

Introduction

Terna - Rete Elettrica Nazionale S.p.A. is the company responsible in Italy for electricity transmission and dispatching on the extra high voltage and high voltage electricity grid throughout the national territory. To guarantee service continuity and quality in the safest conditions, Terna must collect, instant by instant, all the data on the status of the power system. By processing these data, indicators are then developed of the power system performance.

The publication “Provisional Data on Operation of the Italian Power System - 2009” summarizes the figures.

The most significant events included in the publication refer to the reduced electricity consumption in 2009, equal to -6.7% compared to 2008. In 2009, electricity demand reached 316.9 billion kWh. 86.0% of this demand was covered by domestic production allocated for consumption which dropped by 9.0% compared to 2008, and the remaining part (14.0%) by the balance between imports and exports with foreign countries which increased by 11.0% compared to 2008.

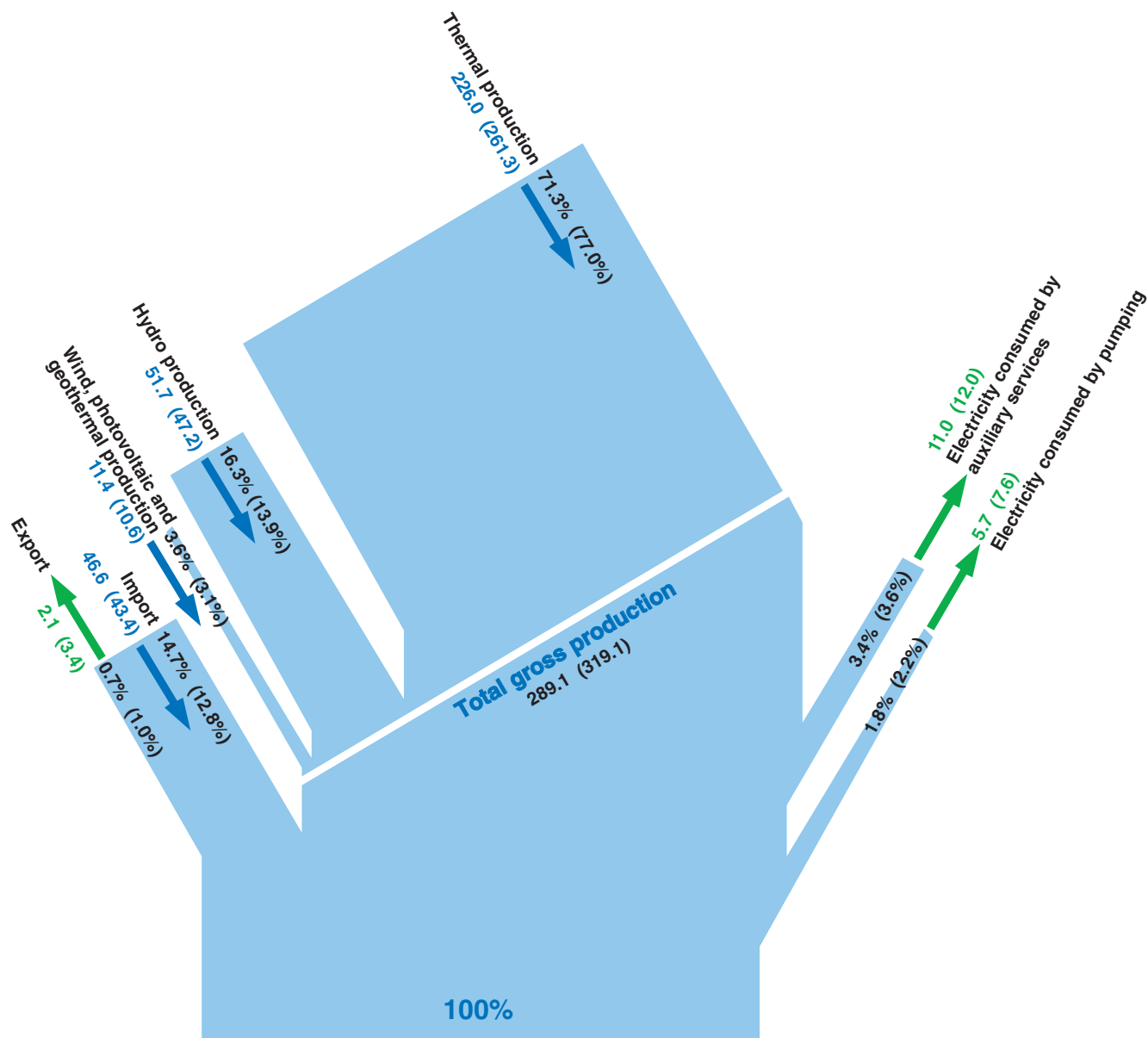
The installed generating capacity rose by about 2,200 MW. Wind parks made a significant contribution to this increase for a total of over 620 MW of new capacity (+17.5%).

In 2009, the highest electricity demand on the Italian electricity grid equaled 51,873 MW (-5.7% compared to 2008), recorded on July 17 at 12 pm.

The following pages provide additional information on these and other aspects of the Italian power system's management and operation.

Italian Electricity Balance









TWh (2008 data between parentheses)



Electricity supplied (consumption + losses) **316.9 (339.5)**

2009/2008 variation - **6.7 %**
(excluding 29/2/2008) - 6.4 %

Electricity Balance by Regional Area and Total (GWh)

									Total		
	TURIN	MILAN	VENICE	FLORENCE	ROME	NAPLES	PALERMO	CAGLIARI	2009	2008	% Var.
Hydro Production	11,142	11,798	15,427	1,945	5,678	4,317	641	795	51,743	47,227	9.6
Thermal Production	26,472	41,068	20,089	25,606	26,540	51,642	21,798	12,772	225,987	261,328	- 13.5
Wind, photovoltaic and geothermal production	18	0	0	5,386	501	3,476	1,345	708	11,434	10,575	8.1
Total gross production *	37,632	52,866	35,516	32,937	32,719	59,435	23,784	14,275	289,164	319,130	- 9.4
Electricity consumed by auxiliary services	1,110	1,743	1,380	1,149	1,084	2,752	1,008	808	11,034	12,065	- 8.5
Total net production	36,522	51,123	34,136	31,788	31,635	56,683	22,776	13,467	278,130	307,065	- 9.4
Electricity consumed by pumping	1,162	1,556	92	287	95	1,325	752	458	5,727	7,618	- 24.8
Net production allocated for consumption	35,360	49,567	34,044	31,501	31,540	55,358	22,024	13,009	272,403	299,447	- 9.0
Import	13,470	22,969	7,973	0	0	2,158	0	0	46,570	43,433	7.2
Export	905	214	58	0	0	315	0	629	2,121	3,399	- 37.6
Net import/export balance	12,565	22,755	7,915	0	0	1,843	0	- 629	44,449	40,034	11.0
Balance of physical exchanges between regional areas	- 15,785	- 7,626	2,872	16,657	14,831	- 10,336	- 353	- 260			
Electricity supplied	32,140	64,696	44,831	48,158	46,371	46,865	21,671	12,120	316,852	339,481	- 6.7
Year 2008	36,105	69,390	51,028	50,954	48,732	48,993	21,788	12,491			
% variation	- 11.0	- 6.8	- 12.1	- 5.5	- 4.8	- 4.3	- 0.5	- 3.0			
* of which CIP-6 production	145	2,482	4,695	16,458	6,442	7,756	3,205	2,828	44,011	48,372	- 9.0

