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Italian Energy Policy 1987-2018: Historical Developments and the International Dimension

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TABLE OF CONTENTS

INTRODUCTION – THE ROLE OF ENERGY

Energy is a key component of a country. Nowadays, the resource sector is characterised by the eminent role of the state in the control, development and usage of energy. This has come to be known as the fourth stage (Bressand 2009: 26) of oil and gas markets, which still account for most of the energy markets. In this phase, it is the state which is to take over, being prioritised over market principles and energy firms.

The energy market is archaic and modern at the same time. It is archaic because large parts of the energy sector are not covered by any international trading regime, for instance crude natural resources. This leaves virtually unlimited room for state intervention. Yet, it is modern because the energy market is global in scope. In this sense, it is mainly through the interaction of nation states and international organisations that power markets are shaped; even on the national level, market processes operate within a clear-cut policy framework.

Furthermore, the energy market features high substitutability; this is proven by the transition from coal to oil and, more recently, the enhanced role of renewable energy systems. Disruptive technologies and the proliferation of alternative sources influence national policy strategies and energy markets in an ever-changing environment.

In the international relation system, the rise of state power in energy affairs has displayed many implications. Energy has a multi-faceted relevance in terms of power and policy aims. First and foremost, a country can build up its national policy-making and attain internal stability if it manages to retain control of the country's resources. Chavez used Venezuela's oil wealth to support candidates who shared his Bolivarian ideas across South America. The degeneration of the energy-power equation is defined as a "rentier state", a country in which a certain ruling class is able to impose itself through the exploitation of the energy resources the natural territory finds itself rich in, usually oil and gas. A rentier state makes enough money off energy, whether rents or revenues and it does not require taxation from its citizens, thereby not needing to be accountable and turning undemocratic.

It is worth reminding that the relation between energy disposal and development is ambiguous. This has come to be known as the "resource curse" paradox: numerous developing countries which happen to be rich in natural resources score far lower in human development index and economic growth indicators with respect to countries affected by energy scarcity. The explanation of this is the malfunctioning of institutions, the low degree of diversification in the economy and high levels of corruption. While this is not attributable to energy in itself, developing countries are still

struggling to develop and create economies of scale in an increasingly globalised world. Resource revenues yield high volatility and the real exchange rate appreciates, shifting consumers to foreign goods rather than domestic ones. Countries with poorly developed organisational structures struggle to cope with revenue management and they may sometimes overborrow in case of large windfalls, which ties sovereign debt crisis to any oil price shock in the market as it was the case for countries such as Venezuela and Mexico in the 1980s.

There are many more ingredients to power than just energy. That being said, resources are fundamental to a country's survival, no matter its institutional organisation and long-term aims. Therefore, securing access to energy is an end in itself, especially for resource-low, consuming countries. A country's industrial and also military policy hinges on the resources at its disposal. That is why conflict may arise from a global resource scramble. For instance, tension has been growing between the countries bathed by the South China Sea. This is because 30% of the world's shipped oil passes through the Straits of Malacca and significant oil and gas deposits are believed to be found in the area. As a result, every country has declared its primary concern for the South China Sea and heavy military investment is envisaged to secure their interest. In spite of that, no country is willing to trigger a conflict which would hinder the smooth passage of critical energy resources. Be that as it may, conflict may simply break out because of misunderstandings in an increasingly militarised arena.

It is also clear that securing energy also relates to national security. China's "going out" approach to Africa, for instance, provides for the coupling of direct access of oil supplies for Chinese oil companies and aid packages to African countries. This helps China reduce its dependency on oil imports, considering how much energy it is bound to use: Chinese energy consumption was recorded at 10.1 TWh in 1990 and such figure stood at 24.8 TWh in 2008, which means a 146% growth in less than two decades (IEA 2017).

It follows that, even indirectly, China is causing geopolitical tensions. This is not only due to a possible resource struggle – although it looks very much like one: Chinese foreign direct investment in the continent grew by 166.7% from 2014 to 2015, compared to just 29.5% by the US and Angola became the third oil supplier to China in 2016, a trade volume worth $13.8 billion (WTEx 2016). But other than securing access to an increasing amount of energy, China poses a political threat. Its strategy of decoupling foreign aid and investment from governance objectives is at the other end of the scale with OECD countries efforts in Africa. After Angola's civil war broke out in 2004, Chinese unconditioned aid kept the IMF from implementing its programme to promote economic and political reforms to help the country in a crucial transition period.

It is easy to note how energy is the ultimate goal of China's grand strategy to Africa, which more or

less indirectly tilts the balance of power and so brings about deeper issues of governance, development and international relations.

Energy is not necessarily an end to be achieved; it can also be used as a means on the international stage. In particular, resource-abundant countries use energy as a geopolitical leverage for their foreign policy aims. This became particularly evident in the infamous 1973 Arab oil embargo, where countries deemed to be helping Israel in the Yom Kippur war were denied oil trade by the OAPEC. The embargo had oil prices skyrocket and the recession it caused on the global economy cannot be denied. But as the oil market becomes more globalised and alternative technology means such as shale drilling are employed, it became harder and harder for oil-producing countries to have the upper hand on importing ones.

It can be argued the features of the specific energy market affects the extent to which states rich in natural resources can force their way to importing countries. For instance, the natural gas market is not global in scope, rather it is divided in three regional markets: North America, Europe and Asia respectively. In this sense, producers have by consequence a much higher bargaining power with respect to the more competitive oil scenario, and they can also have major consequences for importing countries. Russia's cutoff of gas to Ukraine in 2009 deprived south-eastern Europe of gas for 15 winter days.

However, this power proves to be very limited: there is a strong interdependency between gas producers and consumers. Other than the new system of Liquefied Natural Gas, traditional gas is transported through pipelines which are lengthy in construction times and economic cost. This implies it is very hard, if almost not impossible, to shift to other consumers, thereby restricting the producer's room for manoeuvre.

Overall, each country has its own definition of energy security. To oil-rich Middle East countries, this relates to securing demand, whereas emerging economies such as China and India see energy security as access to resources at any cost. In the developed world, energy is to some extent conceived as a commodity in the free market.

Energy is what a country makes of it. Being one of the most dynamic scenarios in international relations, an analysis of resource availability can provide useful insights on international relations theory and a country's economic, industrial and military policy. We shall begin by an overview of the current global energy scenario.

1 – THE INTERNATIONAL ENERGY SCENARIO

1.1 International Energy Governance

1.1.1 A new challenge to developed countries and the Kyoto Protocol

Latest technological developments and international engagements have completely reshaped the balance of power in terms of energy policy. The distinction between producers and consumers has become more and more blurred. International relations have turned out multipolar, and so did the energy discourse. Power is no longer the prerogative of the industrialised North, and resource policy is no exception. To some extent, the energy discourse is no longer the prerogative of states, either. Since the early 2000s, a growing number of public-private partnerships have been founded to complement UNFCCC commitments. They have become a cornerstone of the global energy and environmental issues; the Renewable Energy and Energy Efficiency Partnership (REEEP) is a glaring example thereof, comprising all G7 members, 180 private entities and 6 international organisations for initiatives in the sustainable development and renewable energy goals. Things have come a long way since developed states were the sole actors in global energy. In the wake of the 1973 oil price shock, G6 leaders met for the first time in Rambouillet, France. The later G7 and G8 meetings saw energy sneak into the core of the debate: on the occasion of the 1980 Venice summit, countries agreed to reduce their oil share to 40% of their national economy and develop non-oil resources as high as 20 million barrels per day by 1990. By 1982, oil prices had dropped and energy stayed relatively out of G8 meetings. It seemed blatant that energy was an issue which belonged to the "major league", with developing countries not even allowed to sit at the big boys' table.

The 1992 Rio conference was the first grain of sand in the gear of energy supremacy the developed world had experienced so far. Defining "sustainable development" as an ultimate goal in international engagements (Rio Declaration 1992:1), developing countries could not be kept off the energy game like in the past. Another step towards a more inclusive energy dialogue was represented by the 1997 Kyoto Protocol, which arose out of enhanced awareness on the need of joint efforts to tackle climate change. It aimed to reduce greenhouse gases emissions by 5% with respect to the 1990 level in the 2008-2012 commitment period. Much in contrast with inclusiveness, Kyoto set the principle of common but differentiated responsibilities (CBDR) which held developed countries responsible for its historic weight in yielding climate-changing emissions (Kyoto Protocol 1997: 1-2). This meant countries of the industrialised North were the only ones obliged to undertake emissions reduction commitments under the supervision of a specific compliance body. Thinking

such distinction did not justify a special treatment for emerging countries, the US never ratified the protocol, which did not enter into force until the Russian Duma approved it in 2005.

1.1.2 The Paris Agreement and Multipolarity

Kyoto had effectively failed to appreciate the importance of developing countries in the energy discourse. But the global South had been summoned into global governance issues, and the process was non-reversible. The G8+5 emerged as a forum in the context of the 2005 Gleneagles Plan of Action on Climate Change, in an attempt to include countries which could be decisive on the international stage such as China and Brazil. Ultimately, the first G20 meeting was held in 2008. Apart from showing the increased tendency to a multipolar IR system, since it had been foreshadowed at the G7 Cologne meeting in 1999, the G20 included key energy exporters and consumers such as India, China, Turkey and Saudi Arabia.

Energy consumption shifts reflect the new governance landscape: non-OECD countries are going to be responsible for 93% of global energy demand growth between 2008 and 2035 and OECD countries are expected to enjoy less than 40% of global energy consumption by 2035[1]. The World Bank itself has become more and more involved with energy issues. The 2008 Climate Investment Fund (CIF) has been set up in order to dedicate more public finance than ever before to secure energy access and fight climate change.

The 2015 Paris Agreement represented a turnaround of what Kyoto had established. By acknowledging the common goal of limiting global warming and prevent temperature from rising above 1.5 °C, the CBDR principle was wiped out of the treaty. The objective which COP 21 set is not merely emissions-abatement for the ratifying parties, rather a worldwide consideration of CO_2 levels to be reduced in order to achieve the aforementioned goal in a joint effort. Developing countries are to play a role as much as developed ones, and they will do so through Nationally Determined Contributions (NDCs). Each country will assess its energy strategy in the light of their international engagements and there is no specific deadline for attainment, since any country can always opt-up and set more ambitious targets as energy-related developments and national policies allow so (Paris Agreement 2015: 2, 12-21). Whether Paris will live up to expectations is debatable, especially after the US reported dissatisfaction with the agreement. However, what remains indisputable is the enhanced involvement of developing countries into new the energy discourse.

1.2 Fossil Fuels

1.2.1 An oil decline?

Fossil fuels' golden age seems to be over. Carbon-based economies are still up and running and it would be foolish to downplay the role of coal and oil as of today, but fossil fuels consumption simply cannot go on playing the same role as it used to be. Were countries to follow COP 21 climate change goals consistently, only a third of fossil fuels deposits ought to be used up by 2050. In the light of the latest trends, fossil fuels demand is expected to be in free fall: -30% coal and -12% oil by 2030 (IEA 2017).

Coal is less and less of a factor in energy strategies. Being the most polluting of energy sources, it is responsible for 45% of global carbon emissions. The US set the goal of reducing by 32% the carbon levels of 2005 in thermal electric factories within 2030 (Silvestrini 2016: 81). China has shut down over 1000 mines since 2015, and its consumption is expected to slightly rise until 2020 before dropping dramatically. China is rich in coal, but it has been turning to alternative sources since implementing the 2005-2010 National Plan, especially through direct investment in renewable energy plants and its growing oil imports.

How about oil? It would be premature to write it off at present time. Supporters of the "Peak Oil" argument stress the finiteness of hydrocarbons, so much so that nowadays reserves are on the downward half of the Hubbert's curve, which declines after hitting its peak. However, the peak oil theory fails to appreciate the dynamicity of the model. First of all, technological innovations enhance finding rates, which makes the assumption of exactly knowing the amount of oil reserves invalid. More importantly, price adjustment mechanism is key to oil markets: whenever a mismatch between supply and demand takes place, price adjustment strikes a new balance. It is a matter of market power: if oil demand grows, producers may in response either raise production or prices. In the case of the latter, oil production does not need to go up as demand goes up. The oil market features cyclicality: if prices go down, oil investment is curbed. Once demand recovers, an oil price shock is on the cards. Thus, the oil market may experience long periods of surplus capacity followed by terms of tight capacity. Oil is a volatile good, but it is hardly substitutable in sectors such as transportation.

Furthermore, the oil market is still fundamental in geopolitical and economic issues. It cannot be denied that in the latest years oil markets have been flooded with financial speculators outside the oil business. This makes the whole market structure very unstable, but the oil market has its own means of recovery. For instance, an increase in oil prices and the awareness of limited oil reserves has pushed companies and countries to find alternative solutions, to be more specific sand

oil in Canada and hydraulic fracturing in the US.

1.2.2 Reassertion of oil's status quo

While more and more emerging countries are investing in cleaner energy sources, oil is still vital to national energy policy. Oil still represents the largest source of primary energy, accounting for about a third of global energy consumption (BP 2017).Taking a closer look, oil never stopped growing: available reserves rose by 75% and yearly extraction by 40% from 1980 to 2010 (Mohn 2010: 394). The factor mostly contributing to the reassertion of oil importance is the demand growth in non-OECD countries. In particular, China has been the first responsible for oil growth in the past two decades. Up to 2002, China's energy demand augmented by less than half the rate of its GDP. Since then, resource strategy has taken a u-turn: the Chinese government decided to invest in coal-fired power plants to improve electricity supply and energy intensity increased by 5% on average per year (Chinese National Bureau of Statistics 2010). Absolute oil consumption steadily rose and China's global share was recorded at 12.8% in 2016[9]; this led Chinese state-owned oil firms to expand their markets overseas. In spite of the latest Chinese 5-Year Plan incentivising renewable energy sources, 64.4% of its crude oil demand was satisfied by imports in 2016 (IEA 2017) Oil reliance is nothing but growing: the three main National Oil Companies PetroChina, Sinopec, and CNOOC were forced to reduce national production since they could not to compete at oil prices below $50 a barrel. As a consequence, domestic oil production fell by 6.9 percent to 3.98 million bpd in 2016 (IEA 2017), which prompted China to fill its strategic petroleum reserve by importing more foreign crude oil.

