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THE CLIMATE CITIES CONCTRACTS AS A HYBRID LEGAL TOOL

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ANNO ACCADEMICO 2020/2021

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INTRODUCTION

Cities now house 75% of Europe's population of roughly 450 million people. Cities have evolved into social, physical, technical, and ecological communities that are dynamic and complex. Cities are leading the way in addressing these issues by developing and implementing evidence-based policies and collaborating in cutting-edge research to find new answers. Cities are critical sites for the implementation of global and European innovations, as well as public participation in political choices and citizen science, in the context of increased urbanization.

Climate change, pollution, energy efficiency, urban transportation, water, waste, food and resource efficiency, health and well-being, and all social innovation are all centered in cities. Our cities can win the struggle for a better future by bringing all sectors and strata of society together to expedite the transition to inclusive, resilient, safe, climate-proof, and resource-efficient ecosystems. Exploitation and inspiration, as well as the engagement of young people, need research, innovation, and investment. This is central to the European Green Deal concept, as well as the digital transition and recovery and resilience strategy.

To make Europe the first climate-neutral continent, it will be important to develop new institutional capacities to handle shared issues, discover solutions, and ensure that local governments have a strong information and research role.

To strengthen the connection between research and policy, research findings, as well as prospective tools and recommendations, must be made available in ways that residents and local officials can understand. With the aid of the European Commission, the research community may make the findings available to cities so that they can be used and profited. This will need a concerted effort including major financial commitment as well as central guidance and assistance. To make such partnerships meaningful to all parties involved, a design and cross-sectoral approach are required.

To be able to solve the issues that cities confront, a more direct link between European cities and the services of the European Commission is required. The CSI effort demonstrates a common need and desire across EU professionals and networks, as well as municipal and regional specialists, to collaborate closely on

research and urban concerns. It also shows that the European Commission is prepared and capable of working as a partner on multilevel governance challenges like city science. In the coming decade, the CIS might play an important role, since planetary boundaries will produce a cascade of crises that will have a substantial impact on life in European cities and residents. Increasing the capability of today's and tomorrow's students

It wants the CSI to continue as a networking point and venue where City Science Officers from different European cities meet because of its unique and vital focus on science and politics. They are the main players who can assist cities in bridging the research-policy divide. To guarantee that European research can contribute significantly to today's practical difficulties in the EU, a direct link between them and the European Commission, as well as the assistance of various networks, is required. This not only assists cities in addressing future difficulties, but it also allows the Commission and networks to illustrate how the European dimension can assist individuals in improving their everyday reality and living situations.

In recent years, the role of cities has been fundamentally rethought on a global, European, and national level. Several adverse factors have put the latter in jeopardy. The city is at the core of the financial and economic crises; it will be home to more than two-thirds of the world's population by 2050; it is where climate change and pollution are affecting people's lives; and it is where inequity and social conflicts are on the increase.

It is now a foregone conclusion that urban planning techniques must be rethought and reinterpreted in a strategic and innovative manner. The "management of the territory," which includes urban legislation, is currently focusing on enhancing the quality of the environment rather than the quantity.

The issue of what we might call last generation urbanism is the theme of urban regeneration, both in terms of its physical component and, more importantly, in terms of its social and civic component. The goal of regeneration methods is to link these two elements inside urban areas so that they might "recover their functional vocation to the desires and expectations of the society of reference."

A clear and universal legal framework of reference, which is now nonexistent or fragmented, would be necessary to achieve this aim. Two opposing doctrinal positions have evolved because of the lack of a complete discipline on urban regeneration, as well as the difficult nature of regeneration initiatives encompassing multiple sectors and subjects.

On the one hand, proponents of "great urban planning" or "urban planning by projects," who say that regeneration may be conducted more successfully through "complex" initiatives that foster a new public-private partnership. On the other hand, supporters of the "right to the city" or "urban right of community" call for an experimental and collaborative approach to suggest creative regeneration methods that may be seen as "an instrument through which inhabitants can claim their right to quality of life." At the same time, city models that integrate technological innovation with urban sustainability are being investigated.

