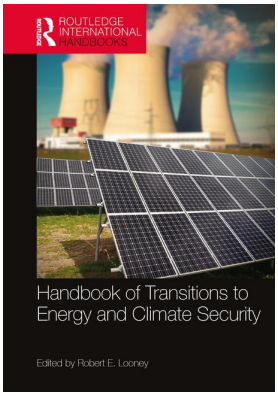

Handbook of Transitions to Energy and Climate Security

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Energy transitions and climate security in Italy

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Energy transitions and climate security in Italy

Morena Skalamera and Fabio Farinosi

Introduction

The socio-economic context

Italy is characterized by peculiar natural resources, geography, socio-cultural and economic factors. The Italian energy mix has for many years consisted of a dominant role for oil (until 2012), a much higher share of gas and hydro as compared to other European countries, and a limited use of coal. Furthermore, Italy heavily relies on foreign energy supplies. Italian reliance on imported fuels (particularly oil and gas, but also coal and electricity) has remained very high: above 80% until recently. By comparison, the EU-28 has a rate of import dependency of about 53%.[1] Italy has one of the highest dependence rates in Europe, which causes concern when energy prices are high or in case of supply disruptions. On the other hand, stagnating and aging populations and low economic growth have in the last few years signaled a somewhat reduced demand for hydrocarbons.

The last years' fall in economic growth raises important questions about Italy's declared energy priorities: how quickly will the country develop the necessary technology to improve energy efficiency and lower carbon intensity? How will it seek to reconfigure its energy mix subsequent to the eurozone debt crisis?

The 2008 financial crisis and the subsequent shocks, such as the eurozone debt crisis, have disrupted the global economic order of the prior decade. In this context, Italy is still struggling with the double crisis of high sovereign debt and stagnant growth. Stabilizing the debt burden, while stimulating growth and employment, is a tough balancing act. It calls for adjusting the old social welfare state model and deregulating labor markets, steps that will be socially disruptive before paying off. This requires extensive market and political reforms, which, however, face strong headwinds from vested interest groups and infrastructure constraints. Especially in large and lucrative sectors such as energy, there is a general will for more business-friendly policies but also firm opposition from vested interests. All these factors combined with rising demand for political participation inspired by the harder economic realities have eventually forced the government to start wider political and economic reforms. Reform would need to set the agenda toward completely breaking up the privileges of ex-state-owned monopolies (i.e. ENI,

the Italian multinational oil and gas corporation) and interest groups, spurring investment growth and building functional social safety nets, which are the prerequisites for sustainable domestic demand driven growth. Italy is definitely on the right track, but judging by the slow reform speed of the past decade, entrenched corruption and powerful industrial elites, the transition may take well into the 2020s. On the other hand, assuming that reforms and fiscal consolidation are implemented and paid off by the 2020s, Italy may enjoy much-improved prospects. Yet there is considerable uncertainty about how these drivers will impact energy demand over the coming years and decades.

The energy mix

The remainder of this decade will most likely be shaped by slow but profound transition processes toward an energy mix largely consisting of a combination of renewables and natural gas. Regarding renewables, policies have been influenced by the EU's 20–20–20 targets[2] which Italy is not only expected to meet but highly exceed, especially after the demand decrease due to the economic crisis. Italy's energy mix has historically experienced a higher share of gas and oil products and a lower share of coal. In the period 1995–2013, in fact, the fuel mix showed a continuous decrease in consumption of oil and oil products, a steady increase in gas use (peaking in 2005), and the sustained growth of renewables. Currently, 10–11% of gas is produced domestically. The remainder is imported, mainly through pipelines.[3]

Today Italian economics and, consequently, energy consumption is depressed by the eurozone crisis (Figure 28.1). Barring major and, for the moment unexpected, changes in attitudes to nuclear, the contributions of wind and solar to Italian power generation will continue growing. There are however signs that the current economic malaise is eroding the government's resolve to continue subsidizing these technologies as generously as they have in the recent past.

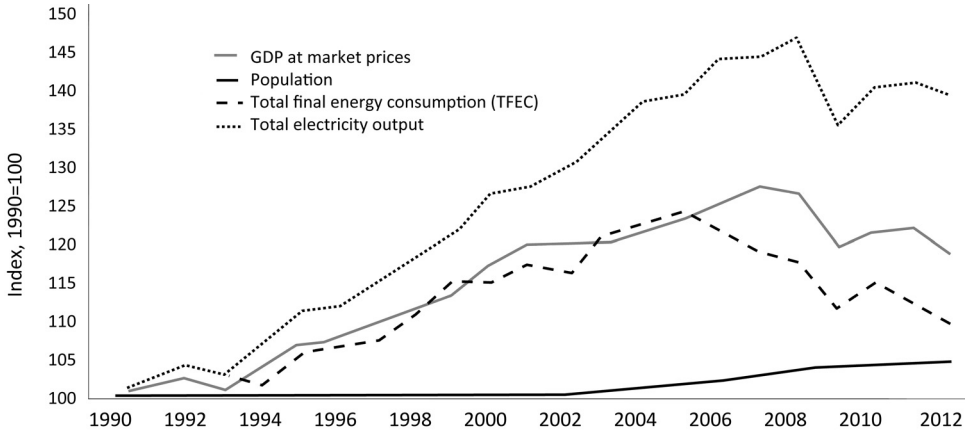

Figure 28.1 Population, income and energy consumption in Italy 1990–2012, 1990=100.
Source: World Bank, World Development Indicators (2015). Retrieved from http://data.worldbank.org/data-catalog/world-development-indicators.

Identifying Italian tradeoffs between energy security, competitiveness and climate security

In such a complex contest, this article seeks to disentangle the following questions: how has Italy historically dealt with satisfying the three key policy objectives of energy security, sustainable climate (climate security), and economic competitiveness? Were all the three key policy goals approached simultaneously, or, rather, was precedence given to one or two elements of the trilemma at the expense of the others? What changes do we observe over time? Can we consider Italy successful in managing the nexus between energy security, competitiveness and climate-related goals?

