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# THE EUROPEAN GREEN DEAL AND SUSTAINABLE TRANSACTION

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## INTRODUCTION

In the first months of 2020, the "modern world" faced the concept of a pandemic for the first time.

In fact, Covid began to change all our habits and above all brought to the evidence of how sociality and personal freedom were essential goods for man, which, however, could not be separated from a healthy environment or at least as liveable as possible. In a concept of a more liveable environment, a relevant aspect reflects the idea of sustainability, understood as the possibility, by the current population, of satisfying their needs without indiscriminate exploitation of the planet's resources, finding the way in renewable energy teacher to achieve this goal.

At a global level, this assumption has been taken up and addressed in three different moments: in 1992 with the Rio climate conference, in 1995 with the Kyoto protocol, and finally in 2015 with the Paris climate agreements.

The European Union, for its part, with the "European Green Deal" project, has adopted most of the concepts expressed in the meetings described above, implementing, through the European funds MMF and NextGenEU, a series of energy sustainability policies with the 'goal of becoming the first Eco-Sustainable continent by 2050.

One of the main implementation tools was certainly the PNRR, which provides, among other things, an important allocation of funds aimed at transforming the energy production chains from polluting to renewable / sustainable.

For example, two large Italian companies such as Eni and Enel, already starting from the last decade have begun a process of structural and strategic renewal, aimed at creating alternative solutions and developing eco-sustainable projects for the supply of energy.

Therefore, the paper presented will include a first chapter where, starting from the impact that the pandemic has had on our society, it will analyse the importance of renewable energies, their impact on the environment and how this aspect of sustainability has been discussed in the three main conferences of Rio, Kyoto and Paris.

In the next chapter I will analyse how the European community has made these concepts its own, developing an intervention policy through funding such as the MMF and PNRR, aimed at guaranteeing and accelerating the process of change towards an exploitation of the planet's resources in a more sustainable.

Finally, in the third chapter I will consider two Italian multinationals such as Enel and Eni, highlighting how this process of sustainable change has impacted their strategic management, through the development of business segments and projects increasingly focused on the exploitation of energy from renewable sources.

## FIRST CHAPTER

### PANDEMIC COVID - 19

The year 2020 has revolutionized our lives forever.

Since its inception, it has been a year full of events that have marked and will influence generations for all the years to come.

Just think of the fires that hit Australia as early as the end of 2019, causing the death of over 500 million animals<sup>1</sup>.

Or the collapse of the Dow Jones index which reaches 1190 points, marking the worst week for the index since the 2008 sub-prime mortgage crisis<sup>2</sup>.

Even reaching the protests that began in the city of Minneapolis (Minnesota), due to the killing of African American George Floyd by a police officer.

Unfortunately, the event that most affected us as mankind was the Covid-19 Pandemic that began in China, precisely in the city of Wuhan (Hubei province), which caused a global recession, affecting every aspect of people's life, starting with health, work and the entire world market.

Already in 2019, the first signs of a global slowdown were visible.

The IMF (International Monetary Fund), in fact, reported that the global economy was going through a period of "synchronized slowdown", the slowest since the 2007-2008 financial crisis.

This slowdown has found its explanations in a series of reasons derived from the increase in intensified trade and geopolitical tensions, starting from the trade war between China and the US up to the Brexit that defined Britain's exit from the European Union.

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<sup>1</sup> JALALUDIN, Bin, et al. Reflections on the catastrophic 2019–2020 Australian bushfires. *The Innovation*, 2020, 1.1.

<sup>2</sup> R. Davies, R. Partington, G. Wearden, Coronavirus fears trigger biggest one-day fall on US stock market, 27 February 2020, The Guardian, <https://www.theguardian.com/business/2020/feb/27/coronavirus-could-trigger-damage-on-scale-of-2008-financial-crisis-covid-19>

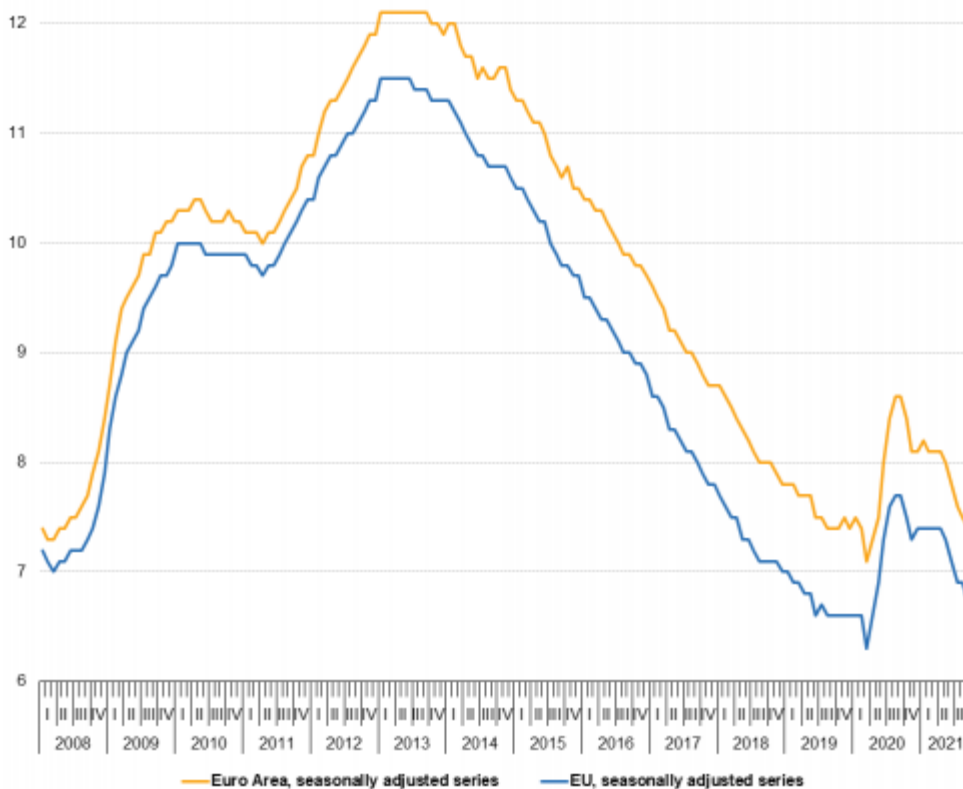
Following the Subprime Crisis, there has been a substantial increase in corporate debt, particularly in the main world economies, where it has gone from an average debt of 34 trillion dollars in 2009 to almost 51 trillion in 2019, increasing almost 50%<sup>3</sup>.

To all this was connected the risk on the part of highly indebted companies of incurring the risk of not paying interest or being forced to refinance their debt.

In addition, starting in the United States, the yield curve has reversed, causing a sell-off in global equity markets and giving the first signs of a fragile economic market.

To all this, the average European unemployment rate was in total decline, from the

**Unemployment rates, EU and EA, seasonally adjusted, January 2008 - September 2021**



Source: Eurostat

3 P.Buckley, A. Barua, M. Samaddar, The pandemic has forced corporate debt higher: But is that a bad thing?, July 2021, Deloitte S.p.A.

<https://www2.deloitte.com/xen/en/insights/economy/issues-by-the-numbers/rising-corporate-debt-after-covid.html>

peak reached in the two-year period 2011-2012, as shown in the graph below, and then grew significantly in the second quarter of 2020

As a result, the February-March period was the hardest of all.

Starting from 10 February 2020, global markets have been hit in a decisive way, albeit to a lesser extent, those in Europe which closed partially up, those in the Asia-Pacific area closed.

In addition, oil prices rose about 1%, while US 10- and 30-year treasury bonds fell to 1.59% and 2.05%, respectively<sup>4</sup>.

In the following days, the Asian markets continued to close lower, unlike the European ones which continued to rise.

On Monday, February 24, the Dow Jones, and FTSE 100 index fell more than 3%, coinciding with the spread of the outbreak outside of China<sup>5</sup>.

Subsequently, in conjunction with the diffusion, they followed a general decline of all the main indices (DAX, CAC 40 and IBEX 35) which fell by more than 4% and the FTSE MIB fell by more than 5%.

Concurrently, the major world states had initiated major moves to stem the pandemic. Italy, for its part, had issued the first preventive measures, suspending university and school activities in the regions of Veneto and Lombardy, postponing the Venice Carnival and as many sporting events.

The following weeks continued on the same trend as in February, with a continuous decline in the stock markets, the lowering of the average price of oil due to both the reduction in travel and the closure of national borders, paralyzing the entire world economy.

But if on the economic side things have plummeted drastically, the same has happened in everyday life.

Following the precautionary measures implemented in Italy, the whole started to move accordingly.

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<sup>4</sup> J. Pound, S. Meredith, Treasury prices gain, yields fall in flight to safety on Russia-Ukraine fears, 11 February 2022, CNBC, <https://www.cnbc.com/2022/02/11/10-year-treasury-yield-in-focus-after-breaching-2percent-as-inflation-spikes.html>

<sup>5</sup> F. Imbert, E. Huang, MARKETS Dow plunges 1,000 points on coronavirus fears, 3.5% drop is worst in two years, 23 February 2020, CNBC, <https://www.cnbc.com/2020/02/24/us-futures-coronavirus-outbreak.html>

In early March, the European Centre for Disease Prevention and Control (ECDC) announced the increase in the level of risk from moderate to high<sup>6</sup>.

Parallel to the collapse of world economies, in all continents the various states began to apply restrictive rules to try to stem the epidemic.

As mentioned above, Italy, after China, was one of the first states to cancel events / demonstrations, even suspending school activities<sup>7</sup>.

Initially, Italy was one of the first nations to take concrete steps to try to stem the pandemic.

First, on 31/01 the Council of Ministers established a state of Emergency for the whole national territory (valid for 6 months).

The following day, February 1, 2020, all flights to and from China were blocked.

Subsequently, following the discovery of the first internal outbreak, the first containment measure applied was the mandatory quarantine for 11 municipalities in Northern Italy (Vo 'in Veneto).

With the continuing increase in infections, on 21/02 the Minister of Health signed an order that provided for the 14-day quarantine for anyone who had been in contact with subjects who tested positive for the antigen test, with the obligation to report this contact to the health authorities.

The next day (22/02/2020), the Council of Ministers signed a new decree-law aimed at containing the pandemic, providing for the forty of over 50,000 people residing in 11 municipalities in northern Italy (10 in Lombardy and 1 in Veneto )<sup>8</sup>.

A further Decree of the Prime Minister was promulgated on 25/02, with validity until 15/03, which extended the quarantine obligation to the regions of Veneto, Lombardy, Friuli-Venezia Giulia, Piedmont, Liguria and Emilia Romagna<sup>9</sup>.

Unfortunately, the measures adopted were not sufficient to stem the contagion,

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<sup>6</sup> EUROSURVEILLANCE EDITORIAL TEAM, et al. Updated rapid risk assessment from ECDC on the novel coronavirus disease 2019 (COVID-19) pandemic: increased transmission in the EU/EEA and the UK. *Eurosurveillance*, 2020, 25.10: 2003121.

<sup>7</sup> LAU, Hien, et al. The positive impact of lockdown in Wuhan on containing the COVID-19 outbreak in China. *Journal of travel medicine*, 2020.

<sup>8</sup> REN, Xuefei. Pandemic and lockdown: a territorial approach to COVID-19 in China, Italy and the United States. *Eurasian Geography and Economics*, 2020, 61.4-5: 423-434.

<sup>9</sup> BOSA, Iris, et al. Response to COVID-19: was Italy (un) prepared? *Health Economics, Policy and Law*, 2022, 17.1: 1-13.



forcing the Prime Minister Giuseppe Conte to extend the restrictive measures to the whole national territory, maintaining the same rules applied before.

This phase, identified as Phase 1, remained in effect until May 4, the day when the restraining measures are exercised following the descent of the epidemic curve.

The loosening, in fact, allowed visits to relatives within the regional territory (while always maintaining the safety distances and the use of the mask).

The beginning of summer coincided with a further training of containment measures, allowing the performance of indoor shows (with limited capacity), the reopening of bathing establishments, spas and wellness centres<sup>10</sup>.

Following the epidemic trend of the period, summer 2020 coincided with an ever smaller number of infected people, also generating the reopening of national borders and progressively international flights.

The beginning of winter coincide with a progressive increase in infections, identified as the Second Wave.

The wave caused a further extension of the state of Emergency, institution until 31/12/2021, and the introduction of new restitution rules, limiting the restaurant activity and placing a general curfew starting from 22.00 until 05.00 the following day . But the most important revolution implemented during the winter / spring, specifically from 6 November, was the subdivision of the various Italian regions into three bands, namely white, yellow, orange and red<sup>11</sup>.

This subdivision was mainly based on various parameters:

- ❖ The RT index, which how many people can be infected by one person on average and over a certain period.
- ❖ The weekly incidence of infections.
- ❖ Occupational rate of the beds.

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<sup>10</sup> DE NATALE, Giuseppe, et al. The evolution of Covid-19 in Italy after the spring of 2020: an unpredicted summer respite followed by a second wave. *International Journal of Environmental Research and Public Health*, 2020, 17.23: 8708.

<sup>11</sup> DPCM 18 ottobre 2020.

The table below explains the values broken down for the various bands.

	WHITE ZONE	YELLOW ZONE	ORANGE ZONE	RED ZONE
RT INDEX (6/11/20- 18/05/21)	RT<0.5	RT between 0,5-1	RT between 1- 1,25	RT above 1,25
WEEKLY INCIDENCE OF INFECTIONS (19/05/2021- 22/07/2021)	<50 cases on 100000 people	>= 50 cases on 100000 people	>= 150 cases on 100000 people	>= 250 cases on 100000 people
RATE OCCUPANCY FOR BEDS (SINCE 23/07/2021)	intensive care <= 10% medical area <= 15%	intensive care >= 10% medical area >= 15%	intensive care >= 20% medical area >= 30%	intensive care >= 30% medical area >= 40%

Spring 2021 coincided with the tightening of containment measures due to the third wave.

This entailed the confirmation of the previous rules applied during the second wave, the extension of the state of emergency until 07/31/2021 and stricter rules for the red zone, in particular the closure of hairdressers and the prohibition of travel for visits to private homes and / or second homes.

Parallel to the beginning and development of the third pandemic wave, the governments of world powers and major pharmaceutical companies cooperated to

promote the first real response to the virus: the Covid-19 vaccine<sup>12</sup>.

The vaccine rush, indeed, was an unprecedented event.

Since the first sequencing of the new viral strain, isolated in December 2019, it has triggered an international response, in the short term, which has revolutionized the pharmaceutical industry.

In fact, before the advent of COVID-19, the average production period of a vaccine capable of fighting an infectious disease was no less than 3-4 years.

After sequencing, the first step is the preparation of vaccine preparations, that is the simplified microorganism which is completely inactivated or in an attenuated form.

Once this is achieved, the first part is passed and the preclinical experimentation phase is carried out, where important characteristics such as behaviour and toxicity are observed.

After this experimentation we arrive at clinical experimentation.

This process is divided into 4 phases<sup>13</sup>:

- Phase 1, where the vaccine is tested on a limited number of people to assess its tolerability.
- Phase 2, where many more subjects are involved (more than hundreds), who are given more doses of the vaccine to observe its effects, observing its ability to induce an immune response.
- Phase 3, a large-scale efficacy test (thousands of subjects) is performed at research centres
- Phase 4, observation of the consequences and side effects of vaccination.

At the end of this ITER, the product must send a detailed dossier to the competent authorities (AIFA - Italian medicines agency and EMA - European medicines agency).

This bureaucratic process can even last many years (even 10), aimed at guaranteeing the total safety and security of the recipients.

For its part, the Covid vaccine has surprised for its speed and acceptance, since from the first segmentation (end of 2019) to its actual distribution (January 2021), the time

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<sup>12</sup> LEDFORD, Heidi, et al. The UK has approved a COVID vaccine—here's what scientists now want to know. *Nature*, 2020, 588.7837: 205-206.

<sup>13</sup> GENZEL, Yvonne; REICHL, Udo. Vaccine production. In: *Animal Cell Biotechnology*. Humana Press, 2007. p. 457-473.

elapsed is just over a year<sup>14</sup>.

This is due to an international collaboration of the pharmaceutical industry and governments unmatched in the recent history of medicine.

In fact, since its first study, tens of billions of dollars have been allocated to accelerate its distribution to the world population.

Regarding the production of vaccines, there are mainly two types:

- RNA vaccine (mRNA), which is a vaccine that acts by inoculating messenger mRNA fragments into human cells, stimulating the antigenic and immune response.
- Viral vector vaccine, that is, exploiting the ability of the virus to adhere to the cell surface by releasing its genetic makeup, stimulating the mixture of its chromosomal makeup with that of the host cell.

In the first category described, the main pharmaceutical companies to have invested in this type were Pfizer, which is the largest pharmaceutical company in the world based in New York (USA), and BioNTech, a German biotechnology and biopharmaceutical company, and Moderna (USA).

These three companies have respectively prepared Tozinameran (Pfizer-BioNTech), which is the first vaccine put on the market, and the Moderna vaccine.

The second category includes the companies AstraZeneca, the Anglo-Swedish biopharmaceutical multinational, the National Epidemiological / Microbiological Research Centre of the Russian Republic and the American multinational pharmaceutical company Johnson & Johnson.

These pharmaceutical companies have produced the Moderna vaccine, Sputnik V and the Johnson & Johnson single-dose vaccine respectively<sup>15</sup>.

As for Italy, the anti-Covid-19 vaccine has been made available since January 2021. Initially for health workers / RSA, over 80 and people with chronic diseases.

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<sup>14</sup> LE, T. Thanh, et al. The COVID-19 vaccine development landscape. *Nat Rev Drug Discov*, 2020, 19.5: 305-306.

<sup>15</sup> HUANG, Qingrui; ZENG, Jiawei; YAN, Jinghua. COVID-19 mRNA vaccines. *Journal of Genetics and Genomics*, 2021, 48.2: 107-114.

