

Italy's National Energy Strategy:

For a more competitive and sustainable energy



Ministero dello Sviluppo Economico

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Introduction

The national and international scenario in the current period is difficult and uncertain. The economic crisis has affected all western economies, and our country is one of the hardest hit. At the same time, an unprecedented development of many regions throughout the world is exerting a growing pressure on the environment and on the prices of raw materials, including energy resources.

A priority for Italy is to resume sustainable growth – sustainable from both the economic and the environmental perspectives. Only in this way we will attain development, employment and the resources to achieve greater equity and reduce our huge public debt. And in order to attain growth, it is essential to increase the competitiveness of both our businesses and our economic system.

The energy sector has a fundamental role to play in the growth of the economy and of the country, both as a facilitating factor (having energy at competitive costs, with a limited environmental impact and a high quality is a prerequisite for the development of our businesses and for families), and as a growth factor in itself (just think of the potential of the green economy). Achieving a more competitive and sustainable energy is therefore one of the most significant challenges for Italy's future.

That is why the Government felt there was a need to draw up a National Energy Strategy that sets out clearly the main goals to be pursued in the coming years, that describes the basic decisions to be taken and establishes the priorities of action – albeit being aware that we are acting in a free market context and with driving forces that cannot be controlled centrally.

This document is the outcome of a broad public consultation and the engagement with public institutions, research centres, associations and social partners and with direct and indirect stakeholders in the energy sector. The end result is a broadly shared set of analyses and energy policies and a guideline for future action, with the aim to structurally influence a sector that is key in terms of economic growth and improvement of the quality of life in our country.

Contents

The key messages – a summary

1. The international and Italian contexts

- 1.1. Two “winners” on the global stage
- 1.2. Europe’s road to decarbonisation and the single market
- 1.3. The starting point of Italy: challenges and opportunities

2. The goals of the new National Energy Strategy

- 2.1. The role of energy for growth and the value of an Energy Strategy
- 2.2. Four key goals for the sector

3. Priorities of action and expected results by 2020

- 3.1. Seven priorities for the coming years
- 3.2. Expected results by 2020

4. The priorities of action, in detail

- 4.1. Energy efficiency
- 4.2. A competitive gas market and the Southern European Hub
- 4.3. Sustainable development of renewable energy
- 4.4. Developing the electricity market and infrastructure
- 4.5. Restructuring the refining sector and the fuel distribution network
- 4.6. Sustainable hydrocarbons production in Italy
- 4.7. Modernising the system of governance

5. System evolution by 2050

- 5.1. The basic choices
- 5.2. Possible scenarios and their implication for the system
- 5.3. Research and development in the energy sector

The key messages – a summary

Background and goals

In difficult and uncertain economic times, all of our country's efforts must be focused on resuming **sustainable growth**. This can only happen through a substantial improvement in the competitiveness of the Italian economic system.

Against this background, our energy system can and must play a key role in improving Italian **competitiveness**. Tackling the main problems facing the sector will entail an important structural reform for the country. To achieve this, we need to address some important challenges:

- Energy prices for businesses and families that are higher than in other European countries (another “spread” that penalises us heavily).
- Security of supply that is by no means optimal at peak loads, especially as regards natural gas, and a high dependence on imported fossil fuels.
- Economic and financial difficulties experienced by a number of operators in the sector.

Recovering competitiveness, however, need not mean a compromise on decisions taken on **environmental sustainability**, with our signing up to the European 2020 objectives and the Roadmap 2050 for a low-carbon Europe.

Facing the consequences of climate change, ensuring the competitiveness of industry and granting secure and accessible energy to all citizens are key elements that will characterise policy in Italy and Europe in **the long and very long term (until 2050)**, and which will require **a radical transformation** of the energy system and of society in general.

In keeping with these needs, the new National Energy Strategy (NES) focuses on **four main goals**:

1. **Significantly reduce the energy cost gap** for consumers and businesses, by bringing prices and costs in line with European levels by 2020 and ensuring that the longer-term energy transition (2030-2050) will not compromise Italian and European industrial competitiveness. In this sphere, we start from a more critical position for which a greater effort is required: price differentials of over 25% for electricity, for example, have a decisive impact on businesses' competitiveness and on families' budgets.
2. **Achieve and exceed the environmental and decarbonisation targets** established by the European Union's 2020 Climate and Energy Package (known as the “20-20-20” package) and take on a lead role in defining and implementing the *Roadmap 2050*. All energy policy decisions therefore aim to improve our environmental and decarbonisation standards, which are already among the world's highest, and to ensure that Italy acts as an example at a global level.
3. **Continue to improve our security of supply**, especially in the gas sector, and reduce dependency on imports. We need, most notably, to improve our ability to respond to critical events (as the February 2012 gas crisis showed us) and reduce our overall energy imports, which currently cost the

country about €62 billion annually, and which directly expose us to volatility and price risks expected in the future.

4. **Foster sustainable economic growth** by developing the energy sector. The development of the energy supply chain can and must be a goal in itself in our energy strategy. We need only to consider the opportunities, also internationally, that will arise in a sector experiencing continuous growth (the IEA estimates \$38,000 billion in global investment by 2035) and the tradition and expertise of our industrial system in many key segments. In this context specific attention will be dedicated to the growth of all segments of the “green” economy, a sector with a huge potential that we need to fully tap into.

Priorities of action and expected results by 2020

Over the medium-long term, i.e. up to 2020, in order to attain these results the strategy has been broken down into **seven priorities**, each with its specific supporting measures that have already been set in motion or are currently being defined:

1. **Energy efficiency.** Energy efficiency contributes to the achievement of all the above mentioned energy policy objectives: reducing our energy costs thanks to savings in fuel consumption, reducing environmental impact (energy efficiency is the most economical way for emissions reductions, with a return on investment that is often positive for the country, and that should be preferred to achieve the environmental objectives), the improvement of our security of supply and reducing our dependence on imported energy; economic development generated by a sector with a strong positive impact on the national value chain, in which Italy has numerous leadership positions which can also be projected in the rapidly expanding market abroad.

The strong impulse to energy efficiency will absorb a substantial portion of expected increases in energy demand by 2020, both in terms of primary supply and final consumption. In this context, the sector will have to deal with a scenario in which overall demand will likely remain steady, at levels comparable to those of recent years.

2. **Competitive gas market and Hub Southern Europe.** For Italy it is a priority to create an internal liquid and competitive market which is fully integrated with other European countries. In addition, over the next 20 years, Europe will significantly increase the import of gas (by about 190 billion cubic meters according to the IEA) and for our country this may be the opportunity to become an important crossroads for the entry of gas to Europe from the South. The main impact of the expected changes described above is that of an alignment of our gas prices to those in Europe, which will be accompanied by an increase in the security of supply by strengthening the infrastructure and market liquidity. The more competitive price of gas will allow, on the one hand to become a country of exchange and/or transit to northern Europe, on the other hand it will allow the Italian combined cycle gas turbine fleet to become competitive again, reducing electricity imports.
3. **Sustainable development of renewable energy.** Italy intends to go beyond the objectives of renewable energy production in Europe ('20-20-20'), contributing significantly to the reduction of emissions and to the objective of energy security. In doing so, however, it is of great importance to curb expenditure in the electricity bill, a burden for businesses and households, aligning the level of incentives to European values and pushing the development of thermal renewables, which have a good potential for growth and lower specific costs than renewable electricity. It will be necessary to

National Energy Strategy: for a more competitive and sustainable energy

The key messages – a summary

direct expenditure towards the most high value technologies and sectors, i.e. with higher returns in terms of environmental benefits and national economic value chain (in this respect, particular attention will be paid to the recovery and use of waste). Renewables represent in fact a central segment of the green economy that internationally is increasingly recognized as an opportunity for economic recovery.

4. **Development of electricity infrastructure and the electricity market.** The electricity sector is in a period of profound transformation, determined by a number of changes; just to mention the most obvious: the slowdown in demand, high (overabundant) availability of thermoelectric generation capacity and the increase of renewable energy production, which occurred at a much faster pace than anticipated in earlier planning documents. In this context, the basic choices will be oriented to maintain and develop a free electricity market, efficient and fully integrated with Europe, both in terms of infrastructure and of rules, and with prices gradually converging with those in Europe. It will also be essential to fully integrate renewable energy production in the market and in the electricity grid.
5. **Restructuring the refining industry and the fuel distribution sector.** The refining industry is in difficulty, out of contingent reasons (decrease in demand because of the economic crisis) but also because of structural reasons, given by the declining demand and the increasing competition from new countries. This industry needs to be transformed in a way that its competitiveness is increased and its technology improved. Fuel distribution also needs to be modernised in order to be more efficient, competitive and with improved levels of service for customers.
6. **Sustainable production of domestic hydrocarbons.** Italy is highly dependent on imported fossil fuels and at the same time it has large reserves of oil and gas. In this context, it is necessary to take advantage (also) of these resources, given the benefits in terms of employment and economic growth in a sector in which Italy has considerable and recognised expertise. On the other hand, we realize the potential environmental impact and it is therefore essential to pay maximum attention to prevention: it is therefore necessary to have environmental and safety rules in line with the most advanced international standards (a sector in which Italy scores very well internationally in terms of low number of accidents). In this sense, the Government does not intend to pursue the development of projects in sensitive areas offshore or onshore, and in particular does not intend to pursue shale gas projects.
7. **Modernization of the system governance.** To facilitate the achievement of all the previous objectives a more effective and efficient decision-making system has to be developed; today's system has procedures that are much longer and more cumbersome than those of other countries we compete with. Sharing a clear and coherent national energy strategy is an important first step in this direction.

Once the strategy has been implemented, the system will be able to evolve, gradually but significantly, and to surpass the 20-20-20 European targets. The **results expected by 2020** are as follows:

- **Reduction of fuel consumption and an evolution of the energy mix with a focus on renewables.** Specifically, a reduction of **24% in primary consumption** is foreseen compared to the inertial performance by 2020 (i.e. 4% compared to 2010), exceeding the European targets of 20%, mainly thanks to energy efficiency measures. In terms of the energy mix, we expect a **19-20% share of renewable energy in gross final consumption** (compared to about 10% in 2010). The share of renewables on primary energy consumption will be equivalent to 23%, while there is a reduction from

National Energy Strategy: for a more competitive and sustainable energy

The key messages – a summary

86 to 76% of fossil fuels. In addition, it is expected that **renewables will reach or exceed the levels of gas as source number one in the electricity sector**, accounting for approximately 34-38% of consumption (compared to 23% in 2010).

- **Significant reduction of energy costs and a gradual alignment of wholesale prices** to European levels. In particular, **savings of about €9 billion a year** can be achieved on the national electricity and gas bills (amounting to about 70 billion today). This is the result of about 4-5 billion a year in additional costs compared to 2012, and approximately 13,5 billion a year in savings including both lower prices (assuming constant international prices), and a reduction in volumes (relative to an inertial reference scenario).
- **Achieving and exceeding all European environmental targets** for 2020. These include both the above-mentioned targets for final consumption of renewable energy and energy efficiency, and a **reduction in greenhouse gas emissions by 21%**, exceeding the European objectives for Italy, both ETS and non-ETS, set at 18% reduction compared to 2005 emissions, in line with the National CO₂ reduction plan.
- **Increased security, reduced dependence on supply** and greater flexibility of the system. It provides for a **reduction of the external energy bill** of about **€14 billion a year (compared to the current 62 billion)**, and -19 with respect to the imports trend 2020 assuming constant commodity prices), with the **reduction from 84 to 67% of dependence from abroad**, thanks to energy efficiency, increased renewable production, lower electricity imports and increased production of national resources. This is equivalent to about 1% of additional GDP and is, at current levels, sufficient to bring the trade balance back to a surplus, after many years of deficits.
- **Positive impact on economic growth thanks to major investments** expected in the sector and the implications of the strategy in terms of **competitiveness** of the system. It is estimated that about **€170 to 180 billion will be invested** by 2020, both in white and green economy (renewables and energy efficiency), and in traditional sectors (electricity and gas networks, LNG terminals, storage facilities, hydrocarbons development). It is essentially private investment, partly supported by incentives, and with a positive economic return for the country.

Sustainable energy development by 2050

As regards the long and very-long term (2030-2050), environmental challenges, competitiveness, and security will require a more radical change of the system, which will largely involve not only the energy sector, but the entire functioning of society.

Recent decades have shown us, that it is difficult to predict developments in technology and the markets, especially in the long term. Italy therefore intends to adopt a **flexible and efficient long-term strategy** to pursue its key low-carbon policy. In this, it will focus on and exploit – especially through research and technological development – any factors that could produce significant changes (for example, a more rapid cost reduction in renewable and storage technologies, in biofuels, or in CO₂ capture and storage).

In keeping with this, **Italy should adopt a technology neutral approach**, promoting in Europe the **definition of a single post-2020 target focused on overall emissions reduction** to be appraised based on the starting point for each country, or neutral one from the geographical point of view (thus dropping the current system that partially overlaps obligations and specific measures for different technologies and sectors). In this context the European **evolution of the EU ETS** will be assessed. An alternative might be dropping it with the **introduction of an environmental taxation**. At the same time, it is essential that Italy and Europe play a lead role that can **stimulate a global response** to climate change, as this is the only effective way forward.

An analysis of **possible evolutionary scenarios** for the country – at present knowledge - to achieve the decarbonisation targets, allows us to more accurately **identify the common implications** that should guide the sector in its long-term choices, and to be taken into account in the choices we make today. Among the most important:

- The need to **strengthen efforts in energy efficiency**. Primary consumption will have to fall in the range of 17-26% by 2050 compared to 2010, by decoupling economic growth from energy consumption. In particular, efforts in building and transport will be critical.
- The **high penetration of renewable energy**, than in any of the scenarios envisaged at the time is expected to reach levels of at least 60% of gross final consumption by 2050, with much higher levels in the electricity sector. In addition to the need of research and development for the reduction of costs, it will be fundamental to rethinking the market and network infrastructure.
- A substantial increase in the degree of **electrification**, which will almost double by 2050, reaching at least 38%, particularly in electricity and transport.
- The **key role of gas for the energy transition**, despite a reduction of its weight both in percentage and in absolute value in the span of the scenario.

This process of gradual decarbonisation requires **research and development of cutting-edge technologies, capable of bringing about 'discontinuity'** that can change the balance of market forces. The launch of a coordinated global effort in this direction is needed: in this sense Italy can help by investing more and with greater determination, and even more so by helping to guide the debate and contributing to the construction of an international agenda on.

The **basic choices** that will guide decisions about research and development aim to raise issues of priority interest (including research on innovative renewables, smart grids and energy storage systems

National Energy Strategy: for a more competitive and sustainable energy

The key messages – a summary

and on energy efficient materials and solutions), strengthen the resources available accessible under competitive conditions destined to partnership between universities, research centres and businesses and overcome the current segmentation of initiatives assigned to various agencies and Ministries.

1. The international and Italian contexts

1.1 Two “winners” on the global stage

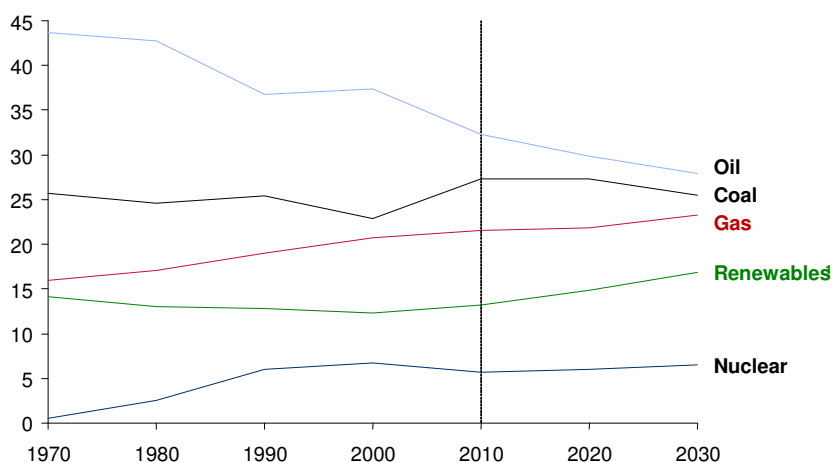
The current international situation is both difficult and uncertain. The global economy is slowing down and predicting how future energy scenarios will develop is a complex exercise. However, there are a number of global trends that will most likely affect the development of the energy sector in the long term. In analysing the international situation, this document draws on analyses by some of the most eminent international research and analysis institutions in the energy sector and in particular on the more recent work of the International Energy Agency (IEA)¹.

This said, the global scenario over the next 20-25 years is expected to show the following trends:

- The world’s **demand** for energy is forecast to grow (by 35% by 2035), but to highly different degrees from one region to another. Growth will be almost flat in the industrialised countries but will rise sharply in developing nations (+60%), which in 20 years time will account for over 60% of global demand.

TABLE 1

Gas and renewables are the energy sources showing increasing growth, while oil will lose market share
Percentage of total world primary energy demand



¹ Includes use of traditional biomass
Source: IEA World Energy Outlook 2012, scenario NPS

- At the same time, the world is becoming increasingly energy-efficient. **Energy intensity** (energy consumed per unit of GDP) looks set to decrease by 1.8% annually over the next 20 years, and so at a faster pace than the 0,6-1,2% seen in recent decades. One reason for this is the gradual increase in the price levels (and their volatility) of many resources (energy and other), a factor that, in keeping

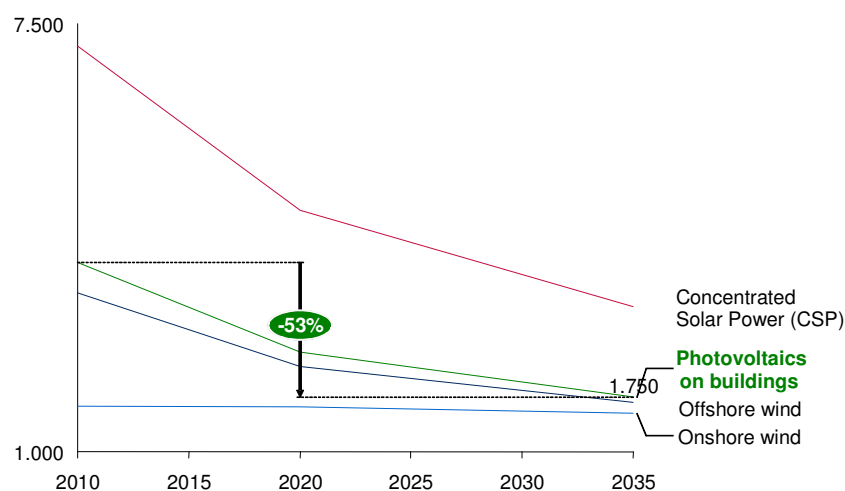
¹ Except where otherwise indicated, the central scenario (“New Policies Scenario” – (NPS)) of the International Energy Agency’s World Energy Outlook 2012 is taken as a reference.

with market forces, is driving the adoption of innovative efficiency improvement solutions. Unprecedented economic development, in terms of its scale and rapid pace, in many regions of the world has exerted strong pressure on raw material prices in recent decades (this applies to energy, but also to water and agricultural products). As a result, solutions to replace or reduce consumption, which previously were relatively too costly, are growing in appeal.

TABLE 2

In the next 20 years a marked reduction in renewable technology costs is expected

Investment costs, \$2010 per kW, average European values



Source: World Energy Outlook 2011

- Of the various energy sources, **gas** and **renewables** are showing increasing expansion, to the detriment first and foremost of oil, which will lose market shares, while coal and nuclear will essentially retain their current market share.
 - **Oil** is gradually losing relative importance (from ~45% of primary energy in the 1970s to little over 30% at present and ~27% in 2035), but its consumption in absolute terms is expected to grow. Indeed, development projections seem somewhat alarming: new oil fields are increasingly costly to exploit, while an increase in the share produced by the OPEC countries and National Oil Companies is expected, as is a shift in the demand-supply balance towards “difficult” price scenarios. Some technological methods could improve this outlook – for example, the development of unconventional sources (tight oil/shale oil, oil sands), or a reduction in demand for oil in the transport sector (biofuels, electric vehicles). But these technologies are unlikely to have a radical impact within the next 20 years.
 - **Coal** is expected to fall sharply in importance in the OECD countries (from ~20% to ~15% of demand), a development that will be offset by the growth in, most notably, China and India, particularly over the next 10 years. Thanks to the ample reserves available, demand and supply will be more balanced than is the case for oil.

National Energy Strategy: for a more competitive and sustainable energy

1. The international and Italian contexts

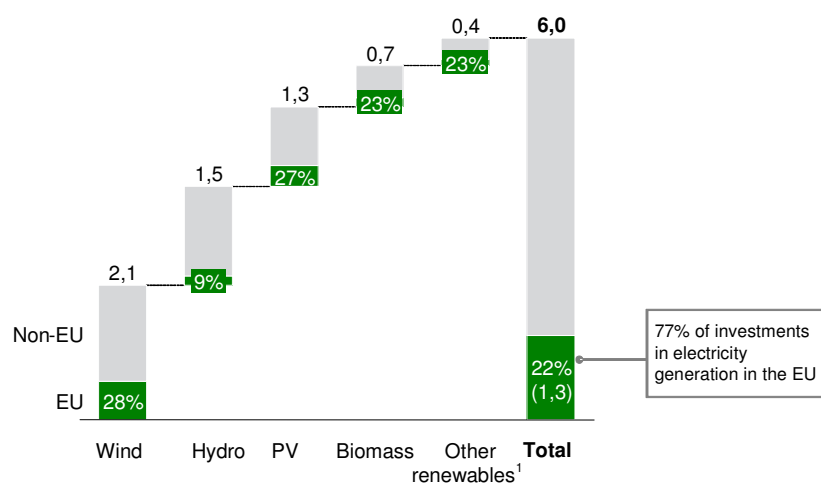
1.1 Two “winners” on the global stage

- **Nuclear power** is expected to grow only in non-OECD countries, with the exception of Korea, (and in China, India and Russia in particular). In the West no significant developments are expected (especially in Europe), for two reasons: the high economic cost/risk profile and fears over the safety of the current technology. These fears will lead to a re-assessment of the safety margins of plants currently operating or under construction, and to a renewed effort by Western countries in the areas of research, the reduction in and safer treatment of waste, and international cooperation for the safe use of nuclear for civil purposes.

TABLE 3

The prospect of renewables development will create a global market of notable dimension

Cumulative investments in renewable energy, thousands of billions of Dollars, 2012-2035



¹ Includes geothermal, concentrated solar, ocean
Source: World Energy Outlook 2012, NPS Scenario

- **Renewable sources** are expected to see the highest growth, in terms of both relative and absolute value. This growth will be led by a foreseeable increase in environmental awareness, but also and above all by the expected reduction in technology **costs** over the next 20 years. This will make it possible to bring many renewable sources into competition, on an equal footing, with the traditional fossil fuel technologies, even considering the effects of (directly or indirectly) taxing CO₂ emissions.

This development will also provide an important industrial opportunity. Global cumulative **investment** is expected in the range of \$6.000 billion, from 2012 to 2035, of which \$1.300 billion in Europe (representing around 77% of investment in electricity generation).

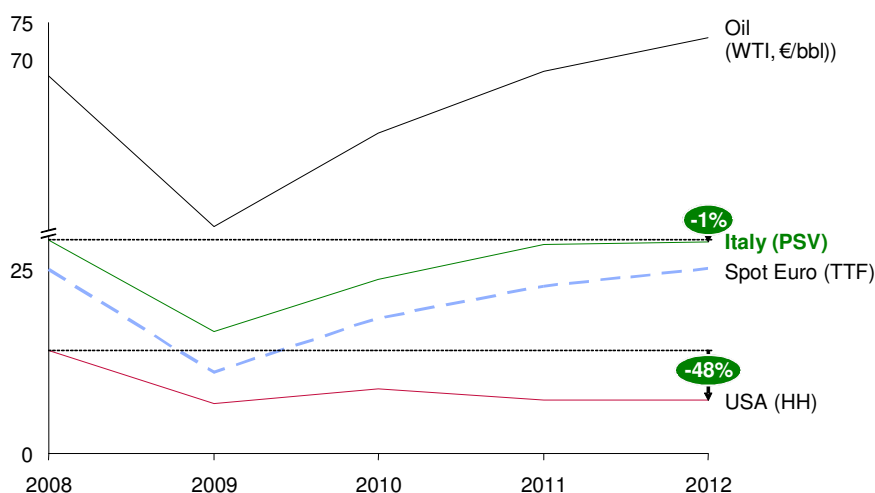
Notwithstanding this growth, renewables' contribution to total primary energy will remain relatively limited (between 15% and 18% by 2035) compared with traditional fossil fuels (oil, gas and coal will account overall for 75%).

- As regards **gas**, global demand is expected to rise significantly, from 3,300 billion cubic metres in 2010 to over 5,000 in 2035. This increase will be driven by consumption in Asia,

especially for electricity generation, but also for industrial and civil uses. Supply will rise in tandem, with increasing geographical diversification and the growing importance of the liquefied natural gas (LNG) market.

TABLE 4

The impact of shale gas capacity on US prices is already significant, and a factor in uncoupling oil from gas
€/MWh



Source: GME, EIA

“Unconventional” gas (shale gas, tight gas and coal-bed methane) will also play a leading role. In twenty years time these sources are expected to account for 25-27% of global production (and over 50% of absolute growth in volumes from now until 2035). This is in spite of the fact that the development of these technologies in many countries will depend on whether the geographical reserves identified thus far can actually be exploited and solutions to the environmental problems can be found. To date, the effects of the “unconventional gas revolution” have been seen primarily in the United States, which have rapidly become self-sufficient and seen prices tumble: in 2012, the average price on the US market (Henry Hub) was €7/MWh, compared to €25/MWh in Europe and €28-29 on the Italian spot market (PSV).

The situation of gas in **Europe** is somewhat unusual. This is the only large region in the world where production is expected to fall (even under optimistic assumptions as to the development of unconventional gas). It is the region where the lowest increase in consumption is expected, as a result of limited economic growth, energy efficiency policies and the substitution effect of renewables. This will in any case lead to a need for an increase in imports of about 190 billion cubic metres in the next 20 years.

1.2 Europe's road to decarbonisation and the single market

European energy policies pursue two main goals: the progressive move to a low-carbon economy and the completion of the single market.

The road to decarbonisation

In recent years, the European Union has decided to take on a global leadership role in reducing greenhouse gases. The first key step in this process was to establish ambitious goals to be achieved as early as 2020:

- In 2008, the European Union approved the "Climate and Energy Package" (known as the "20-20-20" package), which set the following energy and climate targets for **2020**:
 - A unilateral commitment by the EU to **reduce greenhouse gas emissions by at least 20%** compared to 1990 levels. The initiatives undertaken to achieve the 2020 targets will continue to produce results after that date, and help reduce emissions by 40% by 2050.
 - A binding target to raise the share of gross EU energy consumption produced from renewable resources to 20%, including a **10% target for biofuels**;
 - **A reduction of 20% in primary energy consumption**, with respect to the levels forecast for 2020, through energy efficiency measures. Although the package did not address the energy efficiency target directly, it was later incorporated, albeit in a non-binding form, in the energy efficiency Directive approved definitively in October 2012.
- **Italy** fully embraces the spirit of the Energy and Climate Package and has transposed the European legislative framework, with the following targets for 2020:
 - A binding commitment to **reduce emissions** by 18% overall; this can be broken down as follows: 21% for the Emissions Trading Scheme (ETS) sectors, most notably electricity generation, and, in the non-ETS sectors, 13% with respect to the 2005 levels.
 - A binding commitment to attain **17% of energy from renewable sources**, including a **10% target for biofuels**.
 - A commitment to **reduce primary energy consumption by 20%** with respect to the projected levels. The June 2012 energy efficiency Directive identifies a number of measures available to member states to achieve this goal.

Discussion has also begun in the European Union on long and very-long-term scenarios and targets, **extending beyond 2020**.

- The **Energy Roadmap 2050** envisages a **reduction of greenhouse gas emissions to 80-95%** below 1990 levels by 2050, with a 95% target for the electricity sector. The various scenarios examined by the Commission for the Roadmap attributed great importance to energy efficiency and production from renewables. The Commission also examined the use of nuclear energy and the development of Carbon Capture & Storage (CCS) technology, with a key role being envisaged for gas during the transition period. This will enable emissions to be reduced by replacing coal and oil during

the intermediate stage, at least until 2030-35. The main structural changes will include:

- Increased **investment expenditure** accompanied by a reduction in spending for fuel.
 - A greater **emphasis on electricity**, which will need to almost double as a proportion of final consumption (up to 36-39%) and help achieve the decarbonisation goals in the transport and heating sectors.
 - A crucial role for **energy efficiency**, which should achieve reductions of up to 40% in consumption with respect to 2005 levels.
 - A substantial increase in **renewables**, which could account for 55% of final energy consumption (and 60–90% of electricity consumption).
 - Increased **interaction between centralised and distributed systems**.
- Within the European Commission, **discussion is already under way to identify further actions**, in addition to the 20-20-20 Package, to achieve the Roadmap's long- and very-long-term goals:
 - As regards **renewables**, the Commission has suggested the adoption of **milestones for 2030** and has announced that concrete proposals will be submitted on the policies to be adopted post-2020.
 - On **energy efficiency**, by 30 June 2014 the Commission will assess the progress achieved towards meeting the overall European target and will consider the possibility of introducing binding goals.
 - Close attention will be paid to instruments designed to achieve the **emissions reduction** targets.

In the case of the **sectors covered by the ETS Directive**, CO₂ prices have not yet proved fit to sending a sufficiently strong signal to operators (specifically, they didn't bring about the transition from coal fired power generation to gas). The Commission is evaluating whether to reduce the amount of permits to be auctioned in 2013-15, in particular by postponing the emission of 900 million allowances to 2018-2020 (the 'back-loading' mechanism). Based on impact estimates this would represent an amount sufficient to stabilise and support CO₂ prices in the next three years, partially compensated by a reduction of pressure on prices expected by the end of the decade.

This measure could, potentially, have an effect on the country's energy/industrial production system, bringing about positive aspects (for example, by making solutions involving less use of fossil fuels and more use of cleaner sources more attractive, and a closer alignment of our prices to European levels). But it could also have negative effects (increases in wholesale electricity prices and higher production costs for energy-intensive businesses and a consequent loss of competitiveness with respect to countries outside Europe) unless it is adequately implemented. After the disagreements of the Industry and Environment Committees of the European Parliament, there are expectations for the plenary vote by the European Parliament, scheduled for 2013. Considering the performance of the CO₂ market, an intervention to stabilize the system in the short term is considered very likely. A reflection

on the different scenarios proposed by the European Commission to redefine the instruments of a decarbonisation strategy is just as necessary.

As regards **all the other sectors**, a project to change energy taxation with a view to standardising the minimum tax level on energy products, on the basis of their energy content and the CO₂ they emit, is currently being evaluated. This would eliminate market distortions such as the exemptions envisaged by the current system. In this context, the Government has considered the possibility of introducing new forms of taxation aimed at preserving and ensuring the environmental balance and the revision of the excise duties on energy products, also as a function of carbon content, in accordance with the principles laid down by the proposed EU Directive. This option could also allow for a progressive shift in the financing of renewable energy towards a solution that weighs less on the energy bills of citizens and businesses.

It should be borne in mind that these measures partly overlap with other existing measures (most notably those regarding energy efficiency and energy production from renewables) designed to achieve an overall reduction in emissions.

- In the meantime, the **main European countries** are moving towards the adoption of energy strategy goals in line with the EU ones. Examples are the energy strategies of Germany, Denmark and the United Kingdom.
 - With the “*Energiewende*”, **Germany** intends to achieve: production from renewables amounting to 18% of consumption by 2020, reaching 60% by 2050 (for the electricity sector the goal is to develop renewables to 35% by 2020 and up to 80% by 2050); a reduction in primary consumption of 20% below 2008 values by 2020 (with, most notably, an expected 10% reduction in electricity consumption), rising to 50% by 2050; and a progressive phasing-out of nuclear power stations by 2022.
 - The **UK** Government, with “*Enabling the transition to a Green Economy*”, has introduced a series of policy instruments to support this transition. The Government's goals for 2020 include a 34% reduction in greenhouse gas emissions and production from renewables amounting to 15%.
 - **Denmark's** “Energy Strategy 2050” adopts a flexible long-term approach that aims to make the country independent of fossil fuels by 2050. Key points for 2020 are: production from renewables amounting to 30% of consumption and a reduction of primary consumption to 4% below the values for 2006.

Completing the Single Energy Market

In addition to its environmental targets, the European Union aims to achieve full integration of the national energy markets. The goal is to give consumers and businesses better products and services, at more competitive costs and with greater security of supply, through a more efficient and competitive energy system.

This goal encompasses drawing up and putting in place consistent and standardised market rules and instruments and constructing major cross-border connection infrastructure for both gas and electricity.

National Energy Strategy: for a more competitive and sustainable energy

1. The international and Italian contexts

1.2 Europe's road to decarbonisation and the single market

- From the point of view of **market instruments and rules**, the European Commission has set an ambitious target envisaging full market integration by the end of 2014. With the third legislative package for an internal EU gas and electricity market, approved in April 2009 and implemented in Italy in June 2011, it has introduced:
 - Structural unbundling of transmission/transport, on the one hand, and production and supply on the other, for vertically integrated companies.
 - New instruments to harmonise market and network operation rules at the pan-European level.
 - High standards of public service obligation and consumer protection (e.g., provisions simplifying consumer choice and transparency obligations for operators).
 - Stronger powers and independence of national energy regulators.
 - A new institutional framework, with the creation of a European Agency for the Cooperation of Energy Regulators (ACER) and the strengthening of the European Network for Transmission System Operators' associations (for electricity and gas) – the ENTSOs.
- From the point of view of **network integration and development**, the Commission aims to ensure that all connection and storage infrastructure deemed to be strategic for European energy security and integration is completed by 2020.
 - In October 2011 the Commission adopted the proposal for a Regulation on “Guidelines for **Trans-European Energy Infrastructure**”. 9 priority corridors and 3 areas of interest have been identified, covering the electricity and gas transmission and storage networks, oil pipelines, smart grids and networks for CO₂ transportation and re-injection. The Commission intends to select a certain number of “**projects of common interest**” that are important for achieving the energy and climate targets. Projects awarded the “common interest” label will enjoy several advantages: streamlined permit-granting procedures, which will be quicker, simpler and more transparent, and EU financial support as well as tariff incentives and cross-border sharing of the costs of cross-border infrastructure (for 2014-2020, €5,1 billion should be earmarked under the Connecting Europe Facility (CEF))
 - Italy is touched by 5 of the corridors (2 for electricity and 3 for gas) and, like all member states, by the 3 priority thematic areas. The following are of interest to Italy:
 - For the electricity sector, the North-South (NSI West Electricity and East Electricity) corridors.
 - For the gas sector, the North-South (NSI West Gas, East Gas, and Southern Gas) corridors.
 - The thematic areas for the development of smart grids, electricity highways and CO₂ transport networks.

The Regulation is expected to **enter into force in 2013**. This will give sufficient time to draw up an initial list of projects of common interest at the EU level that will be eligible for funding within

National Energy Strategy: for a more competitive and sustainable energy

1. The international and Italian contexts

1.2 Europe's road to decarbonisation and the single market

the CEF framework due to enter into force in 2014. Indeed, work has already begun and is being taken forward intensively on the basis of provisional criteria.

1.3 The starting point for Italy: challenges and opportunities

The challenges: the macro-economic context, security and energy competitiveness

The **Italian economic context** is, at present, both difficult and uncertain. After a decade of very limited growth, the impact of the economic crisis of 2008 has reduced Italian GDP by over 5%. The most recent forecasts again point to difficult growth in the short-term, with recovery only expected from end of 2013-beginning of 2014. **Sustainable growth**, the main priority for both the Government and the country, can be achieved only if the **competitiveness** of the Italian economic system improves substantially and specifically the industrial and manufacturing sector, which the Government intends to keep in a central position of the Italian economy. To achieve this goal it will be essential to act on all structural factors that can enhance our competitive position with respect to international competition.

If the industrial and manufacturing sector is to retain its central role for the development of the country, we will need to act on all of the structural factors with the potential to improve our competitive situation with respect to our international competitors.

These, most definitely, include the **energy sector**, which is faced with **significant** and, in part, contrasting **challenges**:

- First, Italy's **energy prices** (and especially electricity prices) are, on average, **higher** than Europe's and much higher than those of the United States. This situation weighs heavily on the **competitiveness** of the Italian economic system, and can largely be explained on the grounds of four structural reasons:
 - The current **energy mix**, in particular for electricity, is fairly costly because it is based primarily on gas and renewables. It differs greatly from the average EU mix in light of the absence of nuclear power and the low share of coal.
 - Wholesale **gas** prices are on average higher in Italy than in other European countries. The average price of gas on the PSV (Punto di Scambio Virtuale, the Virtual Exchange Point of the gas system) spot market in 2011 was about 25% higher than on the principal north-European hubs (the price of long-term Italian take-or-pay (ToP) contracts was also higher, on average, than similar European ToP contracts).

This also reflects on the wholesale price of electricity, which is mostly determined by gas CCGT power stations. The gas price differential, of about €6/MWh thermal in 2011, has an impact of about €10-12/MWh on electricity produced by CCGT. In recent months this spread has narrowed bringing the yearly average spread down to €3.7/MWh in 2012, partly as a result of the growing liquidity of the spot market.
 - Historically, Italy has the highest incentives in Europe for **renewables production** (for example, the unit incentives for photovoltaic production were about double those of Germany). This has a strong impact on energy costs: over 20% of the Italian electricity bill (taxes excluded) goes to cover incentives for production from renewables.
 - Lastly, there are a several **other costs due to public policies backed by tariffs and widespread inefficiencies**. For example, for the electricity sector: "other system costs" (e.g.,

National Energy Strategy: for a more competitive and sustainable energy

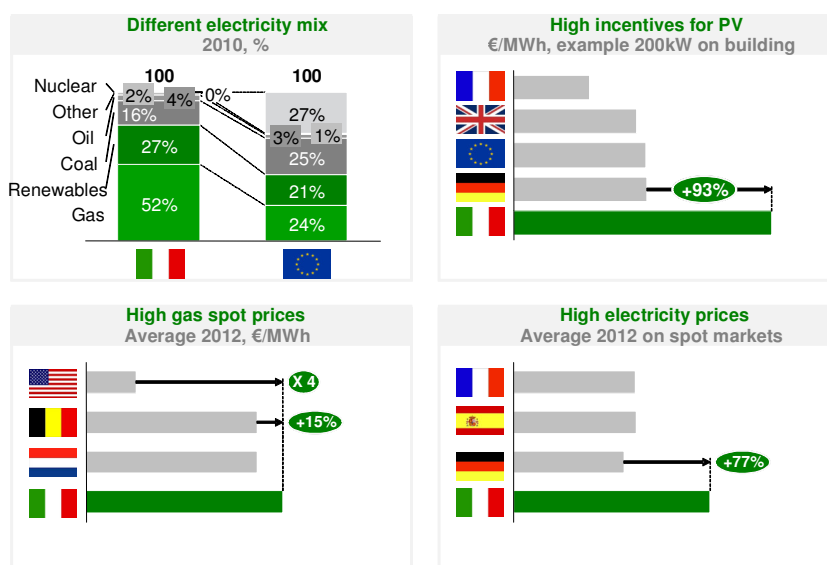
1. The international and Italian contexts

1.3 The starting point for Italy: challenges and opportunities

costs for nuclear decommissioning, system research, special tariff schemes); grid bottlenecks (for example between Sicily and the mainland); and high incentives for certain types of production (e.g. non-renewable CIP6, i.e. incentives approved by the Inter-ministerial Price Committee – CIP), and incentives for certain categories of customers.