A comprehensive empirical analysis of the "paradigm shifts" in the Italian energy policy panorama warrants an investigation of the battle unfolding at the high-policy level between "conservative" constraints favoring hydrocarbons, vis-à-vis inputs toward a more sustainable, modern energy environment. Such an overview requires a time frame of approximately 40 years. However, the period between 2000 and 2015 will be essential to understand, first, why Italy appeared to have favored energy security and climate security at the expense of economic competitiveness, and second, why Italy has encountered so many obstacles in devising more sustainable national energy plans. Conversely, what has been the role of the EU in soliciting Italy to adapt to the new environment, and with what results?

The particular contexts in which changes have been taking place will be of paramount importance in explaining the predominance of certain agendas over others at the national level. The chapter focuses on the country's approach toward four crucial energy sources: coal, oil, natural gas, and renewables. Each section employs in-depth historical analysis to assess the critical importance of the particular energy source in the country's overall energy strategy. In-depth analysis requires great attention to detail in order to unravel complex pathways of cause and effect. In that sense, each section's analytical focus lies on constructing a strong explanatory model of Italy's overall energy priorities, while identifying the key players and tracing what drives them – a pursuit of energy security, climate security, or rather, economic competitiveness.

Energy security

The country's energy mix

In 2010, a large share (84%) of the Italian primary energy supply came from imports, resulting in a strong dependence on foreign fossil fuels,[4] while the European average was much lower at 53%.[5] Indigenous production from renewables, gas and crude oil covers only 10%, 4%, and 3% respectively of the national primary needs.[6]

The current energy-mix makes the Italian economy more exposed to the global geopolitical instabilities of the oil and gas-producing countries, as compared to the northern European countries. This is due to the limited availability of domestic mineral resources, combined with electricity production's strong dependence on fossil fuels. Such a situation should be also viewed in the light of the decision to put an end to the nuclear program, following the referendum of 1987, in turn subsequent to the Chernobyl accident. In June 2011, in the aftermath of the Fukushima Daiichi tragedy and as part of another referendum, Italy reconfirmed its refusal of nuclear power. The reasons also included the perceived risk of nuclear technology in a landslide, flood and earthquake prone country, and the risk of pollution by nuclear waste.[7] In any event, the outcome is an absence of nuclear power generation in the energy mix and a stronger attention to renewables.

Regarding oil, Italy is highly dependent on external sources of supply, importing over 90% of its oil needs.[8] This fossil fuel supplies only 5.5% of electric power, while 54.7% is employed by the Italian transportation sector. However, unlike most of its European counterparts, Italy has made large efforts in the form of compressed natural gas (CNG) vehicles in the transport sector, in order to reduce the use of oil.[9]

In 2011, the Italian generation mix was very different than the European one,[10] featuring gas as 48% of total power production, followed by 27% from renewables (including hydro at 18%), only 15% from coal, 2.6% from old oil plants and 7.4% from other sources. In the early 1990s, the increase in the use of natural gas largely happened at the expense of oil (Figure 28.2, panel a). Italy has a twofold interest in natural gas: gas is used in industries and for domestic heating, but is also widely employed to produce electricity. In 2010, power generation accounted for almost 40% of total gas demand in Italy. The residential and commercial sector is the second biggest source of demand growth for natural gas. As a result, even though Italy has indigenous production of natural gas, over the past decades imports from abroad have grown rapidly (Figure 28.2, panel b). Renewables, on the other side, were still low on the political agenda (Figure 28.3). Nevertheless, especially since 2009, the development of renewables seems to be somewhat eroding the share of gas.[11]

In 2010 still about three-quarters of Italy's supply mix came from oil and natural gas (only slightly down from 88% in 1973). The remaining shares were split between coal (9.2%), hydro (2.4%) and other energies, such as renewable sources (12.3%), rapidly rising.[12] The potential for further reduction in coal in the foreseeable future is large, owing to the extended growth of renewable energy and the local resistance to coal. Thanks to severe regulatory restrictions coal's

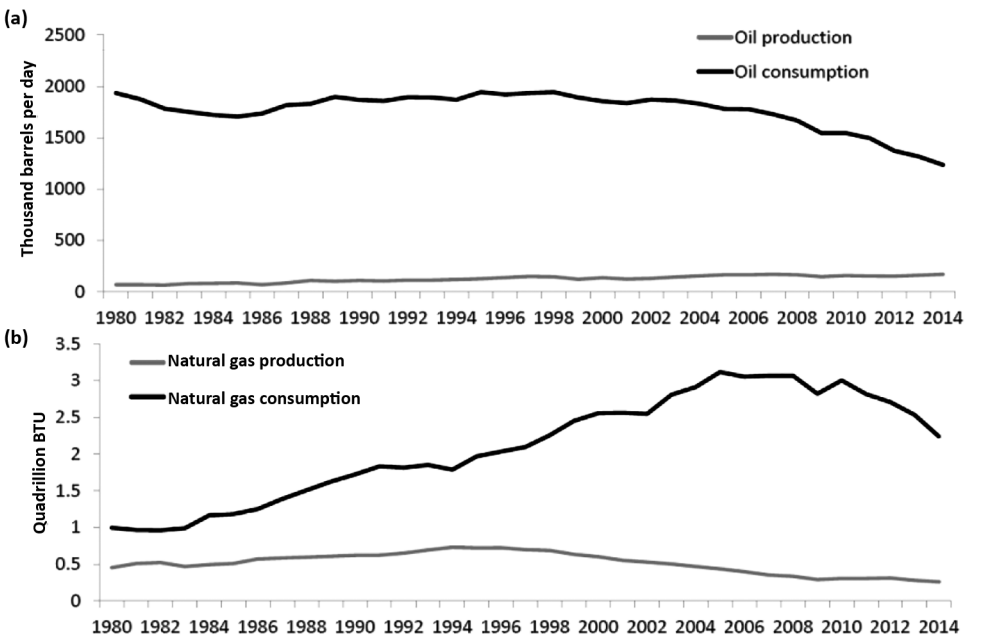

Figure 28.2 Oil (a) and natural gas (b) demand and internal production 1980–2014
Source: Authors' elaboration based on US Energy Information Administration (US EIA), International Energy Statistics, US EIA Database, 2015, http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm#.