In the mid-2000s, a combination of high oil prices, limited access to reserves and hardened fiscal systems encouraged producers to find alternative solutions to traditional deposits. As a result, the US turned out to be a leading actor thanks to the Shale Revolution. This refers to a new system of horizontal drilling and hydraulic fracturing which significantly increased American oil and natural gas national supply. Not only might shale gas allow the US to eventually achieve energy independency, but they could also become an oil net exporter. The IEA estimates the US will account for about 80% of the growth in global oil supply by 2025.

However, the Shale Revolution is useful to shed light precisely on the slackening which is characterising the fossil fuels market. Conventional oil production has plateaued over the past ten years because demand has lowered and relatively few new deposits have been discovered. As a result, the Shale Revolution accounts for most of oil growth. The decision by Saudi Arabia to lower oil prices while leaving production unchanged has been made possible by its amount of sovereign bonds and bank reserves, but it deeply affected other countries whose economy heavily relies on

fossil fuels such as Russia, Venezuela and Nigeria (Silvestrini 2016: 67).

All in all, doubts shall be cast on the real impact of the Shale Revolution itself. The revolutionary technique of fracking has allowed a decrease in prices, but there is a huge financial speculation behind: as both debts and investment on the Shale market go up, one is compelled to wonder whether the whole fracking scenario might end up in a bubble.

The climate change discourse is also in contrast to deep subsoil exploitation. The International Renewable Energy Agency (IRENA) stressed that leaving 82% of fossil fuels in the subsoil untouched is key to enhance by 50% the chances of keeping global average temperature from rising by 2 degrees. It makes sense, then to countries which are extremely oil-dependent to keep selling it now, albeit at lower prices, rather than being forced to leave fossil fuels in deposits in the future. From this perspective, decision-making on oil exploitation strategies is facing a dilemma: on the one hand, investment on deposits should be cautiously assessed (it follows, decreased) in order to prevent useless investment. This in turn will mean a lower supply and higher prices. On the other hand, such investment could already prove to be excessive, in that climate change constraints would freeze deposits altogether for emissions reduction targets.

1.3 Nuclear

1.3.1 A slumping energy source

Nuclear energy used to be seen as the real alternative to fossil fuels. Its potential was deemed to be infinite: US Atomic Energy Commission head Lewis Strauss stated in 1954 that the electricity derived from nuclear plants was “too cheap to meter”.

Things were destined to go quite differently: in the 70s, the public opinion of industrialised countries grew resentment against nuclear plants. The 1973 oil crisis, paradoxically, did not contribute to the development of nuclear energy: production costs had been underestimated and people still seemed too concerned with atomic technology. After nuclear energy producers had built plants so as to prevent any leakage of radioactive material, the threat of evacuating nearby areas pushed the public to demand even more in terms of safety measures. This in turn extended construction times and production prices skyrocketed, so much so that nuclear grew even more unpopular among the boards of the electricity industry.

Accidents such as the one in Chernobyl and, more recently, Fukushima hindered even further the nuclear option. In the words of Nuclear Intelligence Weekly director Stephanie Cook: “a nuclear plant is so complex that there are countless series of events which could lead to an accident. Every single time an accident has occurred, it has been caused by a series of events which was different

from past cases" (Yudin 2013). It follows that an all-round safety assessment of nuclear plants is impossible, and after Fukushima the precautionary principle has been considered the most viable option by many countries. Germany, for instance, declared its intention of dismantling the whole of its nuclear capacity within 2022.

Atomic technology is less and less used : as of 2015, 390 plants can be counted throughout the world, 54 fewer than in 2002 (IEA 2017) .Nuclear energy is contributing less and less to the production of electricity: reaching 18% in 1986, this figure stood at 11% in 2014 (IEA 2017). Not only is nuclear energy less and less relied on, but its use is also dropping more rapidly: in 2016, nuclear production was recorded at 2476 TWh, less than 10% of global electricity production. In other words, nuclear dropped 4 percentage points in the first 10 years of the 21st century and another 3 in the following 6 years.

1.3.2 Nuclear energy in the security discourse

It needs to be reminded that the nuclear question is not only part of energy strategies, but also of military ones. A close parallelism can be drawn between peaceful and military applications in nuclear energy. Whether nuclear is considered as a weapon or not depends on the level of uranium enrichment. If the latter is above 20%, it is classified as high-enriched uranium and if it is above 90% then it has a weaponry character. There is no technological barrier between the two, even more so if it is taken into account that theoretically speaking nuclear exposing devices can be constructed from low-enriched uranium. The same goes for plutonium, which can be used in fuel fabrication but it is also a fissile component in nuclear weapons.

The inherently unstable nature of the nuclear scenario does not favour the non-proliferation regime, which entered into force through the Non-Proliferation Treaty (NPT) in 1970. Of the 8 countries officially holding a nuclear arsenal, 3 of them are not part of the treaty: India, Pakistan and North Korea, which withdrew in 2003.

Another substantial hindrance to the non-proliferation regime is the safeguard mechanism: the International Atomic Energy Association (IAEA) is charged to assess that certified nuclear facilities are not used for military purposes. But in case of non-compliance, the procedure is cumbersome: other than calling upon the violator for remediation, the IAEA should report to the UN Security Council, which is to decide on the penalties to be applied. However, there is no guarantee the deviant state will comply and any permanent member could veto any sanction. Ultimately, the international stage lacks an effective multilateral institution to regulate its peaceful use and implement non-proliferation. Multilateralism would mean placing delicate matters out of national hands, as well as make nuclear technology less vulnerable to misuse and facilitate and

facilitate IAEA safeguards.

Nuclear energy may be less and less relevant in national energy policy, but there is little surprise in seeing how countries would retain its disposal for strategic reasons. In spite of the growing multipolarity in international relations and in the energy discourse, the nuclear sector is far from being taken off national hands and out of international security issues it will most likely remain so in the forthcoming years.

1.4 Natural Gas

1.4.1 An asset on the rise

Natural gas is becoming more and more relevant in the energy scenario. Analysts suggest natural gas is to replace oil as THE energy fuel in the forthcoming years. Demand for gas has outpaced the one for oil by twice as much over the past ten years and it is expected to further grow by 50% over the next 20 years. Why would such shift occur? Natural gas has proven to be much cleaner in terms of CO^2 emissions, making it advantageous for firms and countries to switch to cleaner models in the light of the latest decarbonisation engagements. Perhaps even more importantly, natural gas resources have outgrown oil reserves in availability: unconventional gas production, especially after the Shale revolution took place in the US, boosted the reserve-production ratio to 200 years (IEA 2017).

The enhanced role of natural gas has arisen after precise economic and scientific dynamics. As of 2008, gas prices were rising and scarce resources allowed producers to dictate conditions on buyers. After the economic crisis, gas demand fell dramatically, as high as 9.9% in 2011/12 (BP 2012).

The Shale revolution in the US turned the tables. The US became the first gas producer in the world, with 20% of global share. This meant the US market closed down to Liquefied Natural Gas (LNG) imports; in turn, Russia, the Middle East, Northern Africa and Australia had to switch to other markets in order to sell the LNG. Europe became the harbour of choice.
This energy domino triggered a radical shift in the natural gas market. European utilities, which were tied to long term contracts through pipeline infrastructures and indexed prices, realised they were losing out to bigger margins, desperately trying to help themselves to a larger spot market percentage. The LNG trade novelty challenged the traditional gas market model, which relied on long term contracts and prices pegged to oil. A series of arbitration cases arose between European energy firms and foreign producers especially Russia's Gazprom.

The – newly found - enormous liquidity available in gas deposits is changing the energy landscape

all over the world. In particular, LNG can be turned into its liquid form and it is therefore easy to store and transport across the globe. Being a more flexible product, it has a significantly higher competitiveness than pipeline gas. Its practicability makes it indeed very appealing: LNG importing countries were only 15 in 2005; this figure is now at 40 in 2017. For this reason, it is forecasted Liquefied Natural Gas will correspond to 90% in the expected growth in long-distance gas trade by 2040 (IEA 2017).

1.4.2 Liquefied Natural Gas: a game-changer?

The LNG introduction carries important implications. First of all, the gas market is whisking away from the traditional long term contracts models, bonding producers and consumers to stable prices as a result of the pipeline infrastructure required to transport gas. LNG is changing the very nature of gas market; this is both true in terms of competition, in that natural gas markets are less and less of monopolistic and oligopolistic character as new competitors are able to enter regional markets through LNG shipping, but also in terms of scope. The natural gas market, by consequence of the process we have just described, is going global. Another sign of its expansion is that natural gas is more and more traded in spot markets and this is challenging oil indexation, the mechanism pegging the price of gas to the oscillations in the price of oil. Instead of relying on long term contracts, spot trade is increasingly frequent for gas transactions, making gas price dependent on its own supply and demand flows.

This is very smooth from a theoretical standpoint. But whether such transition to natural gas will actually be as significant as forecasts suggest, or whether such transition will take place at all is still a matter of debate. We are yet to address the elephant in the room: political risk. The state still plays a central role in natural gas markets and at the end of the day; it is the one deciding the quantity of imports and exports. In the US, two dynamics are hindering LNG exports: the low price of natural gas on the national level is greatly benefitting the American industry, making its output more competitive. The second factor is the energy independence discourse: the Shale Revolution gave the vital opportunity to reduce the country's net energy imports, which were recorded at about 30% in 2005 and plummeted to 12.5% in 2013 (US EIA 2013).

American isolation could prove to leave more room for Russian intervention in the LNG market. Despite possessing 30% of global resources, Russia accounts for merely 5% of global LNG trade. If it developed such sector, Russia could also be more effective in its Eastern Strategy. The cake everyone wants a piece of is China: with a 15% year on year growth since 2000, China's current gas consumption of 155 bcm/y could easily double by 2030. However, at present time Russia seems paradoxically more in need of China than the other way around. The Middle Kingdom has found

alternative supplies such as Qatar and Australia, and Russia's threat to sell gas to alternative markets such as Thailand and Vietnam appears a bluff at best, since its very sale of pipeline gas to China is aimed to marginalise LNG trade from other Asia-Pacific consumers.

LNG transition is therefore far from being straightforward. Yet again, there is little concern for its very existence: the 250 mt/y LNG potentially coming from other actors scattered around the world – Nigeria, Israel, Angola, Papua New Guinea to name a few - should continue to erode old long term contracts and pricing. In spite of policy strategies, the question seems to be not *whether* LNG is to take over, rather *when*.

1.5 Renewable Energy Systems

1.5.1 The ascent of green sources

Renewable energy systems have undoubtedly experienced the biggest rise in the past few decades and they are playing a relevant role in the latest energy strategies of both developed and emerging countries. Renewable energy accounted for 19% of global final consumption in 2013 and its progress has been spectacular: in 2000, the IEA underestimated PV power by over 10 times on forecasting its potential in 2010. In 2015, Renewable energy made up 53.6% of the new power generating capacity installed, the first time to ever constitute the majority (UNEP 2016)

What could possibly explain the unprecedented centrality of renewable sources? Energy demand is rising, albeit by lower figures, but it will have to rise by 30% within 2040 because of the demographic explosion of 9 billion people expected on the planet in two decades and a growing urbanisation: urban population overtook the rural one for the first time in 2007 and a city the size of Shanghai is destined to pop up every 4 months in the future (IEA 2017).

Overall, the ideal path to 2040 can be described in two words: decarbonisation and efficiency. The latter refers to a new paradigm for emission-saving: instead of reducing consumption altogether in the traditional mitigation strategy, energy efficiency introduces new energy-saving materials and techniques to achieve the same goal with less energy. RES are both the forerunner and the main vehicle of both principles.

It is precisely out of enhanced energy needs that renewable energy systems are and will be vital to energy strategies. While it is forecasted fossil fuels will grow slightly, low-carbon sources are expected to double their shares, reaching 40% in final consumption (IEA 2017). Renewable energy already accounts for 40% of the increase in primary demand and it will have to rise even further to meet Paris' decarbonisation goals. Investments have not been indifferent to these major changes, either: global investment on electricity systems overtook for the first time the one on fossil fuels in

2017. It also needs to be stressed that electricity is responsible for 40% in the growth of final consumption; to put it into perspective, the same rise had involved fossil fuels over the past 25 years.

It is a common argument among RES critics that renewable energy is a luxury which only developed countries can afford. On the contrary, 2015 was the first year in which developing countries exceeded developed ones in clean energy investment, large hydro aside. Emerging economies invested $156 billion in the sector, 17 times higher the 2004 $9 billion figure (IRENA 2017).

The tipping point of renewable energy has been the ratification of the Kyoto Protocol in 2005. Since then, PV panels' power has risen by 46 times. More importantly, every time PV power doubled, its related price went down by 20% on average, making it a more competitive product and seriously threatening fossil fuels prevalence. In 2015, RES recorded their highest investment with over $ 329 billion spent on clean sources.

The reasons for PV prices to drop are twofold. The most straightforward cause is that the whole RES sector and PV in particular, is a science based technology. Thanks to scientific progress and new materials, the solar power industry has managed to continuously renew itself and as a result solar panels are more and more efficient. Another explanatory factor to PV price reduction is the mode of production: in order to build PV plants, a certain number of modules are assembled; this is done through an automated process which is easy to replicate large scale, so much so that unitary cost sinks as the business expands.