TABLE 5

High energy costs



Source: GME; GSE; MISE; Eurostat

- Second, Italy has a rather critical situation in terms of **security and independence of supply**. This problem can be broken down into two areas:
 - Limited **gas-system response capacity in peak conditions**: at times when reductions in supply from abroad coincide with prolonged periods of exceptionally cold weather throughout the country – as happened in February 2012 – the system is still insufficiently resilient. Faced with an estimated peak demand in exceptional weather conditions of about 480 Mmc/day (millions of standard cubic meters/day), the reserve margin is somewhat limited, at around 50 Mmc/day. This applies in particular towards the end of the thermal winter, when delivery capacity from storage is low. During these emergency periods, additional flexibility measures had to be put in place, with a resulting increase in energy costs.
 - **Import dependence**: 84% of Italy's energy needs are covered by imports, with domestic production from renewables, gas and crude covering just 10%, 4% and 3% respectively of the national demand (2010). This figure compares with a significantly lower average import share in Europe 27, at 53%. This factor has a strong macro-economic impact on the country, which had an **energy bill** for 2011 of around €62 billion (net energy imports). For years, this has kept the trade balance deeply in the red. Moreover, **diversification of sources** of supply is fairly limited, especially for gas.

National Energy Strategy: for a more competitive and sustainable energy

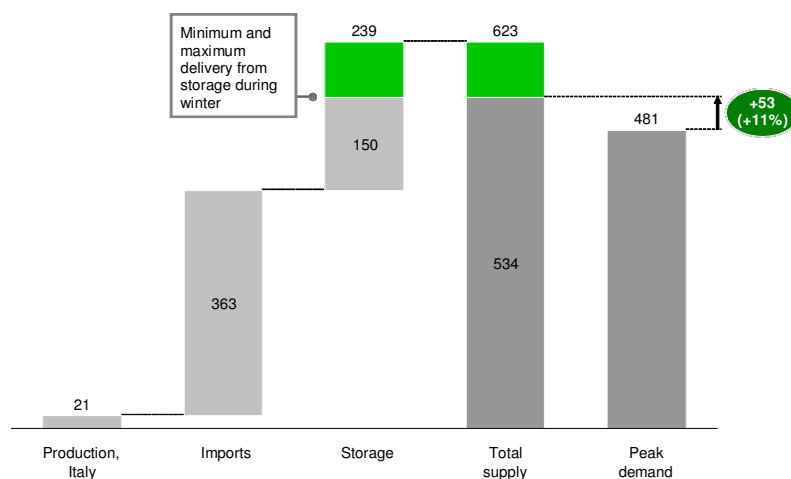
1. The international and Italian contexts

1.3 The starting point for Italy: challenges and opportunities

TABLE 6

Limited response capacity of the gas system in peak conditions

Mcm/day, 2012



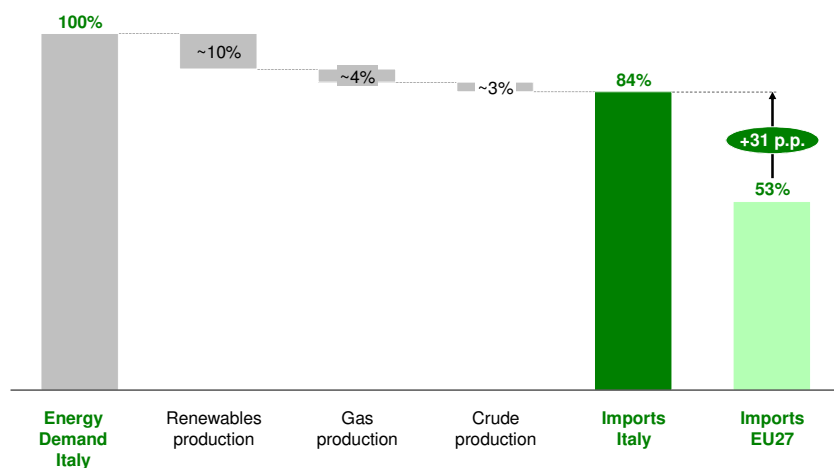
Source: MISE

- Lastly, some segments of the electricity sector are facing **difficult economic and financial conditions or are facing market transition**. Most notably:
 - The electricity companies mostly reliant on combined cycle **gas production** (CCGT) suffer from high over-capacity in electricity generation. This is caused in part by the fall in demand (which is not expected to grow significantly in coming years), in part by the notable increase in thermo-electric production capacity (about 20 GW of new CCGT from 2005 to 2011), and in part by the increased production from renewables.
 - Companies with **long-term (ToP) gas contracts**, with purchase prices indexed to oil are having to deal with a market characterised by lower demand (where the volumes requested are often below the ToP threshold) and strong competition from the spot market, where prices are lower than oil-linked prices.
 - The **oil refining** sector, which is suffering a fall in demand, both cyclical (as a result of the economic crisis) and structural (as a result of vehicles' ever-improving energy performance and the influence of biofuels). Another factor is the increased competition from plants in regions like India, the Middle East and China.

TABLE 7

The high proportion of energy imports means that security of supply is especially pertinent to Italy

Production and imports of energy resources, 2010



Source: MISE

The foundations to build on: the strengths of the Italian energy system

In addressing the challenges described above, Italy’s energy system has significant strengths to draw on. These include:

- High **environmental standards**. Today, Italy is one of the world’s most **energy-efficient** countries (with primary energy intensity 14% lower than the European average in 2010). In addition to being historically well positioned in this area, the country has seen a fall in consumption in recent years. This is a result not just of the economic crisis, but also of the reduction in energy intensity (5% lower than in 2005). Contributory factors include increased electricity generation yields and the introduction of the energy efficiency plan for end uses (e.g. tax rebates, White Certificates, minimum requirements for buildings and electricity equipment). In 2011, the American Council for an Energy-Efficient Economy (ACEEE) placed Italy third in the world after Great Britain and Germany in its comparison of countries’ efforts to increase their energy efficiency levels.
- A favourable **geographical position** that sees our country acting as a bridge between continental Europe and the Mediterranean, with privileged access to North Africa, the Balkans and the Middle East – important regions from the energy perspective.
- Solid foundations in terms of **service quality**. If, for example, we consider unplanned interruptions in the electricity service, Italy is well-placed with respect to other European countries. According to the CEER report for 2011, Italy had just 47 minutes/year of unplanned interruptions in 2010, compared to 63 in France, 70 in Great Britain and 88 in Spain.
- A highly developed **regulatory framework**. For example, regulation of the electricity distribution system is at an advanced stage and has led to notable efficiency gains and service quality improvements, through reward and penalty schemes.

National Energy Strategy: for a more competitive and sustainable energy

1. The international and Italian contexts

1.3 The starting point for Italy: challenges and opportunities

- A good level of **technological progress**, with a number of areas of excellence, thanks to the considerable investment made in recent years. For example, we lead the world in the deployment of smart metering and have one of the most efficient CCGT generating pools.
- Moreover, for Italy energy is an important **industrial sector**, which employs about 470,000 (one of the few sectors showing growth, with about 36,000 new jobs in 2011)². The sector has attained a highly competitive international position in certain segments, both in the “clean-tech” sectors (for example, concentrated solar, heating and cooling renewables and energy efficiency) but also in more traditional sectors (such as hydrocarbon exploration and production)

² Figures from the Sole 24 Ore's Energy Report, February 2012

2. The goals of the new National Energy Strategy

2.1 The role of energy in growth and the value of an Energy Strategy

As mentioned earlier, the first priority for the country and for the Government is sustainable economic growth. The energy sector is a **key element for growth**, both as an enabling factor and as a growth factor in itself:

- As an **enabling factor for sustainable growth**, because energy has a decisive impact on the costs of businesses and households. Energy bills are significant items of expenditure – and therefore a competitiveness factor – for Italian businesses, which find themselves facing directly international competitors whose energy costs are often much lower. For example, the average cost of electricity per MWh for an industrial customer consuming between 2,000 and 20,000 MWh/year can be up to 25% higher in Italy than in the major European countries. Moreover, more than 80% of our energy needs depend on imported fuel. This **dependence** makes us vulnerable to uncontrollable external events (e.g., increases in commodity prices). It weighs heavily on the country's finances, given our external energy bill of € 62 billion in 2011. Lastly, the energy sector plays a fundamental role in ensuring high **environmental quality standards**, in terms of sustainable use of scarce resources, the health of the environment we live in and the conservation of our landscape and ecosystems.
- As a **growth factor in itself**, the energy sector is a potential driver of economic recovery. It is, indeed, a sector that has been experiencing continuous growth at the global level, with high rates of investment (from now until 2035 the IEA estimates that \$38,000 billion will be invested in the sector) and the resulting innovation and spin-off effects. Our country is well-placed to take advantage of several areas of opportunity, pertaining both to the green&white economy (renewables, energy efficiency, sustainable mobility and transport) but also in the more traditional areas.

In a context like the one described in the previous chapter – with wide discrepancies at the international and national levels and significant challenges for the future – it is of **vital importance for the country to draw up a National Energy Strategy (NES)**. Such a strategy serves to outline the direction in which the sector will develop, the main **strategic choices to be made, and our priorities**. The NES will guide our decisions and choices in coming years, albeit knowing that we are acting in a free market context and with development scenarios that cannot be centrally controlled. The strategy must be consistent and act in synergy with the National Action Plan for Renewable Energy (which will need to be up-dated in line with the NES), the Action Plan for Energy Efficiency, and, lastly, with the Plan for CO₂ Reduction and Decarbonisation of the Italian economy, which is currently being drawn up.

This document, outlining objectives, priorities and main initiatives, is the **outcome of an extensive public consultation**, through a wide involvement of all the stakeholders. During the two months of public consultation, meetings have been organized at the Ministry of Economic Development with more than 100 stakeholders among Institutions, industry associations, social partners and trade unions, research and study centres. More than 800 suggestions and contributions have been received from citizens and companies mainly, through the online platform. This wealth of analysis and positions will be made available to the public (subject to the consent to publication by the various parties involved). The proposed strategy will be followed by the definition of an implementation process through various initiatives, setting the details of responsibilities, means of implementation and timing for each of them.

National Energy Strategy: for a more competitive and sustainable energy

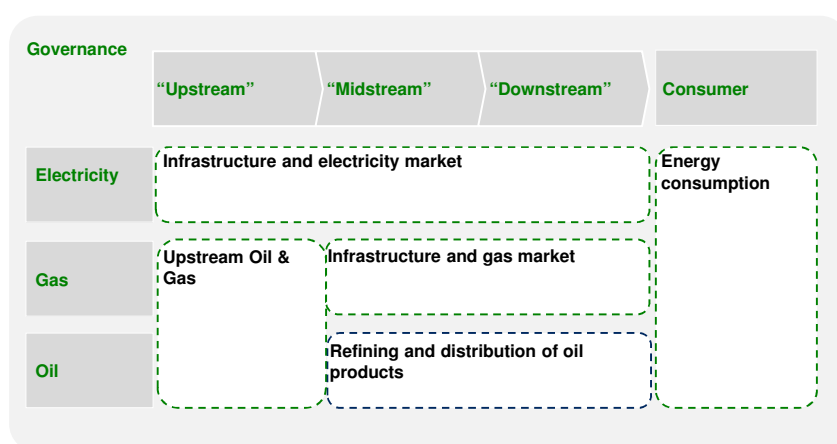
2. The goals of the new National Energy Strategy

2.1 The role of energy in growth and the value of an Energy Strategy

It is also considered important for the energy strategy to establish a monitoring and scenario update process at least every two years (as provided for by art.1 Para 2 of Legislative Decree 93/2011), and a regular update (every three years), in order to intervene on possible deviations from targets (both on single initiatives and in terms of the total system), as well as to adapt choices to the evolution of macroeconomic and technology context, and also to ensure full coordination with the European and regional energy policies and with other sectoral policies.

TABLE 8

5 distinct areas of intervention in the energy sector



Source: MISE

From a **methodological** perspective, this document analyses the energy sector and breaks it down into **5 sub-sectors/areas of intervention**. These are based on the energy source (electricity, gas, oil) and/or on the different stages of the value chain (*upstream*, i.e. generation or extraction; *midstream*, i.e. transport or refining; *downstream*, i.e. *distribution*; and, lastly, consumption). The 5 areas are:

- Energy consumption
- Electricity infrastructure and market
- Gas infrastructure and market
- Refining and distribution of oil products
- Oil and gas exploration and production

Finally there is **one area that cuts across all 5 areas**: the **governance** of the sector. This concerns policy and regulation (international, European, national, regional and local) and administrative and authorisation processes.

In terms of timing, the Energy Strategy **focuses primarily on two horizons**:

National Energy Strategy: for a more competitive and sustainable energy

2. The goals of the new National Energy Strategy

2.1 The role of energy in growth and the value of an Energy Strategy

- One on a **medium-to-long-term to 2020** in which the objectives are defined in greater detail, specific priorities for action and concrete support initiatives are identify, and the forecast of the evolution of the energy system is outlined.

It was deliberately decided to use this as the **main horizon** of NES. It makes it possible to have a sufficient degree of freedom to set a direction (albeit with some constraints related to the current contingencies), and at the same time it allows us to finalize the priorities and actions in a substantive manner (hard to do if we had used only a very long-term horizon). Thus, forcing policy makers to make choices between alternatives or finding effective syntheses, and ensuring the **consistency of short-term decisions** with the longer term's significant choices. In addition, the 2020 horizon is still the main one of the policies defined at European level.

- A **very-long-term horizon up to 2050**, that would establish the guidelines on the **significant choices** of the country and identify and anticipate the main implications of the possible scenarios, particularly in some sectors with structurally long development times (e.g., research). For this horizon, there is also a European reference scenario (the *Energy Roadmap 2050*), currently still under debate.

2.2 Four key goals for the sector

In line with the comments made earlier regarding the international context, the challenges facing Italy and the country's strengths, the new National Energy Strategy focuses on four main goals:

1. **To significantly reduce the energy cost gap** for consumers and businesses, by bringing energy costs and prices into line with European levels up to 2020, and ensuring that the energy transition in the longer term (2030-2050) will not compromise the competitiveness of the Italian and European industry.
2. **To achieve and outdo the environmental and decarbonisation targets** set out in the European Climate and Energy 2020 Package, and take a lead role in the definition and implementation of the 2050 Roadmap.
3. **To continue improving our security and independence** of energy supply.
4. **To foster sustainable economic growth** by developing the energy sector.

Each of the above objectives is briefly analysed here below:

1. **Reducing the cost gap** for consumers and businesses is by far the leading goal, in light of the country's intention of becoming more competitive and achieving more – and more sustainable – growth. As we have seen, this is also the area where we are starting out from the position of greatest disadvantage, and the one which **will require the greatest efforts**. Given the structural nature of this cost gap, the actions to be undertaken will show their effects gradually over the medium-term. To achieve this goal, gas prices will need to be aligned (a critical element, not least in order to reduce electricity prices), while the widespread inefficiencies in the system, which cause higher prices, will need to be curbed. Reducing energy costs and prices means not just restoring business competitiveness on the international markets and increasing citizens' purchasing power. It also means offering our electricity generation sector the prospect of exporting – or of importing less.

In a longer-term horizon - 2030-2050 - when the country is expected to be fully integrated with Europe in terms of costs and energy prices – it will be a priority to ensure that the pathway to **decarbonisation** is carried out so as **not to undermine the competitiveness of the Italian and European system** compared to the main world economies.

2. The second objective is to **meet and surpass the European environmental and decarbonisation targets**, which are a key element in the sustainable development pathway the country intends to embark on. This will involve, on the one hand exceeding the targets set by the Climate-Energy Package ("20-20-20"), on the other an active participation in the definition of the path to decarbonisation of the 2050 Roadmap. The well-being of future generations, in terms of environment and of industrial competitiveness, and the overall functioning of society will depend largely on the answers we can provide to prevent and to adapt the system **to the challenges of climate change**.
3. We then need to focus on **security and independence** of energy supply, in both the electricity and gas sectors, but especially the latter. This goal can be broken down as follows. First, a reduction in the levels of fossil fuel and electricity **imports** (so as to reduce the overall level of dependence and improve our trade balance). And second, a **diversification** of sources of supply (which at present, for

gas, are somewhat concentrated), and the optimisation of **flexibility of supply** (for example, through gas storage) to respond to peaks in consumption and unexpected reductions in imports.

4. Implementing the energy strategy will involve significant investment and technological innovation and will therefore be an opportunity for growth in the energy sector. If we also take into account the considerable international opportunities that will arise, and our favourable starting point in areas where we have a notable tradition and expertise, the **industrial growth of the energy sector** is in itself a goal of the energy strategy. The strategy therefore intends to **foster spin-offs, throughout the national supply chain**, of the initiatives undertaken in all of the areas of action that we will be analysing. In this context, particular attention should be paid to **the growth of all segments of the “green economy”**, the potential of which it will be important to fully exploit.

3. Priorities of action and expected results by 2020

3.1 Seven priorities for the coming years

To achieve the medium to long-term objectives (2020), the National Energy Strategy has been structured according to 7 priorities, each of which with specific support measures already undertaken or being drawn up, as described below. There are, of course, numerous other areas of intervention the Government will be focusing on, but the priorities illustrated here are the ones with the greatest importance and impact.

1. **Energy efficiency.** Energy efficiency will play a part in achieving all of the energy policy objectives mentioned in the previous chapter:
 - reducing energy costs, thanks to savings in consumption;
 - reducing environmental impact (energy efficiency is the most cost-effective way to lower emissions, with a return on investment that can often be positive for the country. As such, it should be a preferred means of achieving our environmental quality goals);
 - improving the security of our energy supply and a reduction in our energy dependency;
 - achieving economic development generated by a sector with strong knock-on effects on the national supply chain, where Italy is in a leading position in several areas and can therefore view other countries as additional, and rapidly expanding, markets.

The strong drive to energy efficiency will absorb a substantial part of the expected increases in demand from now until 2020, both primary and for end users. In this context, the energy sector will need to take a realistic approach to a scenario where demand will remain flat, at levels comparable with those of recent years.

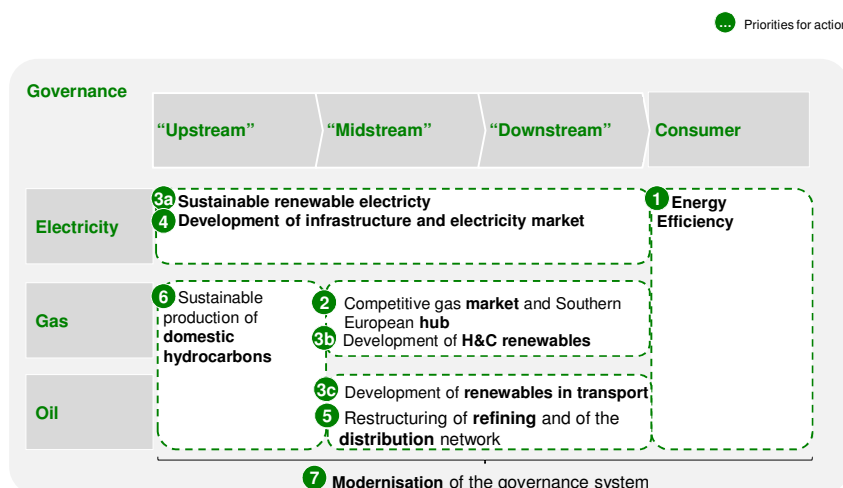
2. **Competitive gas market and Southern European Hub.** It is a priority for Italy to create a liquid and competitive domestic market that is fully integrated with those of other European countries. Moreover, in the next 20 years Europe will significantly increase its gas imports (the IEA forecasts an additional 190 billion cubic metres (bcm) per year). For Italy, this could be an opportunity to become an important crossroads for gas entering Europe from the South. The main expected impact of the above changes is an alignment of our gas prices with European prices; this will be accompanied by increased security of supply thanks to improved infrastructure and greater market liquidity. More competitive gas prices will make it possible for Italy to act as a trading and/or transit country towards Northern Europe, while restoring competitiveness to the country's gas-fired combined cycle installations and reducing electricity imports.
3. **Sustainable development of renewable energy.** Italy intends to meet and surpass the European ("20-20-20") targets for production from renewables and thereby play a significant part in reducing emissions and achieving the energy security objective. While doing so, however, it is most important to keep energy bills down, given the burden they place on businesses and households. Incentives need to be brought in line with European levels and further impetus needs to be given to the development of renewables in heating and cooling, which have good growth potential and lower specific costs than electricity. It will also be necessary to focus spending on the most virtuous technologies and sectors, those with the highest returns in terms of environmental benefits and the highest potential for the national supply chain. In this respect, close attention will be devoted to energy recovery from waste and re-use. Renewables are a

central segment of the green economy, which is increasingly being seen also at the international level as an opportunity for economic recovery.

4. **Development of the electricity infrastructure and market.** The Italian electricity market is undergoing a far-reaching transformation, caused by numerous changes. To mention just the most evident: the slow-down in demand, the large (excessive) amount of thermo-electric generating capacity and the increased production from renewables, which has occurred at a markedly faster pace than envisaged in previous planning documents. In this context, the fundamental choices and decisions will focus on maintaining and developing a free and efficient electricity market that is fully integrated with the European markets in terms of both infrastructure and regulation, and with prices increasingly converging with European levels. Production from renewables will also need to be fully integrated with the market and with the electricity grid.

TABLE 9

7 priorities identified with concrete objectives and specific support measures



Source: MISE

5. **Restructuring the refining sector and the fuel distribution network.** The refining sector is experiencing major difficulties, both for cyclical reasons (fall in demand caused by the economic crisis) and also, and above all, for structural reasons, given the progressive fall in consumption and growing competition from countries new to the sector. The sector is in need of restructuring if it is to become more competitive and technologically more advanced. Fuel distribution also needs to be modernised, in order to make it more efficient and more competitive and to improve service levels for consumers.
6. **Sustainable development of domestic hydrocarbons production.** Italy is heavily dependent on fossil fuel imports; at the same time, the country has substantial gas and oil reserves. We are therefore duty bound to exploit these resources, given the benefits they offer in terms of employment and economic growth in a sector where our expertise is widely recognised. That said, the potential environmental impact has to be taken into account. It will be essential, therefore, to show the greatest possible care to prevent any such impact. Our environmental and

National Energy Strategy: for a more competitive and sustainable energy

3. Priorities of action and expected results by 2020

3.1 Seven priorities for the coming years

safety regulations will need to be aligned with the most advanced international standards (while noting that in this sector Italy has one of the best records of any country in the world as far as accidents are concerned). The Government does not intend to develop projects in sensitive areas offshore or on land; nor does it intend to pursue shale gas extraction.

7. **The modernisation of the governance system.** To make it easier to attain all of the above objectives, we will need to increase the effectiveness and efficiency of our decision-making process, which is bound by far more red tape and far longer timescales than is the case in our competitor countries. Agreeing on a clear and consistent National Energy Strategy will be a first important step in this direction.

3.2 Expected results by 2020

First, a comment on methodology: formulating long-term projections is difficult. It requires us not just to establish the policy actions the Government intends to take forward, but also to make a series of assumptions on conditions that are exogenous to the system. These clearly cannot be controlled and could, in the end, be markedly different from our forecast. Therefore, in drawing up this document we prepared a series of **development scenarios** with the valuable and greatly appreciated collaboration of the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA). These represent, in quantitative terms, the expected results of the actions set forth in the Energy Strategy (for the sake of simplicity, in this document we only include the summary data for the “NES Scenario”, or what, according to specific projections of the main exogenous variables, would result on average as a response to the designed actions). More specifically, as regards economic growth (GDP), we have assumed an economic recovery starting in 2014, with an average annual growth rate of 1.1% up to 2020 (in line with the forecasts used by the European Commission for Italy in “*The Ageing Report 2012*”³).

This said, the expected result from the implementation of all priority activities described will be a **gradual but significant evolution of the system**, both in economic and environmental terms, and which provides the following results by 2020:

1. **Volumes and energy mix: reduced consumption and evolution of the mix** in favour of renewables.
2. **Costs and energy prices: a significant reduction in energy costs** and a **progressive alignment of prices** to European levels.
3. **Environmental impact: achieving and exceeding all European 2020 environmental and decarbonisation targets.**
4. **System Security: improved safety and security due to reduced dependence** on external supply and **greater flexibility.**
5. **Economic growth: positive impact on growth thanks to the significant investments** expected in the sector and the strategic implications in terms of **competitiveness** of the system.

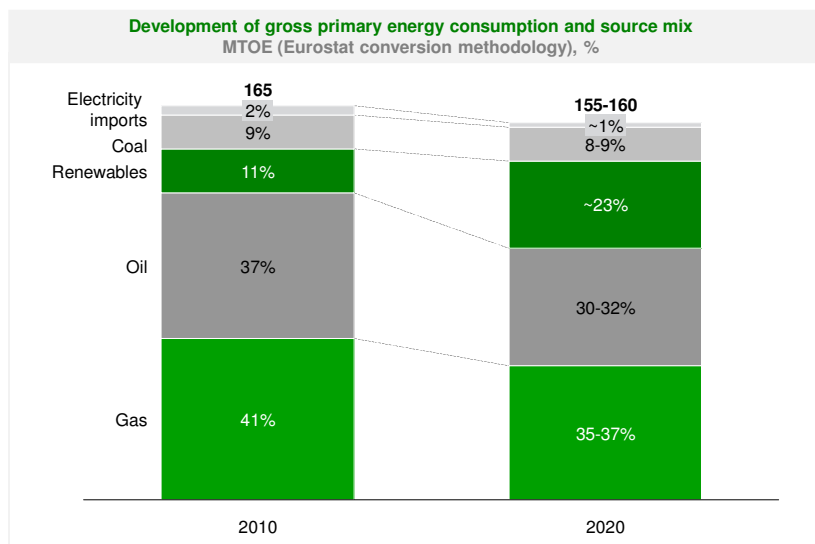
Let us analyse in more detail the expected evolution of the system:

1. Volumes and energy mix

Thanks to a strong push for energy efficiency, a reduction of energy consumption is expected compared to 2010, both in terms of primary energy and electricity (with an expected reduction of ~ 4% of primary energy and reduced growth of electricity consumption).

TABLE 10

A gradual but significant development of the system: gross primary energy consumption



Source: MISE

The evolution of the production mix envisages a **significant increase in the part played by renewables in all sectors** (electricity, heat, transport). Renewables will amount, in total up to 22-23% of primary consumption, compared to 11% in 2010, with the share represented by fossil fuels gradually decreasing while still remaining predominant (approximately 76% of primary consumption). More specifically, the mix in the **electricity sector** will increasingly be based on gas and renewables – a trend expected to be followed by other European countries too: the importance of renewables in the consumption mix will reach the level of gas expected at 35-37%.

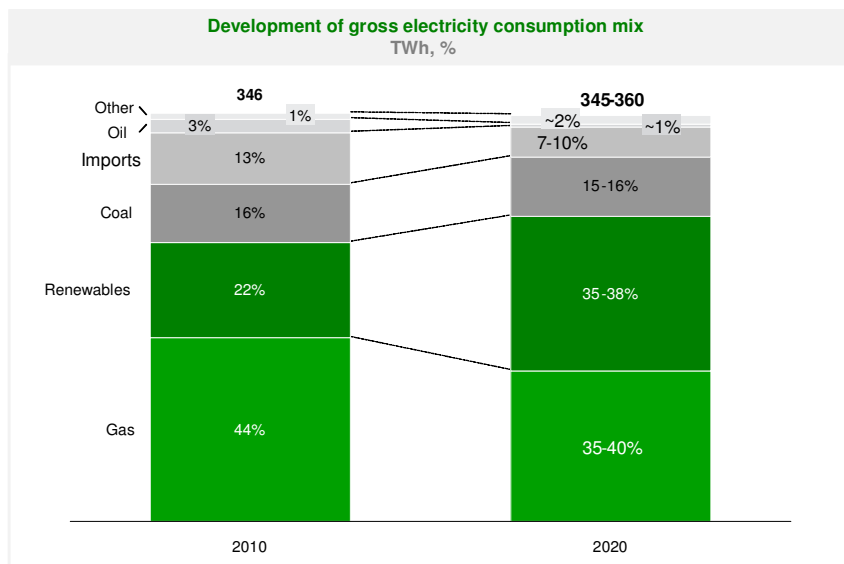
2. Costs and energy prices

We expect a significant reduction in energy costs for the country due to the gradual elimination of the gap in prices compared to other European countries, as well as a result of energy efficiency measures. An estimate of the evolution of the system in a scenario of full achievement of the NES targets, **assuming constant prices (2012) of international commodities and of CO₂**, provides:

- In terms of **overall costs, savings of about € 9 billion a year** on national electricity and gas bill (the total cost incurred by all the Italian consumers for the supply of electricity and gas, is today equal to about € 70 billion). The savings are made up of:
 - **About € 4-5 billion of additional costs** in the 2020 bill compared to 2012, primarily targeted at improve the environmental impact of the energy system (according to the objectives of the Energy Strategy) and making the system more efficient and competitive while maintaining high standards of safety. In particular, these additional costs are related to incentives/support to investments in energy efficiency, development of renewable thermal energy, the development of the electricity and gas grids (including some strategic infrastructure). It is a significant commitment, to control and monitor carefully, initiative by initiative, during the whole period.

TABLE 11

Electricity consumption: shift to a gas-renewables mix



Source: MiSE

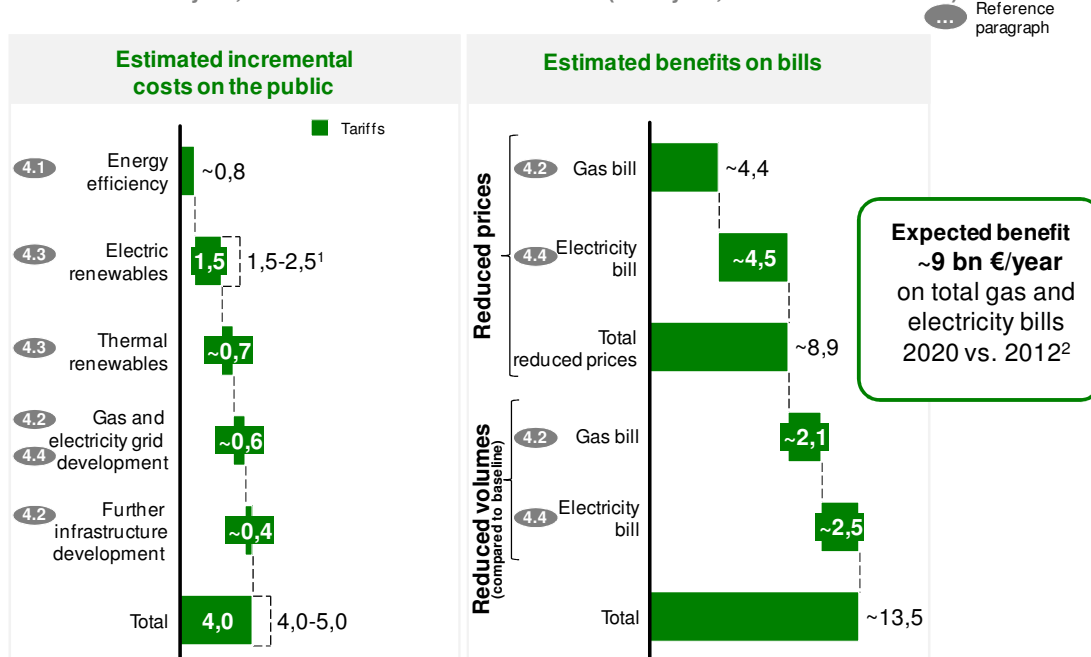
- About **€13.5 billion in savings** bill 2020, of which **nearly €9 billion due to an expectation of lower prices and approximately €4.5 to a reduction in volumes**. The former are related to an expected alignment of the Italian wholesale gas prices to European prices (assuming the full transfer of the benefit to final consumers), and to the reduction of rents and widespread inefficiencies (e.g., elimination of existing bottlenecks of the network involving local prices above average in some areas and a high cost of dispatching, reduction of network losses, review of the CIP 6 incentives (incentive scheme introduced in 1992 and currently being phased out) and other system costs (e.g., introduction of competitive mechanisms for awarding hydroelectric concessions with partial return of rents reducing system expenses, rationalization of electricity distribution and tenders for gas distribution, review of benefits to specific customer segments, reducing the burden of managing gas emergencies). The latter are mainly related to energy efficiency measures that will reduce consumption volumes compared to growth in absence of measures, both gas and electric.

The detail of the individual contributions shown in Table 12 is discussed in more detail in the specific paragraphs.

TABLE 12

Development of electricity and gas bills – the incremental costs on the public are more than compensated by expected benefits

Billions of Euros/year, difference between 2020 and 2012 (base year, total cost ~70 billions)



¹ The 2012 base doesn't include installations subject to registries and auctions (non-PV) registered between 2012 and 2013
² Assuming equal international commodity prices

With regard to unit prices, the scenario foresees a gradual alignment to European **price** levels for all energy sources. In particular, **gas** is expected to be the fastest to align: this approach has already begun in an eye-catching fashion, thanks to the actions undertaken in recent months (as we shall see in the relevant paragraph). We will experience a gradual alignment also for fuels, thanks to the structural changes that have been undertaken in both the refining and distribution sectors, which will be further pursued. Finally, reducing the gap for electricity probably will take longer due to its more structural nature (in particular, due to the mix of generation and incentives for renewable energy already accounted for in the price components), but it can be achieved progressively. The above, both as an effect of the changes underway in the Italian market (e.g., in the gas market and the reduction of inefficiencies and bottlenecks), as well as due to the gradual evolution of the European electrical systems to a mix closer to the Italian one.

3. Environmental impact

In line with the basic choice of the progressive decarbonisation of the economy, the actions proposed will allow a dramatic improvement of our environmental standards, **achieving and exceeding all EU commitments for 2020**, and a gradual alignment towards the objectives of the Roadmap 2050:

National Energy Strategy: for a more competitive and sustainable energy

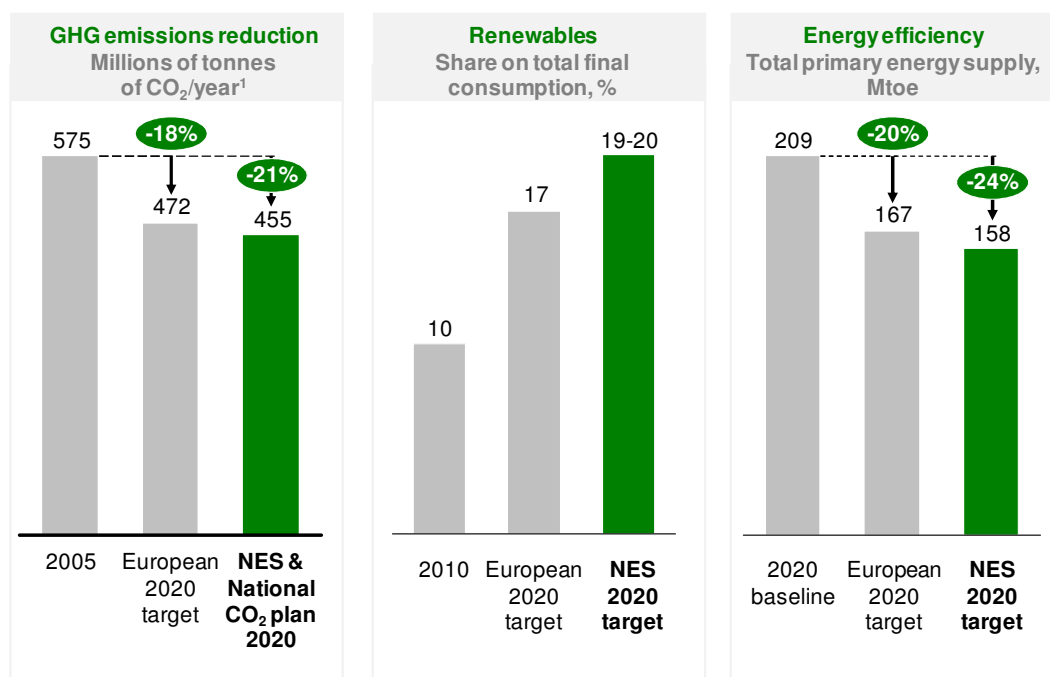
3. Priorities of action and expected results up 2020

3.2 Expected results by 2020

- With regard to the reduction of greenhouse gas emissions, a 21% lower level than in 2005 is expected, thus exceeding the EU objective quantified by the ETS and non-ETS targets of 18%, consistently with the Plan for CO₂ reduction and decarbonisation of the Italian economy.
- With regard to the development of **renewable energy**, it is expected that Italy will reach **19-20% of gross final consumption** (and 22-23% of primary consumption), exceeding the target of the National Action Plan (NAP) of 17% of final consumption.

TABLE 13

Outperforming European environmental targets by 2020



¹ Priority initiatives introduced are consistent with the National CO₂ reduction plan which envisages 455 Mt/year emissions in 2020

- With regard to **energy efficiency** - an area where the 20-20-20 targets are not binding - Italy intends to outdo the European targets of to 20% compared to **inertial consumption**, with expected **savings of up to 24%** (equivalent to a reduction of about 20 Mtoe of primary energy compared to today), reviewing thus the Action Plan for Energy Efficiency (which, as shown in Directive 2006/32/EC, has a time horizon bound to 2016).