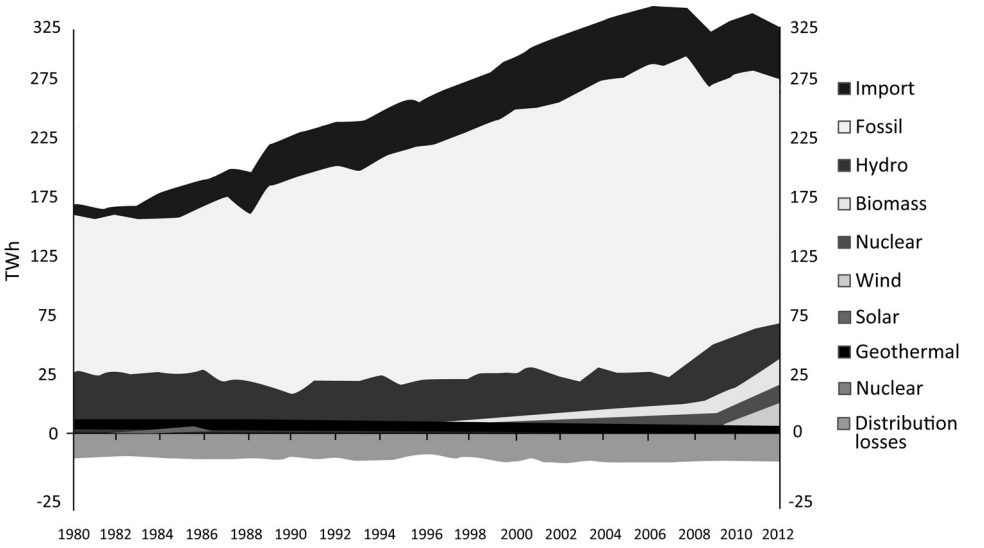

Figure 28.3 Italy's electricity mix 1980–2012
Source: Authors' elaboration based on US EIA, International Energy Statistics database (2015). Retrieved from http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm#.

share of Italy's generation mix is steadily declining, being replaced by natural gas and renewables. Recently coal fired power has captured market share in the EU because coal imports have become cheaper and given that the EU carbon price is not sufficiently high to impact relative economics. This has raised a flurry of speculation over whether the pace of Italy's gas demand growth may be checked by coal price developments eroding gas's recent competitiveness in the power sector. A renaissance for coal based power generation is, however, unlikely. Coal use is under sustained regulatory attack. It is feasible that the combination of moderate natural gas prices and gradually tougher climate and other environmental policies, combined with higher carbon prices, will contribute to lower – in parts of the world negative – growth in coal consumption from 2020 onwards. This development will also be fostered by development of electricity production based on new renewables.

Historical background

While today's share of oil in the Italian energy mix is shrinking, this was not always so. During the second half of the 1930s the Italian government exerted considerable pressure on AGIP (*Azienda Generale Italiana Petroli*), for a rapid exploitation of national mineral resources to achieve self-sufficiency.[13] In the interwar period, due to strong political pressure oil's contribution to the national energy mix gradually grew. Quite obviously, oil's share in the national energy mix had grown even more dramatically after World War II, passing from 22.1% in 1950, to 44% in 1960, 72.6% in 1970 and about 75.3% in 1973.[14]

Italian economic growth, and thus competitiveness in the 1950s and 1960s was mainly powered by oil; in 1973 the share of oil in primary energy consumption reached 79%.[15] In absolute terms, oil consumption has remained relatively static since 1970, but its primary energy share has decreased significantly, steadily replaced by natural gas. In fact, the oil shocks in the 1970s reinforced the country's emphasis on gas rather than oil. Moreover, environmental

policies made natural gas the primary fuel for power generation in the 1990s and, to a lesser extent, in the 2000s. In the 2010s, dependency on fuel oil of the 1980s gave way to a new dependency on both gas and renewables.[16] Although gas became the uncontested champion of Italy's energy supply mix, the start of Italy's preference for gas is somewhat accidental. While searching for oil during World War II, the state company AGIP found large quantities of natural gas in the Po Valley, in Northern Italy, where the majority of promising oil and gas fields were located. After the war, AGIP developed the resources and by 1960 Italy was the largest consumer and producer of gas in Europe.[17]

In 1953 ENI *(Ente Nazionale Idrocarburi)* was created with the mission to provide energy to the rapidly growing economy.[18] ENI was given the exclusive right to look for and exploit hydrocarbon deposits and the exclusive right to build and run gas and oil pipelines in the Po Valley. As a result, ENI (and the companies controlled by ENI) had a monopoly (de jure or de facto) in all segments of the gas chain.

ENI's vertical integration and monopolistic position contributed to the expansion of the gas network to other parts of the country, including the Southern regions. Yet gas production was driven by rapid industrial development concentrated in the North. To speed up the use of gas, in 1949 the first Italian gas-fired power station was set up. In 1974, the first Russian gas flowed in the direction of Italy. By 1980, the gas national network had reached 15,000 km and covered almost the entire country. Since the early 1990s the length of the Italian gas network has tripled, driven by the remarkable growth in power generation from gas.[19] In the early 2000s, Italy had cemented the predominance of natural gas over all other primary sources. At that time the country became the fourth major world importer after the USA, Germany and Japan, while Algeria and Russia were supplying most of the imported methane.

As for oil, indeed, the first wave in the decrease of consumption (1980–2008) is due to the increasing incidence achieved by natural gas. The additional energy demand, compared to 1980, was almost completely satisfied by natural gas, whose emissions per energy unit are about 30% lower.[20] Concerning the recent part of the trend, the sharp decrease in oil consumption is due to the expansion of renewables, whose contribution almost doubled in the period 2008–2010 thanks to the incentives created by the Italian government.[21] The phasing out of fuel-oil in the power sector and the rapid success of gas-fired power plants (albeit, still, under long-term oil-indexed contracts) was part of the national program to lessen the dependence on oil imports due to growing environmental concerns.

