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European energy market reform
Country profile: Italy

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Current situation

Energy consumption and trade balance

In 2012, Italy's gross inland energy consumption amounted to 163 Mtoe. **Thirty-eight percent of primary energy consumed is derived from gas (61 Mtoe) and another 38% comes from crude oil, which holds second place in the energy mix (59 Mtoe), followed by coal, which represents 10% of consumption (16 Mtoe).**¹

Figure 1. Gross inland energy consumption in 2012 (163 Mtoe)²

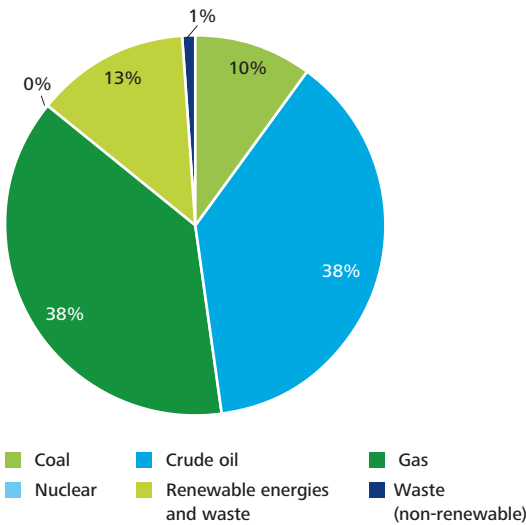
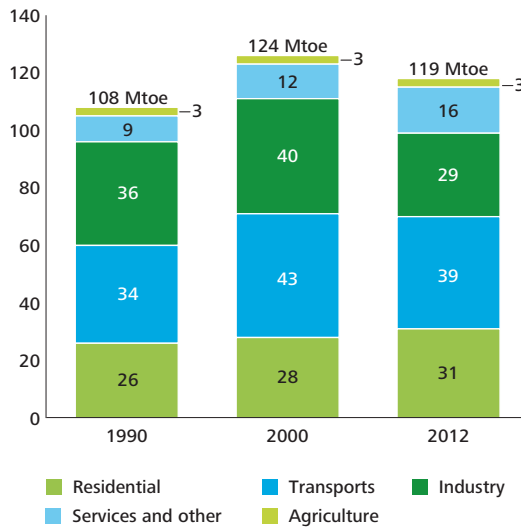


Figure 2. Final energy consumption by sector (in Mtoe)²



Key figures:

Population (2013): 59.7m cap.
 GDP (2013): 1,560 bn €
 GDP/capita (2013): 26,138 €
 GDP/PEC (2012): 9.6 €/kgoe
 PEC/capita (2013): 2.5 toe/cap.

Fossil fuels make up 86% of Italy's primary energy consumption, with 38% in crude oil and 38% in gas.

Transport and the residential sector represent almost 60% of overall final energy consumption, and have both been increasing since 1990.

Italians consume less energy than average Europeans (2.5 toe, including 4,800 kWh of electricity per capita, compared to 3.2 toe and 5,580 kWh for the EU in 2013).³ This is due to several factors, such as relatively high power prices and the legacy of the economic crisis, which saw electricity demand in the industrial sector fall by 21% between 2008 and 2013. In 2012-2013, overall electricity demand reached its record low since the market was first liberalized at the beginning of the century.⁴

In 2012, the transportation, residential and industrial sectors' share of final energy consumption was 33%, 26% and 25% respectively. Industry and agriculture were the only two sectors showing a decrease in their final energy consumption from 1990 to 2012 (-20% and -10% respectively). **Since 2000, there has been a downward trend for all sectors, excluding services, where final energy consumption increased by 37%.**

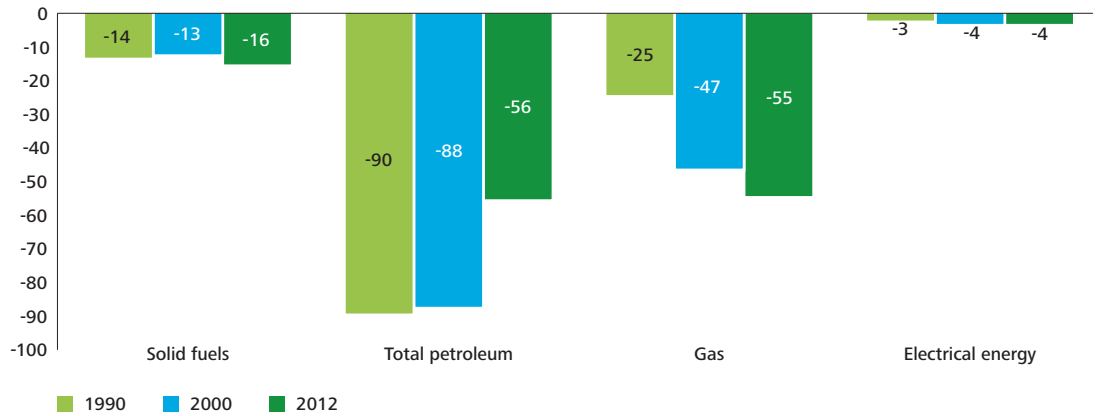
1 It can be noted that, although it is not shown in figure 1, Italy does consume nuclear energy. However, this consumption is 'hidden' as part of total electricity imports taken into account in the calculation of primary energy consumption and thus is not shown in Eurostat data

2 Eurostat, <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&code=tsdcc320&plugin=1>; <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&code=tsdpc320>

3 ENERDATA – Italy energy report, August 2014 update, <https://estore.enerdata.net/energy-market/italy-energy-report-and-data.html>

4 REF-E (2014) – Il mercato elettrico italiano: stato dell'arte e prospettive. Presentation by Virginia Carnazza

Figure 3. Energy trade balance (Mtoe)



Italy has a high preponderance of thermal power production (74%), while non-hydro renewables generated 13% in 2012.

