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Are future net-zero cities our medium-term decarbonization strategy?

BY

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Glossary of Acronyms

BEA (Bilateral Environmental Agreement)

CBAM (Carbon Border Adjustment Mechanism)

C.F. (Complementary Fund)

EIT (Economies in Transition)

ET (Emissions Trading System)

ERDF (European Regional Development Fund)

ESF (European Social Fund)

FEAD (European Fund for Aid to the Most Deprived)

GND (Green New Deal)

ICT (Information and Communication Technology)

IPCC (Intergovernmental Panel on Climate Change)

MEA (Multilateral Environmental Agreement)

MFF (Multiannual Financial Framework)

NDCs (National Determined Contributions)

NGEU (Next Generation EU)

NRRP (National Recovery and Resilience Plan)

REACT-EU (Recovery Assistance for Cohesion and the Territories of Europe)

RES (Renewable Energy Sources)

RRF (Recovery and Resilience Facility)

SDGs (Sustainable Development Goals)

UNCHE (United Nations Conference on the Human Environment)

UNEP (UN Environment Programme)

UNFCCC (UN Framework Convention on Climate Change)

WCED (World Commission on the Environment and Development)

WSSD (World Summit on Sustainable Development)

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Abstract

This dissertation intends to investigate the roots of the recent history of Science and Climate Diplomacy, trying to evaluate the impact that scientific communities have had on global politics, especially when dealing with climate action. We wanted to understand when the consensus on climate change has happened and if it has pushed governments to strongly commit to this cause. The analysis proceeds with a recollection of the international agreements on climate that have occurred in the past decades, and we have tried to find the best approaches to create a dynamic, flexible, legally-binding agreement. We have decided then to specifically focus on the Paris Agreement and the European Green New Deal, not only because they represent the latest update in regards to climate diplomacy, but also because we found them to have learnt the lessons from the past. The dissertation then tries to put to the test its assumption, so that the medium-term strategy for the EU is to adopt a new approach towards urban planning. It focuses on Next Generation EU and the Italian National Recovery and Resilience Plans, trying to understand what policy areas will be tackled in the upcoming years and it concentrates on the Italian approach towards urban development. Hence, it showcases Milan, as an Italian example of a smart city, analyzing what are its strengths and weaknesses. Finally, the dissertation gives recommendations for future implementation.

Key words

Climate Diplomacy; International Agreements on Climate; EU Green New Deal; Next Generation EU; National Recovery and Resilience Plans; Green and Digital Transition; Urban Planning; Smart and Sustainable Cities.

Introduction

This dissertation begins with a brief recollection of the recent history of Western Science Diplomacy, analyzing the texts that formed an international momentum around climate change and made it clear that a political response was needed; therefore, we went through the first reports that were made in the 1970s, an era that definitely represented a watershed in global politics and that created a narrative around climate and development that was solid and scientific. Then, we decided to focus on the impact that these scientific reports made on global politics, looking at the firsts international forums and organizations that were created to support political change. In fact, we are convinced that without these reports and without this scientific evidence, the narrative around global warming and the negative and catastrophic impacts of that would have not changed. Moreover, we are also convinced that the role of Science Diplomacy and Climate Diplomacy was and still is crucial to make every country comply with the green and digital transition. After this recollection, we scrutinized the international and European policy frameworks at stake, to investigate their effectiveness: for the European side, it was clear that these investigations would focus on the European Green New Deal and Next Generation EU, directing our spotlight at the Italian Recovery and Resilience Plans. We have gone through the different missions that are part of the document, focusing especially on three of them that would have given us an idea of the Italian approach towards urban planning. The thesis then focuses on the concept and current implementation of *smart cities*, trying to cope with the fragmented terminology: this decision was made because the core idea of this dissertation is to find out whether smart cities can represent a useful tool to implement the GND targets and whether a bottom-up approach to embark on these transitions could be better than a top-down approach. Therefore, we analyzed the literature available on such matter and tried to come up with a definition that suits the world we live in and the capacities within cities to react to the current challenges: in our opinion, smartness cannot be measured by the number of ICT that is involved but also by the purpose and the benefits that society can reap from it. In conclusion, we decided to look for Italian implementations of smart cities, focusing on the most successful best practices, that we found in Milan. We showcased a successful collaboration between different stakeholders and policymakers in order to create energy communities in Lombardy. We found this case to be very interesting because energy communities can become an effective tool for climate actions.

Methodology

The methodology used for this qualitative research is the following: we have had different assumptions for each chapter and we have tested their validity, through a deep analysis of the literature available. For the first chapter, our assumption was that: starting from the 1970s climate scientists and system scientists started to issue reports that slowly began to inform policy-makers and finally entered international political fora; because of the role that scientific communities played, climate change and its related negative impacts began to be considered as a crucial problem that global politics had to face. We have proved that this role was crucial not only to open discussions related to climate change to the general public, but it definitely shaped global politics from then on, as we have outlined the rate at which multilateral and bilateral agreements were signed.

For the second chapter, we have put to the test our second assumption, which was actually more difficult to prove right or wrong because we found a gap in the current literature; the assumption is that since the most polluting sectors (notably agriculture, international aviation and shipping) are the ones where we do not already have the disruptive technologies to use for their transition, the Green New Deal will largely focus on creating a new path for urban planning while pushing for research and innovation. In order to test this second assumption, we relied mostly on the text of the GND and we analyzed EU urban strategies that were already in place even before the GND.

In the last chapter, we could not prove yet the results of the Italian's Recovery and Resilience National Plans, since they have been submitted only in 2021. Furthermore, we decided to investigate the Italian approach towards smart cities, since we have selected them as the tool for the GND implementation.

Chapter 1: Why the time is now? A recollection of scientific reports and international policy frameworks.

1.1 The importance of scientific reports in informing policy-makers on environmental challenges.

In April 1968, thirty professionals from all walks of life gathered together at the Accademia dei Lincei, in Rome. That was the first meeting that would have birthed the famous Club of Rome: an informal international association with the purpose of bringing to the attention of policymakers and the general public the timely issues of the whole mankind, like environmental degradation, poverty, endemic illnesses, and economic stagnation. One of the most distinctive characteristics of the Club of Rome's approach to such matters was that they looked at these different issues with a holistic approach: in fact, they thought that the only way to solve them was integrating them. After a series of meetings, the Club of Rome's members decided to develop a research which culminated then in the "Project on the Predicament of the Mankind", investigating the so-called *world problematique*.

The project intended to analyze not only the characteristics of a diverse set of problems that limit growth on this planet (population, agricultural production, use of natural resources, pollution, and industrial production) but also to dig down and tackle their deep interrelationships in order to find effective responses. In their opinion, exponential growth was the common problem that permeated all fields of life: energy consumption, food and material production, population. All these factors relate to a specific field, but they do interact with one another and they all have limits. One useful example to that could be found in Donella Meadows' original memoir, is a paragraph where she describes the first stage of the research[1]. In this passage, she describes how the systems scientist, Mr. Jay Forrester, had his "eureka moment" and found out how much every system interact with another; he explained to the group that, for instance, an increase in the food production rate brings along more land and energy use, determining limits to these systems and more pollution. We can see in the following graph, as the Club of Rome outlined in the book *Limits to Growth,* that the statistics used for the W3 modeling indicate a massive decrease in resources, food per capita, and population.

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[1] Meadows, D. H., & Meadows, D. (2007). The history and conclusions of The Limits to Growth. *System Dynamics Review: The Journal of the System Dynamics Society*, *23*(2-3), p.193.
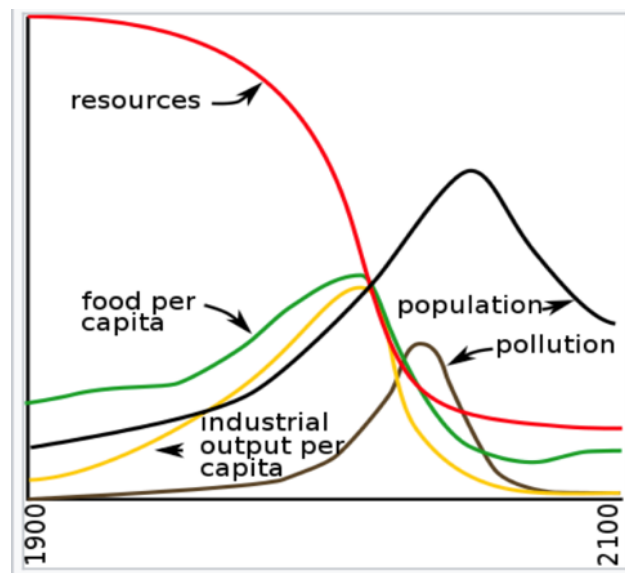
In fact, the first symptoms of today's global crisis appeared at the beginning of the 20th century[2]. Some exceptional philosophers of the time such as Nikolai Berdiaiev, Oswald Spengler, Erich Fromm, repeatedly tried to shed a light on the critical issues of our modern societies and raise public awareness, by using a holistic and comprehensive approach. For instance, Erich Fromm worked on the social and political crisis of modern ages, and eventually found out that the two crises could not be analyzed separately, but needed to be combined together to offer a comprehensive solution for our societies[3].

However, these studies that intended to investigate the nature of modern times were interrupted by the two vicious World Wars which crushed the entire first half of the 20th century. Those events created a huge turmoil that displaced the interests and concerns of humanity, identifying them as "secondary issues". After the World War II, the economic boom and the arms race escalated, accompanied by a thoughtless waste of resources and more environmental destruction. Furthermore, the post-war decades sustained a series of atomic weapon tests in the atmosphere alongside an outstanding and hazardous development of the chemical industry, including the production of polymeric materials, fertilizers, and chemical pesticides in the agricultural sector. This is why it came with no surprise the fact that the international community, in the 1960s, began to be aware of the environmental pollution problem and started to understand the need to protect wild nature[4].

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[2] To name few examples of ecological crises: the Rongelap nuclear fallout (1954); the Mercury crisis of Minamata (1956); the Torrey Canyon oil spill (1957); the Seveso disaster (1976); the Bhopal disaster (1984): the Chernobyl nuclear disaster (1986); the Exxon Valdez oil spill (1989); the Erika disaster (1999).

[3] Alavipour, S., Nematpour, A. (2009). *The Psycho-political: Erich Fromm and the Crisis in Modern Society*.

[4] Danillov-Danil'yan V. I., Losev K. S., Reyf I. E., (2009). Sustainable Development and the Limitation of Growth. *Springer Praxis Books*. Springer, Berlin, Heidelberg, pp. 83-87.

Combining the importance of a comprehensive and holistic approach to tackle the problems related to resource management, economic and population growth, together with an environmental and sustainable approach, the Club of Rome decided to write its report on the human predicament. In their vision, these problems were not being dealt with by policymakers or really taken into consideration by the general public due to their lack of awareness of the interdependency of such matters and especially the direct impacts on their daily lives. In fact, they discovered that both policymakers and citizens shared the same attitude towards the future: due to their day to day struggles, the majority of them would care only about the private matter in the short time, as their graph on human perspective shows[5].
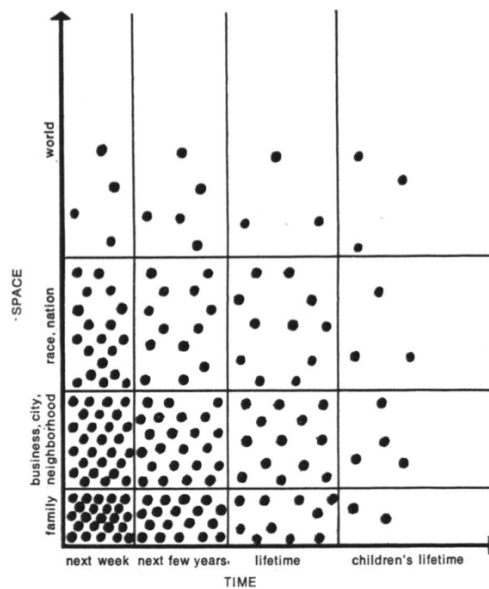
This graph demonstrates that even if the world's perspectives may vary over time and space, the majority of people are concerned with might influence their daily lives or the friends and family's ones and over a short period of time: the minority of them would be involved in city or nation's dilemmas; a very small portion of them would be interested in global problems in the far future. These dissimilar levels of the human perspective on the importance to tackle global issues vary, nevertheless the rate of goods' consumption, industrialization, pollution, and populations' growth increased and needed to be brought under control so that every individuals' needs and global well-being are respected and preserved.

Another factor that made the Club of Rome investigate these issues and find a model to clearly illustrate them to both policymakers and the general public was the fact that decision-makers would never be able to take into account all the worldly and future possibilities: the human brain would have never been able to decipher every information and develop a mental

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[5] Behrens W.W., Meadows D. H., Meadows D. L., Randers J., (1972). The Limits to Growth: A report for the Club of Rome's projection and predicament of mankind. *Universe Books,* New York, p. 19.

model capable of interpreting every complex bit of information. In fact, the human brain can only keep track of a limited number of simultaneous and complex information: they needed a reliable written model. This is why they created a computer-based model of assessment, which could substitute the human shortcomings and replace them with long-lasting development analyses, including five major global concerns: accelerating industrialization, rapid population growth, widespread malnutrition, depletion of nonrenewable resources, and deteriorating environment[6]. The value of this formal model was its vast horizon and the fact that its information could be added at any time: it was the first time that predictions could have been made far out on the space-time graph and that every bit of information could be registered in a formal fashion that would have been easily read and share with others, notably policy and decision-makers.

