4,503.9	97.2	0.0	0.0	0.0	0.0	97.2	4,406.7
March	1,293.6	2,424.9	122.4	788.4	284.4	4,913.7	57.7	0.4	0.0	0.0	0.0	58.1	4,855.6
April	1,256.9	2,362.5	119.9	840.9	157.5	4,737.7	48.7	1.0	0.0	0.0	0.0	49.7	4,688.0
May	1,279.1	2,291.5	134.5	579.9	20.3	4,305.3	50.1	6.3	0.0	0.0	1.7	58.1	4,247.2
June	1,203.9	2,024.1	126.7	629.9	0.4	3,985.0	52.4	7.0	0.0	0.4	21.4	81.2	3,903.8
July	1,250.6	2,139.6	107.1	731.2	0.1	4,228.6	43.3	6.1	0.0	0.0	74.9	124.3	4,104.3
August	877.9	1,764.2	117.1	372.2	0.3	3,131.7	58.6	7.2	0.0	0.0	70.1	135.9	2,995.8
September	1,246.3	1,957.3	120.9	545.2	27.4	3,897.1	36.0	7.6	0.0	0.0	38.3	81.9	3,815.2
October	1,528.6	2,390.4	127.1	831.9	2.5	4,880.5	21.9	6.2	0.0	0.0	27.2	55.3	4,825.2
November	1,281.1	1,963.6	117.9	615.4	27.9	4,005.9	50.5	15.4	0.0	0.0	13.0	78.9	3,927.0
December	803.0	1,474.7	118.0	543.9	1.0	2,940.6	99.5	74.2	0.0	0.1	24.9	198.7	2,741.9
YEAR	14,615.9	25,466.3	1,478.6	7,990.4	712.8	50,264.0	706.1	131.4	0.0	0.5	271.5	1,109.5	49,154.5