In 2012, Italy's global energy imports reached 165 Mtoe and exports reached 31 Mtoe.

Italy's energy reserves are scarce: limited oil resources (202 Mt in 2013) and dwindling gas reserves (from 199 bcm in 2000 to 56 bcm in 2013). **The country depends on imports of fossil fuels.**

Oil imports (crude and refined) amounted to 56 Mtoe in 2012 and **have decreased by 38%** since 1990, while **natural gas imports** (55 Mtoe in 2012) **have increased by 119%**. In the 1990s and early 2000s, rising demand for energy, and growing economic and geopolitical uncertainties related to the use of oil, **forced Italian energy producers to intensify their efforts to diversify their energy sources**. Oil as fuel in thermal power plants has been partially replaced by natural gas, as the latter is considered less volatile in terms of price, more accessible and typically comes from less politically unstable areas.

Italy is a net importer of electricity. Roughly 87% of demand is satisfied by a national production of 285 billion kWh (1.3% less than in 2011). The remaining 13% comes from France and Switzerland electricity imports, which benefit from low prices driven by excess power during off-peak periods.

Power generation

Power generation capacity was 128 GW in 2012.⁵ **More than 70% of Italy's electricity was generated by thermal plants in 2012**, 14% by hydropower and 13% by other renewables sources.⁵

Figure 4. Electricity production capacity – 128 GW (2012)⁵

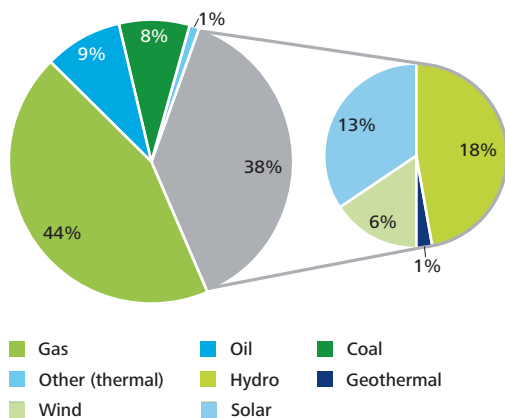
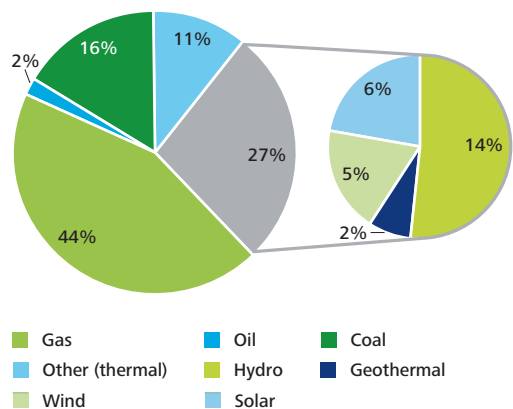


Figure 5. Gross electricity production – 299 GWh (2012)⁶



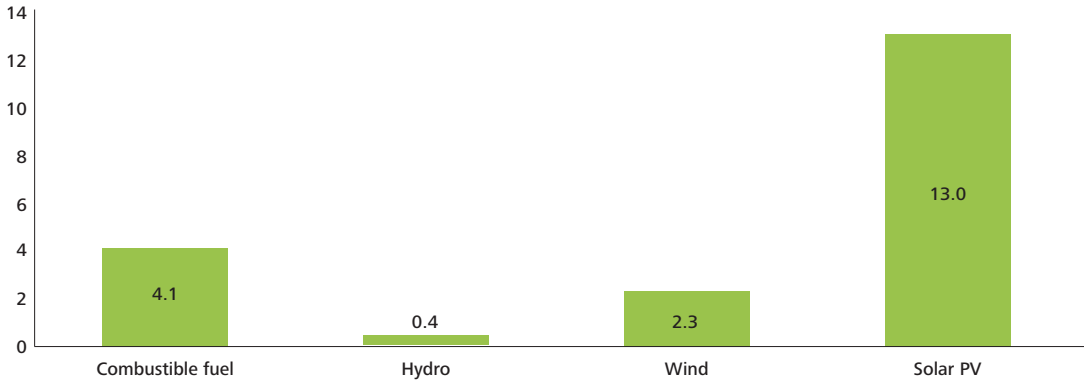
5 Terna Group, Confronti Internazionali 2013 (2012 data), <http://www.terna.it/LinkClick.aspx?fileticket=3UMfptQkg0k%3d&tabid=418&mid=2501>, page 147

6 Terna Group, Direzione Dispacciamento Nazionale. Dati statistici sull'energia elettrica in Italia – 2013, Nota di sintesi ("produzione" pag 100, 112) http://www.terna.it/default/Home/SISTEMA_ELETRICO/statistiche/dati_statistici.aspx

7 Eurostat (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_113a&lang=en)

After gas, coal is the second most frequently-used fuel in the Italian electricity generation mix,⁷ although reliance on coal has been diminishing in recent years. Italy still has 13 coal-fired power plants, which are increasingly the targets of environmental activism, public attention and media pressure.