Subsequently, with the decree of 12 March and the Ordinance no. 6/202<sup>16</sup>, the categories to be vaccinated as a priority were presented, namely:

- Category 1** • People with high frailty (extremely vulnerable people; severe disability; people aged > 80 years) and cohabiting family members / caregivers.
- Category 2** • People aged between 70 and 79 years.
- Category 3** • People aged between 60 and 69 years.
- Category 4** • People with comorbidities aged <60, without the connotation of gravity reported for extremely vulnerable people.
- Category 5** • rest of the population aged <60 years.

This classification contributed to making the main working categories (health workers) and the most fragile subjects (over 80 years old) immunized, who were the most predisposed to contract the violent form of the infection.

Thanks to this vaccination campaign, which is still in progress (inoculation of the third dose during the fourth wave), it has been possible to provide a first serious response to the world pandemic.

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<sup>16</sup> Ordinanza n. 6/20202, Presidenza del Consiglio dei Ministri , [https://www.governo.it/sites/governo.it/files/CSCovid19\\_Ord\\_6-2020-txt.pdf](https://www.governo.it/sites/governo.it/files/CSCovid19_Ord_6-2020-txt.pdf)

## CLIMATE OVERVIEW

The earth is constantly changing.

Since the beginning the earth has undergone significant changes, which have led to significant revolutions in its order.

As we all know, life on earth is made possible by a series of factors that combine with each other and make our planet suitable for the development of organisms, i.e., the right distance from the Sun, the presence of an atmosphere and the presence of water.

Since its inception, about 4 billion years ago, life has been influenced by the subtle balance of these three factors, which have generated the greenhouse effect.

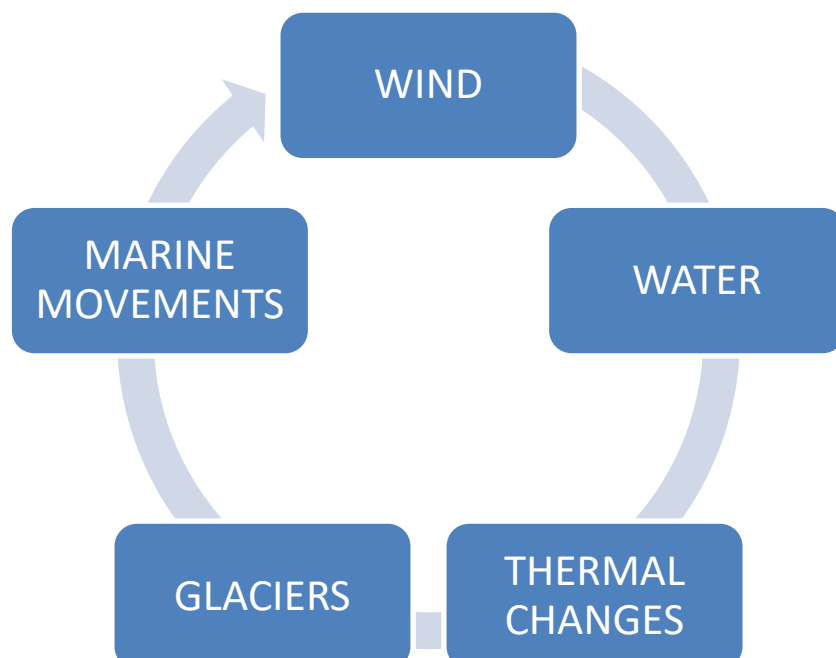
The solar rays passing through the atmosphere are partially absorbed by the ground or by the sea and in part by bouncing they are captured by the gases, retaining the solar heat.

All this is combined with the effect of particular forces acting both inside and on the earth's surface.

These changes are mainly due to the action of forces that have combined to shape our planet as we know it.

These forces, to which the pressures generated by extra-planetary factors are added, are divided into two categories: exogenous and endogenous.

The former are born and act on the earth's surface and are respectively:



The latter, on the other hand, originate inside the earth and act on it, under the action of heat and the pressure generated by the internal layers.

They are mainly identified in three categories:

- ❖ The movements of the earth's crust, which are responsible for the drift of the continents and the formation / destruction of mountain ranges.
- ❖ Volcanic activities, from which magma comes out, that is a combination of fused silicates and dissolved gases.
- ❖ Earthquakes and tsunamis, powerful earthquakes that can permanently modify the earth's surface and can occur both on land and on water.

All these forces, combining with each other, are responsible for the current conformation of the conformation of the Earth.

To these components, particularly in the last 150 years, an agent has been added that has fundamentally compromised the subtle balance between these natural forces: Humanity.

Although present for over 2 million years, in the last two centuries man has contributed to polluting and upsetting the natural balance.

Starting from the industrial revolution born in England at the end of the 18th century, through the exploitation of fossil fuels, especially coal and oil above all, it has caused continuous global warming<sup>17</sup>.

Although historically the Earth has always been subject to climate change, for the first time we are faced with an anomalous change, as it is triggered by man and his activities.

This global warming, defined as the anthropic greenhouse effect, is added to the natural greenhouse effect, generated by the considerable quantities of CO<sub>2</sub> present in the atmosphere.

From a comparison with pre-industrial levels, the world average temperature has increased by almost 1 ° C, which could reach about + 1.5 ° C between 2030 and 2050 if

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<sup>17</sup> ELHEDDAD, Mohamed, et al. The effect of the Fourth Industrial Revolution on the environment: the relationship between electronic finance and pollution in OECD countries. *Technological Forecasting and Social Change*, 2021, 163: 120485.

there were no interventions<sup>18</sup>.

To this global warming the greatest impact is still felt today by the ice reserves on the planet.

These "solid" reserves of fresh water cover about 15 million square meters and occupy about 10% of the earth's surface, which are mainly the ice sheets of Greenland and Antarctica, followed by continental ice<sup>19</sup>.

According to a NASA study, tons of ice disappear every year at both the North and South Pole<sup>20</sup>.

The causes can mainly be traced back to human activity, in particular:

- ❖ CO<sub>2</sub> emissions and the increase in the greenhouse effect (mentioned above).
- ❖ The use of fossil fuels, which generate sulfuric, carbonic, and nitric acids, which falling to the earth like acid rain have a negative impact on the environment.
- ❖ Intensive deforestation, i.e., the felling of trees for commercial purposes or to expand intensive crops.

This dissolution therefore has consequences, which have dramatic repercussions for the ecosystem, for animals and even for man himself.

These signs, which are already visible, mainly concern the modification of natural habitats and the disappearance of specific species of fauna and flora.

More in detail, the main repercussions we will see in the coming years will be:

- ❖ Raising of marine levels. According to a study carried out in 2018 by the University of Bristol, a hypothetical melting of the entire Arctic ice sheet would lead to a sea level rise of over 7 meters, which would cause the disappearance of entire cities on the coasts of the continents.
- ❖ Climatic upheavals, mainly deriving from the upheaval of ocean currents due to the desalination of the seas.

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<sup>18</sup> RANA, Anchal, et al. Climate change and potato productivity in Punjab—Impacts and adaptation. *Potato Research*, 2020, 63.4: 597-613.

<sup>19</sup> Water Science School, Where is Earth's Water?, 6 June 2018, USGS, <https://www.usgs.gov/special-topics/water-science-school/science/where-earths-water>

<sup>20</sup> COMISO, Josefino C. A rapidly declining perennial sea ice cover in the Arctic. *Geophysical Research Letters*, 2002, 29.20: 17-1-17-4.



- ❖ Changes to the terrestrial tree, as the essence white polar caps significantly reflect the sunlight, which, in their absence, would remain trapped in the atmosphere, further raising the temperature.
- ❖ Reduction of Biodiversity. With the increase of marine levels, entire species would be forced to migrate and would upset the composition of the present biodiversity.
- ❖ Alteration of the food chain, which is directly linked to the previous point.

But the rising and melting of the polar ice caps is only one of the consequences of global warming.

In fact, the last decade has been the hottest ever recorded in recent centuries, causing the increase and intensification of the fire season, such as the one that occurred in Australia at the end of 2019<sup>21</sup>.

At the same time, since the end of the 21st century, extreme weather events represent another dangerous consequence, which has affected all continents.

From the aforementioned Australia, adverse events have had repercussions on all five continents, starting with the fires in California, where 4 million acres were burned.

As arctic temperatures rose by nearly 1 ° C, which released tons of gas locked up in glaciers.

Or even the intensification of the number of hurricanes that hit the United States and the record floods that have hit Central and Southern China.

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<sup>21</sup> KERSHAW, A. Peter, et al. A history of fire in Australia. *Flammable Australia: the fire regimes and biodiversity of a continent*, 2002, 3-25.

## KYOTO PROTOCOL AND 2015 PARIGI AGREEMENTS

A first action to stem the problem of climate change was dealt with by world powers, developing countries and the third world, during the United Nations conference on the environment and development in Rio de Janeiro in 1992.

In this event, also called "summit", the leaders of 172 countries discuss issues related to climate change, the impact of human action and the increase in the greenhouse effect, generated by the continuous use of fossil fuels.

At the same time, the discussion focused on the possibility of creating a sustainable socio-economic system, capable of laying the foundations for a more prosperous and inequality-free future, trying to implement a series of reforms aimed at supporting less developed countries and solving global issues such as poverty, food / water shortages and public health.

After the meeting, the participating nations signed 5 agreements (binding and not) that have produced a turning point in the fight against climate change<sup>22</sup>:

- ❖ The United Nations Framework Convention on climate change (UNFCCC), i.e., the reduction of greenhouse gas emissions responsible for climate warming.
- ❖ The Convention on Biological Diversity, which is a legal instrument for the conservation and appropriate use of biological diversity.
- ❖ Agenda 21, a series of efforts aimed at stemming poverty, deforestation, ecosystem protection, conservation, and management of the world's natural resources.
- ❖ The Rio Declaration on Environment and Development, i.e., the 27 principles of rights and responsibilities aimed at guaranteeing sustainable development.
- ❖ The Principles on Forests, a document with the aim of providing for the protection and conservation of the world "lung".

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<sup>22</sup> SÁNCHEZ, Luis E.; CROAL, Peter. Environmental impact assessment, from Rio-92 to Rio+ 20 and beyond. *Ambiente & Sociedade*, 2012, 15.3: 41-54.

The central part of the summit concerned the UNFCCC, which although initially did not set limits on the emission of greenhouse gases, but rather set itself the goal of stabilizing emissions at a certain level in order not to compromise the global climate.

These limitations laid the foundation for the international treaty presented at the 1997 UN Climate Change Conference, the Kyoto Protocol<sup>23</sup>.

This protocol represented an international agreement with the main objective of stemming global warming, putting into practice a series of restrictions and reforms to reduce the production of greenhouse gases.

In fact, the aim was to reduce by 5%, for the period 2008-2012 compared to 1990, the production of these gases identified as "climate-altering", i.e. CO<sub>2</sub>, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

Furthermore, the countries that would have signed the protocol, defined with the name of "Parties", assumed the obligation to set up a system for monitoring and absorbing greenhouse gases, at the same time undertaking the protection of forest areas and helping developing countries to limit their emissions.

However, the Climate Treaty, before officially entering into force, provided for the signing of at least 55 countries, which, taken together, must not have represented less than 55% of harmful emissions.

This goal was achieved only in 2005, eight years later, thanks to the signing of Russia, which alone accounted for 17% of global emissions<sup>24</sup>.

Consequently, all signatory countries were required to achieve the objectives through the adoption of measures at national level aimed at limiting emissions.

Nonetheless, the treaty provided for a number of flexible mechanisms to facilitate the implementation of the plan and obtain emission credits<sup>25</sup>:

- ❖ Join Implementation (JI), which is a cooperation tool between the various member states for the joint achievement of objectives. It allowed world

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<sup>23</sup> PROTOCOL, Kyoto. Kyoto protocol. *UNFCCC Website*. Available online: [http://unfccc.int/kyoto\\_protocol/items/2830.php](http://unfccc.int/kyoto_protocol/items/2830.php) (accessed on 1 January 2011), 1997.

<sup>24</sup> AVDEEVA, Tatiana G. Russia and the Kyoto Protocol: challenges ahead. *Rev. Eur. Comp. & Int'l Envtl. L.*, 2005, 14: 293.

<sup>25</sup> BOOM, Jan-Tjeerd. International emissions trading under the Kyoto Protocol:: credit trading. *Energy Policy*, 2001, 29.8: 605-613.

powers and transition economies to implement specific projects for the reduction of emissions to generate zero emissions jointly with the host country, obtaining emission credits (Emissions Reductions Unit).

- ❖ Clean Development Mechanism (CDM), i.e., the possibility for developed countries and economies in transition to implement projects in developing countries, projects for the abatement of emissions, earning emission credits.
- ❖ Emissions Trading (ET), allowing the exchange of emission credits between developed countries and economies in transition, that is, if a country has exceeded the target of reducing emissions and has earned emission credits, it can sell them to another country that does not he was able to achieve his goals.

The Rio Summit and the Kyoto Protocol laid the foundations for those agreements to combat climate change.

One above all, which is also an integral part of the European Green Deal, is the Paris Agreement<sup>26</sup>.

This agreement, signed by 196 states during the 21st Conference of the Parties of the UNFCCC in 2015, has as its main objective to contain the global average temperature rise below 2 ° C compared to pre-industrial levels, by striving to limit it even to 1.5 ° C.

The main elements of this Action Plan concern:

- ❖ The creation of a long-term goal, that is, the containment of the increase in temperatures.
- ❖ Cooperation between the various countries, through the presentation of the contributions that would be provided by the individual states to ensure the achievement of the objective.
- ❖ Ambition, or rather the communication of action plans every 5 years, trying to promote ever more ambitious goals.
- ❖ Transparency, i.e., communicating the results achieved to each other to ensure transparency in relationships.

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<sup>26</sup> AGREEMENT, Paris. Paris agreement. In: *Report of the Conference of the Parties to the United Nations Framework Convention on Climate Change (21st Session, 2015: Paris)*. Retrived December. HeinOnline, 2015. p. 2017.

- ❖ Solidarity, through mutual help in the development of action plans, supporting both from a financial and environmental point of view.

The agreement, which entered into force on November 4, 2016, followed the same adoption philosophy as Rio 1992, namely ratification by at least 55 countries representing at least 55% of global greenhouse gas emissions.

As far as the European Union is concerned, all member states have signed the Agreement, which not only represents a key objective for achieving the first climate-neutral impact society, but also serves as an example worldwide.

In addition to the objectives of containing temperatures and emissions, the Agreement, being binding, imposes the obligation on the signatory countries to meet every 5 years, to present the projects implemented, the results achieved and evaluate the current situation according to the utmost transparency. and objectivity.

Furthermore, Member States must always present clear and measurable reduction targets, always maintaining the principle of ambitiousness described above.

Another fundamental element of the Agreements is support for the poorest and developing countries, in order to guarantee the establishment of a cutting-edge and sustainable production system, seeking to increasingly reduce the gap between world economies.

In fact, important milestones already concern 2030, the year in which the following goals will be achieved:

- ❖ The 40% reduction in greenhouse gas emissions compared to 1990 levels.
- ❖ The 27% increase in the supply of energy from renewable sources.
- ❖ An energy efficiency gains of 27%.

All of these represent the first steps towards the creation of the first zero-emission continent<sup>27</sup>.

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<sup>27</sup> LEONARD, Mark, et al. *The geopolitics of the European green deal*. Bruegel Policy Contribution, 2021.

## NON-RENEWABLE ENERGY

The renewable transition is increasingly needed.

The main sources of fossil energy are constantly decreasing and as they become scarcer, they increase their value.

On the other hand, in the last two centuries the world population has grown at a rate without equals, despite the world wars that took place in the 1900s<sup>28</sup>.

This development has caused a greater demand for raw materials, starting from basic necessities up to the energy market.

As we have already faced, energy sources are divided into two categories<sup>29</sup>:

- ❖ Primary, or those that are used directly as they are found in nature (sun, wind, thermal energy).
- ❖ Secondary, i.e., those deriving from the transformation of primary energies, such as electricity deriving from the conversion of mechanical energy through hydroelectric plants.

At present, however, the dominant energy sources are non-renewable, that is, those energy resources present within our planet in limited quantities.

The secondary energy sources are mainly composed of non-renewable energies, or at least derive from their transformation processes.

Although the most common, which will be described, there are various categories of resources in nature, which are not generated in a short time or on a par with human social development.

Starting from the minerals present on the earth's crust, to fossil fuels deriving from the decomposition of living organisms, up to nuclear fuels, the main categories of non-renewable energies are:

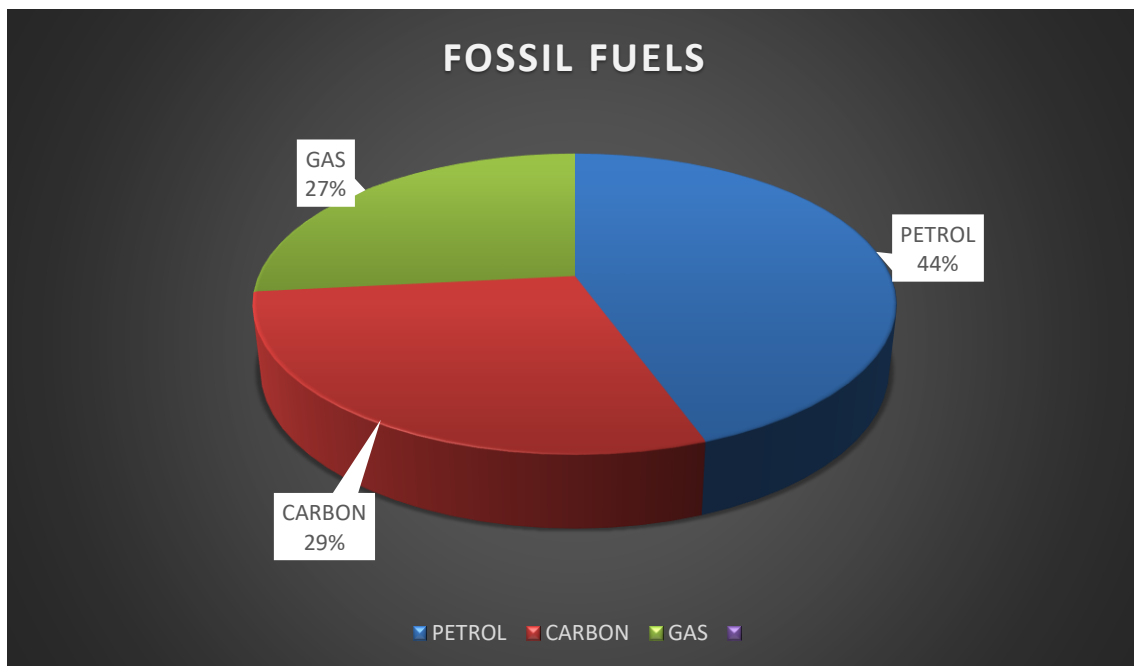
- ❖ Fossil fuels
  - Carbon

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<sup>28</sup> SLAFER, G. A., et al. Photoperiod sensitivity during stem elongation as an avenue to raise potential yield in wheat. In: *Wheat in a global environment*. Springer, Dordrecht, 2001. p. 487-496.