Their final conclusions made clear that: the rate of growth in world population, food production, pollution, and resource consumption was appallingly increasing in contrast to the "Earth's capacity", so much than within a time-span of a century both world population and industrial capacity would have collapsed uncontrollably and suddenly. Nevertheless, their findings outlined the fact that a change towards a sustainable growth model, that would have allowed the world population to survive and thrive far into the future, was still possible but would have required policymakers to change their approach to growth and resource management, making it more sustainable and forward-looking. With this book, they were trying to show that another strategy for a healthier development was feasible and the only aim they had in mind was to challenge policymakers and societies to strive for a society that was not only about economic growth, but that would have fought for material sufficiency, socially equitability, and ecologically sustainability.

Nevertheless, even if in some cases the book made a positive impact and urged others to embark on this sustainable journey, for the most it made scientific communities, industrialists, and politicians (both left and right-winged parties) very skeptical and distrustful towards these findings, so much that even the authors were shocked by the intensity of the responses[7]. Moreover, Donella Meadows said that the reaction that the book provoked was not imaginable both when it came to their supporters as well as detractors: the message and the aim of the researchers was to shed a light on the fact that our planet has limits and that it cannot sustain exponential physical growth for a long time.

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[6] Ibid.; p. 21.
[7] Meadows, D. H., & Meadows, D. (2007). The history and conclusions of The Limits to Growth. *System Dynamics Review: The Journal of the System Dynamics Society*, *23*(2-3), pp. 194-195.

However, many found the book to be catastrophic and theatrical, as Robert Gillette stated in his review in March 1972[8]: he argued that the book represented just a "fascinating example of model-making", where all the equations taken into account were not shown and visible to the public, making it a tautological text rather than an open text and that the economic assumptions were vague and with no value for the real world[9]. Even if its detractors marked this book as a *doomsday prophecy that did not hold up the scrutiny[10],* it paved the way for the advancement of sustainability studies and made people and decision-makers start reflecting on the precautionary principle of promoting prevention when still possible. The implementation of this principle would have meant for future generations to be protected from the environmental and health risks determined by the hazardous and massive rate of production and consumption[11]. As we outlined in the previous pages, this principle came about in the late 1960s as a reaction against the unsustainable growth rate and shaped the themes related to ecology, efficient resource management and human activities, forming the first waves of "green-thinking", as also pointed out by A. Bramwell in her study on the ecological movements of the twentieth century[12].

In fact, between 1965 and 1975 plenty of books and researches started to appear and fill every library and bookshops' shelves, dealing with the topic of sustaining civilization. Another milestone was reached in this field by Barbara Ward and René Dubos with their *Only One Earth: The Care and Maintenance of a Small Planet,* a report written for the UN Stockholm Conference on the Human Environment, in 1972. This report was commissioned by the secretary-general of the UN Conference on the Human Environment, Maurice Strong, and prepared with a committee composed of 152 members, representing 58 countries. Just by acknowledging the effort put by the authors to reach as many countries as possible, we can understand how much the authors valued the different responses and a global approach towards environmental issues, trying to make all the parties understand the "planetary interdependence" and not a "hard inescapable scientific fact"[13]. Therefore, the core sections of the report pointed

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[8] Gillette R., (1972). The Limits to Growth: Hard Sell for a Computer View of Doomsday. *Science*, Vol. 175, Issue 4026, pp. 1088-1092.

[9] For a more comprehensive view on the critics of *Limits to Growth*, we could divide its detractors into three groups: a) the ones who found the research to be incomplete and substantially a rediscovery of already famous computer science researches (P. Passel, M. Roberts and L. Ross in 2/04/1972, *New York Times*); b) a group of researchers at the Science Policy Research Unit at the University of Sussex published in 1973 a book called *Thinking about the Future; A Critique of The Limits to Growth*, published in the U.S. as *Models of Doom:* in this book they argued that the methodology used and their projections were faulty and too pessimistic; c) academics, economists and business-people, who did not agree on the exponential and limitless growth of the economy, like H. C. Wallich did.

[10] Nørgård, J. S., Peet J., Ragnarsdóttir K. V. (March 2010). The History of Limits to Growth. *The Solutions Journal*. 1 (2), pp. 59–63.

[11] Hanekamp, J. C., Vera-Navas, G., & Verstegen, S. W. (2005). The historical roots of precautionary thinking: the cultural-ecological critique and 'The Limits to Growth'. *Journal of Risk Research*, 8(4), p. 295.

[12] Bramwell A., (1989). Ecology in the 20th Century: A History. *Yale University Press,* Vol. 10, Issue 2.

[13] Dubos R., Ward B., (1972). Only One Earth. *Andre Deutsch Ltd.*

out the importance of collaboration and unity among nations to fight environmental degradation, taking into account the disparities between developed and developing countries. The Stockholm Conference was one of the first international stages that raised global awareness on the protection of the environment and promoted the creation of environment ministries and agencies, linking human societies to nature[14]. A clear example of the huge impact that this Conference had is the creation of a special body, inside the UN Secretariat, called the UN Environment Programme (UNEP)[15]. This report represented also the foundation on which the UN Conference on the Human Environment (UNCHE) built its declaration, which then became the hallmark of environmental politics[16]. Its principles laid down a set of norms, which can be summed up as follows: a) information and knowledge are the tools that help us respond to environmental crises; b) individuals from all walks of life (i.e. citizens, communities, institutions, and private companies) are required to participate in this fight; c) local and regional governments will bear the burden of adapting or changing their jurisdiction in order to counteract the great set of environmental problems; d) extensive cooperation between nations is needed; e) this indispensable international cooperation is needed also to support the developing countries to make them live up to their responsibility[17].

The increasing emergence of environmental issues and the importance of the UN Conference made a significant impact in international politics and showed that those were international concerns that needed an international forum to develop common ground rules to counteract these dangerous phenomena. In addition to that, social movements played a great role in the late 1960s and early 1970s through their protests and the creation of some of the most famous international environmental NGOs: WWF in 1961, Friends of the Earth in 1969, and Greenpeace in 1971. Following the UN Conference in 1972, several international environmental agreements were stipulated between developed countries, signaling increased importance given to the environment after that the Conference created a set of environmental international norms. Ronald B. Mitchell collected the evolution of bilateral (BEA) and multilateral (MEA) environmental agreements since the 19th century. His project highlighted the flourishing of international environmental agreements after the UN Conference in Stockholm and how much the creation of its hallmark principles gave structure for future international forums. Nevertheless, even if environmental politics and laws have vastly

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[14] Meyer J. W., Frank D. J., Hironaka A., Schofer E., and Tuma N. B., (1997). The structuring of a world environmental regime. *International Organization*, p. 62

[15] The United Nations Environment Programme (UNEP) was also crucial, together with the World Meteorological Organization (WMO), for the creation of the International Panel on Climate Change (IPCC), an international panel set up to provide governments with scientific information to draft climate policies.

[16] Schachter, O. (1991). The Emergence of International Environmental Law. *Journal of International Affairs* 44(2), pp. 457–493.

[17] UNCHE, (1972). *Stockholm Declaration*. Geneva: United Nations Conference on Human Environment.

expanded, they lacked depth, effective implementation schemes and they could not attract developing countries to participate de facto even in theoretical and behavioral patterns towards sustainable development. Here we can have a look at the data gathered in Mitchell's *International Environmental Agreements Database Project*[18]:
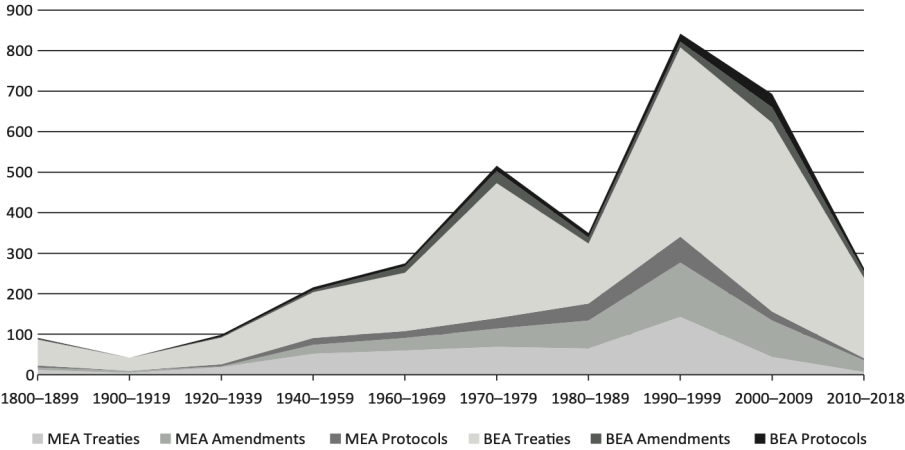
Figure 85.1   Multilateral (MEA) and bilateral (BEA) environmental agreements 1800–2018

In addition to Mitchell's data gathering of the increased level of multilateral and bilateral environmental agreements, we could also have a look at this chart, created to support a study on the world environmental regime[19]:
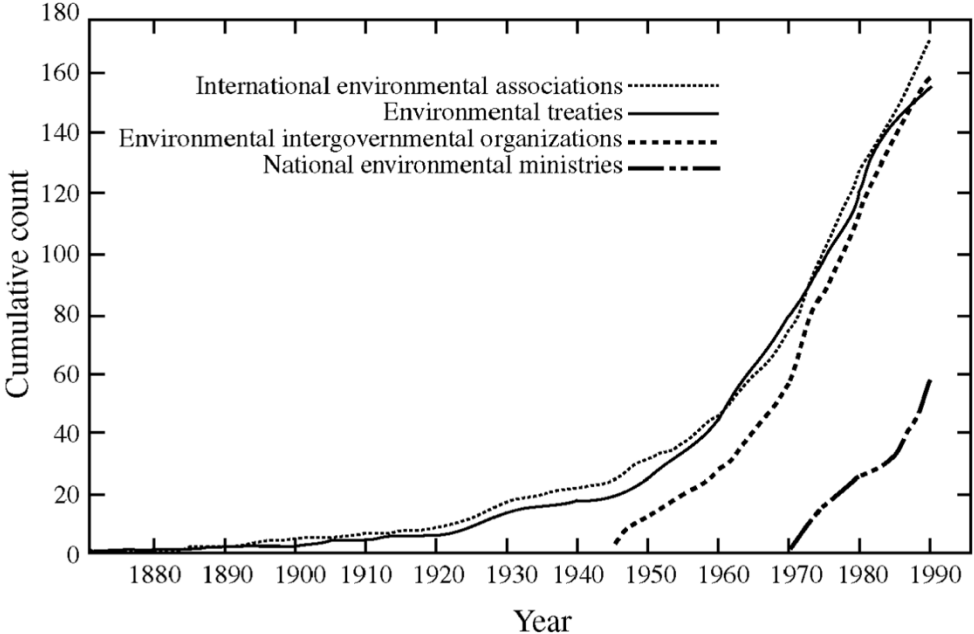
[18] Mitchell, R.B. (2002–2018). *International Environmental Agreements Database Project.*
[19] Meyer, J., Frank, D., Hironaka, A., Schofer, E., & Tuma, N. (1997). The Structuring of a World Environmental Regime, 1870–1990. *International Organization, 51*(4), p. 635.

After these first investigations around environmental issues and growth paths increased in developed countries, which started to set norms and create international forums where they could discuss these problems and engage with international scientific communities to tackle them, it was clear that, in order to fight environmental degradation and the negative effects of climate change, developed countries should have strengthened their efforts to make developing countries part of the conversation. Addressing development and growth models without shying away from the environmental concerns was the precise task requested from the UN Secretary General Pérez in 1983 to the Norwegian Prime Minister Gro Harlem Brundtland. In fact, he asked her to set up an organization independent of the UN, to analyze environmental and developmental issues and find feasible solutions to them: the World Commission on Environment and Development (WCED), also called the "Brundtland Commission". This Commission came about to complete the work done by the independent Brandt Commission (1980), and create an international community united by common environmental and development concerns. Their report, called *Our Common Future*, made a great impact especially in regards to the analyses related to sustainable development, a term that was coined by them. This concept can be best described by the Brundtland Commission itself as a "development that meets the needs of the present without compromising the ability of future generations to meet their own needs"[20].

Similar to *Limits to Growth*, the World Commission on Environment and Development aimed to push for the type of economic growth that still would have protected the environment, while asking developed countries to alleviate the state of poverty of developing countries and create redistributive policies to help them increase their per capita income of at least 3%. Our Common Future laid down the foundation for the Earth Summit, the Rio Declaration, the 21 Agenda, and the creation of the UN Commission on Sustainable Development, accelerating the evolution of international environmental agreements and policies into what O'Neil has called a *meta-regime*[21]. This "environmental meta-regime" is a term that describes a macro-level approach to the evolving governance architecture through its norms, principles, decision-making procedures, and actor roles: a regime that would have replaced a horizontal diffusionism of environmental protection norms executed by different stake-holder, with a vertical institutionalism[22]. Furthermore, we can see a strong increase in the creation of international environmental organizations and an intensified participation of governments just by looking at some figures: at the Earth Summit in 1992, 178 states participated alongside 1.420 NGOs

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[20] WCED (1987). Our Common Future. Brundtland Report. *Oxford University Press*.
[21] O'Neill, K. (2007). From Stockholm to Johannesburg and beyond: The Evolving Meta-Regime for Global Environmental Governance. Paper presented at the *2007 Amsterdam Conference on the Human Dimensions of Global Environmental Change*, May 24–26 2007.
[22] Voituriez, T. (2020). Environmental Changes. In Dirk Berg-Schlosser, Bertrand, Badie,V. 3, p. 1449.