The key role of refining

Still today Italy plays an important role as Europe's largest refining center, and is a net exporter of refined products, providing finished products to other countries (Figure 28.4). While ENI had the largest share of the market in 2008 (around 30%), it intends to reduce its presence in the retail market and will focus on upstream and refining activities. There are three non-OECD companies operating in Italy: Tamoil Italia (Libya), Petroleum Italiana (Kuwait) and Lukoil (Russia). The three companies have refining and marketing operations.[22] The country's refining capacity grew rapidly: in 1951 it was four times the value of 1940 and more than twice the 1948 figure.[23] Although the internal supply of crude oil soon turned out to be practically non-existent and that of natural gas insufficient, for many years Italy played an important role as supplier of refined products to foreign countries. The discovery of new rich oil fields in the Middle East and the shift of refining activities toward safer locations, closer to the consumption areas, gave new importance to Italy's position in the middle of the Mediterranean Sea and gave rise to the creation of a number of independent refining companies.

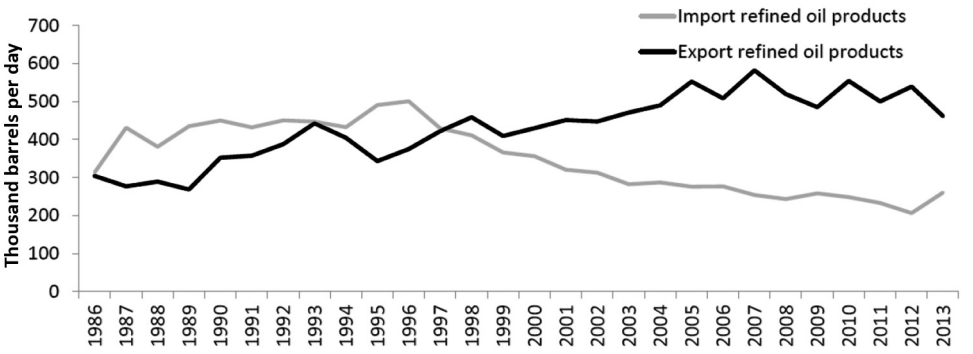

Figure 28.4 Refined oil products import and export 1986–2013
Source: Authors' elaboration based on US EIA, International Energy Statistics database (2015). Retrieved from http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm#.

Substantial investments have been carried out in order to adapt the refineries to the decline in heavy fuel oil demand in the power sector and the growth of cleaner fuel consumption in the transport sector. Further investment in conversion capacity and fuel quality is expected in light of ever-growing demand for diesel fuels and greater availability on the market of sour (rather than sweet) crude oils. Nevertheless, the refining sector is currently undergoing a painful crisis along with the entire downstream oil sector, mainly due to lower demand and competition from cheaper Asian refining facilities. Therefore, a large share of older refineries will likely be scrapped.

Entrenched interests

The entrenched interests of big conglomerates, such as ENI, Enel and Edison lie behind policies of protection and adaptation of Italy's refining capacity. Especially former state oil company ENI retains a dominant position in the Italian oil and gas sector, although a number of Italian and foreign private companies have established a significant presence. This is due to path-dependent policies carried out in the 1980s. At that time, under a general global climate of low oil prices following the shocks of the 1970s, Italy continued to rely on hydrocarbons and, increasingly, on imported electricity, thereby giving scant attention to alternative renewable sources. The two oil shocks in 1973 and 1979 only partially affected this state of affairs, leading to a decrease in energy intensity (i.e. the amount of energy consumed per unit of GDP produced) but not to a permanent decline in energy imports (from 82% to 83% in the same period).[24] Due to the scarcity of domestic energy resources and high energy costs, energy intensity in Italy has historically been lower than the European average. In such a climate, the two public energy oligopolies, ENI and ENEL (oil and gas corporation the first, electricity the second), gained further power. ENI, which had entered the 1980s as the eighth largest oil company, in 1990 was the fifth largest for sales and the third for assets and employment.[25] By the early 1980s, the state company had definitively entered the elite of the world oil market. Political and economic considerations, both at domestic and international levels, thus, influenced the defining of Italian strategy on oil consumption. As for gas, import dependency for natural gas is very high, standing at around 90%.[26] In 2013, 45% of gas imports came from Russia, 20% from Algeria, 9% from Libya, and 8.6% from Qatar, with the rest coming mostly from EU countries and Norway.[27] Yet, still, two countries alone – Algeria (22.7 bcm) and

Russia (20.0 bcm) – account for two-thirds of Italy's imports.[28] Italy, along with Germany and the UK, is one of the largest European markets for natural gas. However, unlike the other two, Italy sources most of its gas from Russia and Algeria and, despite the country's overwhelming dependence on imported gas it greatly relies on gas for electricity generation. Such a situation causes economic hardship when imported energy prices are high or, even worse, in cases of supply disruptions.

As noted by Luciani and Mazzanti, historically the two incumbent companies (ENI and ENEL), have taken major decisions affecting national energy security, with little input from the government.[29] The decision to build a strong interdependence with Russia was definitely informed by both commercial and geopolitical considerations, reaching a peak during the Berlusconi governments,[30] epitomized by the ENI-Gazprom strategic partnership agreement of 2006 that launched common projects in all segments of the gas chain. With the government's support, ENI has completed some of its most spectacular gas projects: Blue Stream, a deep under-water pipeline connecting Italy with Turkey and then all the way to Russia, Green Stream connecting Libya to Sicily, and Transmed, the pipeline between Tunisia and Italy, which was completed in 1983.[31]

Concentrated foreign supplies

Both in oil and in natural gas Italy relies on a concentrated set of supplies. While oil supply sources rely on over 30 countries, Libya and Russia are the dominant sources, each accounting for almost a quarter of all Italian crude oil imports. Saudi Arabia, Iraq and Iran together represent an additional quarter of oil imports.[32] The Persian Gulf as a whole is the main region that supplies Italy's hydrocarbons, while Russia is the largest supplier of both oil and gas.[33] Expensive infrastructure, where Italy's ENI pioneered deep underwater gas pipelines transport, stays at the center of the Italian approach to energy security, in which Russia, the Middle East and North Africa remain the main points of reference.

Today Italy still relies on fossil fuels for a quite large portion of its electricity generation: IEA, US-EIA and TERNA data for 2012 show that Italy relied on traditional sources for about 67% of its electricity generation. This situation is largely due to Italy's long-lasting decision to avoid nuclear power at a national level and exposes Italy to the turbulent geopolitics of its supplying regions, the Middle East and Eurasia.