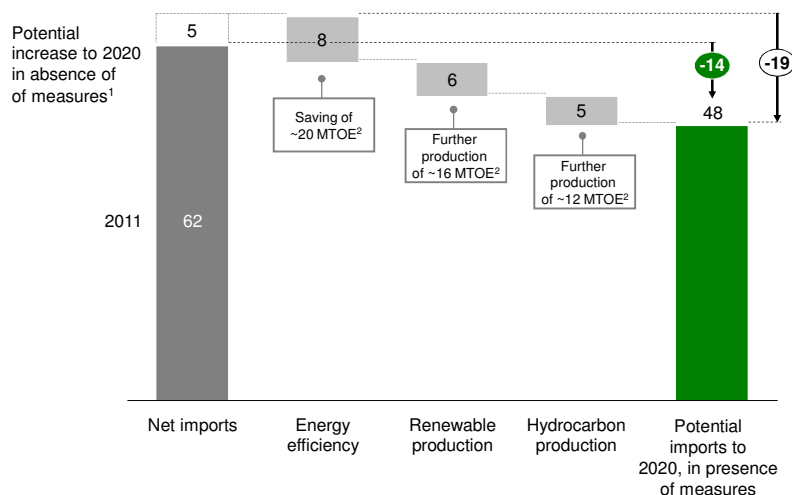
4. System Security

Italy will significantly reduce its dependence on energy imports through the envisaged energy efficiency measures, the increase of renewable energy and domestic production of hydrocarbons, as well as a reduction in imports of electricity. The dependence on import **will decrease from 84% to approximately 67%** of domestic energy demand, resulting in a **reduction of the external energy bill of around €14 billion per year** compared to the current 62 billion (or about 19 billion, compared to the level of 67 billion expected in 2020 in the case of baseline (“inertial”) system evolution without measures and at constant prices).

The expected savings on imports amount to about 1% of GDP and would alone be able to bring the trade balance back in a surplus, after many years of deficit.

TABLE 14

The country's potential for savings is significant
 Billions of euros/year, price estimates taking imports as constant



1 Assuming halt in energy efficiency measures and incentives for renewables, and natural decline of hydrocarbon production
 2 Primary energy, Eurostat methodology, compared to 2010 values

The reduction of energy dependence will be accompanied by an increase in the flexibility of the system response and diversification of supply sources. In particular, thanks to the market rules that we intend to implement and to the new storage and import infrastructures, we do expect to reach a high level of security. This **while fully respecting the criterion "N-1" even in the worst conditions of supply through storage** and solving the problem of winter gas crises, which in the past 10 years have often penalized us. The above, in order to get better response capabilities, in case of extraordinary events that could occur in strategically important supplying countries.

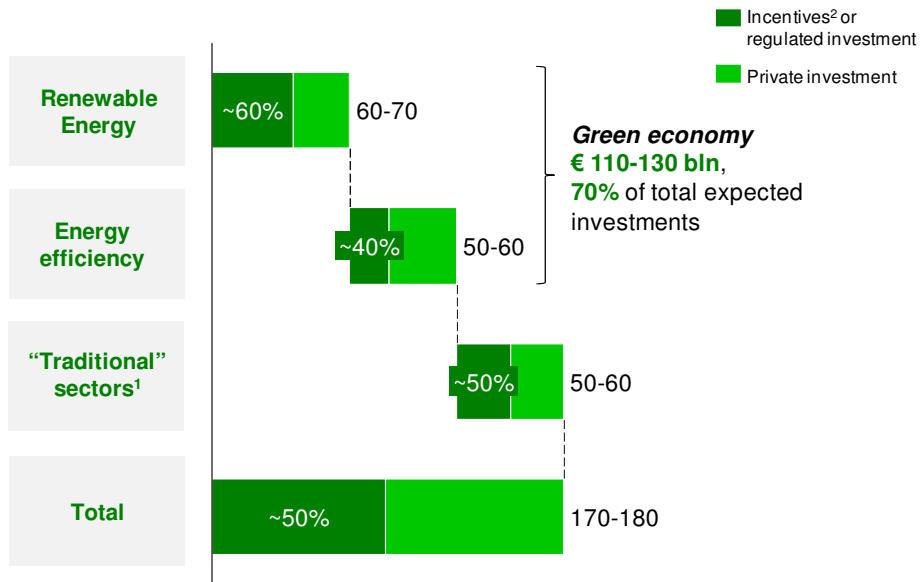
5. Economic Growth

The set of priority initiatives will require a very significant **development and deployment of investments**, both in the 'green&white economy' (renewables, energy efficiency), and in traditional sectors (such as electricity and gas networks, LNG terminals and storage facilities, and energy production operations). By 2020 it is expected that the amount of investments will be approximately equal to € **170-180 billion**. These are private investments, partially supported by incentives or by tariff schemes, and with a positive economic return for the country.

These important investments, followed by the regaining of competitiveness in sectors with higher electricity and gas consumption, by saving resources currently used for fuels import, and the restart of research and innovation in the sector, will create benefits. Benefits whose overall impact are, however, difficult to quantify, in terms of economic growth and employment.

TABLE 15

The energy sector – specifically Green economy – will stimulate investment for the Country’s economic growth
 Estimated cumulative investment by 2020, billions of Euros



1 Includes: Gas transmission and distributions grid; Regasification terminals, gas pipelines and gas storage; Generation, transmission and distribution of electricity; hydrocarbons E&P.
 2 Private investments, partially supported by incentives

4. The priorities of action, in detail

4.1 Energy efficiency

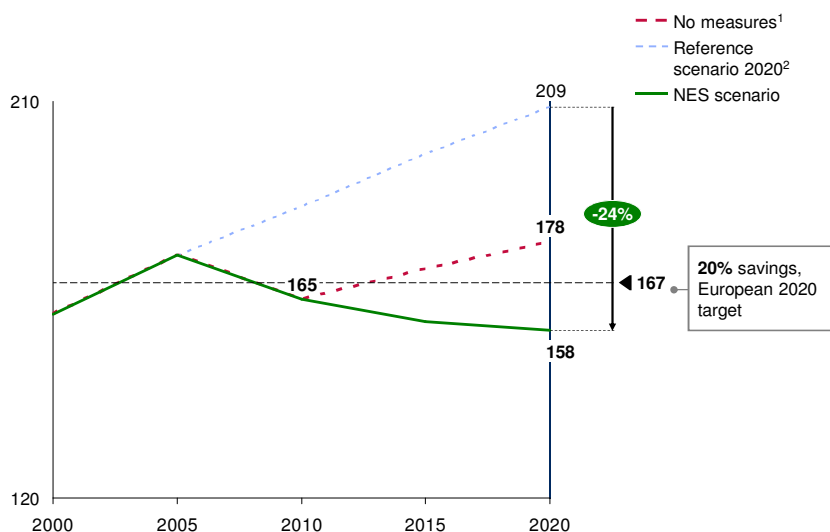
The targets

Energy efficiency is **the top priority of the new energy strategy**. In fact, at the same time it contributes to achieving all NES targets: reducing energy costs, reducing emissions and environmental impact, improving the safety and independence of supply and development of economic growth. The centrepiece of these policies is the launch of a wide-ranging and structured programme that allows to:

- **outdo Europe's 2020 targets.**
- achieve a position of **industrial leadership** in order to capture the growth of the sector in Italy and abroad.

TABLE 16

Energy savings target 2020 – Primary consumption
Primary energy consumption excluding non-energy uses, MTOE



¹ Interruption of all energy efficiency support measures (does not take into account any savings expected in NEEAP subsequent to 2010)

² Primes 2008

Source: MISE

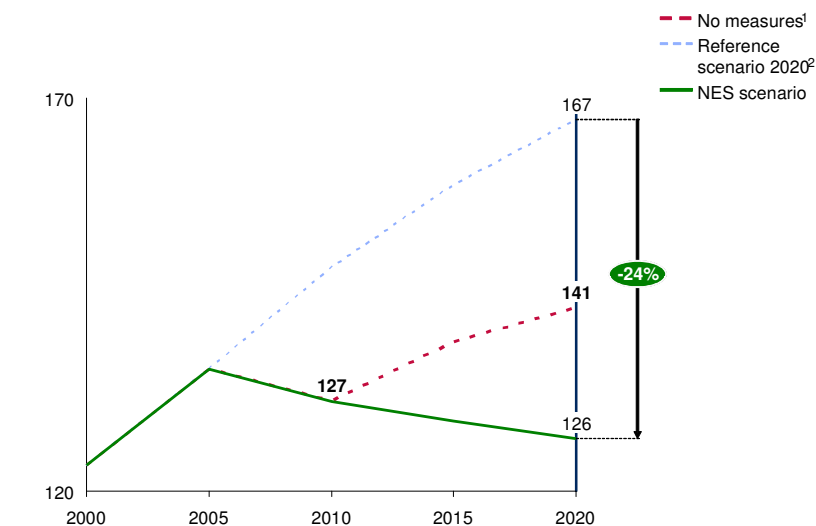
In terms of quantitative targets, the programme aims to:

- save **20 Mtoe of primary energy yearly**, and 15 Mtoe of final energy, so that by 2020 we will consume about 24% less than the European benchmark, based on the reference scenario (Primes 2008).
- prevent the emission of about **55 million tonnes of CO₂ annually**. Energy efficiency will therefore be **the main driver in lowering CO₂ emissions**.
- save **about €8 billion each year** in fossil fuel imports.

TABLE 17

Energy savings target 2020 – Final consumption

Final energy consumption, MTOE (as definition by Directive 2009/28/EC)



¹ Interruption of all energy efficiency support measures (does not take into account any savings expected in NEEAP subsequent to 2010)

² Primes 2008

Source: MISE

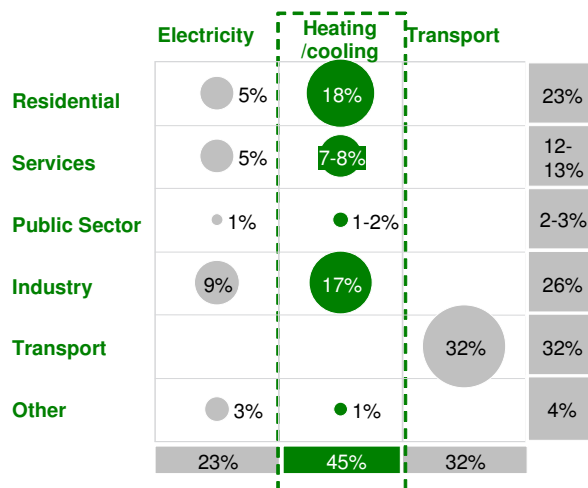
The starting point

In energy efficiency terms, Italy already performs very well compared to other European countries. However, significant room for improvement still remains, and can be exploited through initiatives with a positive economic return.

- Energy consumption (**gross final consumption**) in Italy is currently about 127.5 **Mtoe** (excluding non-energy uses, 2010). Of this, heat (i.e., the use of energy for heating and cooling) takes the lion's share, of around 45%. Next comes transport, at just over 30%, followed by electricity. If we examine use on a sectoral basis, transport is the highest final energy consumer (32%), followed by industry (26%), residential (23%) and services (12-13%), while government and the civil service represent just 2%-3%, approximately.
- In terms of energy efficiency, **Italy has, on average, a good starting point**: we are one of Europe's best-performing countries in terms of energy intensity at about 14% below EU average. This is all the more remarkable considering Italy's economic structure in which the manufacturing industry has a share above the European average (even though European countries have, on average, improved this indicator more substantially in the last two decades than Italy has).

TABLE 18

Heating/cooling consumption represents the largest share of national energy consumption, in both the residential and business sectors
 Final energy consumption 2010, % total consumption, estimates



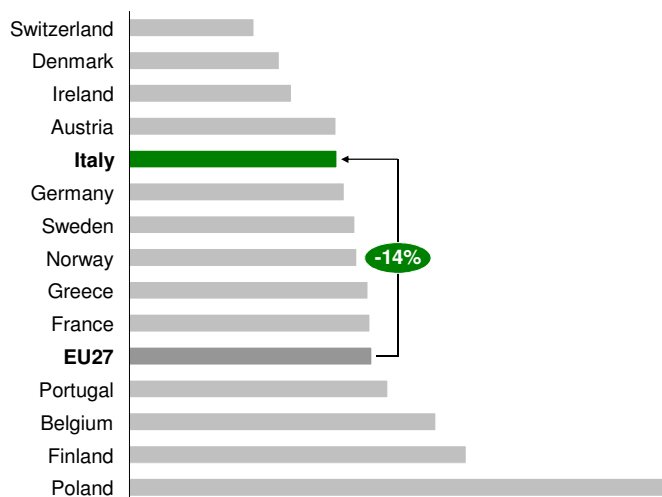
Source: From N.E.B. data

- In recent years, thanks to the **Energy Efficiency Action Plan (EEAP)**, **much progress has already been made**. By 2010, the initiatives introduced under the EEAP since 2007 (e.g., White Certificates, 55% tax rebate, incentives and minimum performance requirements) had already enabled savings of around 4 Mtoe/year in final energy (and about 6 Mtoe of primary energy). The target for that date – of about 3.5 Mtoe – was outperformed. These results were calculated net of the reduction in energy consumption resulting from the economic crisis that has hit the country.
- Moreover, from a technological point of view, Italy has **a sound tradition in many industrial sectors** with a keen interest in promoting energy efficiency. Examples are household appliances and home automation, lighting, boilers, engines, inverters and smart grids – and of course construction and automotive.
- A **high** and as yet unexploited **energy-saving potential** remains, however, with numerous interventions that offer a positive economic return not just for the country but for individual consumers. For example, in Italy a building constructed to comply with energy efficiency standards enables tenants to save up to 70% in consumption compared to a traditional building. Numerous studies confirm the great potential of many energy efficiency initiatives, having positive economic returns for. The following chart, for example, shows the cost curve of energy-saving initiatives, many of which have a “negative” cost (i.e., their investment is repaid by the economic savings gained).

TABLE 19

Italy is one of the most energy-efficient industrialised countries

Primary energy intensity with respect to GDP, koe/€1,000, 2010



Source: Eurostat

- Given that energy efficiency initiatives often have a positive economic return, in a purely rational scenario we would expect these initiatives and investments to be market driven and take place spontaneously. On the contrary, this virtuous mechanism has been held back by numerous **barriers to the adoption** of energy efficiency technologies, which vary from one sector to another. The main examples are:
 - In the **civil sector**, the high initial investment costs often discourage small consumers (residential, offices). In addition, consumers often show little awareness of the potential savings and experience difficulties in accessing incentives.
 - For the **government and civil service**, which do not have access to the tax rebate schemes and have difficulties with self-financing, greater reliance on the ESCO model would seem fitting. However, the “principal–agent” problem – i.e. difficulties in contracting the allocation of costs and risk among the parties – makes it hard to implement measures in the public sector, which in our intentions will become an example and a guide for the rest of the economy (in spite of its low share of total consumption).
 - In **industry**, limiting factors include the relative lack of internal expertise, especially for small and medium-sized enterprises, the shortage of skilled personnel for what are often complex measures, and a low propensity to engage in projects that often have relatively long payback times.

TABLE 20

Energy efficiency initiatives have a high potential in Italy, many of them with positive economic returns
Average cost of energy saving, €/toe, examples

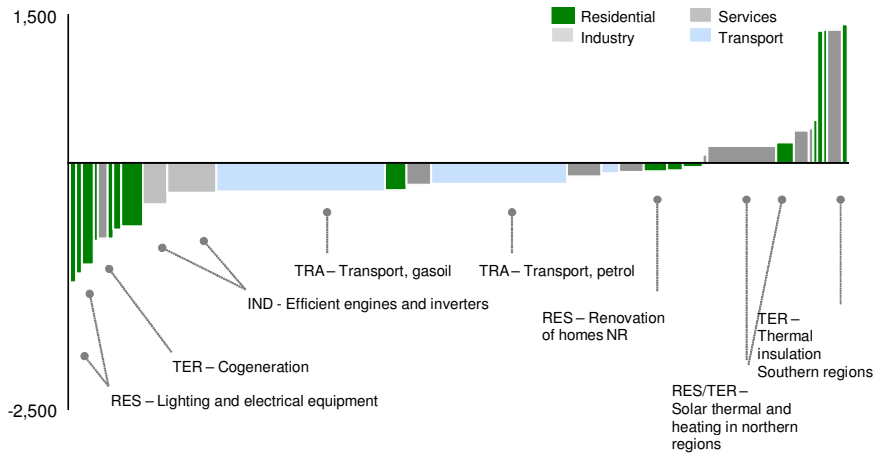


TABLE 21

Barriers to the adoption of energy-efficiency and renewable technologies have different degrees of relevance in different sectors

Sector	Barrier relevance								
	Interest and awareness building			Financial aspects			Accessibility		
	Awareness	Lack of focus	"Agency" issue	Risk or returns	Payback time	Initial capital	Product	Support	
Residential	Yellow	Grey	Grey	Grey	Yellow	Red	Grey	Yellow	
Services	Yellow	Red	Grey	Grey	Yellow	Yellow	Grey	Yellow	
Public sector	Grey	Yellow	Red	Grey	Grey	Yellow	Grey	Grey	
Industry	Grey	Red	Grey	Yellow	Red	Grey	Yellow	Grey	
Transport	Grey	Grey	Grey	Yellow	Red	Red	Grey	Grey	

The main initiatives

Eliminating the above-described barriers to adoption is, therefore, the first priority in this area. Some initiatives have already been undertaken during 2012 - including an extension to the tax rebate - the introduction of the 'Heating Account', and the definition of new savings targets to be achieved by 2016 through White Certificates. More generally, to overcome the barriers to the adoption of energy efficiency solutions it will be essential to **rationalise and reinforce the instruments and actions devoted to each market sector and segment**. Existing instruments have therefore been strengthened or new ones introduced, the aim being to match instruments and targets. This should be done on the basis of the potential efficiency gains in the consuming sector to which each instrument applies, and of the specific cost-benefit ratio of the instrument itself (summarised in Table 21). It will also be important to avoid overlaps between the various forms of incentives. In particular, consistently with the provisions of Directive 2012/27/EC on energy efficiency, the following initiatives are envisaged:

- Stronger **minimum and legal standards and the relative actions of compliance control and sanction** especially as regards the building industry (for new buildings or major renovation works) the transport sector (also to implement European legislation) and the set of products falling within the scope of the Ecodesign Directive.
- An extension of the timescale for **tax deductions**, mainly for the civil construction sector (refurbishment and renovations). For example, the 55% rebate has recently been extended.
- The introduction of **direct incentives** for Government and Public Administration initiatives (which cannot use the tax deduction mechanism) through the so called "Heating Account" recently issued (which will contribute to energy savings, including through the production of renewable thermal energy in the private sector). Mandatory contract standards for Public Administration based on energy performance improvements are also envisaged: these would boost the existing Energy Service Contract and establish *ad hoc* systems to measure and verify results.
- More rigorous targets and strengthening of **the White Certificates** mechanism (Energy Efficiency Certificates or *Titoli di efficienza energetica* -TEE). New instruments are already in place to support small-scale initiatives in the residential and public sectors (tax rebate and Heating Account). White Certificates could therefore be focused primarily on the industry and service sectors and the promotion of energy saving measures at infrastructure level in sectors as yet scarcely involved (ICT, water distribution, transport). They would still retain an important role for residential projects not covered by the tax rebate and Heating Account measures.

TABLE 22

Energy-efficiency instruments available in the different sectors of intervention

Sector	Main instruments				Relevance
	Normative/ Standards	White Certificates (TEE)	Incentives (Heating Account)	Tax relief	
Residential	New ¹			✓	✓
Services	New ¹			✓	✓
Public Sector	New ¹		✓	-	✓
Industry	-	✓	-	-	✓
Transport	✓		-	-	✓

Actions envisaged	To be strengthened, especially for construction & transport	Increased supply (new standard forms & direct incentive in areas of intervention) Review of arrangements (timescales, rewards, red tape, market)	Introduction of incentives "Heating Account"	Extension of tax rebate (55%) Improvements , eg benefit differentiation, cost parameters, elimination of overlaps
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¹ Stronger legislation, regulations and standards, acting primarily on new buildings and/or major renovation work

A more detailed description of these instruments is set out below.

- With regard to **standards and legislative provisions**:

In the **construction** sector, Directive 2002/91/EC on the energy performance of buildings established minimum primary energy requirements for the shell of new buildings; promoted energy certification and the use of higher-performance installations; and introduced requirements for monitoring and for the integration of renewables. These elements are already present in the national legislation, and have been made more effective by recent measures undertaken by the Government in order to transpose EU legislation on energy performance certification in a proper and comprehensive manner (Ministerial Decree no. 290 of 13 December 2012 has removed the self-certification of buildings at the time of sale, even for properties with bad energy performance; a new regulation supplementing the current regulations on inspections of heating systems with a specific discipline for summer air conditioning systems and an update of system controls, according to a criterion of simplification and reduction of costs borne by the public and government (measure approved by the Council of Ministers of 15 February 2013); a further regulation defining the professional requirements and criteria for accreditation of experts or agencies for energy certification of buildings with the aim of raising the quality of service with a view to guarantee the independence and impartiality of the work of certifiers (measure approved by the Council of Ministers of 15 February 2013). The transposition of **Directive 2010/31/EC** - that will be a priority of Government intervention, as soon as authorised by Parliament - **will make it possible to tighten up the requirements** for new buildings (Class B) and to introduce more effective ways of classifying existing buildings by 2020. In this, tax deductions will be used or, in future, other instruments providing rewards designed to promote the upgrade of entire buildings or apartment blocks to a higher energy-efficiency class. At the same time, inspection and penalty systems will have to be tightened up and all of the Regions' systems

- brought into line, the certification process improved (with the possible creation of a single entity and/or the inclusion of information in the cadastre registry), the qualification of operators improved, and measures dedicated to real estate for rent introduced. The European Commission has estimated that the implementation of the Directive will lead to a 5-6% reduction in energy consumption at a European level.
- In the **high-efficiency cogeneration** sector (combined heat and power), in line with the provisions of the new energy efficiency Directive, further regulatory measures will be introduced to supplement the incentive scheme currently in force. The aim here is to facilitate the wider use of this technology, which offers significant – and as yet not fully exploited – potential to save primary energy. In this sector Italy has a strong record in the industrial sector, serving specific production processes, and having mainly medium to large production facilities. Public support could aim, therefore, not just at developing new installations, specifically small ones, but also and above all at replacing and/or renovating existing plants and thus introducing higher-yield systems and technologies.
 - Turning to the **transport** sector, the implementation of Regulation 443/2009/EC has led to a significant reduction in consumption. The Regulation requires automobile manufacturers to sell increasingly energy-efficient vehicles with low greenhouse gas emissions (95 g CO₂/km by 2020). The promotion of sustainable mobility in urban areas will play also a very important role thanks to regulatory measures that can stimulate the wider increase **of electric and other low-emissions vehicles**. Through incentives the Government has given in recent months clear signals in this direction (within the limits allowed by the current economic situation).

On the other hand, it will be important to continue pursuing to shift the mix towards more sustainable mobility, especially by encouraging modal shift from rubber to rail and individual to collective transport. It is desirable that these issues are handled within a comprehensive National Plan for Transport outlining development guidelines and investment in particular in rail and metropolitan transport.

- As regards **tax rebate** (the so called “55%” scheme), it will be important to extend, adjust and improve this provision to increase its cost-benefit effectiveness and efficiency. Among the possible improvements, the most significant are: a differentiation between the percentage of deductible expenditure (and/or the timing of the refund), in proportion to the actual savings produced by the intervention; the introduction of maximum specific cost parameters for each type of intervention to prevent part of the incentive being transferred to product prices; a tighter focus of the instrument on improving the energy efficiency of existing buildings by reviewing the current scope of eligible initiatives in order to avoid overlaps with other newly introduced incentives having the same aim (specifically the Heating Account).

As a result of the planned measures, it is expected that the cost for such deductions increases from about €1.1 billion in the year of 2012, to about €1.5 billion in 2020, and by this stimulating the total private investment to about €20 billion in the period considered, saving about 1 Mtoe/year of final energy in 2020.

- The introduction of **direct incentives** for energy efficiency projects in the public sector which, in view of budgetary constraints and its ineligibility for tax deduction mechanisms, has not managed to fully

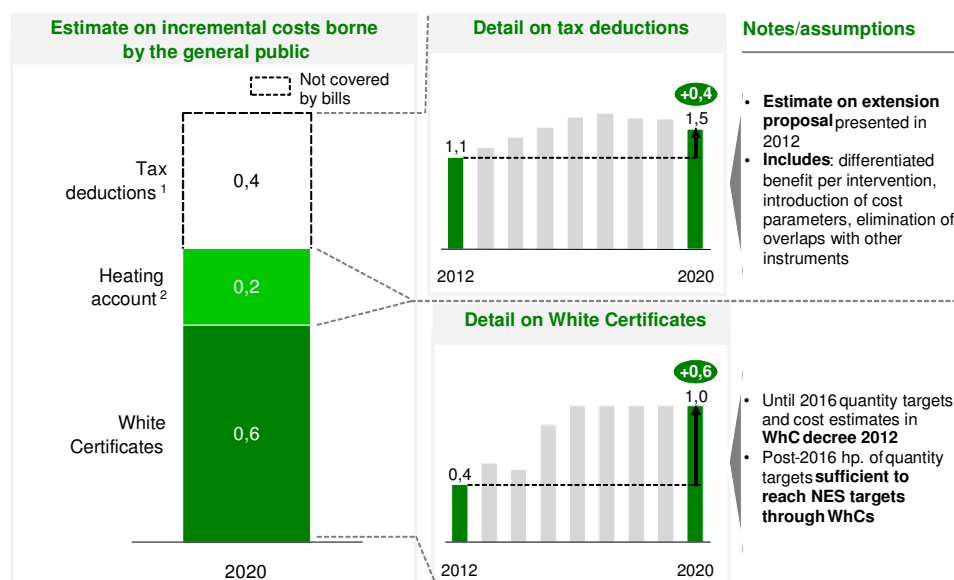
exploit its energy saving potential. Through these new instruments, particularly the new “Heating Account” and the introduction of specific binding contractual models for the public sector, we expect to fully comply with the obligation to improve the energy performance of buildings owned by central Government (3% per year of the overall floor area) envisaged by the new energy efficiency Directive.

At full capacity the Heating Account has about €200 million per year dedicated to PA, which will be able to activate cumulative investments between now and 2020 of approximately €5 billion. Together with the energy savings associated with other interventions supported by the Heating Account and addressed primarily to the development of renewable thermal energy in the private sector (to which additional €700 million per year are dedicated), it is expected that the tool will help saving between 2 and 3 Mtoe per year of final energy.

TABLE 23

Detail on incremental costs for energy efficiency

Billions of Euros/year, 2012 base, estimate



1 Covered by general taxation
 2 Component for Public Administration only
 Source: MISE

- **White Certificates** have a key role to play in achieving the goals, given their increasing importance in the industry and service sectors and the minor cost this “market” instrument has proved to guarantee compared to direct incentive systems (feed-in or tax relief). Analyses of the comparative effectiveness of the various regulations and legislative provisions introduced in Italy spotlight the important role played by Certificates in recent years, with a constant growth in the savings generated and improved cost-effectiveness for the State. Cost-effectiveness is likely to improve further as energy savings targets increase and interventions are supported; costs, on the other hand, will remain lower relative to similar interventions in renewable energy or tax deductions. The recent European Directive which sets out the objectives of reduced energy consumption by 2020 envisages an obligation on Member States to set up mandatory national energy efficiency schemes based on requirements to be met by

energy distribution or retail sales companies. Italy's experience in this sector will be therefore useful, and enable us to strengthen the system solving some "growth" and transition problems seen recently.

A recent decree (MD 28/12/2012) has established the targets that have entered into force on 1 January 2013 (for the 2013-2016 period) in line with the overall objectives of the NES by 2020 and which aim to strengthen the role of White Certificates. These will take into account the areas of intervention "entrusted" to other instruments (Heating Account, cogeneration with renewable sources, etc.). They will also eliminate certain complexities ranging from reconciliation of different sizes on to the growth trend of Certificates produced (which takes multiplicative factors into account) with the trend in actual efficiency generated over the year. The criteria for reimbursement, through tariffs, of the costs incurred for the interventions have been revised and, depending on the setting entrusted by the Authority for Electricity and Gas, they will enhance the value of market dynamics on transactions and bring the system to a more stable balance. Supply has also been increased by introducing new standard forms and including new areas of intervention (e.g., in distribution grids, the ICT sector, water distribution and transport). These should counteract the "erosion" of the area of intervention as a result of the introduction of new instruments (Heating Account, tax rebates) and new rules (ban on accumulation with other incentives, non-retroactivity of eligible interventions from 1 January 2014). In order also to strengthen the mechanism of White Certificates the range of players that can take part in the generation of titles was extended (to all companies appointing an energy manager), and rewards for large industrial and infrastructure projects capable of generating savings for at least 35,000 toe/year have been introduced. In this context it will be important to set objectives also in the 2017-2020 period consistent with the overall NES and the European Directive. This is to say: continue to increase the supply, both through the emission of new standard forms, and the promotion of large projects; continue the process of reduction of timing and bureaucracy; implement accompanying measures (e.g., communication and training) provided by this action. The possibility of extending the range of players entitled to take part in the market will also be evaluated as well as the possible extension or shift of the buyers/obliged parties.

It is estimated that the instrument – as a result of the increase of the targets – implies a burden on the fully operational system in 2020 of about 1 billion euro per year (compared to about €400 million estimated in 2012), allowing us to save an additional ~ 5 Mtoe/year of final energy.

- A substantial part of the **programming of EU funds** for some areas of the country ("Convergence" and "Competitiveness" Regions) is also addressed especially to public housing and to public use of energy. This provides an important opportunity to develop standard intervention models, establish public-private partnership forms, set the requirements and conditions for credit access at widespread level, and entrench a culture of efficient energy use both at managerial and operational levels, also with a view to reducing the cost of operation of Government structures. The capacity of Italian institutions to manage these funds will need to be enhanced and upgraded, setting clear targets and assessing results.
- Beyond the tools described above, the efficiency of buildings can be improved by rethinking town **planning and management**, where buildings are at the core of broader improvement projects. This is especially pertinent if we consider that about 70% of energy is consumed in towns and cities. In order to implement the European Union's action programmes (Smart Cities), initiatives will be launched, in coordination with the ministries concerned and with local and regional government, designed to introduce innovative planning models for urban services and energy flows, network efficiency, mobility and transport, renovation of the built environment, and public-private partnerships.

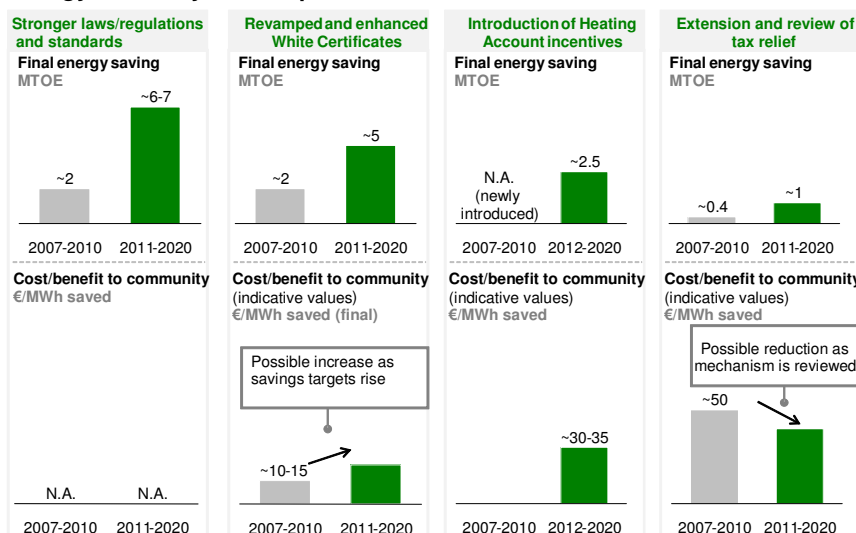
The issue is already included in the Digital Agenda, in the “Cities Plan” established by the recent “Development Decree”, and in the current programming period for EU funding for sustainable development.

Another factor that will help attain the energy efficiency objectives is a trend, already evident, for a shift in consumption towards electricity. This includes the more widespread use of applications such as heat pumps for heating and cooling, electricity-powered cars and trains, and improvements in the distribution network with the growing use of smart grids.

In addition to purely consumption-based efficiency gains, **waste recovery and use/re-use** is a major opportunity to pursue sustainable development goals. It should be considered systematically in all the initiatives currently being drawn up in the various spheres of intervention (e.g., in the renewables sector).

TABLE 24

Energy efficiency – Principal instruments



Moreover, with the instruments described above, which have a direct role to play in achieving the objectives, a number of other **enabling factors** will also be decisive for the energy efficiency programme. They include:

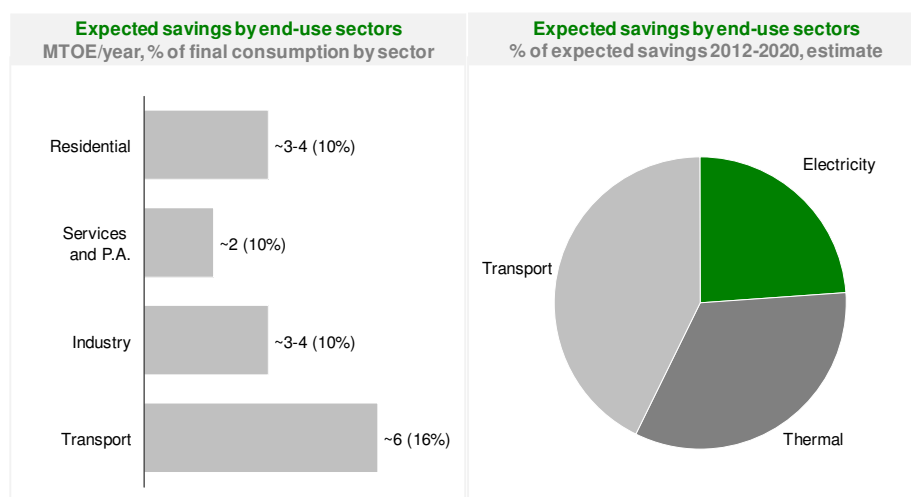
- Enhancing the **Energy Service Company (ESCO) model** by introducing classification criteria, developing and disseminating innovative contract models for financing via third parties, and setting up dedicated guarantee funds or special revolving funds for larger projects, with possible participation of public financial institutions.
- **Monitoring and enforcing** the measures, by stepping up inspection procedures and introducing heavier penalties, the aim being to ensure that operators obliged to do so comply with the regulatory

provisions and standards and meet their energy saving targets. In this context, the system of monitoring and accounting of results will also be improved.

- The introduction of new efforts for efficiency and investments for sustainability through **direct regulation** of energy services (infrastructure, structure and breakdown of tariffs), attributed to the Regulatory Authority for electricity and gas, or the **taxation** of some widespread goods and services.
- **Communication and awareness-raising** initiatives for the public, businesses and the public sector. The aim here is to launch an extensive communication campaign and provide easy access to information on energy savings, in close collaboration with the Regions and business associations. Other initiatives to be promoted are an **energy audit campaign** for the service and industrial sectors (particularly for SMEs), the introduction of specialised energy efficiency **training courses** strengthening the role of ENEA in collaboration with companies and in her role as 'sensitizer'; the promotion and exploitation of mature systems of voluntary certification. It will be increasingly important to dedicate a stable share of total incentives available to energy efficiency to these initiatives (as has already been done with the recent decrees on Heating Account and White Certificates). Making the end-consumers more active and better informed, as well as the managers of small companies, of the Public Administration and the categories of professional engineers/designers and small installers will be a vital factor in adopting the planned instruments, and in the success of the programme.
- Support to **research and innovation**, through financial incentives or other relief to promote research, development and technological innovation, start-up of innovative enterprises (for example, the RES and EE technological development funds, the Sustainable Growth Fund, and the Kyoto Fund to support green economy).

TABLE 25

Expected savings by end-use sectors



Source: MISE; ENEA

The achievement of the energy efficiency targets - as well as for renewable energy – needs, as a prerequisite, the **organic collaboration and coordinated action between the State and the local governments**, as for the widespread nature of interventions as for the allocation of functions. This has resulted in the distribution among the Regions of the 2020 targets on renewable energy and energy efficiency (“Burden Sharing”) in ways that assign to each of them the corresponding objective in terms of share of consumption covered by renewable sources. Each Region can, based on the characteristics of its territory and of its consumption, operate the most appropriate levers. Therefore in the outlined context the State provides the primary incentives and the regional and local authorities are called upon to facilitate access, with the management of the authorization instruments. It is appropriate, therefore, that the coordinated action continues. **Potential savings are in fact very broad and only a careful action of local government can give rise to them**, such as in the fields of local transport and mobility, public lighting, buildings, district heating. Likewise, the role of regional and local authorities is crucial for the effective simplification and harmonization of the authorization procedures

These initiatives at the national level will be included and updated **in the framework resulting from the new energy efficiency Directive** (Directive 2012/27/EC). Without setting binding targets for Member States, the Directive establishes a common framework for the promotion of energy efficiency through measures in the supply and final use sectors (e.g., regarding mandatory energy saving schemes, buildings and procurement, measuring and accounting for consumption, and energy audits). It sets, for the first time, a target ceiling for energy consumption in Europe in 2020.

The results expected from the measures described above are significant, in terms of mix and absolute value:

- Compared to the efficiency measures of recent years – which focused on the residential sector – the new initiatives here explained will involve major savings in the **industrial and transport sectors** too (which together will account for over 60% of the expected savings). Moreover, the **public sector** will be given a specific role, with the introduction of dedicated instruments and an efficiency-improvement target of at least 20%.
- In terms of final energy consumption, the largest part of the savings (about 80%) will come from **heating/cooling and transport sectors**.
- Taken as a whole, these measures are estimated to reach €25 billion (including the amounts already committed) in public support by 2020. This could stimulate **€50-€60 billion of aggregate investment**, with major spin-offs in an industrial sector where the aim is to achieve international leadership and savings of about **€8 billion/year in fuel imports by 2020**.