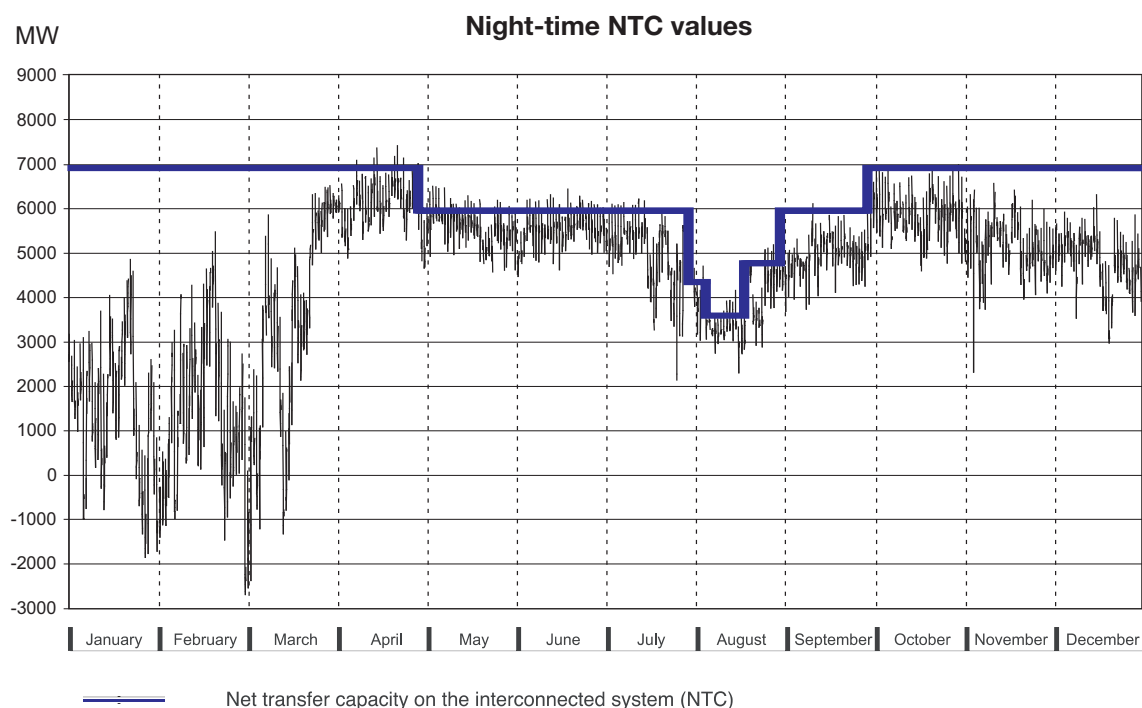
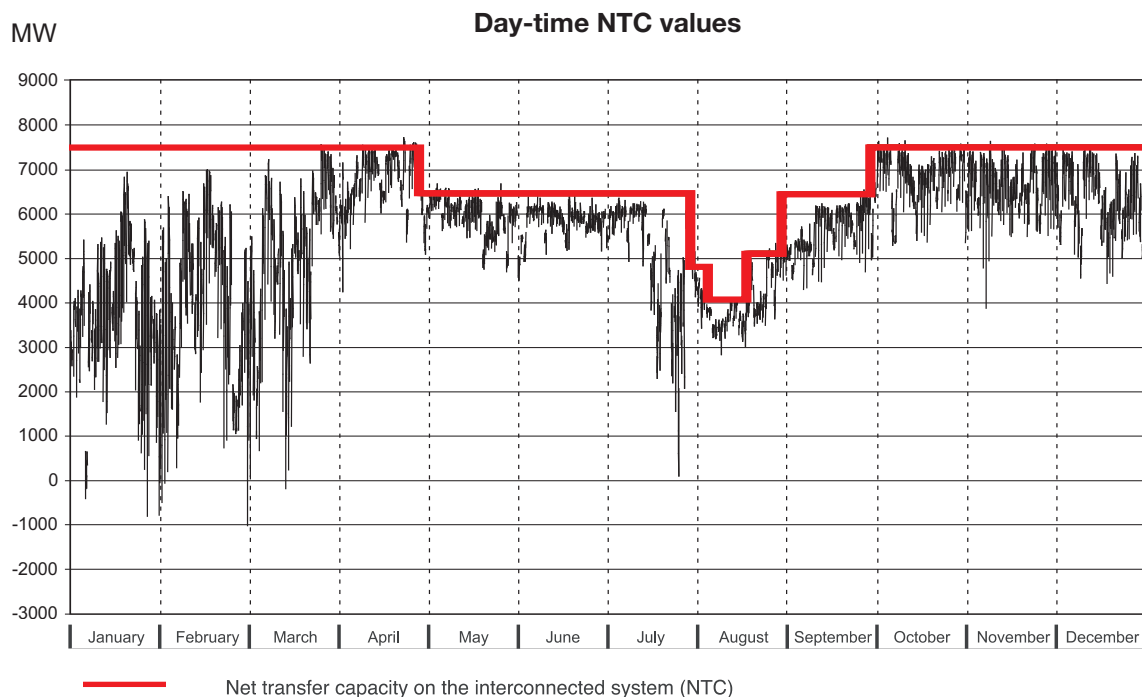
2006	Electricity imported to Italy from						Electricity exported from Italy to						Net import/export balance
	France	Switzerland	Austria	Slovenia	Greece	TOTAL	France	Switzerland	Austria	Slovenia	Greece	TOTAL	
January	702.6	1,042.0	71.0	416.3	168.8	2,400.7	123.6	150.1	0.0	1.8	3.8	279.3	2,121.4
February	696.4	1,068.8	87.4	475.9	49.9	2,378.4	103.4	129.4	0.0	0.4	0.0	233.2	2,145.2
March	1,050.5	1,395.1	110.4	565.0	221.4	3,342.4	100.4	98.5	0.0	1.4	0.0	200.3	3,142.1
April	1,617.1	2,146.7	111.4	698.7	172.2	4,746.1	35.5	0.0	0.0	0.0	3.2	38.7	4,707.4
May	1,444.1	2,044.6	138.1	590.3	148.3	4,365.4	41.3	1.8	0.0	0.0	0.2	43.3	4,322.1
June	1,371.4	2,161.7	109.9	519.0	18.7	4,180.7	44.0	4.5	0.0	0.0	3.7	52.2	4,128.5
July	1,253.4	2,095.5	128.0	442.1	6.7	3,925.7	53.4	28.6	0.0	0.8	13.9	96.7	3,829.0
August	869.7	1,742.4	139.3	288.9	3.7	3,044.0	31.7	1.4	0.0	0.9	76.0	110.0	2,934.0
September	1,396.6	2,212.3	110.9	201.4	33.6	3,954.8	32.6	0.4	0.0	4.1	47.6	84.7	3,870.1
October	1,619.5	2,714.9	132.9	412.7	48.9	4,928.9	35.7	4.8	0.0	0.0	69.0	109.5	4,819.4
November	1,539.9	2,459.0	122.5	391.3	39.3	4,552.0	47.2	0.9	0.0	1.0	100.1	149.2	4,402.8
December	1,370.6	2,603.2	133.1	371.1	26.1	4,504.1	78.0	0.9	0.0	0.1	128.7	207.7	4,296.4
YEAR	14,931.8	23,686.2	1,394.9	5,372.7	937.6	46,323.2	726.8	421.3	0.0	10.5	446.2	1,604.8	44,718.4