Figure 6. Electrical capacity change 2010-2012 (GW)⁷



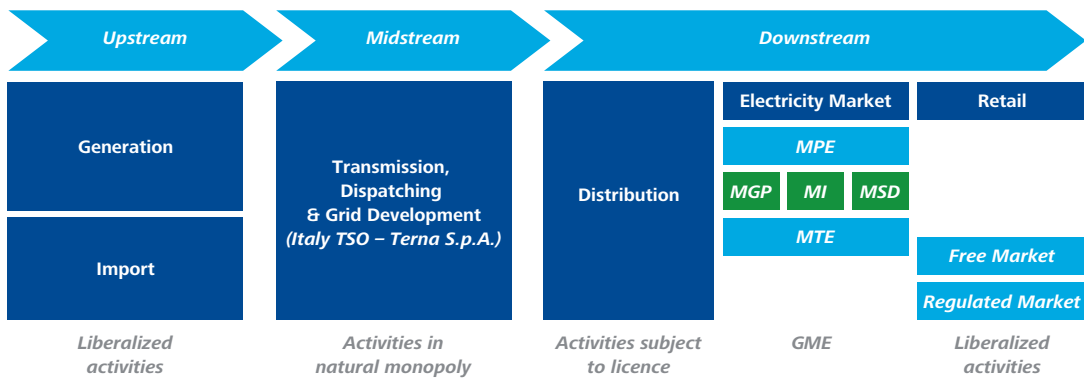
Non-hydropower renewable energy production capacity increased very sharply between 2008 and 2013.

Wind and biomass power generation capacities multiplied by two during this period, with an accelerated growth in 2012 (+140% and +155%, respectively, versus 2011). The positive trend is expected to continue.

In 2011, photovoltaic (PV) installed capacity boomed as a result of the generous prices offered under the Conto Energia and Salva Alcoa law, although it slowed down in 2013 after certain incentives to solar farms on agricultural land were eliminated (this took place on July 6, 2013, 30 calendar days after reaching the indicative cumulative cost of incentives of € 6.7 billion per year). That said, PV growth is expected to continue unabated until 2020 (+50%). Geothermal power capacity growth has been weak (+9%) and will probably be slow until 2020 (+22%). Hydropower capacity has remained fairly stable (+4%) and should remain so until 2020 (+3%).⁴

Power market: main actors

Figure 7. Market mechanism/actors⁸



Since the 1990s, regulations have been based on two main pillars: limiting the power generation of former monopolist Enel, and unbundling generation, transmission and retail companies, which led to the introduction of a free market for the sale of electricity to customers. Retail market liberalization started in 1999 with the passing of the so-called "Bersani Decree".⁹

Today, the Italian power market is fairly dispersed. Electricity generation is still dominated by Enel (25.4% of 2012 Italian power production), followed by Eni (9.5%), Edison (7.2%), E.On (4.4%) and other producers to a lesser degree.¹⁰

The Italian electricity transmission network is almost entirely owned and operated by Terna, a state-owned company. The power distribution market is also very concentrated, with Enel operating 86% of the network despite the existence of more than 133 local operators,¹¹ mainly municipal.

8 GME = Gestore dei Mercati Energetici S.p.A.; GSE = Gestore dei Servizi Energetici S.p.A.
 9 Legislative Decree March 16, 1999, no. 79
 10 AEEG Autorità per l'energia elettrica, il gas e il sistema idrico (August 2013). Contributo dei principali operatori alla produzione nazionale lorda, <http://www.autorita.energia.it/it/dati/eem30.htm>
 11 AEEG Autorità per l'energia elettrica, il gas e il sistema idrico (2013). Relazione annuale sullo stato ei servizi e sull'attività svolta

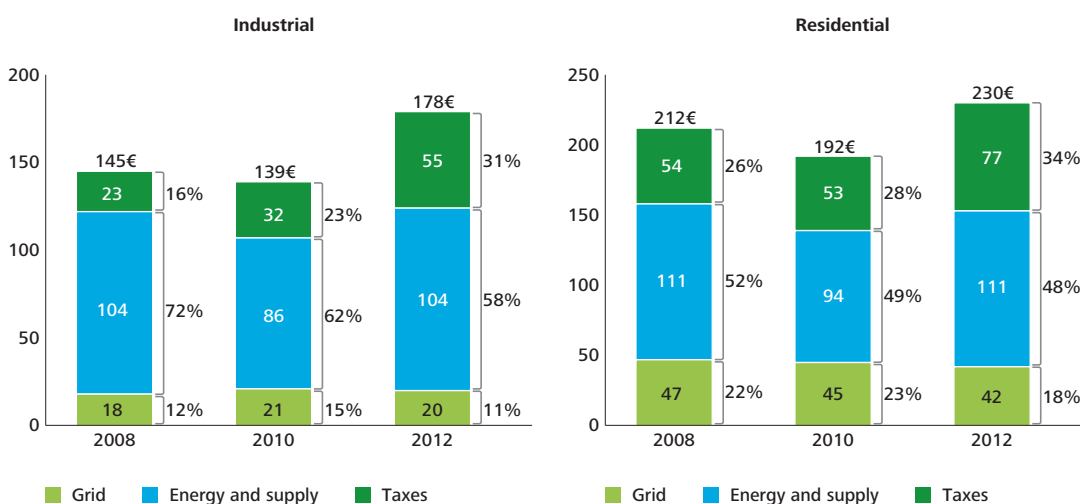
Power prices

On the spot power market, Italy is one of only two European countries (with the UK) where prices on the power exchange have not shown some higher degree of convergence over the 2011-2014 period. Electricity usually trades at a premium compared to most continental peers due to high dependence on natural gas.