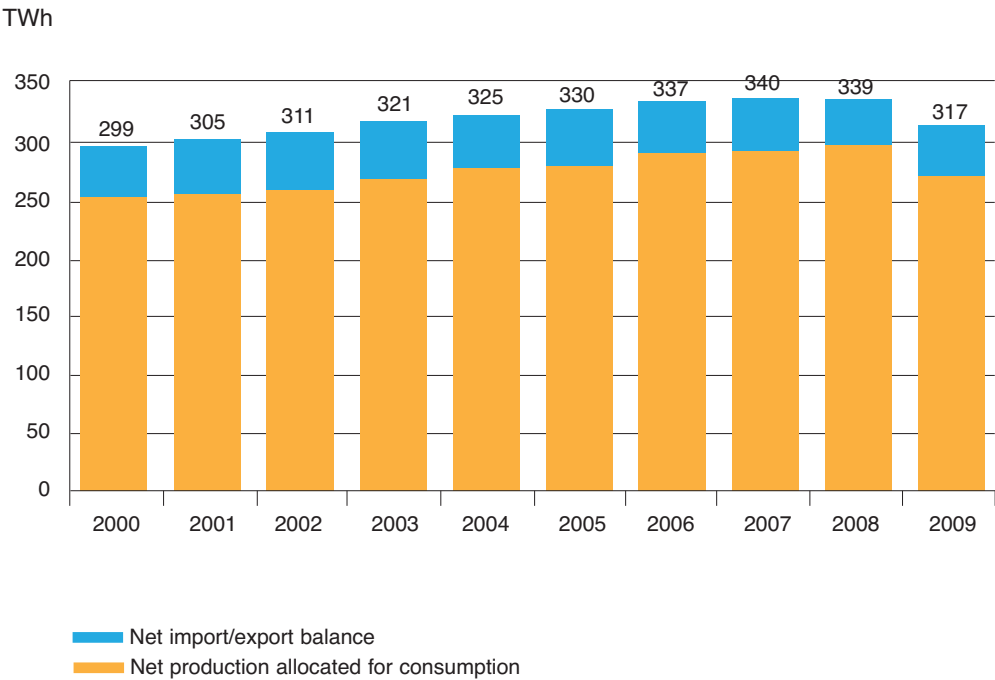
N.B. Net import/export balance excluding the Republic of San Marino and the Vatican City

During the year, **electricity demand** reached 316.9 billion kWh, dropping by 6.7% compared to 2008, with a fairly variable, but always negative, monthly performance. The net domestic production allocated for consumption registered a 9.0 % reduction. The balance between physical exchanges of electricity with foreign countries was positive, with a variation of 11.0% compared to the previous year. In particular, production from renewable sources increased: geothermal, wind and photovoltaic (+8.1%), as well as hydro sources (+9.6%). Thermoelectric production decreased by -13.5%.

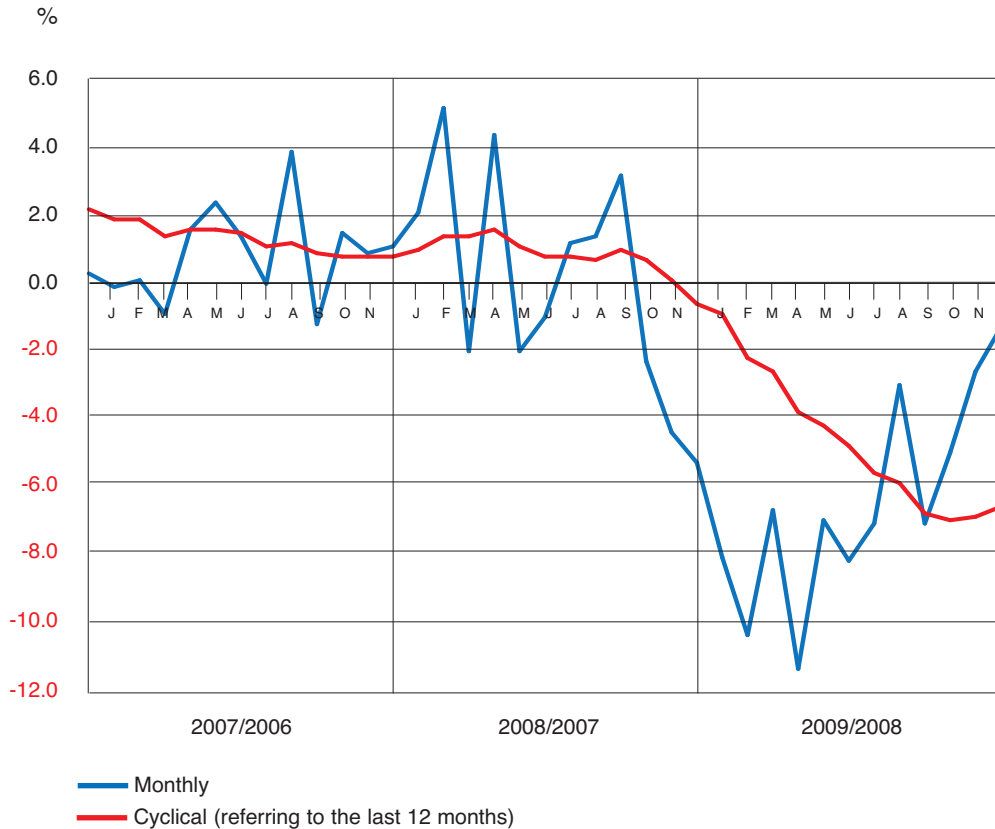
Electricity imports from foreign countries registered an increase equal to 7.2%, while exports dropped significantly (-37.6%).