Physical Exchanges of Electricity between Italy and Neighbouring Countries from 1963 to 2006 (GWh)



In the course of 2006, the **balance of physical exchanges of electricity** with neighbouring countries fell significantly, reaching an actual value of 44.7 billion kWh, i.e. down by 9.0% on the previous year.

Time Curves of Net Import/Export Balance



The red line shows the **limit value of the maximum transfer capacity on the interconnected system (NTC)**, while the blue one represents the minimum transfer capacity. The maximum transfer capacity in the Winter period ranged daily from 7,490 to 6,840 MW. In the Summer period (May-September 2006, excluding August), the range was 6,390-5,840 MW. In August, the range was 5,050-3,500 MW. In the first months of 2006, imports diminished significantly, involving an overall decrease of 7.8% on the previous year.

Grid Facilities Entered into Operation (new or renovated)

Thermal			
Torviscosa	gas turbine G1 + gas turbine G2 + unit V	(320 + 320 +337) MVA	Edison
Energia Termoli	gas turbine G1 + gas turbine G2 + unit 3	(326 + 326 +337) MVA	Energia Molise
EniPower Brindisi	gas turbine GG-13 + unit GD-23	(300 + 170) MVA	EniPower
Teverola	gas turbine G1	295 MVA	Servizi Energetici Teverola
Roselectra	gas turbine G4	480 MVA	Roselectra S.p.A.
S. Barbara	gas turbine E + unit 3	(300 + 170) MVA	Enel Produzione
Tenaris Dalmine	gas turbine G1	53.6 MVA	Dalmine
Sparanise	gas turbine G1	300 MVA	Calenia Energia
Renewable-Energy Power Plants			
Montemurro	Wind	29.08 MW	FRI-EL Montemurro S.r.l.
Troia	Wind	15 MW	Mistral S.p.A.
Monte Cute	Wind	44 MW	Parco Eolico Monte Cute S.r.l.
Sant' Agata di Puglia	Wind	72 MW	FRI-EL Sant' Agata di Puglia S.r.l.
Vizzini	Wind	23.8 MW	Endesa Italia S.p.A.
Daunia Calvello	Wind	41.4 MW	Daunia Calvello S.r.l.
Poggi Alti	Wind	20 MW	Parco Eolico Poggi Alti S.r.l.
Contrada Colla	Wind	17 MW	Enel Produzione
Lines			
380 kV Carpi Fossoli-S. Damaso		29.4 km	Terna
380 kV Caorso-Carpi Fossoli		92.9 km	Terna
380 kV Acciaiole-Rosignano		24 km	Terna
380 kV Rosignano-Roselectra		1.3 km	Roselectra S.p.A.
380 kV Turbigo-Ospiate		30.9 km	Terna
380 kV Ferrara Focomorto-Ferrara Nord		9.6 km	Terna
380 kV Ferrara Nord-Ostiglia		42.747 km	Terna
380 kV Roselectra di Rosignano power plant-Rosignano electrical station		0.3 km	Roselectra S.p.A.
380 kV Garigliano-Sparanise		27.7 km	Terna
380 kV S.M.Capua Vetere-Sparanise		21.9 km	Terna
220 kV Capriati-S.M.Capua Vetere		56.9 km	Terna
220 kV S.M.Capua Vetere-Aversa		4.5 km	Terna
220 kV S. Barbara-Cintoia All.		12.8 km	Terna
220 kV Fratta-S.M.Capua Vetere		13.769 km	Terna
220 kV S.M.Capua Vetere-Presenzano		47.9 km	Terna
220 kV Rumianca-Villasor		19.6 km	Terna
220 kV Rumianca-Sulcis		53.1 km	Terna
220 kV Ricevitrice Nord Milano-Verderio		23.9 km	Terna-AEM Milano
220 kV Grosio-Verderio		106.8 km	Terna-AEM Milano
150 kV submarine link (SAR.CO, Sardegna-Corsica)		31.6 km	Terna-EDF
10 x 150 kV lines			Terna
7 x 132 kV lines			Terna
5 x 150 kV lines			Enel Distribuzione
Transmission Facilities			
380 kV S/E - Rosignano			Roselectra S.p.A.
380 kV S/E - Ferrara Nord			Terna
380 kV S/E - Sparanise			Terna
380 kV S/E - Magisano			Terna
380 kV S/E - Carpi Fossoli			Terna
380 kV Unit - S. Barbara			Terna
220 kV Unit - S. Maria Capua Vetere			Terna
220 kV Unit - Rumianca			Terna
150 kV electrical station - Vizzini			Brulli Energia S.r.l.
150 kV HV/MV substation- Montecilfone			Enel Distribuzione
150 kV HV/MV substation- Martignano			Enel Distribuzione
150 kV HV/MV substation- Amato			Enel Distribuzione
150 kV HV/MV substation- Montemurro			Enel Distribuzione
150 kV HV/MV substation- Acea Fiera di Roma			ACEA Distribuzione
150 kV HV/MV substation- Turi			Enel Distribuzione
150 kV Unit - Partinico			Terna
132 kV electrical station - Enerpass			Enerpass S.p.A.
132 kV electrical station - Bardi			Terna
132 kV HV/MV substation- Pietrafitta			Enel Distribuzione
132 kV HV/MV substation- S.G. in Persiceto			Enel Distribuzione
132 kV Unit - Vicenza Monteviale			Terna
132 kV Unit - S. Damaso			Terna
132 kV substation - Montuolo FS			RFI
Transformers			
380/220 kV	1200 MVA		Terna
380/132 kV	250 MVA		Terna
220/132 kV	640 MVA		Terna
220/132 kV	160 MVA		AEM Torino
Capacitor Banks			
Cordignano	54 MVAR		Terna
Sandrigio	54 MVAR		Terna
Nogarole Rocca	54 MVAR		Terna
Vicenza Monteviale	54 MVAR		Terna
Bari Ovest	54 MVAR		Terna
Parma Vigheffio	54 MVAR		Terna
Patria	54 MVAR		Terna
Chiari	54 MVAR		Terna
Montecorvino	54 MVAR		Terna
Latina	54 MVAR		Terna
Rubiera	54 MVAR		Terna
Ceprano	54 MVAR		Terna