For instance, the spread of the Arab Spring to new countries in the Middle East and North Africa led to large supply losses in 2011 and 2012. The main losses in 2012 were from South Sudan, Syria, Libya and Iran.

Furthermore, the ongoing war in Ukraine raises doubts over gas supplies, too. Given that Gazprom is not on the list of sanctioned companies and there have been no problems on gas pipelines, supplies have thus far continued to flow. However, the elevated supply risk associated with the Ukraine war will probably last for several years.

As already noted, Italy's strategy on hydrocarbons in the past has made the country reliant on a limited number of unstable countries. Moreover, it largely reflects the preferences and priorities of the main energy company: ENI. Path dependent practices that ENI established since its inception explain why Italy may have had a more difficult time adapting to the new energy-climate nexus within the EU.

Despite several measures to restrain ENI's dominant position, the latter remains crucial throughout the gas chain. Such a situation clearly impedes the attainment of Italy's national goals for 2020, such as greater energy efficiency, competition in the gas market and the creation of the Southern European gas hub.[34]

Hydrocarbons lose but show resilience

In sum, the brief picture that we have sketched illustrates that oil largely powered Italy's path to industrialization following World War II. Technical improvements in production and refining went side by side with a renewed oil nationalism, which included in its ranks the new and dynamic Italian national agency for energy, ENI, created by Enrico Mattei. Subsequently, as already noted, gas expansion was promoted by a national program to alleviate the country's dependence on oil imports.

However, the Italian government did not pursue an interventionist policy to reduce oil's contribution to primary energy (compared with other European countries). Indeed, Italy plays an important role as Europe's largest refining center, and is a net exporter of refined products. While recognizing that oil contracts may represent a barrier to environmental security, considering the market power of incumbents such as ENI and ENEL which due to their refining and marketing operations guard the status quo, Italy also considered the importance of oil for Italian competitiveness and relied on market mechanisms for the evolution of oil contracts vis-à-vis other sources. Moreover, due to its availability and environmentally friendly characteristics compared to oil, natural gas became an increasingly important fuel in the Italian energy mix. At least until the 2000s, renewables retained a negligible role, except for hydropower that supplies about 15% of the national electricity.

In 2010, the power produced by hydroelectric power plants, including pumped stations, covered about 18% (54.4 TWh) of the total. More generally, in 2010 12.2% of the Italian energy mix consisted of renewables, in turn constituted mainly by hydroelectric power (67.6%).[35]

In general, fluctuations in the price of oil (acting slightly on energy efficiency in times of high oil prices) did not, however, significantly affect Italy's energy dependency that stabilized around 80% starting from the 1980s.[36] This strategy is consistent with profit maximization by holding companies, as profits obtained, say, by an ad-hoc program encouraging larger use of renewables would have not been of the same magnitude as gains obtained by incumbents in the refining business.

Italy's trajectory in hydrocarbon consumption also shows that oil and gas became appealing primary energy sources due to a strong incumbent (i.e. ENI), which has de facto led the Italian national energy policy and has favored energy security and economic competitiveness at the expense of climate security.

A key question then becomes, how has the former state energy company ENI's dominant position in the Italian gas sector influenced the tackling of Italy's conundrum between competitiveness, security and environmentally-driven concerns? High dependence on imported gas, for the residential and power generation sectors, and complex access to storage, triggered risks of periodic gas shortages. In sum, all this has meant that Italy hardly features high on the gas security parameter.

Energy security: Italy's position within the EU

Due to such a situation, Italy was severely affected by a disruption of gas supplies over the winter of 2005–2006 (partly due to a Russia-Ukraine gas dispute), and has since taken significant measures to better prepare for another similar situation. Starting from 2007, the Ministry of Economic Development has adopted and updated its legislation regarding specific emergency procedures. The update establishes the roles of the actors involved, the system monitoring procedures, and the measures to be taken by the Ministry in the case of a crisis.[37]

However, prolonged gas shortages in 2006 and 2009 have not dramatically changed the strategy of Italy's most important authority for gas security, ENI. Bellicose statements from Gazprom and the Russian authorities against the pillars of the EU's gas liberalization process have been quietly supported by ENI. Moreover, despite the EU's persistent goals at gas market liberalization at the EU level, the path towards a common internal gas market has been fraught with obstacles (see below).

In Europe, Gazprom's big clients are Germany, France and Italy, which together account for more than half of the EU's consumption of Russian gas.[38] These countries have a long history of friendly "special relations" with the Kremlin with policies focused on promoting the interests of their respective "national champions" through bilateral relations with Russia, rather than an EU-wide strategy on security of supply. These three large member states have traditionally been characterized by national or regional monopolies, supported by the respective governments, or have directly delegated energy governance to their "national champions," as in the Italian case. Historically, the three biggest Russian clients who enjoy close relations with Moscow – Germany, France, and Italy in particular – have blocked steps toward a real EU energy integration. The issue of sovereignty over energy policy has cropped up repeatedly in the history of European integration to justify individual and varied approaches to energy security. Energy specialists are divided between those who advocate a truly common European internal and external energy policy[39] and those who believe that one step at a time should be taken instead; i.e. the EU should make the internal gas market integration a priority, and only when that goal is achieved an eventual external energy policy should be pursued.[40] In sum, the current weakness of energy policy at the EU level is due to a complex mix between: an internal market and competition policy, a nascent sustainable energy policy and a still empty EU-level security of supply policy. At the core of this problem is the "mandate" issue, which is the EU's lack of legitimacy over its member states' energy policies. With the Lisbon Treaty now the European Union has a mandate to establish a common energy policy based on "solidarity, sustainability, security of supply and economic efficiency."[41]

Most recently, subsequent to the Ukraine crisis, former Polish PM Donald Tusk has used the very same concept, sovereignty, to argue for a common EU external energy policy against Russia. On 2014, writing an editorial for the *Financial Times*, Tusk warned, "Gas security is a fundamental prerequisite of sovereignty."[42] Yet, Italy, France and Germany are simply not convinced that a truly common external European energy policy is in their interest. The UK, somewhat ironically considering its traditional Euroscepticism, having already liberalized its own markets, is pushing for fully integrated EU energy markets.[43] Comprehensive and definitive views on the best way forward are beyond the scope of this chapter, yet only in the context of this dilemma can we understand the lingering challenges moving forward. With this in mind, we now turn to the second pillar affecting Italy's energy strategy, economic competitiveness.