1.5.2 Is renewable energy the future?

China has proved to understand the importance of the solar panel business; other than enlarging its PV capacity, 8 out of the first 10 producers of solar panels are Chinese firms, accounting for more than 50% of global production (Zorzoli 2017: 109).

The wind power industry has also experienced a massive leap forward. Between 1983 and 2014, global investment on onshore wind power has overstepped $ 647 billion, 93% of which was allocated after 2000. This led wind power to be 20 times higher with respect to its 2001 levels. Production costs, following the same path of PV, have continued to drop from 380 $/MWh in 1983 to 70 $/MWh in 2015.

Once again, China's policy on clean energy sources is worth mentioning. Its development of wind sources has been impressive: with only 44.733 MW in 2011, its wind power rose by four times in five years, reaching 168.732 MW in 2016 and more than doubling the second-placed USA, which dispose of an 82.184 MW wind power (GWEC 2017).

What is the future of renewable energy? It has been shown clean sources have a relatively stable contractual condition, in the sense that their growth is decreasing fossil fuels' demand. In this sense, it can be said renewable energy is influencing coal and oil exploitation more than the other way around. Government strategies are also more and more turning to the green economy, proving national economic and industrial policies to be a driving force for cleaner energy. China is paving the way for the transition: at COP21, it committed to expand wind force up to 200 GW and solar power up to 100 GW by 2020.

The IEA estimates that by 2040 27% of global electricity will be produced through PV panels, thermodynamic and solar systems. The PV alternative is more and more of an option and it is rising by exponential figures. Global PV power skyrocketed from no more than 5 GW in 2000 to about 100 GW in 2012, eventually reaching a spectacular 306.5 GW only four years later (Solar Power Europe 2017).

The agency goes even further by forecasting that by 2050 79% of global energy consumption will be covered by renewable energy. This is indeed a bold statement, but latest trends suggest RES have grown exponentially over the past decades, and at present time there is little evidence in terms of technological innovation or geopolitical scenarios to suggest they will stop.

2 – ITALIAN ENERGY POLICY, 1987-2018

2.1 The Italian nuclear strategy

2.1.1 The 1987 referendum

The 1981 National Energy Plan (PEN) was approved with the long-term goal of ensuring Italian economic and industrial growth at the lowest cost and guaranteeing the highest level of security. Deeply affected by the 1979 energy crisis, the PEN aimed to reduce the country's oil dependency from 68% in 1980 to 50% in 1990. It attempted to do so by encouraging the development of budget-saving, alternative resources as well as promoting an industrial policy based on investment in the energy sector fostering technological innovation.

In concrete terms, the 1981 Plan incentivised the use of coal for thermal-electric production purposes. In particular, it designated the creation of new ENEL plants and the conversion of existing oil fuel plants into coal-fired ones. The Plan also set structural policy measures for distribution infrastructures and supply mechanisms of coal to the industrial and household sector. In addition, the PEN gave new voice to the nuclear discourse: it sought to complete the construction of the plant in Montalto di Castro and make the facility in Caorso fully operational. One year later, the National Agency ENEA was founded: its duty constituted in dealing with Research and Development on nuclear energy and alternative sources.

Clearly, the nuclear option represented the new path to be pursued internally for two reasons: developing atomic technology implied a lighter reliance on fossil fuels imports, and in the light of the lower kWh cost it was also cheaper to produce, reducing the country's national debt. Nuclear energy was seen as a more convenient alternative to oil: the Plan set the goal of reaching a 12.000 MW nuclear sector, which would account for a yearly contribution of 18 Mtoe on the national energy balance.

The global energy scenario has gone through radical changes in the early 1980s. The second oil shock was followed by energy-saving policies and it discouraged heavy industry investment; more generally, the world found itself in deep economic stagnation. Global consumption grew from 6,600 to 6,800 million/Toe only from 1980 to 1984; oil demand actually lowered, with decreasing oil prices: at the end of 1984, an oil barrel was sold at $28 (PEN 1985:7). All elements suggested that the future looked bright for nuclear energy: although it did require massive -investment in funding costs and technological expertise at first, it also encompassed higher marginal profits, it yielded more energy per unit than fossil fuels and it was cheaper, at least in the long run.

What is more, in the 80s Italy was no stranger to nuclear energy. In the 50s, it was common belief

atomic energy could be the solution to oil, in the sense that countries could virtually turn energy-independent by switching to the nuclear option, and they could do so with no harm to other countries. After Eisenhower stated at the UN General Assembly in 1953 that the US wanted to be the world ambassador of peace in the nuclear scenario, the 1955 Geneva Conference "atoms for peace" promoted the peaceful use of nuclear energy and it contributed to the creation of the IAEA in 1957.

In such a favourable context, Italy followed along: three plants were inaugurated in the early 1960s in Latina, Garigliano and Trino respectively. Their energy combined only contributed to 4% of domestic energy requirements, but as the PEN in 1975 and 1981 were approved, the reasserted preference for atomic energy had the better of alternative sources. A new facility in Caorso had been activated in the 70s. In 1982, construction work began for the plant in Montalto di Castro. What stopped the atomic wave from flooding national energy strategies for years to come? As the nuclear choice became prominent, a growing number of social actors started protesting against its use. Alongside the 1977 student movement, regional social movements started demonstrating to shut down the factories, advocating for the high risk of nuclear energy to both the environment and human health. The 1979 incident in Harrisburg, Pennsylvania contributed to rally more people under the no-nuke flag. In the Three Mile Island plant, the unrefrigerated core of the reactor left zircaloy bars exposed to excessive heat, thereby creating a gigantic hydrogen bull. The subsequent meltdown released radioactive gases into the atmosphere and damages were estimated at $2 billion. However, nuclear supporters pointed out that it was the lack of safety measures and supervision that caused the accident, not fissile material *per se*.

The event that did stop (literally) Italian nuclear energy from developing was Chernobyl. On April 26th 1986 during the simulation of a power blackout, reactor flaws caused a deadly chemical reaction: water turned into steam too quickly and it generated hydrogen, which collided with the graphite contained in the control rods. The subsequent explosion released radioactive material into the atmosphere. Dairy products and food crops from the area were banned and the IAEA classified the incident as type 7 on the INES scale, the highest ever recorded. Chernobyl was a slap in the face for the scientific world of nuclear-enthusiasts, who were faithful in its development and claimed it was the only viable choice other than fossil fuels. It also represented a major setback for ENI, ENEL and ENEA, which all risked seeing their long-term nuclear project go to shreds after they had carefully planned it in all its aspects, dividing shares between private and public actors and enhancing national energy competitiveness as a whole (Mattioli & Scalia 2010: 232).

Chernobyl poured gas on the fire of the Italian environmentalist protests. Two weeks after the disaster, more than 200,000 people partook in a demonstration in Rome against nuclear energy.

Legambiente was the core actor behind the referendum initiative. It consisted of an environmentalist NGO which in turn had originated from ARCI, the recreational association of both the Communist and the Socialist Party. The protest movement mainly came from the left, both in terms of scientific expertise of scholars coming from University faculties of Physics and Engineering as well as the political parties involved: the far-left Proletarian Democracy (DP) and the liberalist Radical Party (PR), which was in close ties with the centre-left parties. Interestingly enough, the Communist Party had a controversial stance; before Chernobyl, party members split up between nuclear aficionados and fierce opponents. After the accident, the anti-nuclearism took over within the party and an advisory referendum was proposed on the nuclear question. It was the way for the Communist party to mark its detachment from atomic energy without adopting too extreme a position on the Italian political landscape. Eventually, the binding referendum on the nuclear choice would prevail. The threshold of 500,000 signatures was overcome in no time. *Legambiente* set up a national conference in July to discuss the dos and don'ts in the strategy of social protest. On October 10th, 1986 all operative plants and the one under construction in Montalto were occupied.

The following year, the anti-nuclear sentiment grew even deeper within Italian public opinion. At the 1987 general elections, the Green Lists obtained almost one million votes. Finally, on November 8th-9th 1987, the referendum was held. Importantly, the outcome of the vote would not be a dichotomous choice on the use of nuclear energy. Under art.75 of the Italian Constitution, referenda by popular initiative have to be abrogative. Thus, in 1987 Italians were summoned to repeal three different provisions on nuclear energy. These were the possibility of the government to take charge of nuclear projects if local municipalities did not provide a response on time, the additional funding assigned to municipalities hosting nuclear plants and the possibility for ENEL to engage in international nuclear projects. "Yes" won by 80% on the first two questions and by 70% on the latter, with 65% turnout.

Although the binding character of the referendum is limited to few provisions, the 1987 vote de facto ousted nuclear production from national energy strategies. The plants in Trino 2 and Latina were immediately shut down and further studies on the dismantlement option for the facilities in Caorso and Trino 1 were commissioned by the Government. Both of them would be shut down by 1990. The Montalto di Castro plant will never become operational in its nuclear capacity. The Green Party alongside environmentalist movements occupied the site again in 1988 and after months of protests the government announced the reconversion of the plant into a thermal-electric factory on April 21st, 1988.

In the 1988 National Energy Plan, the Italian government issued a moratorium on the exploitation of nuclear fission as an energy source. The Plan also set new goals following the latest global

forecasts: in the light of a tertiary sector on the rise and growing prices of energy, one of the primary objectives of the 1988 PEN became saving energy and strengthen energy efficiency. Studies contained in the Plan forecasted national consumption to be at 180 Mtoe in 2000, with aggregate savings in the resource sector reaching 10 Mtoe in the worst case scenario. Law 10/1991 ratified the goals advocated for by the 1988 Plan. The Government allocated specific funds for energy efficiency interventions and it encouraged the R&D sector for renewable energy plants, as well as studies on the viability of alternative sources (Mattioli & Scalia 2010: 237).

Ultimately, why was the referendum so successful? While Chernobyl was by all means the straw that broke the camel's back, the Italian energy policy background constitutes a vital element to the story. Former Legambiente president Ermete Realacci lists three main features of the Italian case that have to be taken into account. Structurally speaking, Italy was less involved in nuclear energy than other European countries; it possessed fewer plants and of very limited capacity: with the exception of Caorso, no plant scored higher than 200 MW. In cultural terms, the anti-nuclear movement was based on scientific merit, through the careful assessment of alternative energy sources rather than the Manichean logic of nuclear = danger. In this sense, the Italian green movement proved to be very different from its counterpart in France and Germany, where the debate was substantially on ideological grounds and full of political rhetoric. The third reason is the organisational structure: *Legambiente* represented the backbone of the movement, as it managed to coordinate various political, institutional and social actors throughout the protest and the vote.

2.1.2 A Nuclear Renaissance?

1987 did not put the final nail in the coffin of nuclear energy in Italy. First of all, Italy still imports electricity from France that is produced by its nuclear plants. Besides, the issue of what to do with nuclear waste remained. The state company SOGIN was created in the wake of the 1999 Bersani decree with the purpose of nuclear decommissioning as well as the disposal and management of waste from the Italian short yet intense nuclear experience. In 2003, SOGIN selected the site of Scanzano Jonico for medium and high level waste. The Berlusconi Government approved the Decree 314/2003, ruling for the creation of a geological storage system in the area. The decision appeared controversial: the site was awfully close to another waste facility in Trisaia and above all no pre-emptive environmental impact assessment had been commissioned. The Basilicata Region appealed against the Decree after declaring Scanzano a denuclearised zone. The government was then pushed to amend the decree and charge SOGIN with finding another appropriate site.

Other than managing waste, ENEL has still continued to get involved into nuclear projects abroad. By the 2004 Marzano law, national electricity producers were allowed to engage in the

development and management of energy plants abroad, regardless of their nature. This somewhat crushed one of the three provisions which had entered into force by the 1987 referendum. In 2005, ENEL signed a cooperation agreement with the French utility EDF to engage in a third-generation nuclear power programme; one year later, ENEL bought 66% of utility Slovenske Elektrarne, which possessed two nuclear facilities in Slovakia. But as we shall see later in this chapter, in recent years ENEL took a U-turn in its agenda-setting and thoroughly planned to shut down its nuclear business in favour of renewable energy development .

Even more importantly, the 1987 referendum, in spite of the impact it had on the anti-nuclear discourse, has never explicitly prohibited atomic energy from popping up again on the government agenda. In the 2005-2008 period, fossil fuels prices skyrocketed. Global oil demand rose significantly and so did consumption, with a recorded growth of 2.9 MBd in 2004. Under such conditions, OPEC countries were less and less able to determine oil prices: in order to meet surging demand, production quotas were kept at higher levels. In turn, this reduced OPEC excess capacity and left less of a cushion between consumers and producers. Oil prices therefore became the result of a competitive equilibrium in the short run with highly inelastic demand, all of which explains its increase by 30% in 2005, eventually reaching 79$/barrel in 2006 (Berkmen et al. 2005).

Because of Italy's strong dependency on fossil fuels imports, the Berlusconi Government intended to restore nuclear plants in order to reach 25% national electricity production. The underlying goal was the same as 30 years earlier: reaching higher levels of energy independency, lowering electricity cost to final users and, in the light of the 90s engagements, cutting on climate-changing emissions.

Hitting such an ambitious target would have meant a nuclear Renaissance, the real game changer of Italian energy policy. Yet again, a major accident occurred only a few months before the nuclear referendum, just like in 1987. In March 2011, an earthquake in Tohoku, Japan started off a tsunami which hit the Fukushima nuclear facility. The tsunami short-circuited the power system necessary to cool down the fission reactors. The lack of refrigeration caused three nuclear meltdowns and so released radioactive material into the atmosphere. Hundreds of people are expected to eventually die from cancer because of Fukushima; just like Chernobyl, the accident was classified 7 on the INES scale by the IAEA.