Italian 380 kV Grid as of 31 December 2006



FACILITIES

- 380 kV substation (national transmission grid)
- Substation not belonging to national transmission grid
- Customer substation
- Thermal power plant
- Hydro power plant

LINES

- 380 kV line (national transmission grid)
- ++++ 380 kV double-circuit line (national transmission grid)
- 400 kV DC line (national transmission grid)

0 100 200 kilometre.

Legend

- The **electricity supplied** (or electricity demand) is the electricity to be injected into the grid for covering its net internal consumption. In the case of a national grid, it is equal to the sum of net electricity production and of imports from neighbouring countries, after deducting the electricity consumed by pumping and exports to neighbouring countries.
- The **trend variation** is the percentage change with respect to the same month or period of the previous year.
- The **gross electricity production** of a group of power plants in a given period is the sum of the amounts of electricity generated, measured at the terminals of electrical generators.
- The **electricity consumed by auxiliary services** is the sum of the electricity consumed by all the auxiliary services of power plants and of losses in the main transformers.
- The **net electricity production** is equal to the gross electricity production, after deducting the electricity consumed by auxiliary services and the losses in the main transformers.
- The **electricity consumed by pumping** is the electricity used for the sole purpose of pumping water and storing it for subsequent electricity generation.
- **Regional areas** consist of one or more neighbouring regions, which are grouped as follows:

TURIN:	Piemonte - Liguria - Valle d'Aosta
MILAN:	Lombardia
VENICE:	Friuli Venezia Giulia - Veneto - Trentino Alto Adige
FLORENCE:	Emilia Romagna - Toscana
ROME:	Lazio - Umbria - Abruzzo - Molise - Marche
NAPLES:	Campania - Puglia - Basilicata - Calabria
PALERMO:	Sicilia
CAGLIARI:	Sardegna
- The **hydro energy capability factor** is the ratio of the energy capability in a given period to the mean energy capability in the same period.

The energy capability of a group of power plants in a given period is the maximum amount of electricity that all the inflows observed in the same period would enable them to generate under the most favourable conditions.



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