4.2 A competitive gas market and the Southern European Hub

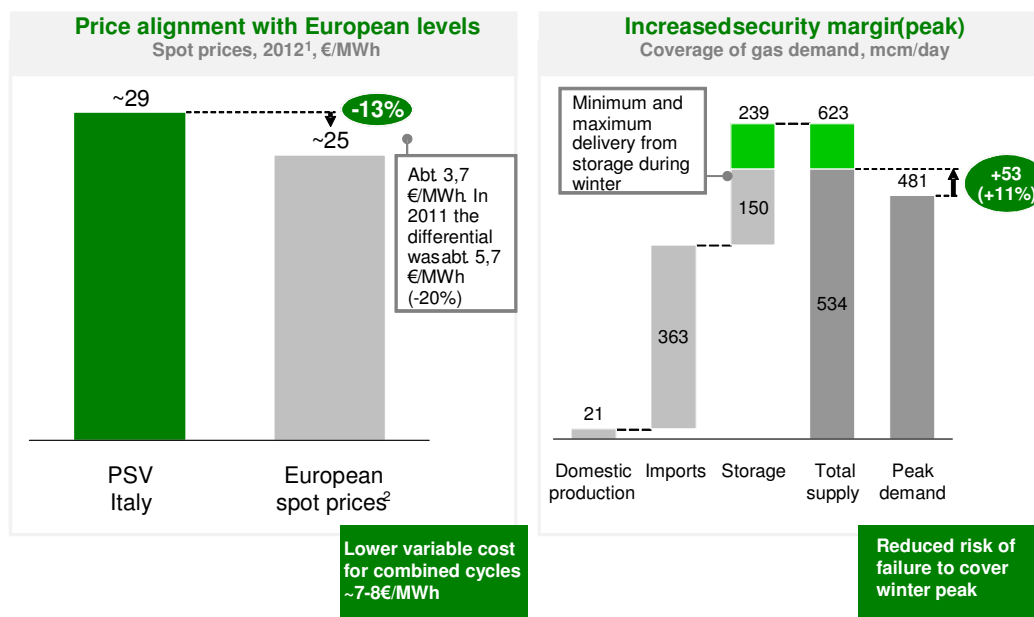
The objectives

The development of a competitive and efficient gas market is a **key element that will enable Italy to recover competitiveness** and improve its security profile. The underlying choices and decisions inspiring initiatives in this area are based on the need to:

- Ensure a full and structural alignment of domestic prices to those in the main European countries (not dependent on the economic situation of *oversupply*) creating a competitive and liquid market.
- **Guarantee the security and diversification** of energy sources.
- **Fully integrate the country with the European market and network**, thus enabling Italy to become an energy trading hub and possibly transit country and to offer high value-added services for other countries too (e.g., volume, peak and modulation storage, etc.).

TABLE 26

Gas market and southern European hub – main objectives



¹ In late 2012 the differential, about 5,7 euro/MWh in 2012, has begun to narrow, due to growing spot market liquidity
² TTF, Zeebrugge
 Source: MiSE; GME

The main initiatives being drawn up in this area will therefore seek to achieve the following two key goals:

- **Eliminate the price differential – which was 3.7 €/MWh in 2012 (-13%),** already reduced in comparison to 2011 when it was equal to 5,7 €/MWh – with the northern European markets, and

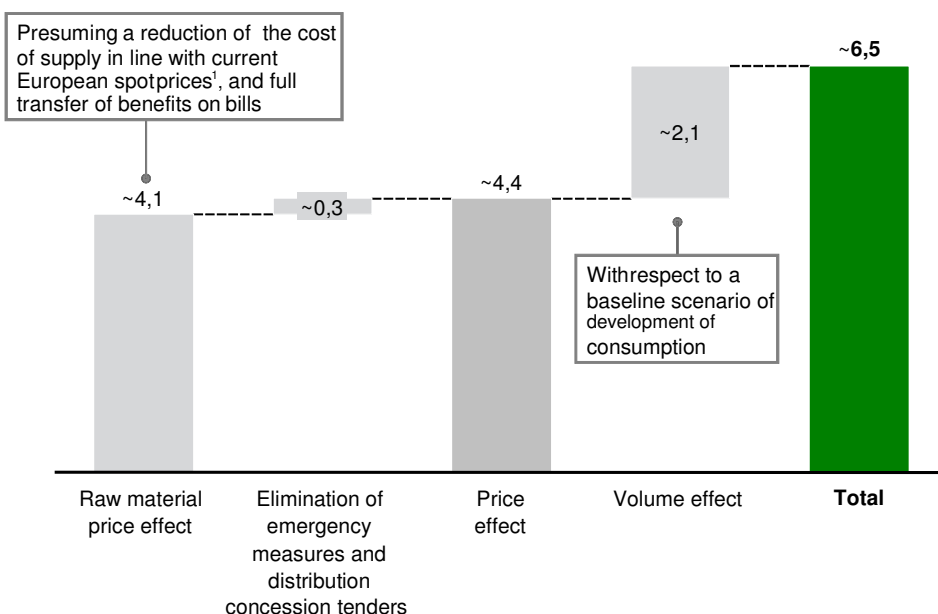
therefore also increase the competitiveness of our electricity market (and in particular of combined cycle power plants which, as a result of the higher cost of gas, is subject at present to a higher variable cost, in the range of 7-8 €/MWh).

- **Increase the security margin of the Italian gas system**, ensuring resilience and ability to react in potential emergency situations of exceptional peaks in demand and/or strong reductions in supply.

TABLE 27

Expected benefits on the gas bill

Billions of Euros/year by 2020, doesn't include expected incremental costs, estimate



1 Excludes volumes related to thermoelectric production. Based on 2012 differentials. Source: MISE

The impact on the bill resulting from the reduction of the price differential on the raw material would be important, estimated up to € 4,1 billion per year in the case the benefits are all captured by the end customers (in case of reduction of Italian prices up to an alignment with European ones). All this considering only the impact relative to civil and industrial consumption, not including the positive effect for thermal generation, which will be analyzed in the chapter on the electricity market. This benefit adds to a price reduction in the bill, due to the increased efficiency of the system (e.g., by eliminating the extra costs for emergency measures or by arranging tenders for distribution concessions, that will be discussed in-depth later on).

In addition, a reduction in gas bills is expected thanks to the energy efficiency measures described in paragraph 4.1, which will cause reductions in consumption volumes with respect to the inertial growth expected in the reference scenario. The sum of these effects is an overall expected benefit of around € 6.5 billion per year.

Background

The international context

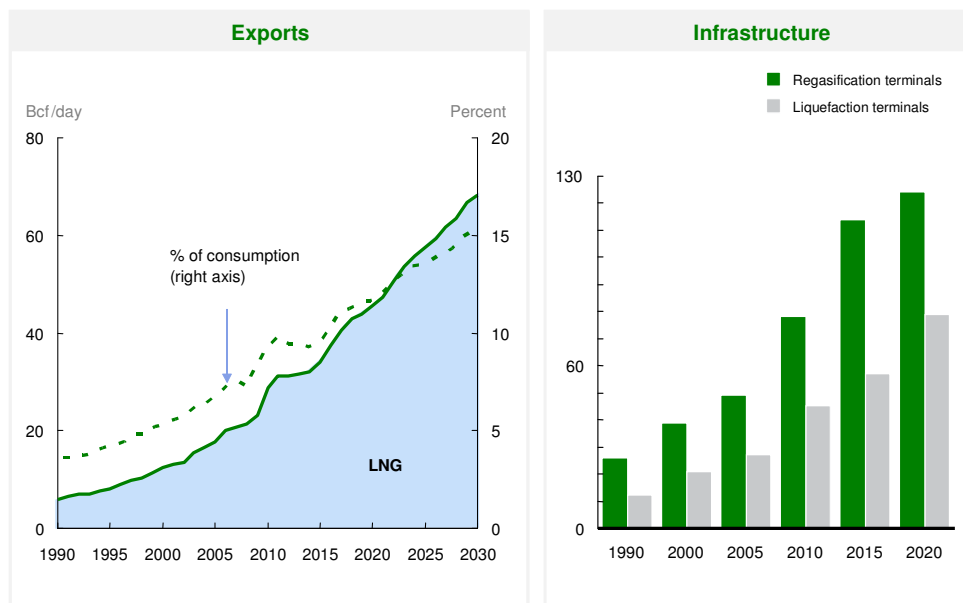
At the global level, the key factors determining demand and supply are translating into **an increasingly important role** for gas in the energy mix:

- On the **demand** side, the expected growth in consumption will be led by: i) the replacement of other fossil fuels by gas (e.g. oil in the Middle East, coal in the USA and China) thanks to its lower costs, emissions and local pollutant levels; ii) energy source diversification and, therefore, security of supply; iii) the flexibility offered by the CCGT technology required to complement the development of renewables. There is also the possibility of gas consumption developing for vehicle use (especially heavy duty vehicles) in Countries where gas is abundant and cheap (e.g., the US), although it is difficult at present to predict how this model will develop in practice, and for maritime transportation.
- On the **supply** side, growth will be led by: i) the huge amount of available “conventional” resources; ii) the “unconventional gas revolution”, which – notwithstanding the uncertainty over its future development – has led to dramatic changes in the pioneering countries (United States and Canada) in terms of available capacity and prices (at present about 3-4 times lower than in Europe).

The scope and speed of development of **shale gas** will be decisive factors in the growth of this market in coming years. On the grounds of the possible scenarios drawn up by the IEA, the production of shale gas could triple (Golden Rule scenario) by 2035 most notably thanks to the United States, China and Australia. Such a development would lead to a significant diversification of suppliers and **downwards pressure on prices**. In this context gas, of which about one third would be shale gas, could represent over 25% of the global mix. This compares to 20-21% of the mix in 2010. The uncertainties over technological developments, the feasibility of exploiting the geological resources, acceptance by public opinion, and supporting policies could, however, translate into slower development of shale gas. In this event, the importance of gas as a primary source at the global level would still increase, but less markedly, and reach 22-23% by 2035.

TABLE 28

Expected growth of the global LNG market



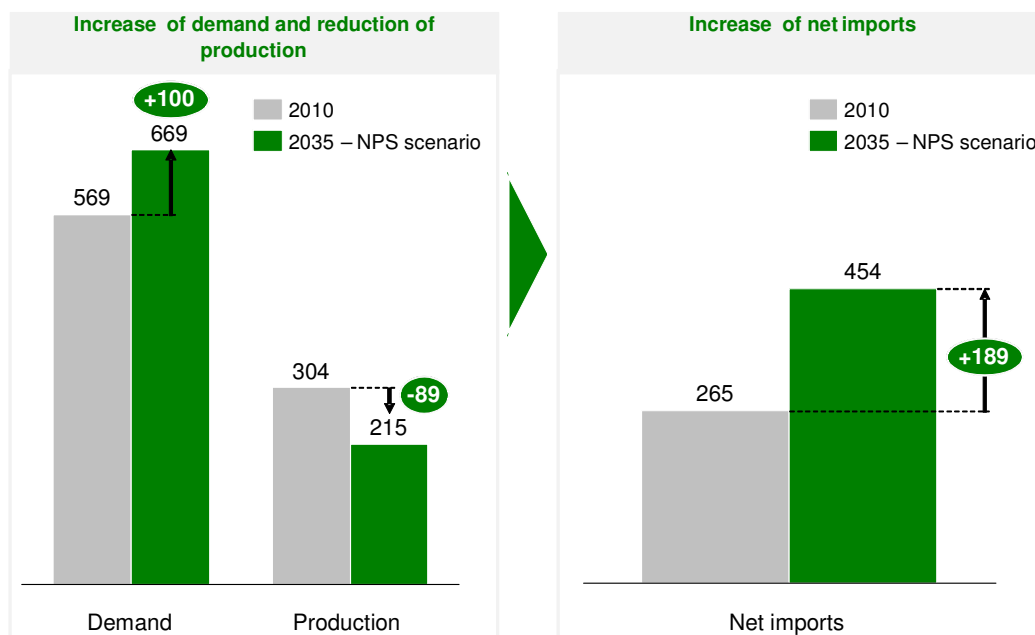
Source: BP Energy Outlook 2030

The future demand-supply balance and the resulting price movements are difficult to predict. In the short term (the next 3-4 years) the global/trans-regional market, led by LNG, could be short, as a result of the sharp increase in consumption in Asia (with a risk of higher European spot prices). In the medium-long term, the expected strong increase in production and liquefaction capacity (the latter is expected to increase up to 1,000 bcm in 2030 compared to 400 bcm in 2010), thanks to the discovery of gas fields in remote areas with limited access to export infrastructure will **increase LNG flows**, which are expected to rise increase from 42% to 50% of inter-regional total gas flows (source IEA). This should show its effect on the market and on prices. A gradual closing of the gap between prices in the main regional macro-markets (particularly between Europe and Asia) is also possible.

TABLE 29

In Europe production is foreseen decreasing, facing an expected growth in demand

Demand and production of natural gas in Europe, bcm, 2010-2035



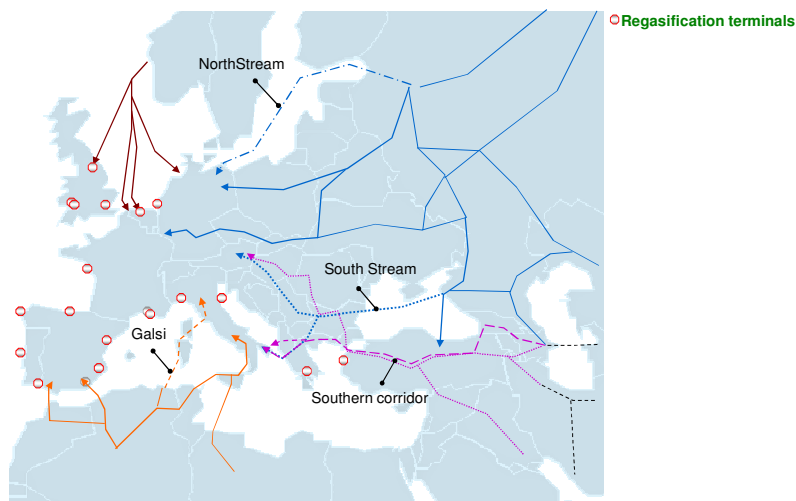
Source: IEA WEO 2012

Turning to **Europe**, where the outlook for a recovery of demand is highly uncertain, the need for **imports will increase by about 190** bcm per year from the current 265 bcm to around 455 bcm in 2035. About half of this increased import requirement will be caused by the expected reduction in European domestic production, as a result of the rapid decline in production from the North Sea and the rest of Europe. The remaining part will arise from the expected increase in demand in the medium term (2025-2035), following the gradual replacement of coal and nuclear for environmental and energy policy reasons. The European Commission recognises the role of gas for Europe as a “bridge” to the low-carbon Roadmap 2050 goal, and aims to **diversify supply countries and routes**. Thus, the *North Stream*, Southern Corridor and *South Stream* projects, and imports from North Africa, together with regasification terminals, will play a complementary role in consolidating the continent’s energy security. Depending on the trend of European decarbonisation, the demand for gas imports could be different from these estimates, but still considerable.

TABLE 30

Increasing import capacity and diversifying sources of supply are European priorities

Not exhaustive



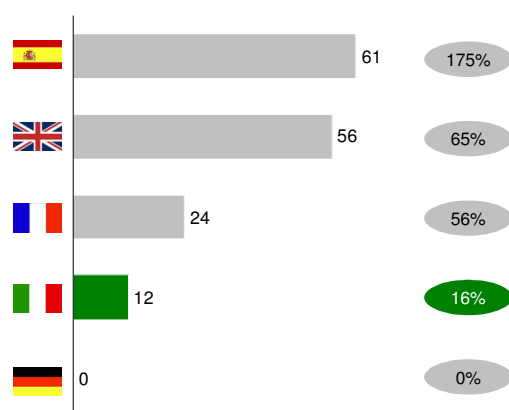
The most recent analyses of the IEA show that **an increasing share of supplies in Europe is indexed to the reference spot prices** of national or regional hubs, or sold spot directly. This trend is set to grow in the coming years, based on the development of market conditions and risk management tools. The speed of this transition will depend essentially on the amount of LNG globally available for spot transactions, which, as mentioned, is expected to increase in the medium to long-term.

The national context

At a national level, gas plays a **central role** in the energy mix: Italy is the European country most dependent on gas, both for electricity generation (over 50%) and more generally in its share of primary consumption (about 40%). Gas is also a key factor in energy security, given our high degree of dependence on imports (over 90% of demand). The gas sector in Italy faces a number of **challenges**:

- **Demand-supply balance:** The recent economic crisis and the development of renewable technologies have led to a **substantial fall in gas consumption**, from 85 bmc in 2008 to about 74 bcm in 2012. The current supply is fully adequate, both in physical terms (with an import capacity of approximately 114 billion cubic meters of gas per year), and in commercial terms, but in terms of level of competition problems remain both in infrastructure and market power of individual operators.

TABLE 31

LNG import capacity in Italy is lower than in other European countriesLNG import capacity, bcm and in % national consumption
2012, estimate

Demand development up to 2020 is uncertain, and will depend mainly on the performance of the economic recovery, the effectiveness of the energy efficiency programme and the development of renewables: in our baseline scenario an annual consumption of around 69-73 billion cubic meters in 2020 is expected, but in other scenarios (not shown here) a consumption of more than 80 billion cubic meters is expected. On the supply side, the situation may be very different in relation to the commissioning of new import infrastructure, to the possible revision of the existing long-term contracts and to the implementation of the forward wholesale market.

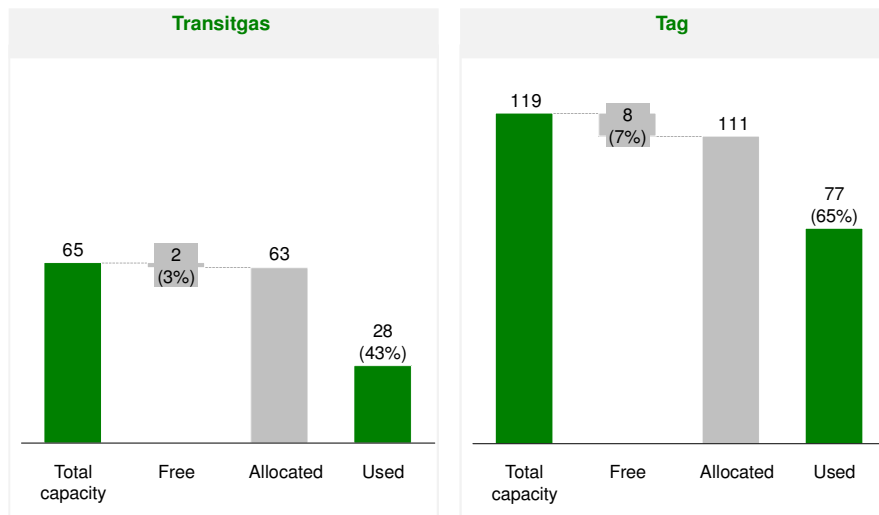
- **Prices:** for many years the Italian market has been penalized in terms of prices in comparison with Europe, although in the last year the situation has drastically improved. **Until 2011** Italy has suffered from high gas prices: in 2011, 25% higher than in the northern European markets, on average, and about 4 times higher than US prices. This is mainly due to the structure of most of the existing import contracts, which are long-term and **'take or pay'** (ToP), with indexation clauses of supply prices established in accordance with international prices of a basket of crudes, and with mechanisms for renegotiation of the price level tied to a periodic ex-post analysis of market dynamics. The structure of these contracts, apart from the events related to the current situation of oversupply, has led to a high level of prices of imported gas in Italy.

These show a disconnect with the gas price trend in northern Europe, where prices effectively reflect the real dynamics of supply and demand of the gas market, thanks to the presence of markets which are liquid, competitive and with a strong capacity for local production and import for spot supplies, particularly LNG. Moreover, even with respect to European ToP contracts Italy suffers a significant price gap, caused by historic contractual conditions.

TABLE 32

A very significant share of cross-border transport capacity has been allocated but only partly used

Mcm/day, average October-March, thermal year 2011-2012

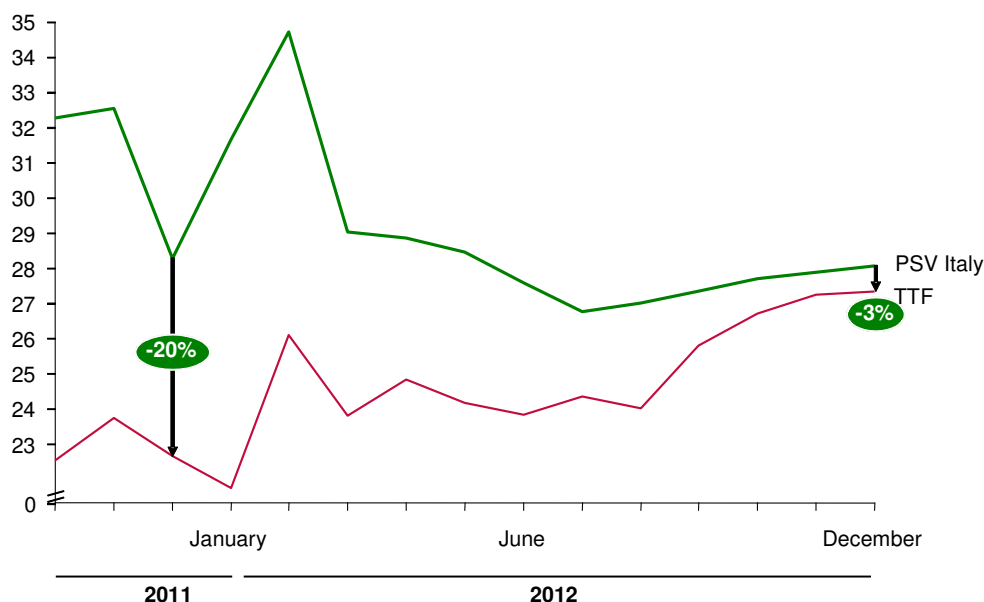


Moreover, until 2011, the import capacity did not allowed to have a significant contribution to the alignment of the spot market prices due to the incomplete integration with the more liquid northern European markets. This situation is mainly caused by the poor availability for use by third-party operators of transit capacity on gas pipelines in the north (in particular the Transitgas) and the lack of a significant LNG regasification capacity for short term operations (the LNG terminal in Panigaglia, for instance, faces operational limits due to the limited tonnage of ships which can dock there, and this excludes it from the international LNG market, while the Adriatic LNG offshore terminal has only a limited capacity available for the market).

TABLE 33

In 2012 the spot price differentials have started to decrease

Spot prices, €/MWh



Source: GME

During 2012 the situation has changed significantly compared to the scenario described above: there was a **significant reduction of the 'spread'** between the Italian and the North European prices, amounting to about 3.7 €/MWh on average in 2012, supported by the Italian and European situation of oversupply due to the drop in demand, which has led to an **increasing market liquidity**. In Italy this situation has been facilitated by the application of European rules on Congestion Management and for allocation of daily capacity on the TAG pipeline, which have re-balanced Italian prices with the hub of Baumgarten, and by the new system of Italian market balancing. As a result, the liquidity of the different exchange platforms in Italy has increased significantly, reaching ~95 TWh in 2012. At the same time, as illustrated by the recent survey of the Regulatory Authority for electricity and gas, the economic conditions of supply **contracts show a tendency to converge with prices at the PSV**, both for retailers, for industrial customers and for thermal power plants.

However, a structural **component of differential of cost** with the prices of North European markets remains, due to transportation costs between European hubs and the Italian market (estimated at approximately 2,7 €/MWh⁴), as well as a potential risk of new decoupling of prices in the Italian market, in case of recovery in demand exceeding the expectations and/or exceptional events of

⁴ In recent months, the oversupply on the Italian market, with sales volumes related to long-term contracts lower than the minimum levels of withdrawal ToP, has contributed to reduce the differential of the price with North Europe below the cost of transportation.

reducing or stopping some supply routes, or changes to the terms and conditions of supply contracts that will reduce the share of ToP volumes.

- **Security:** there is a major problem linked to the **limited flexibility of the Italian gas system in “peak supply” conditions.**

In fact, Italy fully complies with the so-called 'N-1 rule' for the security of supplies to protected customers introduced by the EU Regulation 994/2010 (the goal has been reached 2 years in advance). This rule establishes that each Member State must be able to ensure the supplies to such customers in the worst condition of winter demand even in absence of the major source of supply for a given period of time.

However, the security margin of daily coverage is still insufficient. Storage facilities are replenished between April and September, to then be used for delivery during the winter months. The delivery capacity they provide to the system can vary from a maximum of 239 million m³/day at the start of winter, when storage facilities are operating at maximum functioning pressure, to the contractual level of 150 million m³/day, which under the regulations must be guaranteed at the end of the delivery campaign (31 March). In these conditions, the system's security margin (before any interventions on the demand side) is about 40-50 million m³/day for a period of some days. For instance, during the recent emergency of February 2012, the critical conditions were such that various measures from the Emergency Plan had to be adopted. These included the activation of oil-fired thermoelectric power plants and restrictions on gas consumption by those industrial customers who had offered this service on a payment basis, with high overall costs for the country (it should be noted that in other European countries these adjustments in demand in critical phases are achieved largely through gas contracts that can be actually interrupted; such kind of contract is not yet available in the Italian market). At present, natural gas storage capacity for the storage year 2013/14 is 16,058 million standard cubic metres (MSm³), of which 4,600 MSm³ for strategic storage. In coming years, the implementation of new – already authorised – projects could play a significant part in raising energy security levels by increasing gas storage capacity. A further increase is envisaged following the application of Legislative Decree 130/2010, which has prompted Eni to develop new storage infrastructure amounting to 4 bcm by the end of 2015. Currently 2.6 bcm capacity has been developed by implementing overpressure in existing fields.

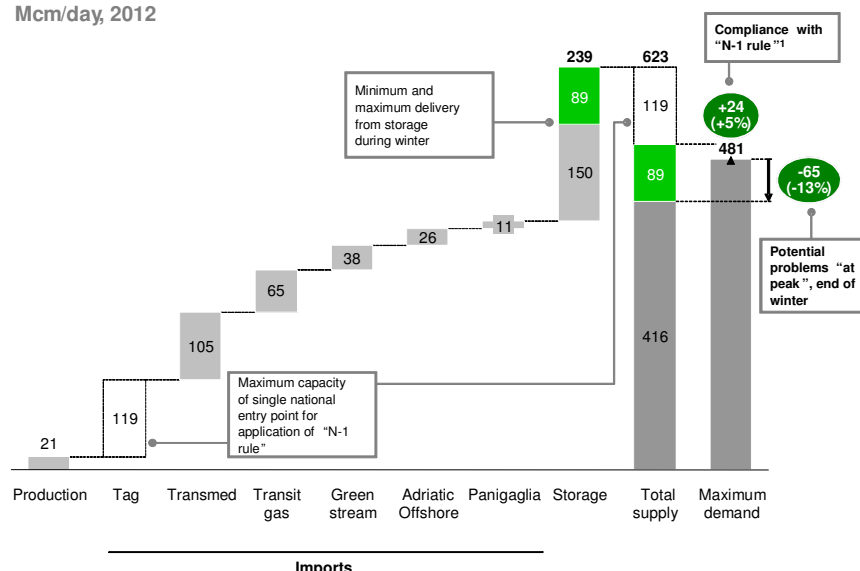
In order to keep on a high level of security in “peak supply” conditions, it will be possible to keep temporarily in stand by some power plants that use fuels different from gas (approximately 4,700 MW for the winter 2012-2013, for potential savings of about 16 million cubic meters of gas per day in case of emergency). Furthermore, for the industrial sector, it will be still possible to adopt temporarily a gas policy aimed at reducing consumption, through contracts with industrial customers provided with daily remote reading system, in order to saving potentially about 11 million cubic meters of gas per day. These measures will be reduced gradually, consistently with improvements in infrastructure (e.g., storage and import) and procedures for security management (e.g., limitations on delivery from storage).

In addition, from the point of view of security of supply, it would be useful **increasing the diversification of sources of supply to Italy.** Most of the import capacity 'from the South' (i.e., not from Europe) is bound to single-supplier sources (Algeria, Libya, Qatar through the Rovigo regasification terminal), and more generally over 60% of total imports comes from just two countries:

Russia and Algeria (the level of diversification in Italy is higher than in other European countries, which are, however, less dependent on gas).

TABLE 34

Compliance with “N-1 rule ” but system fragility “at peak”, end of winter
Mcm/day, 2012



¹ In the application of "N-1 rule", maximum delivery capacity from storage at start of winter is considered
Source: MISE

The initiatives

To attain the goals described above, the chosen strategy is to create a **competitive and efficient gas market**, fully integrated with the European one.

To ensure that this strategy is implemented efficiently and effectively, Italy’s **legislative, regulatory and infrastructure framework** should develop in a way as to ensure a gradual diversification of sources of supply. It should also ensure an increase in the number of operators (and relative volumes traded) on the spot market on the Gas Exchange.

From a commercial point of view, **a more prominent role for spot and short-term supplies** is encouraged in order to improve gas market liquidity and promote the structural price alignment with the European hubs. However, **long-term import contracts** are an important supply factor and **the role they can play in ensuring security of supply** is recognized. Probably, since they have achieved their original function of enabling the construction of the supply infrastructure, their average term will be reduced. Furthermore, since the competition framework for the gas sector has changed considerably, **the model of long-term contracts should be revised** in order to bring the country in line with more developed and liquid European markets.

Specifically, the price indexing formulas (originally linked to crude as the gas-substitution fuel) should increasingly reflect the real dynamics of gas prices, in a “gas-to-gas competition” context. Therefore, to gradually increase the proportion of supply at market prices, even in ToP contracts, the intention is to

encourage - supporting operators – a rapid **reformulation of existing import contracts** through a realignment of existing price levels and including indexation clauses that take account market prices. In this sense, also the regulatory system that currently indexes the reference prices for the household market prevalently to ToP type contract prices will have to evolve towards an indexation linked to market prices.

From the infrastructure point of view, the expansion of the import and storage infrastructure will have to continue in order to increase diversification, competition and security of the system. To acquire more information - especially on global LNG market scenarios, on demand and supply scenarios in Italy and Europe, and on the potential pivotal role on price of producing countries through existing infrastructure - a study has been carried out, coordinated by the Ministry of Economic Development and the Regulatory Authority for electricity and gas.

The proposed initiatives (in order of importance) to achieve the goals described above are listed as follows:

- **Allowing the full use of existing transport capacity between Italy and the rest of Europe** by applying the European rules, which will enter into force in October 2013, both rapidly and rigorously. These rules govern the management of congestion at interconnection points between the networks of the different Member States and the ones due to new cross-border capacity allocation mechanisms with a view to maximising transport capacity to Italy (also in reverse flow), including through hub-to-hub products (which include integrated transport services on several operators' networks). They will facilitate gas transits and trading, also through the introduction of mechanisms for the sale or transfer of capacity booked but not used, also on a continuous basis.

Another aim, connected to the opening of the access to the TAG pipeline, is to **promote in a short time the full use of capacity on the Transitgas pipeline (both in North-South direction and vice-versa)**. As the main connection route with the more liquid markets of northern Europe, the pipeline is of strategic importance to Italy. To this end, a framework agreement with Switzerland has recently been signed. The intention is to promote the application of the EU transport capacity allocation rules, also on a daily basis, and the "Use It or Lose It" (UIOLI) rules. This will be done by assigning the obligation to manage the secondary capacity market directly to the relevant TSOs, which can offer unused transport capacity on the market, also for short periods (up to intra-day). In particular, by April 2013 a system of coordinated allocation between the Italian, Swiss and German network operators should enter into operation. The capacity of long term reverse flow from the Italian side, amounting to a total of 40 million cubic meters/day from the points of exit of Passo Gries and Tarvisio, will be allocated through an open procedure.

- **Building new strategic infrastructure**, with special reference to **storage capacity** (to counter peak delivery requirements, to help the market function better and to guarantee high levels of security of supply) and to LNG terminals (to ensure that there is sufficient import capacity, above all for spot operations).

For these works, a regulatory system could be applied based on a guaranteed mechanism for the recovery of the investment costs covered by the system. This would be also applied in conditions of a partial use of the capacity – in order to favour the bankability and the realization - even in a context of falling consumption, a factor that would slow down construction if left to purely market-based mechanisms. The infrastructure (including in implementation of the provisions of art. 3 of Legislative

Decree 93/2011 on national strategic infrastructure, consistently with the NES) would benefit from fast-track authorisation procedures. Regarding the dimension of these infrastructures, it is believed, also on the basis of a quantitative indication of the study mentioned above, that security, diversification and competition can also be achieved through investments that would burden the system very little. In particular it is noted that, to ensure the safety of the system, **it is sufficient to carry out the storage projects already authorized**, while it is **necessary to increase the import capacity of LNG available for spot transactions**, primarily to increase competition, but with a consequent impact also on diversification and security of the system, as described below.

Detail of the need for strategic infrastructure

A. Storage infrastructure

Regarding **the development of new storage capacity**, the analysis made in the study mentioned above suggests **an increase of about 75 million cubic meters/day** of additional peak supply capacity and **about 5 bcm** of storage capacity in total as **being sufficient. This is almost a 50% increase in commercial storage**. This increase in storage will allow the system to be put into security in case of emergency situations as the situation in February 2012. In that way it will be possible to decrease progressively the measures reducing industrial consumption and even those for the conservation and activation of oil fired "reserve" power plants. Furthermore, this storage capacity – together with possible further commercial storage capacity – will help to increase the liquidity and competitiveness of the market, representing also a potential for modulation of export flows.

In order to operate a selection of investments, it seems suitable that only costs related to storage infrastructure considered strictly necessary for system security be promoted by the regulatory system and enjoy guaranteed coverage through tariffs. Therefore, **the capacity currently under construction and already authorized** (a peak of 75 million cubic meters/day) **seems sufficient to meet the identified needs**.

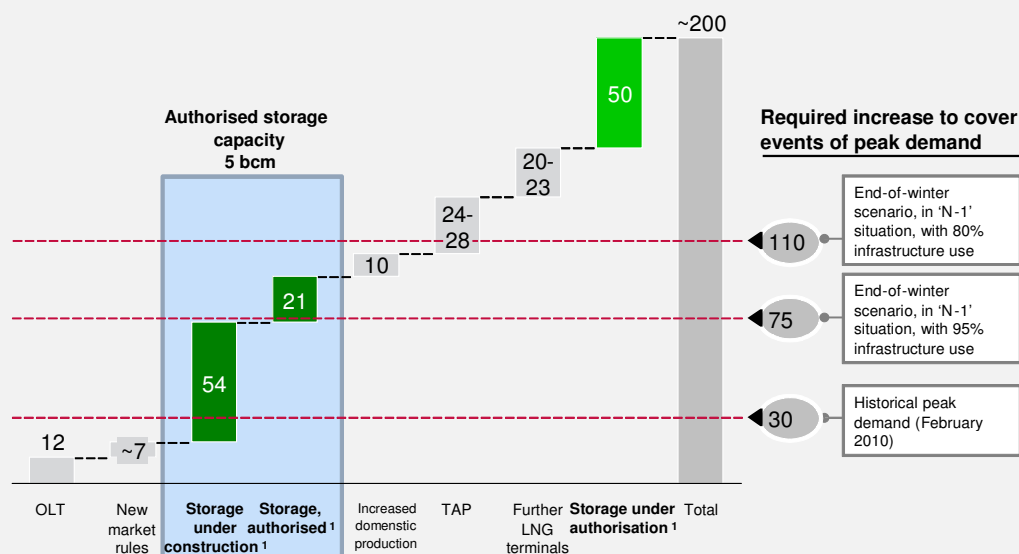
In addition to the effects of increased storage capacity, security of supply will be improved through the contributions from the strategic import infrastructure (see next chapter) and from the introduction of parameters for overall storage supply during the winter. Such parameters will allow, for instance, to maintain the performance of peak delivery in late winter, combined with the introduction of a "day ahead" session on balancing which allows the operator to act in order to give effect to such parameters. All these factors, in combination with the imminent entry into operation of the offshore terminal off the coast of Tuscany, will help to decrease, from the thermal year 2013-2014, the costly measures to reduce consumption of natural gas of industrial and thermoelectric customers (quantifiable in about €150-200 million per year), pending the entry into operation of new peak delivery capacity from 2014/2015.

A further possibility to be assessed is the realization of peak capacity to be used in case of emergency through peak shaving installations fed by LNG. These installations would be realized in connection with new or existing LNG facilities, or in dedicated sites through construction of a liquefaction plant connected to the gas transportation network.

TABLE 35

Authorised storage capacity – together with further planned facilities – is sufficient to cover peak demand by 2020

Mcm/day, expected increase of peak supply



¹ Assessment underway of actual minimum contribution to peak coverage through storage
Source: MiSE

B. LNG import Infrastructure

Regarding the **regasification capacity**, it is **estimated that an increase in capacity from 8 to 16 bcm is sufficient**, in addition to the two terminals already in operation and the one impending operations off the coast of Tuscany (8 bcm in case of realization of TAP gas pipeline with contractual supply conditions indexed to market prices; 16 bcm in the case of non-realization of these conditions).

With this contribution, the regasification capacity will grow from the current 12 to 24-32 bcm (taking into account the new terminal in Tuscany and the mentioned additional 8-16 bcm). As mentioned, this new capacity refers to works subject to a regulatory mechanism of guaranteed recovery of the costs of investment through system charges, and does not exclude further *merchant* initiatives (typically under an exemption from third party access), as described further on. The implementation of such infrastructure will contribute in a major way to:

- Structurally **align Italian market prices to European levels**, increasing the share of regasification capacity available in spot and short-term mode and reduce the pivotal role of gas suppliers from outside Europe. This will avoid that, after the current phase of oversupply on the Italian market (due to lower demand and volumes - higher than such demand - contracted in ToP), significant price differentials can be restored compared to other European hubs. Moreover it will limit the possibility of commercial operations aimed at reducing the volume of supply in such a way as to influence the price on the Italian market. It is further estimated that - notwithstanding

the pending availability of competitive LNG spot transactions in the medium/long term - this increase is sufficient to balance the flows on the northern border, so as to **apply pressure and to reduce or eliminate the differential transport cost** (now equal to about 2,7 €/MWh).

- **Increase the diversification of supply sources**, since LNG terminals with spot capacity can be supplied by numerous countries and liquefaction plants, thus re-balancing the excessive exposure of Italy to pipeline supplies from a limited number of foreign suppliers. The analysis carried out in this study shows that it can be decisive both in order to face a scenario of total import interruption from North Africa, and also to contribute to the reduction of the pivotal role of operators in the overall European market.
- **Contribute to enhance the safety of the gas system in crisis conditions**; in particular in terms of peak delivery, thanks to the ability of peak regasification, reducing the burden of costly measures to reduce the consumption of gas in an emergency event, mainly by the industrial sector and oil fired power plants.
- **Contribute to the development of the Italian gas hub** thus allowing Italy to become a country of exchange and transit of gas from the South (leveraging on the expected near-doubling of European imports in the next 20 years) and to offer value-added services to other countries (i.e. volume, peak and modulation storage).
- Finally, greater availability of LNG will encourage **the use of this fuel for shipping and heavy transport**, with advantages in terms of cost and environment.

The realisation of an LNG terminal of about 8 bcm per year with a peak contribution of about 24 million cubic meters/day and with an estimated investment of around one billion Euros, would result in a cost to the system of about 100-150 million Euros per year on the extreme assumption that it would remain totally unused. Given that the expenditure for gas as a raw material is estimated to be approximately € 25 billion per year, even the modest reduction in the price of gas attributable to the contribution of liquidity offered by the infrastructure (in particular with reference only to the **component of transport from Europe of about 2.7 €/MWh**) shows the convenience of the investment. In fact, such infrastructure should contribute to a reduction **in the overall national gas bill close to 1.5 billion Euro per year** (equal to the gap in cost due to transport). The reduction of the price differential of the Italian gas market would also allow a reduction in the price of electricity in Italy and a recovery of competitiveness of the Italian power plant fleet.