The news shocked Italian public opinion. Albeit not on Japanese levels, Italy is quite an earthquake-prone country as well. Considering nuclear plants require a great amount of financial capital, technical expertise and above all safety regulations, Italians feared the long-term consequences of switching to the atomic option. All in all, nuclear exploitation would not be achieved in little time, let alone if it also encompassed risks for the surrounding area and population. The 11-12 June

referendum repealed the provision allowing the adoption of a national energy strategy which does of the vote, law 27/2012 sped up the decommissioning process for nuclear facilities and related waste.

2.2 Liberalisation and security of supply

2.2.1 The 90s paradigm shift of the energy market

One of the major changes in the Italian energy landscape has taken place in the electricity market. In the 90s, such market has been subject to extensive liberalisation. The new strategy aimed to enhance competitiveness and reduce risk in a sector which was largely based on long term contracts. The electricity business bears a high risk of overproduction: the long term character of investment and return implies that electricity firms cannot adopt flexible solutions so as to adjust to demand flows. Since the electricity market is extremely capital intensive and heavy losses are round the corner, its liberalisation means opening up to different competitors, which out of pluralism are going to have different reactions to consumers' preferences and improve the quality of services while driving prices downwards, at least on a theoretical level.

Up to the 90s, ENEL was the undisputed actor when it came to electricity: it was responsible for 73% of production and 93% of national distribution (Zorzoli 2017: 217). The 9/1991 law rules out the constraint for firms other than ENEL to produce at most 3 MW electricity from renewable sources and other techniques such as co-generation. Companies were allowed to produce electricity for their own purpose and they would hand over the excess quantity to ENEL. In 1992, ENEL was turned into a limited company, of which the Treasury was to be the unique shareholder. Although this cannot be considered as a full liberalisation yet, the 1991-92 period represents a decisive passage. However, a major conflict of interest arose: because of its growing debt the government wished on the one hand to promote ENEL's turnover, while still promoting competitiveness by liberalising the electricity market.

The 90s liberalisation paradigm has not been bound to the electric sector. It is the whole energy market which was destined to undergo a deep transformation. In 1995, the Regulatory Authority for Electricity and Gas (AEEGSI) was created. Funded through annual industry contributions, the Authority consisted of an independent body which sought to ensure energy quality standards while guaranteeing a free and fair competition in the market. AEEGSI was given wide regulatory powers: it could define standards, carry out inspections, apply sanctions, setting tariffs and make recommendations to the Government. Its creation was key to ensure that the free market would take over even in terms of resource management.

The electricity liberalisation took place under the 1999 Bersani decree. The issue with the electricity market is that while its monopolistic production can be overcome at relative ease, the distribution network which operates through a specific voltage line is a natural monopoly. The decree was written in complete awareness of the features of the industry and it therefore stated the obligation to set up independent firms for production, transmission and distribution. Thus, ENEL was forced to form a joint stock company, the National Transmission System Operator (GRTN), which would have the prerogative on the transmission, dispatching and connection of electricity on the national level. Its shares were given to the Treasury and it would retain absolute independency from its creator ENEL.

Decree provisions went even further by limiting to 50% the maximum amount for electricity production and imports by a single firm. As a consequence, ENEL had to sell 15.000 MW worth of plants. Furthermore, the 1999 law introduced the new mechanism of green certificates, a tradable instrument indicating the amount of electricity which has been produced outside the traditional fossil fuels exploitation. Under the Bersani decree, firms generating or importing electricity from conventional sources were required to at least to provide for 2% from renewable sources in their electricity supply.

What impact did the liberalisation have on the energy mix? The newly formed market structure pushed firms to switch from oil fuel plants to gas-fired combined cycle facilities. Gas was chosen because it was inherently more efficient than oil in energy production. International environmental regimes on climate change law to reduce polluting emissions did nothing but strengthen the transition. In 2008, gas accounted for 39, 8% of national consumption, a giant leap forward from the 26.5% share in 1990 (Frappi & Varvelli 2010: 103).

Other than encouraging gas-based electricity production, another liberalisation was implemented altogether in the gas market itself. The 2000 Letta decree laid down that no company will be allowed in the 2003-2010 period to sell gas more than 50% of the national consumption level. Gas transmission would have to be administratively divided from all other gas related activities so as to prevent any natural monopoly. The decree also opened up to international competition, in that foreign gas companies would be allowed to operate in Italy under the condition that consumers would have access to supplies in the companies' own country. Overall, the gas service was defined as of "public interest", which meant firms could refuse access to their gas systems only in case of insufficient capacity or if access would interfere with public service obligations.

In compliance with the European directive 54/2003, in 2007 Italy has liberalised the energy market as a whole. Distribution firms with more than 100,000 customers are obliged to found separate companies for electricity-selling purposes.

How to assess the attempt to ensure pluralism in the energy market? European wholesale prices have undoubtedly gone down, 70% less compared to 2008 levels (European Commission 2016). However, such decrease can be explained by other factors, especially the drop in fossil fuels prices. Moreover, the assumption the Italian electricity market is now liberalised can be seriously challenged. The majority of ENEL shares are possessed by the Treasury and other institutional actors. The 13 main Italian utilities, accounting for 64.5% of electricity production in 2016, are still publicly owned up to 81% (AEEGSI 2016). Ultimately, the Italian electricity market is no longer a monopoly, but it is still a long way from a competition in which private actors are protagonist.

2.2.2 The Italian Energy Security Strategy

Italy is a very vulnerable country in terms of energy security. Its energy imports are recorded at 76.5% as a percentage of total energy use in 2016 (IEA 2016: 13). Energy demand and consumption is steadily rising worldwide and primary sources prices are characterised by high volatility in prices. It makes strategic sense for Italy to reduce its energy dependency. Only a decade ago, Italy imported over 84% of its energy needs. In order to be less subject to international flows, the Italian government pursued two different strategies: on the one hand, diversifying its importing partners so as to avoid "a dependency on the dependency"; on the other hand, developing its own energy production, in particular the development of renewable energy sources.

The first point is particularly true for natural gas markets. The idea of opening up to alternative gas partners via the construction of new pipelines was put into practice as early as the 1980s, when ENI built the TransMed gas pipeline in a joint venture with the Algerian state-owned Sonatrach so as to connect the Hassi R'Mel reserves to Sicily. Italy had already been importing gas from the Netherlands through the Trans-European Pipeline and from Russia through the Trans Austria Gasleitung. The TransMed relied on the historically positive relation between ENI and Sonatrach, and it gave Italy a third way out to sustain its upward gas demand by interacting with only one country across the Mediterranean Sea. The government contributed to the project by a substantial amount; the reasons for the funding were twofold: internally, the TransMed would provide for a better gas supply to the underdeveloped and underserved South of Italy; foreign policy wise, the pipeline would promote stability and prosperity in Northern Africa.

The Algerian case is not an isolated one. ENI's longstanding relation with Libyan National Oil Corporation (NOC) encouraged the planning of a pipeline project in the 1990s. The so called Green Stream was designed to link the deposits in Wafa and Bahr Essalam to Sicily. However, Libya became the target of UN multilateral sanctions after the Pan Am Flight 103 incident in 1988, after two Libyan nationals were accused of being the perpetrators of the terror attack. While Italy

economic interest and colonial legacy had continued to maintain ties with Libya in spite of the pressure put by the international community, the project could not be implemented because of sanctions themselves. The tug of war between Libya and the UN went on during the 90s but thanks to the mediation operated by the Italian government, Colonel Gaddafi handed the two suspects for trial in the Netherlands. Libya got restored into the international community as sanctions were lifted and a joint venture between ENI and NOC finally completed the Green Stream in 2004.

Following the two cases in Algeria and Libya, it can be stated that Italy has traditionally decided to conduct its energy security policy following a model of triangular diplomacy. This means that the first actor to secure Italian security of gas supply abroad was ENI itself, backed by the Government political and economic resources. In other words, it was up to ENI to seal gas infrastructure deals and create new pipelines. Although the Government set the long-term goals regarding energy policy, on the field it merely represented ENI's institutional guarantor.

Perhaps not surprisingly, such two-headed structure did not stop with the 90s market liberalisation. In a context of thriving demand for resources, the opportunity to expand the gas business arose as the nuclear option was crossed off after the 1987 referendum. Because fossil fuels competition was still in its archaic form on the national level, the subsequent move for ENI was to enlarge its outreach abroad. As the 2000 Letta decree laid down the end of ENI's gas monopoly, its expectedly reduced margins internally pushed the company to develop even further its international projects, all the more reason for the Government to still rely on ENI for energy security.

Relying on ENI has proved to be a good call in international matters. However, the natural gas market has remained structurally vulnerable on the national level. During the 2004/05 winter, early signs of gas shortage came up. Some industrial actors saw their gas supply decrease by the Government under an interruptability clause; that was enough to settle things up back then. However, the gas shortage became an issue of national concern in the following winter. A series of factors contributed to the crisis. 2006 winter was the coldest one in two decades, driving gas demand for heating up. Coincidentally, Italy experienced an insufficiency of peak capacity, which means the gas industry was unable to enhance production following an insurgent demand. Finally, gas prices didn't rise in Italy as they did in the rest of Europe because of the rigidity of regulation and a very low degree of competition in the sector, since the liberalisation decree had been approved only 6 years earlier. This meant gas exports stayed high because of the more affordable price compared to other European markets, but they did so in a context of gas scarcity. On December 9th 2005, the Ministry of Economic Development declared the state of emergency. Gas was withdrawn at too fast a pace, exceeding all expectations and leaving the country literally out in the cold. An Emergency Committee obligated energy operators to maximise gas imports and

provided incentives for companies willing to switch to other energy sources. Such measures proved not to be enough, so that 1.2 billion m^3 of strategic reserves had to be used to cope with the shortage.

While on the one hand it can be fairly stated that the crisis has taken place out of an intricate intertwining of multiple factors, the limits of the Italian natural gas market became clear. The industry sector showed its lack of competition as well as a deep dependency on foreign imports: as the IEA notes in its 2016 Italy report, foreign gas still covers 90% of domestic demand. In spite of the latest pipeline projects created throughout the years, security of supply is far from being achieved. As we shall see in the next chapter, the TAP project seeks to open up to the Southern Gas Corridor from Azerbaijan and find an alternative path to current gas routes.

Italy finds itself in a relatively well-diversified position in terms of trade partners: 60% of imported gas comes from Russia and Northern Europe, while other considerable percentages are provided for by Algeria (12%), Libya (11%) and Qatar (8%) (IEA 2016: 152). Nonetheless, Italy's relatively secure position can also be explained by the drop in consumption which has characterised the 2008 post-crisis scenario: Gas gross consumption plummeted from 84.883 million m^3 in 2008 to 67.523 million m^3 in 2015 (IEA 2016: 125).

The natural gas market is still tied to long-term contracts and pipelines represent a form of natural monopoly. Building new ones requires massive investment, with returns available only after a relatively high amount of time. Liquefied Natural Gas is somehow challenging such paradigm in favour of short-term deals and spot gas prices. It is true LNG is far from accomplishing a structural transformation of the gas market at present market. It is also true that thanks to LNG, global gas trade seems to have taken a clear path towards flexibility, and Italy is no exception: the 2014 AEEGSI report points out how contracts lasting 20 years or longer in the Italian gas business have declined from 47% in 2008 to 23% in 2014.

The same diversification effort has been carried out in the oil sector. Crude oil production reached 5.4 Mt in 2015, 11% lower than in 2005. Domestic supply is merely responsible for 8% of internal consumption. Once again, Italy's vulnerability to foreign imports of fossil fuels comes to light; given the high volatility and inherent insecurity of oil markets, the Italian strategy has consisted of widening its relations with oil exporting countries. The choice of forging new partnerships somehow strengthened over the past decade: imports from new actors such as Azerbaijan and Kazakhstan have increased by 318% and 293% respectively, while traditional trade relations with Russia, Saudi Arabia and Libya declined by 43%, 50% and 81% in volume (IEA 2016: 125).

The oil market features a high degree of liberalisation. The Government is no price-maker and it only intervenes to ensure a free and fair competition. As in the case for gas, oil consumption has

lowered: its share on the total primary energy supply has been decreasing from 45 to 35% over the last decade (IEA 2016: 172). But unlike natural gas, the oil industry is in a better position as far as the securitisation of the industry is concerned. Implementing European directive 2009/119, Law 249/2012 calls for the Government to store a minimum amount of strategic oil stock to guarantee security of supply. On the occasion, the Ministry of Economic Development set up the Italian Central Stockholding Agency (OCSIT). The Agency is charged to transport, store and manage the state-owned stocks to face any possible shortage in the sector.

2.3 The 2000s global commitments

2.3.1 From Kyoto to Paris: the European roadmap

The environmental concern which has characterised the regimes of international law in the 90s was destined to have an enormous impact on Italian energy policy. Since the Rio Conference had set the goal of sustainable development in 1992, cutting on climate-changing emissions has been at the core of international engagements. The European Union has traditionally been one of the most, if not the most ambitious actor regarding reduction targets. On the occasion of the 1997 Kyoto Protocol, the European Union committed to reducing its greenhouse gases by 8% compared to the 1990 levels, whereas the signatory parties' common target remained at 5%. Following the principle of burden sharing, European decision 358/2002 assigned a different target to each member state following its national degree of pollution and economic context: Italy's quota was fixed at -6.5%. Brussels also conceived an Emission Trading Scheme (ETS) to decrease the amount of CO_2 in the most energy intensive sectors. Every business in the field needed a government authorisation and it was subsequently given a specific pollution quota; carbon dioxide emissions were measured throughout the year, and if they exceeded the quota the company needed to buy more permits on the market. In the opposite case, the company could sell them. The system coupled energy efficiency and competitiveness, pushing firms to adopt cleaner solutions. The amount of pollution permitted lowered every year, bearing in mind Kyoto's reduction targets: the ETS managed to cover about 50% of the gross emissions production by member states. Italian Law 316/2004 implemented the ETS mechanism on national stage through the approval of a National Allocation Plan in 2005: the Italian Government engaged to reduce by 23 million tons the annual total quantity of tradable pollution quotas by setting a limited number of European Unit Allowances (EUA). The European Commission decision 1527/2005 bound Italy to an even stricter Plan, setting the goal of further reducing emissions by 23 $MtCO_2$ per year, corresponding to 9% of the allowances (Villa 2006: 15).