(compared to the 255 NGOs which attended the Stockholm Conference)[23]. The Rio Declaration was built on the Brundtland definition of sustainable development and put it at the core of its Agenda 21, assuming that more growth could have been feasible only by respecting the global environment. Even though this Summit was not able to further legally binding agreements between negotiators on a forest treaty, it opened two conventions for signature: the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity. In addition to that, three major international treaties were signed: the UN Framework Convention on Climate Changes (UNFCCC), the UN Convention on Biodiversity (CBD), and the UN Convention on desertification. The Earth Summit established a new path in political, military, and economic social systems, making environmental protection another important asset for governments; it also created a forum in which states could access information and share expertise to drive the change[24], showing that the transition towards a sustainable development model would have been a constant learning process, with no pre-structured path to follow. Agenda 21 was set up to fill this gap and shed a light on the areas that needed to be tackled in its 500 pages long document: outlining healthy practices and directions to lead governments towards a more sustainable growth model. Its areas of interest were in fact: sustainable economic growth, better management of natural resources, attention to a healthy human settlement, biodiversity, and quality of life. Another layer added to these new features and Convention on climate change was the creation of the "Major Groups"[25], formalized by the Agenda 21: those were nine societal categories picked to create multi-stakeholder participation to the UN activities related to sustainable development. This feature shows us a more inclusive attitude within international forums and their willingness to increase representation and participation in the decision-making processes. The legacy of the Rio Summit is something that we will analyze in the next pages, but for now, we would say that this Summit definitely represented a watershed in environmental governance because it tried to bring about vertical motions (thanks to the creation and stipulation of protocols and conventions) and add depth to the horizontal diffusion of environmental awareness that we have recollected at the beginning of the chapter.

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[23] Dauvergne, P. (2005). Globalization and the environment. *Global political economy*, pp. 377-378.
[24] Frank, D.J. (1997). Science, Nature, and the Globalization of the Environment, 1870– 1990. *Social Forces,* pp. 409–435.
[25] The "Major Groups" were: women; children; indigenous people; NGOs; local authorities; workers and trade unions; business and industry; scientific and technological communities; farmers.

1.2 Global Environmental Politics after the Rio Summit.

The Rio Summit was centered around the concept of sustainable development and because of that and the vast high-profile participation, it managed to integrate environmental issues in governments' agendas for the first time. Nevertheless, it did not manage to give guidance to governments that were not capable of turn their development model into a sustainable one: this lack of guidance in the implementation processes (both for developed and developing countries) was very criticized by all sides. Critics argued that the promised funds of Northern countries were not enough to implement Agenda 21; more radical environmentalists attacked the Brundtland definition of sustainable development that aimed at more economic growth and industrialization; some others raised the issue that negotiators kept ignoring the root cause of climate change, which was due to historical inequalities, overconsumption and unsustainable production of Northern countries. For all these reasons the outcomes of Agenda 21 were little and ineffective[26].

Unfortunately, the decade after the Rio conference saw global environmental commitments slip down governments' agendas, which started to focus again on terrorism, financial crises, and chemical and biological warfare[27]. To give a brief recollection of the conventions opened for signatures in that decade, we can have a look at this chart, made by Dauvergne[28]:

Name of the agreement	Opened for signature	Entered into force
International Convention for the Regulation of Whaling	1946	1948
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar)	1971	1975
Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter (London Convention)	1972	1975
Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES)	1973	1975
Convention on the Conservation of Antarctic Marine Living Resources	1980	1982, as part of the Antarctic Treaty System
Montreal Protocol on Substances that Deplete the Ozone Layer	1987	1989
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	1989	1992
Convention on Biological Diversity	1992	1993
United Nations Convention on the Law of the Sea (LOS)	1982	1994
United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	1994	1996
Kyoto Protocol to the United Nations Framework Convention on Climate Change	1998	Not in force as of July 2004
Stockholm Convention on Persistent Organic Pollutants (POPs)	2001	2004

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[26] Chatterjee, P. and Finger, M. (2014). *The earth brokers: power, politics and world development*. Routledge.
[27] Dauvergne, P. (2005). Globalization and the environment. *Global political economy*, p. 378.
[28] Ibid., p. 379.

As we can see from the chart, the global community tried to keep tackling environmental issues and part of the global political conversation, but it was only able to endorse conventions, rather than legally-binding contracts or protocols. This particular asset tells us something about 1990s' global environmental politics: while governments started integrating environmental issues in the growth equation, they struggled to create an effective policy framework, capable of implementing environmental actions. In conclusion, we could say that -on one hand- the Brundtland Report and the Rio Summit helped the concept of sustainable development acquire a political and historical momentum "through a rising public concern in the developed countries over the new and alarming phenomenon of global environmental change, and in some ways, it replaced fears of nuclear war that had prevailed in the early 1980's"[29]. On the other hand, these historic events did not pave the way for a turnover in governments' growth paths or for legally binding commitments.

In 1997, the Kyoto Conference on climate change took place, with the aim of operationalizing the UNFCCC's objective[30]: in order to do that, developed countries and economies in transition (EIT) agreed to cut their emissions of GHGs. This agreement resulted in a general framework, which then became known as the Kyoto Protocol. The Kyoto Protocol was adopted in 1997 during the Third Conference of Parties to the Framework Convention on Climate Change (COP-3 of the FCCC); it entered into force only in 2005, but it was never ratified. The protocol defined different commitments for Annex I countries (developed countries and nations with economies in transition), Annex II countries, and non-Annex I countries (developing countries). In addition to this differentiated approach between the countries, Annex I countries committed themselves to a mandatory cut of their emissions of 5.2% vis à vis their rate of 1990s' emissions; within this category, there was another division between the parties, according to the so-called "Assigned Amounts" (AA). Other Parties to the UNFCCC and the Kyoto Protocol, notably developing countries, were not obliged to cut their emissions. The protocol provided several instruments to help signatories achieve their targets and foster sustainable development: a) through technology and infrastructure investments and transfers (Clean Development Mechanism); b) the use of natural processes in order to help signatories remove GHGs from the atmosphere ("carbon sinks"); c) assistance of Annex II parties to achieve their targets through cost-efficient means (Joint Implementation); d) an

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[29] Vogler, J., (2007). The international politics of sustainable development, *Handbook of Sustainable Development*, Edward Elgar Publishing Limited, Cheltenham, p. 435.
[30] We would say again that the main objective of the UN Convention on Climate Change is to commit countries to cut their CO2 emissions, since scientific reports have clearly demonstrated that global warming is occurring and that is human-made and driven by CO2 emissions (Art. 2 of the Kyoto Protocol).

emissions trading system (ET) that allows countries to have spare emission units and to sell their excess capacity to other countries[31].

The complexity of the negotiations and the Common but Differentiated Responsibility principle, which means that every signatory country must commit itself to fight global environmental destruction but yet each of them does not share responsibilities equitably, created confusion and lowered countries' compliance to the protocol. Those are the main reasons why even though 84 countries signed the Kyoto Protocol and intended to ratify it, many others were reluctant or vocally against it. Moreover, although the Kyoto Protocol still represents a landmark in Climate Diplomacy, its success -in compliant countries- was little and not really detectable, since the world's largest emitters of GHGs were not bound by the Kyoto Protocol: the U.S. did not ratify the protocol, and China was still considered as a developing country. In addition to these causes, we would argue that the top-down approach that characterized the Kyoto Protocol was doomed to fail, or at least very unlikely to succeed. In fact, while the merits of the UNFCCC of becoming the main international forum for a global debate on climate change and it was crucial for the creation of what we have called the "climate regime", its UN-led arena for climate negotiations did not meet the expectations and was not able to provide an effective impact. This top-down approach and the importance given to the UN as a negotiator, with its consensus-based system, could not meet different needs of different countries, whose capacity, agency, level of economic development, and reliance on third countries' fossil fuels differed from one another[32].

Another step towards the implementation of the concept of sustainable development was taken in 2000, at the Millennium Summit held in New York. There, leaders from all over the world agreed on the Millennium Development Goals with the aim of reducing extreme poverty while setting out time-bound targets to achieve by 2015. The main document, adopted by every country, was the Millennium Declaration, which set the principle and objectives of the upcoming twenty-first century. These objectives involved: peace, security, and disarmament; development and poverty eradication; environmental protection; end of extreme poverty[33]. The world leaders agreed on the fact that globalization could not increase inequality, but should make everyone benefit from it. Moreover, its overall aim was to work on the three pillars that constituted the concept of sustainable development, which were; economy, societal problems, and environmental protection. In fact, they recognized that these three pillars should be tackled together and not separately, because of their common origins and repercussions. Unfortunately,

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[31] Bollen, J., Gielen, A., and Timmer, H. Compliance with the Kyoto Protocol: Macroeconomics of emissions trading joint implementation, and the clean development mechanism. *OECD Report*.
[32] Leal-Arcas, R., (2011). Top-Down Versus Bottom-Up Approaches for Climate Change Negotiations: An Analysis.
[33] UN, Resolution adopted by the General Assembly, (2000). United Nations Millennium Declaration.

once again their implementation and governments' level of commitment to tackling these issues were not enough to meet the expectation, because world politics could convene together on these issues but was not able to then build strategic cooperation and find real-world solutions[34].

The World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002 was a landmark in regards to the involvement of businesses, NGOs, and governments to fight global warming, climate change, health, and poverty. This Summit provided the opportunity for businesses to be integrated in international discussions on global issues, reaffirming -in the Johannesburg Declaration on Sustainable Development- the importance of the Millennium Goals and complementing them with new ones, like: access to basic sanitation, biodiversity loss, lower the negative impacts of chemicals. Similar to the official documents of the Stockholm and Rio Summit, the Johannesburg Declaration called for global sustainability and proposed non-binding targets to meet. The added values of the latter were: a deeper reflection on the impact of globalization on the Earth and humankind; more specific time-frames within which governments had to meet these goals. For some authors, the Summit was seen as a "progress in moving the concept [of sustainable development] toward a more productive exploration of the relationship between economic development and environmental quality"[35]. These supporters valued the continuity across Stockholm, the Rio, and the Johannesburg Summits, which placed the concept of sustainable development as the core organizing idea for global and national environmental action. Whereas, detractors criticized its lack of depth and guidance in the implementation process of these targets, set up to mitigate the negative ecological impacts of globalization (e.g. overproduction, overconsumption, etc...). Overall, we could say that the Johannesburg Summit confirmed the same trend, which appeared – as we have seen at the beginning of the chapter – in 1992 at the Earth Summit: one of increasing importance given to socio-economic pillars of the concept "sustainable development". It seems that, following all the conferences held from 1972 to 2002, we can see a shift in the political discourse. Starting our analysis from the 1972 Stockholm Conference we can notice a primary emphasis put on environmental issues, based on scientific evidence; then this same emphasis put on a shared focus on the three pillars of sustainable development at the Rio de Janeiro Earth Summit in 1992; a differentiated approach towards it, depending on the status of a country, with the Kyoto Protocol in 1997; a shift in governments' priorities, which arguably focused on poverty alleviation at the Millennium Summit in 2000 and at the Johannesburg World Summit

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34Gorbachev, M. (2006). A New Glasnost for Global Sustainability. In *The Future of Sustainability*, pp. 153-160. Springer, Dordrecht.

35 Asefa, S., (2005). The Concept of Sustainable Development: An Introduction. In *The Economics of Sustainable Development*, W.E. Upjohn Institute for Employment Research, Michigan, p.1.

in 2002[36]. We would argue that this apparent change in governments' priorities does not essentially mean that environmental protection has become marginal *de facto*. We would say that it is rather the opposite: what has started as a call to protect the environment in order to allow human development to grow, has then become a specific call to put the well-being of peoples and nature as the center of world politics.

1.3 International and European Policy Frameworks.

In the previous pages, we have tried to give readers a brief recollection of the history of Science Diplomacy and Climate Diplomacy, and we have also tried to highlight the fact that, thanks to scientific communities and international forums like the IPCC, we have witnessed the creation of the so-called climate regime. We have also tried to make a link between the increased number of global debates on climate change and the increased number of multilateral and bilateral agreements: for the latter, we have also tried to understand what went wrong, outlining the importance of a mixed approach between a top-down and a bottom-up one. This mixture would mean that there is an international or supra-national actor that has to provide a forum where governments are informed by international scientific communities on global climate change-related issues but the targets set in the agreements signed would not be enforced in the same way in every signatory country, but according to their capacities. This approach, in our vision, is more successful when it comes to diplomacy because it enables statesmen to find compromises in the inevitable conflict between domestic politics and international imperatives[37]. Another lesson learned from the previous agreement was to collaborate on a text that would result in an ambitious, hybrid, flexible and universal agreement. The outcomes of the 21st Conference of the Parties (COP-21) to the UNFCCC were successful and resulted in the Paris Agreement, what we would call a hybrid, flexible and universal agreement on climate. On this occasion, the lessons that we have outlined previously were taken into consideration and governments understood that domestic politics would shape a new narrative on climate change and build a new global climate regime. When we argue that the Paris Agreement is a watershed in international climate policy, that is because, for the first time, countries were able to set their own targets for climate change mitigation strategies, and their own voluntary pledges with the intention of increasing their level of ambition every five years[38]. This approach that can be called a "naming and shaming" process, coupled up with what is called the "reflexivity

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[36] Paul, B. D. (2008). A history of the concept of sustainable development: literature review. *The Annals of the University of Oradea, Economic Sciences Series*, *17*(2), p. 579.

[37] Putnam, R. (1988). Diplomacy and Domestic Politics: The Logic of Two-Level Games. *International Organization, 42*(3), 427-460.

[38] Falkner, R. (2016). The Paris Agreement and the new logic of international climate politics. *International Affairs*, *92*(5), 1107-1125.

principle" in social theories, will hopefully let us achieve globally the overall target of limiting global warming well below 2°C, while pushing for 1.5°C vis à vis pre-industrial levels of pollution[39]. It avoids distributional conflicts, managing to remove one of the biggest barriers to international climate cooperation that we have seen, on the contrary, with the Kyoto Protocol. This system of National Determined Contributions (NDCs) enables countries to set their own targets and at their own pace, but nevertheless, it holds them accountable, because of their integration in an international community that provides also monitoring systems.