Electricity Demand on the Italian Grid

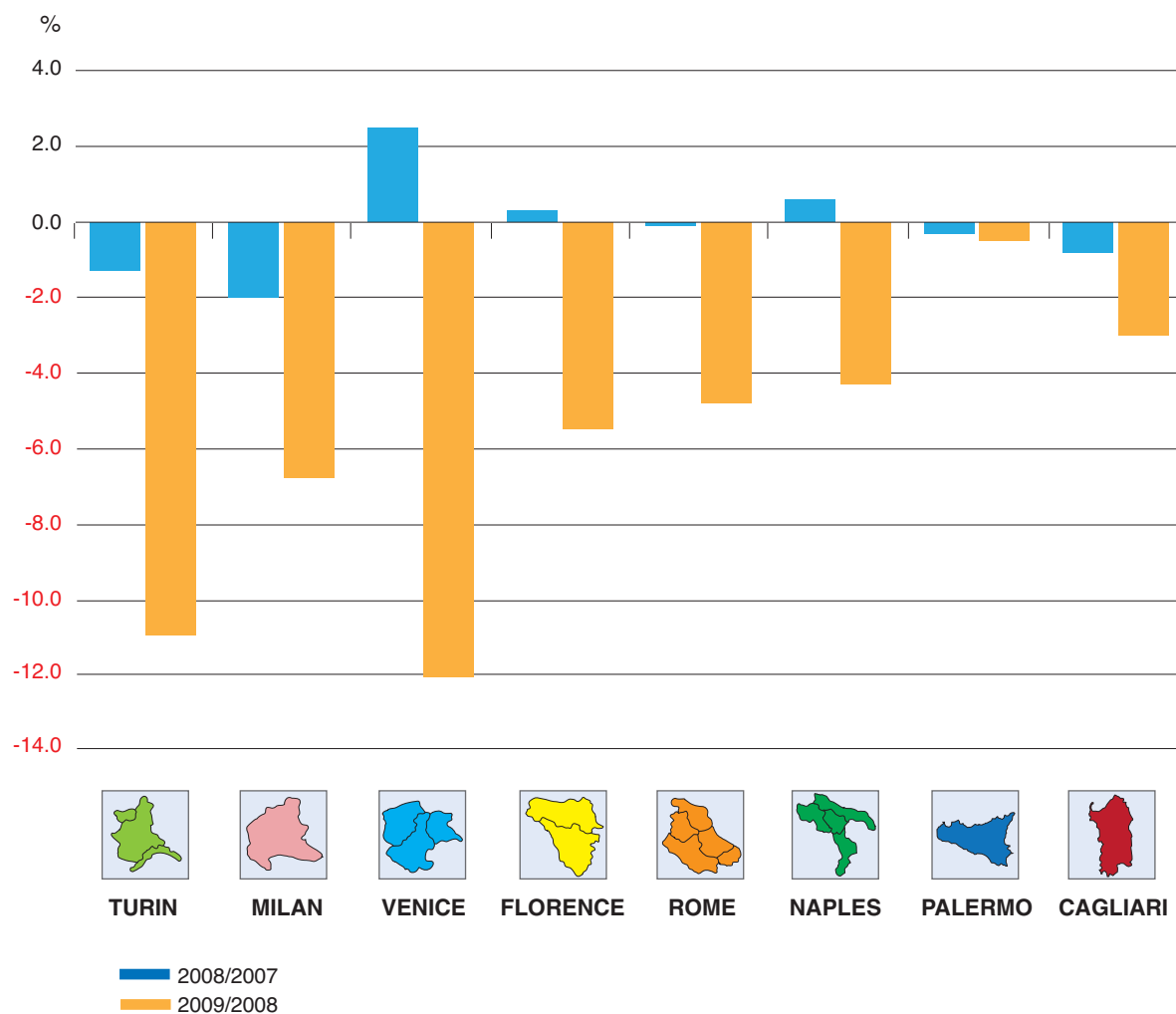
Trend and Coverage



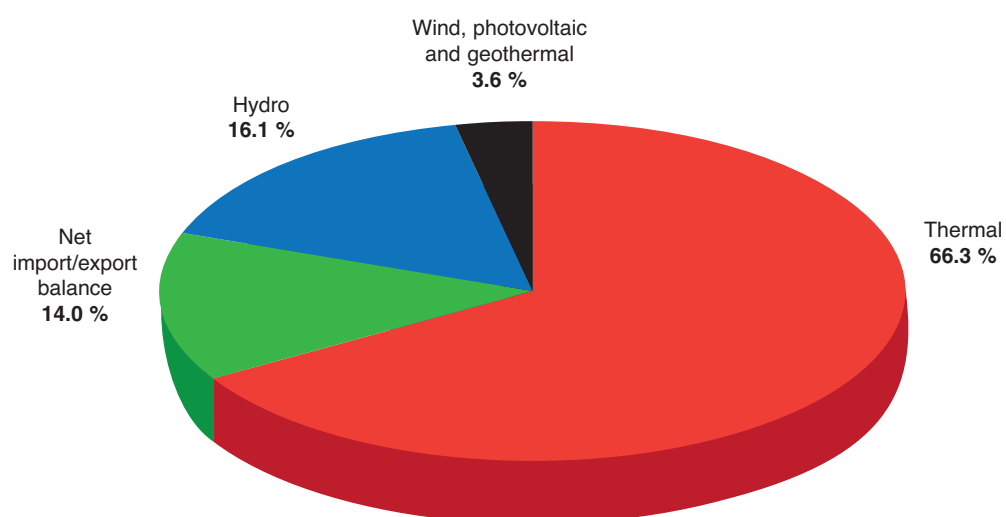
Monthly and Cyclical Percentage Variations



Percentage Variations by Regional Area



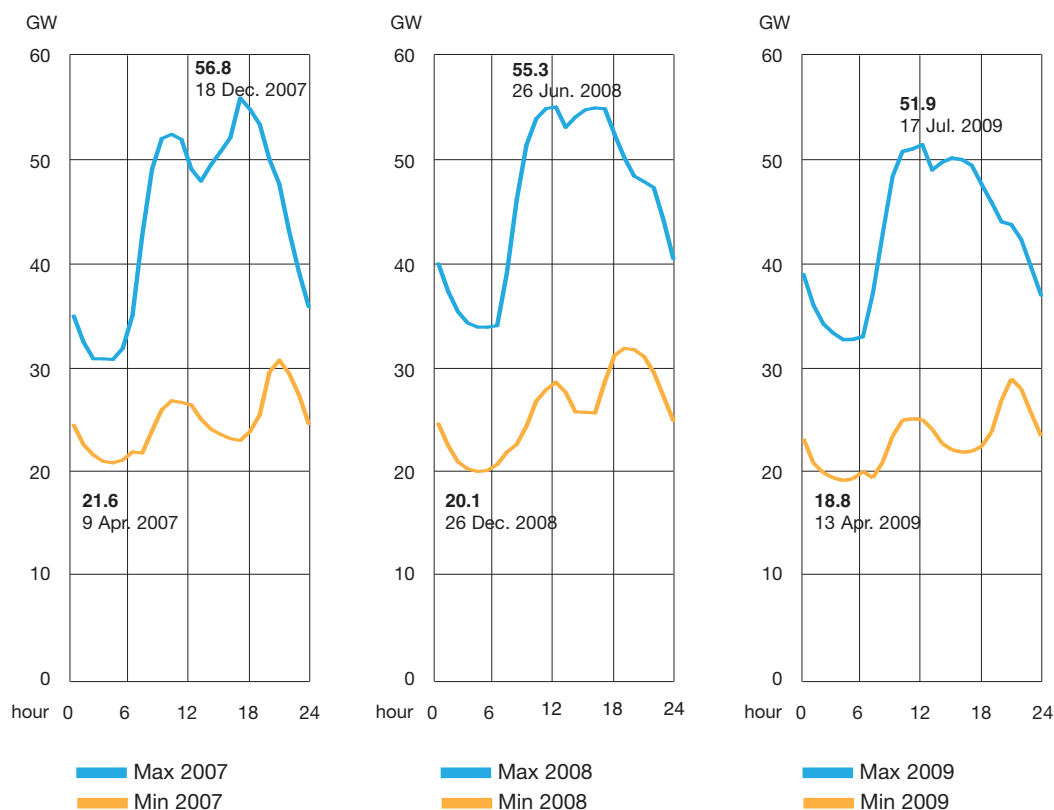
Components (%) of Electricity Supply Side*



* % 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



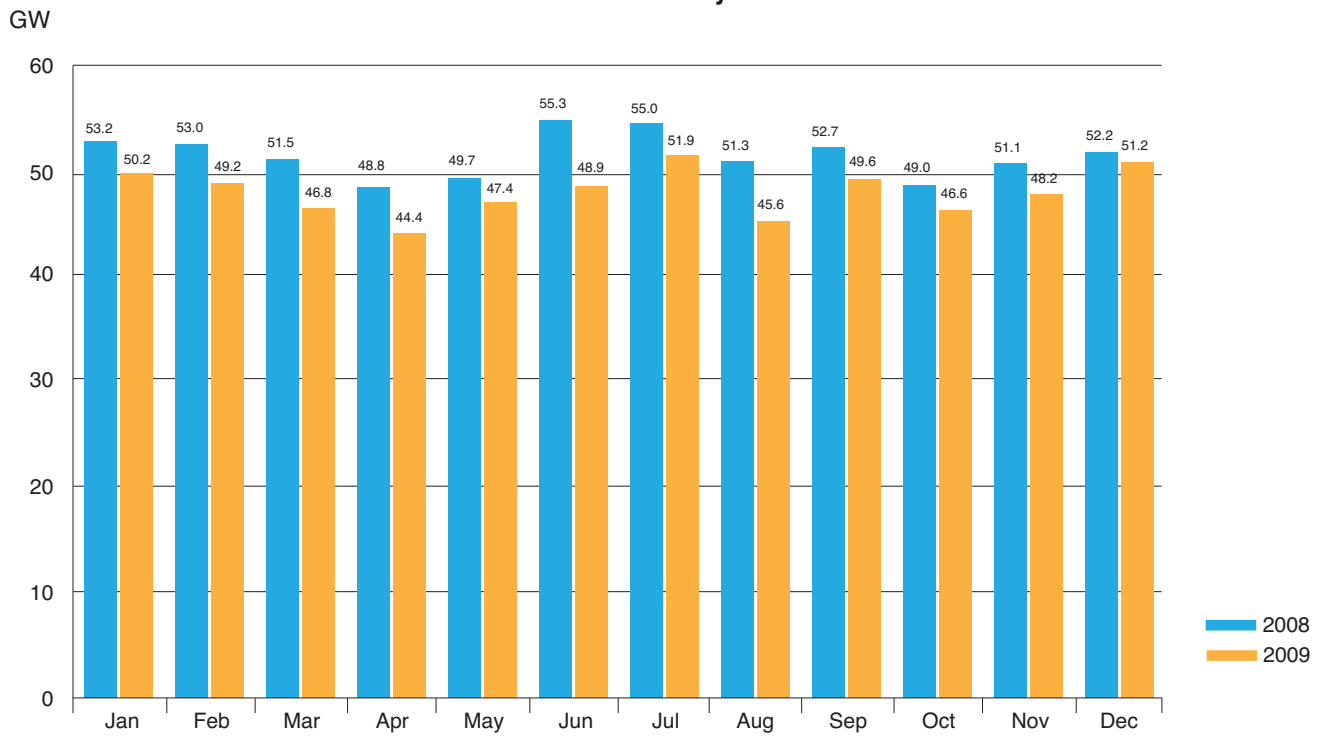
Daily Values - 2009

	MAX		MIN	
	GW	Date - Time	GW	Date - Time
LOAD				
Gross thermal production	43.2	17 December 19:00	15.0	2 May 1:00
Gross hydro production	12.1	12 June 11:00	1.3	26 November 4:00
Hourly peak load	51.9	17 July 12:00	18.8	13 April 4:00
ENERGY	GWh	Date	GWh	Date
Gross thermal production	913.6	17 December	388.7	17 May
Gross hydro production	213.7	3 June	59.4	22 November
Daily electricity demand	1,044.5	16 July	543.5	13 April

