

The page features a decorative graphic consisting of several overlapping circles in various shades of blue, arranged in a descending staircase pattern from the top right towards the bottom right. A thin, light blue diagonal line runs from the top left towards the bottom right, passing through the circles. The text is positioned on the left side of the page.

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General Introduction

With limited domestic energy sources, Italy is highly dependent on imports to meet its consumption needs. In absolute terms, oil consumption has remained relatively static since 1970, but oil's share of Italy's primary energy mix has decreased significantly, steadily replaced by natural gas. A pressing issue affecting Italy has been the country's electricity supply. Over the past decade, Italy's installed electricity generation has not been able to keep up with demand, resulting in an increased share of electricity imports as a percent of total consumption.

Oil is the largest source of Italy's energy consumption, representing 47 percent of primary energy consumption in 2004. Natural gas is the second-largest with 35 percent of primary energy consumption, followed by minor contributions from coal (8 percent), hydroelectricity (5 percent), and other renewables (2 percent). Unlike many other OECD countries, Italy still relies upon oil for a sizable portion of electricity generation: preliminary International Energy Agency (IEA) data for 2005 shows that Italy relied upon oil for 16 percent of its electricity generation, versus 5 percent for the OECD as a whole¹.

Oil background

Italy is a large consumer and importer of oil. The country consumed 1.7 million barrels per day (bbl/d) of oil in 2006, slightly less than the previous year. Italy's domestic oil production in 2006 (total liquids) was 151,000 barrels per day (bbl/d), sufficient to meet only 9 percent of domestic oil needs.

As a result, according to Eurostat, Italy imported 1.7 million bbl/d of crude oil in 2006, with the largest sources of these imports being Libya (27 percent), Russia (16 percent),

¹ The Energy Information Administration (EIA).

and Saudi Arabia (12 percent). According to the *Oil and Gas Journal (OGJ)*, Italy had proven crude oil reserves of 600 million barrels in 2007, the third-largest in the EU behind the UK and Denmark. Italy produced 110,000 bbl/d of crude oil in 2006, with about three-quarters of that production coming from Eni.²

In April 2007, the European Commission and representatives of seven European governments signed an agreement to begin construction of the Pan-European Pipeline (also known as the Constanta-Trieste Pipeline). The system could link Constanta, Romania with Trieste, Italy, allowing crude oil from the Black Sea region to bypass the congested Bosphorus Straits. Current plans call for the pipeline to transport 800,000-1.8 million bbl/d of crude oil by 2012, at an estimated cost of \$2 billion.

According to *OGJ*, Italy had 2.3 million bbl/d of total refining capacity, the second-largest in the EU behind Germany. The country has seventeen major refineries, concentrated along the Mediterranean coastline.³

According to an industry group, Italy produced 14.7 thousand bbl/d of biodiesel in 2006, with 40 percent of this production slated for domestic consumption and the remainder exported: Italian domestic supply of conventional diesel fuel was 527 thousand bbl/d in 2006. While Italy relies upon crude oil imports for the bulk of its domestic consumption, Italy is a net exporter of refined petroleum products. According to Eurostat, the country imported about 260,000 bbl/d of petroleum productions in 2006, while exporting 560,000 bbl/d. The largest amount of product exports went to Spain (16 percent), the United States (8 percent) and Belgium (8 percent). Italy holds 621 million barrels in proven oil reserves.⁴

In 1992, a program was launched to privatize Eni. Between 1995 and 2001, the government reduced its share in Eni to 30.3%. The government raised approximately US\$ 25 billion through this privatization. In parallel to its privatization, Eni restructured its activities to focus on the oil, natural gas and petrochemicals businesses. In 1997, Agip, Eni's subsidiary, became Eni's Exploration and Production Division, and in 2002 Eni

² Ibid.

³ Ibid.