<sup>29</sup> DEMIREL, Yaşar. Energy and energy types. In: *Energy*. Springer, London, 2012. p. 27-70.

- Petrol
- Natural Gas
- ❖ Nuclear fuels
  - Uranium
  - Plutonium
- ❖ Terrestrial minerals and metal ores



Fossil fuels percentage

As for fossil fuels, oil, a mixture of hydrocarbons, is the most used.

Also called "black gold", it is a highly flammable viscous liquid, present on the earth's crust and from which, following refining processes, numerous products used daily are obtained<sup>30</sup>:

- ❖ Plastic
- ❖ Asphalt

<sup>30</sup> PESCUA, Micaela; DE VALDEZ, Graciela Font; MOZZI, Fernanda. Whey-derived valuable products obtained by microbial fermentation. *Applied microbiology and biotechnology*, 2015, 99.15: 6183-6196.

- ❖ Petrol / diesel / LPG
- ❖ Kerosene
- ❖ Lubricating oil

In second place we find coal, a fossil fuel extracted directly from mines or artificially produced.

This mineral originates from the carbonification of materials and plant remains accumulated over millions of years in an anaerobic environment.

Initially, it was considered the main energy source in the world and was one of the peculiarities that gave way to the great industrial revolution of the 1700s.

The main feature of this material is the ability, through combustion, to emit exothermic energy.

The main derivatives from the transformation of coal are<sup>31</sup>:

- ❖ Peat, a newly formed coal.
- ❖ Lignite, a coal that originated from the forests of the secondary and tertiary eras.

Finally, natural gas, which is a gas produced by the anaerobic decomposition of organic material.

The peculiarity of this gas is the state in which it is found, which can be in single fields or in the fossil state together with oil and coal.

This gas, easily transportable and with a lower polluting impact than the previous ones, is mainly used for domestic use (gas for cooking), as well as in production processes and in power plants for generating electricity.

These fuels, which currently represent the largest source of energy in the world, have allowed society to guarantee an unparalleled economic and social development over the last 3 centuries.

Having at his disposal copious quantities of resources and gradually the technologies available for exploitation, man was able to lay the foundations of today's well-being society.

However, the intensive exploitation over the decades has led to an ever higher level of

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<sup>31</sup> TOMECZEK, Jerzy; PALUGNIOK, Henryk. Kinetics of mineral matter transformation during coal combustion. *Fuel*, 2002, 81.10: 1251-1258.



terrestrial pollution, which at the same time has decreased the benefits generated by these resources.

Specifically, the main benefits generated by these resources are:

- ❖ Cost-effectiveness, as the fossil fuel market is relatively cheap (despite various periods of price increases).
- ❖ Reliability, derived from the large number of coal and oil fields.
- ❖ the abundance, previously considered almost infinite and currently increasingly decreasing.
- ❖ The by-products generated by their transformation, such as plastics.

On the other hand, in the last decades, the disadvantages deriving from the intensive exploitation of these resources and the progressive increase of the world population, has meant that the damages caused by fossil fuels were greater than their benefits.

They are<sup>32</sup>:

- ❖ Non-renewable, as with the current use it is estimated 100 years of coal production and 50 for gas and oil respectively.
- ❖ Dangerousness, resulting from production and extraction, although enormous strides have been made in terms of workforce security over the decades, recent ecological disasters have been one of the reasons for forcing change
- ❖ Water pollution and oil spills, which cause the death of animal species present in the ecosystem every year
- ❖ Ground poisoning, directly linked to water pollution, as the main basins are located above the aquifers
- ❖ Air pollution, resulting from the extraction, transport, and combustion of the respective products
- ❖ The exploitation of the soil, through the construction of new extraction basins or the expansion of the latter

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<sup>32</sup> AMIGUES, Jean-Pierre; MOREAUX, Michel; SCHUBERT, Katheline. Optimal use of a polluting non-renewable resource generating both manageable and catastrophic damages. *Annals of Economics and Statistics/Annales d'Économie et de Statistique*, 2011, 107-141.

- ❖ Global warming, or climate change, deriving from CO<sub>2</sub> emissions during combustion, which affect the ozone layer present in the atmosphere, reducing the natural shield of solar emissions
- ❖ Acid rain, which damages not only human structures but also forests, crops, wildlife, rivers

On the other hand, the other major category of energy sources is nuclear power<sup>33</sup>.

It mainly arises from nuclear fission / fusion reactions and radioactive decay.

Fission is a chemical-physical process through which a heavy chemical element decays by dividing into smaller fragments emitting large amounts of energy, while fusion is a particular nuclear process during which the nuclei of two or more atoms unite into a new one. chemical element generating energy (the process is still being tested due to the high temperatures to generate it).

From a practical point of view, in nuclear fission power plants, uranium nuclei are used as raw material, which are bombarded by high-energy neutron beams which compacting with the nucleus divides it into several parts, generating energy and heat. This energy / heat is consequently trapped and used to generate steam power, electricity and heating.

The advantages of exploiting nuclear energy are mainly:

- ❖ Quantities, as few quantities of Uranium or its isotopes are needed to generate large quantities of energy
- ❖ Reduced production of greenhouse gases, as the plants do not emit CO<sub>2</sub> / Methane
- ❖ Energy independence, in the nuclear energy producing countries that are relatively less dependent on the import of raw materials from other countries

On the other hand, here too the disadvantages are different:

- ❖ Accidents in nuclear power plants, both caused by man (Chernobyl 1986) and resulting from climatic catechisms (Fukushima 2011)

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<sup>33</sup> LENZEN, Manfred. Life cycle energy and greenhouse gas emissions of nuclear energy: A review. *Energy conversion and management*, 2008, 49.8: 2178-2199.

- ❖ The production of nuclear weapons, as in particular countries it is difficult to produce legislation that prohibits the use of nuclear energy only for non-war purposes
- ❖ The costs of construction / management of nuclear power plants, which in the face of the reduced per capita costs are a considerable social expense
- ❖ The location of the plants, and the consequent location of the waste
- ❖ The management of radioactive waste, which is the main problem, both from an economic point of view (transport / storage / management costs) and from an environmental point of view due to the long-lasting radioactivity.

## ACCOUNTABILITY AND CORPORATE SOCIAL RESPONSIBILITY

From the economic / environmental picture presented, it is possible to observe how people play a crucial role at the basis of all these social changes.

In recent times, there has been a growing need to change the way the company conducts its business, i.e., the way it pursues its business goal.

Since the dawn of the industrial revolution, the main objective of large manufacturing companies was to offer a large-scale product / service aimed at satisfying the needs of an increasing number of users.

The aim, in fact, was pursued in such a way as to maximize profit by increasing one's sales while at the same time trying to minimize costs.

This mechanism of action has allowed the great world powers (USA and EU above all) to generate an improvement in the quality of life of their citizens and guaranteeing unprecedented development.

Consequently, the general attention was mainly placed on trying to make this development possible, using all available resources regardless of the consequences of this behaviour.

With the advent of the twentieth century, especially in the second half, the level of well-being in the main world powers was such that the maximization of profit was no longer sufficient to guarantee the intensive exploitation of human and environmental resources.

From this point of view, over the years, the need to develop a concept of generating corporate profit by minimizing the impact deriving from business processes has become increasingly fundamental.

This new way of managing the business finds its essence in observing and analysing how the persons in charge (CEO or reference persons) develop their business strategy.

This responsibility in conducting the business has its roots in the concept of Accountability<sup>34</sup>.

From a technical point of view, accountability refers to the process by which the

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<sup>34</sup> ROBERTS, John. The possibilities of accountability. *Accounting, organizations and society*, 1991, 16.4: 355-368.

person or entity is called to account for the consequences of their decisions and to be responsible for the results achieved.

As we have been able to observe from the description of the current world situation, it is increasingly necessary to try to establish a system of procedures aimed at guaranteeing the protection of the environment and the impact that the company has on society.

From this need for change in the management of the corporate business, from the responsibility for one's own actions and for the impact of the corporate activity on the environment, the implication of ethics in operational management develops hand in hand.

Corporate social responsibility has recently become a fundamental part of the strategic vision of the company.

In fact, the CSR, officially defined in 2001 by the European community, refers to the integration, on a voluntary basis by companies, on the management of social and environmental concerns, the ethical / social impact of their activities<sup>35</sup>.

As evidence of this, the European Commission, with the communication of 25 October 2011, defines CSR as the responsibility of companies for their impact on society.

In this new awareness on the part of producers, the need to adopt a series of socially responsible behaviours, aimed at monitoring and satisfying the social, environmental and economic needs of all those directly involved in the business process, the stakeholders, develops at the same time.

This category of people are all those who have a direct interest in making the company last over time, maximizing its profit in pursuit of the business objective, making the management of collaboration between the company and stakeholders essential.

A first classification of these subjects identifies them in two categories::

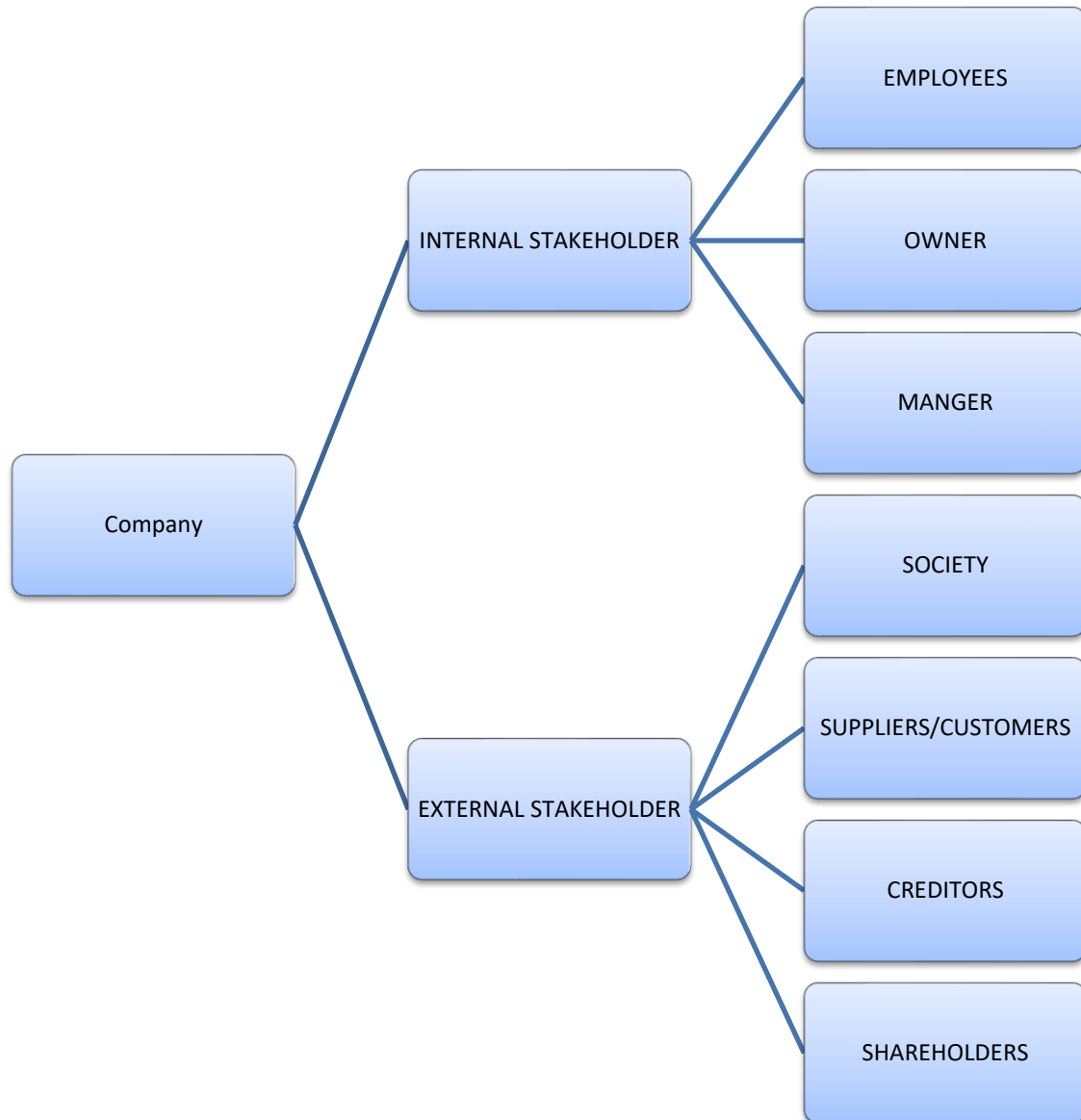
- ❖ Internal, i.e., those who operate directly in the company production processes and are responsible for the achievement of company objectives.
- ❖ External, all these subjects that are interesting for the continuation of the company activity over time and by which they are influenced.

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<sup>35</sup> CHRISTIANSEN, Thomas. Legitimacy dilemmas of supranational governance: the European Commission between accountability and independence. 1997.

Furthermore, the stakeholders can be identified in three further categories:

- ❖ Primaries, who are the most involved and directly linked to the company's fate.
- ❖ Secondary, which have less weight and are limited to the business activity
- ❖ Tertiaries or excluded stakeholders, who are minimally stakeholders and have a minimal or zero impact on the company business



Company stakeholder model

For all this it is necessary to define a series of parameters or indicators, which provide us with the information necessary to evaluate both the stakeholder-business

relationship and their social impact, and to monitor the business activity and the responsibility of its managers. in the pursuit of sustainable development.

These criteria are represented by ESGs<sup>36</sup>.

ESGs, which stand for environmental, social and governance, allow us to examine business activity, not only from a corporate and governmental profile, but also from an environmental, social, and good governance profile.

Specifically, they are:

- ❖ Environment, i.e., the assessment of the impact of the company activity on the environment, on the energy efficiency in the subsequent processes, the emissions of gas and CO<sub>2</sub>, the management of waste and water resources. It also refers to the ability of companies to offer a range of products and services capable of responding to climate and environmental challenges.
- ❖ Social, or the management of human resources, the protection of rights and working standards and relations with the current company. Furthermore, the company is evaluated based on the relationships with its suppliers, customers, and the management of the activity to generate a social and solidarity economy
- ❖ Governance, with particular attention to the way the company is managed, the independence of the board of directors, the implementation of control procedures and compliance with current legislation. In addition, corporate investments and management with the main corporate stakeholders are monitored.

Consequently, the company is assigned a sustainability rating, which substantially provides a summary assessment, evaluating its commitment in the social, environmental and governance areas.

In fact, these indices have become increasingly fundamental in business analysis, as

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<sup>36</sup> FRIEDE, Gunnar; BUSCH, Timo; BASSEN, Alexander. ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, 2015, 5.4: 210-233.

they provide a direct measure of the company's involvement in the creation of sustainable development.

On the other hand, the company in question benefits from compliance with the ESG criteria.

Firstly, by improving the corporate valuation, the company has the possibility to attract new consumers / customers and to improve the image in the eyes of its investors, increasing the ever increasing number of sustainable investors.

Secondly, compliance with ESG standards can be evidence of the actions and direct impact of the corporate business, protecting and increasing the corporate reputation.

Finally, ESGs are increasingly part of the company's long-term strategy, aimed at monitoring the company's commitment to pursuing sustainable development.



## CHAPTER 2

### EUROPE FUNDS

As we have analysed, the problem of climate change represents one of the focal points of the economy and the development of world society.

These problems, which day after day are growing and increasing in intensity, have ensured that the main world powers coalesced to be able to resolve this dramatic situation.

A concrete demonstration, in fact, wants to be given by the European Union through a series of reforms that takes the name of "Green Deal"<sup>37</sup>.

In concrete terms, the European Green Deal will be a strategy, or a set of laws and investments, which over the next 30 years want to lead the EU to achieve the goal of climate neutrality, becoming the first eco-sustainable continent.

Furthermore, the other objectives that the main European nations have set themselves are:

- ❖ The reduction of greenhouse gas emissions by at least 55%, preventing the ever-increasing exploitation of renewable energy sources.
- ❖ Keep the containment of the global average temperature increase below 2 ° C, limiting it to 1.5°, in accordance with the Paris Accords of 2015.

This "sustainable development plan", defined by the President of the European Commission Ursula von der Leyer as "the landing of man on the moon", was presented on 11 December 2019.