European involvement in the environmental *enjeu* could not help but growing. In 2008, the 2020 climate and energy package was approved: member states committed themselves to the triple goal of cutting CO_2 emissions by 20% with respect to the 1990 levels, developing renewable energy so that it would account for 20% of EU energy and improve energy efficiency by 20%. The 2015 Paris Agreement has constituted a milestone in international environmental law. We have been discussing its implications in the previous chapter. As far as Italy is concerned, the European Union has set a joint – much to the dismay of the name - Nationally Determined Contribution by the Riga Declaration on November 6th 2015. The document advocated for the collective target of reducing greenhouse gases emissions by 40% within 2030 with respect to 1990 levels so as to comply with the 1.5° degrees overarching threshold. Decision 590/2016 by the European Council authorised the signature of the Agreement on behalf of the European Union. Decision 1841/2016 officially approved the accord, making it binding under European regulation and in turn on member states' national legislation. Italy ratified the Paris Agreement under law 204/2016 on November 4th 2016.

Interestingly enough, the prominent role of the EU in climate change agreements has been made possible by a wider Union strategy. Brussels has been setting increasingly ambitious goals, which have promoted both its international credibility as an actor of international law and its willingness to abide by stricter conditions.

Other than the 20-20-20 goals, the EU has approved the 2030 climate and energy package. It sought to cut on emissions by 40% compared to 1990, and at least 27% share of renewable energy consumption and 27% of energy savings. In particular, the aspiration for the energy sector is to enhance competitiveness through supply diversification, interconnection capacity between European countries and thereby regulation of price differences among member states. Plus, the strategy incentivises sustainability as a means to attain transparency, security and economic growth (European Commission 2014).

In the light of the European framework, what is the future of energy policy? Will there be a reassertion of the state, which will be able to take unilateral decisions ignoring the decarbonisation aims the Union has ascribed to?

It is fair to say the Italian Government will remain a central actor in resources decision-making. Energy constitutes the lifeblood of a country's industrial, economic and security policy. Given how far apart EU member states find themselves nowadays, the European project of shared energy capacity across borders seems far from attainable. However, decarbonisation is proving to be the winning strategy in order to achieve both security of supply and geopolitical influence. Former Chairman of the Chamber of Deputies Environment Commission Ermete Realacci points out that

China is leading the way in the new paradigm of green economy and the world is following along. He also affirms that European Union will more likely carry on as a central actor in international environmental regimes as it has been decisive to the climate change fight since the Kyoto Protocol, which would have not entered into force without its engagement. However, Realacci believes that the Union will face its main obstacle in the member states of the former Communist bloc. These countries have a completely different economic system and because of their heavy reliance on coal they will hardly adjust to a different industrial plan, since they are already struggling to keep up with the rest of the Union. Integration in renewable energy development across member states is missing, yet it represents the key prerequisite to ensure any form of Energy Union will ever see the light of day.

2.2.3 The National Energy Strategy: from 2013 to 2017

The 2013 National Energy Strategy (SEN) produced by the Ministry of Economic Development reflected the willingness to achieve European targets as well as improving the country's security of supply. The document adjusted Italian energy choices to Union policies. In particular, the SEN proclaimed four long-term objectives.

The first one was the significant drop in energy costs and so in prices for final users. The Strategy stated that potential savings could reach €9 out of the €70 billion on the national gas and electricity bill. The development of the natural gas market has contributed to price reduction; gas contracts are less and less based on long term agreements, fostering spot gas trade. In addition, latest contracts rarely include the indexation clauses which used to peg gas prices to flows in the global oil market. Finally, Europe has experienced a steep drop in gas demand after the 2008 crisis: the subsequent oversupply further encouraged market liquidity and flexibility. The combination of such financial conditions pushed Italian gas prices down, closer to European averages.

The second line of action proclaimed the fulfilment of European 2020 environmental targets. In order to achieve the renewable energy requirement, green sources of energy are expected to become the primary source in electricity production alongside natural gas at 35-38%. The third objective constituted the eternal sword of Damocles looming on Italian energy policy: the SEN called on lowering national dependency on foreign imports of fossil fuels so as to obtain a more stable internal situation in terms of security of supply. The Government sought to reduce its imports from 84% to 67% on the total primary energy mix, thereby cutting on €14 billion a year.

What do the second and third aim have in common? They can both be achieved through the development of renewable energy. Not only would clean sources raise national production of energy at a lower carbon impact, but they would also guarantee a more solid position vis-à-vis its

exporting partners.

Enhancing solar and wind power production, investing on hydroelectric and geothermal facilities, promoting research on biofuels are measures worth noticing in the 2000s Italian energy strategies. The SEN did nothing but confirm the path that had been taken a few years back. The CIP6 was the first feed-in tariff incentive scheme for renewable energy and it came as early as 1992. We shall see later how the Government incentivised solar and wind power generation. To put it into perspective, between 2008 and 2011 wind power capacity almost doubled from 3538 MW to 6936 MW; on the same trajectory, PV capacity rose by 2856% (Marcantonini & Valero 2017: 600).

The fourth SEN goal was to ensure economic growth. Rather than an objective per se, this fourth priority seemed to be an overarching principle of mainstreaming: regardless of environmental engagements, price reduction and competitive markets, decisions on resources should never come at a loss for the Government budget. €180 billion are planned to be invested within 2020 in both green (RES development) and white economy (energy efficiency enhancement), as well as more traditional sectors like the fossil fuels industry and electricity/gas infrastructures. Specifically, Legislative decree 102/2014 laid out provisions to improve energy efficiency. Companies of a certain size or working in carbon intensive sectors were obliged to carry out an energy performance assessment and tax deductions for efficiency interventions in the building sector could be as high as 65%.

The latest SEN has been presented in November 2017. The strategy does not contain any major differences compared to the previous one. Paradigm wise, the 2017 SEN encouraged to go even further into the path of decarbonisation, lower energy prices to acquire competitiveness, raise energy efficiency and strengthen national security of supply.

Possibly, the biggest novelty in the Government agenda-setting of energy priorities is the relinquishment of coal to produce electricity within 2025. All coal-fired plants for electricity generation will be forced to shut down by then. This is no minor provision, since in 2015 coal was responsible for 16.6% of the electricity produced in Italy. While it is true that the share of renewable energy in the electricity sector is rising, renouncing to coal for electricity means *de facto* renouncing to coal altogether, as more than 80% is destined to electricity generation (IEA 2016: 178).

Environmentalists claim the 2017 SEN has been complacent in setting unimpressive decarbonisation goals. In spite of the criticism, it is undeniable Italian energy policy has completely reshaped itself in the past few years. ENEL agenda is proof thereof. The company abandoned the plant of Slovenske Elektrarne and decided to quit the nuclear business. Perhaps such decision has been conditioned by the low competitiveness nuclear energy is more and more featuring in Western

Europe. The only two plants under construction are currently in Flamanville, France and Olkiluoto, Finland; they both have massive delays in construction and the required budget doubled and tripled respectively. Be that as it may, ENEL understood the future lies in renewable energy. In 2016 the RES oriented company ENEL Green Power, founded in 2008, has been absorbed back into the ENEL Power group. In the same year, ENEL power capacity has grown by 2 MW from renewable energy projects in the US, South America and South Africa (ENEL 2016). Such added capacity brought the share of emission-free energy produced at 46%. ENEL went even further, announcing its aim to completely decarbonise production by 2050. Being an energy utility mainly based on electricity production, total decarbonisation is all but a taken for granted move; this shows how Italy has turned tables in the renewable energy business over the past decade, both in terms of institutional decisions and business-making (Silvestrini 2016: 287). We shall see in the later chapter how such transition is taking place and its potential impact on the future energy scenario.

3 – ITALIAN ENERGY POLICY NOWADAYS: GAS OR GREEN?

3.1 The TAP: a new opportunity?

The Trans-Adriatic Pipeline is an ongoing project of a gas facility network known as Southern Gas Corridor, linking the Caspian region to Europe. In a country poor in raw materials and primary resources such as Italy, the TAP represents another relevant supply source in the light of the instability of its existing gas networks. Yet to be completed, the TAP would provide Italy with 10 bcm of gas every year. We are going to assess the importance of the project in the broader European energy strategy, particularly in the EU-Russia relation. We are then going to analyse the choice of TAP as the final pipeline of the Southern Corridor over the Nabucco project. Finally, we are going to evaluate the potential impact TAP could have on Italian energy policy once the pipeline will become operational.

3.1.1 The Southern Gas Corridor vs. Russia

In its 2008 EU Energy Security and Solidarity Action Plan, the European Commission highlighted the importance of the diversification of energy supplies. As the document noted, "the EU is projected to remain dependent on imported energy [...] for many years to come", if anything because internal production of fossil fuels had been substantially dropping. Therefore, the Plan stressed the necessity to develop a "Southern Gas Corridor [...] for the supply of gas from Caspian and Middle Eastern sources, which could potentially supply a significant part of the EU's future needs" (European Commission 2008: 3-4).

What did such document imply on a practical level? Diversification would lower gas dependency from traditional partners, namely Russia which accounts for 35% of European gas imports (BP 2017); the Southern Corridor strategy has therefore complicated Russian export policy. As we have noted in the first chapter, gas dependency is a double-edged sword: the traditional system of long term contracts and lengthy pipeline infrastructure does not only tie the buyer to the seller, but also the other way around, given the regional character of the market; in this sense, Europe represented its most important natural gas partner. While still playing a dominant role, Russia found itself as the undesired n.1 in gas trade. To defend its status quo, the Russian Federation has been pursuing two different paths. On the one hand, diversifying its customers itself: the goal is to increase gas exports to Asia up to 20% of the total by 2030. However, China and other Asian countries appeared unwilling to pay the same price for gas as Europeans. That brings us to the second strategy: the creation of alternative pipelines, such as the South Stream. The business was announced in 2007: it would provide Austria with gas from Russkaya compressor station in Anapa through the Black Sea,

Bulgaria, Serbia, Hungary and Slovenia. The project appeared controversial: with a capacity of 2.2 tcf, it represented a direct competitor to the European Southern Corridor, bypassing key neighbour countries (Ukraine and Belarus) and European member states (Lithuania, Poland). Even more controversially, South Stream did not comply with European legislation on competition. It effectively ignored the 2009 Energy Package, which set the obligation of setting up different companies for energy generation and distribution. Construction work began in 2012. In a spiral of tension, EU-Russia relation did nothing but deteriorate from that moment on. Bulgaria never approved of the project, the European Commission put pressure on Gazprom to ensure South Stream would abide by Union regulation. After the Crimean crisis broke out in 2014, Europe imposed sanctions on Russia, which ultimately decided to abandon South Stream. Russian President Vladimir Putin venomously accused the European Commission of being "non-constructive, [...] obstacles are being created".

The episode is to show how Russia has been effectively prevented from attaining an even bigger share of gas exports to Europe, which in turn opened up to the Southern Corridor. This is not to say Brussels merely refused to expand the business of its largest gas partner. More blatantly, the Union energy goals such as supply diversification happened to coincide with Russian unlawful behaviour in the European energy scenario, as the separation of production and distribution firms is a cornerstone of the liberalisation of the EU energy market.

However, thinking Russia would simply give up on its most lucrative market is naive at best. Although the business expansion did not work out, European member states are still tied to Russia by long term bilateral contracts and Gazprom attempted to purchase stakes in European energy distribution networks.

What is more, some European countries have decided to negotiate with Moscow directly, thus undermining EU's credibility on the international stage. The most glaring example is the Nord Stream pipeline. The project consists of a pipeline which links Russia and Germany through the North Sea. First conceived in 1997, the facility was inaugurated in 2011 with a capacity of 2 tcf per year. As a result, Russia accounted for 60% of German gas imports in 2017 (Bloomberg 2018). Russia, more or less willingly, had to back off from competing with the Southern Gas Corridor. However, the Federation seemed to have decided by itself not to compete with the Caspian route: even when the South Stream was under construction, Gazprom decided to cancel a southern branch from Greece to Italy; to further signal its intention of keeping an amicable relation with Azerbaijan, in 2013 Russia gave the green light to providing the Caspian country with $1 billion in weapons, after such shipping had been delayed for the past few years. Renouncing to such leverage possibly marked the end of Russian interest in the Southern Gas Corridor, although Russia still remains a

vital actor in both European and Italian energy policy.

3.1.2 The Southern Gas Corridor: Nabucco vs. TAP

In 2011, Azerbaijan President Ilham Aliyev and European Commission President Jose Manuel Barroso signed a joint declaration. It stated that "our common objective is to see the Southern Corridor established", so that "this strategic corridor will entail the creation of a sufficient dedicated infrastructure [...] thus enabling the transportation and marketing/distribution of natural gas from Azerbaijan in the European Union" (European Commission & Azerbaijan 2011).

As the Southern Corridor strategy became a reality, two main alternative pipelines were envisaged the exploit the Shah Deniz II gas deposit in Azerbaijan. These were the Nabucco project and the TAP.

Nabucco designed a gas transportation facility which would link the deposit to Turkey, Bulgaria, Romania, Hungary and finally Austria. By contrast, TAP would take the southern way and so going through Greece, Albania and Italy.