High and rising power prices.

Already high, power prices have further increased for both residential and industrial users, primarily as a result of taxes to cover renewable and network charges. They are likely to increase further in the coming years due to the necessary evolution of the power production mix.

Figure 8. Retail prices for industrial¹² and residential¹³ users (€/MWh)



The electricity bill rose sharply between 2010 and 2012, before leveling off in 2013.

In 2012, **retail prices for industrial users** (500 MWh–2,000 MWh band) reached 178 €/MWh and were 64% above the European average (109 €/MWh). For industrial users, the 23% price increase between 2008 and 2012 was driven by tax increases (+58%) and grid costs to a lesser extent (+8%).

In 2014, there still exists a regulated tariff for households and SMEs. In February 2015, the Italian government proposed to suppress this regulated tariff by 2018.¹⁴ In 2012, **residential customer retail prices** reached 230 €/MWh for the 2.5 MWh–5 MWh consumption band, which is 34% higher than the European average (171 €/MWh in 2012). The 8% rise since 2008 is the result of an increase in taxes (+42%) and a decrease in grid costs (-10%). Electricity prices for domestic customers are progressive, i.e. increase with consumption.

The general tendency of electricity prices to rise for final consumers is mainly driven by grid costs and increasing taxes to support renewables development, as well as additional measures to promote energy efficiency. Furthermore, the energy component of consumer electricity bills is influenced by the peculiar Italian electricity mix, which is based mostly on gas. The electricity bill for all final consumers increased in the last few years, but not uniformly, with wide differences between consumers depending on the amount of their consumption. No provisions are in place to reduce charges to electricity-intensive consumers, unlike in most other countries. The price dynamic for industrial users also raises competitive issues for the economy: as an example, a mid-size industrial company with two similar producing facilities in Finland and in Italy will receive an electricity bill of 75 €/MWh from Finland and of more than 200 €/MWh from Italy.

¹² 500–2,000 MWh band

¹³ 2.5–5.0 MWh band

¹⁴ Reuters, February 20, 2015

Targets for 2020

The **National Energy Strategy** (Strategia Energetica Nazionale – SEN), adopted in March 2013 (as approved by Ministerial Decree of MISE on March 8, 2013), defined four main objectives to improve the competitiveness and sustainability of the Italian energy sector by 2020:

- Reducing energy costs by aligning prices to European average prices.
- Meeting and going beyond European targets set out in the 2020 European Climate-energy package and Italy's National Action Plan of June 2010 (NAP).
- Improving supply security, with a reduction in foreign dependency from 84% to 67% of total energy needs.
- Boosting growth and employment by mobilizing investments of €170-180 billion by 2020, either in traditional sectors or in the 'green economy'.¹⁵

Energy efficiency targets

Energy efficiency is paramount to achieving all four SEN energy policy objectives.

Italy has several types of energy efficiency targets:¹⁶

- An indicative target expressed in absolute terms: final energy consumption of 126 Mtoe in 2020.
- A binding target expressed in relative terms: minimum energy savings of 15.5 Mtoe by 2020.

Figure 9. Final energy consumption (Mtoe)²



In the SEN 2020 scenario, final energy consumption is expected to be 126 Mtoe.¹⁷

Between 2005 and 2012, the year with the lowest consumption since 2000, Italy achieved 182% of its final energy consumption target – that is, the target has been exceeded.

In line with the targets defined by the SEN, the Legislative Decree no. 102/2014, implementing the Energy Efficiency Directive 2012/27/EU, established the national energy saving target in a reduction of primary energy consumption equal to 20 Mtoe by 2020.

However, if the expected economic recovery occurs, energy consumption could increase between now and 2020. Relative targets are therefore important to take into account as well, in order to offset this potential increase in final energy consumption due to economic recovery by 2020.

20-20-20 EU targets for Italy: what is Italy committed to?

- Reducing GHG emissions by 18% compared with 2005.
- 15.5 Mtoe of energy savings in annual final energy consumption between 2011 and 2020.
- Achieving a 17% share of renewable energy in final gross consumption.

¹⁵ Ministry of Economic Development, Department of Energy (April 2013) – Annual Report on Energy Efficiency: Results achieved as of 2011 and targets for 2020

¹⁶ These targets are put forward in several official documents: the SEN (March 2013) sets global targets for 2011-2020; the Energy Efficiency National Action Plan (Piano d'Azione Italiano per l'Efficienza Energetica – PAEE) of July 2014 (PAEE 2014), updating that of July 2011 (PAEE 2011), clarifies the distribution by sector of global 2020 SEN targets and specifies the progress already made

¹⁷ REF-E (2013) – Energia: Rapporto sul mercato e la regolamentazione

In fact, while final energy consumption in 2012 was already below the 2020 target, Italy may have difficulty reaching its energy saving targets. **As far as energy saving targets are concerned, Italy is only at the beginning of its efforts.** The expected savings in 2020 and the savings already achieved in 2012 (vs. 2011) are shown in the table below:

