

## ITALY

### The energy sector

Italy is very dependent on imported energy. Hydropower and natural gas are the only significant domestic energy sources. Natural gas is the most important fuel for district heating and CHP- production with a share of 67.2% of the whole fuel consumption. Geothermal energy is increasing while the use of coal and urban waste seems to be stable.

The Italian electricity system has, compared to the European average, a very high share of fossil power plants most of which are fired with heavy fuel oil. During the last 5 years, combined cycle natural gas plants have slowly started to substitute heavy fuel oil. This substitution process will accelerate during the next decade. All the other energy carriers have had a more or less stable share of the domestic generation mix.

### Energy balances in Italy (Source: Energy Policies of IEA Countries, 2001)

			1999		1999		
			1999	%	1999	%	
<b>Population (millions)</b>			<b>57.63</b>		<b>Total final consumption</b>		
<b>Energy consumption/capita</b>			<b>2.29</b>			<b>131.8</b>	
<b>Total energy production (Mtoe)</b>			<b>27.8</b>		<b>Coal</b>	2.5 1.9	
	<b>Coal</b>	0.0 0.0			<b>Oil</b>	66.7 50.6	
	<b>Oil</b>	5.2 18.7			<b>Gas</b>	38.6 29.3	
	<b>Gas</b>	14.3 51.4			<b>Biomass &amp; Wastes</b>	1.3 1.0	
	<b>Biomass &amp; Wastes</b>	1.5 5.4			<b>Geothermal</b>	- -	
	<b>Nuclear</b>	- -			<b>Solar/Wind/Other</b>	0.0 -	
	<b>Hydro</b>	3.9 14.0			<b>Electricity</b>	22.5 17.1	
	<b>Geothermal</b>	2.7 9.7			<b>Heat</b>	0.2 0.2	
	<b>Solar/Wind/Other</b>	0.1 0.4			<b>Total industry consumption</b>		
<b>Net energy imports (Mtoe)</b>			<b>140.7</b>			<b>45.9</b>	
	<b>Coal</b>	11.8 8.4			<b>Coal</b>	2.4 5.2	
	<b>Oil</b>	84.4 60.0			<b>Oil</b>	14.9 32.5	
	<b>Gas</b>	40.5 28.8			<b>Gas</b>	16.8 36.6	
	<b>Electricity</b>	3.6 2.6			<b>Biomass &amp; Wastes</b>	0.3 0.7	
<b>Total supply - TPES (Mtoe)</b>			<b>169.0</b>			<b>Geothermal</b>	- -
	<b>Coal</b>	11.8 7.0			<b>Solar/Wind/Other</b>	- -	
	<b>Oil</b>	89.5 53.0			<b>Electricity</b>	11.5 25.1	
	<b>Gas</b>	55.6 32.9			<b>Heat</b>	- -	
	<b>Biomass &amp; Wastes</b>	1.9 1.1			<b>Transport consumption</b>		
	<b>Nuclear</b>	- -				<b>42.4</b>	
	<b>Hydro</b>	3.9 2.3			<b>Total other sectors consumption</b>		
	<b>Geothermal</b>	2.7 1.6				<b>43.5</b>	
	<b>Solar/Wind/Other</b>	0.1 0.1			<b>Coal</b>	0.1 0.2	
	<b>Electricity Trade</b>	3.6 2.1			<b>Oil</b>	10.4 23.9	
<b>Electricity generation</b>			<b>22.3</b>		<b>Gas</b>	21.5 49.4	
					<b>Biomass &amp; Wastes</b>	1.1 2.5	
<b>Electricity generation (TWh)</b>			<b>259.2</b>		<b>Geothermal</b>	- -	
					<b>Solar/Wind/Other</b>	0.0 0.0	
					<b>Electricity</b>	10.3 23.7	
					<b>Heat</b>	0.2 0.5	

## Policy for renewables and CHP

For a long time, there was no real political programme supporting energy efficiency in Italy. This situation changed with the introduction of the national energy plan (PEN) in 1988, the Law 9 in 1991 and, finally, with the inter-ministerial provision CIP 6 in 1992, when cogeneration was integrated in a subsidy programme for renewable energies as “assimilated” technology. According to this provision, a cogeneration plant can be considered assimilated to renewable energy, and thus profit from premium feed-in tariffs, if the so called energy index  $I_{en}$  is above 0.51 <Autorità 2000>. Differentiated premium feed-in tariffs were granted for power from cogeneration and renewable energy, on the basis of a call for tender.

In 1997, after the 6th call for tender, the programme was blocked due to shortage of money and the obstructive behaviour of ENEL. Until spring 1999, the feed-in conditions for independent power producers have not been regulated anymore, and ENEL often refused to stipulate buy-back contracts for more or less arbitrary reasons. Italy has experienced an intense period of political and industrial change. It is therefore logical that public and private entrepreneurs alike are treading very carefully and prefer to wait for the situation to be clarified in depth before making new investments. There are, however, fairly strong signs of recovery that soon lead to significant progress.