Because of the high investment required and the lengthy construction times of pipelines, only one project would be backed by the European Commission. It became soon clear that Nabucco was preferred over TAP. On the occasion of the signature of the 2009 Nabucco Intergovernmental Agreement, Barroso affirmed that "Nabucco will provide energy security to Turkey, South East Europe and Central Europe", to the extent that "this is an achievement of which we can all be proud" (European Commission 2009). By contrast, TAP was merely plan B: as an intergovernmental agreement on TAP was reached in 2013, Energy Commissioner Guenther Oettinger pointed out that TAP "could be among the first components of the Southern Gas Corridor" (Sartori 2013: 3).

The Union predilection for Nabucco was inconsistent with its energy goals. The 2009 Energy Package asserted the need of supply diversification to lower dependence from Russia and secure alternative resources. But the Corridor further set the goal of decreasing the influence and role of upstream energy firms and producing countries within the European market. Yet, the Nabucco project encompassed only European utilities and by consequence national streaming operators.

Other than broad policy objectives, Nabucco presented structural disadvantages in comparison to TAP. For one thing, the Nabucco committee was composed of public and private actors, which were only able to interact in a cumbersome procedure when it came to decision-making, a significantly slower system than TAP's. Moreover, TAP benefitted a total exemption from third party access. This was granted by EU legislation, under the condition that such investment was to improve security of supply and thereby boost competition in the gas market. This allowed TAP to

offer the Shah Deniz II Consortium to operate at full pipeline initial capacity of 10 bcm. On the other hand, Nabucco was only granted a 50% exemption from third party access, guaranteeing a lower 5 bcm capacity on the first period.

The Shah Deniz II consortium was the body involved in the selection process. Eight different selection criteria were set, among which seven of commercial and economic nature, with only one of political character, under the name of "public policy considerations". At a press release on June 28th, 2013 the Consortium announced its decision to back the TAP project to transport Azeri gas to Europe.

What constituted the decisive factor in the verdict? Shah Deniz II field responsible BP stressed the commercial imbalance between the two pipelines, pointing out how the first seven criteria – rather than the political one – drove the Consortium to prefer TAP. Another element has possibly played a relevant role in the decision, that is to say Azeri interest in the Greek market. During the assessment phase, Azerbaijan state-owned energy company SOCAR expressed interest in the Greek gas operator DESFA. Only a few days before the verdict, SOCAR bought 66% of the company. The purchase had two implications. Concerning the commercial aspect, SOCAR managed to expand its business westwards. But in political terms, this meant Azerbaijan effectively entered the European gas market in both transmission and distribution. In this sense, the Shah Deniz II decision in favour of the southern route based TAP hardly comes as a surprise.

Once finished, the TAP will represent an alternative source of natural gas and it will have attained the European goals of supply security and diversification. It is fair to say the Southern Gas Corridor strategy has eventually been implemented. However, its main objectives – reducing dependency from Russia and ensuring lower involvement of European upstream companies – have not been followed by the slightest chance. While it may be true that TAP had a head start on a commercial level, the decision to let go of Nabucco has also to be analysed in the light of the political framework of EU-Azerbaijan relations, which was by no means a small component of the project.

3.1.3 The impact of TAP on Italian energy policy

The TAP outlines the laying of 878 km long pipelines across Greece, Albania and Italy. It is designed to link at the Greek-Turkish border with the Trans-Anatolian Pipeline (TANAP) which goes through Georgia and Turkey; the latter is in turn connected to the Southern Caucasus Pipeline (SCP), which originates directly from the Shah Deniz II deposit. The three pipelines combined make the Southern Gas Corridor. The TAP will comprise a 10 bcm initial capacity, with two compressor stations in Thessaloniki, Greece and on the Albanian coast. As the third compressor station will be installed at the Greek-Albanian border, the pipeline will be able to attain its

maximum capacity of 20 bcm. The project consists of a joint venture comprising Azerbaijan-state owned SOCAR (20%) and other European utilities: BP (20%), Snam (20%), Fluxys (19%), Enagas (16%) and Axpo (5%).

The TAP has the potential to represent a fresh start for Italian energy policy in all his aspects. In referring to the Southern Corridor, the key word has been double diversification. The most obvious reason is that the pipeline will provide gas from the Caspian Sea, an area yet unexploited by Europe. But another aspect of its diversification is that the pipeline will transit through countries that are not on the map of European gas-transporting facilities. The TAP would constitute new bloodline to such a resource-importing country, in which natural gas has traditionally played a fundamental role since the 1987 referendum ruled out nuclear energy in national production. Italy is the third largest European market in natural gas consumption, with 71 bcm in 2016. It is also affected by one of the highest dependency rates in terms of gas imports, 90%, in comparison to the European average at 70%. Such tendency is reinforced by the fact that national production dropped at 5.8 bcm in 2016, about 15% less than in the previous year (Italian Ministry of Economic Development 2017: 141). Out of this very need, 8 out of the 10 bcm per year are expected to be marketed in Italy. Introducing a new 10% of gas is bound to have structural effects on the national market: oversupply may drive prices down. However, the overall effect of the TAP has to be weighed against other factors, including renewable energy subsidies, EU policy and supply shortages from other pipelines.

A secondary – and second in time – aim comes into question: the Italian state seeks not only to stabilise its internal market, rather it also wishes to turn Italy into a gas hub for Europe. In this scenario, Italy would become the fundamental transit point for natural gas from the Caspian region onto other European states. The TAP would guarantee excess capacity, buffering against risk and allowing for market expansion. As a consequence, Italy would gain from transition fees and benefit from a newly defined central role in the European natural gas market. The strategy encompasses a reverse flow of Transitgas, the pipeline currently importing gas to Italy from Norway and the Netherlands.

Becoming a gas hub seems more of a hope than an actual forecast: the European gas market, while seeking to diversify its gas supplies to reduce Russian influence, is not in desperate need for additional resources. In 2011, Nord Stream contractors planned an expansion of the Russian-German pipeline, attempting to double its capacity up to 110 bcm. The project has not been backed by the EU, with European Council president Donald Tusk declaring that “Nord Stream II does not help diversification” (European Council 2015). Be that as it may, Germany gave its go-ahead for construction and operation near Lubmin in 2018. Were Nord Stream II to be implemented, it would

completely change the power balance in terms of the European energy mix and the gas market, de facto crumbling the already weak hopes for Italy to become a gas hub.

Natural gas plays a key role in the Italian energy mix, accounting for about 40% of gross electricity production: to put it into perspective, in France and Germany this figure currently stands at 4% and 12% respectively (Italian Ministry of Economic Development 2017: 141). Such a high percentage carries implications transcending the economic sphere; as natural gas is the primary fuel for power generation in the electricity sector, strategies on its supply and use are extremely relevant to national security. Supporters of the TAP argue that existing pipelines involve countries with high levels of political instability. On the eastern side, Russia is the main gas exporter to Italy: after the 2009 supply cutoff and the escalation of the Crimean crisis in 2014, such option is no longer deemed as ideal. Depending too much from Russia on gas imports did nothing but strengthen the idea. As previously mentioned, Russia still remains a vital partner for Italy and its role cannot be easily downplayed, but latest development suggested that the Italian strategy would be implemented elsewhere. Looking south, Algeria constitutes the other large exporter of gas to the Italian peninsula. Northern Africa appears torn by political turmoil and regional instability, especially after the civil war which broke out in Libya in 2014. Again, not the most stimulating of backgrounds.

However, doubts shall be cast on the security level which countries crossed by the Southern Corridor would guarantee. Turkey has been clashing against the Kurdistan independence struggle and it has been subject to terror attacks. Georgia is still healing from the wounds of the Russo-Georgian war and the separatist claims of South Ossetia and Abkhazia. After all, the TAP goes through some states with authoritarian government and limited personal liberties. In its 2017 report, Freedom House classifies Azerbaijan as not free and Georgia and Turkey as partly free. We need to further take into consideration that the region is an extremely delicate transit area to tie Asia and Europe. It suffices to say that Turkey finds itself in a strategic position between 47% of world energy resources in Russia, Central Asia and the Middle East and 17% of global gas consumption in Europe (Austvik & Rzayeva 2017: 541). As interests of the main international actors overlap and compete with one another in the region, it can be fairly stated that TAP does not represent a massive step ahead compared to the pipelines already in place.

Former Chairman of the Chamber of Deputies Environment Commission Ermete Realacci (interview, Rome, April 27th 2018) argues that TAP will be beneficial to Italian economy and national energy security as a whole, but to a limited extent. He claims that since the other major pipelines are not operating at their full capacity, the main advantage of TAP will be enhancing competition within the national gas market, thereby driving prices downwards and benefitting final users. Realacci further underlines the importance of securing alternative sources in order to buffer

against the risk of running out of primary energy sources, especially a vital one to the energy mix such as natural gas.

However, Realacci does not believe that regardless if Italy is to become a gas hub for Europe, as the SEN 2013 and 2017 have envisaged, to him natural gas is not the future. He considers gas as an energy source of transition to renewable energy: while natural gas is the best among fossil fuels in terms of competitiveness and environmental impact, green sources are to take over and the question to him is no longer whether such shift will take place, rather *how soon*.

3.2 Renewable energy: the Italian rise

Italian energy policy has experienced a radical shift over the past decade. The total share of renewable energy in the total primary energy of supply has grown from 7.9% in 2005 to 18.2% in 2015 (IEA 2016: 79). Therefore, Italy has already attained the 17% target laid out in the 20-20-20 European goals for the country, and it expects such figure to grow at 20% by 2020. How to explain the unprecedented ascent of clean sources? We are going to take into account specific policy measures which effectively boosted the renewable energy business. We are then going to outline the features of the Italian system, focussing on the peculiarities which provide a fertile ground for clean energy sources. Finally, we are going to analyse the combination of the two factors and look into the possible developments awaiting Italian energy policy in the following years to come.

3.2.1 Policy incentives and the Italian scenario

In compliance with European regulation, Directive 28/2009 set the target of 17% GHG emissions reduction by 2020. The Directive created a framework for renewable energy use, leading to the approval of a National Renewable Energy Action Plan (NREAP) in 2010. The plan identified multiple strategies for different sectors of renewable energy production and consumption. The Government decided to promote two main incentive systems: a feed-in tariff for PV installation, the *Conto Energia* (especially private users) and a green certificate scheme for other RES' businesses. Strategies have been so effective that 2013 SEN raised the 2020 17% target to 19-20%. On the same trajectory, SEN 2017 set the goal of reaching 28% by 2030, with 55% of renewable energy plants involved in electricity production.

As national energy strategies have laid out, Government decisions are aimed to reduce Italian excessive dependency on foreign fossil fuels by strengthening the role played by renewable energy. Italian crude oil imports plummeted from 1804.60 to 1261.60 barrel/day from 2005 to 2015 (CEIC 2016). Over the same time frame, the internal supply side started to improve: energy production grew on average by 17.7%.

The reason for such trend is the latest development of solar and wind power, hydro and geothermal facilities as well as biomass and biofuels. Concerning green energy, Italy has raced through the stages over the past decade. Renewable energy accounted for 46.4% of national energy production in 2005. This figure was recorded at 68.4% in 2015, hitting its peak on the production balance (IEA 2016: 18). In particular, electricity generation has been heavily affected by RES development. In 2015, 40% of Italian production was made possible thanks to clean resources; other EU member states did not get nowhere near this amount, with Germany at 30% and France at 16% (Italian Ministry of Economic Development 2017: 141), although this is in relative terms, since both countries can rely on nuclear plants and therefore their energy mix is completely different from the Italian one.

How was this peak reached? In 2001, the liberalisation of the electricity sector gave way to renewable energy. Not only did the market open up to a fair competition on nonconventional sources, but it also obliged electricity companies to produce a minimum share of green sources in their portfolio through the Tradable Green Certificates scheme. The system treated Green Certificates as a tradable asset in relation to the total gross energy production. Companies were forced to either produce renewable energy on their own or purchase Green Certificates to meet the quota requirement. The scheme has proved to be rather stable, as the managing authority *Gestore Servizi Energetici* (GSE) could set a reference price and also buy certificates back, regulating prices through a feed-in premium. As a consequence, green energy producers have flourished over the past decade.

Apart from the private energy business, innovative and effective legislation has been key to improve the private sector for energy use and production. 2005 boosted RES development for domestic users in Italy: the year marked the inauguration of the first *Conto Energia* programme. PV users were able to sell electricity exported to the grid and a premium tariff was granted for PV devices with a peak power up to 1000 kW. The *Conto Energia* has been renewed another four times up to 2012 through a more detailed incentive scheme and increasingly ambitious goals to be attained. Regulation was so comprehensive that remuneration from the *Conto Energia* will exceed returns from selling electricity in the market. Because of surging costs for consumers, in 2013 a new tax credit programme was approved as a complementary measure: it granted annual fiscal refunds to owners or tenants of the building with PV installation up to 50% of the expenses.

Up to 2007, installing PV bore too high a cost with respect to investment. In 2008, the coupling of the feed-in tariff with the net metering system boosted the installation of large-sized MW plants in open fields. In 2011, a new incentive scheme was created in an attempt to reduce advantages for plants larger than 200 kW; a cap of 23.000 MW was set, but such measure did not hinder

investment in the business. The most relevant reason is the decreasing cost of PV technology, which made the business still convenient in spite of a lower tariff. Plus, two additional conditions applied to incentives: in the case the roof for installation was made of asbestos, and if panels were produced in the EU, all of which further encouraged RES development (Desideri 2014: 586).

Even in the transport sector, RES impact is worth noticing. The share of renewable energy in the business reached 6.4% in 2015, almost twice as much as the 3.7% level in 2009. In compliance with the EU Renewable Energy Directive, Italy set a compulsory quota of biofuels which is devised to rise every year so as to reach the 10% target in 2020. In addition, a double incentive has been granted for biofuels produced from waste, especially cellulosic material; the new paradigm promoted by the Italian Government in terms of biofuels is sustainability. Since they retrieve waste, new generation biofuels have a minimal environmental impact and they do not compete with the agri-food industry. Such approach has come into force through the European Clean Energy Package, which set caps for traditional biofuels and a minimum quota for the new generation ones.