Nevertheless, it is still unclear whether the treaty will be capable of delivering on this timely challenge to decarbonize the global economy. Our recent history shows that governments have a tendency to avoid disruptive changes and usually aim for "business as usual strategies", which nowadays are no longer an option. The global 2030 NDCs will individually aim to cut emissions, adopting a not ambitious target of five effort-sharing allocations in a well-below 2 °C-scenario. If we extend this bottom-up aggregation of equity, these efforts might result in median warming of 2.3°C by 2100. Only if each country's objective will be tightened to aspirational levels of 1.1°C or 1.3°C, then we might accomplish the safest targets of 1.5°C[40]. As we can see in this assessment of the Paris Agreement's bottom-up approach[41]:

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[39] See NASA's series of reports and projections, called "A degree of concerns: Why global temperatures matter", that analyse why these targets were set for the Paris Agreement (in Art. 2, 1(a)): https://climate.nasa.gov/news/2878/a-degree-of-concern-why-global-temperatures-matter/ https://climate.nasa.gov/news/2865/a-degree-of-concern-why-global-temperatures-matter/. See also the 2018 IPCC Report, called "Global Warming of 1.5°C": https://www.ipcc.ch/sr15/.
[40] du Pont, Y. R., & Meinshausen, M. (2018). Warming assessment of the bottom-up Paris Agreement emissions pledges. *Nature communications*, *9*(1), 1-10.
[41] Ibid., p. 3.

a   'Bottom-up' allocation

b   'Hybrid' allocation
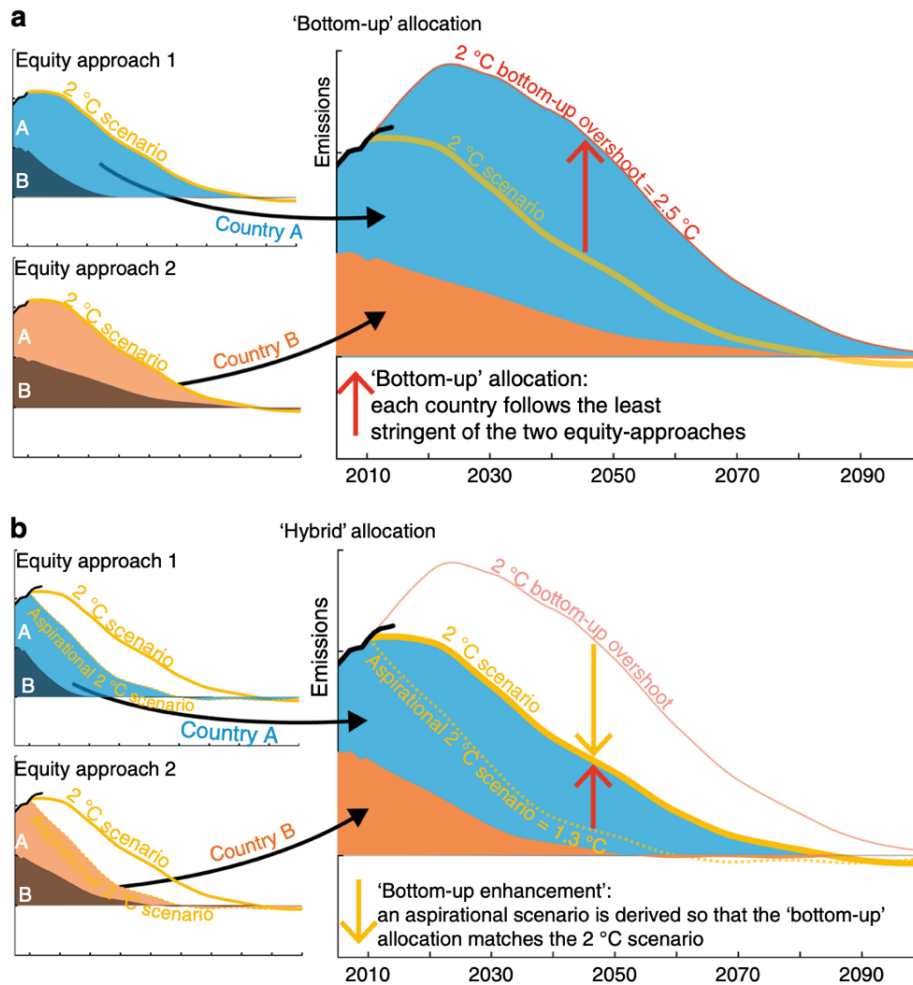
because of the bottom-up allocation, each country adopts an ineffective equity approach that results in exceeding the targeted 2°C scenarios; **b)** an aspirational scenario enables countries to overshoot under the bottom-up allocation, matching their original 2 °C scenarios, collectively. In addition to that, we would conclude that for the Paris Agreement to make a difference, and really be a watershed in international climate policies, its logic of "pledge and review" it will need to mobilize international and domestic pressure, creating a global political momentum and pushing for effective climate policies in each signatory country, that not only will tackle climate change-related issues but also the ones related to sustainable development. This combination would follow the same trend that we have discussed early in this chapter, which linked the scientific debate and its relative policy response with global attention centered around human and nature well-being.

This very attention could be spot also in the multiple overlaps of countries' NDCs, which are not only climate plans but also sustainable development agendas. In fact, usually these plans include many priorities of the 2030 Agenda for Sustainable Development: this is a shared blueprint for peace and prosperity building, protection of people and the planet; it has at its core 17 Sustainable Development Goals (SDGs) that tackle major global issues such as

education, alleviation of poverty, global partnership[42]. In 2015, the approval of the 2030 Agenda and the signing of the Paris Agreement – both – represented a watershed in the global push towards sustainability; furthermore, the mutually supporting implementation processes of the 2030 Agenda and the NDCs have significant potential to become beneficial for one another[43]. Moreover, the more NDC-SDG connections that governments and policymakers will be able to draw, the better it is to foster policy coherence. Since both the SDGs and the NDGs tackle a broad and diverse set of problems, as shown by an analysis done on their implementation strategies[44]: no more than 12% of NDCs are quantified and that only a few SDGs have quantified clear strategies (like SDG 7 affordable and clean energy; SDG 15 life on land). This piece of information adds depth to the previous statement, so that clearer and stronger commitments from governments' part needs to be set, and that synergies between the two would lead to better results[45]. Another dimension that will be useful to take into account is the diverse set of spill-over effects and the country-specific domestic drivers and barriers for implementing these global goals in their own national context[46]. For all these reasons, we would conclude that: because of the vagueness of the implementation strategies of the Paris Agreement and the 2030 Agenda and their overall broadness of scope, domestic politics will be crucial to turn these global goals into clear and effective actions on the ground. Hence, we come back to Putnam's "two-level game" theory, since also in this case, the implementation of international agreements will be effective only if domestic groups will favor climate actions and sustainable development in their policy frameworks. In addition to that, in order to *bring about this "zero-carbon" revolution[47]* we not only need domestic political revolutions that would center global politics' attention around climate action, but also a dramatic revolution in our socioeconomic systems. To conclude, we would say that in order to win this timely fight against climate change, there will need to be strong commitments from governments that will be in charge of leading the transition to a zero-carbon society, having considered their country-specific drivers and

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[42] See all the 17 SDGs here: https://sdgs.un.org/goals.

[43] Brandi, C., Dzebo, A., & Janetschek, H. (2017). *The case for connecting the implementation of the Paris Climate Agreement and the 2030 Agenda for Sustainable Development* (No. 21/2017). Briefing Paper.

[44] Ibid., p. 29.

[45] For instance, tackling equity and justice, which are central features of SDG 1 (end of poverty), SDG 5 (gender equality) and SDG10 (reduced inequalities), will be also crucial feature in climate change negotiations; in this regard, we suggest to see: Adger, W. N., Lorenzoni, I., & O'Brien, K. L. (2009). Adaptation now. *Adapting to climate change: thresholds, values, governance*, *1*, 1-22; Bae et al. (2009). The Greenhouse Development Rights Framework: Drawing Attention to Inequality within Nations in the Global Climate Policy Debate. *Development and Change*, 40(6), 1121–1138.

[46] Keohane, R.O. and Victor, D.G. (2016). Cooperation and discord in global climate policy. *Nature Climate Change* 6, 570–575.

[47] Schröder, E., & Storm, S. (2020). Economic Growth and Carbon Emissions: The Road to "Hothouse Earth" is Paved with Good Intentions. *International Journal of Political Economy*, *49*(2), p. 22.

barriers, and only if they will be capable of decarbonizing our fossil-fuel-based socioeconomic system[48].

Globally, we are starting to see many national plans to fight climate change[49] and in this section, we will focus on the European Green New Deal, the flagship strategy of the new EU Commission President, Ursula Von Der Leyen. Having looked at these events, reports, and at the political and scientific debate around climate change, it does only make sense that the President of the EU Commission decided to make the green and the digital transition at the heart of her program. The Green Deal is – indeed – an integral part of this Commission's strategy to implement the United Nation's 2030 Agenda and the Sustainable Development Goals. As part of the Green New Deal, the Commission will need to revise the European Semester process of macroeconomic coordination in order to integrate the United Nations' Sustainable Development Goals and put sustainability and the well-being of citizens at the heart of its policies.

The Green New Deal covers eight thematic areas, which are: clean, affordable and efficient energy; sustainable industry and products; building renovation promoting energy efficient building methods; food sustainability, support to the producers and reduction of wastage; sustainable and smart mobility; protection of biodiversity; digitalization; climate action. In the chart provided by the EU Commission, we can see these objectives[50].

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[48] Ibid., p. 23.
[49] See for instance: the Chinese Ecological Civilization; the South Korean and Japanese pledges to reach carbon neutrality; the US's "Plans for a clean energy revolution and environmental justice". An interesting reading from the SWP Berlin, available at: https://www.swp-berlin.org/10.18449/2021C14/.
[50] EUROSTAT (2020), EU Green Deal, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:European_Green_Deal_2020v.PNG&oldid=486167.
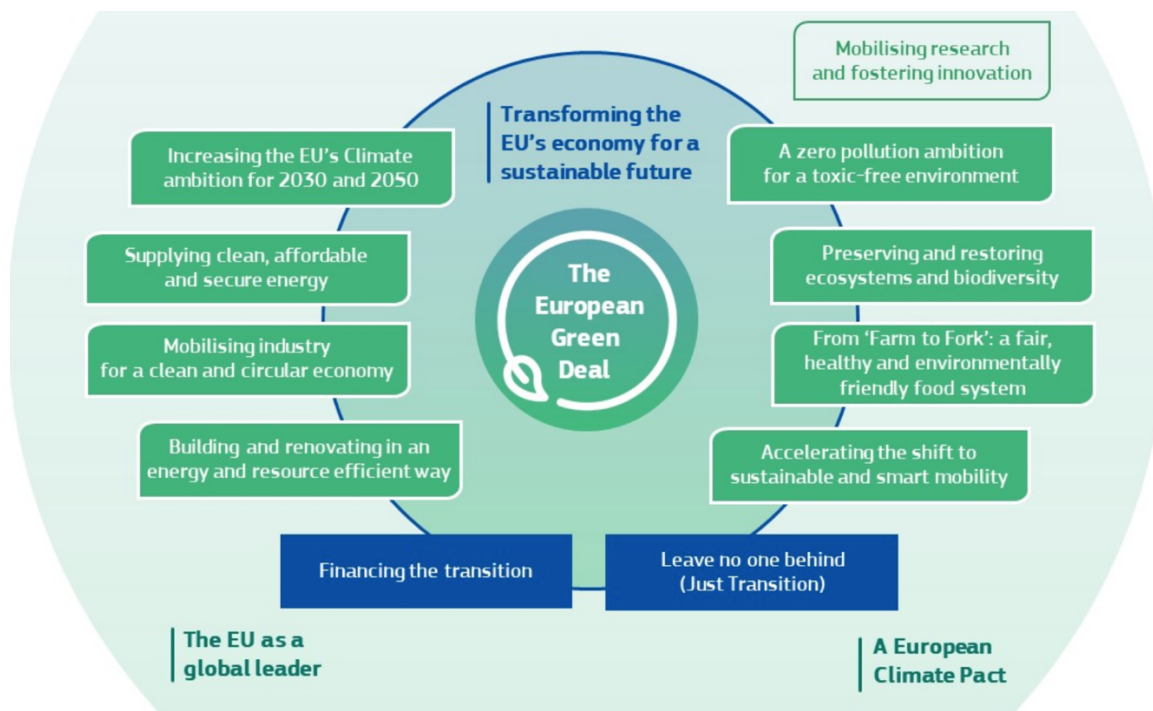
As we go through these targeted areas, we see that in order to tackle climate change and environmental degradation, the Green New Deal needs to change its growth path and turn into a continent with a competitive, resource-efficient and inclusive economy, where nobody and nothing is left behind. In order to achieve the climate objectives, decarbonizing the EU's energy system will be a priority: the production and the consumption of energy, in Europe, accounts for more than 75% of its GHG emissions[51] and only 17.5% of its' gross final energy consumption comes from the use of renewable resources[52]. The principles that will pave the change in the energy sector will be prioritization of renewable sources and their efficiency; secure and affordable energy supply; an interconnected and digitalized EU energy market. At the heart of the European Green New Deal there is the (first) European Climate Law[53], which has been adopted by the European Parliament ENVI Committee last May and ensures that all EU policies are compliant with the Green New Deal and that all Member States participate in the green and digital transition. It sets the 2050 climate neutrality target into law and represents a strong signal of the Commission's commitment to lead on climate issues.

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[51] See the 2018 European Commission Communication, "A clean planet for all", visible at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52018DC0773&from=EN.

[52] See the 2019 European Commission Report, "Renewable energy progress Report", visible at: https://ec.europa.eu/info/sites/default/files/report-progress-renewable-energy-april2019_en.pdf.

[53] To see the targets set in the upcoming European Climate Law: https://ec.europa.eu/clima/policies/eu-climate-action/law_en.