There will be a **selection** of strategic infrastructure required to import LNG, **among the projects already in the implementation stage** for which there is no final investment decision yet and which do not have a total or partial benefit deriving from the exemption from the obligation to grant access to third parties, **through public procedures based** on criteria of transparency and non-discrimination in terms of cost-benefit as follows:

- Minimization of impacts on tariffs, which arises directly from the construction of the infrastructure itself and from the resulting costs for connections and strengthening of the transport network.
- Technical performance (capacity of *loading, reloading*, storage volume, contribution to the daily peak).

- Lower environmental and local impact (reuse of existing sites, local acceptance, use of the refrigerating power on site in integrated projects).

At the same time, these infrastructures will be subject to a penalty system in case of inaction or non-realization by interested investors.

- **Facilitating the construction of other import and storage infrastructure, by exempting it from third party access**, with investment costs incurred by promoters, without any guarantee of revenue or public grants. In particular, the aim is to push the construction of authorised LNG projects and others currently awaiting authorisation (and which don't fall under the procedure described above). Another aim, regarding pipelines, is to open up the southern Corridor to import gas to Italy from the Caspian and other regions, especially through the **TAP (Trans Adriatic Pipeline) project**. The development of the SouthStream project (which would reach Italy at Tarvisio or in the south), the GALSI project from Algeria and new projects to import gas from the Mediterranean basin will also be followed closely. Regarding storage capacity, considering projects pending authorization, there are overall 9 additional projects with a potential capacity of further 3,4 bcm with respect to the ones already under construction or authorized and essential for the security of the system (see section above). The realization of these projects at market conditions will be promoted.
- **Fostering cooperation between EU Member States'** Governments, Regulators and TSOs in order to prevent tariff or other types of barriers (also in relation to the planned Italian reverse-flow projects) and speeding up the full integration of the European internal gas market. In this context it will be essential to continue to promote the role of Italy as strategic gas entry point to Europe from South and South East and exploit the role of modulation storage resources by making it available to neighbouring markets.
- **Promoting the availability of virtual and physical reverse-flow capacity towards the markets of Central and Northern Europe.** To fully exploit our geographical position as a link between Europe and the Mediterranean, SnamReteGas is already working on projects on the Italian network. These will ensure that from 2016 on a physical reverse flow of gas from Italy to northern Europe, at an overall level of about 40 million cubic metres/day, will be continuously available. Transport capacity from the south and the islands to the north of Italy will also be up-graded. In addition, starting from 2013 regulatory instruments will also be identified to ensure that virtual reverse-flow capacity (and the related freed up forward-flow capacity) will be made immediately available at market conditions on the Transgas pipelines. Similarly, instruments to coordinate the various TSOs will be identified, in order to manage the necessary investment to create physical capacity and in order to implement the UIOLI principles. The investment required to ensure reverse flow and upgrade the Italian network have been included among the Projects of Common Interest (which will be covered by the new EU Regulation on cross-border energy infrastructure, pending approval). Therefore they should enjoy financial or tariff incentives in the European context. Lastly, new connections with Europe, such as the TGL (Italy-Austria-Germany) pipeline, will be evaluated; these would be developed in accordance with the trans-European corridors project to be defined at Community level.
- **Complete launch of the Forward Gas Market (through the Energy Market Operator (GME)).** This is an essential condition to create an efficient and liquid market capable of providing price signals that depend solely on the demand/supply balance. The regulation for the forward market, recently approved by a Decree of the Ministry of Economic Development and in an early stage of implementation, will facilitate the integration of the existing trading platforms and the balancing

market, thus improving gas system efficiency. Measures to encourage significant volumes of commercial transactions to move to the exchange will also be supported with a view to increasing liquidity more rapidly (for example, by incentivising the offer of domestic production and imports on the exchange). As reliable exchange prices emerge, it will be possible to link them more fully and efficiently in order to **benchmark commodity prices for price bids on the protected market** and gradually move on from the current indexation mainly linked to ToP import contracts.

- **Reviewing the arrangements for the allocation of and access to storage capacity** in a non-discriminatory manner for all operators in the various segments. For the use of storage capacity (a scarce resource), the aim is to establish an efficient allocation system by quickly adopting non-discriminatory market mechanisms. These should reveal the true values of this resource (and quickly supersede the current capacity allocation based on end-use criteria), not least to stimulate new investment in capacity. Similar market mechanisms could be adopted in relation to **regasification capacity**.
- **Building on the rapid completion of the ownership unbundling of SNAM** to create a strong, independent and stable operator that is able to:
 - deploy new investment in transport, storage and regasification infrastructure both in Italy and abroad (directly or in partnership with other operators) in order to promote the role of the Italian gas system in Europe;
 - guarantee full third-party network access and focus on developing the infrastructure required for a competitive and diversified market;
 - guarantee the continuity of the long-term strategy in the interests of the country.

The unbundling operation is nearly complete. The lines for development will be included in the 10-year network development plan envisaged by the internal market Directives, which will need to be harmonised with the plans of the other European TSOs. A Ministry for Economic Development (Italian initials MiSE) decree establishing the drafting criteria has been issued.

- **Promoting tenders for the concession of the gas distribution service**, organised in 177 “catchment areas” covering the entire country. These should take place over the coming two years, the aim being to facilitate a transition to a more efficient and lower-cost distribution system that will be to users’ advantage. To this end, a Coordination and Monitoring Committee composed of representatives of the MiSE, the Regulatory Authority for Electricity and Gas, the National Association of Italian Municipalities (ANCI) and the Ministry for Regional Affairs, will work to support local authorities and tendering bodies in implementing the new provisions. The MiSE also plans to publish guidelines on how to determine any reimbursement to be paid to the out-going operator, with a view to minimising any potential source of disputes and speeding up the tenders.
- As requested several times by the European Commission (as in the 2012 Communication “Making the internal energy market work”), it will be important to set up **a timetable for the gradual limitation of protection regimes** - currently applied for the final sale of gas as well as for the sale of electricity - to truly vulnerable customers, in compliance with the universal service obligation. For other kinds of users, efficiency and fairness will be ensured by market forces. In a competitive market, an informed and aware consumer will be able to search for the best value in terms of cost or better quality of service. In addition, in order to promote the development of such conditions, it will be important moving toward greater transparency and **simplification of certain aspects of the regulations** (e.g., the transparency of bills for end-customers), facilitating the development of new “beyond the meter”

National Energy Strategy: for a more competitive and sustainable energy

4. The priorities of action, in detail

4.2 A competitive gas market and the Southern European Hub

services and ensuring **a clearer separation of the brands** of vendor companies as required also by the transposition of the Directives for the internal market.

4.3 Sustainable development of renewable energy

The goals

Renewables are a core element in achieving the goals of the Energy Strategy. The basic decisions are to:

- **Exceed the European 20-20-20 targets** for renewables output, striking a better balance between different energy sources (with a greater focus on **renewables for heating and cooling**).
- Achieve **economically sustainable development** in the sector, with incentive costs aligned to European levels and support for a gradual move to grid parity.
- Give preference to technologies with greater **spin-offs for the sector** and for the Italian economy as a whole.
- Gradually **integrate renewable electricity** with the electricity market and the grid.

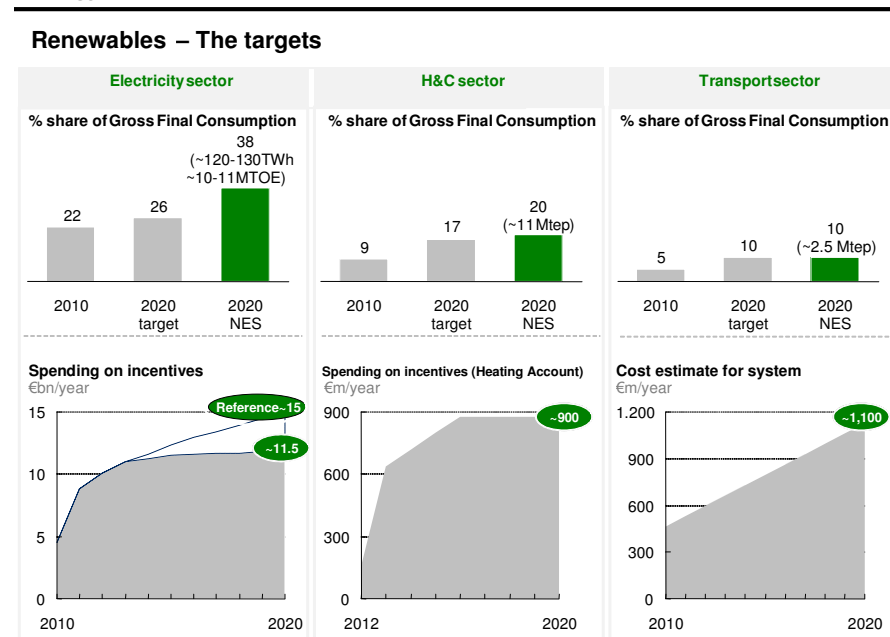
In terms of quantitative targets, the intention is for renewables to account for **19-20% of gross final consumption**⁵ (compared to the European objective of 17%), equal to an annual 23-24 MTOE of final energy. This will enable a reduction in emissions of up to 50 million tons of CO₂.

- More specifically, as regards the **electricity sector**:
 - The goal is to develop renewables so that they account for **34-38% (and potentially more) of final consumption**, which equals to about 120-130 TWh/year or 10-11 MTOE. This would make production from renewables the leading component in the electricity generating mix in Italy, at par with, or exceeding, gas.
 - In terms of the **technology mix**, it's envisaged to follow the dynamics of development planned in the **National Action Plan** (NAP), except for solar technology, which has had, and will continue to have, a much more rapid development.
 - In doing this, it's essential and possible to keep the incremental burden in consumers' bills down **by accompanying** the increase of renewable energy volumes with progressively decreasing incentives proportionate with (decreasing) technology cost and in line with other lead countries in Europe. Overall, to achieve the 2020 targets, up to **about € 11.5 -12.5 billion** are being made available each year (at the end of 2012 ~10.5 billion were already committed), over a 20-year period. The remaining resources will be allocated on the basis of priority criteria that favour efficiency, technological innovation, lower environmental impact and the national supply chain.

⁵ Including transfers from other countries (excluding these, the share is about 19 %)

- As regards the **heating and cooling sector**:
 - The goal here is to bring renewables production up to **20% of final consumption** by 2020 (compared to the 20-20-20 target of 17%). This would amount to about 11 MTOE/year.
 - Achieving the goal is related to the replacement of a part of existing plants fuelled by conventional fuels, to new installations and to the evolution of the integration obligations of renewable energy in buildings. The suggested dimension of the interventions also implies, provided it is cost-effective, the development or expansion of network infrastructure for the deployment of renewable heat - through the activation of a guarantee Fund - and the establishment of a statistical system, with the spread of systems for measurement and metering of heat. In the coming years, the activity will therefore be aimed at a broad development of technologies such as biomass boilers, heat pumps, solar thermal, etc. (the most recent market surveys suggest an increase in production from biomass heating with respect to the National Action Plan's initial estimates).
 - To rationalise and provide continuity to the support mechanisms, a Heating Account has been introduced to incentivise small-scale projects, with up to approximately **€900 million/year** being made available. The planned instruments to support district heating networks will also be activated.

TABLE 36



- Turning to the **transport sector**:
 - Italy has confirmed the 2020 European **consumption target of 10%** for biofuels, which amounts to about 2.5 MTOE/year.
 - We will push as strongly as possible for the adoption of **second generation** biofuels while preserving however the investments already made on the production of first generation biofuels.
 - In terms of system costs, in view of the price differential for biofuels the impact by 2020 could amount to **around €1billion/year**.

Renewable Electricity – Background

The production of renewable electricity has seen very strong development in recent years, led by generous incentives that have generated considerable costs for the system. Significant expertise and technologies have also been developed in Italy, which could be taken advantage of internationally:

- In the electricity sector, the **20-20-20 target** has already almost been met, nearly 8 years ahead of time: ~93 TWh produced at the end of 2012 and 102 TWh considering normalised hydroelectric production and the annualised production of plants, compared to the 2020 target of 100 TWh). This can be explained by the strong **increase in installations** in recent years, most notably photovoltaics: from 2010 Italy has increased the installed capacity of about 13 GW, reaching a total of around 17 GW (second only to Germany, at a global level).
- The main reason for this rapid growth is the **very generous incentive system** in force in the past years which has not always taken into account the rapid fall in technology-related costs (photovoltaic technology costs have fallen by about 70% from 2008 to 2012), which has translated into very high profitability and incentives exceeding those of the other European countries. At January 2012, Italian incentives per photovoltaic unit were double or triple the levels in Germany or France, and those for wind about 50% higher.
- This has led to **significant costs** for the system, with an impact of over €10 billion/year on Italian consumers' energy bills (considering installed capacity at the end of 2012). This amounts to **over 20% of the Italian electricity bill**, with a total commitment of around €170 billion over the 15-20 year lifespan of the incentives. Nonetheless, the incentives have produced **environmental benefits** (e.g., a reduction of 18 million tons of CO₂), as well as employment, energy security and economic benefits (including a reduction in fossil fuel imports of € 2.5 billion/year and a flattening of the demand curve on the wholesale market, for an estimated €400 million/year).
- Italy has also developed an industrial sector that has seen continuous growth – even in these crisis years – and is now well positioned to capture **global industrial opportunities** in various market segments concerned with renewable electricity generation. In some technologies, we can boast a position of excellence. As we have already noted, the sector is expected to experience continuing robust growth at the global level in coming years, presenting market opportunities our operators can seize, as they are actually already doing in many cases. In this context, the industrial opportunities in areas where already strong partnerships exist, such as those in North Africa (with a significant potential for wind and solar production), the Balkans (particularly hydropower), and Latin America, acquire particular importance.

National Energy Strategy: for a more competitive and sustainable energy

4. The priorities of action, in detail

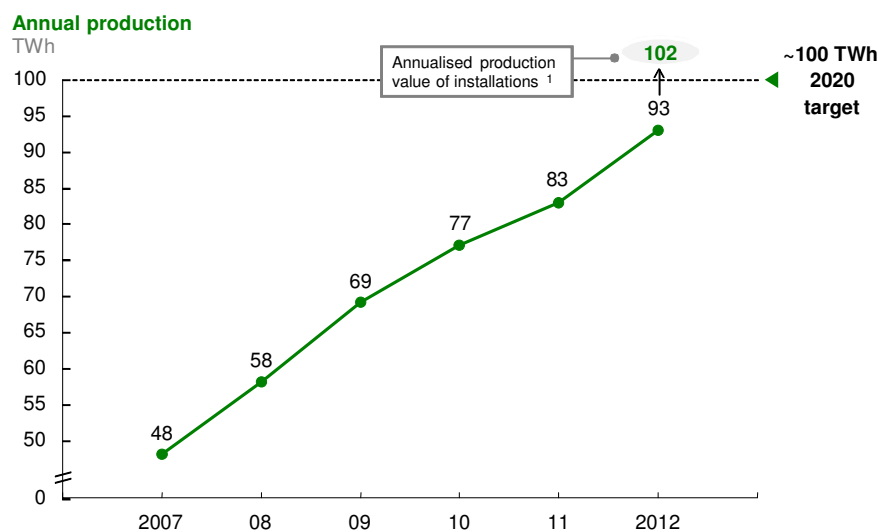
4.3 Sustainable development of renewable energy

- The growing amount of production from intermittent, non-programmable sources is increasingly becoming a **challenge for the network infrastructure and for the market** (an aspect we will examine in more detail in the next section on infrastructure and the electricity market). Discontinuous production from renewables is, for example, concentrated (and will probably become even more so in future) in the south and centre-south of the country, and on the islands. By 2016 the power generated in this macro-region is expected to exceed peak demand there (25,000 MW and 21,000 MW respectively). However, demand is higher in northern Italy, so the existing transmission infrastructure linking the north and south of the country, which provides capacity of around 2,300 MW, will need to be up-graded.
- In the future, the challenge posed by the development of renewable electricity will be even more significant. **Renewables technology** is expected to **develop rapidly**; some sources are expected to see costs fall considerably, to the level of or below those of the traditional technologies. It will be vital, therefore, to support their development and address the possible implications in a timely fashion.

TABLE 37

In the electricity sector, the 2020 target has almost been reached, 8 years ahead of schedule

Total annual production of renewable electricity

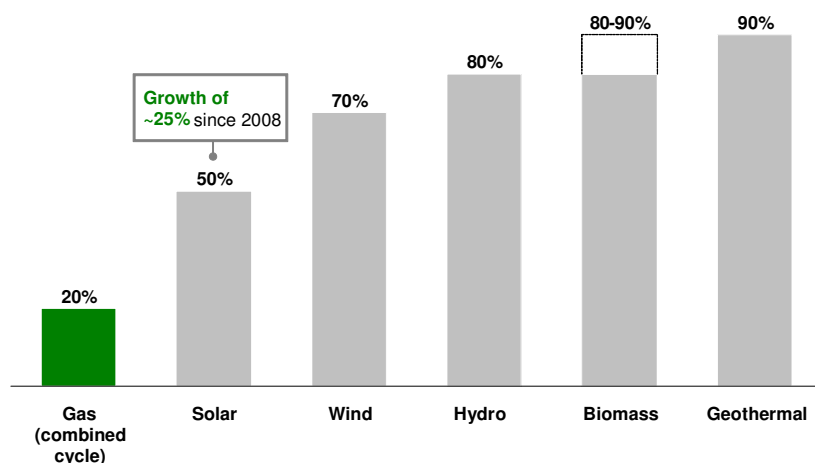


¹ Specifically, in 2012 hydroelectric production was lower compared to the historical average
Source: GSE

TABLE 38

The country is well positioned, from an industrial perspective, to grasp the development opportunities of renewables electricity

Percentage of national contribution with respect to total cost, full lifespan (Investment + operating and fuel costs)–Estimates



Renewables electricity – the initiatives

As illustrated above, the Government wants to continue supporting the development of renewable electricity sources with very ambitious goals (e.g., in terms of incentives to electrical mix) while keeping system costs down and increasing the capacity for governance. To this end, a very important step is the recent issue of two **Ministerial Decrees** (the first for photovoltaic solar technology and the second for other renewable technologies) which have produced several changes to the incentive system:

- Per-unit incentives are being reduced to **align them more closely to European levels**, (while still maintaining them higher compared to other countries). The system will gradually be guided towards competitiveness (**grid parity**) – especially solar – and the integration of renewable technologies in the electricity system. By doing that the impact of incentives on **the energy bill** will be stabilised, providing a reduction in expenditure of about €2.5-3 billion/year with respect to the reference scenario under the previous regime.
- The **mix** will be shifted towards more **innovative** technologies with greater **spin-off potential** for the sector and the national economy.
- The foundations will be laid for an **orderly and sustainable development** in the sector, through competition (auctions mechanisms) and the governance of volumes (registries).
- Measures to promote a greater **integration** of different renewable electricity technologies **with the market** and with the grid will be adopted.

In the case of photovoltaics, grid parity has almost been achieved and in many cases is already a reality. In many regions of the South (and according to several studies soon even in Northern Italy), photovoltaic technology is already competitive, without incentives, with final market prices in case of self consumption

(it is however still far from a full competitiveness with the costs of traditional generation, i.e. with the Single National Price (SNP)).

At the same time, the incentive system provided by the “**5th Energy Account**” will soon have run its course. For this sector, measures to help attain grid parity will need to be put in place for the coming years. For example:

- a **further simplification** of authorisation procedures for grid connections and plant activation (especially for small ones), so that indirect costs, as well as technology costs, can be reduced. In particular, the development of a single interface toward the network operators (NOs) and the Energy Services Manager of (GSE) would be important and in some cases, even a single interface for the authorization procedure.
- **tax advantages** deriving from the provisions governing works implemented to achieve energy savings, including those following on from the installation of renewables plants (Decree Law 201/2011);
- review of the **net metering service** in order to simplify procedures, extend its scope of application and, therefore, modulate the benefits for producers. All this, introducing average fees for the use of the network, according to a principle that renewables producers will bear some of the “system” costs that they themselves generate.

The revision of this instrument, which is an important element for the integration of renewables in the electricity market, is connected to the forecasts of expansion of facilities that will use it and the amount of energy that could then enjoy the exemption from network costs; it is necessary in order to avoid that higher costs fall on an increasingly limited segment of customers who would therefore be excessively penalized.

A hypothesis of intervention with redistributive effects (not only with reference to net metering but also to efficient production facilities and energy exchange) should lead to reduce the indirect benefits for facilities that have access to the direct incentives (with the possible exception of very small plants), and hold instead for plants that do not have access to such incentives. More generally, a large-scale deployment of distributed production for self-consumption can be supported by a coherent evolution of legislation and regulation of the sector and made even more effective, provided that some of the costs can be shifted to general taxation (carbon tax or equivalent).

- As for unbalancing charges it will be important adopting an approach that takes into account the real possibilities of estimates of the different technologies, and that promotes an aggregated management of installations and loads.

Lastly, **waste recovery and use** is a major opportunity to pursue sustainable development goals. Rather than waste disposal in landfill sites, which is still widely used today, recycling and, where this is not possible, waste-to-energy generation, are the primary objectives in this field. In this light, the Ministerial Decree of 6 July 2012 on renewables other than photovoltaics envisaged and regulated the incentive system for electricity production, leaving an ample margin for the development of waste treatment facilities.

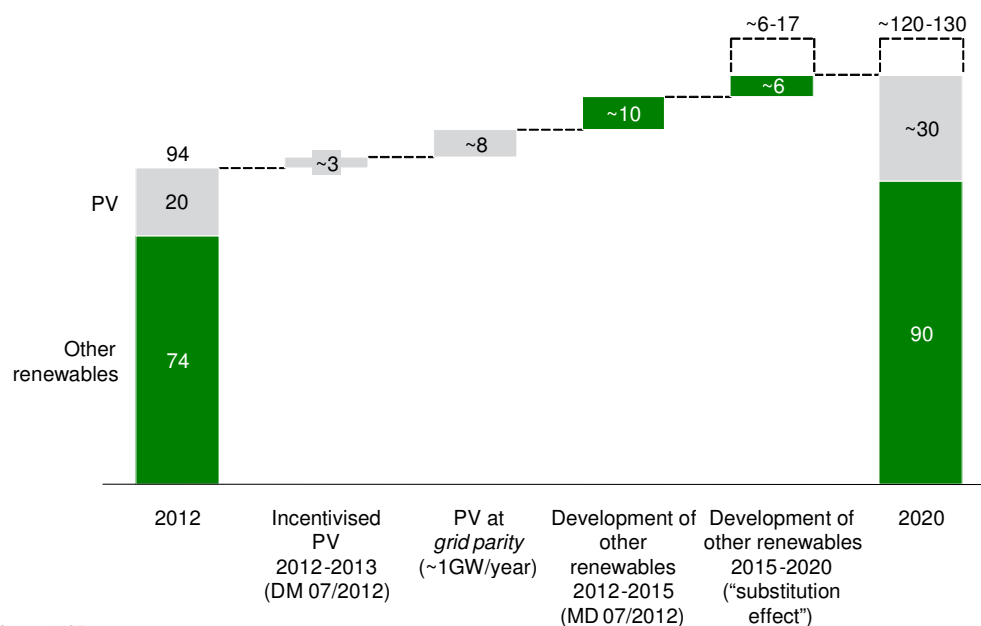
As regards the **integration of renewable sources with the market and with the grid**, the necessary measures are discussed in the next chapter (development of electricity infrastructure and market) and partially they have been already mentioned above (net metering, unbalancing regulations). These measures are top priority since the current structure of the market and the grid must be reviewed and strengthened to enable the integration of distributed generation, which is often non-programmable and volatile, and conceived with dispatching priorities in mind.

The approach illustrated above will pave the way for a gradual and orderly growth in the sector, with inputs from both incentivised and non-incentivised production (essentially photovoltaics). Indeed, **production levels of 120-130 TWh/year** will be possible. This forecast is based on: a) the construction and use of all the capacity envisaged in the two Ministerial Decrees of 2012; b) on possible new installed capacity (on a grid parity basis) for photovoltaic currently estimated at up to 1 GW/year; c) on a “substitution effect” for other renewable technologies. These could develop without generating increases in the annual tariff surcharge (possibly allowing for a reduction), essentially as a result of the withdrawal of old plants from the previous, and more costly, incentive measures.

TABLE 39

Expected development of renewable electricity production

TWh/year, estimate



The development described above will result in an increase in costs in the bill, from ~€10.5 billion end of 2012 to about 11.5-12.5 in 2020. In particular, from 2016, also thanks to the planned exit of plants from the incentive schemes (systems installed in the early 2000s with per-unit incentives much higher than the current ones) it will be possible to continue supporting incentives for renewable energy with additional funds amounting to €0.5-1.5 billion per year when fully operational. It is desirable that such additional

National Energy Strategy: for a more competitive and sustainable energy

4. The priorities of action, in detail

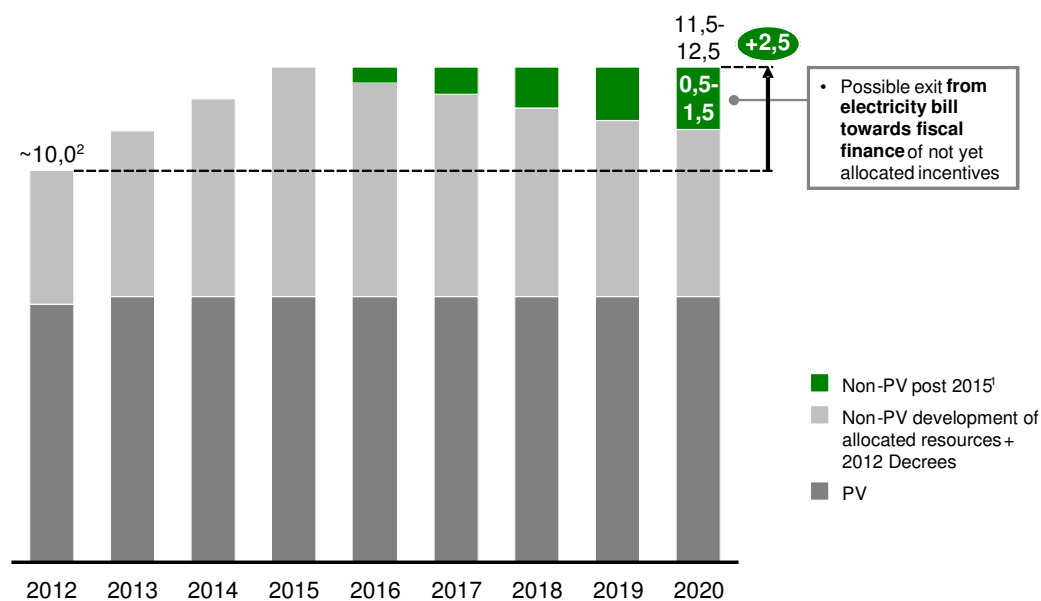
4.3 Sustainable development of renewable energy

incentives find coverage (at least partially) in general taxation, also thanks to the proposed introduction of a 'carbon tax', or to the full exploitation of other funds which have no impact in the bill.

TABLE 40

Expected development of costs for supporting renewable electricity

Billions of Euros/year, accrual, estimates



¹ Not represented in the chart in its development since 2012. In 2012 net metering and purchase/resale arrangements were around € 200-300 million
² The 2012 base doesn't include quantities subject to registries and non- PV RES auctions granted between 2012 and 2013

With the incentives made available and grid parity for photovoltaics expected to be achieved soon, about **€45-55 billion in aggregate investment** in renewable electricity – including renovation of and up-grades to installations – is expected by 2020. This will have significant spin-off effects on an industrial sector where Italy has built up considerable expertise, which could also be taken advantage of in international markets. Indeed, Italian companies, some of which are already major players with a significant international presence, have notable growth opportunities abroad, given the expected development of this sector in other countries. Moreover, in view of the highly fragmented nature of the Italian market, we can assume that a gradual consolidation process will occur, which could produce benefits in terms of efficiency and economies of scale.

Lastly, it is worth noting that, given the rapid progress with which capacity has developed in Italy in recent years, the **strategic relevance of import projects from other countries** (Balkans, North Africa), which had been forecast in the National Action Plan, **will wane**. This notwithstanding, the Government intends to respect the commitments it has undertaken thus far (especially those concerning the interconnection with Montenegro).

Moreover, in case of exceeding the national targets, the possibility of transfer of surplus shares can be considered, through the mechanism of statistical transfer provided for in Directive 2009/28/EC. The economic benefits resulting from the activation of this instrument will be used to reduce the incentive costs imposed on electricity tariffs.

Renewables for heating and cooling – Background

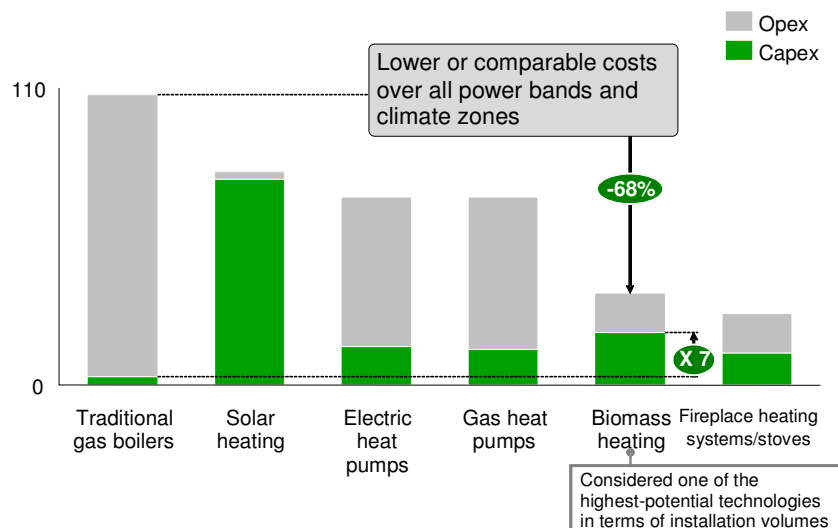
Renewables for heating and cooling (H&C renewables) are a key element in the Italian strategy to achieve the “20-20-20” goals, in view of their cost-efficiency and ease of widespread installation. To date, they have been somewhat neglected by the Country’s energy policies and regulatory framework; however, they have experienced significant development on their own.

- As we have seen, **heating/cooling** uses represent the **lion’s share** of our energy consumption, in both the civil and industrial sectors (about 45% of total final consumption).
- Compared to renewable electricity, renewable heating and cooling are in general a **more efficient** and less costly means of meeting the European targets (in terms of cost per tonne of avoided CO₂ or cost per kWh of final energy produced). They also bring significant benefits in fuel savings for end-users (for example, through biomass heating) and for the country as a whole (lower fossil fuel imports).
- In the last 5 years, H&C renewables have developed in line with the goals of the National Action Plan (NAP) (5.4 MTOE in 2010), but in **the absence of a stable, dedicated framework of incentives** to guide consumers towards more “virtuous” technologies. Support measures largely coincide with those for energy efficiency – tax rebates and white certificates – but with a lack of dedicated initiatives. Moreover, to date there has been no accurate statistical accounting mechanism for the initiatives adopted.
- Italy is well positioned in the H&C renewables **industrial segment**, especially in the biomass sphere, where about 65% of the technology is Italian-produced, including in the segments with the highest technological content. However, the level of biomass imports is by no means negligible.

TABLE 41

In the residential sector, potential savings from renewables are often held back by initial barriers to investment

€/MWh, Example: heating with 1-35 KWth installation, zone D



Renewables for heating and cooling – The initiatives

The strategy for the development of renewable energy for heating and cooling is based on a series of specific mechanisms dedicated to the different usage categories:

- To stimulate **small-scale** H&C renewable projects (mainly for the **civil sector**), the Government has recently launched a ministerial decree directly incentivising the installation of dedicated plants, the so-called “**Heating Account**” (MD 28 December 2012). This mechanism:
 - Provides access to the incentive scheme for the **most virtuous technologies**, with the setting of minimum criteria for each type of initiative and requirements that include, where possible, energy efficiency measures.
 - Allocates incentives to **cover** a proportion of the **initial investment costs**. These would vary in line with the amount and the climate region and be paid over 2 years (for small-scale household projects) or 5 years (for other projects). Additional “rewards” are envisaged for the most efficient technologies. From our interactions with consumers’ and producers’ associations, we feel that this formula should be well received and therefore attract many users to sign up (in all probability, higher than for the tax deduction instrument).

Up to 2020, the **Heating Account alone will make it possible to reach the National Action Plan target** for H&C renewables, i.e. 17% of gross final consumption, or ~10 MTOE. This will represent a total cost for the system, on full implementation, of about €900 million/year, with cover coming from gas surcharges (estimated maximum increase of about 2.2% on the gas price per cubic metre).

- As regards **larger-scale initiatives**, mainly industrial, the support mechanism continues to be **White Certificates**, the aim being to select major investments on the basis of maximising the effectiveness and efficiency of the initiative concerned.
- In view of the potential offered by **district heating and cooling**, as yet not fully exploited in our country, special attention will be devoted to the activation of initiatives encouraging the application of these technologies. In this sphere, the activation of the **guarantee fund** for investment in district heating/cooling networks is envisaged. This fund, which was set up under the Cassa Conguaglio per il Settore Elettrico (Electricity Sector Equalization Fund – Italian initials CCSE), is in turn financed by a surcharge applied to natural gas consumption.

The incentive scheme is expected to generate about **€15-20 billion** of investment up to 2020, with important spin-offs in an industrial sector of considerable significance in Italy and in some segments of the international markets.

Finally, greater use will be made of biomass for the production of energy for heating/cooling (and of second-generation biofuels – see the next chapter). To address this, we will need to focus on promoting investments in the **national forestry sector**, in line with the plan for the reduction of CO₂ and the decarbonisation of the Italian economy.

Particular attention should be paid to the directions contained in the National Inventory of Forests and forest carbon reservoirs (NIFC), also in relation to the potential availability of forest biomass, primarily the one resulting from forest management, and to the consistency with the goals and the priorities set by the Forest Sector Framework Program (FSFP). Another important step will be the launch of a census of the potential for energy recovery from marginal land (land in no condition for food production or for breeding livestock) in order to avoid generating overlapping or competition in the final use of these lands.

Renewables in transport – background

The transport sector is responsible for a significant proportion of greenhouse gas emissions (about 20% in the EU). It is a cause of energy dependence, given that consumption in the sector is based almost entirely on petroleum products imported to Europe or refined from imported crude oil. That is why the development of biofuels is so important in the European context.

- More specifically, the European target (the same for all countries, Italy included) for the use of renewable sources in the transport sector is 10% by 2020. The main instrument envisaged by the legislation is the obligation on all consumers causing vehicle fuel emissions to include a given proportion of biofuels in their consumption (mainly bio diesel, bio ethanol and derivatives, ethyl tertiary butyl ether (ETBE) and bio-methane or bio-hydrogen).
- The development of biofuels is, however, the **subject of some debate**, given the doubts over the sustainability of “conventional” biofuels – doubts linked, for example, to the overall balance of emissions reduction, potentially in conflict with food uses, and high costs. The European Commission is preparing a review of the section of Directive 2009/28/EC covering biofuels and bioliquids. The underlying choice is to make the transition to the second and third generation, but the technology to completely replace first generation “conventional” production is not yet sufficiently developed.

- Pending the review of the Directive, submitted by the Commission and currently in negotiation at the Council, **Italy has thus far fulfilled or exceeded its obligations**, with the proportion of biofuels rising from 1% in 2007 to 4.5% in 2012. This is partly the result of the introduction of a number of supporting measures, such as a reduction of the duty on biodiesel, bio ethanol and ETBE. To implement the EU requirements, a national system has also been set up for the certification of biofuel and bioliquid sustainability. This envisages checks and inspections to ensure that the criteria for the attainment of the 2020 targets and for access to incentives are being met. The National System also envisages the full implementation in Italy of the voluntary systems approved at the EU level.
- This has made it possible to develop an **important industrial sector** in Italy in recent years (the fourth in Europe for biofuel production). However, the sector is going through a **difficult period** as a result of:
 - Strong **competition** from non-EU countries attracted by growing European demand, and who are shifting their production from raw material to finished products (a shift that is also advantageous in terms of taxes). Many European plants are producing at only limited levels, given that the players subject to the mandatory requirements (oil companies) prefer to purchase finished products from abroad at more competitive prices.
 - Production **over-capacity**, which developed following the rapid construction of new production facilities, accompanied by an overall fall in demand – and so in demand for fuel – as a result of the economic crisis.

As expected, the upstream element of the sector (agricultural produce), both European and Italian, is very small in scale, as imported raw materials are very cheap.

Renewables in transport – The initiatives

Italy intends to **meet its European obligations** and will play an active part in the review (expected in 2014) of the European Directive to conduct a critical analysis of the sustainability of the solutions adopted thus far and decide how to continue the development of renewables in the transport sector. Italy's view is that:

- Biofuels must continue to be **included in the targets** for renewable energy production, given their potential significant contribution to reducing CO₂ emissions.
- At the same time, it is vital to verify whether biofuels are being **produced in a sustainable way**, with a real reduction in emissions and no negative impact on the local environment (e.g. deforestation) or on the use of the land for food crops.
- Only **second and third generation** biofuels can provide guarantees in this respect, which is why it is very important to support them through research and incentives. If it turns out that more time is needed to develop these technologies properly, the possibility of postponing the 2020 target of 10% should be assessed. In this sphere, Italy holds a significant technological lead (as developed, most notably, by the company Mossi&Ghisolfi), which we should exploit at both the national and international levels. An important step in this direction is the recent Memorandum of Understanding for green chemistry that by speeding up the necessary authorization procedures and supporting

cooperation between administrations and companies, will promote some important projects in the field of industrial chemistry from renewable sources.

- The current **crisis in the industrial sector** must also be addressed. The sector's development was initially helped by the system of obligations and incentives but it is currently going through a troubled period.
- Finally, the development outlook for **bio-methane for transport use** will need to be suitably supported. According to some studies, it has significant growth potential in terms of volumes – above all deriving from livestock farms, food transformation companies and waste disposal dumps – and in terms of spin-offs for the Italian supply chain, taking into account its lead in the methane-fuelled vehicles sector and the possibility of aiming at a leading position in other markets too. It will therefore be necessary to create the conditions to ensure the full competitiveness of bio methane, which can also be sold over the natural gas distribution network, with other imported biofuels. In particular, from a regulatory perspective, it will be important to ensure rapid definition of certificates of immission for consumption. This incentive mechanism should be considered prevailing since, in case of recognition of the *double counting* benefit for the achievement of the European goals, it is estimated be fully enough to ensure adequate profitability of such technology.