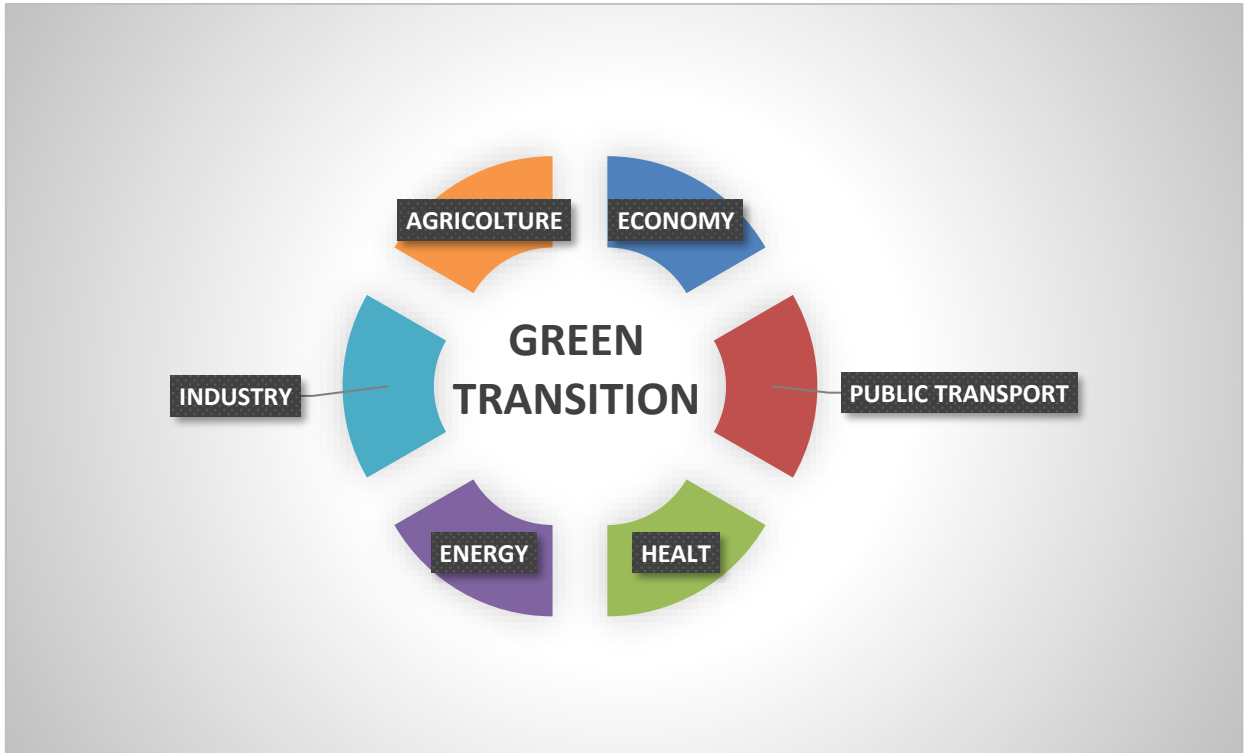
During her presentation, the President of the European Commission also defined the main sectors that this green revolution will mainly touch:

- ❖ Economy.

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<sup>37</sup> ECKERT, Eva; KOVALEVSKA, Oleksandra. Sustainability in the European Union: analyzing the discourse of the European green deal. *Journal of Risk and Financial Management*, 2021, 14.2: 80.

- ❖ The public transport system and the infrastructures connected to it.
- ❖ Well-being and health.
- ❖ Energy.
- ❖ The industry.
- ❖ Agriculture.



Mainly areas of Green Transition

Going into more detail, from the energy point of view, in addition to the objective of reducing greenhouse gas emissions, the EU aims to bring energy supply from renewable sources to about 40% by 2030, parallel to the 36-39% reduction in final and primary energy consumption.

Furthermore, regarding transport, the Commission has set itself ambitious objectives in the fight against CO<sub>2</sub> emissions, aiming to achieve a 55% reduction in car emissions (again by 2030), a 50% reduction for emissions produced by vans and finally the Zero emissions produced by new cars by 2035, promoting the growth of the market for

zero- or low-emission vehicles<sup>38</sup>.

Agriculture is also profoundly influenced by encouraging food and individual producers' sustainability through the application of the "From Farm to Fork" strategy<sup>39</sup>.

The project developed by the European Commission is based on ensuring:

- ❖ A just transition for anyone working in the agricultural and maritime sectors.
- ❖ The substantial reduction of dependence, risk and use of chemical pesticides / antibiotics.
- ❖ The development of innovative farming and fishing techniques.

In addition, the plan will work to combat food fraud by increasing the prevention and fight against counterfeiting.

Finally, Farm to Fork will contribute to achieving a circular economy, making the food production process more efficient, reducing waste, and innovating agricultural technologies in a sustainable way.

The transport sector represents the second macro-area of European expenditure, as it contributes over 5% to the European GDP and includes a pool of about 10 million workers.

The main objective for this sector is the creation of a sustainable, smart, and resilient mobility.

Sustainable as by 2050 gas emissions will be reduced by 90%, reducing dependence on fossil fuels by preferring alternative forms of energy, pricing the environmental impact. Smart as by increasing the "technological level" of means of transport, integrating the ticket booking system in digital form only, eliminating the paper one (by 2030) and encouraging large-scale automated mobility by 2030.

Finally, by focusing on resilience, as being one of the sectors most affected by the Covid 19 pandemic, it is necessary to revolutionize the sector by investing in better-performing infrastructures, guaranteeing the safety of passengers and workers, trying to guarantee high standards of safety and protection.

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<sup>38</sup> HAAS, Tobias; SANDER, Hendrik. Decarbonizing transport in the European Union: Emission performance standards and the perspectives for a European Green Deal. *Sustainability*, 2020, 12.20: 8381.

<sup>39</sup> NUKALA, Revathi, et al. Internet of Things: A review from 'Farm to Fork'. In: *2016 27th Irish signals and systems conference (ISSC)*. IEEE, 2016. p. 1-6.

From an industrial point of view, the Green Deal aims to achieve the creation of a sustainable industry, making citizens and local regions aware of the best technologies available.

In fact, the focal points of this transformation are the strengthening of infrastructures and the digitization of processes, investing in research and development and intervening in the production of sustainable products<sup>40</sup>.

In particular, the European Commission will focus on reducing the waste of materials, guaranteeing the reuse of products by strengthening the recycling processes.

To respond to the crisis triggered by the pandemic, which has damaged the entire world economy, the fight against climate change and the challenge of achieving continental sustainability, the European Union has prepared a series of unprecedented financial measures.

As already described, the 16th century was hit by pandemics and increasingly intense climatic events, which put people's lives to a severe test.

In the face of all this, the European Commission has presented a package of reforms aimed at tackling all these adversities.

The resources made available amount to over € 2 billion (€ 1.8 billion adjusted to the 2018 prices).

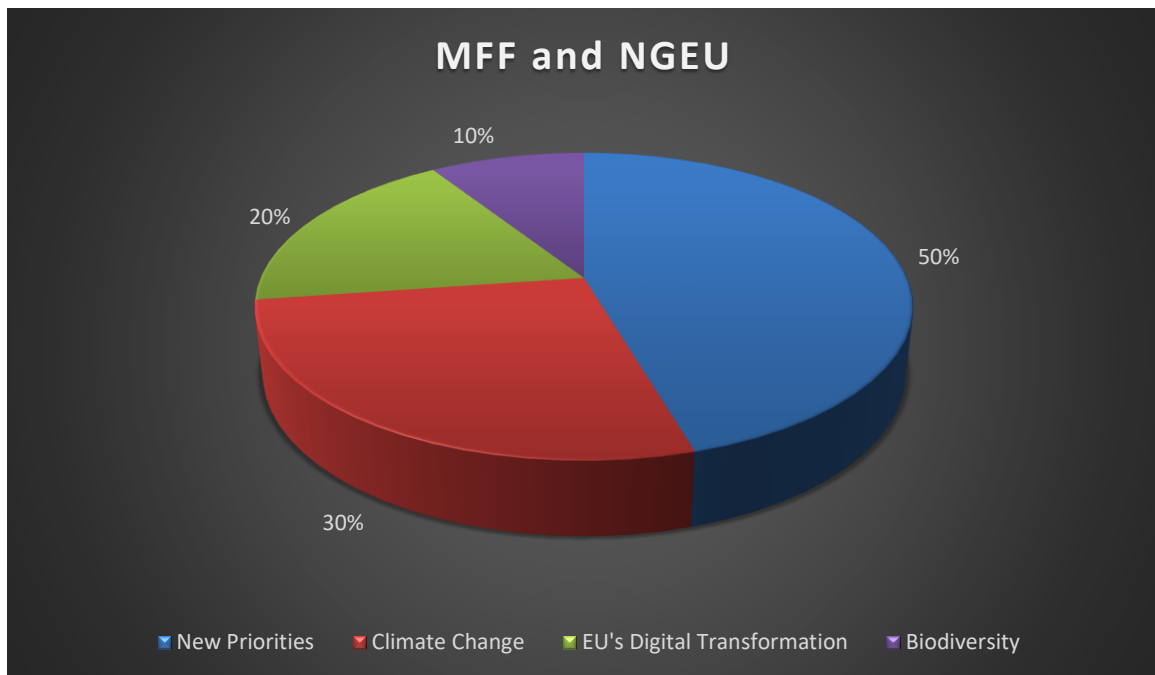
This package consists mainly of two funds<sup>41</sup>:

- ❖ MMF (multiannual financial framework), i.e., a long-term budget valid for the period 2021-2027, which amounts to 1,211 billion euros (1,074 compared to 2018).
- ❖ Next Generation EU, a fund worth 806.9 billion euros (750 in 2018).

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<sup>40</sup> SHARMA, Rohit, et al. The role of digital technologies to unleash a green recovery: pathways and pitfalls to achieve the European Green Deal. *Journal of Enterprise Information Management*, 2021.

<sup>41</sup> A European Green Deal, European Commission, [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en)



Objectives of MFF and NGEU

The main purpose of these two instruments is to finance the continent's economic recovery and give a boost to the recovery of the various states following the pandemic, guiding member countries towards a sustainable and resilient transition.

As for the MFF valid for the period 2021-2027, the goal is to support the local development of European regions, investing in farmers, companies, R&D, in the well-being of citizens and students.

Going into detail, the European Commission has defined the main parameters and sectors that this package will touch, namely<sup>42</sup>:

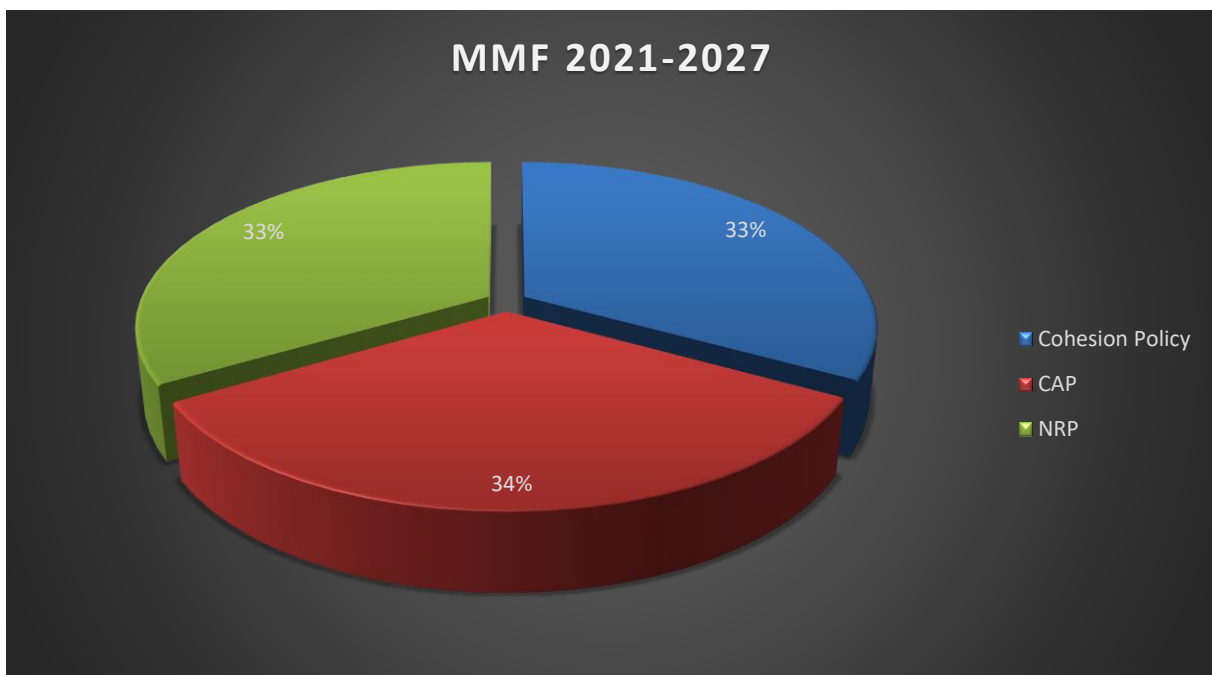
- ❖ Cohesion Policy, to which € 372.6 billion will be attributed, which will be divided between the Cohesion Fund (also CF for a value of € 48 billion), European Regional Development Fund (ERDF € 226) and European Social Fund + (ESF + € 98.5).

<sup>42</sup> MATTHEWS, Alan. The CAP in the 2021–2027 MFF Negotiations. *Intereconomics*, 2018, 53.6: 306-311.

- ❖ Common Agricultural Policy (CAP), or a package of 378.5 billion euros, which is divided into € 87.4 billion European Agricultural Fund for Rural Development (EAFRD) and € 291 billion European Agricultural Guarantee Fund (EAGF).
- ❖ New and Reinforced Priorities, € 377.3 billion relating to investments in R&D, Horizon Europe, Neighbourhood, and International Cooperation.

PACKAGE	AMOUNT	OBJECTIVE
Cohesion Policy	€ 372.6	Cohesion Fund (CF) ERDF ESF
Common Agricultural Policy (CAP)	€ 378.5	EAFRD EAGF
New and Reinforced Priorities	€ 377.3	R&D Horizon Europe Neighbourhood International Cooperation

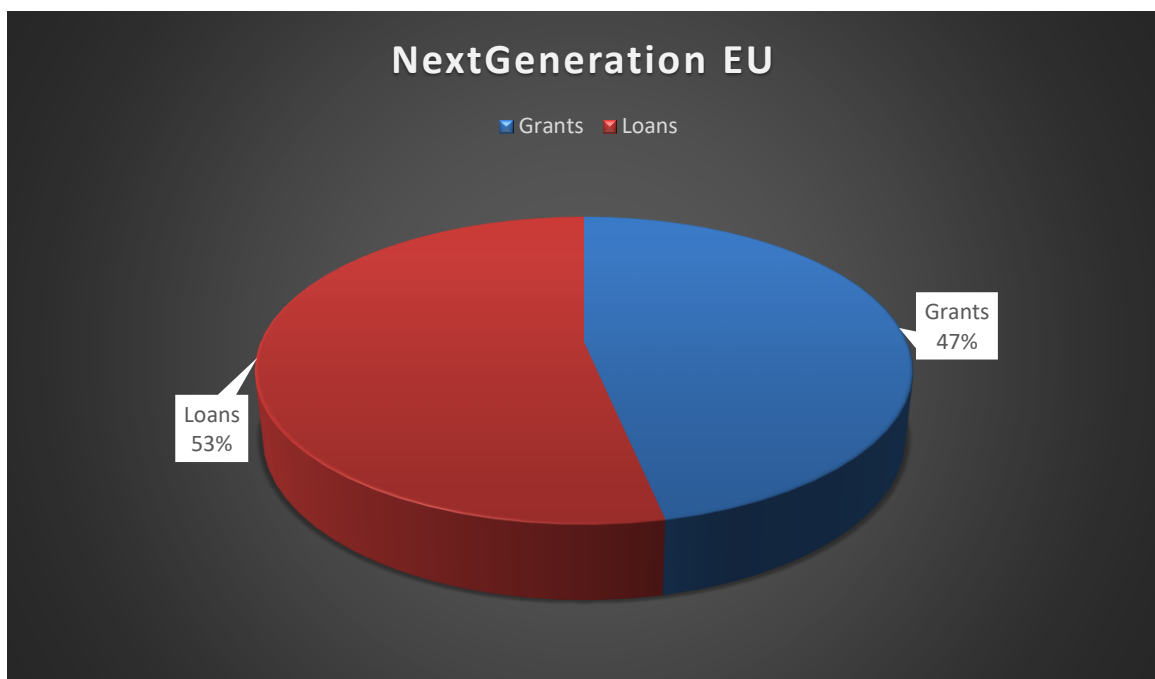
Mainly Package



As for the other investment package, the Next Generation EU is a fund of € 806.9 billion (€ 750 2018), which has the following main objectives<sup>43</sup>:

- ❖ The enhancement of renewable energy and technologies.
- ❖ The renewal of the energy efficiency of buildings.
- ❖ The investment in sustainable transport and the creation of electricity recharging stations.
- ❖ The modernization of the public administration, investing in digitization and streamlining the bureaucratic process.
- ❖ In education and support for the development of digital skills.

This capital will in fact be financed through two instruments, namely € 338.0 billion in grants and 385.8 in loans.



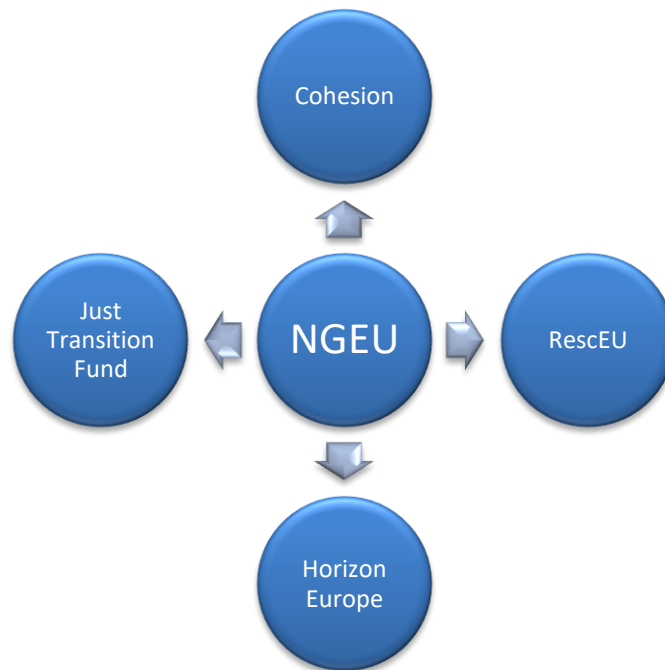
NGEU Percentage

Furthermore, the NGEU will serve to reinforce various EU programs and policies, such as:

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<sup>43</sup> NextGenerationEU, European Union, [https://europa.eu/next-generation-eu/index\\_en](https://europa.eu/next-generation-eu/index_en)

- ❖ Cohesion policy, to help member states in the first years of economic recovery following the pandemic.
- ❖ Just Transition Fund, to help companies in the climate transition.
- ❖ RescEU, or the safeguarding of the EU Civil Protection Mechanism relating to the ability to respond to large-scale emergencies.
- ❖ Horizon Europe, aimed at encouraging investment in research.