Another important feature is the European Green Deal Investment Plan[54], set up to generate €1 trillion of investments to support a greener EU economy. The Commission is also working on the carbon border adjustment mechanism (CBAM)[55], to ensure a level playing field at the global stage and fair conditions for EU companies that want to participate in the climate effort. In order to counteract the negative effects of the transition and support workers and societies that still rely heavily on carbon-intensive sectors, the Commission proposed the Just Transition Mechanism[56], which should mobilize at least €100 billion. It is threefold and includes the Just Transition Fund, which will invest €7.5 billion from the EU budget in the regions most affected by the green transition and will provide mostly grants; a dedicated Just Transition Scheme under the InvestEU Programme to attract private investments; a Public Sector Loan Facility provided by the European Investment Bank to leverage public financing. In 2019, the new President of the European Commission, Ursula von der Leyen, came into office and launched an ambitious project for a renewed growth strategy called the "European Green New Deal". That project placed the fight against climate change, protection of biodiversity, digitalization, and -overall- sustainable development at the heart of EU policies. But soon after the EU Green New Deal took shape, the COVID-19-pandemic broke out in March 2020, shifting the EU's attention and action towards the health and economic crisis. This pandemic profoundly changed the way we lived and made us realize how much nature and its protection is important for human life and well-being: these new circumstances changed also our habits and showed us that we cannot go back to "business as usual" and that we have to change our way of doing things.

This change must be backed by policies that encourage a sustainable growth path in all possible ways and at all levels of governance. This is why in May 2020, the Executive Vice-President of the Commission, Frans Timmermans, launched the "Next Generation EU" recovery programme, to put the EU back on track and make sure that no administration would have to choose between reacting to the economic crisis or investing in the future. The set-up of "Next Generation EU" has shown us that renewing EU's growth strategy in a sustainable fashion was not just a creative way for greenwashing EU citizens, but actually EU's roadmap out of the crisis and a lifeline for a greener and better future. In spring 2020, many Member States started to doubt the feasibility of this ambitious programme as the pandemic kept raging,

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[54] To see an extensive explanation of the Green New Deal Investment Plan: https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_24.
[55] To see the Commission's proposal for the Carbon Border Adjustment Mechanism (CBAM): https://op.europa.eu/en/publication-detail/-/publication/062f76c4-5e06-11ea-b735-01aa75ed71a1/language-hr
[56] To see more on the Just Transition Mechanism (JTM): https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/just-transition-mechanism_en.

lives continued to be lost and the economic crisis started to re-appear in the picture. Nevertheless, the Executive Vice President of the Commission, Frans Timmermans, opted for a "green recovery", highlighting the fact that the moment to react to the climate crisis was still timely: in his eyes, 2020 was the year of the change in EU type of growth and, even if the pandemic has quickly turned it into negative growth, the green transition could have been used – still – as a roadmap out of the crisis. Next Generation EU is a €750 billion temporary recovery instrument that will help repair the immediate economic and social damage caused by the coronavirus pandemic. So that, after the crisis, Europe will be greener, more digital, more resilient because it allows the Member States not to choose between recovery or green and digital transition, through its "green recovery". This program intends to raise money by temporarily lifting the own resources ceiling to 2.00% of the EU Gross National Income: this will allow the Commission to borrow €750 billion on the financial markets. The EU's long-term budget, together with "Next Generation EU", will be the largest stimulus package ever financed in Europe. Amounting to a total of €1.8 trillion, it will help rebuild Europe after the COVID-19 pandemic. That Europe, at which the Commission is aiming, will be greener, more digital, and more resilient, and massive resources will soon be available to promote and implement the green recovery inside our cities.

In order to implement the imperative shift towards a sustainable future, local administrations will be hugely involved. In fact, national governments will be the ones to draw their national recovery plans and decide how to invest the resources with which Europe is providing them; they will also be the ones that offer projects and new ideas to meet the European goals of the green and digital transition. Cities will, therefore, have a fundamental role in this, because inside our cities is where all the challenges are coming together and where we can find micro solutions for macro issues. Cities are, also, the places where these new ideas can be tested in ways that make a difference to people in their daily lives and that afterward can be scaled up across all Europe. But in order to make cities live up to this role of designers and inventors of a new sustainable future, they will need to evolve and respond to the critical issues they are now facing: clean, efficient, affordable energy; building renovation; circular economy and waste management; digitalization; equality.

Chapter 2: Rethinking urban planning to implement EU Green New Deal targets.

## 2.1 A medium-term strategy for the green and digital transition.

As we have seen in the first chapter, the Paris Agreement, our international framework on climate, is committed to limit global warming to well below 2°C and signatory countries will try to keep it to 1.5°C above preindustrial levels[57]. The 2018 IPCC report[58] has warned the world politicians about the major negative impacts that an ulterior rise in global temperatures would have on humanity and the planet. In fact, if kept at 1.5°C, global warming's impacts, even if appalling, would be still manageable, but those impacts will be more and more dramatic if it was to reach 2°C. Therefore, this report urges the world to aim for 1.5°C and recommends achieving net- zero CO2 emissions globally by 2050. In order to meet these targets, the EU has presented the Green New Deal: its new growth strategy that will drive the change towards a more sustainable economic model and it will represent its roadmap out of the crisis. The GND's overarching objective is to become the first climate-neutral continent by 2050, and – as we have said earlier in the previous chapter – there are many fields in which it operates. In addition to that, we have outlined the fact that the initial phase of this energy transition will be focused on: reducing energy demand through energy efficiency and consumers' behavioral change; decarbonization of electricity whenever possible; the use of alternative renewable energies; use of CO2 removal technologies. The focus on these sectors is due to the fact that technologies and innovative solutions when it comes to RES, transport, food, water, dwelling systems are already available thanks to research and innovation programs[59]. In fact, both green technology prices, market conditions and climate-friendly investments are now enabling factors that will help us move fast towards the green and digital transition. Therefore, we argue that: a) since – historically– these sectors can be found and form cities; b) since cities dominate the energy demand and are responsible for a significant share of carbon emissions; c) since the scalable and available renewable energies that we have currently can be mostly deployed in cities systems, the GND's medium-term strategy will be devoted to urban planning.

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[57] Paris Agreement, Official UN Document (2015). Art. 2, 1(a).
[58] IPCC (2018), *Global warming of 1.5°C.*
[59] Andreucci, M. B., & Marvuglia, A. (2021). Investigating, Implementing and Funding Regenerative Urban Design in a Post-COVID-19 Pandemic Built Environment: A Reading through Selected UN Sustainable Development Goals and the European Green Deal. In *Rethinking Sustainability Towards a Regenerative Economy*, p. 409. Springer, Cham.

In fact, for instance, in 2013, the world's urban areas accounted for 64% of global primary energy use, and generated 70% of the planet's CO_2 emissions[60]. Furthermore, our cities host around 75% of the EU's population and are responsible for a large share of its energy consumption and GHG emissions; cities are also leaders in climate innovation and they represent the right place where citizens engage in climate action. As the Executive Vice-President of the Commission, Frans Timmermans said: cities "will have a huge role to play in the fundamental transformation that the Green Deal is to drive in our society"[61]. In addition to that, these shares will rise since: the world's population grows and its projections clearly indicate that we will witness an era of migrations towards urban areas; cities expand and so and their economic activities. We can make use of two charts to clearly visualize these ideas: the world's urbanization patterns[62] and the world's air pollution[63].

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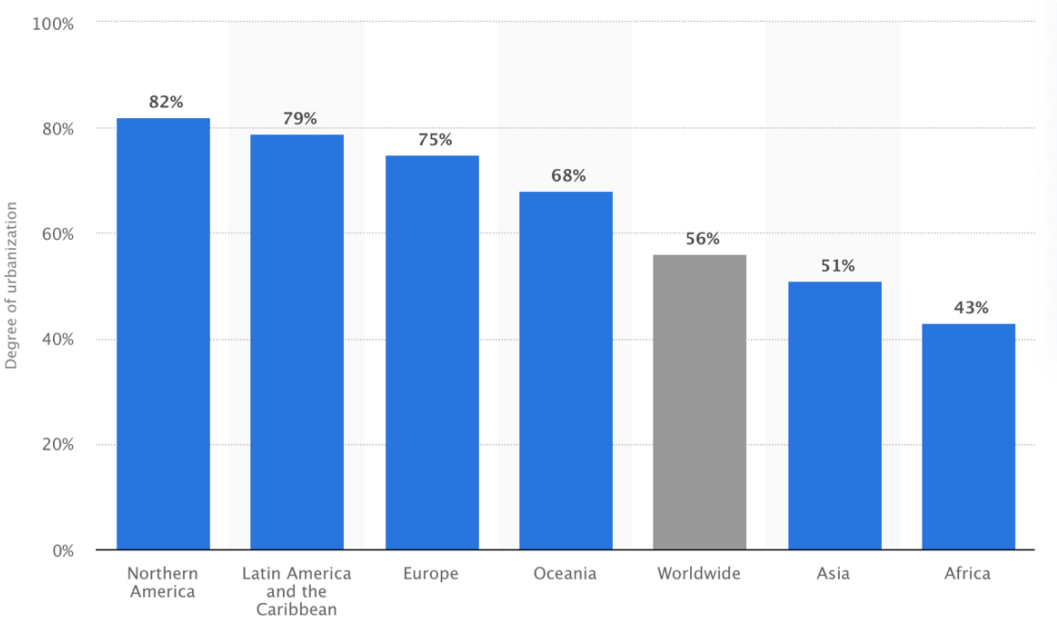
[60] IEA Report, (September 2016). Cities are at the frontline of the energy transition.
Retrieved from: https://www.iea.org/news/cities-are-at-the-frontline-of-the-energy-transition
[61] Available at: https://cor.europa.eu/en/news/ Pages/We-must-act-now-together-. aspx.
[62] Statista. Degree of urbanization (percentage of the urban population in total population) by continent in 2020.
Available at: https://www.statista.com/statistics/270860/urbanization-by-continent/
[63] World Air Quality Index (WAQI) Project. Available at: https://waqi.info.
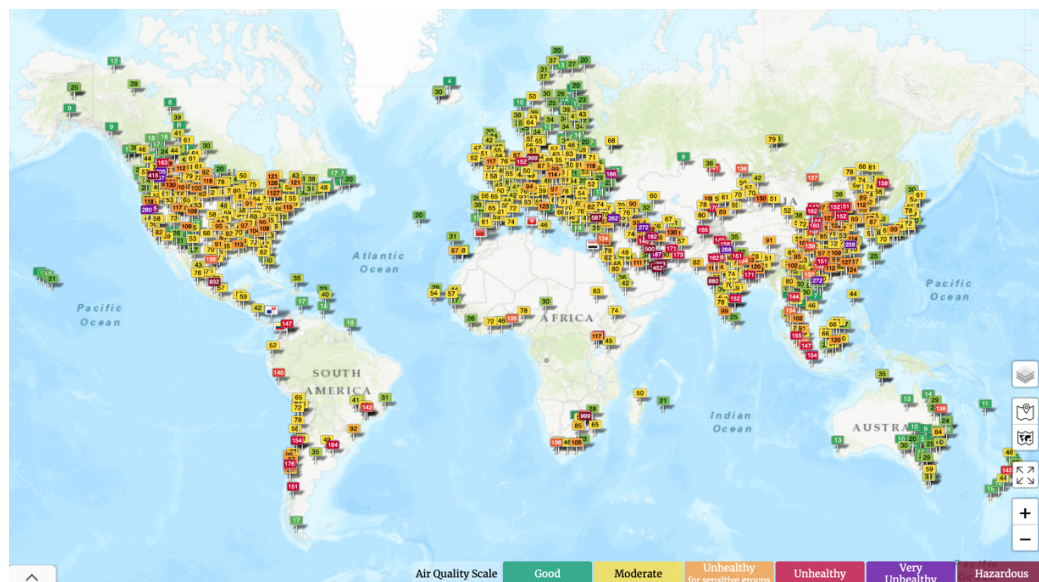
For all these reasons we have concluded that the main ones in which, at first, we will see disruptive change are: the electricity sector, buildings renovation, circular economy, and transport[64]. These sectors are the ones that we find in cities, and therefore we can conclude that cities are and will be at the frontline of the digital and green transition, and it will be crucial for them to take the lead and find solutions for energy efficiency and security while meeting global climate targets. In fact, we have already discussed the importance to have international or European policy frameworks and guidelines to follow; we have then pointed out the first phases of the transition will include the use of RES; GHG emissions reduction targets; carbon pricing mechanism; investments in innovation. Nevertheless, these ambitious targets must be complemented by regional and local actions. European cities and their ability to manage and drive societal transformations will greatly influence the future of the Union and the success of the Green New Deal. Cities must support and endorse the energy and the digital transition; they must help find climate mitigation and adaptation solutions; re- and upskill the workforce[65]. In addition to that, cities have the unlocked potential to raise awareness and engagement around the green transition, and the capacity to provide physical and theoretical arenas to discuss the structural changes that will need to happen in fields such as consumption, smart mobility,

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[64] In fact, we have outlined the fact that such change, in sectors like agriculture and in international aviation and shipping, will be a very complicated and lengthy process because the disruptive clean, and an affordable new type of technologies are not developed yet, therefore solutions will be available only in the future. To investigate and deeply understand the problems around the heavy-to-abate sectors (agriculture, aviation, shipping), the readers could find "Mission Possible" – an Energy Transition Commission's Report – very interesting. Here, the link to consult it: https://www.energy-transitions.org/publications/mission-possible/#download-form.