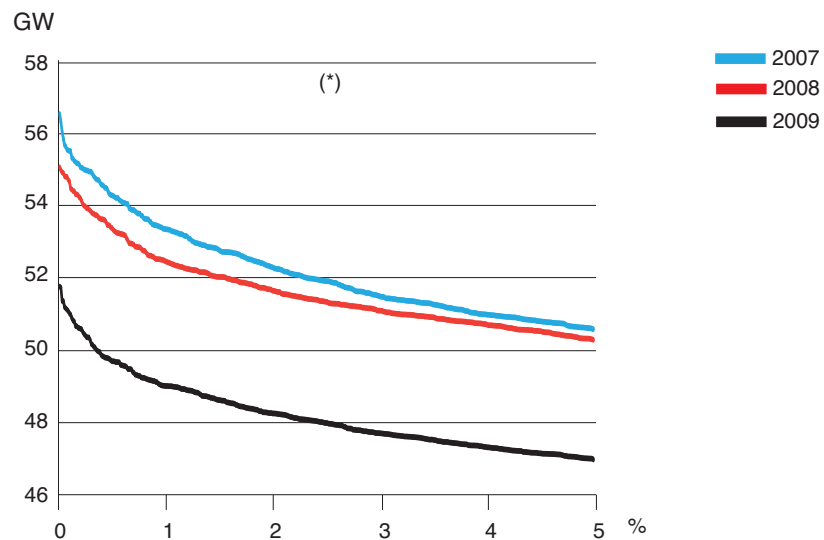
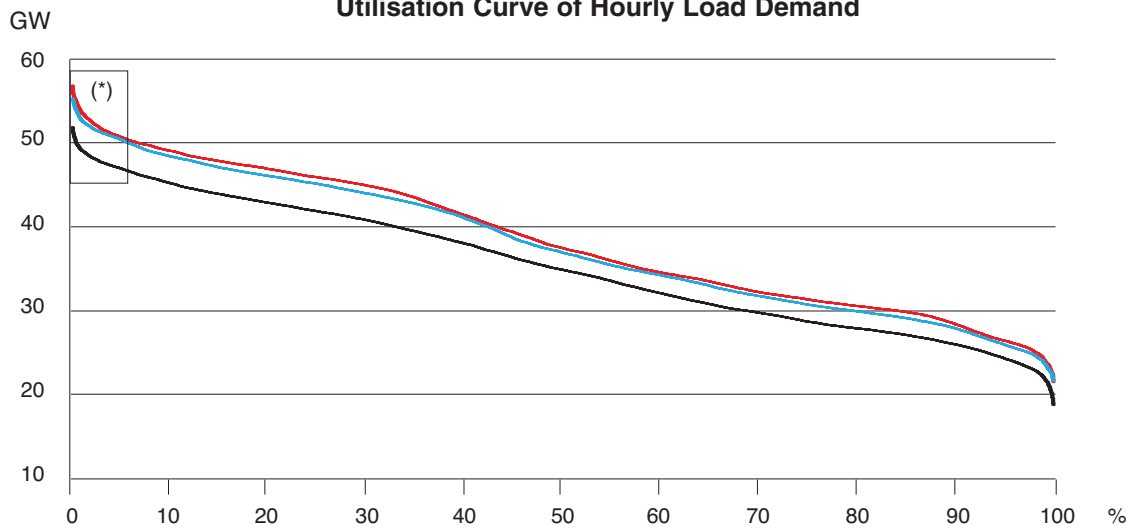
N.B. : Data are net of electricity consumed by auxiliary services and by pumping.

In 2009, the highest **electricity demand on the national power system**, was equal to 51,873 MW, recorded on July 17 at 12 pm, lower by 5.7% compared to the peak of 2008 (55,292 MW, June 26, 2008). During the year, the monthly peak figures were essentially lower than those of the same months of the previous year, with significant lower values during the first few months of the year.