⁴ Ibid.

absorbed the functions of its subsidiary Agip Petroli, which became Eni's Refining and Marketing Division. Eni owns 60% of Italy's 1.170 km of crude oil pipelines and 43% of the 1.690 km of oil products pipelines. Distribution is principally undertaken by integrated oil companies. While Eni (through Agip) has the largest share of the market (29.9%), a number of other companies are also active.⁵

The Italian oil market is currently fully open. Import, export, trade and prices are free. The government intervenes only to protect competition and avoid abuse of dominant position.⁶

Coal background

Italy was one of the first European countries to completely stop domestic coal production, with the last facility closing in 2001. The importance of coal in Italy's energy needs declined to only 7.3 percent in 2003, one of the lowest levels in the EU. The country consumed 24.2 million short tons (Mmst) of coal in 2003, the bulk of which fueled electricity generation. According to Eurostat, Italian imports of coal during the first ten months of 2005 came principally from South Africa (20 percent), Colombia (13 percent), and Australia (12 percent)⁷.

Electricity

Italy had 71.4 gigawatts of installed electricity generating capacity in 2004. In that same year, Italy generated 277.6 billion kilowatt hours (Bkwh) of electricity, while consuming 303.8 Bkwh. Most generation comes from conventional thermal sources, with smaller amounts from hydroelectricity and other renewable.

⁵ *International Energy Agency - Energy Policies of IEA Countries - Italy 2003 Review.*

⁶ Ibid.

⁷ The Energy Information Administration (EIA).

Electricity imports made up for the country's supply shortfalls, and according to Eurostat, the largest sources of these imports are Switzerland, France, and Slovenia. Italy began liberalizing its electricity sector in 1999, initially allowing only large customers to choose their own supplier. Liberalization has now spread to the majority of the retail market.

As part of the liberalization, the Italian government began to privatize Enel, the former, state-owned power monopoly that previously controlled all aspects of the electricity sector. In 2000, the Italian government forced Enel to sell 27 percent of its generating capacity, and to that end, Enel created three new, independent generating companies: Elettrogen, Eurogen, and Interpower. Along with removing Enel's monopoly on electricity generation, distribution, and transmission, the Italian government began to divest its holdings in the company.

While Enel remains the dominant generator and distributor of electricity in Italy, other companies have emerged as significant players in the sector. The most important of these include Edison, Enipower, Acea, Energia Italia, Spain's Endesa, and Belgium's Electrabel⁸

Italy gets the majority of its electricity supply from conventional thermal sources, the bulk of which are oil-fired. The high cost of oil compared to other sources of thermal generation have caused Italian electricity consumers to pay some of the highest rates in Europe. In response, power generators have begun to switch to alternative fuel sources, especially natural gas and co-firing plants burning combinations of oil, natural gas, and coal.⁹ In the summer of 2002, Italy and Greece completed the construction of a new 163-kilometer, 400-kilovolt underwater cable to link Italy and Greece. The cable will allow Greece to transfer electricity to the EU, as well as serve as a back-up source for Italy.¹⁰

France accounted for nearly half of the EU's nuclear capacity and France (20%), Italy (16%) and Spain (14%) together made up half of the region's hydropower generating capacity.¹¹ Historical data indicate a decrease of the potential of hydroelectric plants, due to restrictions of the minimum vital outflow, and to a reduction of rainfall due to climatic

⁸ Ibid.

⁹ Ibid.

¹⁰ Ibid.

¹¹ Eurostat press release- STAT/06/66 May 2006

factors. Given these trends, and considering the effects of new investments, especially in mini-hydro, the expectation is for a total production at 2020 of 43.15TWh, compared with 36TWh in 2005.¹²

Natural Gas background

Italy produced 0.5 Tcf (trillion cubic feet) of natural gas in 2004, while consuming 2.8 Tcf. An increase in the construction of combined-cycle, gas-fired turbines (CCGFT) has been the principle driving force behind the increase in natural gas consumption.

The maturation of Italy's natural gas fields and the rapid advance in domestic consumption have increased the country's reliance upon natural gas imports. According to Eurostat, Italy's natural gas imports supplied 84 percent of the country's domestic consumption in 2004, versus 59 percent in 1985. The largest sources of these imports in 2004 were Algeria (38 percent), Russia (32 percent), and the Netherlands (14 percent).

According to *OGJ*, Italy had proven natural gas reserves of 5.8 Tcf in 2007.¹³ Italy imports natural gas from Russia at two entry points: via the Trans-Austrian Gas Pipeline (TAG) at Tarvisio, and via Slovenia at Gorizia. Italy imports natural gas from Libya via the Greenstream pipeline linking Mellitah, Libya to Gela, Sicily.¹⁴ Eni was the dominant actor in all aspects of the natural gas sector.