As stated by Hobbes, Rousseau, Locke, Rawls, and other political theorists, the underlying notion of a social contract stresses an implicit agreement between citizens, their different communities, and legitimate government to construct a healthier and safer society together. The Social Contract idea asserts that legitimate, collective governing systems should be guided by the permission of the people, and as a result, our present notions of democracy are shaped by this theory. However, it remains to be seen if contemporary social contracts can meet the problems of the twenty-first century. A key omission in Social Contract theory is that ecological fragility translates into social and economic vulnerability, as well as a complex set of security and justice concerns. In the future, our civilizations will have to reconsider how we live in and develop our environments.

Because of the nature of today's social, environmental, and economic crises, we need a new social compact, a Natural Social Contract. The Natural Social Contract views society as a social-ecological system, with humans as members of a community and contributors to the natural environment. It focuses on long-term sustainability and general wellbeing by merging human and natural resources and recalibrating our unbridled attitude to infinite economic development, overconsumption, and over-individualization.

A Natural Social Contract is a multi-dimensional theoretical framework that aims to start a conversation on how to enhance the present social contract to achieve a more sustainable, regenerative, healthy, and just society.

Systemic changes in existing patterns of activity and structure, including formal and informal institutions and economies, that contribute to sustainability, health, and justice in all social-ecological systems' is how transformative social-ecological innovation is characterized. Creating a sustainable and healthy future for society would necessitate institutional reform as well as effective collaboration and action from many parties, sectors, and levels of government.

CHAPTER 1
THE DEFINITION OF CITY SCIENCE

Abstract

Urban computing is an interdisciplinary approach to the understanding, management and design of the city using systematic theories and methods based on new information technologies. By integrating urban science, geomatics and informatics, urban informatics is a particularly timely way to blend many interdisciplinary perspectives in the study of urban systems.

Starting from an introductory definition on urban science, I will move on to the analysis of what and how cities can be considered, thanks also to the evolution towards the creation of different cities models and how the latter can be.

1. What is urban informatics

Urban informatics is an interdisciplinary approach to understanding, managing, and designing the city using systematic theories and methods based on new information technologies, and grounded in contemporary developments of computers and communications.[1] It combines urban science, geomatics, and informatics: urban science studies activities, places, and flows in urban areas; geomatics provides the science and technologies for measuring spatiotemporal and dynamic urban objects in the real world and managing the data obtained from the measurements; and informatics provides the science and technologies of information processing, information systems, computer science, and statistics to support the quest to decode the data obtained from the measurements.

Because computers have scaled down to the point where they can be used as sensors and embedded in a variety of physical infrastructures, as well as being used in a mobile context by the public, urban informatics is a particularly quick and efficient way of gathering and fusing many interdisciplinary perspectives that involve computation. As a result, we now have access to streams of data on a city's

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[1] Shi, Wenzhong. Urban Informatics., 2021.

functioning in real time, something that was previously unavailable because most of our data collecting methods were not automated by sensors.

Urban informatics encompasses a wide spectrum of digital data, ranging from traditional census data gathered at low frequencies such as years or decades to real-time big data streams captured at extremely high frequencies and providing an image of how the city is developing continually. This topic encompasses not only data, but also the tools and models that are collectively known as urban analytics.

1.1 How urban informatics can be applied to urban science

Understanding the basic mechanisms that drive, shape, and maintain cities and urbanization is the goal of urban science. It's a multidisciplinary/transdisciplinary approach that incorporates ideas, techniques, and research from the social, natural, engineering, and computer sciences, as well as the humanities. Urban science is not the same as "urban analytics" or "urban informatics," and it is not the same as "smart cities." Urban analytics is a set of tools for analyzing and mapping "urban big data" (data generated by social media, crowd sourcing, and sensor networks) and is theoretically and methodologically connected to geographic information systems (GIS) and spatial statistics. The following statement by Batty[2] captures what makes *urban science* distinct from and irreducible to any of the extant research traditions on the urban:

"City science is often called 'urban science', in this context referring to theories of the urban system that provide analogies to flows of energy and information but not particularly in the physical domain. Urban science deals with the structure and functioning of cities, and the generic laws that seem to govern cities everywhere insofar as they can be articulated...Urban science in this portrayal does not mean the technology of constructing cities, or of the materials and energy flows that determine its rudimentary functioning. It means here a science of human behavior as it applies to cities. This is not the science of the physics of buildings or energy flows in cities (although it clearly relates in part to some of these aspects),

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[2] Batty, M. (2019) On the confusion of terminologies. Environment and Planning B: Urban Analytics and City Science, 46: 997-998.

it is the science of people flows, flows of goods, and the flow of information and ideas and the extent to which all these can be generalized over city size and scale."