Mainly areas of NGEU

But the real purpose and main objective of the plan is to create a harmonious and constantly expanding economic system, capable of enhancing every single aspect of the Member States, increasing investments and profits.

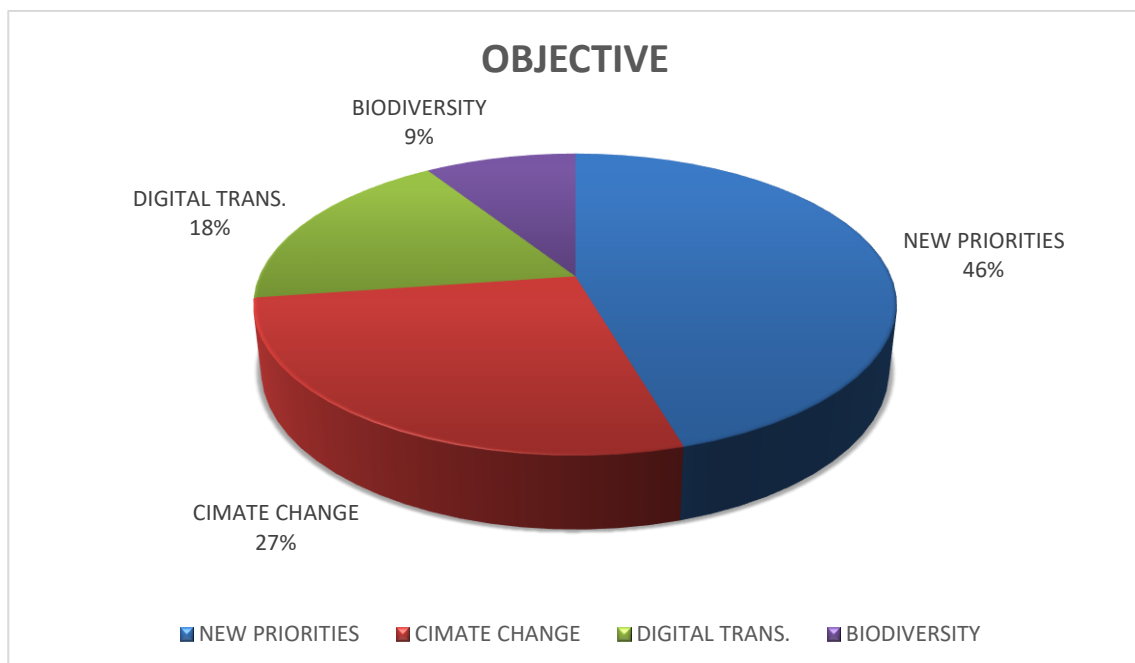
In fact, one of the peculiarities of this tool is the reinforcement of the added value generated by the Members of the European Union, since, by financing at a continental level, I can obtain better results than financing myself.

Consequently we can observe that the MFF and NEGEU packages are summarized



as in the table below:

PORTION	MAIN TARGET	OTHER TARGETS	NOTE
More 50%	New priorities	R&D, through Horizon Europe Fair climate and digital transitions Recovery and Resilience	
30%	Climate change	Green development Climate neutrality	
20%	EU's digital transformation	Boosted A.I Cybersecurity Digital skills Digital technologies	
10%	Decline of Biodiversity	Restoring forests Green space in towns	



## RECOVERY AND RESILIENCE PLAN

Following the global crisis resulting from the Covid-19 Pandemic, our country was one of the most affected.

As previously described, the Italian Government has adopted a series of reforms and precautions aimed at safeguarding the health of citizens (Lockdown, obligation of personal prevention systems, social distancing, ...) which have contributed to stem the spread but at the same time have reduced the productive and economic capacity of the state.

In 2020, following the European and World trend, the national GDP fell by about 8.9%, compared to the average European decline of 6.2%<sup>44</sup>.

This data is alarming and the result of a series of economic crises and recoveries that have demonstrated the fragility and inefficiency from an economic, social and environmental point of view.

These shortcomings have contributed to widening the gap with the main European economies.

Between 1999 and 2019, the Gross Domestic Product grew by 7.9%, compared with growth of over 30% in France, Spain and Germany<sup>45</sup>.

Of these inequalities, the main targets were women and boys.

In 2020 NEETs (Neither in Employment or in Education or Training), which corresponds to the population group between 15 and 29 years, reached the rate of 23.3%, where Northern Italy is growing the most, which has increased 2.3% compared to 2019<sup>46</sup>.

The data is highly worrying, as the economic gap between the Italian regions increases.

In fact, compared to the national average presented, the main regions of the South (Campania, Calabria, Puglia and the islands) are affected the most, recording a rate of

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<sup>44</sup> BOLT, Jutta; VAN ZANDEN, Jan Luiten. Maddison style estimates of the evolution of the world economy. A new 2020 update. *Maddison-Project Working Paper WP-15*, 2020.

<sup>45</sup> BUTI, Marco; MESSORI, Marcello. Implementing the Recovery and Resilience Plans: The case of Italy. 2020.

<sup>46</sup> Translate Statistics on young people neither in employment nor in education or training, June 2021, EuroStat, [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Statistics\\_on\\_young\\_people\\_neither\\_in\\_employment\\_nor\\_in\\_education\\_or\\_training](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Statistics_on_young_people_neither_in_employment_nor_in_education_or_training)

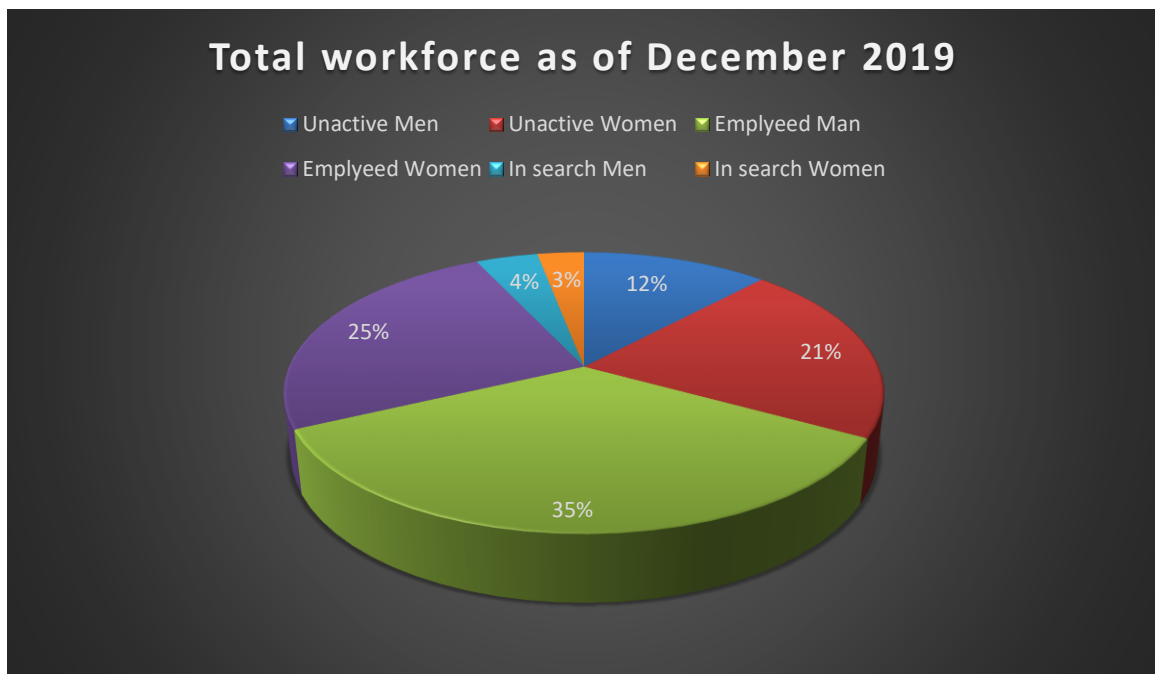
32%, compared to 19.9% in Central Italy and the 16.9% of the North.

Another worrying factor is the data concerning the participation rate in the labour market by women.

In 2018, the worldwide rate was 48.5%, compared to 25.2% for men.

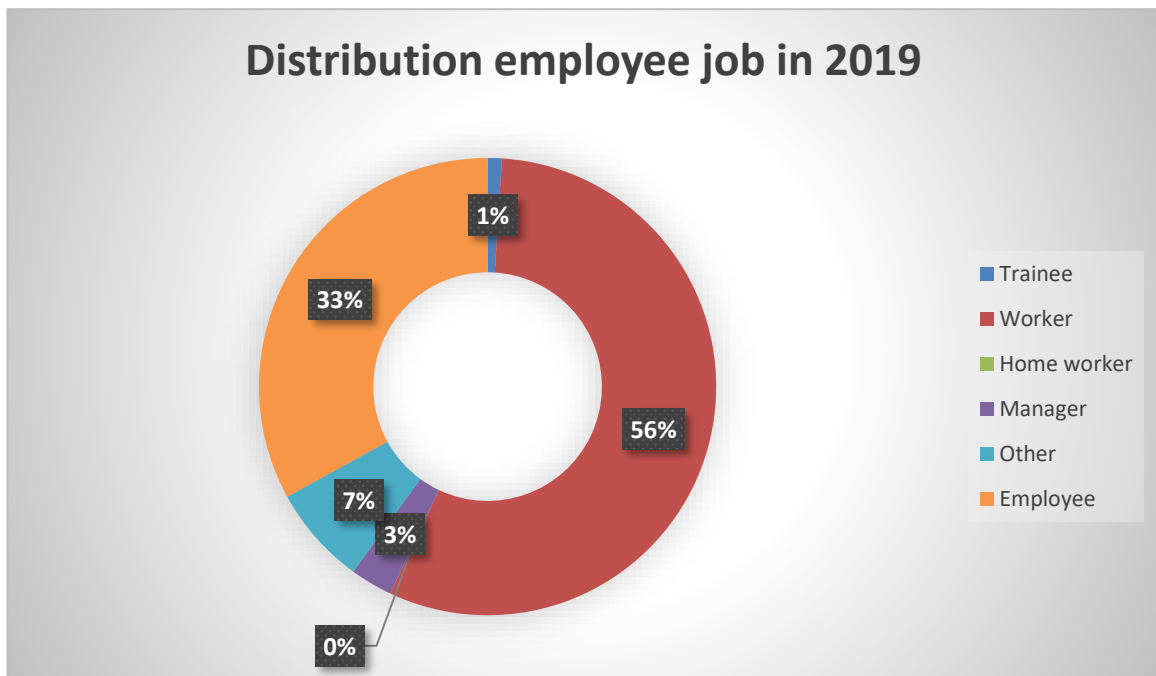
In 2019 the OECD, using the ISTAT and EUROSTA statistics as a database, establishes an Italian employment rate of 58%, with a rate of less than 50% for women and about 70% for the male counterpart.

At the European level, the employment rate exceeds 60%, with a level above 60% of women.



Total workforce as of December 2019, source Eurostat

From this analysis it follows that in Italy, not only one woman out of two does not work, but she is also not even looking for work.



Mainly employee job in 2019, source ISTAT

Even more alarming is the distribution of female work in 2019.

As can be seen in the graph above, about 55% of women are employed or contract workers, compared to 3% who occupy managerial positions.

Another important problem that explains this substantial difference with the other main European countries is the vulnerability to climate change.

The excessive sea rise that caused the second largest tide ever recorded in Venice (a peak of 187 cm), or the Vaia storm that battered the Italian north-east between 26-30 October 2018, with gusts of wind up at 200 km / h, or even the fires that hit southern Italy in the summer of 2021<sup>47</sup>.

All these are clear examples of problems that require interventions, as according to a study by ISPRA, in 2017 12.6% of the Italian population lived in areas of high environmental hazard.

To encourage these problems, there is the need to implement both the administrative / bureaucratic processes and to implement reforms aimed at reducing the imbalance between the various areas of the peninsula.

As for the public administration and bureaucracy, copious investments are needed in improving and expanding not only the infrastructures, but also the scarcity with the

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<sup>47</sup> CHIRICI, G., et al. Forest damage inventory after the " Vaia" storm in Italy. 2019.

new forms of technological work.

If, from a structural point of view, investments are required to modernize and streamline the bureaucratic process (just think of the slowness of civil / criminal justice), it is necessary to invest in training the digital skills of public employees. According to research conducted by ISTAT, before the pandemic, only 1.2% of public administration employees had benefited from smart work from home, unlike the over 50% who benefited from it during the pandemic.

On the other hand, the situation that arises between the territorial areas of the Peninsula is problematic.

The economic imbalance, mainly between North and South, represents another shortcoming that penalizes Italy with the other major European powers.

Despite the abundant aid already provided by the EU (Development and Cohesion Fund for an amount of 4.5 billion), they have contributed in part to raise inequality, but the differences between centres and suburbs, i.e. urban and extra-urban areas, remain substantial.

The aforementioned problems are just some of the interventions that will be continued upon the arrival of European funds, as Italy is one of the countries that will benefit most from these funds.

## RECOVERY AND RESILIENT PLAN (ITALY)

The Recovery and Resilience Plan (RRP) represents a plan for allocating resources financed by the European Union, for a rapid economic recovery of Italy, guiding it in eco-sustainable development and in the digital transition.

This package of resources is part of the Next Generation EU program, or the 750 billion fund made available to the European Commission for Economic Recovery.

The main objective of this plan is to identify and describe the various sectors in which the Italian State intends to invest the resources made available to it, acting as a "general guide" in its application.

This plan, to ensure that Italy has access to these funds, must be drawn up in such a way as to clearly present the projects, reforms and measures it intends to continue / implement, which must be attributable to six foundations<sup>48</sup>:

- ❖ Green transition.
- ❖ Digital transition.
- ❖ Smart and sustainable economic growth.
- ❖ Social and territorial cohesion.
- ❖ Health and economic resilience.
- ❖ Management of the next generations and the most sensitive categories.

In relation to the definition of the main operational areas, the Italian Government has also proposed the structure aimed at coordinating and supervising the correct application of the available funds.

The Governance scheme of the plan provides for the creation of a structure that refers to the Ministry of Economy.

This body has the task of coordinating the individual areas in the correct application of the funds and consequent implementation of the plan, in addition to the responsibility

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<sup>48</sup> FRANCHINI, Michela, et al. Facing the National Recovery and Resilience Plan: Sources of Data, Indicators, and Participatory Strategies in Healthcare and Social Fields. *International Journal of Environmental Research and Public Health*, 2021, 18.19: 10457.

for sending payment requests to the European Commission, which is subject to the achievement of certain objectives that we will explain later.

Affected to the activity of the Ministry of Economy, the individual Administrations will be responsible for the individual investments, sending periodic detailed reports to the central coordination structure.

In addition, there will be some Task Forces set up by the government, with the specific task of helping the Administrations and encouraging coordination.

The implementation of the plan is based on three principles, defined as the Transversal Priorities of the Plan.

These Priorities represent the guidelines for investments, reforms, and projects that we intend to implement, with the aim of reducing the generational and territorial gaps in Italy:

- ❖ Young people or investing in the new generations with the aim of forming the future working and management class of the country.
- ❖ Gender equality, reducing the labour gap between men and women, both from the point of view of effective work and wage differences.
- ❖ Reduction of the regional gap, i.e., by implementing reforms and aid aimed at reducing the difference between Northern and Southern Italy.

Following these directives, the Italian Government, first with the 2<sup>nd</sup> Conte Government and currently with the Draghi Government, has articulated the plan in accordance with the European guidelines, determining the main areas of intervention, defined as Missions, which are specify in the following table:

Mission	Definition	Targets
1	Digitalization, innovation, competitiveness, and culture	Fund digital transaction, through modernization PA Guarantee high level of internet connection Investments in tourism and culture

2	Green revolution and ecologic transition	<p>Guarantee economic sustainability</p> <p>Powered renewable energy sources</p> <p>Fund efficiency mobility</p>
3	Sustainability infrastructure	<p>Expand high-speed train infrastructure</p> <p>Enhance freight transport services (naval, air, rail)</p> <p>Air traffic optimization and digitization</p>
4	Instruction and research	<p>Empowerment instruction services and structure</p> <p>Boosted R&amp;D and fund new technological</p>
5	Cohesion and inclusion	<p>Investments in social infrastructure</p> <p>Enforcement social policies</p> <p>Protection family and economic fragility</p> <p>Enhance Special Economic zone</p>
6	Health	<p>Enhance Prevention and assistance</p> <p>Modernization technological dotation (SSN)</p> <p>Improve digital, managerial, and sanitary skills</p>



By analysing the individual categories in more detail, we can observe how the RRP funds are used.

As regards Digitization (Mission 1), the amount allocated to this mission amounts to approximately € 40.29 billion, 21.05% of the RRP.

As specified in the table, the enhancement of the Public Administration and its digitization remains the focal point.

The main activities will concern the strengthening of the digital infrastructures of the PA, through reforms of the service delivery processes and migration of data to efficient digital archives (Cloud), the digitization of procedures and services, thanks to the establishment of the National Data Platform, and the improvement of digital security, through the hiring of highly specialized personnel and resources in dealing with problems<sup>49</sup>.

Furthermore, another important component of the PA concerns the recasting of the Times of Italian Justice, with the aim of:

- ❖ Reaching 40% less time in civil trials.
- ❖ Reaching 25% less time in criminal ones.
- ❖ Investing in resources and revolutionizing the organizational structure.

Another fundamental aspect is represented by the implementation of ultra-broadband and the creation of an infrastructure to speed up the Internet connection, implementing the “Connected Health” plan for over 10,000 hospital infrastructures and the “Connected School” plan, equipping over 9000 institutions with state of the art internet connection<sup>50</sup>.

Furthermore, again from the point of view of investments in the digital transaction, we intend to promote the adoption of innovative technologies and cutting-edge digital skills, encouraging the development of Italian companies on the international market, with the aim of promoting the brand. Made in Italy.