Peak Loads by Month

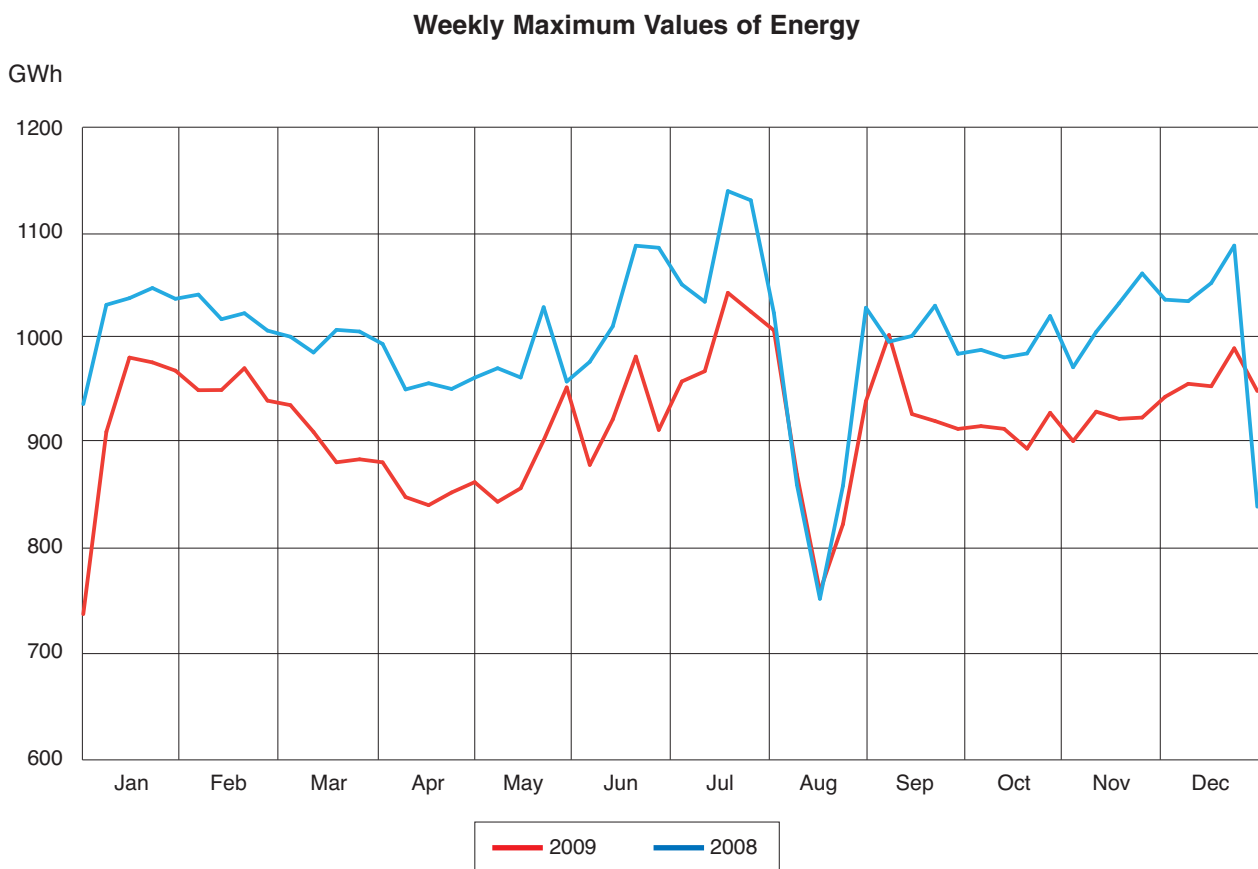
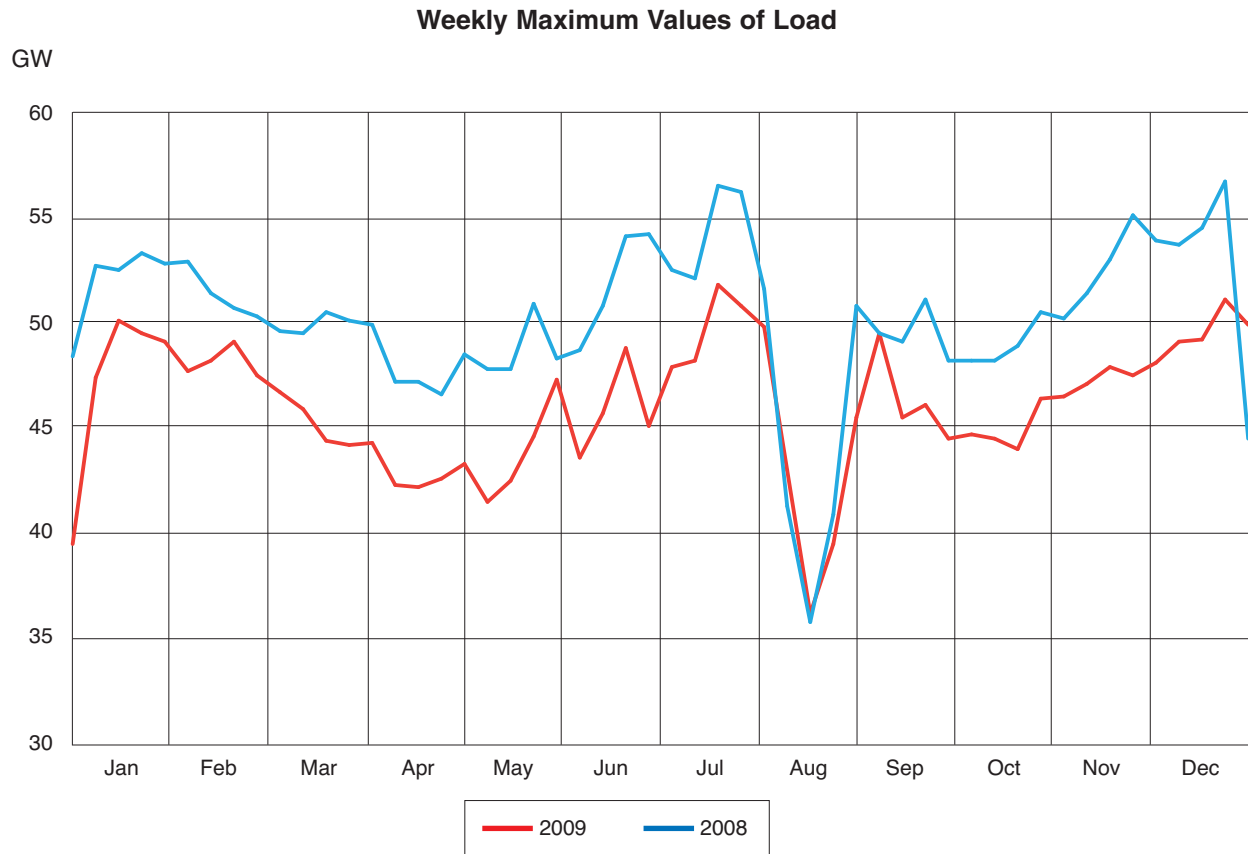


Utilisation Curve of Hourly Load Demand



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

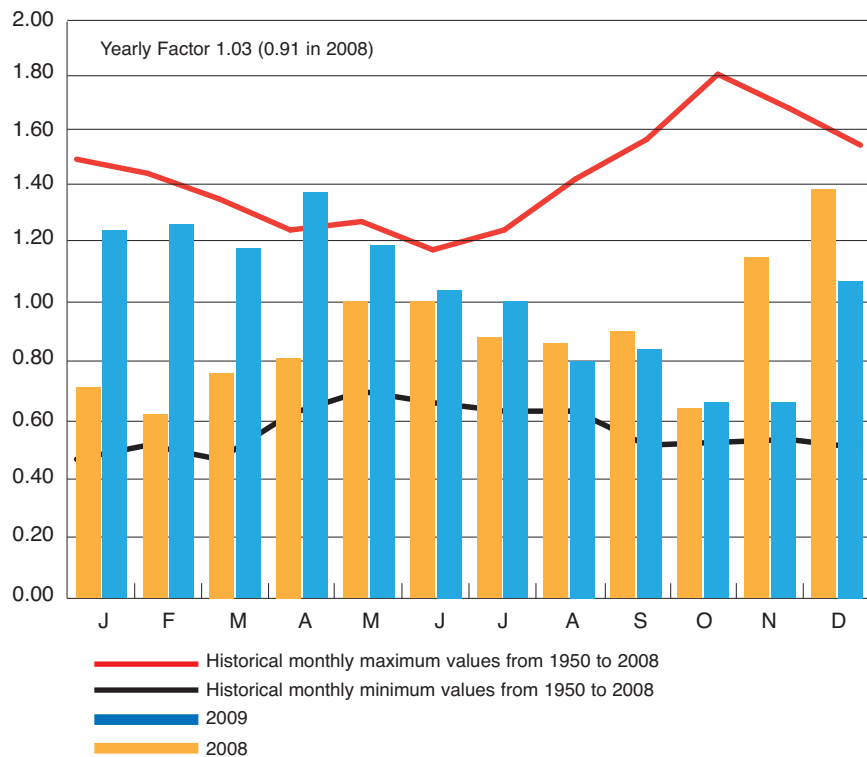
Weekly Maximum Values of Load and Energy



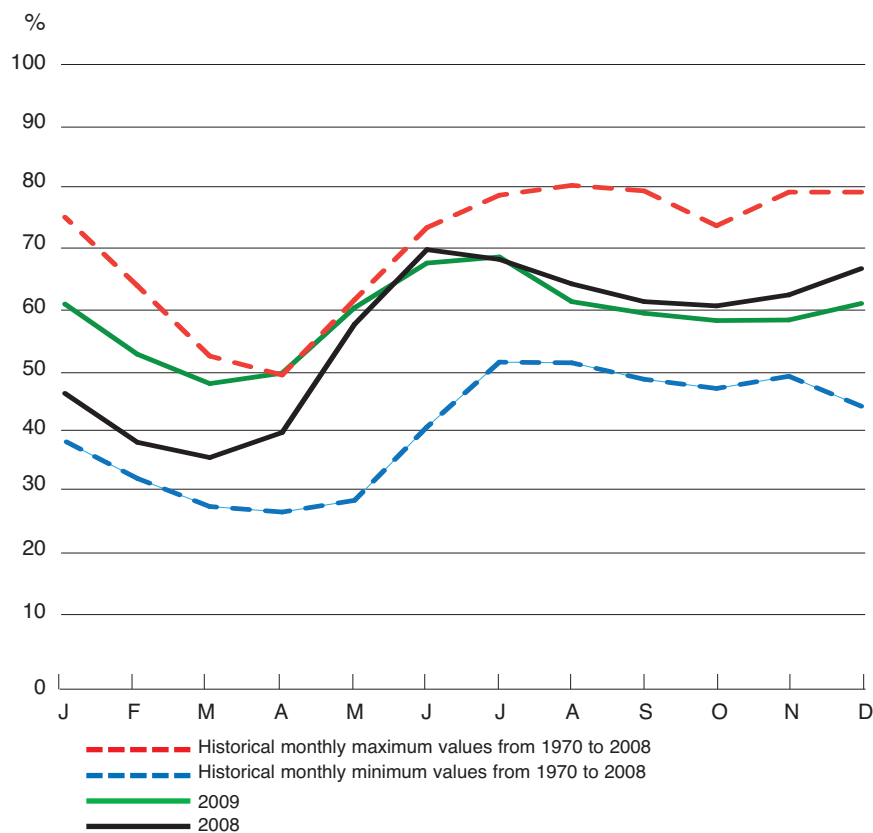
The **weekly load curve shows** the maximum values of load and energy recorded on the Italian power grid in each of the 52 weeks of 2009. The diagrams clearly show low demand values during the Easter holidays, August and year-end holidays.