The use of methane and bio-methane in the transport sector could also grow as a result of **new technologies in the refining sector**. In this field, technologies enabling the use of methane, to varying degrees, in fuel production are particularly interesting: Eni Slurry Technology (EST) and gas to liquids (GTL), for example. EST is an advanced production method that could generate significant competitive advantages in an environmentally-friendly manner. The GTL method produces fuels of a particularly high environmental (and technological) quality in view of the absence, in methane, of the typical impurities found in petroleum products. The advantages deriving from the use of methane in refining could increase even more if the conditions (including contractual conditions, by exploiting gas transport and distribution networks) for the use of bio methane were put in place.

In the short term, the Government adopted a number of “tactical” provisions in the recent “Growth Decree”:

- An attempt has been made to **guide the sector towards more sustainable production**, by assigning the “double value” recognised for compliance purposes only to **second generation** biofuels (a segment where Italy, as said, can boast excellent technology levels) and those produced by **waste and sub-products** that have no other industrial uses.
- Steps have been taken to **encourage the development of the national and Community production system**, throughout the supply chain. Most notably, for the calculation of the European obligations, a higher value has been assigned to biofuels that use raw materials from crops grown within the EU. Restrictions on authorisations for imports of biofuels produced in non-EU Countries have also been introduced. These concern, *inter alia*, compliance with the environmental legislation of the Country in which the production facility or unit referred to in the authorisation application is located.

4.4 Developing the electricity market and infrastructure

The objectives

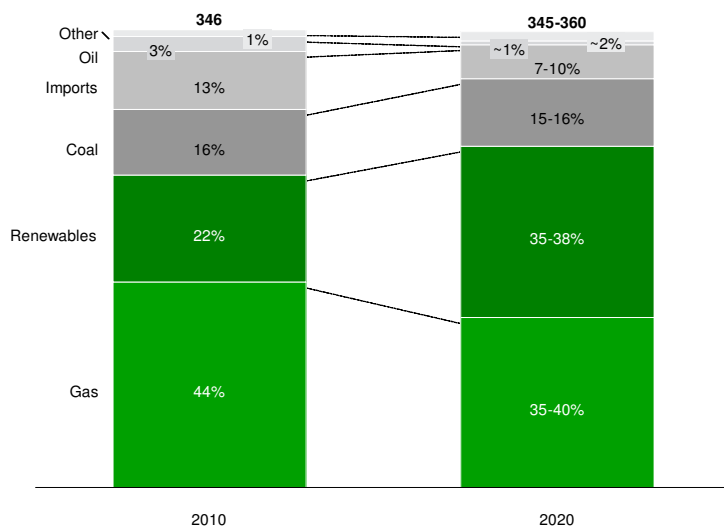
The Italian electricity market is undergoing a far-reaching transformation, caused by numerous recent changes (from the rushing development of renewables to the slowdown of demand, from the increase of CCGT capacity to the decrease of CO₂ prices) some recent, and some expected in coming years. The strategy being pursued in this sector has three main objectives:

- To **align electricity prices and costs to European standards**, including through reductions in production costs, in order to lower energy bills for households and businesses, increase the country's competitiveness and reduce the level of net electricity imports.
- To **ensure full European integration**, both by creating new infrastructure and by harmonising the rules governing market operation.
- To **go on developing a free electricity market and integrate energy produced from renewable sources**, gradually removing all market distortions and **absorbing current surplus production capacity**.

TABLE 42

Containment of electricity consumption and shift to gas - renewables mix

Gross electricity consumption, TWh, %



The measures set out in the NES will lead to a gradual but substantial development of the scenario and of the production mix from now until 2020. The following changes are expected:

- **Electricity consumption will be contained**; consumption is indeed expected to be essentially stable/slightly increasing compared to 2010, as a result of the economic situation and, above all, the strong drive for energy efficiency, even if a progressive shift to electricity is foreseen to the detriment of other sources.
- The production mix will see a **marked increase in the proportion of renewable energy**, which is foreseen up to 35-38% of consumption. Renewables will therefore become the leading source, equal to gas. Taken together, **renewables and gas** will cover about 75% of electricity consumption. The share of coal will remain essentially unchanged, while fuel oil will fall to **near zero levels**.
- **Net imports will fall**, as our wholesale prices gradually draw closer to European levels as a result of the expected alignment of gas prices and due to the fact that the Green Certificate bonus will expire (and that alone is worth almost 6 €/MWh).
- **A greater opening of the retail market** through the removal of obstacles which prevent its development.

Background

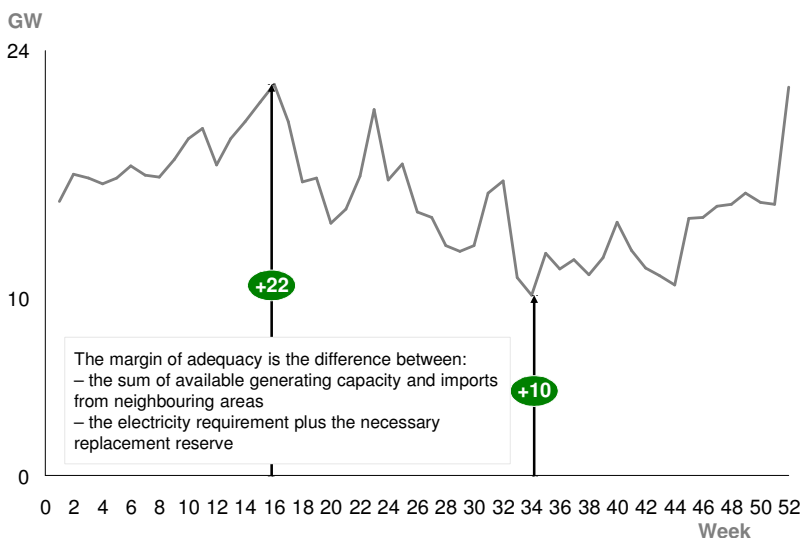
The electricity market is experiencing a period of significant change:

- The gradual **liberalisation process** outlined in the late 1990s has in recent years reached **full maturity**. The components of the wholesale market in Italy (players, rules, instruments) are now well developed and have succeeded in increasing and diversifying supply, reducing the degree of concentration, and stimulating major investment in production capacity and networks. These developments have had significant effects on reserve margins, environmental impact, and service quality for consumers. Nevertheless there are still areas of low efficiency in the wholesale market, particularly in geographic areas not entirely integrated with the rest of the system from a network point of view. Moreover, there is still a need to further enhance the retail market liberalisation process in order to enable the final consumer to choose to move to the free market, to make a conscious evaluation of the different offers that fits with real needs and to benefit properly from the advantages derived from the liberalisation as well. So it is essential to remove the potential obstacles that deny a full optimisation by customers of the competitive offers in the free market such as an improved level of information transparency to the consumer and the persistent inefficient kind of business relations between supplier, retailer and end user.
- This context is **currently being transformed** as a result of numerous factors that have emerged in recent years. Most notably, the **rapid growth of Combined Cycle Gas Turbine (CCGT) and renewable production capacity** (especially solar) and the simultaneous slowdown of electricity consumption have led to a situation of **marked over-capacity** with respect to our coverage needs: the national coverage margin (see Table 43) clearly shows a situation of huge availability in the short/medium term – at least for mainland Italy.

TABLE 43

The mainland does not have problems with margins of adequacy

Weekly minimum operating margins on the mainland, estimate for 2012, GW



Source: From Terna data

Against this background of profound change, in coming years the system will need to tackle **three major challenges**:

- Reducing electricity costs and **prices**, at present among the highest in Europe.
- Full integration with the European markets, to achieve which we will need to **strengthen grid interconnections** and **standardise market procedures and governance**.
- Integration of renewables, especially solar and wind technologies, in the electricity market, with all the related **grid and service security issues** that it entails.

These three challenges are analysed in more detail below.

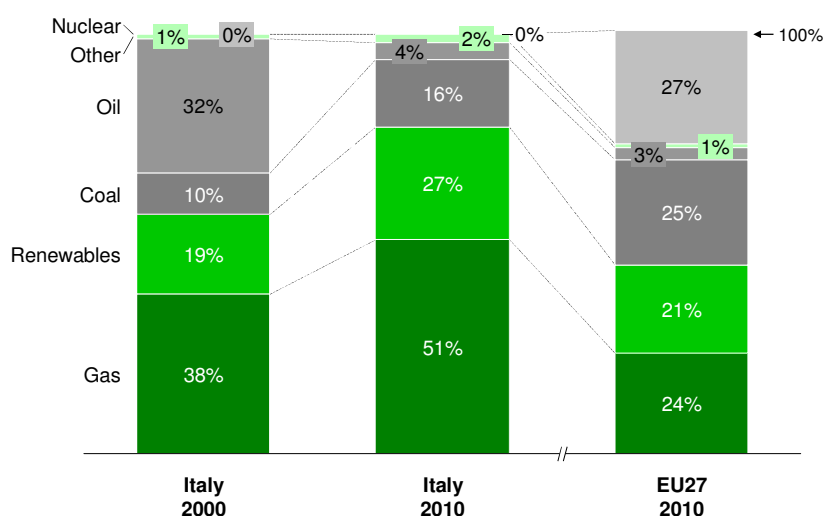
- Electricity **costs and prices** are at present considerably higher than the European average. As we saw in section 1.3, this is due to four main structural factors:
 - The electricity generation **mix**, which in Italy is based mainly on gas and renewables (nearly 80%, excluding imports) and differs notably from the average European mix by reason of the absence of nuclear and the low share of coal which could lead to lower costs. In recent years, coal and CO₂ price trends (-7% and -50% respectively since 2010) have had a negative impact on the cost differential of Italian electricity generation.
 - In the future the present situation could fundamentally change. First of all, on the basis of developments in European CO₂ policies (for example, the possible adoption of the “*ETS Back Loading*” mechanism) and future coal price trends, the relative cheapness or cost-effectiveness of the different technologies could vary. Moreover it is reasonable to predict that, in addressing the issues arising from environmental policies and from phasing out

nuclear, the main European countries are expected to gradually converge towards a mix that is more similar to Italy's. This will probably help bring our prices more closely in line with European levels (in the 2012 World Energy Outlook the IEA predicts a fall of around 8-10 percentage points in average European generation from coal and nuclear by 2020 with respect to the year 2010).

TABLE 44

The generation mix has changed significantly in the last 10 years and today is very different from the European mix

Gross electricity generation mix by source, %



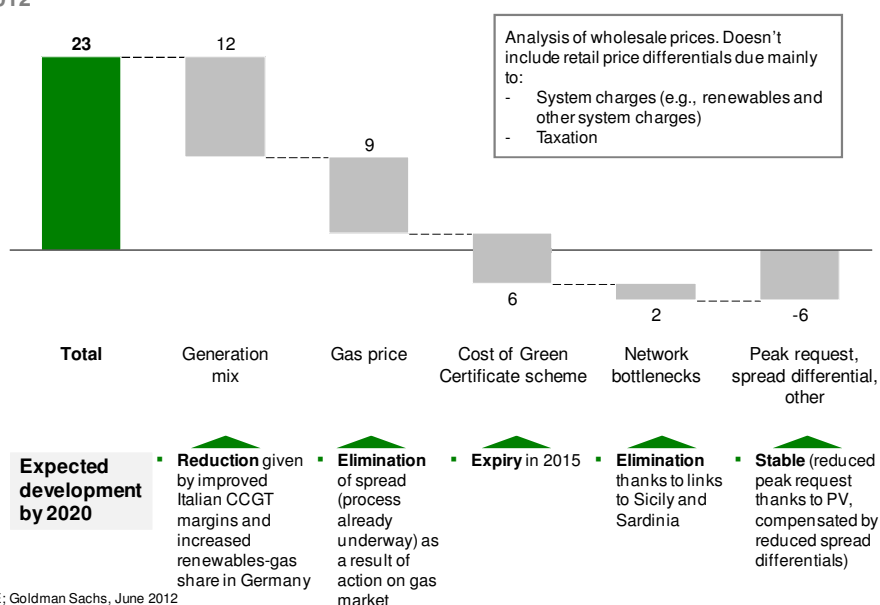
- Wholesale **gas** prices, as we analysed previously, with a differential of around 3.7 €/MWh in 2012 with respect to European prices, have led to an increase of about 7-8 €/MWh in the cost of electricity produced by a CCGT power plant compared to similar production in Europe.
- Incentives for **renewable electricity production**, which affect both wholesale prices (due to the Green Certificates mechanism) and system charges, influence the final price. If on one hand the mechanism that relies on the obligation to buy the Green Certificates will expire by 2016, on the other hand the other incentive schemes will spread their effects for several years (even if not directly on the wholesale price). As analysed earlier, these last obligations amount to a total of almost €10 billion/year and, at moment, they account for nearly 20% of the total electricity bill (excluding taxes) and it is predictable that they will grow.
- **Network inefficiencies and bottlenecks**, which create an estimated €500-600 million/year in additional costs to the system. The connections between the islands and the mainland are one example, and produce a significant price differential in addition to the fact that they represent areas in which the market completion is restricted due to structural barriers, potentially enabling strategic behaviour of operators. An additional intervention area concerns the bottlenecks between central and southern Italy, which can **limit the potential for renewables** (and so create a need to “switch off” overflow wind production, for example, while still paying for this production downtime). Other factors **are the system costs related with certain public policies** funded through energy bills (system research, CIP6 incentives

for non renewable production, charges for nuclear decommissioning, dismantling and local compensations), and **advantageous conditions** for certain customer segments or for major energy consumers.

TABLE 45

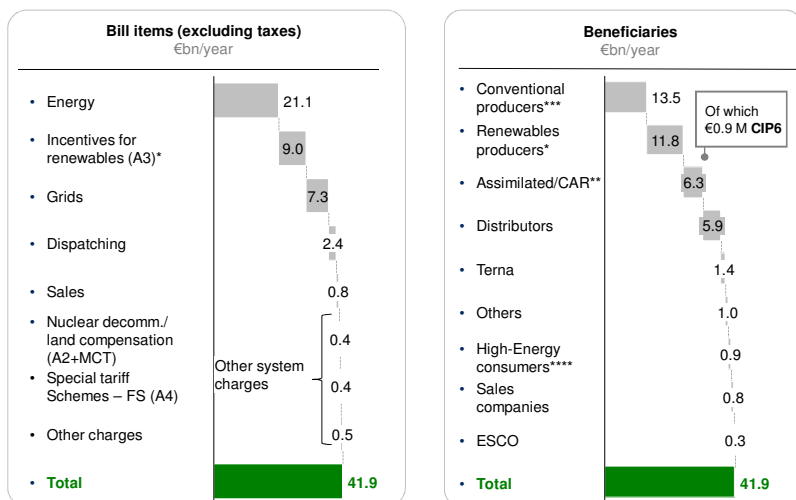
Wholesale price differential between Italy and Europe is foreseen in progressive decrease

Wholesale price differential between Italy and Germany, €/MWh, estimates, June 2012



- The full **integration of Italy's market and electricity system** with Europe will most certainly be a challenge in terms of regulation and infrastructure development, not least in view of the tight deadlines envisaged by the European *Roadmap*. In general terms, this process could offer significant margins for the development of internal competition. It could also be – for our system, with its high over-capacity – an **opportunity** to export energy (or reduce imports) and to develop new “flexibility” services that the Italian system could offer to Europe. Indeed:
 - The European Commission is pushing for **rapid market integration**, and has set **2014** as the deadline for the completion of the single energy market. The adoption of the Third Energy Package gave a strong impetus to the creation of the single electricity market. Its measures include a strengthening of the functions of the super-national bodies (ACER and ENTSO-E), greater responsibilities for the national regulatory authorities and network operators, and the creation of European network codes (a most important measure, containing common rules for network access, requirements for generators, congestion management, price coupling on the day-ahead markets, the integration of the intraday markets based on continuous negotiation more and more close to real time, the new rules for the supply of ancillary services and the management of balancing). The codes open up the prospect of different ways of using the interconnection lines, with a **greater emphasis on variable and two-way** exchanges.

TABLE 46

Action must be taken on all critical cost items of the Italian “electricity bill”

* Aggregate cost of installed plant at end-2011. Energy: 3 Mdi; A3 PV: 5,6 Mdi; A3 non-PV: 2,5 M.di; Revenue CV: 0,7 Mdi

** CAR: High-efficiency cogeneration. Energy: 5,4 M.di; A3: 0,9 M.di (non-renewable CIP6)

*** Energy: 12,7 Mdi; Cap payment: 0,15; Services: 1 Mdi; UESS: 0,3; CV Cost: -0,7 Mdi

**** Interruptibility: 0,6 M.di; Virtual amount: 0,3 M.di (+ exemptions: 0,3 M.di)

- Moreover, as underlined previously, there is an **ongoing process in which several geographical areas of Central Europe are developing a mix of energy generation similar to the Italian one**. Such process will be driven by energy policies aimed to the phasing out the nuclear production. They should include Germany (which has already shut down over 8GW and plans to decommission its remaining nuclear plants by 2022), Switzerland (which is drawing up a decommissioning programme that will be completed in 2034), Belgium (where 7 reactors will be closed between 2015 and 2025) and France (with plans to reduce the proportion of nuclear in its mix). Further drivers will include the pressing European obligations related to the coal fired plants emissions which will enter into force in 2016, the potential evolution of the European policies related to the CO₂ reduction that could imply rising CO₂ prices. Finally, in several countries the share of renewable production is expected to grow, with the consequence that there will be a need of new plants with flexibility services. All these transformations will create a need to build new capacity (in which natural gas combined cycles can be expected to play a central role) or import electricity. Of course we are talking about scenarios still being drawn up, largely dependent on the decisions of Governments and European institutions that are not yet fully defined, that hardly can be inferred only on the basis of market dynamics. In any case, it is likely that these changes will bring an upward trend in the average prices of electricity, equal to current prices of fuel, resulting in a possible change of our position in trade flows. For example, initial estimates suggest that, in 2011, **if Italian combined cycles had had a gas cost in line with European levels** (a key goal of the NES) and had not been penalised by the implicit cost of Green Certificates, then they would have been competitive with respect to the European markets by more than 1500 additional hours per year. Beyond the analysis of a single year, it is clear that what matters are the prospects in the coming years and also the evolution of the technological generation mix. However, there is some convergence of positive qualitative effects that the integration of European markets will have, in terms of trade facilitation, better

allocation of transit capacity, increased degree of competition in individual markets. These starting conditions create a significant potential market for export of energy and services provided by Italian combined cycles to central Europe. We can quantify and value such potential market according to the expected evolution of foreign markets, and turn it into reality by adopting the measures envisaged for the gas system and factoring out the effects of the changes in the electricity mix of central Europe described above.

- Lastly, it will be most important to manage the **integration of our growing non-programmable renewable capacity**. Most notably, the extremely rapid growth of renewables means that we should focus on two key criteria:
 - Network problems caused by **excess production with respect to consumption**, at the national or local levels. Capacity is concentrated in regions that are distant from the main consumption centres and where grid development has not kept pace with the spread of production facilities, especially with distributed generation. This creates local over-production problems under certain conditions (for example strong solar radiation and strong winds combined with low consumption), with risks to the balance and security of the grid and costs deriving from the remuneration of any breaks in production. Already at the present time, at certain times domestic production from renewables is very close to the country's entire electricity demand. This situation is likely to become more common in the future, as available capacity from renewables increases.

The same problem is found on the distribution network, to which a growing proportion of generation from renewables is connected. The distribution networks will therefore have to develop the systems and infrastructure needed to manage local input. And this will require investment.

- A market-related problem that derives in part from the need to provide **adequate back-up capacity** to ensure system security and in part from the effects of the **“crowding out” of the thermoelectric generating stock** (especially CCGT). The large proportion of generation from renewables, which is difficult to forecast and is subject to rapid changes in production levels, means that high levels of reserves are needed, and a high degree of flexibility for those reserves. This leads to intervention by the network operators that could entail higher costs for the system as a result of the need to buy more resources on the dispatching and balancing services markets. At the same time, the thermoelectric stock, which is increasingly necessary to guarantee security of supply in the high-stress conditions described above, is being brought into play for increasingly limited periods. This can be explained both by the increased production from renewables, and – above all – by the slow-down in consumption and the increase in installed CCGT capacity. This has effects on the prices offered at different times of the day (as witnessed by the recent strong price increases in late evening hours, when solar production ceases). In the future, the available supply could also be reduced: some oil groups have already started to halt, other systems may decide to do so in the coming years due to the new emissions limit in the atmosphere which, from 2016, could be applied to the current generation stock, unless some exception is introduced; possible further halts/closures are related to the excess capacity on the market. This would create potential risks to system security in specific regions, as well as the risk of a potential re-concentration of supply.

The initiatives

The above challenges mean that a structured approach and broad range of initiatives is needed. These are set out below, on the basis of the three elements described above:

1. Eliminating the cost differential

To **eliminate the cost differential** with respect our European partners it is essential first of all to align gas prices and renewables incentives, actions already described in the previous paragraphs. These two changes will contribute in a fundamental way the alignment of the Italian energy costs. In addition to these, three actions are considered to be a priority: stepping up initiatives to **develop the domestic transmission network** to reduce bottlenecks and overcome possible market restrictions and reduced competitive margins; limiting current widespread market **distortions and inefficiencies**; and **reviewing the advantages** for specific customer segments.

- From the point of view of **infrastructure**, the transmission **Network Development Plan** should give the utmost intervention priority to the **reduction of congestion between market zones** (by increasing transit capacity by about 5,000 MW) and “limited production areas”. The constraints on the full exploitation of the most efficient plants’ production capacity (and, as described later, that of production from renewables) should be eliminated. To achieve this, the administrative simplification measures introduced during the process of evaluating the Development Plan and those authorising individual projects must be applied to reduce the time required for works to begin. As with electricity power stations in 2002, in this field too, the aim is to have a more effective collaboration between central and regional government. This should be sealed through a specific agreement in order to reduce the time required for prior consultation. It will also be important to have an active participation of the energy regulator in the formal evaluation of the Plan – starting from the 2012 Plan – as a result and according to the provisions of the Third Energy Package, as well as the existence of a tariff regulation appropriate to the level of planning and dealing with implementation efficiency.

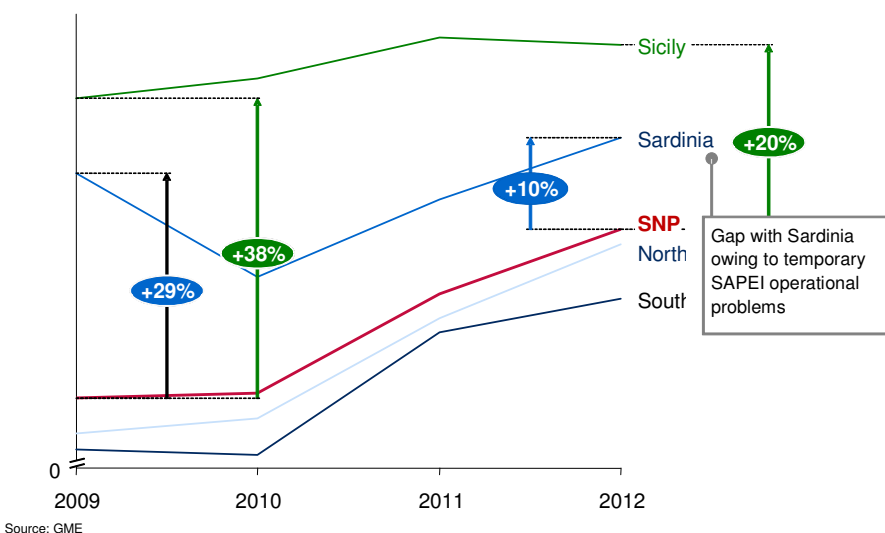
The issue of “price zones” has gradually decreased in significance and today - with the full operational efficiency of the SAPEI undersea cable (connecting Sardinia to mainland Italy) as of the end of 2012, after an initial period of unavailability – we can confidently say that, in structural terms and for a few more years, it will – in essence – only affect Sicily, until the new Sorgente-Rizziconi electricity cable connecting the island to the mainland is built and the Sicilian network completed. In the rest of southern Italy, prices in recent years have essentially come into line with those of the Centre-North zones, as the result of network development policies and the construction of new production hubs. Nonetheless, significant operational constraints remain in the South, on which operators must be pressed to take action.

In addition to allowing the full exploitation of more efficient production capacity and the removal of restrictions to the use of energy produced from renewable sources, the investment scheduled in the Plan will result in significant benefits in terms of **reduction of network losses** and **reducing the costs of the Dispatching Services Market (DSM)**.

TABLE 47

Progressive convergence of zone prices, not yet fully complete for Sicily and Sardinia

Average annual zone prices, €/MWh



Finally, in light of the improvement of the security conditions and increased physical interconnection capacity, **certain security and flexibility measures**, (simple and special interruptible contracts, 'interconnector', exemption from dispatching costs) which account for approximately one billion Euros on the national bill, **will be revisited over time**.

"Other system charges" (other than incentives for renewables, as already discussed) account for about 4% of the cost of electricity for average consumers. A detailed review of bill items has been initiated with the aim of reducing their specific impact, while safeguarding the investments made thus far and the public policies underpinning them. The review on CIP6 incentives for non-renewable sources has already begun, leading in many cases to the early – voluntary – withdrawal from the agreements. It will soon be extended to the CIP6 incentives for renewables and waste (here too, with the prospect of voluntary exit from the agreements). The parameters for the "avoided fuel cost" incentive tariff (Italian initials: CEC) will also be reviewed in the near future based on a proposal of the Regulatory Authority for Electricity and Gas, as envisaged by Law 99/2009, with further savings as a result. The measures already adopted will produce, as a consequence of a voluntary withdrawal of non-renewable plants from the CIP6 scheme and the updating of the parameters for calculating the tariff, a total estimated saving of more than €400 million per year. In addition, further savings could come from the impact of the update of the calculation of the cost of conventional fuels.

The new rules to make up for the delays in nuclear decommissioning (still less than 15% complete more than 25 years from the closure of nuclear power stations) and the creation of a National Storage Facility for radioactive waste and a Technological Park are steps in the same direction. The Storage Facility responds to a precise obligation towards both the European Union and the Regions where the temporary facilities are currently located. It will make it possible to review the overall cost (of the entire life cycle) of nuclear waste management, currently included in the electricity tariff. Even if in this

case it is mentioned for the its contribution to reducing energy prices, the decommissioning plan is a major priority for the Government, as made evident by the positive results achieved in the last year. In fact we could mention the completion of the assessment of numerous projects of intervention stranded for years, the authorization of two decommissioning projects of former nuclear power plants, the effective conclusion of the assessment for the other two scheduled decommissioning projects, the initiation of work on defining security requirements and suitability for possible areas of National Storage locations.

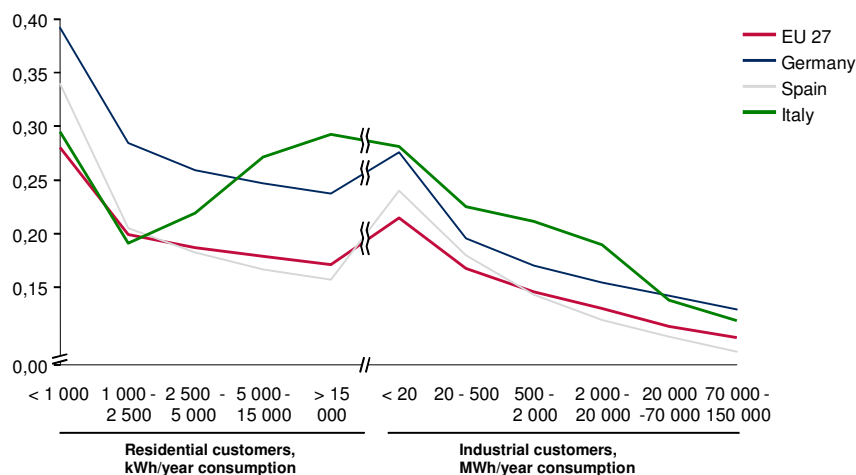
These are the most significant areas of intervention. However, other initiatives too could help keep costs down. For example, greater competition in **hydroelectric** production, by conducting tenders to award concessions close to expiry, and the use of part of the revenue from the bids to reduce system charges, following criteria that will be agreed with the Regions in coming months. In more general terms, a comprehensive **review of the charges covering all the costs of the electricity system** will be undertaken.

In addition, **a further reduction** in system **inefficiencies** could be driven by a greater **rationalisation of the electricity distribution** system. Here, the continuing presence of companies that are sub-optimal in size (one hundred or so distributors with fewer than 5,000 customers still remain, out of a total of about 150) has a negative impact on electricity service costs.

TABLE 48

Some customers in Italy are currently penalised by energy taxation and charges

Price of electricity (taxes included) at varying consumption levels, €/kWh Q1&2 2012



Source: Eurostat

- Lastly, there is potential to rationalise the **advantageous conditions** enjoyed by **certain customer segments**, with a view to achieving greater equity. The **criteria for allocating costs** to consumers will therefore be reviewed. Care will be taken to safeguard highly energy-intensive activities and

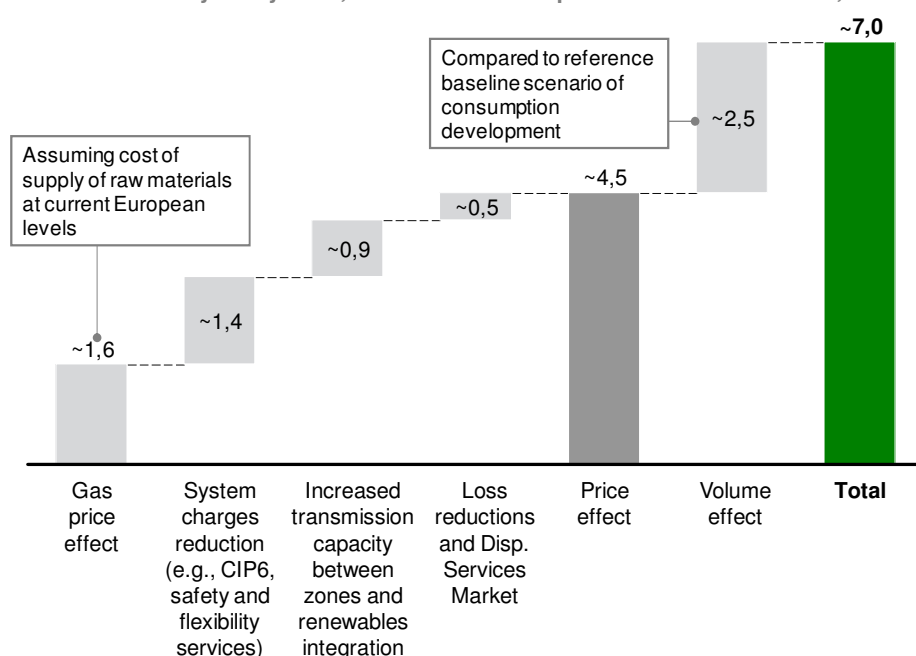
achieve greater equity, to the advantage of highly energy-intensive small and medium-sized consumers. Some categories, the latter in particular, are placed at a disadvantage by the current system. To address this problem, the “Development Decree” sets out criteria and instruments to re-determine the fiscal and related components (e.g., surcharges for renewables) weighing on energy intensive businesses. These take into account not just the amount of energy consumed but also its relative impact on the company’s activity and production costs.

In addition to the above described actions that impact the unit price of electricity, energy efficiency will have a critical role to reduce the volume (not in absolute terms, but compared to the inertial trend that it would have without such actions). The set of economic benefits on electricity costs are shown in the Table below.

TABLE 49

Expected benefits in the electricity bill

Billions of Euros/year by 2020, doesn't include expected incremental costs, estimates



Along with these measures, a determining factor will be the **trend of the relative competitiveness of the Italian generation mix**. As said before, the CO₂ price trends, together with other environmental policies in other European countries, will play a key role in fostering the competitiveness of gas production and in determining the speed of evolution towards a mix composed mainly by gas-renewable. The current price levels of CO₂ emissions, relatively low, favour a mix oriented towards coal fired power generation, and therefore the maintenance or extension of operations of such plants in the next future. Recent proposals at European level (e.g., *backloading*), in line with the objectives of decarbonisation in the longer term, however, aim to support and stabilize the prices of emissions. The Italian Government considers favourably measures aimed at rebalancing supply and demand on the ETS market and to provide a stable price signal to the sector operators. It is important that such rebalancing process be carried out minimizing the negative effects on the European manufacturing competitiveness and together with a

structural revision in the medium to long-term of the tools which support the reduction of emissions in order to avoid duplication of costs (as it will be discussed in section 5.1, going beyond the ETS system with a specific mechanism of carbon taxation extended to all sectors of the economy could be a possible alternative to consider, and it could even replace direct incentives to renewables and energy efficiency).

Moreover, the regulatory framework of the sector and the provisions to protect competition and the market will also need to become operational. Their role is to enable a developing and transparent market; increase the amount of information available to consumers regarding the opportunities and alternatives available (**better informed consumers** can make better choices); and strengthen the role of the demand side in the operation of the market and in bringing down system costs. In coming years, growing demand in the free market and the development of distributed generation and production from renewables will bring significant changes to the role played by consumers. They will be more active in choosing their supplier and in adopting energy efficiency and self-production solutions. This will create a favourable climate for a rapid transformation of consumers' role, from actors primarily to be "protected" to active players in reducing the prices of their supplies.

In such context, as it was said earlier for gas trade, it will be fundamental to define **a timetable for confining these schemes progressively**; currently they are planned for the final sale to actually vulnerable customers, as it is foreseen by Legislative Decree 93/2011 (the adoption of the "Third Package" on market liberalization). Moreover it will be necessary supervise and ensure that sufficient market actors secure efficiency and fairness to all other types of customers, moving towards a higher level of transparency and **simplification of certain aspects of the regulation** (for example, the "readability" of bills); facilitate the development of new **"beyond the meter" services**; ensure a clearer **separation of the brands** of sale companies.

2. European integration

To grasp the opportunities opened up by **European integration** and not simply be subject to the constraints it imposes, we will need to take steps to harmonise our current system with the European one and ensure that all future decisions taken at the national level converge with shared and agreed rules, while ensuring our full participation and influence in the decisions taken by the European Union itself.

Important steps have already been taken in this direction, most notably through the decision to retain the current market model based on *system marginal price* (rather than introduce a *pay-as-bid* system) and the adaptation of the forthcoming new European regulations in the field of market design and trans-border allocation of capacity (such capacity until 2011 was based on annual MiSE decrees and AEEG resolutions, instruments that are no longer consistent, in terms of the timescales and the players involved, with the system mapped out by the new European regulations). Thus, strategic attention should be focused on:

- Drawing up European **network codes** and market **governance** instruments, not least to exploit - in setting common rules - the specificity of the Italian system, through an institutional working group (MiSE, Terna, GME, Regulatory Authority for Electricity and Gas) and regular dialogue with market operators. The provisions of the forthcoming European code for the **allocation of transport capacity – daily and intraday – and the management of cross-border congestions** are particularly important. These are based on mechanisms of implicit allocation through market coupling for the day-

ahead markets and continuous negotiating systems for same-day delivery allocation. For the future composition of the market also the rules regarding the management of the balance by grid operators are of critical importance. These rules, which for the time being are only addressed by ACER guidelines, concern the ways in which balancing resources can be effectively shared between the various countries in the interests of security of supply and cost reduction. A similar effort will be dedicated to promoting a review of the cross-border transport rules and adoption by non-EU countries, most notably Switzerland, of those rules. In this context it will be important to ensure full availability of the existing interconnection capacity for the export of energy and flexibility services.

- Harmonising **operational procedures** (such as operating rules, calculation algorithms, operational timescales and payment regulation) with a view to fostering efficient market coupling. Here, the **question of whether or not to keep the Single National Price (SNP)** is particularly important. The SNP was originally introduced following a comprehensible, and indeed justified, political decision not to create regional inequalities (especially between the North and South of the country) in the supply price of an essential service – electricity. Such inequalities could derive, for example, from shortcomings in the development of the infrastructure (grids and production hubs) and failure to develop a sufficiently competitive market. In effect, had the SNP not been introduced the effects in the past would have been hardly sustainable for much of southern Italy – and would be even today for Sicily and Sardinia (the latter, in the unavailability periods of the SAPEI undersea cable).

In the medium term, the conditions should be created for a discussion on **eliminating the SNP**. In this context, “medium-term” means once the essential national infrastructure to eliminate the discrepancies existing at the time of the liberalisation of the electricity sector (and here the new Sicily-mainland cable will, by 2014-15, play a key role) is complete. The effects of eliminating the SNP are deemed to be positive, for example in light of the greater effectiveness of market coupling systems.

- Increasing cross-border **interconnection capacity**, thanks to the implementation of Terna’s Development Plan and **interconnector and merchant lines financed by private operators** in accordance with Law 99/2009. Terna’s 2012 Development Plan includes a programme to increase the public grid by an estimated 4,000 MW, of which about 1,000 MW on the Balkans side and about 3,000 on the northern border. A further 2,500 MW need to be produced by the selected operators through the procedures set out in the above-mentioned law. Other lines could be added to these initiatives, with a smaller quantitative impact, and built using the interconnector model. However, given the way the European regulatory framework and prices have developed, the impetus for this is likely to be less strong. Moreover, in view of the outlook for the development of energy and electricity service exports, the need might arise to boost domestic connections (e.g., between northern and central-northern Italy and between southern and central-northern Italy).

In a situation of progressive unification of the European market and increasing harmonisation of the rules of the different countries, the ability to **export both energy and dispatching services** for interconnected electricity systems is an opportunity the network operator should grasp – once again with adequate regulatory support. This would exploit the remarkable efficiency and flexibility of the national thermoelectric stock and relieve the economic sustainability problems caused by its current over-capacity. The integration of the balancing markets brings more resources into play. And, by mediating the needs arising from more geographically extensive regions with different predominant technologies (wind, photovoltaic, hydroelectric), it reduces the relative variability of production from renewables. From the economic point of view, it increases competitiveness in meeting domestic needs and places the Italian generating pool, most notably combined cycles, in a position to participate in the supply of dispatching

services at the European level. As the actions to align gas prices take full effect, and as the regulation of the sector succeeds in aligning grid operators' interests with those of the system, this opportunity will become all the more concrete. At the same time, it will be necessary that a European regulation of these services comes about and that the national transmission system operator will share – with neighbouring TSOs – new management criteria and remuneration of dispatching services which take into account the requirements of expansion of generation from non-programmable renewable sources.

3. Integrating renewable capacity

To integrate the **growing amount of renewable capacity** to its best and fullest effect, it will be necessary to address both the network problems caused by over-production and those related to system security arising in a market where the thermoelectric stock is gradually being “crowded out”. This “crowding out” is a result of increased production from renewables, and – above all – of the slow-down in consumption and the increase in installed CCGT capacity.