The company controlled almost all of Italy's natural gas production. Anyway, Italy has mostly brought its natural gas sector into compliance with EU regulations concerning liberalization. These areas include the opening of the sector to new entrants; the unbundling of production, distribution, and transmission activities; and the freeing of gas prices from state control.¹⁵

¹² *Energy: issues and challenges for Europe and for Italy*. Position paper of the Italian Government (10th September 2007).

¹³ The Energy Information Administration (EIA).

¹⁴ The Energy Information Administration (EIA).

¹⁵ Natural Gas Production in Italy – The global oil and gas industry article (<http://www.oilgasarticles.com/articles/243/1/Natural-Gas-Reserves-in-Italy/Page1.html>).

Natural gas liberalization has slowly eroded Eni's dominant position in the sector, with Eni's share of total natural gas delivered to the national grid declining from almost 100 percent prior to liberalization to 68 percent in 2003. Besides Eni, the other major players in the Italian natural gas sector include Edison (majority-owned by Italian automaker Fiat and France's Electricité de France) and Enel, the former electricity monopoly.

Imports of Natural Gas (LNG) constitute a very small portion of Italy's total natural gas imports. The country has a single LNG receiving terminal at Panigaglia, located on the country's western coast near La Spezia. According to Snam, the terminal's operator, the Panigaglia facility sent out 302.8 MMcf/d of natural gas in 2006, or around four percent of Italy's natural gas consumption.

Italy's natural gas consumption has risen substantially since imports began in the early 1970s. Italy currently is the third largest natural gas market in Europe, behind Germany and the United Kingdom.

Natural gas use has increased substantially in recent years, especially for power generation. In 2001, natural gas represented about 34% of total energy consumed in Italy, and this share is expected to grow to 44% by 2010. In 2000, residential and commercial sectors accounted for 35% of the market, industrial 30%, and electricity generation 32%. It is estimated that by 2010, 48% of electricity in Italy will be generated by natural gas and only 7% by oil. By 2010, gas demand could reach 92 bcm (billion cubic meters) to 95 bcm, about 40 bcm being consumed in the power sector: 90% of new power plant projects will be gas-fired.¹⁶

Eni confirms its objective of strengthening its leading position in the European gas market, where it holds a unique competitive position thanks to the availability of gas from several long-term supply contracts, as well as access to a wide infrastructure system. Italy is increasingly dependent on imports.

¹⁶ Ibid.

Diversification of supply is an important issue, as Italy relies heavily on Algeria and Russia.¹⁷ The Algerian figure includes liquefied natural gas (LNG) and pipeline gas. Eni will increase its gas sales outside Italy by an average of 9% a year. This will enable Eni to reach total gas sales of 110 billion cubic meters by 2011. As well as enhancing its market share in the main European countries, Eni sees a significant increase in its US sales and aims to start selling equity gas in Russia.¹⁸

Nuclear Power

Nuclear power, like the one that come from renewable sources, does not produce CO₂ (gas that is the main responsible for the greenhouse effect) or other pollutants such as oxides of sulphur and nitrogen, which are generally emitted into the atmosphere from fossil fuels. It is significant in this context to underline that the European Union has recently defined the nuclear as an important tool in order to fight global warming .

In Europe nuclear energy is currently the main source of electricity generation, with about 35% of electricity produced.

As far as Italy experience is concerned, the age of nuclear began early, at the end of the '50s. In that time some private power companies (first among all Edison) launched a program of production of electricity by nuclear energy. This program allowed Italy to quickly acquire necessary skills for the construction of nuclear reactors without any support from abroad.

But the accident in the nuclear plant of Three Miles Island (Pennsylvania - United States) in 1979 and then the explosion of the Chernobyl reactor (now Belarus), led both Italian government and people to see the nuclear solution adversely, ultimately deciding to hold a referendum in order to banish nuclear power from Italian soil.