Economic competitiveness

Falling indigenous oil and gas production, continuous economic crisis, low or negative energy demand growth, planned and unplanned fuel mix changes driven by policies and changing economic and energy realities, have made an overarching analysis of Italian competitiveness a daunting task. Moreover, emerging doubts about the consistency of Brussels's 2020 targets, and divergent policy priorities within the EU put a question mark over Italy's strength as a global climate policy frontrunner.

According to the National Energy Strategy, Italy intends to double its domestic production of oil and gas by 2020 and boost renewable power generation as it moves to cut consumers'

energy costs and boost faltering economic growth.[44] This optimistic scenario entails the reduction of hydrocarbon imports to 67%, although it remains to be seen whether indigenous production will be cheaper than imported fuels.

In any event, the Italian economic situation is currently complex and uncertain. After a decade of very slow growth, the economic crisis reduced GDP by more than 5%. Sustainable growth is the government's declared goal,[45] however, its attainment is hindered by a series of structural factors, most notably energy prices much higher than the European average (especially on electricity). According to the National Energy Strategy there are four main structural factors impeding Italian competitiveness:[46]

1 The Italian energy mix and in particular the electricity mix mainly consists of gas and renewables and largely differs from the European one for the absence of nuclear and much lower volumes of coal.
2 The wholesale price of gas in Italy is higher than the European average despite the web of "special relationships" that ENI has established with a series of foreign gas suppliers, such as Russia (see section 1). For example, in 2011 Italian gas was on average 25% more expensive than the gas sold at North European hubs.[47] Even the price of the long-term take-or-pay Italian gas contracts is on average higher than the same contracts elsewhere in Europe. Such a situation negatively affects the final electricity price.
3 Italy has Europe's highest incentives for the production of renewable energy (for example, the incentives for the production of solar energy – photovoltaic – have been twice as generous as the German ones) despite the dire state of Italian finances and with a sharp negative effect on the general cost of energy: more than 20% of the average Italian energy bill consists of incentives to the production of renewables.
4 There is also a series of other costs related to public policies on tariffs and widespread inefficiencies.

These factors, compounded with Italy's still insufficient resiliency due to overwhelming dependence on foreign hydrocarbon supplies and the inability to respond effectively during crisis periods (as the February 2012[48] crisis has revealed), diminish Italian flexibility and therefore have a negative impact on the competitiveness of the system. The much-needed structural reforms are still incomplete, largely because of vested interests and to a lesser degree because they would be socially painful and unpopular with voters.

In order to enhance competitiveness by 2020 the Italian Ministry of Economic Development has put forth the following goals: aligning the Italian electricity costs with European ones; reducing the large gap between energy costs for businesses and residential consumers while making sure that the long-term energy transition does not hinder industrial competitiveness. Other first-tier priorities are growth in the "green economy," investments in gas storage and regasification facilities, and domestic production of hydrocarbons. The Government plans to allocate a sum of 170–180 billion euros to implement such measures up to 2020.[49]

On the other hand, the high energy prices led the Italian productive sector to extremely high energy efficiency. The energy intensity of GDP in the period 2000–2014 (unit of energy per unit of GDP) was one of the 10 lowest in the world.[50]

In sum, the government promotes positive economic development by combining more effectively environmental sustainability and economic competitiveness. In that respect, the development of a liquid natural gas market is considered key to position Italy as a gas hub in the Mediterranean, thereby gaining both in economic competitiveness and in secure energy supplies.

Diversification

In the last decade Italy has tried to diversify its energy sources in an attempt to redress the excessive reliance on certain supplying countries and to lower the import price of its hydrocarbons.

Therefore, Italy's interest in broadening its hydrocarbon foreign sources is driven not only by security of supply-related worries but also by competitiveness-driven considerations. Italy is largely reliant on pipeline imported oil and gas supplies. High oil prices and the fact that major shares of these come from unstable regions raise both economic and fuel supply security issues. Italy needs to import more and more of its gas supplies too, but faces a different set of suppliers and trade routes for gas with respect to oil, and therefore hopes that European shale gas in the long term will add materially to indigenous supply.

In order to boost both its competitiveness and energy supply, Italy aims to broaden its base of gas supply sources and import routes. It is also taking steps to strengthen gas and power grids, improve interconnectedness with the rest of Europe and facilitate gas and power exchanges across borders. Efforts to make more supply available to Italy and the rest of Europe have focused on, among other things, opening a "Southern corridor" for Caspian and potentially Central Asian and/or Middle Eastern gas imports. A decade-long rivalry between various consortia aiming to build pipeline systems from Azerbaijan via Turkey to Southeast Europe came to an end in 2013, with the Shah Deniz field owners declaring the Trans-Adriatic Pipeline (TAP) proposal the winner.

With TAP coming to fruition, Italy has taken a first step to diversify its still very concentrated supplies of gas. To bring Azeri gas to Italy and the rest of Europe, the TAP will connect Greece, Albania and Italy, and will join the domestic gas network in Brindisi (Puglia). There are also many projects for LNG terminals, at different levels of planning, for a total capacity of about 24–32 billion cubic meters (bcm).[51] Additional infrastructure is seen as a way to develop further competition, add flexibility to the system, and transform the country into a Southern European hub.

In this regard, there now is action in addition to the decades-long diversity talk. Rome seems to be largely interested in an economic cooperation with Azerbaijan: the Southern Gas Corridor has been agreed upon and it has now started its implementation phase.[52] And so, in a couple of years, a southern corridor should be taking fuel from the Caspian Sea through Azerbaijan, Georgia and Turkey, and into Europe, bypassing Russia. Those advances combined with other moving parts – such as liquefied gas plants off the Adriatic and Tyrrhenian coasts and greater gas integration with the rest of Europe, mean the Italian government will be getting closer to its aspirations of setting itself as a gas hub in the Mediterranean, thereby also weakening Russia's grip. Nonetheless, Russia is not standing idly by. The EU's attempts to get Caspian gas and mobilize support for the Southern corridor are complicated by Russia's plans to build a giant pipeline of its own across the Black Sea to Southeast Europe, called Turkish Stream. Given Southeast Europe's prolonged economic downturn, the market hardly supports the construction of several major new import pipelines into this region in the same timeframe.