3.2.2 A favourable environment

Technological innovation and policy-making aside, Italy bears the potential to be a leading force in the RES global industry. Italy has always been a country poor in raw materials and primary resources, which means industrial production and energy generation have traditionally taken the attitude of making the most of what they have because of their limited nature. Such a specific trait did nothing but strengthen after the 2008 crisis. A new economic model has been envisaged since the credit crunch, namely circular economy. In a global context of population growth and resource scarcity, the firms' priority is no longer to enhance production, rather to retrieve raw materials, to consume less energy and to enhance industrial efficiency in terms of quality and sustainability. How to explain such a paradigm shift? It makes sense for companies to adjust to this new model for three main reasons. Internally, circular economy means greater returns by lower production costs in terms of primary resources. Externally, an increasingly high number of consumers are revising their purchasing decisions in terms of environmental impact and product sustainability. Globally, the new model of energy efficiency and material recovery is advantageous to reduce dependency on foreign imports, boost industrial competitiveness in a globalised market and comply with emissions reduction constraints imposed by treaties of international environmental law. Circular Economy has therefore been backed by the main channels of international regimes: the 2030 UN Agenda for Sustainable Development, the 2015 Paris Agreement and the 2017 G7 5-year Plan for Efficient Resource Management all mention it as a fundamental means to attain the ultimate goals of sustainability and environmental protection. Even on a European scale, the EU has confirmed its

leading role in environmental protection and innovation supporter in the economic and technological field. In 2015, the European Commission presented a Circular Economy package. Through this document, it analysed the benefits of circular economy on the whole value chain, from material extraction to design and consumption. The package further included an Action Plan to assess the main sectors to intervene in and the key measures to be implemented. To be more specific, the strategy outlines recycling actions during all phases of the production cycle and it focuses on waste management so as to ensure its reuse, especially by medium and small-sized firms (Italian Ministry of Environment & Italian Ministry of Economic Development 2015).
As we have mentioned, Italian political and economic actors have traditionally used energy efficiency and resource/waste management as its steering wheel for development. It is not surprising then that Italy is the first EU member state in terms of raw materials recovery, with over 20 Mtoe a year. As a result, resource productivity doubled from 1.25 to 2.50 $/kg over the past 40 years, higher than countries with a bigger GDP per capita such as Germany, Canada and the US.
As we have previously noted, circular economy carries inherent advantages to traditional models. Prevent resource depletion is always a good idea for firms willing to maximise their revenues, because it also lowers dependency on raw materials purchase and overall primary costs. The same logic can be applied on the national level, especially for a resource-poor country such as Italy. This has carried implications in the international energy market: as Italy imports less, it improves internal security of supply and it is less affected by price volatility, particularly persistent in the oil market. Ultimately, the finite nature of fossil fuels means that sooner or later, any country will have to find viable alternatives. Investing in sustainability and circularity is merely accelerating the process.
Taking into account the combination of raw material input, energy input, waste production and atmospheric emissions Italy scored fourth among EU member states in eco-efficiency with a 157.7 score (GreenItaly 2017). Circular economy features a high degree of marginal revenues, which brings about advantages for both the economic and political dimension. In 2008, 16.6 Mtoe were required to yield €1 million worth of GDP. In 2015, 13.7 Mtoe were enough (GreenItaly 2017).
Energy efficiency and environmental virtuosity appear to be the paradigms of both the Italian government and its economic actors for many years to come. The 2017 SEN has set the goal of reducing final energy consumption by 10 Mtoe per year up to 2030, highlighting the importance of energy efficiency in terms of security and inexpensiveness (Italian Ministry of Economic Development 2017:99).
In its latest strategies, the Italian Government has strongly encouraged circular economy, as it has understood that recycling and efficiency are two essential conditions to have a head start in the

national energy mix. Between 2005 and 2015, net resource imports have dropped from 225 to 155 million tons (OECD 2016). Of course, a large proportion of this decrease has been caused by the economic crisis; but the fact that resource efficiency has also risen is undeniable, and it was no small component in the Italian energy policy U-turn of the last decade.

3.2.3 Policy assessment

The impact of the aforementioned national policies cannot be easily downplayed: the 2015 overall power generated by PV systems hit 24.676 GWh, equal to 9.12% of national energy production (Orioli & Di Gangi 2016: 445). By implementing the European Directive 2009/28, the Italian Government promoted effective strategies to incentivise solar power, which increased its capacity by 63% on average per year from 2005 to 2015 (IEA 2016).

In spite of the positive impact of the incentives onto the development of green sources, doubts shall be cast on their effectiveness as of today. Fiscal aid measures and subsidy schemes for green energy have been criticised since their first installation as they were considered too high, hindering fossil fuel production. Perhaps for this reason the Government set the limit of €6.7 billion in the 2013 Conto Energia: the incentive scheme was to be shut down 30 days after reaching such economic threshold.

Such a money-consuming scenario has been triggered by a variety of factors. The main explanation is that incentives did not take into consideration the spectacular rise of renewable energy, as it could count on an exponential growth in installed capacity and an efficient grid to spread green sources throughout the country. The actual issue in RES development has been technological imbalance and lack of control in the sector, which in turn brought about large support costs. This is because such feed-in tariffs were not paid for by national taxation, rather they were charged to final users on their electricity bills. The main flaw has therefore been not setting a limit until 2013: incentives were there for anyone who wished to install RES facilities, since the amount of incentives has not been capped by a maximum power of installed capacity. Because of electricity surcharges from renewable energy production, support costs reached their peak of €12.4 billion in 2014. The surcharge rate was recorded at €0.06/ KWh; it was less than a cent in 2008. It was the whole system of the PV feed-in tariff to be inherently static and so disadvantageous. The Government set the feed-in tariff as a fixed percentage based on initial PV prices. Because the model did not take into account price flows in the market, PV cost was the only other variable to be changed to keep the renewable energy choice convenient. PV panels' final prices did lower, as a matter of fact. But they did as a result of the reduction of the tariff rather than by the installation of additional capacity. In other words, so as to adjust to lower incentives, PV cost was driven down to stimulate investment,

bearing the insanely high additional cost of €7 billion for users in their final electricity bill for the following 20 years (Desideri 2014: 590).

Have incentives been too generous? Former Chairman of the Chamber of Deputies Environment Commission Ermete Realacci argues that incentives have been precious in starting off the engine of clean energy into the Italian industrial mechanism, yet they are outdated and they have been nowhere near the desirable amount: Italy's incentive scheme is half as much as to what Germany pays. Realacci believes that there are three main flaws in this kind of subsidies. To begin with, their fixed character: the Government has kept them at a certain quota and this has not encouraged technological advancement. On the contrary, the lack of a progressive system has encouraged financial speculation over investment in real economy projects, heavily affecting the production cycle. Another major setback of the incentive scheme is the cumbersome procedure of Italian bureaucracy. One of the reasons for high costs is that benefitting from State aid encompasses the involvement of the bureaucratic machinery, so that subsidies include the added price of timing, procedure and legal requirements of further regulation. Finally, incentives do not acknowledge the principle of self-consumption and production. A municipality producing energy through PV panels installed on one of its buildings has to pay the full price of the energy normally available in the grid if it wishes to use it for other facilities of its property. This means that on top of the costs of PV installation, the price to be paid is exactly the same as a final user connected to the mainstream network. All but a stimulating environment.

It is evident that RES incentives need a higher degree of flexibility in order for Italian green energy to blossom. All the more reason to do it in a country which obtains 20 additional Mtoe every year from raw materials recovery, the highest quantity in Europe. Facilitating institutional, economic and bureaucratic practices for small and medium sized firms may prove to be a win-win strategy in the long run, as it would enhance national energy production, lower imports dependency, effectively cover for and eventually exceed the Government spending necessary for such an ambitious operation.

CONCLUSION - EXPECTATIONS AND FORECASTS ON THE ITALIAN ENERGY SCENARIO

Dynamics in the fossil fuels market involve every country in the world. In its 2017 World Energy Outlook, the IEA foresees the rapid deployment of renewable energy because of its falling costs throughout the world. The IEA distinguishes a New Policies Scenario (NPS) from a Sustainable Development Scenario (SDS). The former takes into account the new energy measures announced by the main international actors, while the latter is an emissions reduction-based paradigm with the most ambitious policies seeking to tackle climate change. While the latter may sound (and perhaps is) too optimistic, both scenarios indicate a clear tendency towards decarbonisation and reduction in energy consumption. In particular, they both expect efficiency to make up for intensity. As international commitments and constraints from traditional sources are being noted on the national agenda, the incentive to switch to renewable energy becomes top of the list.

In this sense, China is turning into the forerunner in green energy investment. The Asian giant has declared its intention to spend at least $ 360 Billion by 2020 (NY Times 2017). On the occasion of the 19th National Congress of the Communist Party, Chinese Leader Xi Jinping used the word "environment" an impressive 89 times , 19 more than "economy" (Bloomberg 2017). China has understood that the green option is a win-win situation. Internally, lower emissions decrease the risk of environmental damages and health hazards. Externally, green energy investment favours compliance with international engagements, competitiveness of Chinese firms and geopolitical influence.

Both case studies above on the TAP and the RES boom shed light on the two latest strategies of Italian energy policy. As we have seen, there exist two main reasons for the Government to operate in this direction. On the one hand, securing access to additional natural gas supply and reduce dependency on Russia and Algeria. On the other hand, stimulating national firms and final users to switch to renewable energy through feed-in tariffs and fiscal reductions so as to lower fossil fuel imports and acquire geopolitical leverage on exporting countries, as well as enhancing competitiveness on the European market.

Such a twofold approach has been conceived in the light of the future energy landscape which the 2017 SEN lays out. The document outlines two main trends. Firstly, an upward movement of fossil fuel prices and so more expensive electricity generation from conventional sources: prices for final users are expected to reach €80/MWh by 2030, an 80% increase with respect to 2016 (Italian Ministry of Economic Development 2017:47). Because of resource scarcity and technological

innovation in other energy sectors (namely clean sources), fossil fuels are less and less competitive on a global scale. Therefore, the 2017 SEN sets the target of phasing out coal in electricity production by 2025. While not explicitly being struck down, oil is also projected to be replaced by natural gas and solar/wind power, with the objective of reaching 28% of renewable energy sources in gross final consumption by 2030.

Much linked to the first one, the second trend is the rise of renewable energy in all sectors, namely industry, private buildings and transportation. The latter is expected to rise through enhanced competitiveness by technological development and the diffusion on a large scale of energy storage system, so that renewable energy can be accessible – and convenient – to truly everyone. These two trends can be summed up in one word: decarbonisation. The SEN policy scenario predicts that by 2030, CO_2 emissions in sectors covered by the European ETS scheme (therefore the most resource-consuming ones) will drop by 43% with respect to the 2005 level (Italian Ministry of Economic Development 2017: 47). How to explain this free fall? It is a three-step process. As we have seen, fossil fuels become more scarce, more costly and less competitive, pushing a resource-poor country like Italy to further take the renewable energy way. This in turn reduces the primary energy to GDP ratio, which measures the energy intensity necessary to produce €1 million of GDP: the document forecasts this figure to lower from 99 to 72 Toe. This is because renewable sources require a drastically lower degree of energy intensity than any other energy generation option to yield the same amount of power. The third and final step of the process has two main consequences: as national renewable energy production rises, overall energy use drops. The 2017 SEN assumes gross consumption will decrease from 156 to 136 Mtoe in the 2015-2030 period. Furthermore, enhancing national production of green sources imply that Italy relies less and less on foreign imports. The document forecasts energy dependency to drop from the 2015 level of 76% to 63.8 % by 2030 (Italian Ministry of Economic Development 2017:51).

As we have seen on the 2017 SEN, this seems to be THE roadmap for the forthcoming years. Latest policy decisions have played a decisive role in clean sources installation and operation. It is up to the entire system of national actors - the Government, firms, NGOs and final users – to effectively interact and promote renewable energy in Italy.

From all possible perspectives, the most sensible strategy for Italy is to commit itself into a green energy transition. The lack of traditional resources makes it almost a compelling case to find alternative solutions. If we also take into account the head start renewable energy has on fossil fuels and we combine it with the international context, Italy needs to exploit its RES potential at the fullest in order to reduce energy dependency, acquire market competitiveness and define itself as a powerful player on both the European and the global chessboard.

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PRECIS

La presente ricerca si propone di analizzare il ruolo dell'energia nella politica interna ed estera italiana dal 1987 a oggi, con una panoramica sullo scenario internazionale e i possibili sviluppi futuri del mercato energetico globale.

L'energia riveste un ruolo chiave per la politica di sicurezza, industriale, economica ed estera di un paese. La disponibilità di risorse è un prerequisito fondamentale per qualsiasi Stato-nazione. Ne consegue che l'energia è sia considerata come un fine, un obiettivo da garantirsi per sostenere la propria posizione, che come un mezzo, uno strumento di pressione, influenza e coercizione nella dimensione geopolitica. Ogni relazione interstatale riguardo a fonti di energia diverse ha i suoi effetti nella grande partita dell'energia globale.

L'elaborato si divide in tre capitoli: il primo esplora l'attuale scenario energetico a livello globale, prendendo in considerazione i target ambientali dagli accordi internazionali e la traiettoria delle diverse fonti di energia. Il secondo capitolo tratta della politica energetica italiana da un punto di vista storico. Prima la storia del nucleare dal referendum del 1987 a quello del 2011. L'analisi in seguito verte sulla liberalizzazione del mercato elettrico degli anni 90 e sulla politica di sicurezza dei gasdotti. L'ultima parte del secondo capitolo considera il regime internazionale di decarbonizzazione dalla Conferenza di Rio del 1992 fino ad oggi, investigando sugli effetti nel mix energetico italiano e gli ultimi obiettivi delle Strategie Energetiche Nazionali del 2013 e 2017.