Table 1. Expected savings for final energy consumption (FEC) for 2011-2020 by sector and by measure (in Mtoe/year)¹⁵

Sector	2013 Annual Report					PAEE 2014		
	Expected FEC savings in 2020					Expected FEC savings in 2020 (revised)	Achieved savings in 2012 (vs. 2011)	2020 objective met (%)
	Regulatory standards	Thermal account	55% tax relief	White certificates	TOTAL			
Residential	1.60	0.90	1.00	0.30	3.80	3.67	0.96	26%
Tertiary	0.20	1.60	–	0.20	2.00	1.23	0.05	4%
Industry	–	–	–	4.20	4.20	5.10	1.09	21%
Transport	5.40	–	–	0.10	5.50	5.50	0.22	4%
Total per measure (Mtoe/year)	7.20	2.50	1.00	4.80	15.50	15.50	2.33	15.0%

Between 2011 and 2012, Italy realized 15% of its 2020 targeted final energy savings. If this trend can be sustained until 2020, the targets are likely to be reached.

Nevertheless, most of the targeted energy savings are still to be reached.

In 2012, savings were in line with the targets in both the industrial and residential sectors, while the tertiary and transport sectors were lagging. Nevertheless, this trend could decline by 2020 if the country's economy recovers.

The PAEE 2014 sets out rather concrete measures for action and hints at how savings were achieved in 2011-2012. The main measures include:

- **Strengthening the rules on minimum energy performance, especially for transport, construction and all products coming under the Ecodesign directive.**
 - The highest savings (5.5 Mtoe) are expected for **transport**, where a significant reduction in energy consumption is expected due to regulations¹⁸ prescribing the sale of vehicles with reduced GHG emissions (95 gCO₂eq/km in 2020).¹⁹ In 2012, only 0.2 Mtoe was achieved (vs. 2011).
 - In the **residential and tertiary** sectors, the Directive on the energy performance of buildings²⁰ helped save 2.3 Mtoe between 2005 and 2012 through replacement of thermal installations, particularly in residential buildings.²¹ 1.8 Mtoe of energy savings are expected through the implementation of regulatory standards in these sectors.
- Developing a compulsory energy efficiency scheme based on **"white certificates."**²² Between 2005 and 2012, 3.0 Mtoe were saved through this mechanism. 4.8 Mtoe of additional energy savings are expected between 2012 and 2020 in all sectors.

18 Regulation 443/2009/EC

19 Ministero dello Sviluppo Italiano – Strategia Energetica Nazionale: per un'energia più competitiva e sostenibile (March 2013)

20 Directive 2002/91/EC (EPBD), transcribed into the 192/05 decree

21 ENEA (Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile) (July 2014) – Piano d'Azione italiano per l'Efficienza Energetica 2014

22 White certificates ("Energy Efficiency Certificates") are tradable instruments giving proof of the achievement of end-use energy savings through energy efficiency improvement initiatives and projects for companies. The mechanism of white certificates was introduced in Italy by Ministerial Decree July 20, 2004. It was amended by Ministerial Decree December 28, 2012

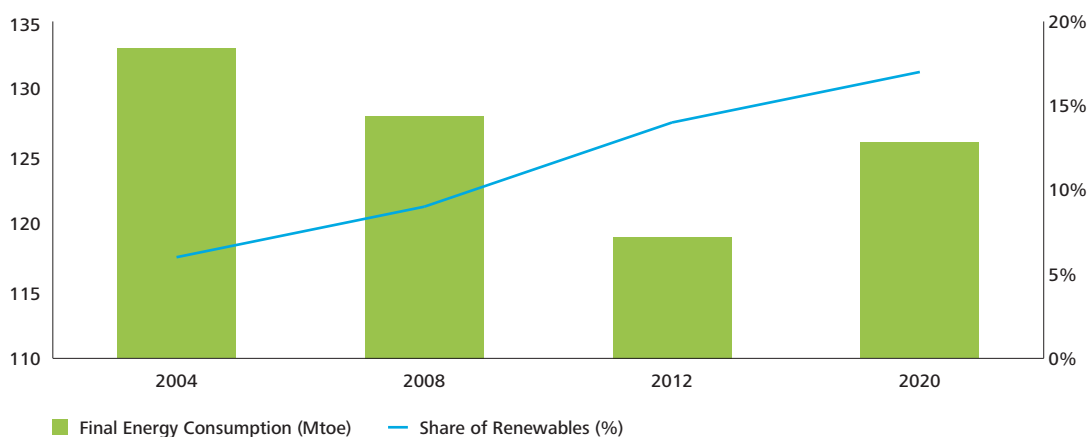
- Stabilizing the instrument in operation since 2007 for a 55% **tax relief** on expenditures to upgrade the energy efficiency of buildings. Between 2005 and 2012, 0.77 Mtoe were saved through this mechanism. One million of tons of oil equivalent of additional energy savings are expected between 2012 and 2020.
- Introducing support tools such as the **thermal energy account**,²³ and the Energy Performance Contract (EPC). The thermal energy account is an incentive for small projects designed to increase buildings' energy efficiency and generate thermal energy from renewable sources. The incentive is indexed to the project's expected capacity to produce thermal energy.²⁴ The Energy Performance Contract is a form of 'creative financing' for capital improvement which allows funding energy upgrades from cost reductions.²⁵ 2.5 Mtoe of additional energy savings are expected by 2020.