- Potential **over-production from renewables** at the local or national level will be managed as follows:
 - First, **pre-emptively, with effects on new plants**, by identifying critical areas with a high concentration of non-programmable renewables (GSE, the energy services operator, has begun an analysis in this direction), restricting the power that can be incentivised in those areas and through the adoption of specific prescriptive measures in terms of grid service delivery. In a possible scenario of a remarkable increase of solar capacity at grid parity conditions (therefore excluded from public incentives), it will be increasingly important to establish monitoring mechanisms and develop a better ability to forecast the access of further capacity to the grid, to avoid severe problems for the electricity system. In this respect, the creation of a full information system linking the institutions that authorise the plant (regional, provincial and municipal government), grid operators, and the GSE is vital. So too is the (already envisaged) direct or indirect participation of network operators in the authorisation procedures for larger plants. In order to give maximum effectiveness, such actions will be integrated and coordinated by the network development plans and the outlooks, including temporary ones, developed by the TSO for the new capacity market.
 - More specific interventions **on the grid** include the following:
 - In the short term, a targeted recourse to **interruptions** to imports and/or production from renewables in the event of “overflow”, also envisaging adequate monitoring mechanisms.
 - In the medium term, a strengthening of **transmission lines** from the areas with the highest concentration of renewable generation (initiatives already envisaged in the Network Development Plan), and of distribution lines. In case of renewable peak production, it is considered appropriate to enhance this resource as far as possible also thanks to the export potential on the northern border.
 - In the longer term, it will be necessary to develop advanced monitoring systems both for the distribution and the transmission network (**smart grids** or, more in general, measures to increase grid flexibility). Success in fully integrating renewables is

linked, to a large degree, to grid efficiency. Structural adjustments to the distribution networks will therefore be necessary; initially conceived as passive, these networks have now become active as they are sources of **distributed generation**, the purpose for which smart grids have essentially been developed.

The development of smart grids will need to go hand in hand with the installation of energy storage systems, both pumped hydro systems (including small-scale ones) and battery systems serving the grids in the most critical areas. As discussed in depth later on, Italy intends to concentrate – including from the industrial perspective – on batteries, as a major opportunity. The focus at present starts from experimentation, but the goal is to launch a major installation programme when the economic fundamentals for the technology are more favourable.

- With respect to a safe management of system needs flexibility in case of an important increase of production with poor programmability and rapid changes. In the present situation of overcapacity, the network operator will be able to guarantee continuity with existing service remuneration mechanisms. This fact will be more evident if the **Dispatching Services Market (DSM)** will fully be taken advantage of, with the creation of the necessary reserve and real-time balancing. In order to make the management of supply of resources in reserve and balancing more efficient a better DSM segmentation will have to be implemented which will allow a better differentiation of the tenders based on the services offered and the performance of the plants and which will take into account the network operator's need to be able to have more flexibility in respect of the impact of the penetration of non-programmable renewable. With regard to guaranteeing the **system adequacy**, in a market where the thermal power plants are gradually being crowded out:
 - In the medium-long term, a well-calibrated and stable **capacity payment mechanism** (capacity market) should be introduced, in absence of adequate price signals on the energy market, in order to guarantee the necessary reserve margins.

In this sphere, it will soon be necessary to take decisions at the national level, with an evaluation of Terna's proposal, based on the Regulatory Authority for electricity and gas guidelines. Capacity payment will be based on a market mechanism through auctions, for which Terna has been tasked with creating demand curves expressing the "adequacy target" for each area, understood as the unit value of productive capacity relative to the capacity level. An essential characteristic of this new system must be efficiency and the **minimisation of overall costs**, avoiding unnecessary burden on consumers. In other words, this system should not be seen as the easy solution to the phase transition of overcapacity that the "conventional" production is going through. The overcapacity has to be exploited toward an enhancement of the role of exporters (both energy and services) that we can play in the neighbouring markets. Once a stable power remuneration system has been set up (one, therefore, that replaces the current provisional system) it will provide an additional instrument to manage the national electricity system in secure conditions and stimulate the necessary ability to forecast its long-term needs.

The Regulatory Authority for Electricity and Gas set 2017 as the date the new system will enter into force. By that time the configuration of the electricity system is unlikely to be very different from the current one. Nor is the system likely to require the development of new generating capacity, at least as an effect of general phenomena connected with increased

demand. It is possible, on the other hand, that continuing over-capacity and underutilized plants in addition to the entry in 2016 of new limits on emissions into the atmosphere will create a need to **restructure and “downsize” the thermoelectric generating stock**. This situation would need to be monitored closely to prevent a re-concentration of supply, which would be a negative development. At the same time, the need could arise to satisfy a need to boost the margins at “zonal” or local level. This context makes it possible to guide the development of the auctions and the drafting of the technical-economic parameters for implementation, ensuring that the service is efficient, as well as effective, and contains the overall costs.

Moreover there may be also in the future a proposal for a harmonized regulation on "capacity markets", due to the **relevance of the topic at the European level** and the diversity of solutions currently adopted or envisaged by other countries. And it would be desirable also to complete the process of definition of Network Codes. It should be underlined that recent indications from the European Commission are strongly cautious with respect to capacity markets, both because they might represent an obstacle to the development of the internal market and in certain cases they can be considered State aid. These guidelines should be taken into account when assessing the proposal for the Italian system.

- On a more fundamental level, we cannot rule out that the significant changes currently under way, with a mix less and less based on supplies subject to variable production costs and a shift to generating systems where production is determined solely by fixed costs or regulatory mechanisms, might open the way to a **more in-depth review of the market model**. This prospect will need to be further studied in the framework of unifying the rules at the European level, since adoption at individual country level would only make the market harmonisation goals more remote.

Overall, the set of measures designed or already under way will result in a potential **benefit on the country's electricity bill up to around €7 billion** per year in 2020 compared to 2012. An important part of this (about 1.7 billion) is expected as a result of the reduction in the prices of gas for thermal generation. Additional price efficiencies are represented by the result of the 'spending review' of system charges; other inefficiencies are expected to be removed as network losses and bottlenecks. Finally, about €2.5 billion per year savings are expected from energy efficiency measures, compared with an inertial trend of demand in the absence of measures.

4.5 Restructuring the refining sector and the fuel distribution network

The objectives

Refining and fuel distribution, sectors of huge importance to Italy, are currently undergoing major changes and difficulties. The Government's principal objectives in this sector are:

- **To accompany the refining sector towards a progressive restructuring** and modernisation in a period of severe structural crisis, in order to increase its competitiveness and efficiency and to safeguard the industrial and employment importance of the sector, with benefits too in terms of security of supply.
- **To contain oil product prices and improve the quality of the distribution service for consumers** by rationalising and modernising the operational models.

The refining sector - Background

The European refining sector, like the entire petroleum downstream sector, is undergoing a **severe crisis**, with numerous proposals of divestment and closure of plants (in Italy, the Tamoil refinery in Cremona in 2011, and TotalErg in Rome, as well as temporary halts to production in the Eni refineries in Marghera and Gela, and the API facility at Falconara). Since the start of the refining crisis in Europe (2008), divestment and closure has been proposed for 33 plants out of a total of 104 currently operating, while about 75% of European refining activity is estimated to be economically unsustainable. This difficult situation can be explained by several factors:

- **The fall in demand** linked to the difficult economic situation in Italy and, indeed, throughout the European continent, with lower commercial and private traffic on the roads. In the last 10 years demand in OECD countries has fallen by 5%, compared to a 50% rise in demand in non-OECD countries. The centre of gravity of consumption and refining is therefore shifting to Asia, driven by demand for transport fuel. Difficulties experienced by some Italian refineries following the **embargo** decided at the European level on crude oil supplies from **Iran** add to this situation. This had a sharper impact on Italy, since our refineries' processing cycles are based on heavy crude oil, for which Iran was our major source of supply. As a result of the embargo, Italian refineries have had to switch to higher-priced crude oil from other markets, the Saudi market in particular.
- **Structural changes** in the refining sector's consumption market, which have a long-term timeframe for development:
 - The gradual **replacement of certain oil products with other sources**, most notably the replacement of heating oil and of fuel oil by methane for thermoelectric generation. The use of petroleum products is now concentrated mainly in the transport sector (and in the petrochemical, bitumen (for roads) and lubricant industries).
 - In the transport sector, the gradual reduction of consumption resulting from **increasingly energy-efficient engines** and the growing use of biofuels.

- Europe's determination to follow a long-term process of significant **decarbonisation of the economy**, as defined in the **Roadmap 2050**, even as global demand for petroleum products, driven by non-OECD countries, continues to grow.
- The need to **adjust refining cycles**. These were initially conceived to maximise petrol yields, and are thus no longer adequate to meet the higher demand for medium distillates. However, given the massive investment needed and the contraction of the European market, this adjustment is not being made.
- **Increasingly strong international competition**, mainly from large, efficient refineries located in Asia, albeit sometimes operating in competition-distorting conditions (e.g., lower environmental, safety and social protection constraints, and subsidies of various kinds).

The refining sector – The initiatives

Having overcome the impact of the embargo on Iranian crude, the Italian refining industry now faces a structural problem, which will inevitably require a gradual reduction of capacity and a focus on advanced production methods and higher added value. The principal measures addressed to the refining sector aim, therefore, at **facilitating the restructuring or conversion** of production capacity while changing the emphasis to higher quality products, **provide equal conditions** with those of non-EU countries, facilitate the **competitiveness of the market for storage** of petroleum products and **develop biofuels**, especially second generation (a topic already discussed in the section on renewables).

- As regards the **restructuring and conversion** of refining capacity:
 - Under the provisions of the “simplification” law, a survey has been conducted on the **strategic importance** of refineries, major logistics structures, coastal storage depots for mineral oil and aviation fuel, vegetable oil (for energy use) production plants and oil pipelines of national interest. This means assigning administrative responsibility for strategic installations at central Government level, which will exercise that responsibility in agreement with the Regions, so as to manage initiatives in the sector in a unified and coordinated manner. **Simplified fast-track authorisation procedures**, underpinned by the provisions of the Development Decree, have also been introduced for the **conversion of refineries** into storage facilities and to enable plant to continue operations even during the conversion work.
 - There is intention to promote a **restructuring plan** for the sector and to identify strategic refining capacity and the possibility of new investment to rationalise and modernise production cycles. The focus here will be improved environmental performance and higher-quality refining products. To this end, a **working group on refining** has been set up, with the participation of the social partners. A **European Forum on Refining**, coordinated by the Commission, has also been proposed. Its task would be to develop and implement all the support measures agreed for the sector.
 - Meetings at the Community level have also been promoted, making it possible to bring the seriousness of the problems faced by the refining sector, not least their knock-on effects on Europe's economic system and on employment, to the attention of the Commission and Parliament. The intention is to **take forward and develop this action at the EU level** with a

view to adopting support measures and to prevent that the new regulations could aggravate the situation in the sector. It is important to reiterate the strategic nature of the refining segment, and the risk we run of becoming highly dependent on imported refined products. The Commission has taken the situation on board and has undertaken to **verify**, at the drafting stage, **the potential impact of new European legislative proposals on the refining sector** (e.g., in the cases of the Fuel Quality Directive and the Roadmap 2050).

- As regards the alignment of **competitive conditions with non-EU countries**, Italy has proposed, at Community level, **the introduction of a “green label”** for products refined in Europe. Under the proposal, only those products obtained using industrial processes meeting European environmental standards could be used in Europe (this measure applies to the same sphere of sustainability criteria as established in the Directives on biofuels and fuel quality). As far as Italy itself is concerned, a first step has been taken to implement this measure, with the adoption (in the recently approved Development Decree) of an authorisation mechanism for imported oil products. This would make it possible to verify the environmental footprint of non-European products and its application will be assessed in 2013.
- Regarding the market development of storage capacity of petroleum products, the Legislative Decree transposing Directive 2009/119/EC on the **obligation to maintain minimum stocks of petroleum products**, has entered into force on 1 January 2013. The new law aims to minimise the overall costs of the new system, by envisaging the intensive use of existing private or publicly owned storage infrastructure. With the adoption of the Directive in Italy, a **Central Stockholding Entity (CSE)**, like the ones already established in nearly all other Member States, has been set up. Its task will be to manage stocks for which the State is responsible and ensure that they are both flexible and readily available. “Acquirente Unico” (the Single Buyer) is in charge of this particular task, also in order to minimise management costs, especially during the first phase. In such context a **logistics platform** has been set up by the Gestore del Mercato Energetico, so that a market for petroleum products storage capacity can develop. Operators, and the CSE itself, will be able to operate on the market to obtain logistics services in an efficient and transparent manner, not least in view of the strategic interest of the sector. So it will be fundamental:
 - **Develop the CSE’s skills** in order to allow it to play a commercial service role in maintaining the stocks even for third parties, so it can reduce stock holding charges, especially for small and medium-sized operators.
 - **Develop the use of logistics**, both independent and integrated, also through the launch of the trading platform by 2013. This will allow the removal of existing barriers and of possible situations of local oligopoly, which have an influence on the final fuel price; moreover it will allow to meet the new requirements on oil stocks and the usage by the other Member States’ operators for their stock obligations.

The fuel distribution network - Background

The fuel distribution sector in Italy suffers from **major structural problems**, which are evident when compared with the structure of the sector in other major European countries. Italy’s distribution network is extremely **fragmented**, with high numbers of filling stations (23,000, about double the number of comparable size countries). They are limited in size on average (in terms of litres delivered/sold and square metres per sales-point), **old**, and **poorly diversified** in non-oil products (which account for only

3% of revenues, compared to over 30% in other countries). The situation is exacerbated by the fall in sales over the last three years. This is having a lose-lose effect: **low profitability** for service stations go along with **relatively high unit prices** for Italian customers (who have the sole advantage, with respect to other countries, of a more widespread network and higher numbers of service staff).

For service stations owned by oil companies, the segment has thus far been characterised by the predominance of the **commodate (gratuitous loan) model**. This form of concession is tied to a sole supply contract for fuel from the oil company, which decides on recommended prices and discount policies. In Europe, on the other hand, the agency model is more widespread. The sustainability of the Italian system has been undermined by a situation of both falling margins and demand, with strong trade union tensions and rigidities in the sector hindering rationalisation. The problems pertaining to restructuring and the competitiveness of the fuel distribution network have been keenly felt recently.

The fuel distribution network – The initiatives

The initiatives to be introduced in this context aim to **increase the competitiveness of the fuel market and influence price levels** by enhancing consumer protection and increasing price transparency and the quality of the service provided. Significant measures were introduced by the recent Liberalisation Decree Law.

- Many of the initiatives are designed to **promote a higher degree of liberalisation in the sector**. They include:
 - Increased use of **self-service** arrangements, not least since this form of refuelling is more cost-effective for customers. It will be achieved through the obligation to install self-service equipment in all service stations by 2012 and the possibility (thus far not envisaged) of having totally automated service stations, without restrictions, outside urban areas (the so called “ghost stations”).
 - The **removal of many constraints on**, and the wider availability of **non-oil products and services** (newspapers, cigarettes, etc.) – a measure that has met the opposition of other categories of shop owners. The development of non-oil is essential if concession-holders are to gain higher margins in a period of declining demand for fuel.
 - **Improved communication and transparency** with respect to fuel prices to users. Service stations are currently required to display fuel prices, while the requirement to highlight the first two digits after the decimal point will be defined more clearly, as will the minimum features required for posters, billboards and the like. This is aimed at ensuring that the prices actually applied to consumers are more visible and transparent, without penalising existing investment in posters and other display material (so as not to burden companies with additional costs). In addition, after a brief trial period, the new method of calculating the “Italy price” has been introduced. This method, based on a weekly average, will make it possible to monitor the price actually offered to customers during all week days, taking into account self-service, discounts and the different types of service on offer at different times of the day.

This should bring the methodology used to calculate the average Italian value more closely in line with the one used in other EU countries, where the prices reported to Eurostat are,

essentially, self-service prices. As a result, it should be possible to have a better perception of the actual “Italy gap”, which has been a focus of disputes. Moreover, at European level such kind of process of adjusting statistical reporting has recently started, with the goal of increasing its representativeness.

- A first step to **eliminating the “sole supplier” constraint** was the introduction of the possibility for service station operators, who also hold a petroleum permit, to be released in part (50%) from that obligation and so obtain some of their supplies directly on the wholesale market.
- Some regional laws in Italy envisage an obligation for new service stations to also supply **liquefied petroleum gas (LPG) or vehicle-quality methane**. The new law has clarified that the obligation cannot be applied universally in cases where it entails economic burdens or where the technical obstacles would be disproportionate with the aims pursued in promoting the wider use of these types of fuel.
- Lastly, the arrangements for **electronic payments** are being reviewed with the aim to extending this type of payment. The aim here is to increase operators’ safety and improve services to customers.
- As regards **rationalising** the fuel network and contractual arrangements, the following steps are envisaged:
 - The implementation of measures for the **closure of service stations defined as “incompatible”** (i.e., with the town planning laws, the highway code, etc.). The ministerial decree on the Fuel Network Rationalisation Fund, soon to be issued, will introduce measures to refinance for three years and extend the scope of the fund to include grants for the environmental costs entailed in cleaning up former service station sites. This instrument will also be used to incentivise rationalisation measures to eliminate network inefficiencies, by introducing grants for incompatible service stations. The funding would remain in place, and be increased if necessary, until the stations are closed down.
 - The introduction of **new types of contract** to regulate relations between oil companies, independent operators and “tied” operators. This major innovation will make it possible to flank the current “gratuitous loan” contract and the connected sole-supply contract with other forms of contract. These include franchising, commission and branch rental contracts, to which various forms of supply contract can be linked. In cases where the trade unions fail to reach agreement on the new contract categories, the Ministry will intervene directly, so that the new contracts can begin operating by the end of 2013.
 - The possibility for sales-point owners and operators to **redeem their facility**, for example by setting up consortia or other forms of affiliation, in order to increase the number of independent operators and **“white pumps”** (fully independent filling stations that get all their supplies on the wholesale markets).
 - Incentives to encourage the wider use of **automotive methane**, which is peculiar to the Italian network (about 900 filling stations and counting, albeit concentrated in certain Regions and hardly present at all on the motorways). More extensive use is currently penalised by factors such as the rules governing capacity allocation at redelivery points on the network;

National Energy Strategy: for a more competitive and sustainable energy

4. The priorities of action, in detail

4.5 Restructuring the refining sector and the fuel distribution network

such factors will be eliminated. The constraints hindering penetration on certain roads or motorways, such as the rules governing the distance between facilities and the arrangements for fuel delivery and sale, will also be reduced. At the European level, the Government will make sure that this unique nature of the Italian sector is taken into consideration, to ensure that tax regulations that would be unsustainable for it are not introduced.

Further to the provisions of the Liberalisation Decree, a **fuel wholesale market** will be set up as part of the implementation of the recently adopted minimum stocks Directive: a “fuel exchange” where independent owner/managers and operators and can also get their supplies. As liquidity grows in this market, it could also provide benchmark price indicators for comparison with the traditional Platt’s benchmark on the Mediterranean market, which is currently used for transactions in Italy.

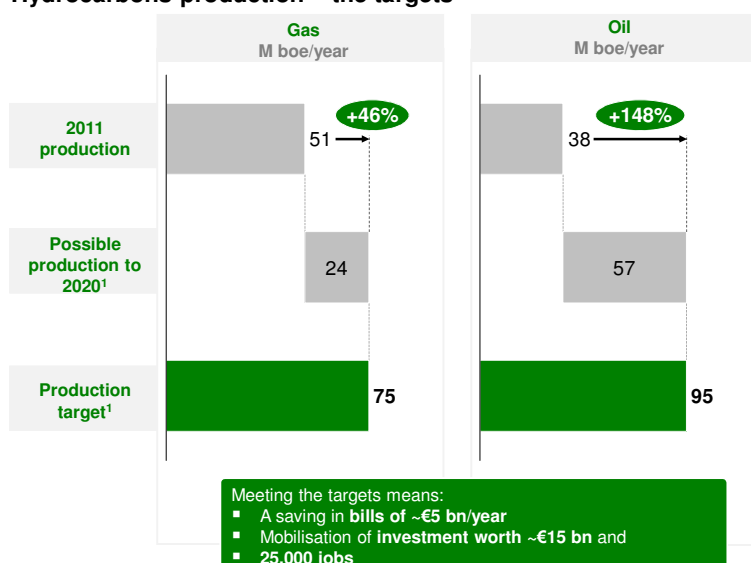
4.6 Sustainable hydrocarbons production in Italy

The objectives

Italy is heavily dependent on fossil fuel imports, **with a negative energy** trade balance of €62 billion in 2011 and the adverse consequences that this implies for security of supply. At the same time, the country has substantial gas and oil reserves, the largest in Europe after the Nordic countries. We are therefore duty-bound to exploit these resources, given the benefits they offer in terms of employment and economic growth in a sector where Italy can boast notable, and widely recognised, expertise. That said, we realise the potential environmental impact. It will be essential, therefore, to show the greatest possible care to prevent any potential negative repercussions (while noting that Italy has one of the best records of any country in the world as far as accidents are concerned). The Government does not intend to develop projects in sensitive areas offshore or on land; nor, and in particular, does it intend to pursue shale gas extraction. For Italy, the reference model in this sector is that of the Scandinavian countries (especially Norway), who managed to combine a remarkable industrial, economic and social development with strong attention to issues of safety and environmental protection.

TABLE 50

Hydrocarbons production – the targets



¹ Does not include possible decrease of around 7.4 million boe/year (oil and gas)

The new energy strategy proposes to:

- **Develop** domestic hydrocarbon production, both gas and oil, with a return to 1990s levels, **while meeting the highest possible international environmental and safety standards.**
- **Support** the **industrial development** of a sector that starts from a position of **international leadership** and a presence in the most important global markets, and is an important driver of investment and employment.

In terms of quantitative objectives, in 2020 we expect to:

- **Increase production** by about 24 million boe/year of gas and 57 million boe/year of oil, increasing their contribution to the total energy requirement from ~7% to ~14%.
- **Mobilise investments of about €15 billion** and create **25,000 new jobs**, with an annual **saving in energy expenditure of about €5 billion** in view of the reduction in fossil fuel imports.

The development of production will be implemented by **reducing the total number of on-shore and off-shore infrastructure (wells and platforms)**, thanks to the optimization of the design and use of advanced technologies. This will ensure a significant reduction soil occupation (we estimate a reduction of about 5% of the infrastructure compared to the current one).

Background

- At least in the medium term (2020/2030), Italy will remain **dependent on fossil fuels**, especially gas and oil. In 2010, about 86% of our energy requirement was covered by fossil fuels, mainly oil (41%) and gas (37%).
- Over **90% of hydrocarbons** in Italy are **imported**, a much higher proportion than our European partners. We import 91% of our gas (more than 70% of which from just 3 countries: Russia, Algeria and Libya), and 93% of our oil. This has a major impact on:
 - **Energy security.** With respect to the EU average, we are more dependent – by about 30 percent – on imports (84% vs. 53%).
 - **System costs.** Our energy imports bill totalled about €62 billion in 2011.
- Italy has **significant national hydrocarbon resources** that could potentially be exploited, especially in the south (a factor which is not widely known) and is one of continental Europe's leading countries in terms of available reserves:
 - Total potential reserves amount to **700 MTOE** of hydrocarbons (since exploration has fallen to minimum levels in the last 10 years, this figure probably falls well short of the actual level). If we consider that current annual production amounts to 12 MTOE, this equals to a coverage period of **over 50 years**, and over 5 years if we consider current total annual consumption of about 135 MTOE of gas and oil.
 - If we exclude the Nordic countries, with their significant off-shore reserves, Italy's proven reserves are **the most significant of continental Europe**.

TABLE 51

Italy is one of the leading European countries in terms of hydrocarbon reserves

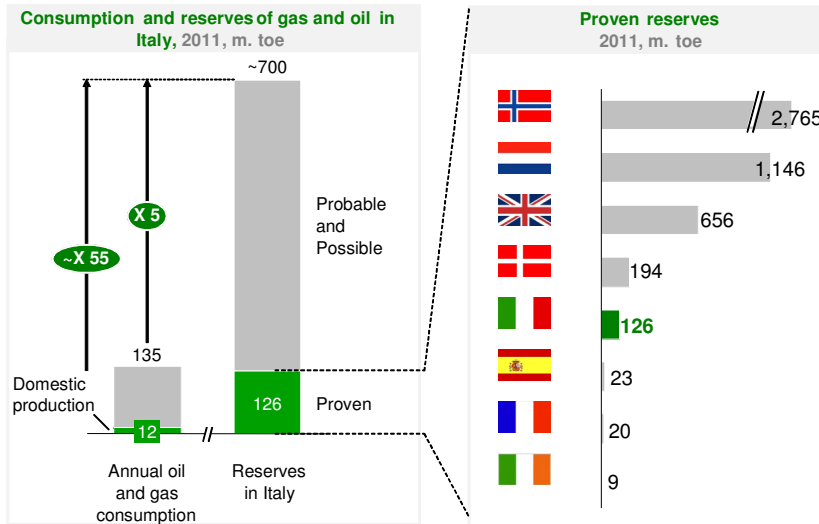
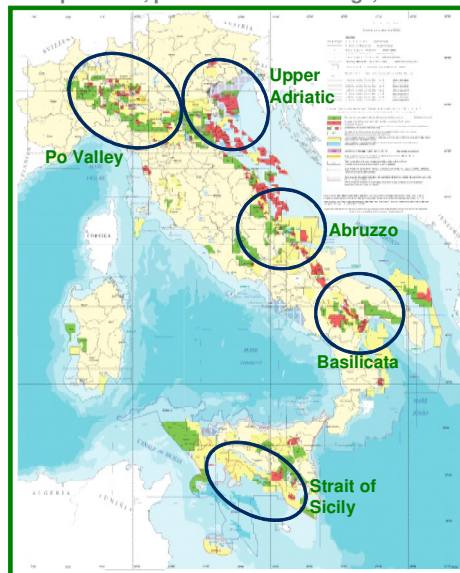


TABLE 39

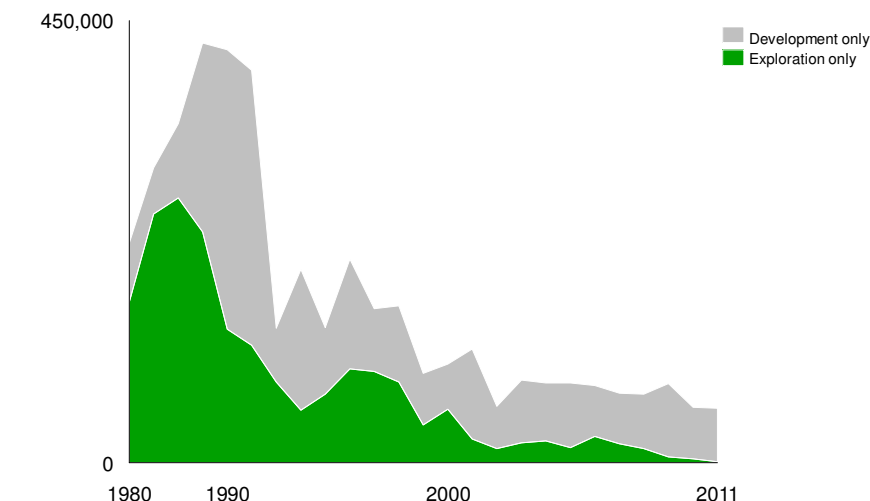
More specifically, 5 zones in Italy have a high potential

Map of licenses for exploration, production and storage, 2011



- **5 zones** in Italy offer a high development potential (see Table 39): the Po Valley, the Upper Adriatic, the Abruzzo Region, Basilicata and the Strait of Sicily.
- Italy has also developed a **strong industrial sector**, with a notable history, expertise and international presence, in the upstream spin-off segments. The sector includes over 120 active companies; more than 65,000 jobs; sales of over €20 billion in 2010, of which €5.5 billion in Italy alone; and research and development spending of €300 million.
- The upstream sector, in Italy, also stands out for its (very) **best practice and safety and environmental protection standards**. For example, it can boast excellent performance levels at both the drilling and exploitation stages.
- Opportunity to mobilise investment in this sphere have, however, been **limited by a legislative framework and decision-making processes** that have slowed down or even halted many initiatives over the last ten years. Waiting times for permits can be up to 10 times the legally envisaged timescales, at both the exploration and production stages, and are much higher than worldwide averages. In recent years we have seen waiting times for permits grow even longer. Three problem areas stand out:
 - The complexity and long timescales, of the **authorisation system**. For example, in Italy exploration and production can only go ahead once 2 or 3 different permits (case based) have been received. In some European countries (for example Norway or the United Kingdom), a single authorisation permit is granted for each zone identified and evaluated in advance by the competent authorities. The recent draft European Directive on this subject removes the distinction between licenses for exploration and for production, which it deems run counter to practice. In Italy, the licensing procedure includes State-Regions agreements, without a deadline for the latter to express an opinion. In all the other producer countries licensing decisions are taken at the central level. It should be noted that the marked slow-down in exploration and production in Italy occurred after 1999, when constitutional reforms changing the roles of **central and regional government** in the decision-making process were introduced (see Table 53).
 - **Restrictions on offshore activity**. Offshore activity is heavily influenced by the prohibitions introduced by Legislative Decree 128/2010. This Decree banned such activities in many areas and in effect blocked most offshore R&D work and led to the cancellation of projects worth €3.5 billion. No other European country has adopted similar laws. Norway, for example, has no generalised ban although certain areas (the Lofoten Islands, for example) are “off-limits” for environmental reasons. Such reasons are in any case taken into consideration in Italy – by the legislation to defend protected areas, to which the Government intends to devote the utmost attention.

TABLE 53

Exploration in Italy has been essentially stagnant for nearly 10 yearsTotal metres drilled, sum of exploration and development activities, 1980-2011¹

¹ Data for 1983-1985 and 1987-1990 not available
Source: MISE

The initiatives

To attain the goals described, two types of initiatives will be required. First, it will be necessary to enact legislation or regulations that guarantee compliance with the highest international safety and environmental protection standards and simplify the bureaucratic procedures for issuing permits. And second, schemes to support the industrial sector and encourage the further development of technological “hubs” will also be needed. More generally, new investment opportunities and environmental protection requirements should not be viewed *a priori* as mutually exclusive. Projects should be evaluated on the basis of rigorous scientific analyses with the involvement of local authorities and communities so that they can proceed – where they prove to be feasible – with all of the necessary guarantees in terms of safety and environmental protection.

- The new **legislative and regulatory provisions** will be specifically designed to:
 - **Strengthen the safety measures governing operations**, particularly by implementing the offshore safety measures envisaged by the draft European Directive. The Government **does not intend to develop projects in sensitive areas** offshore or on land; nor, and in particular, **does it intend to pursue shale gas extraction**.
 - **Bring the procedures for issuing permits in line with new European standards** (offshore safety Directive currently being issued). Specifically Law Decree 83/2012 has granted the necessary financing of the new supervisory structure in order to set up the required separation between the subject responsible for the administrative and authorization procedure and the competent authority for the supervision. Moreover, in the view of a general revision and simplification of the sector laws, the adoption of a single authorisation permit for exploration and production should be taken into consideration.

- Develop the **spin-offs for the local economy and employment** in the Regions concerned. Part of the increased revenue from extracting hydrocarbons will therefore be used to develop infrastructure and employment growth projects in the areas where production plants are established and in neighbouring Regions, as has been recently introduced with the "Liberalisation" decree law.
- Develop production, particularly of natural gas – with due respect for the **offshore protection restrictions** in the (recently up-dated) Environment Code – while keeping safety margins at levels equal to or higher than those of other EU countries and maintaining the current safety and environmental and landscape protection constraints. The recent "Growth" decree law, of June 2012, established a **fund to boost environmental, security and marine protection monitoring** activities, financed through an increase in royalties. The decree also envisages the **standardisation of the criteria used to identify the areas where oil and gas extractive activities** will be prohibited. These are: offshore zones up to 12 miles from the coastline and marine and coastal areas subject to environmental protection constraints.

The decree also introduces a provision **safeguarding permits already issued** and the licensing procedures under way when Legislative Decree 128/2010 entered into force (i.e. on 29 June 2010). The aims here are to: be able to exploit any reserves already discovered, mainly of natural gas; eliminate disputes with operators who have already set up infrastructure; avoid the potential cost to the Government of compensation or damages payments to operators and/or of decommissioning (dismantling and clearing) installations that never even began operating.
- **Make available the data and technical information** relating to the drilling and geophysical research already carried out in order to promote the development of natural resources and to make the subsurface data available to the scientific community, in a transparent and reliable way.
- It will be important to accompany new legislative and regulatory provisions with initiatives to support the system and **boost the country's technological/industrial hubs**. Hydrocarbon production has led to the development of "energy districts" in Emilia-Romagna, Lombardy, Abruzzo, Basilicata and Sicily that could be revitalised in line with the further development of extraction activities. For example:
 - **Emilia-Romagna** and **Lombardy**, already in leading positions at a global level, could further develop their roles as centres of technological excellence.
 - **Abruzzo** is home to some of the major oil services companies, whose facilities could be used as logistics hubs for the development of new extractive activities in southern Italy.
 - The industrial potential of **Basilicata**, which plays a strategic role in our national energy policy, has not yet been exploited. Measures here will focus on developing infrastructure and services, building up the industrial fabric to facilitate the transfer of economic activities, speeding up licensing procedures and developing an administrative system that is adequate to the size and extent of the industry and its investments.
 - The further development of the oil sector in **Sicily** could focus on boosting extractive activities, developing port structures and building up ship-building and repair. This could act

as a strong driver in boosting spin-off activities. The extractive activities themselves could benefit, especially in the offshore sector, with significant – and positive – effects on employment.

One of the most important **enabling factors** in revitalising production is improved support from the MiSE. The Ministry has begun a review of its internal project management procedures for permit authorisations. Additional human resources and instruments will be devoted to project management and the Ministry's relations with local government and operators.

4.7 Modernising the system of governance

The objectives

Energy is an issue that brings together competences, initiatives and decisions at various levels: international, European, State, regional and local. At the same time, investment in the sector requires a clear, stable framework and guidance for the medium-long term; a legislative and regulatory framework that evolves in a foreseeable manner; and transparent and efficient government. To achieve these conditions, and on the basis of an agreed energy strategy, we will need to:

- **Strengthen** and coordinate **Italy's participation** throughout – but **especially in the advanced stages of** – the international (and especially European) decision-making processes that determine many of the long-term choices and shape the various legislative and regulatory instruments.
- Improve and simplify **horizontal coordination at the national level**: interaction on energy issues by the various ministries concerned, the Regulatory Authority for Electricity and Gas, network operators and service providers.
- Improve or introduce new forms of **coordination between central and regional government** in matters concerning legislative functions, and between **central, regional and local government** for administrative matters. The aim here is to provide a framework of clearly defined rules and considerably **simplify and accelerate authorisation procedures**.

Background

The international context

The country's actions in energy matters are strongly influenced by the international – and especially Community – context. **Italy's participation in and monitoring of European decision-making processes is at times inadequate:**

- Before the Lisbon Treaty came into force, the founding treaties did not contain specific provisions governing the EU's intervention in the energy sector. This notwithstanding, through its jurisdiction in competition and environmental matters, Europe has given a decisive impetus to the construction of the single energy market and the promotion of renewables and energy efficiency. The **Lisbon Treaty** explicitly set out the **Union's jurisdiction** over measures governing security of supply and the satisfactory functioning of the energy market, and the promotion of network and grid interconnections and energy efficiency.
- The influence of European intervention is witnessed by the fact that a **significant part of our domestic legislation** in energy matters in recent years **stems from Community sources** (for example, the 20-20-20 Climate and Energy Package, or the 3rd Energy Package). Moreover, many of the most complex issues in authorisation procedures (Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA), Integrated Environmental Authorization (IEA), the impacts assessment on specially protected sites) are handled using procedures regulated by Community law.

- **At times, Italy fails to monitor or pay sufficient attention to negotiations** in which it is taking part, on issues having a significant impact on the sector, or fails at the onset to evaluate their economic or social impact.

National context

- Where **Community issues** are concerned, each Government Department contributes to the drafting of legislation concerning its sector, in the context of the European Council working groups. Coordination is the responsibility of the Inter-Ministerial Committee for European Affairs. Its task is to facilitate the examination of issues pertaining to Italy's participation in the European Union and coordinate the ministries concerned, with the possibility of involving regional and local government where necessary.
- Turning to **domestic decision-making processes in legislative matters**, the main problem concerns **delays in issuing the ministerial decrees** required to transpose primary legislation. This applies above all to inter-departmental laws that require **concerted action** and which are often issued months after the legal deadline. On the other hand, **the current institutional framework at the national level seems to be adequate**, generally speaking, to ensure an efficient and effective functioning of the markets, providing public institutions with tools to guide their results, and is probably among the most advanced in Europe. This structure provides for a separation between the public function of orienting and programming, as well as the preparation of the basic rules of markets functioning, attributed to the Government and Parliament, and the function of regulation and promotion of competition, entrusted to the independent sectoral Authority (AEEG). Finally, the role of ensuring compliance with the competition rules and sanction violations is given to the Competition (Antitrust) Authority. The separation of institutions that preside over the two functions, orientation and programming on the one hand and regulation on the other, combined with a proper definition of their respective spheres of competence and rules of their interaction, helps to bring out, not only the capacity for effective governance of markets, but also, the role of the latter in promoting efficiency and innovation.

For instance, with reference to network infrastructure development, governmental authorities should take decisions that promote positive externalities (reducing the negative ones), in order to respond to the objectives of security of supply, territorial rebalancing, markets connection providing conditions for the development of productive activities, interconnection with neighbouring countries and environmental protection. These goals are pursued by incorporating objectives of general interest in the system of conveniences of the operators, using tools paid for by the general public and incentive based support schemes. In turn, the specific Authority will develop appropriate tools to facilitate the proper implementation of the development goals of the network, avoiding the possible distortive effect on efficiency and market competitiveness, for example through the provision of a tariff methodology suited to enabling the financing of investments or criteria to ensure a proper coverage of the actual public service obligations. In the field of networks, the Italian regulation has stimulated the infrastructure development and ensured a significant improvement in the service quality.

As for the relationship between **the State, the Regions and local government**, the following points should be underscored:

- Under the present constitutional framework, energy issues are governed under a system of **“concurrent legislative powers”**. This means that the Regions have legislative powers over

energy matters, except for the fundamental principles, which are determined by central Government. The application of this constitutional provision causes considerable **difficulty in terms of harmonising legislation**, with growing numbers of disputes being heard by the Constitutional Court.