The (moderate) optimism as far as concerns the future is based on several important assumptions:

- In the National Energy Plan CHP has an important role (1 million toe saved)
- The subsequent laws for applying the plan envisage high capital contributions towards activities of this type and, above all, commit ENEL (the National Electricity Company) to take delivery of the energy at favourable price for the producers.
- The Central Government is undertaking extensive action aimed at privatizing several national bodies including ENEL. This policy helps Municipalities to develop their own public services.
- Co-generation in the framework of industrial plants is highly developed in Italy. Until a short time ago, civil facilities were almost completely separate from industrial plants. Earnest attempts have now been under way to implement joint activities involving private operators and municipalities, with simulating prospects.
- In the field of the treatment of solid urban waste, several large plants including heat recovery facilities for producing electricity are now built.

There are plenty of difficulties relating to the expansion of district heating and cogeneration, in addition to the fierce competition of gas as already mentioned.

- Unfavourable pricing and taxation systems on supplies of fuel to CHP and DH
- Lack of managerial training at local government level in many cities (in particular those not equipped with their own local boards for managing public services)
- The uncertainty of future policies as far as concerns the rates applicable to power produced by co-generation.

Financial support for investments in small and micro CHP plants is available on different administrative and regional levels:

- Regional contributions deriving from the energy saving Law 10 of 1991, which are usually granted on the basis of a call for tender may cover up to 30% of the entire investment in CHP. These contributions, however, are only periodically available and only in a limited number of regions.
- Tax cuts for investments in refurbishment and energy saving projects for buildings (36% in the year 2000, max. deduction: 27 000 Euro) are available only for individual persons, not for companies.

- National funds for the rehabilitation of residential areas, incl. construction of small district heating networks (contratti di quartiere).
  - Investment subsidies available for the development of depressed areas (southern regions and islands)
  - In future possibly a part of the revenues from carbon tax will be redistributed by regional authorities to co-finance renewable energy and energy saving projects.
- However, the funds from 1999 are still blocked by state bureaucracy and the strong increase of oil and gas prices in 2000 led to the proposal not to raise the carbon tax anymore.

One of the most effective incentives for small CHP projects derives from tax exemption applied to natural gas used for cogeneration purposes. However, only a part of the gas consumed by a CHP plant is tax-free.

### CHP and biomass-CHP

In 1997 about 47 TWh/a (15% of production) were generated in cogeneration plants, mainly owned by large energy, steel and chemical industries. 1.8 TWh/a originate from CHP plants connected to district heating networks. ENEL, with 56000 MW the main electricity generator in Italy, has never realised cogeneration plants.

A particularity of the residential sector is, compared to other European countries, the high share of individual flat heating systems in multifamily houses. The conversion from central into individual heating systems has been subsidised for many years. The increasingly decentralised heat supply infrastructure might represent an important obstacle to the future diffusion of small scale CHP.

CHP plants produce more than 77% of the district heat is produced in combined heat and power plants. The CHP plants for district heating in 1996 had a power of 599 MW and produced 1.861 GWh (without plant's own consumption) and thermal energy of 2962 GWh. Today many smaller towns with a limited heat load have got the opportunity to utilise the heat load of combined production. Therefore, several small gas turbine plants have been installed...

In 1996 there were 911 units for thermal and electricity production (cogeneration sections) the most important data are as follows

Electrical power	7.731 MW
Electricity generation	46.394 GWh

Detailed statistics on the small to medium scale CHP (<1MWe) market in Italy are available from COGENA, the Italian association for the promotion of CHP. Till mid-1999, there have been realised 344 small CHP plants with 410 generating units, with total cumulated electric capacity installed 123MWe (preliminary figures for 1999). The estimated annual electricity production is between 430 - 550 GWh per year and covers about 0.2 % of the entire national electricity consumption. Considering the installations realised from 1990 to 1999, most plants are between 200 – 500 kW<sub>e</sub> (23%) and 500 – 1000 kW<sub>e</sub> (67%). Plants below 200 kW<sub>e</sub> represent only 10% of the entire small scale CHP capacity.

Concerning the fuel type prevails natural gas with 63%, biogas from landfills and municipal wastewater treatment plants with 31% comes second. Other fuel types have altogether a share of less than 6%. Biogas has seen an increasing interest particularly thanks to premium feed-in tariffs available under the CIP 6 provision, which has been blocked in 1997, and, more recently, due to the new legislation for waste treatment (Legge Ronchi), which obligates operators of landfills to recover energy from landfill gas.

- **Pozzilli**

The multi- fuel CHP biomass plant of Pozzilli was established by ENERGONUT. The plant, fueled with local argo-forestry and argo- industry residues (average LHV: 18,2 MJ/kg), is selling electricity to the grid and the waste heat to surrounding third party's users such as greenhouses. Ashes are sent to landfill and/or to a cement factory nearby. The steam boiler is equipped with a moving grate especially designed for proper regulation of the combustion rate. Natural gas is used as auxiliary fuel for start up and transient phases. The electricity production is about 65 GWh/y, totally sold to ENEL. The waste heat available is supplied to customers in the form of warm water at 40°C. The plant has an annual consumption of 70000 to 80000 t/y of biomass while the maximum thermal load corresponds to 10 t/h. The net rated power output is 9.8 MWe.