Hydro Power Plants

Energy Capability Factor



Fullness Factor of Hydro Reservoirs at the end of Each Month



The **monthly hydroelectric capability factor** shows an increase during the first part of the year with percentage values above the corresponding values recorded throughout 2008. These values decreased in the second part of the year. In particular, in April, the monthly factor recorded its highest value with 1.37 (previously 1.27).

The **yearly energy capability factor** of 1.03 (ratio of the capability in the current year to the average multi-year reference value) was higher compared to the same value of the previous year (0.91 in 2008). In April, the capability ratio of the seasonal tanks recorded its highest value of 50.1% (previously 49.8%).

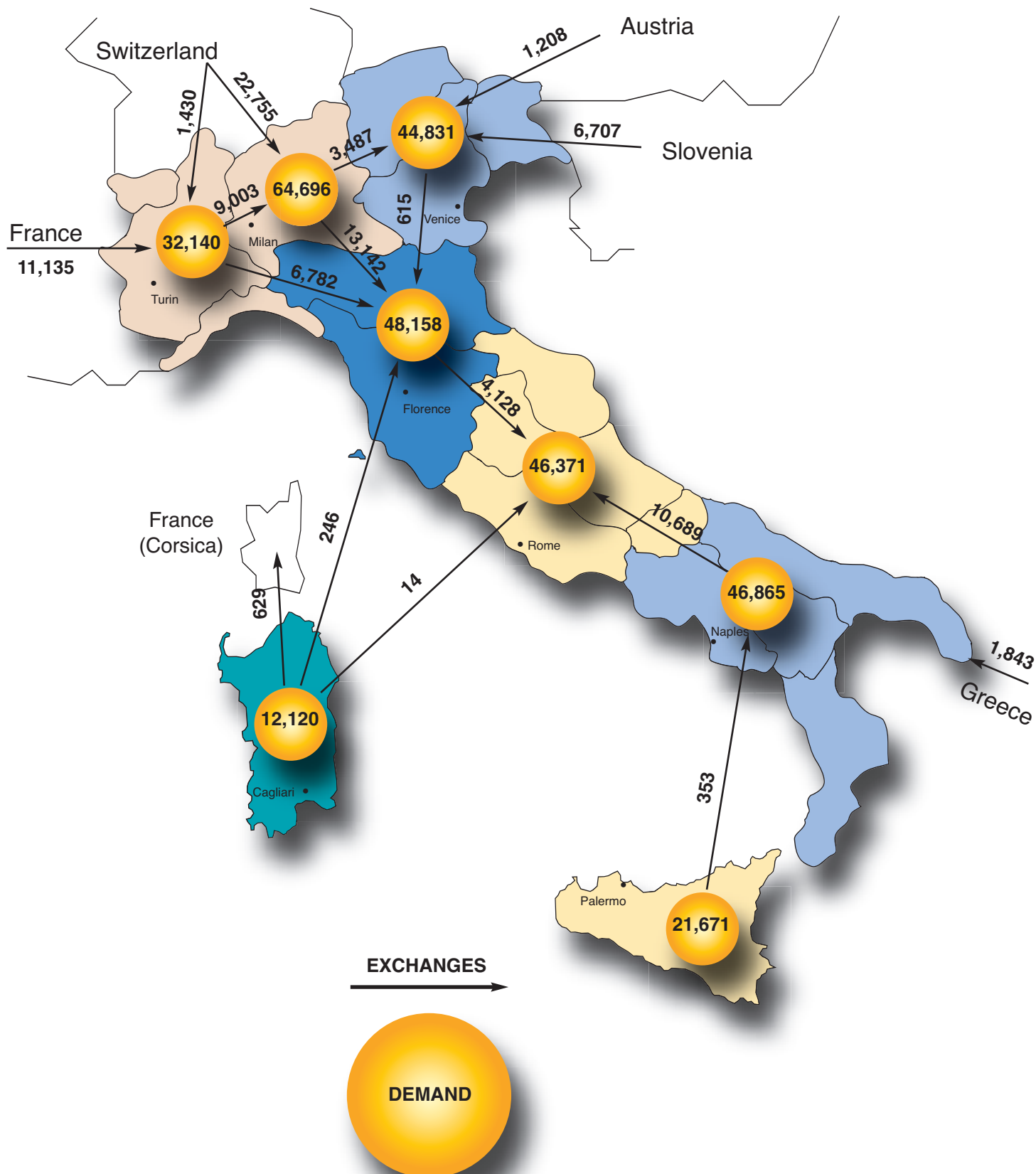
Energy not Supplied (MWh) to the 380-220-150-132 kV Grid

Regional Area	Year 2009	Year 2008
Turin	106.37	1,077.14
Milan	237.62	104.86
Venice	281.55	211.18
Florence	122.83	52.93
Rome	240.45	224.93
Naples	682.38	296.91
Palermo	280.54	320.92
Cagliari	16.56	30.31
Total	1,968.30	2,319.18

Maximum Load Flows among Geographical Areas (MW)

	FRANCE	SWITZERLAND	AUSTRIA	SLOVENIA	GREECE	NORTH ▼ FLORENCE	FLORENCE ▼ ROME	ROME ▼ NAPLES	PALERMO ▼ NAPLES	FLORENCE ▼ CAGLIARI
	11 Mar. 2009 19:00	22 Jul. 2009 21:00	20 Apr. 2009 23:00	27 Apr. 2009 11:00	14 Sep. 2009 23:00	19 Jun. 2009 13:00	27 May 2009 23:00	13 Oct. 2009 14:00	17 Sep. 2009 21:00	18 Mar. 2009 ore 16:00
FRANCE	2,794	1,444	1,553	1,059	1,130	1,351	1,694	- 305	1,819	2,062
SWITZERLAND	3,215	6,012	3,482	3,580	3,525	3,444	3,385	836	3,384	2,997
AUSTRIA	129	174	287	181	0	0	222	120	102	112
SLOVENIA	785	773	1,260	1,697	1,185	1,043	585	918	458	763
GREECE	498	0	476	486	- 510	- 39	0	0	- 248	219
NORTH ➤ FLORENCE	3,606	4,384	2,687	2,695	2,863	5,694	4,979	619	2,414	2,412
FLORENCE ➤ ROME	1,385	1,741	987	- 36	943	2,117	2,964	- 1,536	- 45	45
ROME ➤ NAPLES	- 1,709	- 473	- 571	- 2,407	- 674	- 387	743	- 3,786	- 1,321	- 2,382
PALERMO ➤ NAPLES	160	51	51	71	84	4	67	149	452	180
FLORENCE ➤ CAGLIARI	- 163	- 96	- 83	- 105	75	128	61	- 93	82	- 248

Balance of Physical Exchanges of Electricity (GWh)



The **balance of physical exchanges of electricity** mainly shows the energy flows among the various areas of the Italian power system. In particular, it is necessary to note the high flows going from Lombardy towards central Italy. Electricity exports from Sicily to the mainland through the 380 kV connection, provide for the safe operation of Sicily's and Calabria's power systems.