Il terzo capitolo si concentra su due casi studio della politica energetica italiana dell'ultima decade: il progetto del TAP nel suo concepimento e potenziale impatto e lo sviluppo delle energie rinnovabili in Italia attraverso il sistema di incentivi e le caratteristiche del sistema-paese. Nella conclusione, si prenderà in considerazione nuovamente la scena internazionale per individuarne i possibili sviluppi, per poi focalizzarci sulla situazione italiana e le eventuali strategie energetiche che un paese povero di materie prime come l'Italia dovrebbe adottare nei prossimi anni.

Capitolo 1

L'energia è tradizionalmente rimasta nelle mani dello Stato. Negli anni 90, gli obiettivi vincolanti di riduzione dai regimi internazionali di diritto ambientale hanno posto dei limiti senza precedenti allo Stato-nazione. In particolare, le questioni energetiche hanno interessato sempre di più i paesi in via di sviluppo. La dichiarazione di Rio pone l'obiettivo comune di sviluppo sostenibile nel 1992; il protocollo di Kyoto del 1997 distingue tra paesi industrializzati, con responsabilità storiche, e paesi in via di sviluppo. Delle differenze sono ancora presenti, ma la tendenza è chiara: la questione ambientale (e di riflesso energetica) diventa globale, specialmente perché le emissioni dei paesi emergenti non fanno che crescere. Si stima che i paesi non-OECD saranno responsabili per il 93%

della crescita energetica tra il 2008 e il 2035, oltre il 60% del consumo globale. L'Accordo di Parigi del 2015 rappresenta il primo vero patto globale nella lotta al cambiamento climatico.

Questa multipolarità offusca la distinzione tra produttori e consumatori, e riduce drasticamente l'importanza dei combustibili fossili. Essendo la fonte energetica più inquinante e meno efficiente, il carbone è sempre meno un fattore nelle strategie nazionali: la sua domanda a livello globale dovrebbe calare del 30% nel 2030. Il petrolio, invece, rimane imprescindibile: nonostante la forte volatilità, il suo consumo è aumentato vertiginosamente nei paesi in via di sviluppo e si sono registrate nuove scoperte tecnologiche come la fratturazione idraulica nella rivoluzione *shale* americana. Quest'ultima è destinata a cambiare il mercato: si prevede che gli Stati Uniti rappresenteranno 80% della crescita globale nell'offerta di petrolio entro il 2025, ma lo scenario è incerto a causa dell'eccessiva speculazione finanziaria e degli standard di protezione ambientale. Il nucleare appare in declino, con una minor percentuale nella generazione elettrica globale, dal 18% nel 1986 a meno del 10% di oggi. Combinati con misure d sicurezza e costi di produzione sempre più alti, incidenti come Fukushima sono stati decisivi nell'orientare l'opinione pubblica e buona parte dei governi del mondo ad abbandonare l'opzione atomica, come la Germania ha annunciato per il 2022. Tuttavia, il nucleare si inserisce in un discorso di sicurezza che trascende le politiche di approvvigionamento. Sebbene la bomba atomica sia limitata a 8 paesi, non vi è alcuna barriera tecnologica tra il nucleare civile e militare: l'unica variante è il livello di arricchimento dell'uranio, con una soglia del 20%. La procedura di salvaguardia della non-proliferazione, affidata all'IAEA, è complessa e non garantisce l'adempimento. Gli stati sono ancora gli attori principi del nucleare.

Il gas naturale è in continuo sviluppo. La sua domanda ha doppiato quella di petrolio negli ultimi anni e si prevede un'ulteriore aumento del 50% nei prossimi 20 anni. Il gas è più competitivo degli altri combustibili fossili, inquinando anche meno. Due nuove tecnologie hanno rivoluzionato il mercato: la rivoluzione *shale* negli Stati Uniti e il Gas Naturale Liquefatto. Il secondo è un tipo di gas che non necessita gasdotti per il trasporto. Esso ha sfidato apertamente il mercato tradizionale del gas, basato su regionalismo, prezzi indicizzati al petrolio e contratti a lungo termine con infrastrutture lunghe e costose. Dovrebbe perciò costituire il 90% della crescita di commercio di gas a lunga distanza entro il 2040. Bisogna però ricordare che lo Stato determina l'import/export ed è il limite principale alla diffusione del GNL. Lo abbiamo visto nell'isolazionismo americano dovuto alla rivoluzione *shale*, ma esistono altri ostacoli come la Russia, potenzialmente il primo produttore di GNL al 30% che ne vende solo il 5% e i contratti a lungo termine che legano ancora i paesi europei. Le analisi suggeriscono che il GNL, per le sue peculiarità, sia destinato a cambiare il mercato del gas; l'unica domanda sembra essere quando.

Le energie rinnovabili sono cresciute esponenzialmente nell'ultima decade. Nel 2015, l'energia pulita ha costituito 53.6% della nuova capacità installata globalmente. I pannelli fotovoltaici hanno aumentato la loro potenza di 46 volte dalla ratifica del Protocollo di Kyoto nel 2005, mentre l'eolico ha visto i suoi costi di produzione crollare da 380 $/MWh nel 1983 a 70 $/MWh nel 2015. L'ascesa delle rinnovabili è infatti riconducibile principalmente al progresso tecnologico: le innovazioni tecniche hanno fatto sì che i costi di installazione e manutenzione crollassero, favorendo lo sviluppo del mercato *green*. Siamo ancora lontani da un mondo in cui l'energia pulita è la fonte per antonomasia, ma le previsioni suggeriscono che si sta tendendo inesorabilmente verso questa direzione, per quanto un cambiamento del genere richiederà ancora molti anni.

Capitolo 2

La politica energetica italiana prende una svolta decisiva a seguito del referendum 1987. Nel contesto della crisi petrolifera dei primi anni 80, il Piano Energetico Nazionale del 1981 sosteneva il nucleare per ridurre la dipendenza energetica con l'obiettivo di 12.000 MW l'anno. L'incidente di Chernobyl del 1986 risulterà decisivo per mobilitare l'opinione pubblica; un referendum sul ruolo del governo e dell'ENEL nella partita nucleare proposto dai Radicali e dalla Democrazia Proletaria fu tenuto l'anno dopo. Si avviò un processo di smantellamento degli impianti già esistenti, ma la questione atomica tornò sulle prime pagine negli anni 2000. Con l'aumentare dei prezzi dei combustibili fossili, il Governo Berlusconi IV proclamò il ritorno al nucleare per generare autonomamente il 25% del fabbisogno elettrico nazionale. Si chiese nuovamente un referendum, unito al quesito sulla privatizzazione dell'acqua. L'incidente di Fukushima nel Marzo 2011, come Chernobyl 24 anni prima, ha lo stesso effetto di deterrenza ed è uno dei fattori principali per il raggiungimento del quorum; l'Italia rifiuta il nucleare per la seconda volta.

La liberalizzazione del mercato elettrico degli anni 90 sconvolge il panorama energetico italiano. La creazione dell'Autorità AEEGSI supervisiona le utility energetiche, costrette a separare le imprese di produzione e distribuzione e limitarsi al 50% la quota massima di elettricità offerta. Lo stesso verrà attuato nel mercato del gas con il decreto Letta del 2000. La liberalizzazione porta una maggiore concorrenza e favorisce la transizione verso i più efficienti impianti a gas, una preferenza già nata dopo l'abbandono dell'energia atomica.

La costruzione di gasdotti è un'altra componente fondamentale del mix energetico. Sono stati installati progetti in Nord Europa, dalla Russia e dal Nord Africa. Si è adottato un modello di diplomazia triangolare, poiché l'ENI ha tradizionalmente rappresentato lo Stato italiano con i Governi esteri. La sicurezza di approvvigionamento dai gasdotti è però limitato, come testimonia la crisi energetica del 2006. L'Italia infatti importa il 90% di gas naturale. Tuttavia, la scadenza dei

contratti a lungo termine e l'importazione di GNL hanno contribuito ulteriormente alla diversificazione. Il settore petrolifero è invece meno vulnerabile a causa dell'obbligo europeo per il Governo di conservare riserve per prevenire crisi di approvvigionamento.

Il ruolo dell'UE in ambito internazionale è un altro fattore da considerare nella politica energetica italiana. Fin dal Protocollo di Kyoto, Bruxelles ha imposto target più ambiziosi ai suoi stati membri (all'Italia è stata assegnata una quota di riduzione di – 6,5%) e la dichiarazione di Riga stabilisce i singoli contributi nazionali all'Accordo di Parigi. L'UE ha ulteriormente imposto gli obiettivi 20-20-20 e il Pacchetto Energia e Clima 2030, che favorisce un'unione energetica di infrastrutture per arrivare a una riduzione del 40% delle emissioni dai livelli del 1990. Lo Stato appare ancora come l'attore principe di politica energetica, ma la legislazione comunitaria sta modellando e indirizzando sempre di più le scelte dei suoi stati membri.

Gli obiettivi delle ultime SEN 2013 e 2017 confermano la tendenza di decarbonizzazione europea e mondiale. Le politiche degli ultimi dieci anni appoggiano lo sviluppo di energia rinnovabile per diminuire la dipendenza energetica, ridurre i prezzi e rispettare gli obiettivi di riduzione. Entro il 2025, il carbone non deve più essere usato nella produzione elettrica. L'ENEL ha reintegrato Green Power nel suo gruppo, genera elettricità al 32,8% da rinnovabili e ha dichiarato di voler completamente decarbonizzare la produzione entro il 2050.

Capitolo 3

Il TAP è uno dei gasdotti del Corridoio Meridionale, una rotta che collegherà le riserve di gas naturale del Mar Caspio alla Puglia. Il progetto è nato dopo forti tensioni con la Russia, che prima ha tentato di introdurre il South Stream come via alternativa e poi ha annunciato il raddoppio della capacità del Nord Stream con la Germania. Inoltre, in origine l'UE preferiva al TAP il gasdotto del Nabucco, che avrebbe collegato l'Azerbaigian all'Austria. La scelta non era coerente con gli obiettivi del pacchetto energetico di ridurre il ruolo delle utility europee, oltre che presentare svantaggi strutturali come un processo decisionale più complesso e una esenzione solamente parziale dal diritto di accesso a terzi. Alla fine, il consorzio Shah Deniz II ha scelto il TAP, anche in virtù della decisione della compagnia statale azera SOCAR di espandersi nel mercato greco.

Con 10 miliardi di m^3 all'anno (10% del consumo nazionale), il TAP abbasserebbe i prezzi del gas in un paese in cui quest'ultimo è responsabile del 40% della produzione elettrica. Tuttavia, l'obiettivo di diventare un *hub* del gas europeo sembra ancora un'utopia, a fronte dello sviluppo del Nord Stream, della diffusione del GNL e dell'instabilità di altre fonti di approvvigionamento come il Nord Africa.

L'ascesa delle rinnovabili è senz'altro l'altra grande novità della politica energetica italiana degli ultimi anni. Il sistema di incentivi ha favoriti sia le aziende, soprattutto attraverso sistema dei

certificati verdi derivato dalla liberalizzazione del mercato energetico che i consumatori/installatori, grazie agli incentivi fiscali e alla tariffa fissa nell'installazione di impianti fotovoltaici e interventi di efficienza energetica. Altre misure rilevanti si registrano nel settore dei trasporti, dove si incoraggia l'uso di biocarburanti di nuova generazione che non entrano in competizione col settore agroalimentare.

Inoltre, in Italia si osserva un ambiente per sua natura favorevole allo sviluppo dell'energia pulita: l'Italia è il primo paese europeo per recupero di materiali, con 20 Mtep all'anno. L'economia circolare è diventata un obiettivo anche dell'UE, che ha approvato un pacchetto specifico nel 2015 che prevede disposizioni particolari sul trattamento dei rifiuti. L'economia circolare rappresenta la via da seguire per un paese povero di materie prime come l'Italia, che infatti favorisce interventi di efficienza energetica per ridurre il consumo finale di energia di 10 Mtep per il 2030. L'altro lato del boom dell'energia verde è i costi di produzione e installazione sempre più bassi: oltre allo sviluppo tecnologico, i costi si sono abbassati per continuare a stimolare lo sviluppo delle rinnovabili, poiché la tariffa fissa è stata abbassata con l'imposizione di un tetto massimo nel 2013. Il problema (e la critica principale) agli incentivi è che la differenza non più coperta dalla tariffa fissa ha gravato direttamente sulla bolletta degli utenti finali. Il problema vero degli incentivi, secondo l'ex Presidente della Commissione Ambiente al Senato Ermete Realacci, è che gli incentivi sono troppo rigidi e il costo della burocrazia dietro è troppo alto. Serve quindi maggiore flessibilità per favorire lo sviluppo delle rinnovabili senza gravare ulteriormente sui bilanci statali e dei cittadini.

Conclusione

Nel contesto di decarbonizzazione degli ultimi anni, culminato con la ratifica dell'Accordo di Parigi nel 2016, l'approvvigionamento di risorse diventa, se possibile, ancora di più una priorità sull'agenda politica. Il modello economico di riferimento, alla luce degli obblighi internazionali di riduzione di emissioni climalteranti, non sembra più essere quello basato sullo sviluppo intensivo dei combustibili fossili. Al contrario, la strategia del futuro sembra essere, per l'Italia come per il mondo, l'investimento nelle fonti rinnovabili, che forniscono la stessa quantità di energia con un impatto ambientale ridotto e una forte competitività a livello globale.