- Moreover, a corollary of this law is the more extensive role entrusted to the Regions in administrative matters. As a result, **authorisation for any given project**, requires the agreement of the Region concerned even for works of national interest and not just for those of regional and local interest (such as the growing use of renewable sources, which by nature are widespread require an active role, especially administrative in nature, by Regions and local authorities). Italian legislation on this matter – abundant, complex and scattered as it is – is based on criteria that in principle are effective, with extensive recourse to one-stop-shop procedures, specified timeframes and clearly defined responsibilities. However, this does not prevent those same procedures, in practice, from being uncertain and involving **unpredictable timescales and lengthy delays that take them well beyond their legal deadlines**.
- The Legislative Decree transposing the 3rd European Package envisages that, on the basis of the NES, the requirements regarding strategic up-grades to production, import and transport infrastructure for electricity and gas, and gas storage facilities, should be defined every ten years.

The initiatives

Taking into consideration the above mentioned situation and criticalities, as regards the formation of **European legislation**, the intention is to:

- **Enhance the quality and incisiveness of the role played by the various Government departments** in drafting Community laws, reinforcing the MiSE's oversight, more closely coordinating the work of the Inter-Ministerial Committee for European Affairs. It is also desirable that the positions formulated within the Commission are always accompanied by an analysis of the social and economic impacts broken down by country or geographical area. It is also noted that the **participation** in the ascending phase of the drafting of Community legislative proposals **has recently been extended to the regional government level**: It will be important to ensure that this involvement is implemented in a **streamlined and efficient manner**, avoiding duplication (and above all, it will be important to prevent it from slowing down our participation in Community proceedings, which are nearly always conducted with limited timescales for reaction).
- **Strengthen coordination between the Administrations and the national Parliament** as provided by the recent Law 234/2012, which updates the institutional architecture to the innovations introduced by the Lisbon Treaty, providing for the direct involvement of the national Parliament in some aspects of the functioning of Union and specifically in monitoring the compliance of the subsidiarity principle in the European Union legislative activity, bestowing upon Parliament the power to provide Government with directions in Community law negotiations.

- Strengthen consultation with **national stakeholders**: Italian trade associations in the energy sector often lobby at Community level, potentially creating situations where the interests of the sector are promoted to the detriment of the general interest of the country. The introduction of a transparent consultation process is proposed, with the publication of documents on planned European initiatives, in order to establish consolidated national positions on the items on the agenda.
- Better coordinate relations with the Italian members of the **European Parliament** so that agreement can be reached on the issues under discussion and on the interests of the country. This would be achieved through regular meetings with Italian MEPs sitting in the relevant Committees.

With regard to the decision making process at the **national** level:

- It will be important to introduce forms of early consultation and **prior agreement** between Central Government Departments objectives and instruments. The next step would be to define more clearly the remit of each Central Government Department and thus **reduce**, as far as possible, **the need for consultation** on secondary legislation such as Ministerial Decrees, in order to accelerate the timing of issuing.
- A synergistic action **between Parliament, Government and Authority**, in accordance with their respective roles, will be crucial. In particular, as described in the framework chapter, there are two distinct functions that must continue to interact in an independent way: the programming of use of resources on one hand and the regulatory function in electricity and gas on the other.

It is crucial that the definition of **strategic 'objectives', direction of action and general market rules**, as well as **allocation decisions** – relating, for instance, to taxpayers' and users' public resource allocation taking into account externalities, both horizontal and in time – should remain prerogative of the Government and the Parliament, who are directly accountable to citizens with reference to the economic policy choices.

Regulation plays an important role in primary legislation implementation and in the definition of the conditions and constraints which apply to companies who operate in regulated markets, the aim being to promote competition whenever possible. Moreover it promotes efficient market structures through competition and approximates the outcome of competition in areas where competition cannot work. It should therefore remain within the activities of the sectoral Regulatory Authority. The independence of the Regulatory Authority, confirmed also at the European level through the 3rd Energy Package, reinforces the certainty and stability of rules on which operators must define their strategies, protects consumers' interest and keeps non competitive conduct in check.

Therefore any **action aimed at streamlining** and clarifying such a system, to this regard, is considered appropriate (for example, a clearer definition of the competencies of Government and the Regulatory Authorities, of their respective functions and the rules of interaction, the elimination of overlap, reduction of fragmentation, etc.).

- Finally, opportunities to rationalize the various public bodies, currently active in the energy sector, will be studied carefully, in order to increase the system effectiveness and efficiency.

With regard to **relations between the State, the Regions and local government**:

- A change in the Italian Constitution is deemed necessary by many commentators. The Government recently submitted a bill on this matter, the aim of which is to restore legislative powers to central Government in energy matters where projects and infrastructure facilities of national importance are concerned. A reform of this nature would be useful in harmonising both the legislation and the underlying decisions. It could be implemented through a limited **amendment to article 117 of the Constitution** to eliminate the concurrent legislation principle governing this type of infrastructure. Such an amendment would not exclude the Regions from the decision-making process, but would return the legislation in these sectors to one single level and simplify the authorisation process. The Regions would retain their role in formulating the underlying central Government decisions. Another advantage of this change would be to give the national interest priority over more local interests, which at present, in legislative terms, have an equal weight.
- In parallel with this, **local government involvement** in decisions relating to energy installations should also be addressed. This question is also being debated at the European level, in the draft Regulation on guidelines for trans-European energy infrastructure. The regulation proposes the introduction, drawing on the experience of northern European countries, of **"public debate"** in order to promote, before the authorisation procedure begins, the sharing of the purpose and characteristics of the infrastructure or installation. The aim here is to pave the way for fitting the project into the Region concerned and in its economic-social context. Public debate should help prevent the players from adopting the sort of *a priori* opposition. In this regard, the above-mentioned issue is also addressed in a separate Law, approved by the Council of Ministers in October 2012 "Rules and mandates in terms of infrastructure, transport and land", where the concept of "public consultation" is defined and the procedures carried out.
- **Cost/benefit analyses of planned works and infrastructure** at the national/regional/local levels should also be introduced. These would illustrate the advantages of the works and the disadvantages of failure to build them, or of delays in doing so, and should increase local authorities' accountability with respect to the decisions involved and their national/regional/local repercussions.
- **Early coordination with the Regions** should also be introduced on regional provisions concerning energy matters so that they can be coordinated with the domestic and European legislation. This would also reduce uncertainties and disputes and avoid the need to challenge regional laws in the Constitutional Court.
- Finally, the full implementation of standards and existing tools (e.g., guidelines) to ensure greater consistency of the legal and regulatory framework between the Regions, particularly in the energy efficiency and renewable energy production areas, is considered important.

Turning to **administrative/authorisation issues**:

- For **strategic energy infrastructure and projects**, the first step is to identify the infrastructure itself and its location in the Regions concerned. The NES being agreed upon and approved, this step will be taken in agreement with the Permanent Conference of the State, the Regions and the local autonomies. For such projects, the proposal is that all environmental impact assessments and authorisation procedures should be carried out at central Government level. The decision would be reported to the Council of Ministers in the event of failure to reach agreement with the Region concerned. A fast-track procedure could also be established to resolve administrative disputes.

- On the question of authorisation timescales, the Development Decree Law includes measures to overcome Regional governments' **inertia in reaching and expressing agreement**. If the Region has not expressed agreement in the envisaged timescale (150 days) on authorisation of an energy infrastructure project over which central Government has jurisdiction, the MiSE will be able to appeal to the **Prime Minister's Office**, in consultation with the Region concerned, to obtain a rapid, definitive decision. This is consistent with the position currently expressed by the Constitutional Court. The subsequent "Growth Decree 2" (Decree Law 179/12) regulates also the case of failure to achieve an agreement as a result of a motivated disapproval by the Region, by providing a structured process after which, if the agreement is not reached, the Council of Ministers may adopt its own resolution with the participation of the Presidents of the Regions concerned.
- For **works other than strategic infrastructure**, the existing authorisation procedure will remain in place. However, environmental permits will be placed on the same footing as construction and operating permits.
- **Guidelines** will be drawn up for the main authorisation procedures in order to clarify detailed aspects of tasks, competences, responsibilities, timescales, and the departments that should be involved.

5. The 2050 system evolution

5.1 The basic choices

Addressing climate change issues, ensuring the competitiveness of the system as well as the safety and accessibility of energy for all citizens are the challenges that will mark the path of the Italian and European energy system in the coming decades. Inevitably, these are the same issues that motivate the basic priorities and actions already described for the short to medium term. However, **the dimension of the same long - very-long term challenges will require a more radical transformation of the system**, which does not involve only the energy sector but also a transformation of the functioning of society.

First, the issues related to **climate change**, due to an unprecedented rise of carbon dioxide emissions levels together with the increased global **pressure on the consumption of energy and environmental resources**, due to the rapid growth in some key areas of the world. Both **will be felt strongly in the coming decades** and require a large reduction in emissions and a more careful use of the available resources. Recently the World Bank has unmistakably reminded us that the economic and social consequences of global warming are becoming more and more evident: in the long term they will be significant, but also in the short to medium term the impact could be important, due to the apparent increase of extreme weather events. If **stronger and more concentrated action at the global level** will not be pursued, the development outlooks are worrisome: by the end of the century the average global temperature could rise by about 4° Celsius, with potentially dramatic consequences.

On the other hand, the need to continue to have a positive and widespread economic development will require an evolution of the system which will combine a greater environmental sustainability whilst preserving **system competitiveness** on a global level, **avoiding extra costs** and inefficiencies of the economic system.

In addition, the expected increase of the use of relatively scarce resources worldwide will involve risks of **increasing price level and volatility** of all natural resources in the long-term, and in particular energy, exposing countries which are more dependent from abroad to a **high degree of uncertainty about the security of supply and the economic costs to meet those supplies**. Excluding the oil shock of the 70s, in the last decade, the level and volatility in commodity prices has already reached the historical maximum level of last century.

The well-being of future generations, not only in environmental terms but also socially speaking, will depend in large part on the **answers we can provide to mitigate the impact and to adapt the system** to an inevitable transformation. For this reason it is crucial that the major economies of the world - responsible for the largest share of current emissions – act in a determined manner in order to coordinate a strong global response, because the answer to these challenges must be global. In this context, Europe has decided to take a lead role, which Italy fully supports.

In this context, **the three main objectives set out in the Energy Strategy for 2020 remain substantially in force also in the longer-term** horizon of 2050:

- From an environmental point of view, Italy supports the choice of a progressive decarbonisation of the economy, and aims to play a lead role in the finalization and adoption of the Energy

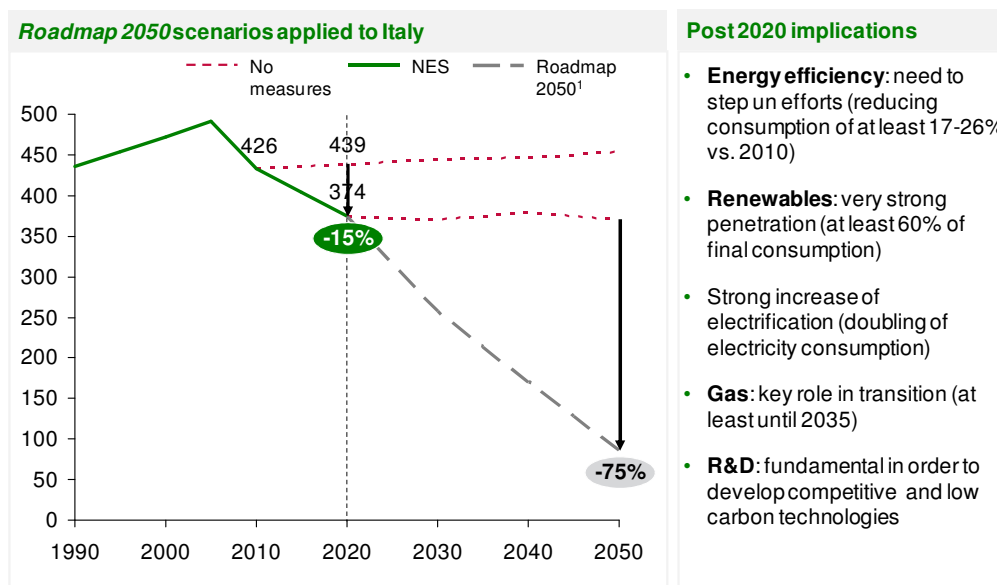
Roadmap 2050. It is a very ambitious plan, targeting by 2050 a reduction in emissions of 80-95% compared to 1990 levels.

The direction is the same already undertaken with the objectives of the Climate-Energy Package (the so-called '20-20-20'), and in this sense the 2020 objectives and actions outlined in the previous chapter of the NES represent a key step in the direction of a low-carbon economy in 2050. The expected results of these actions will continue to generate benefits that will contribute to the reduction of emissions in 2030 and 2050. Nevertheless, **important efforts will be needed beyond 2020 to achieve the expected levels in 2050**, and will need to result in substantial changes in the structure of the world energy, and more generally in the society. The application, in Italy, of the European scenarios proposed in the Roadmap 2050 (without taking into account the necessary differentiation of the different starting points of the different countries in terms of pro capita emissions) shows in fact that, if on one hand the implementation of the NES 2020 scenario leads to a reduction of about 15% compared to a scenario in absence of measures, to follow the trajectory of decarbonisation proposed, new actions will be needed by 2050 to reduce emissions by ~75% compared to an inertial evolution of the post-2020 system.

TABLE 54

The Energy Strategy significantly reduces emissions by 2020, but the 2050 decarbonisation process remains a challenge

Mt CO₂²



¹ Application of overall European targets to the Italian scenario, without considering different starting positions of different countries
² CO₂ only, doesn't include other GHGs
 Source: MiSE; ENEA

- As for **competitiveness and support to economic growth**, it will be important to ensure that the transition **doesn't penalize the Italian and European economy, especially in sectors exposed to international competition**, and avoids the risk of progressive de-industrialization. On the contrary, it will be important to encourage the **full development potential of the "green"**

economy - in all areas - and make it an element of singularity and competitiveness of our system.

The European Commission estimates that the transition can take place **without further net costs** globally, with a shift from fossil fuels to initial investment cost. It will be crucial that **Europe adopts an efficient system - on a continental scale - on emissions reduction**, and it will also be important to punctually estimate and regularly monitor the **implementation of these conditions**, paying great attention to the allocation of any extra costs that the system would need to support.

- As for **security of supply**, the decarbonisation path provides an **opportunity for strong reduction of foreign dependence**, both for Europe and for Italy. More efficient use of resources, together with a gradual replacement of fossil fuels with renewable energy sources, and sustainable exploitation of domestic resources, will help to significantly reduce the costs of importing fossil fuels and the exposure to the volatility of these raw materials. The European Commission estimates that this could reduce up to 35% the level of European energy dependence, compared to 58% of dependence in a current policies scenario.

At the same time, it is essential that Italy and Europe play an exemplary role in order to **stimulate a global response** to the climate change issues. However, as noted above, only a global effort can in fact enable reaching emissions levels required to avoid a dramatic climate change, but it is important that Europe is not the only actor to make such important efforts that could undermine its economic competitiveness. It is therefore crucial to continue to put this issue firmly among the priorities of the international debate, and to take the lead, in all contexts, for concerted action at global level.

The last decades show that it is difficult **to predict technology and market evolution**, especially on long – very long term horizons. Suffice to consider, as an example, that the three electricity generation technologies (CCGT, solar and wind) which now account for a large part of electricity production in Italy (over 60%), only 25 years ago were still in the early stage of development. Formulating specific strategies, target scenarios in terms of the mix of sources and sectors, or specific steps to be taken with a 40-year horizon (within which numerous '**breakthrough**' technologies are expected to be implemented) is difficult and inadvisable.

Italy and Europe must therefore adopt a **flexible and efficient long-term strategy**, which allows - as much as possible - to adapt to the technological evolution and market framework and which is "technology neutral", or neutral in the development of the technology mix, no preference *a priori* to specific technologies, unless justified by important externalities.

Consistently with the need to maintain this flexibility, **Italy promotes within Europe the definition of a single post-2020 target, focused on overall emissions reduction**, to be implemented by each country based on its starting point in terms of emissions per capita (leaving each country free to adopt the most appropriate approach based on the specific characteristics of individual states), or '**neutral**' from the geographical point of view (with the aim of creating interventions where maximum effectiveness and efficiency efforts can be ensured). By this we aim to overcome the current system that partially overlaps the 'cap and trade' ETS emission reduction system with goals and specific measures for supporting the development of renewable technologies and energy efficiency, as well as various energy taxation measures which exist or are proposed.

The current European scheme, based on multiple legally binding targets at the country level leads to **distortions in the allocation of public resources per unit of CO₂ avoided**. For example, in Italy, the incentive cost per unit (per MWh) of energy saving, is up to 25 times lower compared to the production of some renewable electricity. While this has led to the initial development of technology which is not mature and some local industrial supply chains, in the long run it does not seem to be by itself an effective approach for reducing emissions. Rather, it will be important to devote an increasing share of public resources for research and innovation, compared to the subsidized generation or expensive installation of power plants using already developed technologies.

In summary, it will be essential to discuss at the European level how the current model, which is the result of multiple mechanisms - overlapping and inconsistent with each other - can evolve into a **single, more coherent model** focused on the main goal of reducing greenhouse gas emissions. This future system could be made up by further **developing the current ETS, or by dropping the ETS mechanism and introducing an environmental taxation** on the emissions-related externalities of all products - including those imported. The advantages and disadvantages of the two systems (on the one hand a market mechanism, although difficult to manage, in the other, a system that gives more certainty, but that can create inefficiencies) shall be carefully assessed and discussed.

This technology-neutral approach will have to pay attention and follow the evolution of some **potential elements of discontinuity**, such as the development of technologies which to date are not fully mature and/or competitive with the traditional ones, and allocate **adequate resources for research and development** of the most promising solutions.

Among the possible technological developments and market conditions that now seem more relevant, particular attention has to be given to:

- The acceleration of cost reduction and/or improvement of the performance and programmability of **renewable technologies**, thanks to technological discontinuities. To date, the expected evolution of the costs of renewable technologies allows us already to predict a significant reduction (see Table 2), which will bring, for example, solar PV to grid parity in a few years in different areas of the country (even if parity with wholesale prices is still far away). An acceleration of this trend quickly pushes the system towards a higher share of renewable sources compared to the one possible today, provided that the problems of network integration can be solved.
- Cost reduction and performance improvement of the **electricity storage** capacity. Storage technologies, together with the development of the network, will be crucial for ensuring safe development of renewable energies and smart grids, but also to accompany the spread of electric vehicles. To date, the technology is not mature enough for widespread industrial use: all over the world only 450 MW of electrochemical storage is installed, but there is no doubt that this technology is rapidly developing - driven by the automotive industry - and will become increasingly competitive. Italy does not want to miss out on this important industrial development, not only from a national perspective: if therefore, the launch of a massive program of installation in the next 2-3 years seems premature, it is essential to encourage **experimentation in the national supply chain** to acquire know-how, to understand which technologies are best suited, what are the true benefits for the system and distribute expenditure in time more consciously, waiting for the technology to mature and a significantly reduce costs.

- A strong impetus to the spread of **biofuels** through the development of the second and third generation. To date, the prospects of biofuels are uncertain, as the current prevailing technology (so-called 'first generation') presents several problems in terms of environmental and social impact. If an acceleration in the development of more economically efficient technologies that are not in conflict with land and crops can be realized, the growth in the use of biofuels to replace fossil fuels could be significantly boosted.
- Development of CO₂ capture and storage solutions - the so-called **CCS**, Carbon Capture and Storage. To date, this technology is not cost-effective from a commercial point of view, since it carries high levels of investment and energy consumption. However, in the long run we cannot exclude an important role of **CCS** in the energy system, not only for a potential revival of "clean coal" generation, but also in combination with biomass and gas systems, and for emissions intensive sectors (e.g., cement). Italy intends to continue to contribute to research in this field, closely monitoring the evolution of this opportunity.
- Cost reduction and rapid spread of **electric vehicles**. Electric vehicles allow for a reduction of CO₂ emissions - currently between 25 and 40% "well-to-wheel" compared to traditional vehicles in our country, but in the future a more marked reduction will occur as the mix of electricity generation will shift to renewables - and especially the total abatement of local pollutants in city centres. However, **the cost of the technology is still high**, both for the end user, or more generally speaking for the country, **compared to other interventions for reducing emissions** in the transport sector or in energy efficiency. The most recent evaluations of cost trends, however, appear favourable, with possible reduction prospects such as for the batteries of between 45 and 75% over the next 20 years. Italy is committed to supporting the progressive deployment of electric and hybrids vehicles, in terms of public charging infrastructure, stimulate diffusion of vehicles, and R&D. In this case too it will be essential to distribute expenditure in time, consistently with the reduction of the costs of the technology.
- A change in the role and the share of **nuclear power** today, as a consequence of a possible recovery of investments worldwide or at a European level, as a result of the research programs and international cooperation in new generation reactors, in which our country is also involved. Although it is a choice that will not directly affect Italy, given the outcome of the referendum of 2011, if nuclear will give adequate answers to the issues of safety, environmental quality and waste, it could be one of the elements of discontinuity in the worldwide energy development in the long/very long term.

5.2 Possible evolution scenarios and their implications for the system

As already discussed, formulating scenarios - in the long run - in terms of energy mix and consumption is a difficult task. Essentially because the future will be different from any forecast we can make today. On the other hand, forecasts are not the purpose of these scenarios. The purpose of developing evolutionary scenarios in the very long run is rather to **explore how - under certain assumptions - we can develop the system** and think about these possible future configurations of the energy system in order to anticipate problems, infrastructure needs and research. Also, to a certain extent, defining the “envisaged future” allows the system to be steered in the desired direction, rather than passively leave this direction to be determined by events. These scenarios provide a measure of the distance that separates us from some of the longer term objectives, and actions that enable us to achieve them, on the one hand allowing for a **better formulation of policies** to guide the change, on the other hand providing an important **orientation to the sector** on the possible evolution of the system, in particular to overcome the uncertainty in those segments that require activities and investments with more distant returns. Finally, only by looking at a longer-term period, **the choices in research** become crucial for bringing about, as it happened in the past, the **technological 'discontinuity'** – short of which, some of the current ambitions would be beyond reach.

In collaboration with ENEA, some very long-term energy scenarios have been drawn up, in line with those developed in the assessment of Europe's Roadmap 2050 (which has not yet been appraised for each single country). Specifically, **five different scenarios have been developed**: two are extensions in time of the already described 2020 scenario (inertial and NES), assuming from 2020 onwards a development in line with the policies introduced or described in the previous chapters, but in the absence of new strong technological discontinuities and assuming economic growth and evolution of the prices of raw materials and technologies in line with the latest appraisals of the European Commission⁶; three are potential evolutionary scenarios that would allow - with estimates based on current knowledge - to achieve the objectives of decarbonisation as a result of active policies or in the event of accelerated evolution of technologies. These are three scenarios – drawn up taking into consideration the peculiarities of the Italian context - **in line with the scenarios assumptions of the European Energy Roadmap 2050** (excluding scenarios involving use of nuclear energy):

- **high energy efficiency** scenario: this scenario has the most stringent requirements for all new devices, a high rate of renovation of existing buildings especially public ones, stringent standards for all new homes after 2020 and a push to research better performing new technologies.
- **high renewables development** scenario: this is a scenario that includes a strong penetration of renewables especially in the electricity sector (up to 85-90% by 2050) and a share of renewable in gross energy final consumption of about 60-65%. Moreover, this scenario also foresees strong infrastructural network development and the spread of electricity storage.

⁶ Similar to the Roadmap 2050 scenarios 'Reference' and 'Current Policy Initiative' of the DG Energy. See the Commission Staff Working Paper: Impact Assessment Accompanying the Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions on an Energy Roadmap 2050. SEC (2011) 1565 1 and 2.

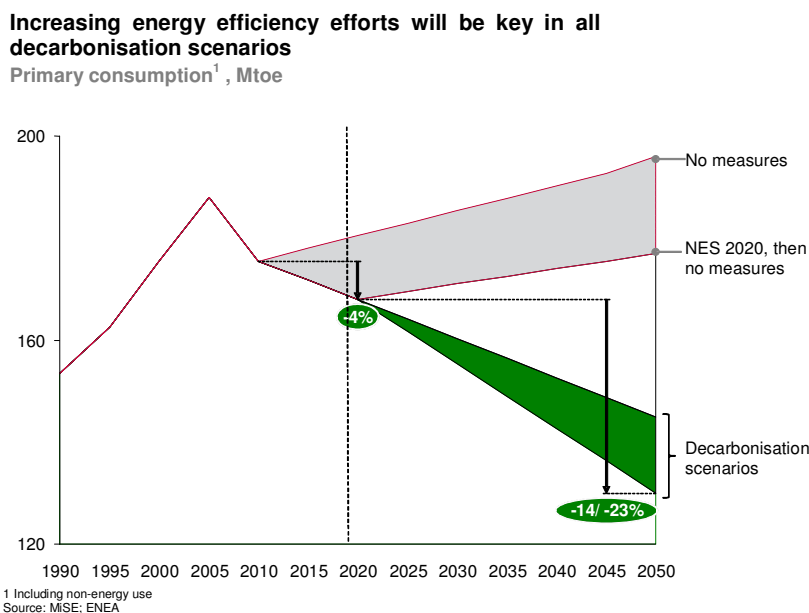
- **fast CCS deployment** scenario: this is a scenario that involves a mix of sources where the fossil component - starting from 2028-30 - is supported by the presence of carbon capture and storage in the electricity sector (24% of electricity production in 2050) as well as in the industry sector.

The goal of this modelling is not to predict or determine exact evolution targets of the system, but to **identify common concerns** that must guide the industry in the longer-term choices, and that can already provide important indications for the choice in the short-term. These are therefore almost obliged trends and choices, which should be taken into account from now on. Here are the main ones:

- The need - in all scenarios – is to at least **multiply efforts in energy efficiency** made over the last 5 years. The primary consumption will be reduced in a range of 17% to 26% by 2050 compared to 2010 (and from 14% to 23% with respect to the NES 2020 objectives) in order to save up to 45 Mtoe of primary energy per year compared to 2010. Already in 2030, in line with the efficiency trajectory, the containment of primary consumption is expected to reach additional 10-15 Mtoe compared to the goals of the NES 2020. Economic growth (taken during the period of 1.3% per annum) will then be completely decoupled from the trend in energy consumption, a phenomenon already anticipated for 2020 from the measures introduced or proposed in the previous chapters, but which will accelerate over the next several decades.

The areas of greatest potential for our country - where it will be important to look carefully already in 2030 - are buildings (new and existing) that will have to move quickly towards a zero-emission system, and **transport**, where a radical change of technologies and behaviour is possible.

TABLE 55



- The **high penetration of renewable energy**, which in any of the scenarios envisaged will have to reach levels of at least 60% of the gross final consumption by 2050 (from about 10%

in 2010 and about 20% in 2020 according to the NES forecasts). In particular in the electricity sector, the share of renewable energy sources is expected to increase substantially in 2050 (over 75%). The decarbonisation trajectory implies levels of renewable energy on final consumption in excess of 29% already by 203.

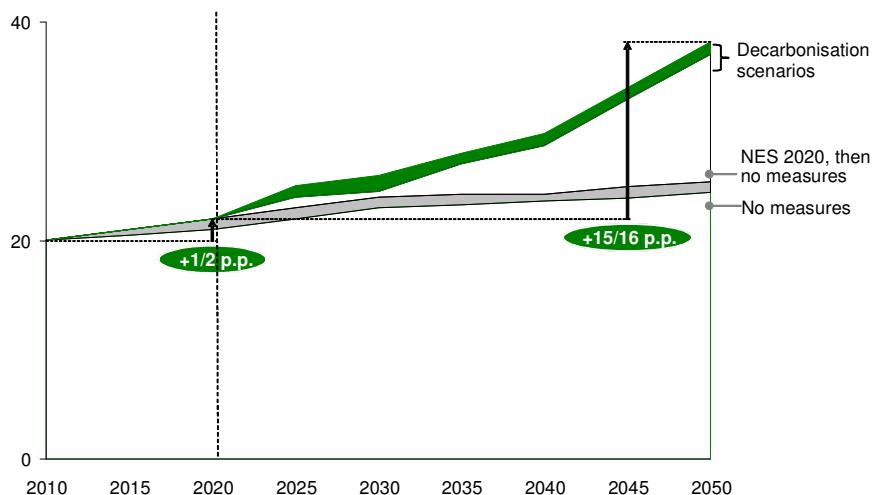
For this reason it is imperative to **accompany the sector towards cost reduction**, supporting research and innovation (particularly with reference to the most innovative technologies and storage systems) and making the sector more efficient and competitive. At the same time – in Europe – it will be a priority to **rethink the network and market infrastructure** in order to accompany this long-term transformation, while maintaining adequate levels of system reliability. In parallel, we need to firmly focus on a strengthened role of second and third generation biofuels and increase the contribution of renewable energy to cover the demand for heating and cooling.

- **Substantial increase in the degree of electrification**, a trend already taking place in recent years, but that will significantly accelerate in order to achieve the objectives of decarbonisation, especially in the **heating and cooling and transport sectors**. Even in the higher energy efficiency scenario, the share of electricity consumption on final consumption will almost double by 2050, assuming a substantial decarbonisation of electricity generation system (already in 2030 the trajectory provides a level of electrification of at least 26%, compared to about 20% in 2010).

TABLE 56

Acceleration of the tendency towards a gradual shift to electricity

% electricity consumption on total final consumption



Source: MISE; ENEA

Therefore it is important to create - **already in 2020 - the conditions for a gradual shift in demand towards electricity** (for example, through the spread of heat pumps and in experimenting the widespread use of electric vehicles).

- **Gas will retain its key role** in the energy transition, despite a reduction of its weight percentage and absolute value in the scenario horizon. As pointed out in the European Roadmap 2050, replacing European coal and oil with natural gas in the short and medium term will give an essential contribution to the reduction of emissions. The demand for gas in Europe - despite the overall energy efficiency measures planned - will still be important by 2030-2035, while in the longer term its retention at high levels will depend on the degree of development of certain technologies. The national context, starting already from a higher level of consumption than the European average, forecasts on the other hand over the long term a reduction of gas consumption in favour of renewable energy, both in the thermal uses and in electricity.

The choice illustrated in section 4.2 to **make Italy become by 2020 a gas crossroads to Europe from South-Southeast is consistent with these predictions on a longer time horizon** (2030-2035), given the time required to realize and take full advantage of infrastructure investments. In this context, the decision to **promote the domestic production of hydrocarbons** is also confirmed, whose assumed production levels, according to the most recent appraisals, are sustainable until 2050 with levels set by the Energy Strategy by 2020.

5.3 Research and development in the energy sector

Background

The path of **progressive decarbonisation of the economy** - just described - **requires research and development in advanced technologies**, with regard to renewable energy, efficient use of energy and sustainable use of fossil fuels. As we have seen, the distance that separates us from the different envisaged decarbonisation scenarios at current knowledge is still very big. To achieve such a transition, without jeopardizing the economic and social performance standards, a **'discontinuity' in terms of cost and effectiveness of the solutions will be needed**.

Unless these conditions are brought about, reaching the Roadmap 2050 scenarios for Europe will be complex and expensive; furthermore the envisaged substantial shift towards 'green energy' by emerging economies will be difficult as they have a strong and growing need for energy; the same is true for those countries where awareness and social choices do not put environmental issues at the top of the political agenda. Market forces, however, can contribute decisively to shift this tendency and - as it happened in the past - **major technological changes are critical in changing the balance of market forces**. In this regard, it is indicative that over the past 5 years, the country which has most strongly reduced emissions (about 430 Mt, or by almost according to the IEA, May 2012 data) was the United States, thanks to an increase in the use of gas (instead of coal) in electricity generation, driven by the strong price reduction, in turn determined by the shale gas technological revolution.

It is therefore essential to **increase the global effort in research and development**, firmly focusing resources and political commitment on the research of 'breakthrough' technologies, instead of using existing technologies. In this sense, Italy can contribute by investing more strongly on research and development, and even more by offering its help to guide the debate and policy-making towards greater international efforts.

- **At the European level, the “Strategic Energy Technology Plan”** (SET Plan) is the strategic response to the major climate and energy challenges. Its aims include:
 - In the **medium term** (2020), a greater dissemination of technologies already available today: further development of wind, photovoltaic and concentrated solar power; the development of smart grids to encourage distributed energy generation and the use of renewables; the development of biofuels; and the dissemination of more efficient white goods and equipment for industry and transport.
 - In the **long term** (2050), a concentrated technological research and innovation effort in the industrial system, with a focus on: second generation renewables; energy storage; the development of new energy efficiency technologies and materials; CO₂ capture and storage; fuel cell and hydrogen powered vehicles; demonstration projects for fourth generation nuclear reactors; and the construction of the ITER nuclear fusion reactor.

The European Commission has taken other initiatives, most notably the Horizon 2020 programme which, from 2014 to 2020, will gather research and innovation measures into a single framework programme. In these, energy (especially renewables) will have a prominent position.

Italy has important areas of international excellence in specific fields. On the other hand, an analysis of the aggregate input (investment) and output (scientific and patent production) indicators reveals that **research and innovation in the energy field is being held back**. This can mainly be explained by the limited resources for research and innovation, the high level of fragmentation of actors and areas of research involved, and by the lack of a single coordination “control room” and clear-cut policy establishing research priorities.

- The country has internationally recognised **areas of excellence**, for example, in the field of **second-generation biofuels, geothermal power, concentrated solar power** or in the development of **smart grids**, an emerging sector in which Italy has recently consolidated its leadership by coordinating the creation of the International Smart Grids Action Network (ISGAN). In addition, the country is engaged in important R&D programmes on clean coal, **storage systems** and in **nuclear research**.
- However, if we compare our system with those of our principal European partners, we can say that our system of research and innovation is not adequate. This leads to a strong dependence on foreign technology, and to a growing trade deficit, especially in high-technology products and for the production of clean energy, which is the one that has grown most in recent years. The evidence from an aggregate point of view is clear:
 - The **level of resources** devoted to research and innovation, both private and public, is significantly **lower** in Italy. In 2010, our country allocated to R&D in the energy sector about \$1.3 billion, of which about \$400 million in public funds. This compares with \$4 billion invested in Germany, \$3.8 billion in France and in \$1.5 billion for the United Kingdom. We are followed by Spain, with \$0.8 billion. This ranking reflects that of Italy in general, in the sphere of R&D.
 - In terms of **patents**, too, Italy does not hold a leading position and in the last decade has **lost ground internationally** – at least in quantitative terms – with a decline from 1.4% to 0.6% of the world’s patents in the energy sector. This compares with 10% for Germany and 2.4% for France.
- Along with **limited public resources**, the following critical areas in the system are obvious obstacles:
 - **Low private sector participation** in R&D investment in the energy sector (here, the main difference between Italy and other countries is the lower engagement of private companies).
 - **The high degree of fragmentation** among the parties and the areas of research involved, which sometimes translates into overlaps or an inability to “act as a system” around major initiatives and/or hubs of excellence.
 - **The lack of clear guidelines** on energy research priorities for the country, on which to concentrate resources, and of a **single coordination “control room”** for the sector to facilitate collaboration and the more effective allocation of the resources available.
 - The need to **revise and adapt the set of knowledge** in human capital and in particular those concerning the energy sector to new demands is a major challenge for the coming years. It is of strategic importance to anticipate and know how to drive the effects of new policies mainly

through the creation of skill in strategic sectors recognized as such and, probably first and foremost, at the global level.

The key choices

The key choices that will guide R&D decisions in the energy sector will focus on overcoming the problems described above, **the aim being to pave the way for wider and more effective participation** of industry and the country's public and private research centres in future R&D programmes. Establishing a National Energy Strategy, after years without one, fills one gap: the lack of clear policy guidelines to catalyse the interest and resources of the scientific and industrial communities. This should in itself act as a stronger spur to action.

- In terms of available resources, it will be important to **support R&D promoted by private sector stakeholders**. The tax reliefs recently introduced by the "Development Decree" are a step in this direction. As for public funding, the Kyoto Revolving Fund is another important element. This will be complemented with two other instruments, both financed from electricity and gas tariff revenues: the Fund for System Research in the Electricity Sector (endowed with about €60 million/year), and the Fund for Technological and Industrial Development in the field of renewable energy sources and energy efficiency (about €100 million/year). This new fund (established under art. 32 of Legislative Decree 28/2011) will begin operating shortly, keeping with the NES priorities for intervention.

Public research has an important role to play in the higher-risk and longer-term areas of technology. The intention, therefore, is to **increase the amount of resources available under competitive access conditions to create partnerships** between both universities and research establishments and private sector companies. These would include business incubators, start-ups and producers from other member states. Enhanced cooperation on shared priorities is the best way to achieve critical mass and more effective results in individual areas of research.

Considering the limited resources available, we will need to focus on making public investment in research as effective as possible. From this perspective, we will need to identify **new organisational models that supersede the present segmentation** of measures entrusted to various entities and ministries. These new models should also facilitate the creation of cross-connections and public-private partnerships (in the case of medium-term research, where scientific advances and technological innovation can be developed in effective collaboration). The Ministry for Education, University and Research has recently issued tenders for **National Technology Clusters** (defined as aggregations of companies, universities or other entities, with an organizational model designed to enhance connections with experiences in other projects in the area on a territorial basis). This is an interesting innovation in both organisational terms and from the perspective of the issues that will be developed, many of which are directly relevant to the energy strategy.

- As regards priority development areas, it will be important to **ensure that Italy's technological innovation activities are closely coordinated with the SET Plan**. This is because in coming years Community R&D resources will increasingly be allocated to the priority projects identified under the Plan, as already happened for the 7th EU Framework Programme for Research and Innovation. Italy considers the following areas to be of priority interest:
 - Research in **innovative renewable** technologies, particularly those in which, as a country, we already start off in a strong position. For example, in **geothermal** and **second-**

generation biofuels, and those that can be integrated in buildings with solutions with low impact on the landscape and the architectural heritage of the historical centres of our cities.

- Research in **smart grids**, partly to facilitate distributed generation, and in **storage systems**, also in relation to sustainable transport and mobility.
- Research in **energy efficiency materials and solutions**, and their **technological transfer**.
- The development of projects on **CO₂ capture and storage**, mainly from the perspective of Italy's participation in the European action programme around this technology and possible technological transfer initiatives in non-EU areas.
- The research **aimed at the exploitation of deposits of indigenous energy resources** and in particular of hydrocarbons and of the sea (offshore wind and marine energy) whose potential is related to the identification of suitable sites, selected in accordance with the environmental and landscape characteristics of the marine ecosystem.

From a longer-term perspective, the development of international collaboration in the field of safety and **studies on fusion and on generation IV nuclear fission reactors**, in which Italy can boast excellent scientific and technological expertise, will also be important.

- A **reorganisation** of the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (**ENEA**) – one of the most important energy research bodies at both the Italian and international levels – is also planned. Its aim is to focus ENEA's activities and organisational structure on priority research fields for the National Energy Strategy, and to rationalise potential overlaps with other public agencies. A **census of national competences** in the energy research sector is also planned, a vital preliminary step in establishing more precise priorities and properly calibrating the incentives applied to specific branches of technology.