The referendum took place in 1987 and it had an affirmative result. The four existing nuclear power in Italy: Central Trino Vercellese (VC) or Central Caorso (PC) Central Latina Central Garigliano (Sessa Aurunca ES) were closed and this closure has resulted in a new type of problem; since the radioactive wastes were mostly kept near the old nuclear plants. It follows that the real problem is purely that of the Italian divestment and dismantling of nuclear facilities, as well as

¹⁷ ENI - Fact Book 2006

¹⁸ The Energy Information Administration (EIA).

putting into safety of waste products. Operations called "decommissioning".

The decommissioning must pass through at least three stages: the reactor shutdown, decontamination and decommissioning of materials with consequent transfer to landfills throughout the material.

For this scope, during the year 1999, was set up a company separated from ENEL called SOGIN SpA. It has as dismantling guidelines activities:

- To treat within ten years all existing radioactive wastes;
- To disable within twenty (20) years decommissioned nuclear facilities (provided that the national filing is available in good time).

In addition, SOGIN has to collaborate with the Ministry of Productive Activities for the promotion of economic and social development of communities and environmental protection.

The nuclear program in Italy has been continuously evolving as well as its nuclear imports from France and Switzerland that are now about 17% of its energy needs. Furthermore, in 2003, Enel acquired 66% of Slovenke Elektarne, mass producing electricity in Slovenia and the second in central and eastern Europe

Enel has also offered to finance the construction in Slovakia of two new reactors still at the draft stage since 1991 due to the lack of funds, and has signed an agreement with Electricité de France (Edf) for participating in the development of the nuclear power of "the third generation". The current situation shows continuous steps forward in the use of nuclear power, the first among all, the Bersani decree, on February 25, 2008, that addresses a working group composed by representatives from Government, Regions, and Enea (Italian National Agency for New Technologies, Energy and Environ) to identify the type, procedures and methodology for an implementation of a single national storage centre for nuclear waste. Bersani's decree also wants to provide incentives relating to the high-technology services, research and formation in the field radioactive waste.

Renewable energies

The adoption by the Spring European Council of the action plan “An energy policy for Europe” will help Member States combating climate change, improving their technology and competitiveness. It will have tangible benefits for European citizens and enterprises.

The targets agreed by Member States have a strong external significance, aiming at improving security of supply and rendering Europe a global leader on these issues.

“An energy policy for Europe” can have the effect of stimulating innovation, thereby creating a real technological leadership for the EU.

All the policies and the related targets contained in the energy package, and in particular those on renewable energies, will have now to be followed by concrete legislative proposals from the Commission.

Agreed milestones would facilitate investment planning both for the public and the private sector, while at the same time providing a useful governance mechanism, to check progress and contribute to the adjustment process if needed.

Member states will be free to define their own energy policy mix. In fact different MS have different situations in terms of landscape, climate, endowment of natural resources, and technology adoption rates. In this framework, the legislative proposal of the Commission should define clear and homogeneous rules, including on incentives.

Italian Policy and Issues

Renewable energy sources make up the 15.2% of the total Italian energy production. Italy is the fourth European producer of renewable energy sources and it supports the idea of defining binding targets for renewable sources in order to increase the future use of them. Last year the production of renewable sources has increased of the 4,5% compared with the previous year.

Hydro power: it is the most important renewable energy, by representing the 12,5% of the total energy production, but historical data indicate a decrease of the potential of hydroelectric plants, due to restrictions of the minimum vital outflow, and to a reduction of rainfall due to climatic factors.

Wind power: it is the renewable energy which grow more. In fact in 2006 it increased with a rate of growth equal to 37% . The main issues at stake are the local acceptance of the potential burdens linked to the environmental impact resulting from the exploitation of progressively more valuable areas; and the natural saturation of the locations that have more specific capability. For these reasons, the development of offshore plants is envisaged.

Photovoltaic energies: they are becoming really popular. They have increased of the 12% , thanks to incentives for building integrated Photovoltaic plants. Firms and institutions, such as Santogrid and the University of Ferrara, are using a first generation of prototypes. The productivity of photovoltaic energy is going to increase in the next few years, allowing users high savings in terms of costs.

Solar thermodynamic: unlike PV, the solar thermodynamic system uses only the direct solar radiation and operates only at a radiation level higher than 300-400W/m². For this reason, installation of plants is possible only in some areas of the *Mezzogiorno*.