Renewable energy targets

According to the 2009/28/EC Directive,²⁶ 17% of Italy's final energy consumption in 2020 should come from renewable sources, vs. 5.9% in 2005 and 13.5% in 2012. Between 2005 and 2012, Italy realized 68% of its renewable target (expressed in Mtoe).²⁷

If the SEN energy efficiency target (126 Mtoe of final energy consumption in 2020) is reached, 21.4 Mtoe of final energy consumption should come from renewables in 2020, compared to 17 Mtoe in 2012, 11 Mtoe in 2008 and 8 Mtoe in 2004. This means an additional 5.3 Mtoe will still be needed by 2020.² Given current trends, this target seems reachable.

Figure 10. Renewable energy share of final energy use (2012)²⁸



23 'Conto Termico', following the Ministerial Decree of December 28, 2012 as published on January 2, 2013. Recently, on last November 11, 2014, Law no. 164 has lastly regulated the incentives for "thermal energy account" (Heating and cooling)

24 GSE website <http://www.gse.it/>

25 <http://iet.jrc.ec.europa.eu/energyefficiency/european-energy-service-companies/energy-performance-contracting>

26 This Directive was implemented in Italy with the Legislative Decree March 3, 2011 no. 28, regarding the promotion of energy by renewable sources. Such Decree provides for the specific authorization procedure to realize renewable energy plants

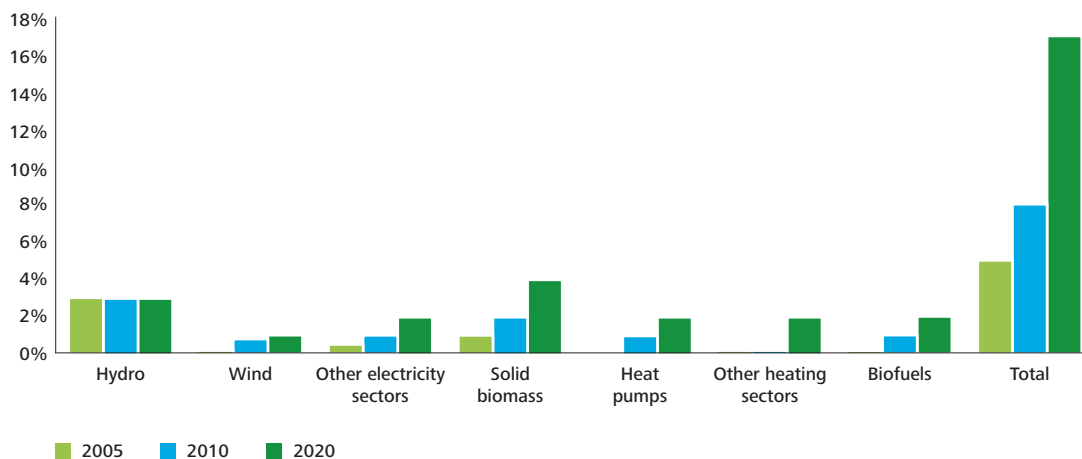
27 The initial gap between 2005 and 2020 was an increase by 13.4 Mtoe (from 8 to 21.4 Mtoe). And between 2005 and 2012, an increase by 9 Mtoe (from 8 to 17 Mtoe), has already been achieved, representing 68% of the target

28 European Commission (2012), http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=t2020_31

Italy has already realized 68% of its 2020 renewable target, thanks mainly to a sharp increase in non-hydropower power production capacity between 2008 and 2012.

Italy is on the right path to reach the EU targets, and its latest energy projection for 2020 forecasts a share of renewable energy higher than the initial target.

Figure 11. Renewable energy share of final energy use by type and target for 2020, in %²⁹



Italy's NAP estimates the contribution of each renewable energy technology to the trajectory for 2020 targets in the electricity, heating and cooling, and transport sectors, without necessarily establishing any binding technology target.

The SEN, published in 2013, included projections for the share of **renewable electricity** in final consumption (as foreseen by REF-E³⁰) higher than the initial NAP target (2010). This is due to a higher volume of renewable energy in absolute terms and decreasing electricity consumption, mainly as a result of the economic crisis, affecting more fossil-based generation. In the SEN projection, renewable electricity production should reach 99 GWh,³¹ close to gas-fired generation, the first component of Italy's electricity generation mix.

Other sectors should also contribute to the renewable energy target. In the **residential and tertiary sectors**, biomass use and other renewables are promoted for heating (thanks to the thermal energy account, mentioned above). The main national mechanisms to promote the use of renewable resources for **heating and cooling** are energy efficiency credits and tax deductions. The technologies that can benefit from these mechanisms include solar thermal installations, biomass boilers, heat pumps (aerothermal, hydrothermal, geothermal), low-temperature geothermal systems, geothermal cogeneration systems, and those fed by biomass and waste.

For **transport**, biofuel incorporation should also play a role in reaching this target. Actions will be taken mainly through obligatory minimum quotas, encouraging the use of biofuels obtained from waste and other raw materials of non-food origin. Measures will aim to support the use of a 25% biodiesel mix (for example, in public transport fleets) and new national regulations will encourage a gradual increase in its percentage of adoption. The obligation mechanism might be extended to biomethane, and greater weight might be given to the use of biogas for transportation. Finally, the energy efficiency credits scheme might be extended to include the growing use of electric vehicles.