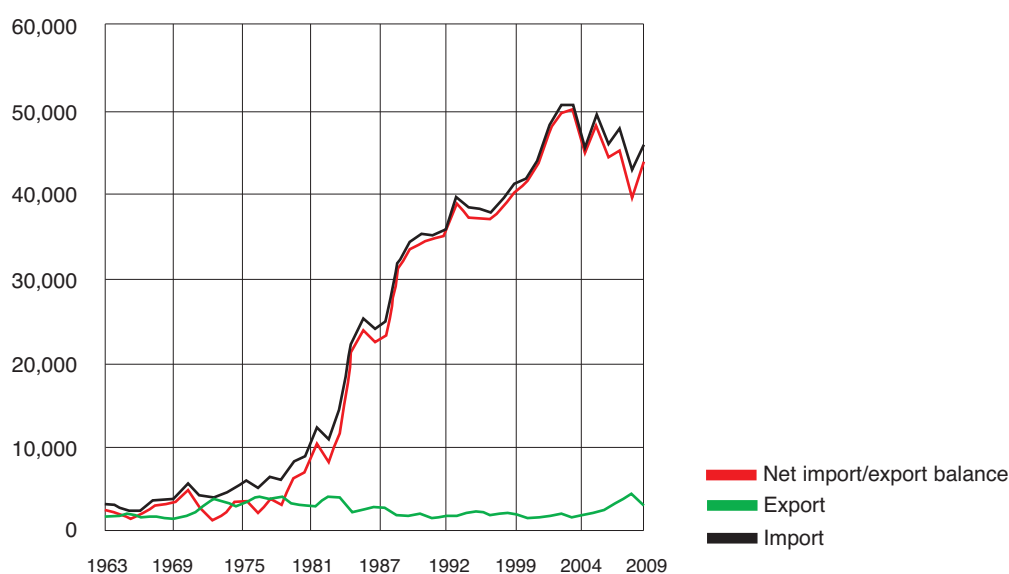
Physical Exchanges of Electricity between Italy and Neighbouring Countries

(GWh)

2008	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	1,202.5	2,186.0	113.0	415.2	8.0	3,924.7	158.0	5.1	0.0	1.9	103.9	268.9	3,655.8
February	1,192.2	2,177.6	107.0	306.1	5.8	3,788.7	117.3	6.8	0.0	2.6	236.0	362.7	3,426.0
March	1,161.0	2,148.4	123.2	447.0	4.6	3,884.2	161.2	22.1	0.0	0.7	282.3	466.3	3,417.9
April	1,143.6	1,934.8	113.5	508.7	54.7	3,755.3	69.8	12.8	0.0	0.5	98.5	181.6	3,573.7
May	1,253.8	2,333.9	120.2	380.4	10.1	4,098.4	42.3	8.5	0.0	3.1	135.3	189.2	3,909.2
June	956.0	1,636.5	113.0	341.2	13.1	3,059.8	61.4	61.6	0.3	8.3	138.2	269.8	2,790.0
July	1,156.7	2,118.0	110.1	490.3	0.1	3,875.2	51.1	30.3	0.0	0.6	91.0	173.0	3,702.2
August	917.6	1,609.2	119.5	203.3	10.5	2,860.1	57.3	38.4	0.0	3.6	150.0	249.3	2,610.8
September	901.9	1,933.1	89.2	162.7	5.8	3,092.7	62.9	59.6	1.3	69.3	143.9	337.0	2,755.7
October	800.2	1,854.4	110.7	320.7	35.2	3,121.2	92.3	86.6	0.3	4.4	58.5	242.1	2,879.1
November	1,184.8	2,137.1	122.3	409.0	12.9	3,866.1	82.7	25.5	0.0	0.6	120.7	229.5	3,636.6
December	1,119.6	2,108.7	118.3	741.6	17.9	4,106.1	194.4	41.6	0.0	0.0	193.1	429.1	3,677.0
YEAR	12,989.9	24,177.7	1,360.0	4,726.2	178.7	43,432.5	1,150.7	398.9	1.9	95.6	1,751.4	3,398.5	40,034.0

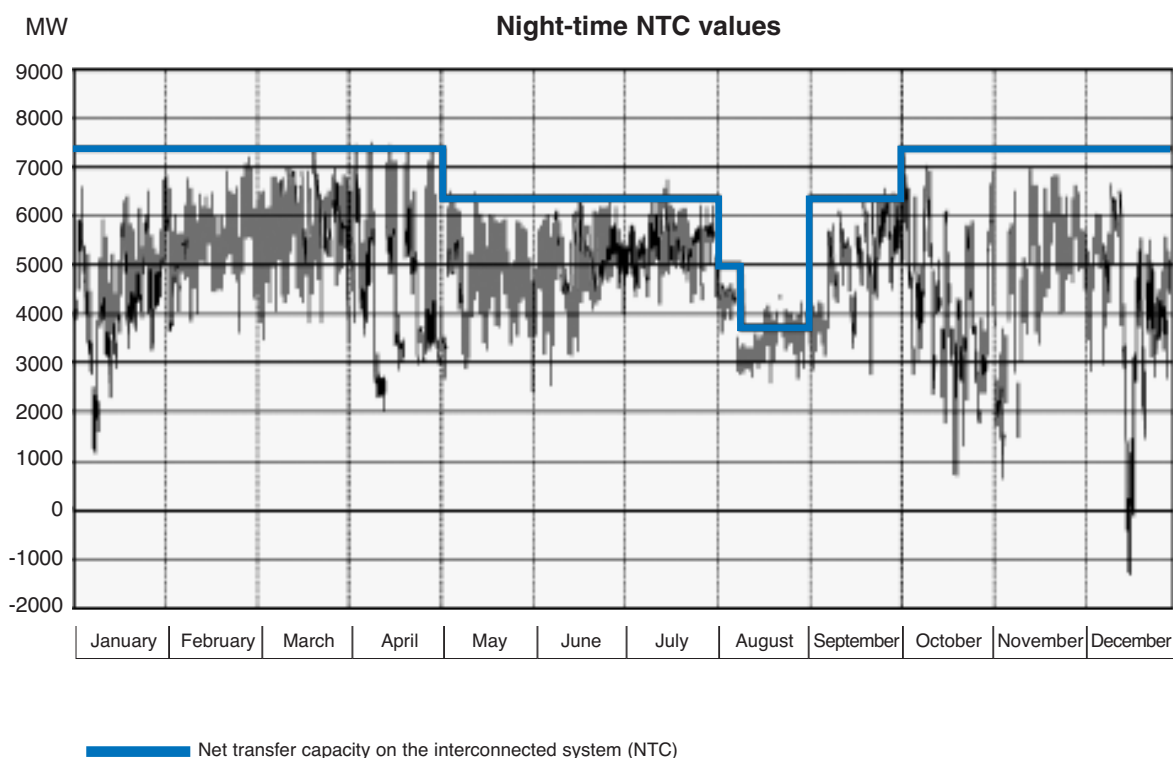
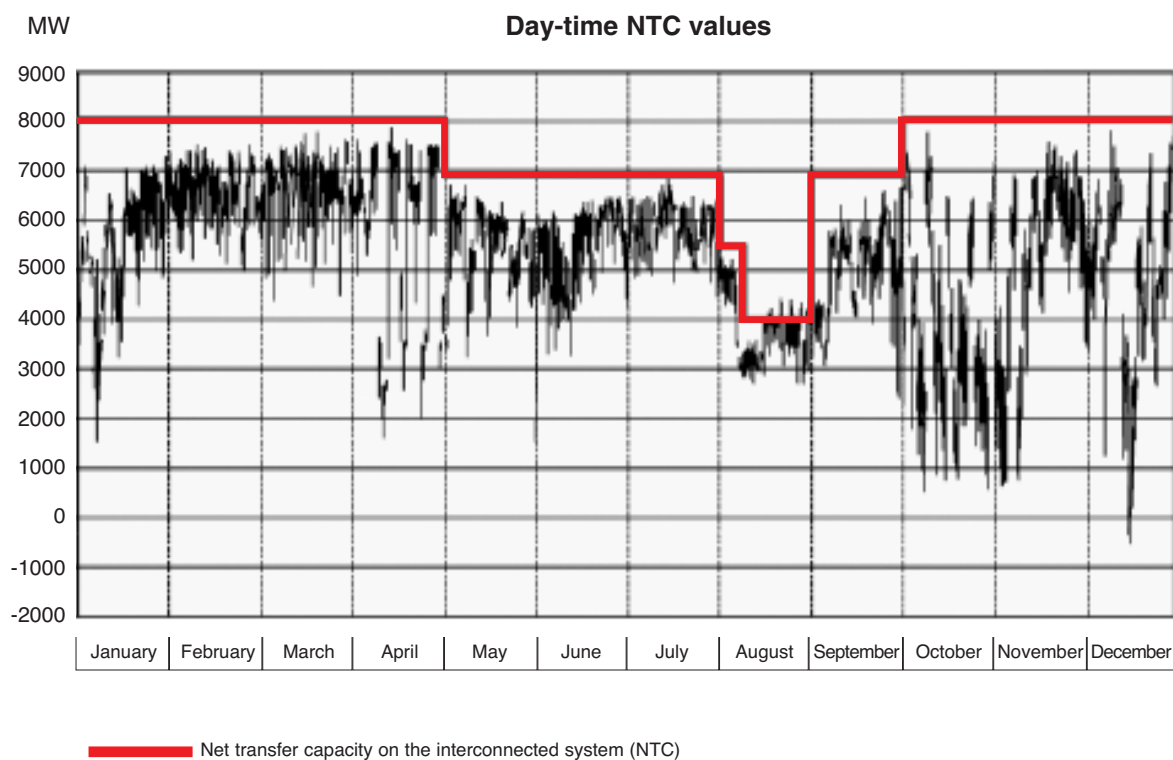
2009	Electricity imported to Italy from						Electricity exported from Italy to						Net import/export balance
	France	Switzerland	Austria	Slovenia	Greece	TOTAL	France	Switzerland	Austria	Slovenia	Greece	TOTAL	
January	1,109.2	2,099.2	117.4	540.3	159.5	4,025.6	129.7	50.1	0.0	0.0	14.3	194.1	3,831.5
February	1,156.1	2,058.9	106.8	677.1	235.1	4,234.0	111.6	22.1	0.0	0.9	5.5	140.1	4,093.9
March	1,514.1	2,290.8	120.1	646.0	187.2	4,758.2	70.8	18.4	0.0	0.2	24.5	113.9	4,644.3
April	1,040.2	1,977.0	126.8	725.2	218.1	4,087.3	95.7	29.0	0.0	0.3	54.3	179.3	3,908.0
May	1,075.7	2,035.9	100.4	558.8	123.4	3,894.2	64.3	45.9	0.0	3.1	22.6	135.9	3,758.3
June	992.6	2,102.6	16.7	637.0	123.9	3,872.8	74.9	75.5	0.0	3.6	50.2	204.2	3,668.6
July	968.6	2,610.7	77.3	595.2	136.6	4,388.4	98.3	48.6	0.0	1.8	4.4	153.1	4,235.3
August	672.2	1,924.7	70.2	98.8	160.4	2,926.3	50.5	27.3	0.0	11.7	4.4	93.9	2,832.4
September	833.3	2,185.8	107.1	403.5	168.1	3,697.8	70.3	37.7	0.0	23.8	59.2	191.0	3,506.8
October	661.6	1,757.1	125.3	589.4	176.1	3,309.5	196.4	76.3	0.0	3.2	29.0	304.9	3,004.6
November	914.3	1,888.9	127.8	672.6	205.6	3,809.2	131.9	59.2	0.0	2.1	30.6	223.8	3,585.4
December	798.2	1,771.5	111.8	621.0	264.4	3,566.9	135.9	27.8	0.0	6.9	16.3	186.9	3,380.0
YEAR	11,736.1	24,703.1	1,207.7	6,764.9	2,158.4	46,570.2	1,230.3	517.9	0.0	57.6	315.3	2,121.1	44,449.1