Most recently, in Africa, the recent discoveries of huge gas fields in Mozambique and Tanzania have opened prospects of future oil and LNG shipments from these countries. In July 2014 ENI CEO, Claudio Descalzi, asserted that the proven reserves in the area could cover the gas consumption of a nation like Italy for the next thirty years.[53]

Yet, due to still incomplete liberalization, ENI's supremacy over national storage, and an insufficient number of LNG terminals to balance ENI's supplies, in the foreseeable future Italy will remain exposed to the vagaries of Russian, Libyan and Algerian foreign policy, and in turn

to ENI's relationship with these countries' corporate counterparts. Furthermore, ENI's sustained opposition to domestic liberalization in the gas market has contributed to Italy paying among the highest gas prices in Europe, and thereby hindered competitiveness.

Domestic gas liberalization – fraught with obstacles

In Italy, ENI – the former monopoly and the main player in the market – is also the largest operator in terms of sales to final users. Moreover, ENI controls SNAM that owns 94% of nearly 34,000 km of grid. ENI's dominant position in the Italian market, in particular its control of the grid, has generally meant less transparency and convenience for end-users. Nowadays this is a highly debated issue, subsequent to the reforms of the Monti government, which has committed to unbundling SNAM from ENI. Yet, only in mid-2012 Italian gas prices started aligning with those of the rest of Western Europe.

The majority of storage is managed by STOGIT, completely owned by SNAM (i.e. ENI). Almost every winter Italy experiences a shortage in the supply of Russian gas (because of severe climatic conditions) that tests the Italian storage capacity, which explains why there are multiple projects to increase the storage capacity.

According to the National Energy Strategy published in 2013, Italy requires an increase of about 75 million cubic meters of gas supply a day and about 5 billion cubic meters of storage capacity – which represents an increase of almost 50% compared to the current commercial capacity.[54] This increased storage will secure the system in case of emergency situations similar to those of February 2012, gradually reducing the need for measures to limit fuel consumption. This storage capacity will also contribute to enhance the liquidity and competitiveness of the market, representing a potential for modulation of streams for export.

In fact, market liberalization in the 2000s failed to achieve levels of competition in the mid and downstream sectors to the extent seen in North West European markets. This resulted not only in one of the highest European end-user gas prices, but also delayed the development of a liquid natural gas hub. Today, the gas industry is fully liberalized but competition has yet to reach its full potential with a few players still dominating the upstream and wholesale sectors. And although the retail sector is more diversified, market concentration is still significant.[55] Gas imports are delivered mostly via long-term oil-indexed contracts, which have come under pressure since 2008, due to a wave of renegotiations for price reductions in the contracts and a revision of take-or-pay (TOP) clauses. Even gas renegotiations, which were initiated by ENI, did not, however, fundamentally change the preceding situation. A real reduction of the cost of natural gas for final users would require an opening of the gas market that can only be fully achieved after the unbundling of the gas network, run by ENI. Such strategic management of the import infrastructure and the full liberalization of the market could, in principle, make Italy a European hub for natural gas, as hoped by the government. However, due to infrastructure constraints but also firm opposition from vested interests, this goal has not been achieved yet.

Climate security

The EU 2020 targets and their implications for Italy

After the adoption of the Kyoto Protocol, the European Commission set an ambitious plan to achieve higher environmental sustainability for the EU's energy sector. A set of targets was calculated for Europe as a whole and national targets were assigned to each member state.[56] In Italy these targets entail increasing the share of renewable energy sources in gross energy

consumption to 17.0%, with a share of 26.4% in electricity generation by 2020. National greenhouse gas emissions were set to be reduced by 13% in 2020, as compared to their 2005 levels. The target for gross energy consumption was set at a level of 158 Mtoe. A recent study, published by the European Energy Agency, stated that Italy is one of the 13 member states currently considered on course to achieve all the three targets by 2020.[57] In the period 2005–2013, efforts to increase energy efficiency and stagnating economic conditions decreased the gross final energy consumption by 10%. Currently, Italian energy intensity is lower than the EU-28 average. The relative contribution of renewable sources to the final energy mix increased by 158% in the same period, reaching a share of 11% in 2013.[58] Between 1990 and 2004, Italy recorded an increase in emissions due to economic growth. In more recent years, the combined effect of the economic crisis and the higher share of renewables in the energy mix led to a notable reduction of carbon emissions. Over the same period, oil use in power generation was replaced by natural gas. Energy efficiency and a rapid growth of production from renewables had a positive effect on dealing with GHG emission reductions (Figure 28.5). Italy over-achieved the intermediate target for the year 2013 and is considered on track for the achievement of the 2020 goal.

To achieve the objectives defined in the Kyoto Protocol (in terms of CO_2 emissions) and to meet the ambitious targets of EU directive 2009/28/EC, Italy adopted several policy instruments. These included tradable certificates for economically subsidizing energy efficiency and renewable sources, feed-in tariffs, investment subsidies, and tax deductions.

In Italy the green energy certificates system was introduced in 1999. It targeted large plants, while small installations (mainly micro-hydro and small photovoltaic for household use) were subsidized through feed-in tariffs. From that moment onwards both domestic energy production and energy imports were bound by obligatory quotas of renewable energy. The quotas were first set to 2% and later increased by an annual rate. The producers or importers of traditional energy had two options: either directly produce a growing amount of energy from renewable sources or cover part or all of their requirements by buying green certificates on the compliance market. Producers of renewable energy benefit from financial and pricing support: the electricity price and the revenue from GECs sales.[59] The system worked rather well at the beginning, but after a few years, under the combined effect of mismanagement in the compliance market and economic crisis, the price of the certificates fell considerably, aggravating the