In fact, the Implementation of the “transition 4.0” Plan, that is, tax credits for companies investing in capital goods and financing in cutting-edge machinery, plants,

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<sup>49</sup> SESTINO, Andrea; SIMONETTI, Alberto; GASTALDI, Luca. COVID-19 and digital acceleration: An investigation about citizens’ perception of digitalized public services in Italy.

<sup>50</sup> FERRI, Paolo. Come cambierà la scuola col PNRR: le misure per colmare le lacune e allinearci all’Ue.

and infrastructures.

Finally, the relaunch of Italian tourism, promoting individual locations and making funds available to encourage the competitiveness of tourism businesses and the enhancement of historical and cultural sites, through substantial investments in offers and structures.

As regards the Second Mission of the RRP, the funds foreseen for its updating are approximately € 59.46 billion, which are mainly related to guaranteeing the “green transaction”, favouring the creation of a circular economy aimed at exploiting renewable energy sources.

Going into more detail, one of the aspects that most characterizes “green Transformation” is waste management.

According to the estimates provided to us by ISPRA, in 2020 separate waste collection in Italy grew by + 3.1% compared to 2019, where Southern Italy recorded a recycling rate of over 50%<sup>51</sup>.

According to this study, an average Italian citizen annually produces 500 kg of waste, for a national total of about 30 million tons, of which about 61% is recycled, more than double compared with the 2008 data.

Faced with these data, the aim is to ensure an ever greater volume of recycled waste, implementing both the collection service and raising awareness among individual citizens.

Similarly, the objective of exploiting renewable energy as the main energy source calls for the simplification of the authorizations granted to individual companies, increasingly exploiting hydrogen as a form of fuel for heavy vehicles.

In addition, one of the most ambitious projects is the acquisition of over 3,000 low-emission buses, investing in the creation of a more sustainable gas network thanks to reconversion biomethane, achieving the aim of reducing CO2 emissions<sup>52</sup>.

Related to this are the investments in improving the electricity and water network, through the increase in the distribution capacity of the renewable energy stations, the

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<sup>51</sup> ISPRA publishes the Municipal Waste Report 2020 edition, December 2020, ISPRA, <https://www.isprambiente.gov.it/en/archive/news-and-other-events/ispra-news/2020/12/ispra-publishes-the-municipal-waste-report-2020-edition>

<sup>52</sup> Renovation of bus fleets and green trains, Italiadomani, <https://italiadomani.gov.it/en/Interventi/investimenti/rinnovo-flotte-bus-e-treni-verdi.html>

reduction of waste (water and electricity) deriving from poor maintenance of the plants and substantially improving the procurement methods.

Incentives will be provided for the energy efficiency of the various public buildings, through the progressive renovation of old systems (Ecobonus and Sismabonus)<sup>53</sup>, favouring the reduction of energy consumption by 50% in schools, and implementing the efficient district heating supply network, and redevelopment of 20% of public buildings, improving their energy class.

Finally, copious investments will be made to counteract the phenomena of hydrological and seismic instability, through the creation of containment systems (for example efficient embankments and river paths) and anti-seismic buildings.

Another crucial aspect of the PRR, Mission 3, concerns the strengthening of the intelligent and sustainable mobility system, creating new and performing infrastructures.

In fact, the total funds available for the third phase of the project are approximately € 25.40 billion, corresponding to 13.26%.

The priority objectives of this mission concern the improvement of road, rail, sea and air networks.

As far as road transport is concerned, the objective is to strengthen the urban and extra-urban road network, thanks above all to the creation of new bridges and tunnels, with investments aimed at restructuring the main roads and ensuring greater safety for motorists.

In fact, the use of the funds will guarantee a decisive strengthening of the monitoring and prevention systems.

Along the same lines, these investments will improve port areas and national airports, facilitating trade thanks to the modernization and expansion of infrastructures, granting greater productivity and improvement of services, while reducing costs.

Finally, the railway system will be the one that will benefit most from these supplies, through the implementation of the project that sees the creation of a high-speed line between the various areas of the Peninsula, making the railway network modern and

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<sup>53</sup> DELLA CAGNOLETTA, Federico. Studio e analisi sull'applicabilità del bonus 110% in relazione a differenti realtà urbanistiche e tipologiche. 2020.

accessible, improving the mobility of citizens<sup>54</sup>.

This modernization will lead to a substantial reduction in delays, a reduction in the timing of the distance between the various cities, the connection with high-speed lines in Europe and the improvement of diagonal connections, that is, the sections such as Rome-Pescara<sup>55</sup>.

The last three stages are those that are most targeted towards citizens and concern them as persons.

Mission 4, which is expected to receive nearly € 31 billion (16.12%), concerns education and research.

On the basis of these assumptions, it is necessary to establish an increasingly efficient and cohesive school system, centralizing the role of young people and guaranteeing the right to education, providing resources and the development of skills for the resolution of future challenges.

This change starts from the base of the school system, through the expansion of places available in kindergartens and nursery schools, thanks to the creation of new school buildings and the renovation / expansion of old ones, extending the number of schools that the so-called “ full time “and strengthening the sports infrastructure.

Furthermore, thanks to the “school 4.0” project, the goal is to enhance and improve the connection to the high-speed network and to make available interactive and performing educational devices<sup>56</sup>.

Furthermore, the aim is to revolutionize university orientation, through the development of vocational education, the issuance of additional scholarships and the implementation of student accommodation thanks to the creation of new university campuses to offer further study opportunities.

Finally, through investments in research, the objectives are to make more and more resources available to incentivize the process, guaranteeing new technologies and

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<sup>54</sup> CASCETTA, Ennio, et al. Economic growth, transport accessibility and regional equity impacts of high-speed railways in Italy: ten years ex post evaluation and future perspectives. *Transportation Research Part A: Policy and Practice*, 2020, 139: 412-428.

<sup>55</sup> LANZINI, M., et al. Studi geologici ed indagini geognostiche per la valutazione del rischio sinkholes, per il progetto di raddoppio della linea ferroviaria Roma-Pescara (tratto Lunghezza-Guidonia).

<sup>56</sup> GJERGJI, Iside. Istruzione 4.0. L'impatto della digitalizzazione sul lavoro dei docenti scolastici in Italia. *Socioscapes. International Journal of Societies, Politics and Cultures*, 2021, 2.2: 207-244.

cutting-edge devices, thus enhancing the opportunities for researchers to develop new skills and abilities aimed at achieving corporate success.

The 5<sup>o</sup> mission concerns the possibility of creating a prosperous future for all citizens, through the innovation of the labour market, the creation of new jobs and the elimination of territorial and gender inequalities, promoting inclusion and cohesion<sup>57</sup>.

This phase of the project represents 10.34% of the funds, for an amount of € 19.85 billion.

The first objective is to stimulate the labour market, creating new opportunities and increasing the employment rate, developing the personal skills of workers and increasing the training activities by companies.

Furthermore, in favour of the reduction of gender inequalities, the intention is to increase the active role of women in the labour market, increasing career opportunities and supporting a substantial cultural change, through the generation of a fund to support the start-up and business development with female management / presence.

Furthermore, copious investments will be aimed at the redevelopment of degraded areas, which favour social inequalities, through the creation of new special economic zones for regions in difficulty (Campania, Puglia, Basilicata, Sicily, ...), the strengthening of regional services and urban regeneration, the provision of funds for disabled or non-self-sufficient people.

The final mission of the plan concerns the improvement of the health of individual citizens through a transformation of the health system, thanks to the improvement of infrastructures and the provision of high-quality services.

Making healthcare more equitable, guaranteeing treatments accessible to all, strengthening local services and investing in research represent some of the crucial points of the sixth phase, for which just over € 15 billion will be available, or 8.16% of the RRP.

Starting with the infrastructures, the goal is to make them suitable for any adverse climatic event, renovating them, and guaranteeing free access to all categories.

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<sup>57</sup> PIERONI, Luca; POMPEI, Fabrizio. Evaluating innovation and labour market relationships: the case of Italy. *Cambridge journal of economics*, 2007, 32.2: 325-347.

Investments in research will be fundamental, especially in the construction of structures suitable for research and the prevention of future pandemics.

Furthermore, the goal will be to renew and strengthen digital systems, implementing the means and methods of data collection and their analysis, developing treatment techniques and speeding up the entire health system.

Parallel to this digital transaction, the strengthening of hospital facilities will go hand in hand, increasing both hospital and intensive care capacity, which has played a fundamental role in the fight against the pandemic.

Finally, making hospitals at the forefront from a sustainable and technological point of view will be necessary in order to guarantee a better supply of hospital service and will increase the success of therapies.

## THIRD CHAPTER

### PREMISE

From the previous analysis, both at the Italian and European level, the ecological transition represents one of the key points on which the European Commission is aiming.

The energy market, given the impetuous growth of the world population during the last two centuries, has seen a sharp increase in demand.

This increase in requests has led to an excessive exploitation of terrestrial resources which, based mainly on non-renewable energy sources, requires a change.

From an Italian point of view, in 2021 the demand for energy saw an increase of about 7% compared to the previous year, generating a growth in CO<sub>2</sub> emissions of about 4.8%, mainly due to the increase in use of fossil fuels such as coal (+ 25%) and oil (+ 8%)<sup>58</sup>.

From an analysis carried out by the national energy system ENEA, 2021 resulted in an overall growth, in terms of consumption, of more than 7%, almost equal to that of emissions<sup>59</sup>.

This comparison, which goes against the trend of the energy transition objective, highlighted a worsening of the Ispred index (-35%), which is an index developed by ENEA to measure compliance with the European guidelines on the decarbonisation objective.

Again according to this study, the negative trend is related to the increase in the exploitation of fossil fuels, mainly in public transport and buildings.

In fact, the analysis shows an increase in fossil fuels of almost 9%, due to the recovery of road and air traffic.

Furthermore, this growth led to the recovery of almost 50% of the emissions avoided in 2020 (also due to the restrictions and the lockdown), but still below the CO<sub>2</sub> levels

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<sup>58</sup> FAIELLA, Ivan; LAVECCHIA, Luciano. Households' energy demand and the effects of carbon pricing in Italy. *Bank of Italy Occasional Paper*, 2021, 614.

<sup>59</sup> Energy: ENEA quarterly report, unprecedented growth of consumption (+24%) and emissions (+25%), 16 September 2021, ENEA, <https://www.enea.it/en/news-enea/news/energy-enea-quarterly-report-unprecedented-growth-of-consumption-24-and-emissions-25>

of 2019.

The analysis provided by ENEA confirms the need to develop the policy presented in the Recovery Plan in a repertory manner, making use of the resources made available to the European Union, achieving the set objectives and guaranteeing a transition that is not only ecological but also social, creating a future more sustainable.

On this front, in fact, many companies are committed to guaranteeing us the creation of a new energy model.

If worldwide companies such as Tesla, Space X, Microsoft, BMW are among the most marked by a sustainable energy system, in the Italian case, the main companies are Enel and Eni, two multinationals operating respectively in the supply of electricity and gas.

Enel Energia is the leader in the free energy market, specializing in the production, sale and distribution of electricity and natural gas.

For its part, Eni operates in the gas / electricity retail and business market, with over 8 million customers in Italy.



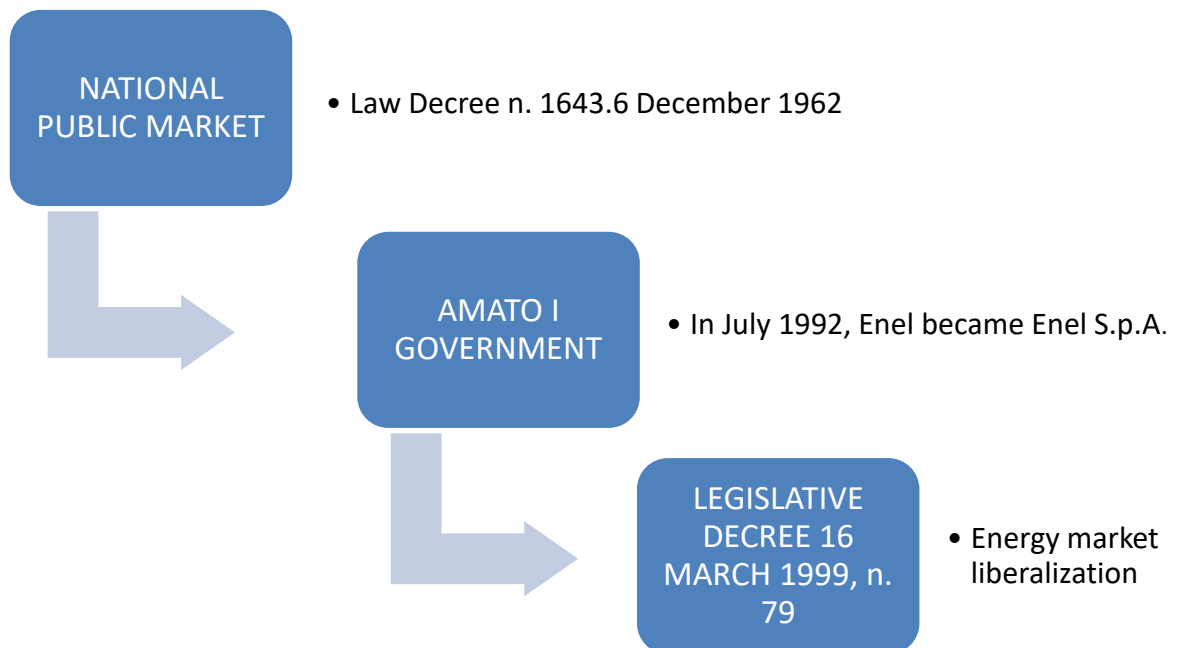
## ENEL

Enel S.p.A. was founded as a public body in 1962, operating mainly in the hydroelectric sector<sup>60</sup>.

This need for the Italian state to create a national public body was due to the great fragmentation of the energy market together with the constant increase in demand, deriving mainly from the economic boom of the second post-war period.

Following this need and based on the French and English models, Law no. 1643 of 6 December 1962 established the birth of the new institution.

Towards the 1990s, following the globalization of the economy and the establishment of the free energy market, Enel was transformed into a joint-stock company Enel S.p.A., listing on the FTSE in 1999.



With the beginning of the new millennium, the digital transition begins for Enel, with the conception and installation of the first digital meters.

At the same time as an Italian joint-stock company, it expands its horizons and

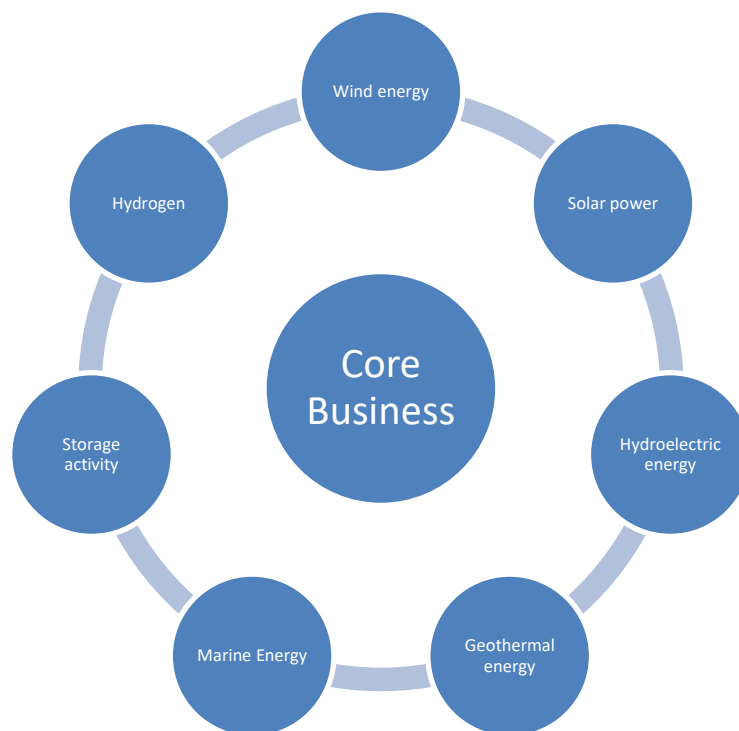
<sup>60</sup> SANTORO, Ciro Francesco, et al. Le privatizzazioni in Italia. Il caso Enel. 2005.

borders, starting its expansion outside, acquiring numerous portions of the South American energy market.

In fact, by 2020 Enel was present in 47 countries divided over 5 continents, having more than 1000 subsidiaries<sup>61</sup>.

The real turning point came in 2008 when Enel Green Power S.p.A was established, a company belonging to the Enel Group with the aim of developing and managing activities relating to the exploitation of energy deriving from renewable sources, having as its main objective the fight against climate change through decarbonization.

### Enel Green Power Core Business



ENEL Green Power business structure

Going into more detail, the previous diagram provides us which are the renewable energies that are most developed by the Company.

Starting from wind energy, the Company uses wind turbines, that is a set of blades (generally three) placed at a specific distance and angle, able to move and orient

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<sup>61</sup> Enel 2020 annual report

themselves according to the intensity of the wind, transforming the kinetic energy of wind into electricity via a transformer<sup>62</sup>.

These wind exploitation systems are generally part of a group, the so-called Aeolian Park, or rather a set of wind turbines set up areas to maximize their operation.

Generally there are three categories of parks, classified according to their location:

- ❖ On-Shore, or places on dry land more than three km from the coasts and which are the most common.
- ❖ Near-Shore located less than 3 km from the coasts.
- ❖ Off-Shore, located in the open sea or in lakes.

These parks are interconnected with each other through connections called conduits, which involve the renewable energy produced in a delivery station-substation.



*Figure 1 An example of On-Shore Eolic Park*

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<sup>62</sup> SANTORO, Mary Elisa Edmea Emma. *Il progetto eolico: tecnologia, normativa e impatto ambientale*. 2008. PhD Thesis. Politecnico di Torino.

The second category of exploited renewable energies is the solar one<sup>63</sup>.

Solar energy, which is the most widespread among renewables, exploits the photovoltaic effect, that is, through the irradiation of particular panels composed of light-sensitive semiconductor materials, they create electricity when they are irradiated by the sun.

These panels placed in places where they are able to make the most of the hours of irradiation, are connected to an inverter, a machine capable of transforming sources of continuous energy into alternating energy.