[65] EUROCITIES Report, (February 2020). The European Green Deal: Delivering results for citizens with Europe's cities.
Retrieved from: https://eurocities.eu/wp-content/uploads/2020/08/EUROCITIES_reaction_to_the_Green_Deal_2020_Final_.pdf.

energy use, or waste management: the active involvement of citizens would represent a solid opportunity to turn utopia into reality. To fully exploit cities' potential and their experience on climate governance, while developing the urban dimension of the Green New Deal, there will need to be a change in the way we approach the instruments and initiatives formalized by the NGEU and MFF 2021–2027. In fact, as outlined earlier in this paragraph, cities have the best know-how, close relations, trust, and technical skills to lead and achieve the objectives of the Green Deal, but this can happen only if the approach we use is city-specific: because of the high degree of diversity across Europe, the effectiveness of these projects would result on their adaptation to the local and regional characteristics. To capitalize on this capacity that cities have, Next Generation EU will become a powerful tool to make that happen. Further, it should channel funding towards physical and infrastructure transformation programs in smart and sustainable mobility; waste management; buildings renovation and high-efficient electrification, heating and cooling systems; creation of local energy communities; the greening of public space to have cooling effects within the city and its outskirts; protection of biodiversity, and the creation of green corridors and nature-based solutions[66].

It is rather obvious that the type of city outlined in the previous paragraph does not refer anymore to the heavily polluted, unsustainable, unhealthy, and divided slums of the early twentieth century: that type of city resembles - hopefully - the future cities we will live in, the smart cities. In the next pages, we will try to analyze the controversies around the term "smart city" that still to this day is difficult to assess. In fact, this is a fuzzy concept and it is used in inconsistent ways: there is not a single template of framing a smart city, nor a definition that would fit every city[67]. Nevertheless, we would say that a smart city is a place where traditional networks and services are made more efficient with the use of ICT that makes inhabitants and businesses reap more benefits and lower emissions[68]. At the same time, a smart city goes beyond the use of these new technologies: it also means smarter urban transportations, upgraded water supply and waste management, more efficient electrification, heating, and cooling systems for buildings. In recent years, this term has witnessed an upgrade, including also a more inclusive and responsible city administration, entailing a smarter, so to say a more strategic and targeted approach towards sustainable development, economic growth, and better quality of life. We would say that the added value of a smart city lies in how these technologies are used rather than simply how much technology is available. Furthermore, the overall objective of a

[66] De Gregorio Hurtado**,** S. Monografías, 2021. A Green Deal for the urban age: A new role for cities in EU climate action, *CIDOB Monografías*, p. 34.

[67] Albino, V., Berardi, U. and Dangelico, R.M., 2015. Smart cities: Definitions, dimensions, performance, and initiatives. *Journal of urban technology*, *22*(1), pp.3-21.

[68] To see the smart cities definition, used by the Commission: https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en.

smart city should be providing an urban environment that delivers better quality of life to its residents while also generating economic growth. This becomes an increasingly important asset if we look at the rate of the future population growth in urban areas, and the related increasing density of the services and industries. Sustainability is an important asset of smart cities as they aim to improve efficiency in urban areas, increase citizens' welfare, and cut pollution: this cross-sectors approach makes the deployment of smart cities one of the most ambitious and fundamental goals to reach. Indeed, the fact that they include so many of the features of the Green New Deal, such as high-efficient buildings, smart transportation, digitalization, and use of technologies to reduce the use of fossils fuels, makes them a sort of micro-cosmos where the EU strategies can be tested and then scale up. In fact, cities are the embryonic systems that will implement these objectives first, and also the ones that express – on a small scale – both the environmental, economic, and societal challenges of the future, as well as the most prepared and skilled actor to tackle them.

2.2 Smarter and Sustainable cities.

In this section we will try to test our assumption on the mid-term strategy of the EU GND, so to say that it will represent a new approach towards urban planning, for the reasons that we have previously listed. In order to achieve net-zero CO_2 emissions from the energy and industrial systems, we will need rapid improvements in energy efficiency combined with the rapid decarbonization of power and gradual electrification. The main sectors in which results can be delivered in this decade are: light-duty road transport, manufacturing, and residential cooking, heating, and cooling[69]. In fact, in the 2017 Energy Transitions Commission's first report, called "Better Energy, Greater Prosperity", they analyzed the challenges. Their conclusions outlined exactly the fact that the huge reductions in the cost of renewable energy generation and the increased options in energy storage systems make it now possible to have power systems that entirely rely only on solar and wind energy[70]. On the other hand, in order to reduce and fully decarbonize the so-called hard-to-abate sectors (cement, steel, chemicals) and heavy-duty transport (international aviation and shipping), it will take more time and it will impact the global GDP of 0.5%, at its best. Overall, the transition for these sectors is technically possible but it will require more investment in R&I and stronger commitments from policy-makers and businesses, in order to find scalable and cost-effective solutions, develop mitigation

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[69] Energy Transition Commission, (2018). *Mission Possible: Reaching net-zero carbon emissions from harder-to-abate sectors by mid-century*, p. 15.
[70] Energy Transitions Commission, (2017). *Better Energy, Greater Prosperity.*

strategies specifically targeted for these sectors, and make better use of carbon-intensive materials used in these industries during the decarbonization process.

Let us focus now on the schemes of what we have identified as the mid-term strategy of the EU GND, trying to form in our minds an image that will resemble the future smart and sustainable cities in which we will live. The first policy area that we will consider is the building renovation strategy, or "Renovation Wave"[71], that intends to: change the unsustainable building and renovation processes; make them efficient and reliant on renewable resources; increase digitalization. The combination of RES and digitalization will optimize not only the energy efficiency of a building, making it a climate-proof building, but the use of more advanced technology (i.e. smart sensors and controls for thermostats and lighting) will shape consumers' behavior towards a more sustainable energy demand and use. Furthermore, this strategy does not exclude the social dimension, in fact, it will be also a social housing renovation, aiming at lowering the cost of energy bills, ending energy poverty.

Another policy area that will be important in this urban rethinking will be the "Sustainable and Smart Mobility Strategy"[72], which will try to increase the use of sustainable and alternative fuels in road, sea, and air transportation while also ensuring that combustion-engine cars meet pollution regulations. This strategy will try to provide businesses and the general public with sustainable alternative options, like smart traffic management systems and applications. From these two strategies, we can clearly see how important digitalization and the use of RES will be in driving the transition, and another added value attached to them is the feasibility of their deployment since they are already available or rapidly scalable and cost-effective. In fact, the use of RES (solar and wind), batteries and electrolyzers are on technology learning curves, so that their costs fall by 15%-20% for every doubling in capacity[73]. In addition to that, the technology landscape keeps enriching the data collection and therefore its management: this element will increasingly and consistently help policymakers be informed on issues related to urban planning; it will also encourage private investments by lowering and advancing the perception of the risks in climate-friendly projects, and therefore creating new business opportunities and new revenue streams[74]. Those initiatives will shape our future cities, that will finally be smart and sustainable, enabling also governments to reach many of the SDGs[75]:

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[71] See the detailed proposal on the EU Commission website, available at:
https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en.
[72] See the detailed proposal in the EU Commission website, available at:
https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2329.
[73] New Energy Outlook (NEO), Community Paper, 2020.
[74] IEA Report, 2021. *Empowering cities for a net-zero future: unlocking resilient, smart, sustainable, urban energy systems.*
[75] Ibid., p. 22.

Smart sustainable cities

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

10 REDUCED INEQUALITIES

13 CLIMATE ACTION

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

17 PARTNERSHIPS FOR THE GOALS

8 DECENT WORK AND ECONOMIC GROWTH

3 GOOD HEALTH AND WELL-BEING

7 AFFORDABLE AND CLEAN ENERGY

- **7.1** Ensure universal access to energy services
- **7.2** Increase share of renewable energy
- **7.3** Double improvement in energy efficiency

National, regional and local governments will therefore play a crucial role in the green and digital transition, and they will have the support and expertise from EU institutions and citizens-led organizations. They can also provide resources, policy tools, and incentives to make our cities smarter, sustainable, and inclusive. What will be important in this process is an intense coordination between the EU and the Member States which will be asked to deliver on their National Recovery and Resilience Plans, and also coordination between national and local governments.

2.3 Benefits of the future net-zero cities.

As we have outlined before, municipalities and regional institutions have the best know-how on their communities' needs, capacities, and problems: implementing smart cities across all Europe and in a country-specific or city-specific fashion will help us achieve the goals set out in the European Climate Law, in the Paris Agreement and in the 2030 Agenda for Sustainable Development. In order to achieve the targets of the GND and create a new path for a long-term systemic change, there needs to be a political and organizational revolution that will refuse to continue the trend of business as usual. In fact, this significant macro-level economic, infrastructural, and technological innovation, but also behavioral change in energy demand and in consumption patterns will need to be backed by highly committed public administrations. Similar to the holistic approach of the UN's 2030 Agenda, the GND has a

broad range of complementary and interlinked goals, because the similar starting point is that one of these policy areas can be achieved in isolation. Another layer that we want to add to the discourse is that the lesson learned from our recent history of climate diplomacy is that a mixture of a top-down and a bottom-up approach is needed when internationally or at the European level, governments want to make a difference. This is why, the combination of the GND and NGEU is, in our opinion, the best solution, because it recognized country-specific needs, capacities, and risks, and it does not dictate a framework that could be impossible to implement for some of the Member States.

Especially when it comes to urban planning, a coherent and holistic approach to the three frameworks will enable regional and municipalities' governments to reach climate targets. In fact, if we isolate three major clusters among the three agendas, we will have Innovative Urban Assets and Infrastructure; Circular and Equitable Economy; Climate Neutrality. The integration of these three urban dimensions will guide us towards a regenerative urban transition and a more resilient and just society. Once that we have come to the conclusion that the EU GND is about rethinking European urban planning, in order to meet the climate targets and compensate for the historical emissions and to buy time before we can finally sort out major problems in the agricultural, aviation, and shipping sectors, we have to ask ourselves another question: what kind of cities are we talking about? As previously stated, of course, these cities that will reshape our skylines across Europe will not resemble the heavily polluted, unsustainable, unhealthy, and divided slums of the early twentieth century. Nevertheless, approaching the concept of smart cities or smart communities can be daunting and confusing, because these terms remain, to this day, fuzzy concepts, around which it is difficult to wrap our minds.

In fact, when it comes to understanding the concept of smart cities, it is difficult to form a clear idea in our minds because both academia and practitioners have introduced a number of different terms. This resulted in a set of equally numerous definitions, like smart, digital, sustainable, inclusive, creative, innovative[76]. These various perspectives on smart cities range from an ecological one (sustainable city) to a technological (smart or digital), to an economic, to a societal (inclusive), to an organizational one. This variety reflects also the different features of urban planning problems, like mobility, buildings, security, public health, waste management, energy consumption, and demand: this link between the term and its application

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[76] See: Abdoullaev, A. (2011). A smart world: a development model for intelligent cities. In The 11th IEEE International Conference on Computer and Information Technology (pp. 1–28); Nam, T., & Pardo, T. A. (2011). Conceptualizing smart city with dimensions of technology, people, and institutions. In 12th Annual International Digital Government Research Conference: Digital Government Innovation in Challenging Times (pp. 282–291); Wolfram, M. (2012). Deconstructing smart cities: an intertextual reading of concepts and practices for integrated urban and ICT development.

domains[77] makes it difficult then for urban policymakers to invest in smart city initiatives[78]. Nevertheless, a common feature in all these different interpretations of smart cities is open innovation: through innovation, technology, and research, we will find solutions to meet city and community-specific needs, and to make a city smart, independent and economically sustainable[79]. Historically, smart cities have been broadly recognized as cities that make use of digital technology to create a better quality of life for their citizens. Nevertheless, it is becoming clearer and clearer that "smartness" is not just using technology in traditional infrastructure or operations, but it is about using these technologies purposefully[80]. The smartness of a city will be three-folded: first, it will be based on technology (smartphones and sensors connected to high-speed communication networks); then, it will be empowered by specific applications that will be able to translate raw data into valuable insight to shape targeted policy tools and actions; finally, public adoption and usage of these technologies. The implementation of the smart applications in our cities will have lots of benefits in different policy areas, that we can list as follows:

1. Security: smart surveillance and home security systems will help authorities prevent incidents or respond rapidly to incidents that occur;

2. Energy: building automation and home energy automation systems and data on home energy consumption will increase energy efficiency and shape consumers' behavior in energy demand;

3. Economic Development and Housing: job creation; new business opportunities;

4. Mobility: shared mobility of cars and bikes, autonomous and electric vehicles will lower the GHG emissions while benefitting from data collection on public transit;

5. Waste: digitalization of tracking systems to prevent illegal dumping and better waste management;

6. Water: smart irrigation will lower wastages and water consumption tracking systems will help detect and control leakages;

7. Health: telemedicine; infectious diseases surveillance; data collection will help public health interventions;

8. Engage with the community: digital citizen services and local civil applications will enable citizens to participate actively in the decision-making processes, helping policy-makers thanks to their insights.

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[77] Neirotti, P., Marco, A., Cagliano, A. C., Mangano, G., & Scorrano, F. (2014). Current trends in smart city initiatives: some stylised facts. *Cities*, 38(1), 25–36.

[78] Hollands, R. G. (2008). Will the real smart city please stand up? *City*, 12(3), 303–320.

[79] Gaffney, C., & Robertson, C. (2016). Smarter than smart: Rio de Janeiro's flawed emergence as a smart city. *Journal of Urban Technology*.