Geothermal power: it has increased of the 3,7%. It is assumed a positive outcome of the research identifying alternative ways of use of the heat emitted from within the Earth. If these results are confirmed, total potential electricity from geothermal would rise a lot.

Wave power: it is not diffused in Italy. But we assume the creation of innovative energy plants that are able to use the wave energy typical of the Italian coasts, very different from the oceanic water in which normally these plants are installed.

Bio Energy is becoming more popular. Solar thermal heat has grown significantly (between 1997 and 2004), although its contribution is negligible. Geothermal heat has decreased over the same period by an average rate of 2%.

Bio-fuel: The Italian biodiesel sector experienced strong growth between 1997 and 2005 (no bio-ethanol is being produced). The average annual growth was 29%. In terms of production capacity, Italy has made significant progress. Italy represents the second highest biodiesel producer in the EU25, after Germany.

Main supporting policies

In order to promote electricity production from renewable energy sources, Italy has adopted the following schemes:

- Priority access to the grid system is granted to electricity from Renewable energies sources and Combined Heat and Power plants.
- An obligation for electricity generators to feed a given proportion of electricity production from renewable energy sources into the power system.
- Tradable Green Certificates (which are tradable commodities proving that certain electricity is generated using renewable energy sources) are used to fulfil the Electricity production from renewable energy sources obligation.
- A feed-in tariff for PV exists. This is a fixed tariff, guaranteed for 20 years and adjusted annually for inflation.

National legislation is being developed, both for Production of heat and cold from renewable energy sources and for bio-fuels. Subsidies are already in place for bio-ethanol production and tax exemptions for biodiesel production.

Energy efficiency

In accordance with EU Directive 32/CE/2006¹⁹, Italy submitted its **National Energy Efficiency Action Plan** in July 2007. To drive forward the energy efficiency action program, a number of instruments have already been enacted, including the 2007 Finance Act, the defining of energy efficiency standards for the building industry, the promotion of high-efficiency cogeneration, the Industry 2015 energy efficiency project and various training and information campaigns directed at end users of every kind (including the residential, tertiary and industrial sectors).

The proposed measures aim to achieve an energy saving target of 9.6% by 2016, comprising 118,464 GWh.

The industrial, residential, tertiary and transport sectors are addressed.

The measures for the *residential sector* are:

- Raising and extending in time the energy efficiency targets for electricity and gas distributors (white certificates);
- Incentives to replace “energy-hungry systems” and appliances, with stringent time limits for putting them on the market;
- Investment program to improve the efficiency of public lighting;
- Stabilizing the prevailing tax concessions (e.g. high-efficiency electric motors, replacement of refrigerators, efficiency in lighting and the construction industry, provided for by the 2007 Finance Act).

for 56.830 GWh/year saved by 2016 (the 45 percent of the total energy saving target).

¹⁹ Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC

The action areas of greatest impact in the *tertiary sector* are:

- Efficient heating;
- Conditioning (as regards the portion not assimilated to the residential sector);
- Lighting and public lighting;

For a total of 24.700 GWh/saved each year (20 percent of the expected annual saving)

Energy efficiency improvement measures in *industry* are:

- Efficient lamps and control systems;
- Replacement of 1 asynchronous motors;
- High-efficiency cogeneration;
- Using mechanical vapour compression

For a total of 21.537 GWh/saved each year (17 percent of the expected annual saving).

For the *transport sector* it is important to notice that Italy is the country with the world's highest concentration of motor vehicles relative to population, with a 2004 ratio of 1.69 persons per car. This underline the heavy imbalance in favor of road transport, caused also by low levels of accessibility to urban public transport services, due to insufficient quality.

For these reasons the most specific action areas considered are as follows:

- *Vehicle technologies* for increased efficiency: the most effective measure is increasing the maximum size of vehicles, thereby making it possible to reduce energy consumption per tonne-km.
- *Telematics for logistics* with a view to better use transport systems and smoother traffic.
- Encourage freight and passengers to transfer from road to rail or sea and to favor less polluting vehicles.

For a total of 23.263 GWh/saved each year (178 percent of the expected annual saving)²⁰.