Thanks to this peculiarity and to the small size, it is possible to place these structures comfortably on the roofs of their homes, or be used in several blocks, creating a park of photovoltaic panels.



*Figure 2 An example of Photovoltaic Panels*

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<sup>63</sup> AFONSO, Maria do Mar. *Enel green power: renewables utilities*. 2015. PhD Thesis.

The third major area of renewable sources is represented by hydroelectric energy<sup>64</sup>. This form of energy exploits the movement of water and the force of gravity, through the constitution of collection basins, which delimited by a dam divert the course of the water according to specific differences in height, making it involve in precise points increasing its energy enhances it.

Subsequently, the water comes into contact with turbines, which, when activated, generate energy which is conveyed to an alternator for the production of electricity.

This form of energy mainly depends on the water collection basin. These "containers" are classified into two categories based on their nature:

- ❖ Natural basin, such as lakes.
- ❖ Artificial basin, a work built by man to modify the watercourse.

These reservoirs, as described above, channel the water into the turbine, which are located inside specific structures called hydroelectric plants.



Figure 3 An example of hydroelectric factory

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<sup>64</sup> ANELLI, R., et al. A study on prediction models for hydroelectric energy resources. *Energ. Elettr.:(Italy)*, 1986, 63.6.

Geothermal energy uses the heat coming from the centre of our planet to transform it into electricity<sup>65</sup>.

This mechanism involves the construction of structures placed in precise points on the Earth, the geothermal power plants.

The power plants are built near the extraction wells, channels up to 3 km deep where, by harnessing the natural vapours produced, which are pushed inside the turbines. The latter are connected to alternators which transform the kinetic energy of the vapours into electrical energy.

Subsequently the vapours are poured towards structures, the condensers, which cool the water which is reintroduced into the subsoil to generate more steam, guaranteeing the continuity of the process.



*Figure 4 A Geyser, a natural manifestation of geothermal energy*

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<sup>65</sup> NOOROLLAHI, Younes, et al. Geothermal energy resources and development in Iran. *Renewable and Sustainable Energy Reviews*, 2009, 13.5: 1127-1132.

Another category of renewable energy exploited by Enel green power is the marine one<sup>66</sup>.

In fact, this source represents a largely under-exploited energy reserve, which would be able to generate almost inexhaustible energy.

Mainly this energy exploits two different marine mechanisms:

- ❖ Wave motion, deriving from both sea / ocean currents and the action of the wind on the water surface.
- ❖ The tides, or rather the rise and fall of the sea level according to movements of the water masses.

Marine energy due to tidal and current changes exploits the same aeolian principle through the construction of underwater wind turbines, which are set in motion because of these changes.



*Figure 5 An example of a possible prototype for the exploitation of marine currents*

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<sup>66</sup> MARINONI, F.; PORRINO, A. HVAC transmission line surface insulation in marine environments: Sizing and design based on tests and field experience; Dimensionamento degli isolamenti superficiali di linee e stazioni destinati ad ambienti marini mediante criteri di progetto basati su esperienze di laboratorio e di esercizio. 1991.

The last type of renewable energy that can be exploited is hydrogen<sup>67</sup>.

Defined as the fuel of space, due to its presence together with Helium in nuclear fusion processes in stars, this source would represent an important alternative to current energy sources.

In fact, the uses are many:

- ❖ Chemical industry.
- ❖ Steel industry.
- ❖ Aviation.
- ❖ Maritime transport.

Given the multiplicity of its fields of use, according to the scenario developed for the European energy transition, green hydrogen would be able to satisfy almost 24% of energy demand by 2050, generating over 5 million jobs and impacting in decisive way in the emission of CO<sub>2</sub><sup>68</sup>.

Basically this source is different from the previous ones as it changes according to the source from which it is extracted.

There are currently three classifications:

- ❖ Gray hydrogen, the most widely used and known, where carbon is taken from fossil fuels, especially natural gas.
- ❖ Blue hydrogen, through the adoption of processes to attract carbon particles.
- ❖ Green hydrogen, through the electrolysis process of water.

This difference in the extraction processes explains why only green hydrogen is sustainable.

As regards the first two models, they involve both large costs in terms of economy and operation, due to the difficulty of withdrawal and the CO<sub>2</sub> emissions emitted, not at all in line with corporate sustainability.

The latter, on the other hand, uses the electrolysis process of water, which is

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<sup>67</sup> BALESTRI, M., et al. Enel's Fusina hydrogen-fed power generation plant. In: *2007 International Conference on Clean Electrical Power*. IEEE, 2007. p. 456-463.

<sup>68</sup> Enel annual report 2020



contained in specific cells powered by renewable energy, representing 100% full sustainability.

## ENI

Eni S.p.A. was founded in 1953 thanks to law number 136 as a public body during the presidency of Enrico Mattei, with the acronym ENI (national hydrocarbon body), active in the natural gas and oil sectors, exploiting them to supply electricity<sup>69</sup>.

The purpose of this creation of a national public body for energy stemmed from the precarious Italian economic condition in the second post-war period, trying to exploit the current resources available in our territory (methane deposits in the Po Valley for example), starting the economic boom of the 60s.

The 90s represented a turning point for the company, given the decrease in the influence of the state in the economic market, transforming the public body ENI into a joint-stock company Eni S.p.A (Law Decree No. 333 of 11/07/1992) and being listed on the Milan and New York stock exchanges in 1995.

The real turning point took place in the early 2000s, when the group decided to implement a substantial change through the development of new technologies aimed at exploiting renewable energy.

In the following years, numerous projects were implemented, starting with the creation of the chemical hub in Porto Torres in 2011, the construction of the biorefinery in Porto Marghera (VE) in 2014 and the establishment of the first photovoltaic plant in Sardinia in 2018.

As evidence of this, in 2020 the company was awarded as the best oil company for sustainable energy.

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<sup>69</sup> PETRINI, Francesco. Oltre Mattei: l'Eni nella storia d'Italia. *Oltre Mattei: l'Eni nella storia d'Italia*, 2019, 164-179.



*Figure 6 The famous symbol of ENI S.p.A.*

2021 represented a year of real change, as from March 2022 the company Eni gas e Luce will become Plenitude.

This new company, which aims completely at the exploitation of renewable energy and e-mobile, aims to supply 100% of the decarbonised energy by 2040, a decade before the European target.

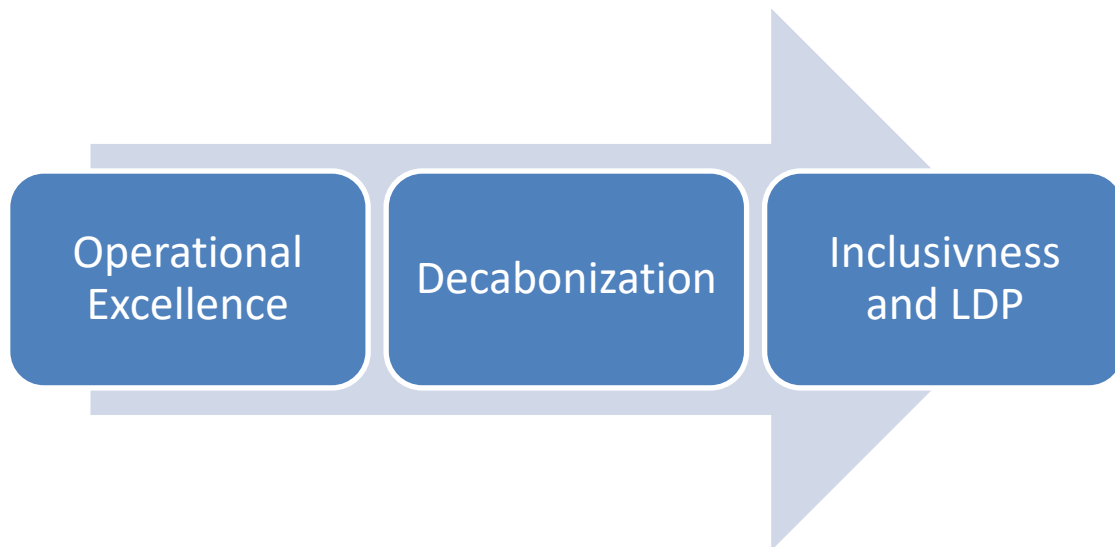
This new project, in fact, is fully in line with the corporate objectives and the business model of Eni S.p.A.

As disclosed in their Annual Report 2020, the company proposed to develop the corporate strategy following three key principles<sup>70</sup>:

1. Operational excellence, focusing on people and their contribution, promoting integration and inclusion, promoting respect for human rights and the diversification of activities.
2. Decarbonisation by 2050, through the exploitation of renewable energy sources and perfectly in line with the European Green Deal.
3. Alliances and the promotion of development, thanks to collaboration with various countries and the sharing of resources, implementing programs for local development LDP in line with the SDGs published in the 2030 Agenda.

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<sup>70</sup> DRAISCI, Gabriele. Integrated reporting: impatto sulla fiducia, sulla percezione degli investitori ed il rapporto con la performance finanziaria: il caso ENI Spa. 2020.

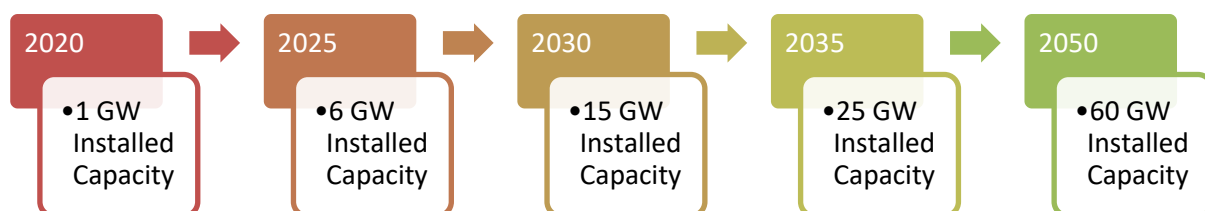


This strategy demonstrates the centrality of renewable energies in the corporate sustainability process.

By 2020, the Company had 1 GW installed capacity, setting itself the goal of reaching 60 GW by 2050.

At the same time, the production of energy deriving from renewable energies also had a copious increase, going from 11.6 GW / h in 2018 to 339.6 GW / h in 2020.

The diagram below represents the temporary line of installed capacity from renewables up to 2050.



This expansion of the energy capacity produced by renewable energies derives from the typology of projects in the development of these infrastructures, Following their business model, Eni classifies renewable energy projects into two macro categories:

- ❖ Brownfield, which consists in the generation of renewable energy deriving from Eni's already operational plants, exploiting the infrastructures already present and focusing mainly on contractual and logistical issues.
- ❖ Greenfield, or the establishment of new projects not connected with the existing infrastructures, with the aim of developing projects for the generation of renewable energy aimed at direct B2B sales.

Following this last type of projects, the company has invested heavily in the creation of special plants.

Focusing mainly on solar and wind sources, Eni has set up a series of projects to enhance their renewable energy production, building or acquiring on-shore and off-shore parks outside, testifying to their multinationalism<sup>71</sup>:

- ❖ The wind farm in Badamsha (Kazakhstan), started in 2018 and started up in 2020, consisting of a total capacity of 48 MW capable of generating, at full capacity, almost 200 GW / h.
- ❖ The photovoltaic park in Katherine (Australia), started in 2019 and connected to a photovoltaic plant capable of collecting energy, generating a saving on emissions of approximately 63 thousand tons of CO2 per year.
- ❖ The photovoltaic park in Bir Rebaa North (Algeria), established in 2018, aimed at ensuring an energy mix in line with the corporate strategy.
- ❖ The purchase of 13 onshore wind farms already active in Italy (2021), resulting from the purchase of the companies Glennmont Partners and PGGM Infrastructure Fund. These parks have guaranteed Eni to reach an installed capacity of 350 MW.

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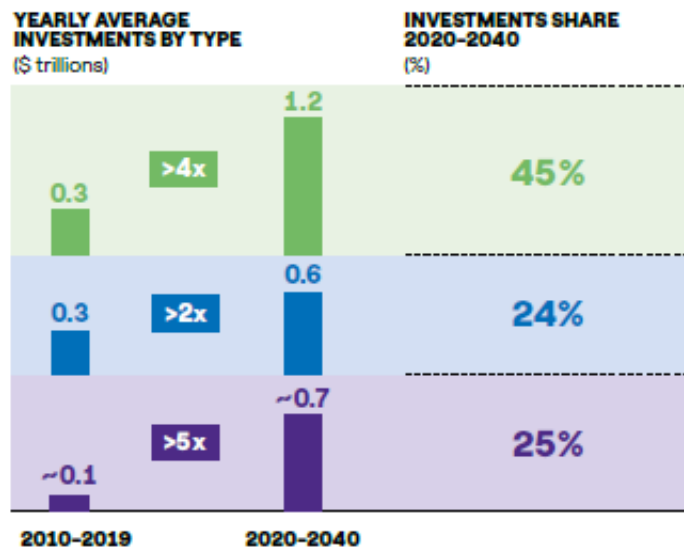
<sup>71</sup> RAZZUOLI, Luciano. Il processo di decarbonizzazione in Italia tra minacce e opportunità. 2020.



*Figure 7 The Eolic Park in Badamsha (Kazakistan)*

## RENEWABLE IMPACT<sup>72</sup>

As described above, the green transition is at the heart of both companies' strategy. In fact, Enel and Eni have set as their main objective the complete cancellation of CO2 emissions by 2050, in line with the European transition plan.

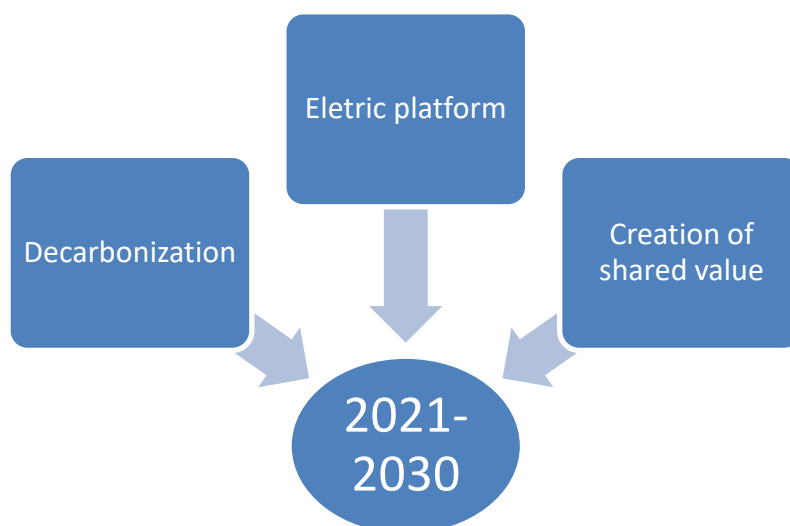


Sources Enel Annual Report 2020

As described above, the green transition is at the heart of both companies' strategy. In fact, Enel and Eni have set as their main objective the complete cancellation of CO2 emissions by 2050, in line with the European transition plan.

In the case of Enel, the company has ready a copious investment plan for the decade 2021-2030 equal to 190 billion euros.

<sup>72</sup> This chapter takes the information respectively from the 2020 Annual reports of Enel S.p.A. and Eni S.p.A.



The Enel 'objectives for short-medium period

As regards the short term 2021-2023, Enel has aimed to lay the foundations for the previous ambitious change, through the issuance of an investment package equal to 40 billion euros<sup>73</sup>:

- ❖ 38 billion through the Ownership model, or thanks to the digital platforms themselves as promoters of the business for the profitability of investments.
- ❖ 2 billion through the Stewardship model, or the exploitation of third-party investments in collaboration with Enel.

For its part, Eni is still focusing on non-renewable energies, through the mobilization of an investment plan of approximately 33 billion euros, which will be mainly exploited from non-renewable sources (approximately 77%).

Nonetheless, the business commitment in the ecological transition, through the subsidiary Plenitude, will grant three-year investments of approximately 5.9 billion, capable of constituting an installed capacity of approximately 6 GW.

Consequently, the plan in the short term will mainly focus on the following points:

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<sup>73</sup> Enel 2020 Annual Report

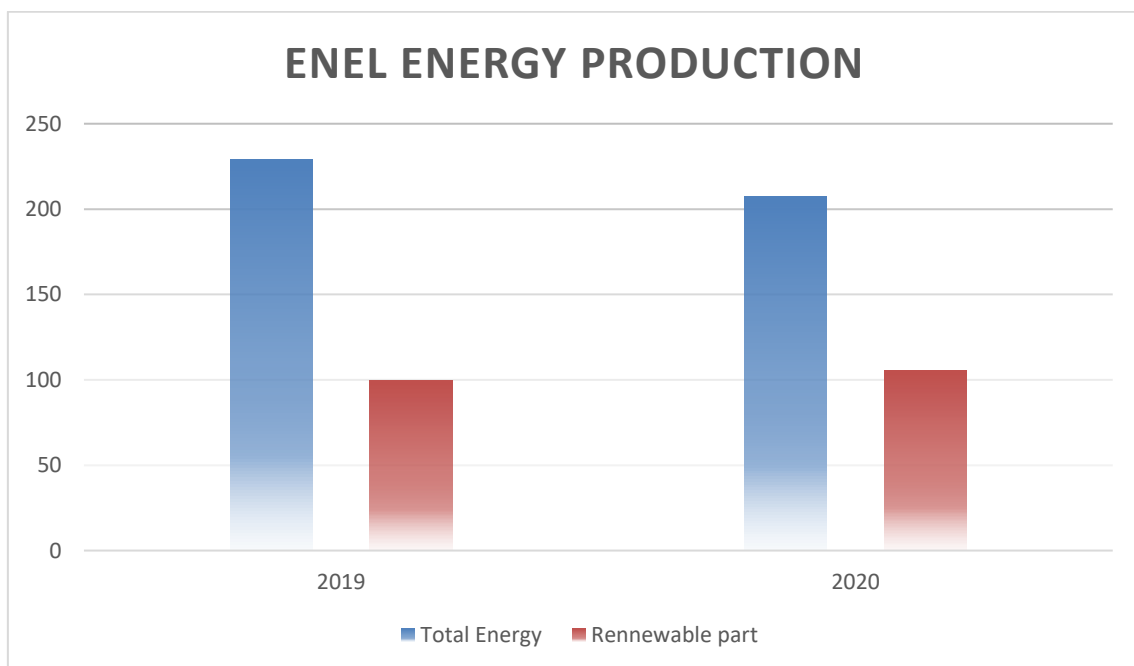


- ❖ Increase in installed capacity for renewable sources.
- ❖ Increase of services in favour of renewable energies through the stipulation of new special contracts.
- ❖ Creation of a network for the development of technological infrastructures for the progressive reduction of greenhouse gas emissions.
- ❖ Increase in energy efficiency and change in the company trend.