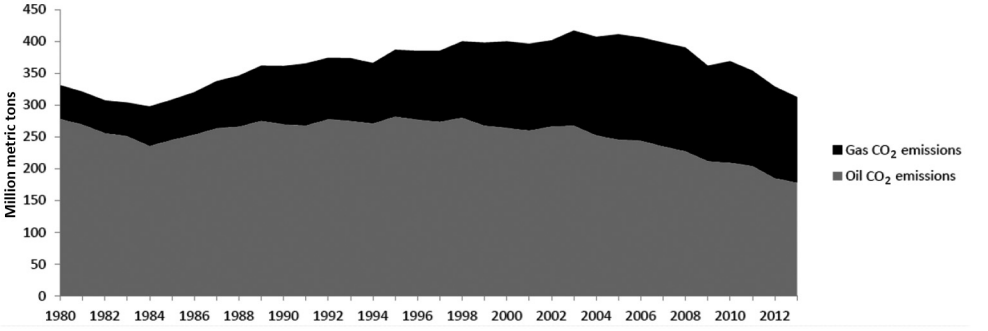

Figure 28.5 Carbon dioxide emission from the two main fossil fuels in the Italian energy mix 1980–2013.
Source: Authors' elaboration based on US EIA, International Energy Statistics database (2015). Retrieved from http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm#.

private investments on RES. The tradable certificate system was progressively phased out between 2013 and 2015 and replaced by feed-in tariffs.

In sum, the incentive scheme's impact on renewable sources installation was substantial, especially for wind and solar, which already account for significant shares of power generation, and for the refurbishment of medium and large hydropower plants. On the other hand, as in the case of new hydropower installations, it also created controversial dynamics. From 2000 to 2010, the number of plants increased by 39.3%, from 1,958 to 2,729, but installed capacity grew by only 0.7%, from 15,641MW to 17,826 MW.[60]

Moreover, many downside risks remain. Increasing shares of intermittent power put power grids to severe tests. Since the wind does not always blow and the sun does not always shine, and since electricity cannot easily be stored, there will be a need for massive investments to ensure demand-side flexibility.

In any event, barring major and, for the moment unexpected, changes in attitudes to nuclear, the contributions of renewables to Italy's power generation will continue growing. Wind and solar power have already captured substantial market shares and upon economic recovery will most likely pave the way for an even stronger support to renewables in the power sector.[61]

Conclusions

In recent years, Italian perceptions over the availability, reliability and affordability of energy sources have all shifted considerably. In terms of affordability, a disruptive economic recession in parallel with policies geared toward increased use of renewable energy left policy-makers with uncomfortable choices. The dilemma revolved around positive, albeit inevitably costly, climate and environmental policies and the competitiveness-driven imperative to reduce public expenditures, increase jobs, and foster growth. As for reliability, both the geopolitical tumult between Russia and Europe over Ukraine and the turbulent geopolitics of the Middle East significantly modified Italian views on the perceived supply risk associated with dependence on these regions.

Looking forward, Italian energy policies will be shaped by slow but profound transition processes, naturally accompanied by high levels of uncertainty. In the late 2010s Italy is expected to gradually climb out of recession and return to positive, albeit unimpressive, growth. However, should long-term commitment to reforms continue slacking, Italy runs the risk of sliding into a prolonged stagnation, with serious social unrest. In sum, the 2010s do not seem to be optimistic for Italy's economic growth. Meanwhile Italy's economic woes not only dampen overall energy demand, but also dilute efforts on the renewables build-up, potentially in favor of coal and gas. In fact, the national energy portfolio management will be heavily influenced by these developments. Gas will be increasingly used to back intermittent and unpredictable power generation by renewable energy and will remain in steady demand. The Italian gas market is the third largest in Europe with strong demand growth, especially from the power generation sector. Yet market competition has failed to achieve levels of competition already present in Northern European markets. This resulted not only in some of the highest European end-user gas prices, but also delayed development of a liquid trading gas hub. In short, liberalization failed to dismantle a rather rigid market structure organized around the incumbent, ENI.

The picture, however, is not uniformly bleak. As noted above, to achieve the objectives defined in the Kyoto Protocol (in terms of CO_2 emissions) and to meet the EU's ambitious 20–20–20 targets, Italy adopted several policy instruments that led to a notable reduction of carbon emissions in the energy mix. Given the combined effect of economic crisis and higher shares of renewables, Italian energy intensity is currently lower than the EU-28 average.

Oil demand already peaked and growth will be limited by its relatively high price and efficiency improvements in the transport sector, in addition to environmental policies. Although there are pressures to revise nuclear policy, Italy's long-term decision to do without nuclear power is not likely to be altered in the foreseeable future.

Natural gas will continue to account for the bulk of power generation although the new renewables – mainly wind and solar – are on the rise and already accounting for significant shares of power generation. This trend is driven mainly by climate and environmental policies, continued technological improvements, but also Italy's desire to mitigate local pollution and diversify energy supply. Hydrocarbons' dominance, however, remains high. As already noted, in the 1970s hydrocarbons peaked to over 80% and have never since fallen below that level. In addition, Italy is becoming increasingly reliant on imported oil and gas supplies. Nevertheless, there are encouraging developments on the hydrocarbons front, too.

To achieve the "diversification of gas sources" as defined by the National Energy Strategy, Italy played an instrumental role in bringing to fruition a southern corridor that will be taking fuel from the Caspian Sea through Azerbaijan, Georgia and Turkey, and into Europe, bypassing Russia. This policy represents a substantial shift from Italy's traditional position within the EU. The current fiscal crisis has dramatically exposed the dilemmas of an EU torn between federalist and nationalistic pressures. In that respect, European euro-sceptics and European federalists alike feel vindicated in arguing that no monetary union could have worked without a fiscal union. The same dilemmas and differences in opinion have surrounded the EU-led energy policy. As for Italy, despite a preference for sovereignty in security of supply seen as critical for national security, the government has recently moderated its behavior. Subsequent to a geopolitical standoff with Russia over Ukraine, it has cautiously supported a more muscular Brussels-led energy policy.

In conclusion, Italy has started a painful but necessary reform process, which has triggered significant social turmoil. The "bite" of these much-needed political and economic reforms will largely determine the pace and the success of Italy's approach vis-à-vis its three key policy goals – energy security, climate security, and economic competitiveness.

By recently approving of a sweeping constitutional reform and a new electoral law, Italy is proving itself more flexible than many observers could have hoped. How vigorously the government is poised to improve the relationship between overall energy use and carbon intensity, however, remains to be seen.

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