Physical Exchanges of Electricity between Italy and Neighbouring Countries from 1963 to 2009 (GWh)



During 2009, the **balance of physical exchanges of electricity with foreign countries** was reduced. The actual value reached 44.4 billion kWh with a 11.0% increase compared to the previous year.

Time Curves of Net Import/Export balance



The **limit value of the maximum transfer capacity on the interconnected system with foreign countries (NTC)** is represented by the red broken line, while the minimum transfer capacity is represented by the blue broken line. In particular, the maximum transfer capacity for the winter months ranged daily from 8,040 MW to 7,390 MW. During the summer months (May-September 2009 excluding August) the range was between 6,890 MW and 6,390 MW. In August, the range was between 5,500 MW and 3,730 MW.






Grid Facilities Entered into Operation (New or Renovated)

Thermal Power Plants			
SEA Malpensa	TG6	32.3 MVA	Malpensa Energia S.r.l.
Hera Casalegno	TG2	32.87 MVA	Hera S.p.A.
Alto Garda Power	TGG2	15.62 MVA	Alto Garda Power S.r.l.
Ferrari	G1 + G2	(10.6 + 10.6) MVA	Ferrari di Maranello
Hera Modena Cavazza	TG1	29.5 MVA	Hera S.p.A.
Erg Nuce Nord	TG 1-12	93.2 MVA	Erg Petroli
Modugno	TV3	407 MVA	Sorgenia Puglia S.p.A.
ERGOSUD Scandale	TG1 + TV1 + TG2	(300 + 185 + 300) MVA	ERGOSUD S.p.A.
Cabot	G1	20.6 MVA	CABOT Italiana
Renewable-Energy Power Plants			
Eolica Energia Carpignano Salentino	wind	14	MW
Eolica del Vallo	wind	48	MW
C.R.E. Rotondella	wind	18	MW
Eolica Faeto	wind	24	MW
Eolica Daunian Wind	wind	34.5	MW
Seca GR.2	biomass	10.04	MVA
Alia Sclafani Bagni	wind	25.5	MW
FRI-EL Acerra GR.3	biomass	21.345	MW
Fibe Acerra	biomass	140	MVA
Edens di Melissa/Strongoli	wind	50	MW
Giarratana	wind	45.6	MW
Sasso 2	geothermal	20	MVA
SER S.Agata	wind	40	MW
VENT1 Capo Rizzuto	wind	96	MW
Trapani-Salemi	wind	66.25	MW
Maridiana	wind	22.1	MW
Nuova Lagoni Rossi	geothermal	20	MVA
Ortona	wind	26	MW
Regalbuto	wind	50	MW
Energia Fiore	wind	60	MW
Lines			
380 kV Casellina - Poggio a Caiano	km	11.249	Terna
380 kV Casellina - Calenzano	km	13.965	Terna
380 kV Tavarnuzze - Casellina	km	9.536	Terna
220 kV Ponti sul Mincio - Marcaria	km	30.032	Terna
220 kV Bussolengo - Ponti sul Mincio c.d. Air Liquide VR	km	14.123	Terna
220 kV Cesano - Tirano	km	123.038	Terna
220 kV Tirano - Glorenza c.d. Premadio	km	74.661	Terna
220 kV Dugale - Verona B.M.	km	33.997	Terna
220 kV Bussolengo S.S. - Riva Acciaio	km	24.549	Terna
220 kV Villasor - Mogorella	km	56.46	Terna
220 kV Mogorella - Busachi	km	14.56	Terna
N° 6 lines at 150 kV			Terna
N° 6 lines at 150 kV			TELAT
N° 11 lines at 132 kV			Terna
N° 6 lines at 132 kV			TELAT
N° 1 lines at 132 kV			RFI
Stations/Substations			
S/E a 220 kV Tirano			Terna
S/E a 220 kV Cedegolo Sud			Terna
S/E a 220 kV Napoli Levante			Terna
S/E a 220 kV Mogorella			Terna
S/E a 220 kV Ponti sul Mincio			Retrasm
S/E a 150 kV Faeto			Terna
380 kV S/E Casellina section			Terna
132 kV S/E Casanova section			Terna
C.P. Savio			Enel Distribuzione
C.P. Bentivoglio			Enel Distribuzione
C.P. Budoni			Enel Distribuzione
C.P. Novara Nord			Enel Distribuzione
C.P. Sezzadio			Enel Distribuzione
C.P. Venamartello			Enel Distribuzione
C.P. Tavarnuzze			Enel Distribuzione
C.P. Casale Antici			Enel Distribuzione
C.S. Sicignano			Terna
C.S. Monte Cute			Enel Distribuzione
C.S. Carapelle			Enel Distribuzione
C.S. Alia			Enel Distribuzione
Transformers			
ATR 380/132 kV	250 MVA		Terna
ATR 220/132 kV	200 MVA		Terna
ATR 220/132 kV	250 MVA		Retrasm
Capacitor Banks			
S/E Casanova	54 MVAR		Terna
S/E Codrongianos	54 MVAR		Terna
Reactors			
S/E Andria	200 MVAR		Terna





Italian 380 kV Grid as of 31 December 2009



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)
-  380 kV line (not belonging to national transmission grid)



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** consists 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.