As evidence of the investments described above, 2020 represented a great leap forward as regards the results in the exploitation of renewable energy.

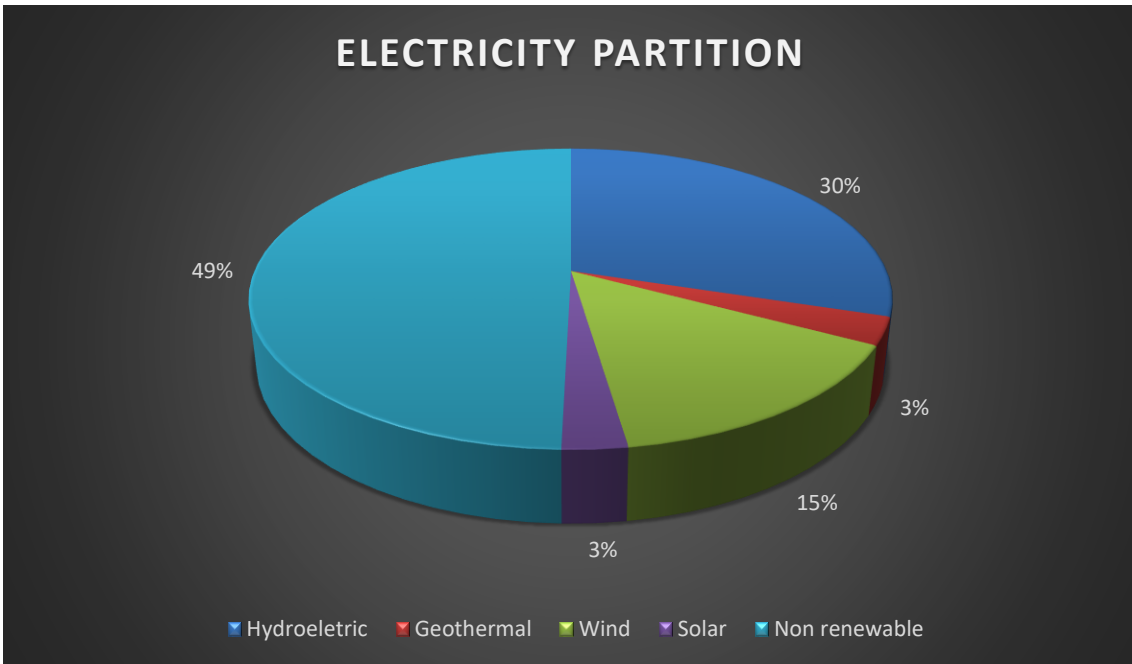
As far as Enel is concerned, the total electricity production was 207.1 TW/h, slightly down on the 229.1 in 2019, or -9.6%.

The decrease, mainly due to the Covid Pandemic, saw an increase in the renewable energy component, generating an increase of 6.0%, going from 99.4 TW/h in 2019 to 105.4 TW/h in 2020.



Electricity production broken down by source

The graph below shows the breakdown of electricity by production source:



As regards the installed capacity, a slight decrease was recorded, going from 84.3 GW in 2019 to 84.0 GW in 2020, recording a decline of 0.3%.

Following the trend of the energy partition, renewable sources instead increased their installed capacity, growing by 2.9%, going from 42.1 GW in 2019 to 45 GW in 2020.

The growth of renewable energies in the Eni company is much more substantial, in relation to the parameters of energy produced and installed capacity.

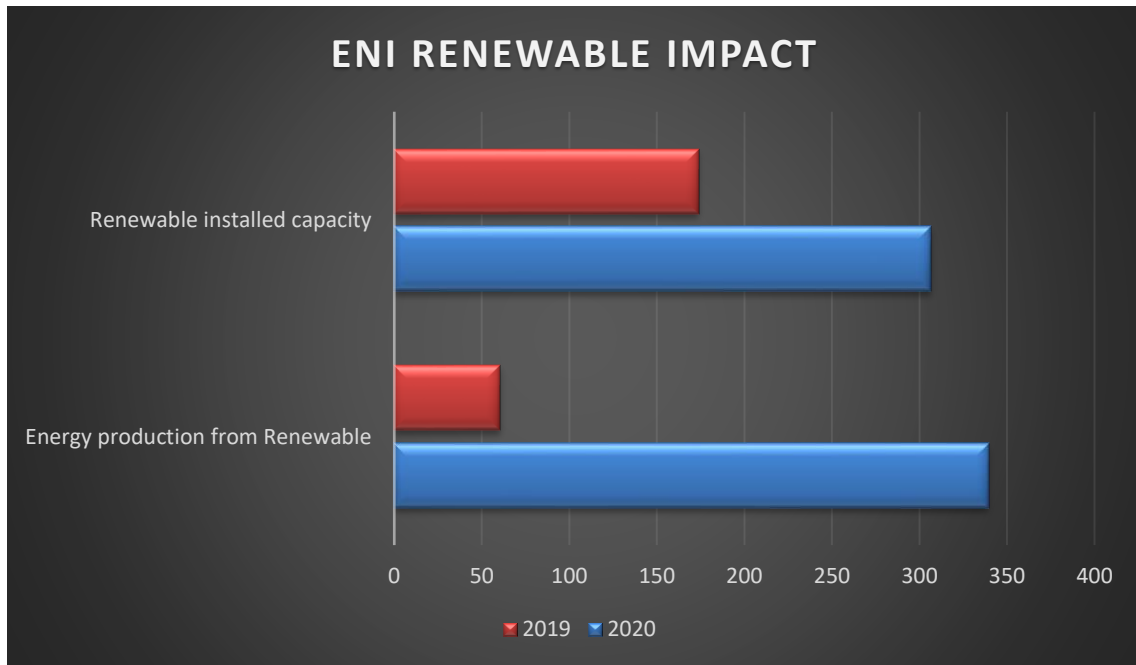
This growth, mainly due to the development of the Energy solution business unit, saw a growth in energy production from renewable sources of 460%, going from 60.6 GW / h in 2019 to 339.6 GW / h in 2020<sup>74</sup>.

Its explanation translates into the increase of the photovoltaic segments (from 60.6 in 2019 to 223.2 in 2020) and above all wind power, which goes from 0 GW / h in 2019 to 116.4 GW / h.

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<sup>74</sup> Eni 2020 annual report

The increase in energy produced is reflected in the growth in installed capacity between 2019 and 2020, i.e. growing by 76% (174 vs 307).



Representation of the installed capacity and energy produced

## ACCOUNTABILITY ASPECTS

From what was analysed it emerged how the ecological transition has influenced the business strategy of both companies.

These two large companies operating in the energy market have based a large part of their revenues and production on the exploitation of non-renewable sources, the current situation has shown how investments in the eco-sustainable field have had substantial repercussions on the environment and communities. .

As previously described, the development and exploitation of renewable energies guarantee both a lower negative impact on the environment and a substantial improvement of local communities.

For example, the creation of the wind farm in Badamasha (Kazakhstan) by Eni does not simply aim to increase the group's overall revenues but aims to guarantee the local region completely sustainable energy independence, guaranteeing clean energy. and available throughout the region.

The same thing concerns the photovoltaic park in Bir Rebaa (Algeria), as being in an underdeveloped area it guarantees access to an efficient energy source for the entire local population.

This aspect of iteration and improvement of the area in which the infrastructure is present represents the key to cooperation with the community and the possibility of creating value by enhancing the capabilities of the people and territories in Eni is present.

In fact, the human aspect represents one of the keys of Eni's corporate mission<sup>75</sup>.

This Mission, in line with the Paris climate agreements, has several objectives:

- ❖ Carbon neutrality for 2050.
- ❖ Operational excellence.
- ❖ The development alliance.

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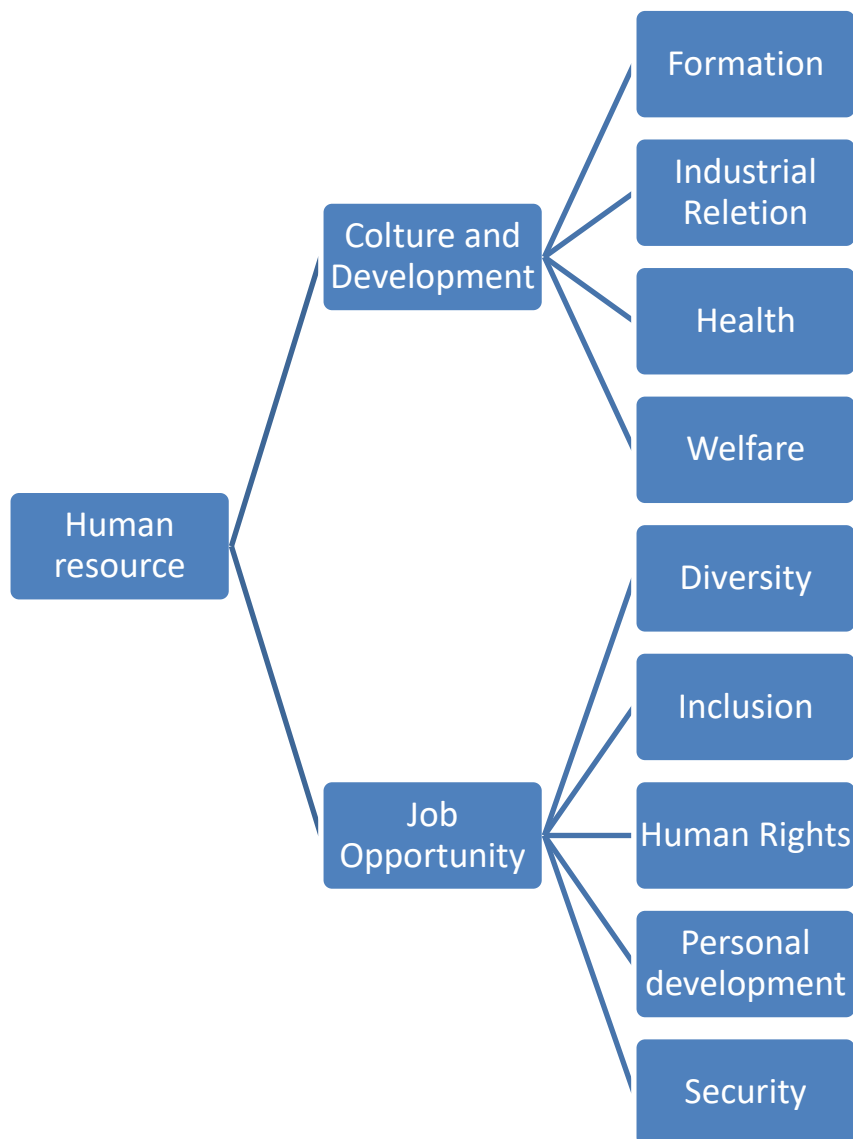
<sup>75</sup> Eni S.p.A. annual report 2020

Going into more detail, from a corporate governance responsibility point of view, the aspects of operational excellence and training for development represent the cornerstones of management.

As far as operational excellence is concerned, it is based on four objectives:

- ❖ The enhancement of people, protecting their health and safety.
- ❖ The use of different resources to reduce the environmental impact and the intensive exploitation of the territories.
- ❖ Respect for human rights, guaranteeing human rights through the creation of a healthy environment with high standards of sensitivity.
- ❖ The fight against corruption by conducting a business aimed at guaranteeing transparency, honesty, and integrity in compliance with local laws.

All these objectives reflect the importance of the concept of Diversity & Inclusion promoted by the Company, which frames the centrality of the importance of people. The scheme below represents the enhancement of the human resource through the analysis of one's own culture and the possibility of its professional growth.



Likewise, the alliance for the promotion of local development demonstrates the importance of creating synergies with the environment and the local community. This aspect of the corporate mission is based on a series of activities aimed at social and economic improvement in the area where the business operates:

- ❖ Projects for social development, through collaboration with local communities to create economic and social opportunities in accordance with local laws. This aspect is based on the improvement of living conditions, the supply of eco-sustainable electricity and the provision of services aimed at improving welfare.
- ❖ Local content, or the creation of added value through the development of skills know-how.

- ❖ Stakeholder engagement, by attracting stakeholders through the creation of a value sharing network, mutual understanding, and the correct transmission of information.
- ❖ Land Management, thanks to the efficient management of the territory, the enhancement of natural resources and the creation of eco-sustainable projects.

Likewise, Enel is focused on reducing the environmental impact and enhancing the local communities in which it has its infrastructures.

In particular, the support to local communities is not limited to the enhancement of resources for the generation of income but aims to create a profitable collaboration for both parties.

This intention of creating a profitable synergy is based on several key aspects:

- ❖ The relaunch or development of the areas in which it operates, through the creation of useful services, the development of small-medium enterprises with which it collaborates, the establishment of recovery programs and work / school training.
- ❖ The implementation of specific programs for the containment of the Covid 19 pandemic thanks to the creation of medical infrastructures and assistance services.
- ❖ Interaction with stakeholders, through knowledge of their needs, requirements, and the management of the collaboration relationship.

This last aspect is particularly important in the supply chain thanks to the guarantee of high-quality standards, a pre- and post-sales support service, the enhancement of human resources and the protection of health.

Another key aspect is the creation of a circular economy capable of reaching the highest standards in terms of competitiveness, quality, cost-effectiveness, and risk reduction.

This concept is important under three fundamental aspects:

Suppliers	Assets	Customers
<ul style="list-style-type: none"> <li>• Improve services with suppliers</li> <li>• Identification of needs</li> <li>• Establish a productive dialogue</li> </ul>	<ul style="list-style-type: none"> <li>• Significant resources for development</li> <li>• Sustainable zero impact projects</li> </ul>	<ul style="list-style-type: none"> <li>• Product / service improvement</li> <li>• Pre and post sales consultancy</li> <li>• Pre and post sales consultancy</li> </ul>

Finally, another key aspect is the centrality of people and their role both as employees in the continuation of the company result and in the enhancement of local citizenship. This represents the importance of the concept of Diversity & Inclusion, through training and awareness programs for employees, favouring the insertion of the resource and its professional growth.

Following this concept, Enel sets a series of fundamental values for the enhancement of people:

- ❖ Corporate welfare, thanks to listening desks for employees.
- ❖ Training and development programs, which despite the Covid pandemic have been guaranteed in smart-working mode.
- ❖ The guarantee of health and safety in the workplace, through the adoption of specific measures for the protection and safeguarding of people.



## CONCLUSION

As we have seen, the past two years have represented a substantial change in people's lives.

Starting from the first months of 2020, the Covid-19 pandemic has generated a block in everyday life.

Since its inception, we have become aware of scenarios that until a few years ago were essentially impossible to imagine.

Words such as lock-down, quarantine, gathering, represent terms that have become common nowadays, placing limits on interactions and personal relationships.

Man is by nature a mammal, a subject who provides parental care, which from the beginning has a particular relationship with the unborn child, as described above.

This representation gives us the fundamental importance of the need to relate to people, to develop relationships or to live in a social way, which in these two years have been limited.

This peculiarity that distinguishes us from the beginning represents a key aspect of human life, which is based on the creation of relationships and communities aimed at sharing well-being<sup>76</sup>.

At the same time, the current energy crisis, which mainly derives from an exponential increase in the human population, the wars for the control of non-renewable energy sources and the increasingly complex needs of people, demonstrate how the environment and nature are the true regulators of life on planet earth.

The resources at our disposal, their procurement and exploitation, are all reasons that the present and future generations will have to live with.

This belief generates the need to develop new projects, new ideals or at least a change in the conception of our planet, which can no longer be identified as something to be exploited at will without consequences, but rather be the right time to restore a synergy between man and nature.

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<sup>76</sup> COATSWORTH, John H. Welfare. *The American historical review*, 1996, 101.1: 1-12.

On this basis, renewable energies represented one of the reasons with which we can develop this relationship.

Water, wind, sun, terrestrial heat, are all sources that can guarantee us clean energy capable of satisfying our needs, without damaging or at least limiting the environmental impact.

Starting from this premise, which has its roots already in the early 1990s through the climate conference in Rio, it demonstrates not only the possibility but also the need to start this sustainable transition process as soon as possible.

Taking a step back, the need for sustainability is a concept that people already live with every day.

Separate collection, the increasingly progressive use of public transport (substantially decreased in 2020 but for pandemic reasons), the choice to use products and food from sustainable industries and agriculture, all represent sustainability choices with which people give their own contribution.

If, on the other hand, citizens, as part of a community, increasingly change their habits, the institutions are no less.

Of course, the pandemic has accelerated the timing of disbursement of funds to revive the economy, but it has also accelerated the start of this transition process.

The ambition of the European Union to become the first eco-sustainable zero-emission continent by 2050 represents the first great example of how we can all feel not only citizens but also people in tune with the surrounding environment.

And if this message is confirmed by the energy industry itself, we are facing an unprecedented change.

As proof of this, if companies like Enel and Eni continue to invest in all this, it means that this transition represents not only the future, but the present itself.

Indeed, as we have seen previously, the two written companies have put in place a series of projects that have changed their core business forever.

If initially Eni was born as a national hydrocarbon body, having as its core business the supply of oil, natural gas and electricity, and Enel, operating mainly in the marketing of electricity deriving from renewable sources, current climate changes have influenced their transition.

Projects such as wind farms or solar panels, the exploitation of geothermal energy, demonstrate the will to find new solutions to counter these changes and guarantee future generations a world that is still healthy and rich in resources.

This does not mean that the change will be immediate, and the consequences of these transitions will be seen over time, but this is a starting point.

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