29 EEA: Renewable Energy Projections as Published in the National Renewable Energy Action Plans of the European Member States

30 REF-E (2013) – Energia: Rapporto sul mercato e la regolamentazione & Italian National Renewable Energy Action Plan (June 30th 2010) data

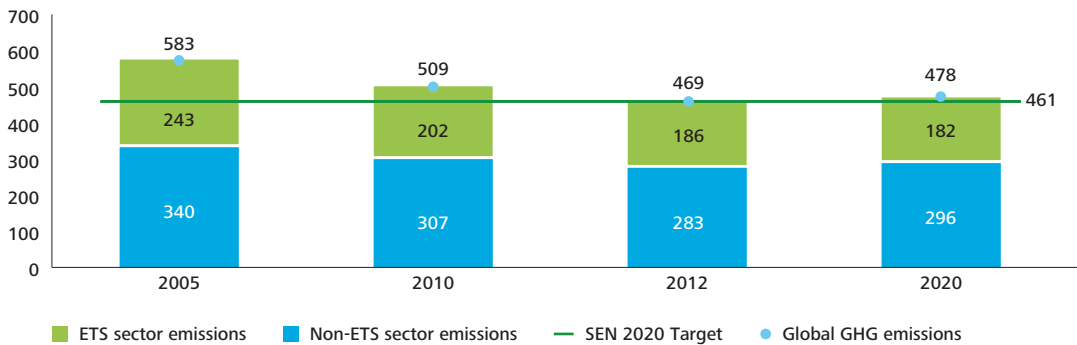
31 NREAP, Table 10ab on page 164

CO₂ emissions and targets

By 2020, Italy is committed to an 18% reduction in global GHG emissions, with a 21% reduction in Emissions Trading System (ETS) sectors and a 13% reduction in non-ETS sectors, compared to 2005.^{19,32}

- In 2005, GHG emissions from the **non-ETS sector** amounted to 340 Mt CO₂eq. The target set by the European Commission is to reduce GHG emissions in this sector by 13% between 2005 and 2020 (i.e. by 44 Mt CO₂eq to reach 296 Mt CO₂eq).² **By 2012, Italy had achieved 130% of its target.**
- In 2005, **global GHG emissions** for Italy amounted to 583 Mt CO₂eq.³³ Since the target to 2020 is an 18% reduction in GHG emissions, in 2012 **Italy achieved 109% of its target.**

Figure 12. ETS & non-ETS sector GHG emissions between 2005 and 2012 and targets for 2020 (2020 European target and SEN global target) (Mt CO₂)^{2,33}



Italy over-achieved its GHG emission target, partly because of the economic crisis.

But the country has committed to more ambitious emission reduction targets. And some additional reductions in GHG emissions are expected through energy efficiency and renewable energy measures.

Economic recovery might be an issue in terms of growing emissions, but measures for energy efficiency should support a reduction path.

The achievement of 2020 European targets for Italy as of 2012 is both due to the effects of the economic crisis and to abatement measures (efforts towards energy efficiency and renewable energy) that have been put in place. However, the **National Energy Strategy** is more ambitious than European goals for Italy and targets a **21% decrease in global GHG emissions** (ETS and non-ETS) between 2005 and 2020.

The National Plan for the Reduction of Greenhouse Gases, updated with a 2013 decision of the CIPE (Interministerial Committee for Economic Planning), reinforced the country’s commitment to emission reduction targets and energy saving measures. According to the SEN, energy efficiency measures should facilitate a reduction of 55 Mt CO₂eq/year, equal to 50% of the target set in the national CO₂ reduction plan.¹⁵

32 Decision 406/2009/ EC on the Effort of Member States to reduce their Greenhouse gas emissions to meet the Community’s GHG emissions reduction commitments up to 2020, April 2009

33 Eurostat from EEA, http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=Greenhouse_gas_emission_statistics&oid=189476#Database

Road ahead and main challenges: the way to 2030 and beyond

Severely hit by the economic crisis, Italy has nonetheless set very ambitious targets until 2050.

But it remains vague on how 2030 and 2050 targets will be met.

Energy (especially electricity) prices have been significantly higher than the European average for years. This may have helped Italy develop renewable energies and reduce its average energy intensity, but it may also hinder its competitiveness.

European market reform: where Italy stands

To date, Italy has implemented several policy measures to reach its 2020 targets regarding energy efficiency, renewables and GHG emissions. **Many objectives have already been met due to the impact of the economic crisis on the country.** The main question that remains is to determine whether an economic turnaround will compromise Italy's ability to reach its efficiency objectives. After 2020, the National Energy Strategy becomes vague regarding how 2030 and 2050 targets will be met.

Despite the crisis, the National Energy Strategy contemplates Italy taking a leadership role in the adoption of the European 2050 Energy Roadmap. It has an ambitious plan aiming at **carbon reduction in the order of 80-95% relative to the 1990 level by 2050.** The goals are expected to be met through a reinforcement of the mechanisms put in place for the 20-20-20 energy package.

While the SEN does not detail how these targets may be achieved, it does indicate that the attainment of post-2020 targets is conditional on the capacity of the European Union to design a roadmap that is robust yet flexible.