[80] McKinsey Report, (2018). *Smart Cities: Digital Solutions for a More Livable Future.*

To have an overall grasp of the benefits that cities can reap from smart applications, we can have a look at this figure, created by the McKinsey Institute (2018):
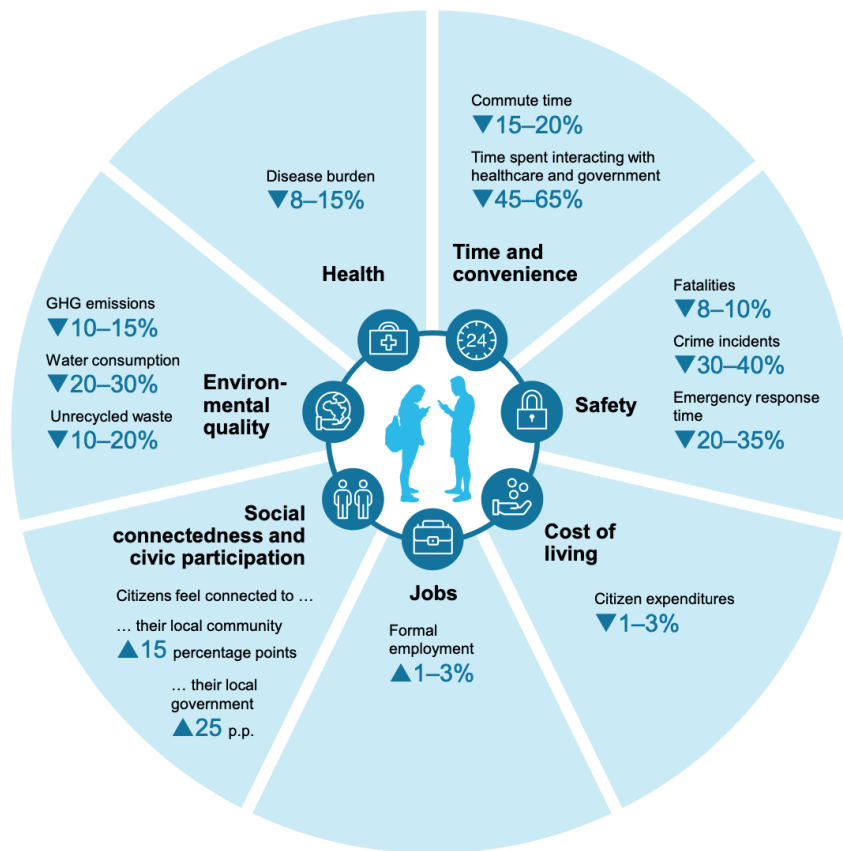
To conclude, we can say that smart cities are and will be the key drivers of the green and digital transition; we have seen how much can they positively impact the human and natural environment and we have also highlighted the fact that smartness does not refer only to the use of technology, but it will have to focus also on the social dimension. We have tried to find the key drivers of a smart city, which are: the use of networked and smart infrastructure that increases economic and political efficiency, while engaging with citizens and citizens-led organizations; the reduction of GHG emissions through higher energy efficiency, better knowledge, and tracking systems for water and energy consumption and waste management, reshaping of consumers' behavior; a new approach towards social and relational capital when it comes to quality of life, job opportunities, increased participation. In the light of our analysis, we would try to come up with a definition of a smart city that integrates all these aspects; therefore, we would say that the "smartness" of a city lies not only in the use of ICT, but thanks to their deployment and public adoption it serves its citizens, providing a more sustainable human and natural environment.

Chapter 3: Italian PNRR and its efforts to meet EU targets

3.1 A preliminary assessment of Italian PNRR.

In the context of the Coronavirus pandemic, the Executive Vice-President of the EU Commission decided to make the transition possible by setting up a recovery plan, that would have helped the Member States achieve their climate targets and not shy away from the climate crisis. This recovery plan is called "Next Generation EU", and has multiple objectives: help MSs repair their economies and social damages caused by the pandemic[81]; assist MSs in the green and digital transition and minimize the social impacts of the pandemic, tackling social issues such as education, health, inclusive growth, and jobs[82]; modernize EU facilities, when it comes to health and the digital and green transition, focusing on creating resilience, and preparedness through research and innovation. For the years 2021–2026, the EU has approved a €750 billion recovery fund, of which €390 billion would be in the form of grants and the rest will be in the form of loans, which will be financed by issuing a common debt. As the centerpiece of the program, there is the Recovery and Resilience Facility[83], with € 672.5 billion in loans and grants to support reforms and investments undertaken by the Member States. Its aim is to mitigate the pandemic's negative impacts on the economy and society and make them more sustainable, resilient, and better prepared for the future challenges and opportunities that the green and digital transitions will bring along. Member States have been working on their recovery and resilience plans, setting out a coherent package of reforms and public investment projects, to be implemented by 2026, in order to unlock the funds under the Recovery and Resilience Facility. Each plan is expected to contribute to the four dimensions outlined in the 2021 Annual Sustainable Growth Strategy, which launched this year's European Semester cycle: environmental sustainability, productivity, fairness, macroeconomic stability.

Another pillar of the Next Generation EU program is called "Recovery Assistance for Cohesion and the Territories of Europe" (REACT-EU): a new initiative, worth € 47.5 billion, that helps respond to the crisis, through the Coronavirus Response Investment Initiative and the Coronavirus Response Investment Initiative Plus. The funds will be made available to the European Regional Development Fund (ERDF); the European Social Fund (ESF); and the

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[81] European Commission, (July 2020). Recovery Plan for Europe.
Available at: https://ec.europa.eu/info/strategy/recovery-plan-europe_en#:~:text=The%20aim%20is%20to%20mitigate,the%20green%20and%20digital%20transitions.
[82] European Council, (February 2021). A recovery plan for Europe.
Available at: https://www.consilium.europa.eu/en/policies/eu-recovery-plan/.
[83] See the detailed figures of the Recovery and Resilience Facility (RRF): https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en.

European Fund for Aid to the Most Deprived (FEAD). Furthermore, Next Generation EU will be coupled with the EU's long-term budget: in doing so, we will have the amount of the Multiannual Financial Framework (from 2021-2027), which stands at 1074.4 billion euros, and €750 billion from NGEU, reaching a total amount of 1824.3 billion euros and representing the largest stimulus package ever financed in Europe[84]. In order to unlock the funds, MSs – technically supported by the EU Commission – have submitted their National Recovery and Resilience Plans (NRRP), including targets, benchmarks, and estimated costs[85]. In the NRRP, Member States must indicate how they intend to use these investments to contribute to the green and digital transition, promoted by the Commission. Compliancy in every NRRP is expected by the Commission, which has set two targets: 37% of the spending must be channeled to green and 21% to digitalization[86].

Now, let us proceed with the investigation on the functioning of the NGEU program, and especially let us have a look at the Italian RRP. The Italian first draft, sent to the Commission on January 2021 by the previous government led by Giuseppe Conte, caused many concerns within the government coalition, which eventually collapsed. When Mario Draghi was accounted as new Prime Minister, he decided to show his commitment to the green and digital transition by stating that the Italian RRP would have become his first priority. The draft had many differences between the first proposal[87], and was then sent to the Commission on April the 30th. This is also because Italy will be the biggest beneficiary of the NGEU, by absolute value. In fact, if we look at the figures: the total amount of resources in the Italian RRP is 235.1 billion euros; the RRF funds allocated to Italy are 191.5 billion euros in total (68.9 billion euros in grants; 122.6 billion in loans), and they must be spent within the 2021-2023 timeframe; in addition to that, there will be available 19 billion euros from the REACT-EU fund. This incredible amount of resources allocated to Italy was due to the severe impacts of Covid-19 on the Italian economy and society, whose GDP was estimated to be lowered by 8.9% in 2020[88]. The pandemic has hit a country that was already fragile from an economic, social, and environmental perspective. Between 1999 and 2019, the Italian GDP grew by a total of 7.9%; whereas in Germany, France and Spain, the GDP increased by 30.2%, 32.4% and 43.6% respectively. In addition to that, between 2005 and 2019, the number of people below the

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[84] See the integrated figure of the Multiannual Financial Framework (MFF) and Next Generation (NGEU):
https://ec.europa.eu/info/strategy/eu-budget/long-term-eu-budget/2021-2027/whats-new_en.
[85] The Council agreed to the position on the RRF.
Available at: https://www.consilium.europa.eu/en/policies/eu-recovery-plan/#.
[86] CEE Bankwatch Network, (2020). *See no evil: how lack of transparency could dash EU hopes for a green pandemic recovery.*
[87] See the details in Pagella Politica, (23 Arpil 2021). *Cos'è cambiato nei piani di ripresa e resilienza.* Available at: https://pagellapolitica.it/blog/show/1054/che-così-cambiato-nel-piano-nazionale-di-ripresa-e-resilienza.
[88] Piano Nazionale di Ripresa e Resilienza, #NextGenerationItalia, (2021). Available at:
https://www.governo.it/sites/governo.it/files/PNRR.pdf.

absolute poverty line rose from 3.3% to 7.7% of the population, and in 2020 it increased up to 9.4%. Furthermore, Italy is considered to be extremely vulnerable to drought, heatwaves, rising sea levels, and heavy rainfall, according to the Instituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA)[89]. This extreme difficulty for Italy to keep pace with other European advanced countries and economies, and to mitigate its social and environmental imbalances, is due to its trend of productivity, which is much slower in Italy than in the rest of Europe. Among the causes of its low productivity trends, there is a sort of inability to seize the many opportunities that arise with the digital revolution: this traces back to inadequate infrastructure and the general capacities of Italian enterprises which are usually small or medium-size and do not know how to adjust to and benefit from newer technologies. Another layer of this problem can be found in delays and the inability to modernize the Italian public administration and to create updated and structural policies fit for the digital era. For all these reasons, NGEU represents an unmissable opportunity for the very much-needed reforms and investments that will transform its public administration and its production systems and will try to end poverty, social injustice, and inequalities. NGEU can and -hopefully- will represent the chance for Italy to remove the obstacles that have blocked it for all these decades and pave a new way towards sustainability.

The Italian RRP focuses on six missions:

1. Digitalization, Innovation, Competitiveness, Culture: this mission will require a total amount of 50.07 billion euros (40.73 RRF / 0.80 REACT-EU / C.F. 8.54).
2. Green revolution and Ecological transition: the second mission will require a total amount of 69.96 billion euros (59.33 RFF / 1.31 REACT-EU / 9.32 C.F.).
3. Infrastructure for sustainable mobility: the third one will require a total amount of 31.46 billion euros (25,13RFF /0.00 REACT-EU / 6.33 C.F.).
4. Education and Research: the fourth mission will require a total amount of 33.81 billion euros (30,88 RFF / 1.93 REACT-EU / 1.00 C.F.).
5. Inclusion and Cohesion: the fifth mission will require a total amount of 29.62 billion euros (19.81 RFF / 7.25 REACT-EU / 2.55 C.F.).
6. Health: the last mission will require a total amount of 20.22 billion euros (15,63 RFF / 1.71 REACT-EU / 2.89 C.F.).

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[89] Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), (2021). *Gli Indicatori del Clima in Italia nel 2020.* Available at: https://www.isprambiente.gov.it/it/pubblicazioni/stato-dellambiente/rapporto_clima_2020-1.pdf.

We will now investigate the ones that, in our vision, will be crucial for the implementation of a new smart and sustainable urban planning, since we have outlined the fact that rethinking the way cities perform will be a key indicator for the transition: if cities will keep growing in a business as usual path, the climate targets will not be achieved. Therefore, let us focus now on the first, second, and third missions which integrate all the features that we have found to be decisive in urban planning.

The first mission is "Digitalization, Innovation, Competitiveness, Culture" and it aims at modernizing the Italian public sector in order to attract private investments and improve its efficiency when providing public service for citizens and businesses[90]. The second one is called "Green revolution and Ecological transition", it aims at creating a more circular economy (waste management, smart and sustainable agricultural supply chain)[91]. It will try to build energy independence through industrial know-how[92], and increase energy efficiency both in public and private buildings[93]. Lastly, it will develop action plans to protect biodiversity and make the country more resilient to climate risks[94]. The third mission is "Infrastructure for sustainable mobility", and it is dedicated to modernizing the transport infrastructure system (trainways and air transport) and reducing the historical gap between the North and the South of Italy[95].

Having looked at these figures and at the current attention that has been devoted to climate during Draghi's administration, if we also consider the fact that has just been set up another ministry dedicated to the Ecological Transition (MiTE) as early as of 2021, and if we also think about the motto "People, Planet, Prosperity" chosen for the Italian Presidency at G20, we can see that Italy is trying to push for the transition, at least in political forums. Nevertheless, we will have to wait and see if the country will be capable of delivering on the fight to climate change.

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[90] Piano Nazionale di Ripresa e Resilienza, pp. 82-84.
[91] Ibid., p. 116.
[92] Ibid., p. 117.
[93] Ibid., p.117.
[94] Ibid., p. 118.
[95] Ibid., p. 157.

3.2 Milan, a nice ideal to follow.

In this paragraph, we will discuss one of the Italian cities that, historically, has been at the forefront in the transition towards sustainable development: Milan. In fact, in 2018 Milan has been ranked first Italian smart city for the fifth consecutive year by the ICity Rate Report[96]; it was also ranked second on the Ernst & Young's Italian smart city index[97] in 2016, closely following behind Bologna. In order to fully understand the value of these reports and rankings, we should have a look at the indicators used by the ICity Rate, so that we could have a clearer idea of what a smart city is in their opinion and how its smartness can be measured. ICity Rate lays its analysis on 15 dimensions, which can be divided in these categories: social inclusion; civic participation; technological and digital transformation; and green infrastructure. The strongest assets of Milan as a smart city rely on its focus on research and innovation, its rate of employment, economic stability, and cultural attractiveness; on the other hand, it does not address enough its environmental dimension – especially – in terms of land use, air pollution, and water management.