²⁰ Piano d'azione italiano per l'efficienza energetica 2007,
http://ec.europa.eu/energy/demand/legislation/doc/neeap/italy_en.pdf

Energy Security

With limited domestic energy sources, Italy is highly dependent on imports to meet its consumption needs. In absolute terms, oil consumption has remained relatively static since 1970, but oil's share of Italy's primary energy mix has decreased significantly, steadily replaced by natural gas.

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Recently, Italy's energy mix is shifting from oil towards gas, but the country is highly dependent on external sources for these two fuels. This creates concern about security of supply and increased price volatility. Natural gas is the fastest growing fuel source in the EU, with consumption rising by 42.3 percent in the last decade, according to the U.S. Energy Information Administration. Europeans consume 506 billion cubic meters of natural gas a year, with Germany, Italy, and France the top consumers.

Germany depends on Russia for 46 percent of its gas supplies, and Italy and France are also major consumers of Russian gas, importing 32 percent and 21 percent respectively of their needs from Russia.²²

There are limited options for energy diversification, partly due to the lack of a nuclear option. Moreover, the target for renewable sources is European, the national energy markets are still not sufficiently integrated. At the same time, the different MS have different situations in terms of landscape, climate, endowment of natural resources, and

²¹ The Energy Information Administration (EIA).

²² Energy: Europe's Escape Routes from Moscow by [Jeffrey White](#) – Businessweek (August 13, 2007)

technology adoption rates. Such heterogeneity reinforces the case for tradable market-based instruments.

Therefore, while Italy understands that scope for locally designed incentives exists, it supports the idea of having an harmonized set of incentives across Europe.²³ Italy believes that – if a full harmonization of incentives cannot be achieved – an harmonization of principles has to be found. This relates especially to stability, reduction of barriers, technology, duration, and the role of state aid. The adoption of an “harmonization of principles” would favor the allocation of the production of renewable energies on the basis of comparative advantages of the MS, reduce the costs of reaching the European target, and facilitate consensus-building in the sharing of the target among the MS.²⁴

The recent blackouts that occurred in several OECD countries have highlighted the vulnerability of national electricity supplies to national and regional infrastructure failures, and the need for adequate investments and effective coordination, particularly of system operation, to efficiently prevent and manage such disruptions.²⁵

Therefore, Italy tried to work towards a long-term prospective: "Italy's remarkable progress in electricity and natural gas market reform will help it to develop a more efficient and secure energy sector," said Claude Mandil, Executive Director of the International Energy Agency (IEA). Italy ratified the Kyoto Protocol in June 2002 and launched a national action plan to mitigate climate change in December 2002. "But the country faces a number of challenges: securing a reliable and less expensive electricity supply, preserving national energy policy goals under decentralization, securing effective competition, diversifying energy sources and mitigating climate change," said Mr. Mandil.²⁶

Some steps have been made to tackle the serious energy security problems: in 2006 Eni and Gazprom reached a three-years-long “wide strategic deal” that will allow them to realize common projects in the gas midstream e downstream, in the upstream and in the

²³ Italy supports market-oriented incentives, for their advantages in terms of transparency, cost-based competition among sources, cross-border trade. Technology-specific support can be provided in this scheme by a series of measures such as technology banding.

²⁴ *Energy: issues and challenges for Europe and for Italy*. Position paper of the Italian Government (10th September 2007).

²⁵ The Energy Information Administration (EIA).

²⁶ IEA Commends Italy's Progress in Energy Market Reform, but Sees Danger in Reducing Energy Diversification (http://www.iea.org/Textbase/press/pressdetail.asp?PRESS_REL_ID=106)

R&D cooperation. Russia will start to sell gas directly in Italy by 2007 (up to a potential of 3 billion m³ from 2010 and through-out the lasting of the contract). The deal, for the mid and downstream part, foresees that Gazprom will extend the length of the contracts concerning gas supply up to 2035.

The new pipeline (South Stream) will connect directly Russia with the Mediterranean sea. This project will represent a decisive step towards the strengthening of energy security supply for the whole Europe which is in desperate increasing need of gas. According to the president of the Italian Energy Authority Sandro Ortis: "Italy can become a big hub for the entire Europe"²⁷.

²⁷ Supergasdotto Eni-Gazprom by Federico Rendina (<http://www.intesa24.it/NR/exeres/F8F75936-9D08-4116-9721-D9C7446CE622.htm>).