Ensuring energy market competitiveness

The energy sector affects Italy's global competitiveness because of some **structural weaknesses.**

Energy prices are among the highest in Europe, and are particularly high relative to the US. That is because the energy mix, especially for electricity, is based on gas (with prices that are only recently aligning to European market ones), which differs from the average European mix influenced predominantly by nuclear and coal. Incentives for renewables also have a significant impact on electricity prices, as do a host of regulatory costs, including tariffs (to dismantle nuclear plants, conduct system research and support special regimes) and other subsidies.

Additionally, **Italy's security of supply and energy independence is at particular risk.** In 2012, 82% of national demand (163 Mtoe²) was met by net imports, with national production from renewables, gas and oil accounting for only 11.1%, 4.3% and 3.5%, respectively. This compares with an average import level of roughly 55% among the 28 countries of the EU.

The energy system, however, does have some **strong points.**

Italy is one of the countries with the lowest energy intensity levels (-19% of primary energy intensity vs. -14% in the Eurozone in 2011). Final energy use has been declining in recent years (equivalent to 119 Mtoe in 2012, 2% less than in 2011). This is largely due to the economic crisis, although a 5% decrease since 2005 can be attributed to improvements in electric generation performance, as well as the active adoption of numerous energy efficiency measures (i.e., fiscal, white certificates, etc.). The American Council for an Energy-Efficient Economy (ACEEE) placed Italy in third place in 2011, just behind England and Germany, in recognition of these efforts.

Italy also enjoys a good level of technological advancement, with leading programs such as smart metering – an essential element of demand side management, and the installation of one of the world's most efficient CCGTs (combined cycle gas turbines) parks.²¹

Italy's energy mix post-2020 and the role of renewables

Given the extent of change likely to occur in the coming years, the SEN did not set specific sectorial or technological objectives. It prefers to be **technology neutral** and flexible to changes in market **conditions as part of its long-term strategy**.

Italy plans to implement a capacity market in the power sector very shortly and is currently developing an auction model with reliability contracts. The first auction took place in 2014.

While Italy has not yet articulated a clear objective for its energy mix in 2030, the SEN anticipates that more than 29% of final energy produced will come from renewable sources by 2030. Italy has even developed a tentative scenario where 50% of final energy produced would come from renewable sources. Considering the generation potential of each energy source, **a significant solar capacity would need to be installed** to reach such a goal. According to ENEA, solar has the greatest development potential among renewables both in technological and economic terms, given that it has reached grid parity and has low installation costs.¹⁹

In this context, coal is not in favor, both due to the need to reduce GHG emissions and to mounting public and local community opposition to coal (a situation amply highlighted by an Italian court's decision to shut down a coal-fired power plant for environmental health reasons in 2014). **A significant investment in coal-fired plants in Italy therefore seems unlikely, even if some plans exist to convert oil-fired to carbon-fired plants.** Some major electricity producers believe coal could still be viable, given both its falling prices and the emerging availability of improved carbon mitigation technologies, arguing that these investments would be less costly than (more efficient and environmental-friendly) gas technologies and could potentially reduce Italy's reliance on imports from largely-unstable countries.

With regard to **nuclear** power, a referendum in June 2011 repealed provisions relating to the so-called nuclear Omnibus Decree. Roughly 54% of the population turned out for the vote and more than 94% of those voters opposed the government's plan to resume nuclear power generation. **This put a definite halt to Italy's nuclear program.** Nevertheless, Italy imports electricity from countries such as France, Switzerland and Slovenia, whose energy mixes are nuclear rich. The country is also involved in international research and cooperation focused on improving nuclear safety and waste management. Should solutions be found, nuclear could arguably satisfy Italy's energy demand for a very long time.¹⁹

In the short term, however, Italy will continue to rely on imports, and will need to adapt its distribution grid and expand its connections with renewable energy-exporting countries, probably in the Balkans and North Africa, to better diversify the sources of its electricity supply. **Projects to connect Italy's grid with neighboring countries are also in progress** (e.g. the ELMED project with Tunisia), and could potentially position Italy to act as an energy hub for the EU.³⁴

Conclusion

Italy has already achieved most of its energy and GHG emission objectives for 2020, predominantly due to decreased energy consumption linked to the economic crisis. The challenge will be to keep meeting these targets as the economy recovers.

It is clear that the 2050 Energy Roadmap will drive structural changes in Italy's energy markets. From a competitive standpoint, and to support economic growth, it is important that the transition not penalize the Italian and European economies, particularly in those sectors exposed to international competition.

Public support in Italy may shift from a focus on renewables to one on energy efficiency. In fact, Italy's incentives system introduces distortions with respect to the cost of public resources allocated for each unit of CO₂ avoided. As part of the country's energy saving incentives, the public cost of energy per MWh is now 25 times lower than the public cost to support renewables. Although this has contributed to the adoption of not-yet-mature renewable technologies, in the long term it may not result in the system most capable of reducing emissions. As such, it is becoming more important for Italy to dedicate public resources to R&D that may result in future technological breakthroughs.¹⁹

Beyond 2020, Italy has committed to an even greater market penetration for renewables and more stringent energy efficiency measures, although it is unclear on the technologies that should be implemented to support these goals.

The renewable technologies that will ultimately be favored will depend on market conditions and technological breakthroughs.

34 SEN provides that Italian Government shall identify, in compliance with EU Regulation 347/2013, Project of Common Interest (PIC) in gas and electricity sector that will benefit from procedural and financial advantages. Italy is waiting for the regulation that will provide the criteria and identification of the competent authority for PIC

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