Let us now dig into the recent history of this smart city in order to find out what were and are its drivers to sustainable development. We can say that the start of its new approach towards urban planning began with the election of its Mayor Giuliano Pisapia in 2011. In the same year, Milan's city council approved a Local Government Plan that focused on issues related to the greening of infrastructures and public services. That plan was also strongly committed to increasing citizen's participation from the early stages of the process and encouraged the contribution of private actors (both non-profit and for-profit) to public initiatives. It did not specifically focus on the development of ICT technologies, but many of the programs that were later reframed implied an increased investment in ICT infrastructures. One year later, in 2012, the municipality chose to adopt a strategy based more on the creation of a smart city agenda, that would enable later on the city to become smart. The responsibility of the creation of this agenda was given to two members of the municipal administration: the Councillor for Employment Policies, Economic Development, University and Research, and the Head of the department of Economic Innovation, Smart City, and University. The work done on the agenda tried to ensure coordination internally, so to say coherence between multiple smart-related projects inside the municipality, and externally between different stakeholders

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[96] See the ICity Rate Report, (2018), available at: https://www.forumpa.it/citta-territori/icity-rate-2018-la-classifica-delle-citta-intelligenti-italiane-settima-edizione/.

[97] See the Ernst & Young's Italian smart city index Report, (2016), available at: https://www.ey.com/Publication/vwLUAssetsPI/EY-smart-city-index-2016/%24FILE/2016-EY-smart-city-index.pdf.

and the citizens. Two main takeaways from this work are the role given to universities, research institutes, and firms altogether, recognized as important stakeholders; and the attention given to coherence and coordination within the municipality projects[98].

If we look at this chart made by Statista[99] to detect smart city project in Milan in 2018, we are reaffirmed by what has been stated previously in this paragraph, so that Milan has been working more on ICT technologies rather than on its environmental dimensions:
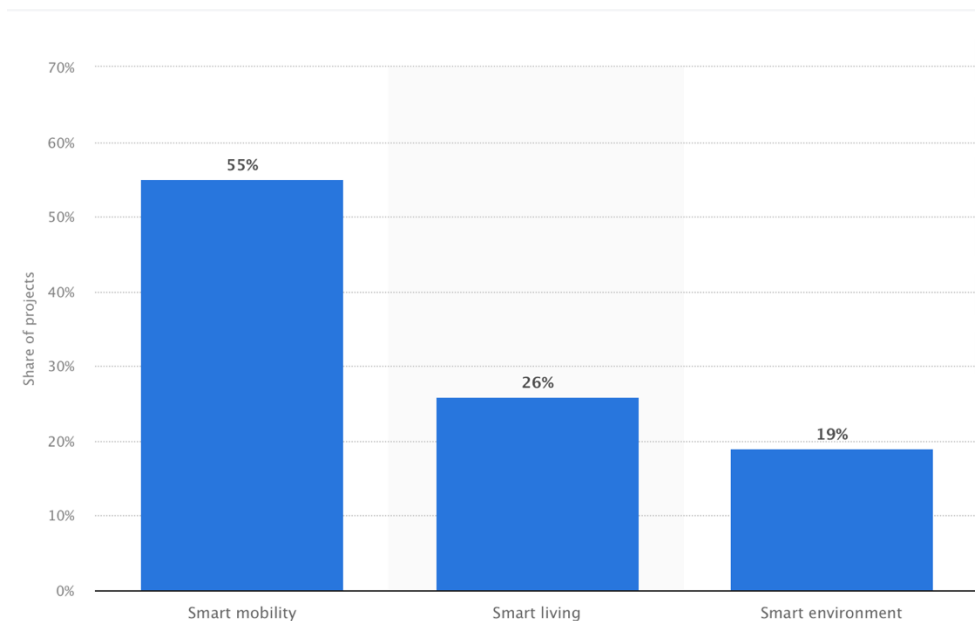
In order to fill the gap in the environmental projects, Milan's strategy for 2030 will be devoted to building a greener, resilient and livable city. This strategy wants to enable the green transition by eliminating land consumption, reducing its impact on urban ecosystems, enhancing its green and blue infrastructure, and increasing its resilience. But since the metropolitan area of Milan is vast and composed of 88 districts, a holistic approach similar for every and each district will not be capable of delivering on the green transition. Therefore, a more localized and district-tailored approach will be more effective, and this is in fact the approach of the city that intends to tackle this issue by pooling together research institutes, universities, firms, and urban planners to develop the best solution for a specific area.

On March the second, it has been published the conversion law No. 21 of the Milleproroghe Decree, which contains the "Conversion into law, with amendments, of Law Decree No. 183 of December 31, 2020, containing urgent provisions on legislative terms, the

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[98] Bonduel, L., (2018). Smart city development: the Milan model. *The urban media Lab*. Available at: https://labgov.city/theurbanmedialab/smart-city-development-the-milan-mode/.
[99] Statista. *Distribution of smart city projects carried out in the Italian city of Milan in 2018, by type.* Available at: https://www.statista.com/statistics/974838/digital-energy-projects-in-milan-italy/.

creation of digital connections, the execution of Council Decision (EU, EURATOM) 2020 / 2053 of December 14, 2020[100]. Thanks to the conversion into law of the Milleproroghe Decree 162/2019, Italy has taken another step further in the implementation of sustainable energy. This event introduced the term "Renewable energy communities" in Italy, that indicates the associations of citizens, businesses, local governments, or companies that decide to join forces to equip themselves with production systems of energy from renewable sources. In this regard, we want to showcase an ongoing project that integrates: the region (Lombardy), a research institute (RSE), RES, and energy storage systems firms (EnelX and Evolvere), to create an energy community in Lombardy, composed of 3000 families. These collaborations usually are brought about in several stages: firstly, research institutes provide knowledge and inform urban planners in order to make the best decision; then private companies deliver their projects according to the city needs; and, finally, the most suitable project is selected and can be implemented in the specific area of the region. In this specific case, EnelX is an energy company that provides green infrastructures and Evolvere is in charge of gathering data on energy flows and controls the energy storage systems of the energy community. In fact, an increasing trend in the use of RES in private buildings is to set up an energy community that is composed basically of your neighbors and breaks the hegemony of a centralized distribution system in favor of a more local one. In these energy communities, citizens have a democratic say or ownership over their energy supply and demand. This is why, this global trend has also been described as "energy democracy" because it allows consumers to secure enough energy supply not only on long-term, with economic benefits and at reasonable prices.

These energy communities are associations between companies, businesses and citizens who decide to join forces to equip themselves with one or more plants for the production consumption of energy electricity from renewable sources, achieving economic, environmental and social benefits. A renewable energy community is a legal entity that is controlled by partners or members who are located in the proximity of the community's production plants. Its members can be natural persons, small and medium-sized enterprises (SMEs), territorial bodies, or local governments, and its main goal is to provide environmentally-friendly energy. They can vary from one another: some of them only have wind and solar generation installations; others are a fully balanced, self-sufficient system that functions as a microgrid; some others have a local footprint, or cover a larger area. Other differences that we can spot among the different communities regard the particular asset that a cluster decides to integrate in their community: one can focus on renewable electricity and heating, or include a range of other

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[100] Decreto Milleproroghe. Ministero del Lavoro e delle Politiche Pubbliche. (March 2021). Available at: https://www.lavoro.gov.it/notizie/Pagine/In-Gazzetta-Ufficiale-la-Legge-di-conversione-del-Decreto-Milleproroghe.aspx

energy activities like electromobility[101]. In fact, this approach to energy consumption and production can be applied to multiple sectors: industrial and agricultural SMEs, shopping centers, residential and artisanal buildings, and local authorities.

Nevertheless, whatever the particular asset of a particular energy community, we would conclude that these communities can pave the way for more inclusive energy systems, thanks to digitalization and cooperation between system operators. In fact, digitalization can improve connectivity among all energy market players, because it can monitor, through designated technologies, manage and optimize dynamic energy flows and data, so that communities can become self-sufficient. Furthermore, these digital tools will be able to reduce transaction costs and support local energy trading platforms while bypassing centralized distribution systems. Energy communities can also co-operate with other system operators in order to increase the resilience and the reliability of the energy grid by taking advantage of the large number of active households involved. In fact, they can benefit from the aggregation of the operators and the flexibility of demand response[102]. For these reasons, we can say that energy communities have a variety of positive impacts on people, entities, and communities involved. These positive impacts can be divided into three categories:

- Environmental benefits: such as avoiding the production of energy from fossil fuels while also avoiding energy dissipation in grid losses; emissions reduction thanks to more clean, reliable, and efficient energy;
- Economic benefits: thanks to the incentive mechanisms provided for by law to promote the energy transition; budget savings and new revenues;
- Social benefits: thanks to the sharing of economic benefits and financial profits with the energy community; improved public welfare and safety; improved services that are centered around people's needs; inclusivity.

To conclude, we would say that initiatives like the one that is ongoing in Lombardy to create an energy community can represent the right approach to integrate environmental projects into Milan's urban planning, because of their close link to a specific area, their flexibility, resilience, and independence.

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[101] IEA Report, (2021). *Empowering cities for a net-zero future: Unlocking resilient, smart, sustainable urban systems*, p. 61.
[102] Ibid., pp. 62-63.

3.3 Recommendations for future implementations.

In the previous chapter, we have tried to go beyond the stereotypical interpretation of a smart city that centers itself around the deployment of ICT. We have highlighted the fact that nowadays smart cities will need to include also other values like safety, sustainability, and resilience. In our attempt we have tried to show another side of ICT which can actually be beneficial for societies, but it is only fair to also shed a light on the problems that could arise. As the importance of digitalization in energy communities grows, data privacy and protection will become a very pressing issue. There are few defined laws or obligations for data handlers and utilities in the context of energy communities, and efforts are being made to solve this issue. In our opinion, to safeguard people's privacy it could be useful to establish smart city charters in order to give users guidelines about ICT and data platforms. These charters could inform the participants about the use of their data.

Another problem that may arise if banks and investors are not fully aware of the different possibilities and designs of energy communities and this low awareness could make the capital cost raise, it could reduce their bankability and - overall – discourage their growth. Authorities could easily counteract this phenomenon by channeling resources and expertise to investors and developers, through public financing schemes this by channeling resources and knowledge to investors and developers, using public financing schemes such as feed-in tariffs, and leveraging national and international funds. Another action that could be taken by authorities could be focusing on the upskilling of their citizens to make sure that their literate enough and ready for the use of these technologies.

The last piece of advice that we would like to offer here in this last chapter is institutionalizing events where authorities, mayors, citizens, firms, universities, and scientific communities can come together and discuss advantages and disadvantages that will come with the deployment of these technologies. For future implementation, we think that pooling together knowledge and insights that come from different stakeholders will be extremely important. This is to say that universities, firms, and civil society must be taken into account by policymakers when deciding how to go about urban planning. In the case of Milan, we have seen for instance that a successful idea was collaborating with these different stakeholders. Another recommendation that we want to give is to take into consideration the specific needs of the specific area of a city because only tailored solutions will be capable of giving the best results and improving citizens' participation.

In our opinion, energy communities can become a valuable, resilient, efficient, and cost-effective tool for greener and more digitalized urban planning strategies. We have tried to highlight their value by stating that energy communities ensure social inclusivity because they

improve energy access for everybody since they can be easily scaled up. Inclusivity will not only mean equal access to energy for everybody, lowering the rate of energy poverty, but it will also mean citizen participation to energy matters. These elements will not only be crucial for the implementation itself of renewable energies but they will also foster their implementation in other cities and communities and increase their acceptance. We have also highlighted the fact that smart technologies will make the systems more efficient, secure, and resilient. For all these reasons we think that energy communities can become an important tool to achieve climate neutrality in cities and they can shape a new path for citizen participation and agency in social and environmental matters.

Conclusions

In this dissertation, we have tried to recollect the recent history of Western Climate Diplomacy and, especially, the role that scientific communities had and still have in informing policymakers while creating an international momentum around climate change. We have concluded that their influence has made possible for governments to understand the severity of climate change and the urge to find responses to that. We have tried to draw a history line of the main scientific contributions and reports that started to come out in the 1970s, an era that surely changed global politics and created a firm and trustworthy narrative around climate and sustainable development. Then, we have decided to focus on the impact that these scientific reports made on global politics, looking at the first international forums and organizations that were created to support political change. Lastly, there is an evaluation of the Paris Agreement, the SDGs and the European Green New Deal because we consider them to be the perfect outcomes after almost 50 years of climate diplomacy. In fact, they represent a mixed approach towards diplomacy, that is both top-down and bottom-up. This element makes them more luckily to succeed because they take into account also domestic politics and barriers to change.

In the second chapter, we have tried to investigate the logic of the Green New Deal to answer our research question and see if it is and urban planning strategy. In our vision, it will represent a new approach towards a more sustainable and digital urban planning. In fact, we have put emphasis on the feasibility of the deployment of RES and their cost-effectiveness. Moreover, we have concluded that the most polluting industries have still a long way to go before being decarbonized. In addition to that, the rate of urbanization and growth population are increasingly growing and cities are expected to host 9.1 billion people by 2050 globally. These factors combined together show that the only option to concretely tackle climate change is to start from our homes, re-designing them and our behavior towards a sustainable way of living. The thesis then focuses on the concept and current implementation of smart cities, trying to cope with the fragmented terminology. We have stated that "smartness" cannot only be measured by the amount of ICT that is involved, but also by the purpose and the benefits that society can reap from it.

The third chapter starts with an evaluation of the Next Generation EU program and of the Italian Recovery and Resilience Plan, particularly in the missions that are dedicated to urban planning. Then, it focuses on the Italian implementations of smart cities, and its most successful best practices. We have tried to showcase a successful collaboration between different stakeholders and policy makers that was made in order to create energy communities in Lombardy. In fact, we found this case to be very interesting because it was built around new concepts that will probably be more and more popular in the future: energy communities and

citizens' participation. Lastly, we have discussed the advantages and disadvantages of energy communities and we have stated that they represent not only an increasing trend but also a feasible and inclusive solution to change our strategies for urban planning. We have also tried to outline the fact that digitalization now offers many opportunities not only to abate the costs of RES in all their applications, but also to create a more inclusive society that puts citizens at its center.

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