Science cities are clusters of scientific and technical expertise molded into a purposely built metropolitan form with a variety of urban amenities and services, which, along with science, give the notion its essential meaning. Diverse growth pathways have led to different sorts of urban-regional science and high-tech concentrations. A true science city, defined as a new town project with a focus on higher education, research, and R&D on the one hand, and supportive urban structure and services on the other, is a fundamental form.

A collection of huge technopoles, high-tech parks, and development zones, which may be achieved within a larger urban development program, is another form that integrates the aspects of science and technology with urban context. There are also "science cities", which are high-tech or science-oriented cities and metropolitan regions (Seoul, Tokyo, London, Austin, Cambridge, Oxford, and so on). Wider-area ideas have their own category, apart from science cities. They include valleys, corridors, and technobelts that have been scientifically or technologically characterized, such as Mobile Valley in Stockholm, Sweden, and Silicon Valley in California, USA.

There is no apparent distinction between these names since the criteria underpinning them are not defined, and they have been used quite loosely. The size, shape, and profile of a science-based concentration are not affected by differences in nomenclature. Despite its very limited definition, the term "science park" or "technology park" is occasionally used to refer to science cities and other such entities. Technopole and technopolis, as well as high-tech center, are general terms used to describe any sufficiently big concentration of scientific and technological talent.

1.2 The concept of science city

Science towns have unique characteristics that integrate science with the urban environment. As a result, the term "science city" refers to a concentration of scientific activity as well as the surrounding urban environment. In terms of the former, governments have established scientific cities to boost innovation, produce

synergistic effects, encourage technical developments, and act as a science and technology node in a region or country.

The 'urban' factor is important in this image since large concentrations require specific sites, infrastructure, and industrial and other services. Most scientific cities have been massive development undertakings. Even in such recent cases in which industrial or technology parks evolve gradually towards science cities, as in the case of Kista in Sweden, this transformation is very much about the 'urban' dimension: the wider geographic area, new infrastructures and logistical solutions, housing projects, wider commercial services, and closer relations with the surrounding urban community.

Even if there are many kinds of science cities, most of the are characterized by certain common features. A good starting point for this is Castells and Hall's conception of science city, "Science cities are new settlements, generally planned and built by governments, and aimed at generating scientific excellence and synergistic research activities, by concentrating a critical mass of research organizations and scientists within a high-quality urban space.".[3]

1.3 How can we define what is a city?

Cities are a very recent phenomenon and urban areas have become the principal driver of most social, institutional, and technological innovations. Cities are also the focus of the solutions to our most pressing challenges, requiring sustainable solutions for continued improvement in the human condition. Technological and social developments have combined to generate unprecedented amounts of data concerning what people do when they agglomerate in cities. To some, this "big data" revolution, often associated with the notion of "smart cities," holds the promise of more effective urban management. A significant realization is that the city is itself an important "unit of analysis" (as Paul Romer argued):

"The urban environment that humans are so busily creating is many things: a biological environment, a social environment, a built environment, a market environment, a business environment, and a political environment. It includes not

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[3] Castells, M. & Hall, P. (1996) Technopoles of the World. The Making of the 21st Century Industrial Complexes. First published 1994. Reprinted 1996. London: Routledge.

only the versions of these environments that exist inside a single city, but also those that are emerging from the interaction between cities. Our understanding of the urban environment will draw on existing academic disciplines, but it will also develop its own abstractions and insights." (Romer 2013) [4]

But what exactly is a city or an urban area? What is the size threshold for an area to qualify as a city? Currently, there are numerous different meanings that vary by country and location. These definitions range from those that use only one criterion (for example, a population threshold) to those that use a mixture of criteria (e.g., combination of population size, density, administrative delimitation, economic occupation etc.). It's challenging to aggregate numbers consistently because of the wide range of definitions and criteria used. Similarly, the term city is used interchangeably with various notions such as city proper, urban region, urban agglomeration, and metropolitan area, among others, making it even more difficult to come up with a unified definition. These ideas differ not only in terms of analytic methods, but also in terms of the geographic scales they cover, which has an impact on the people they include or omit in data estimations.

Developing a worldwide monitoring definition of what defines a city is a difficult endeavor, especially because it would most likely complicate population estimates and require certain nations to change or relocate their borders. About one third of countries use the concept of 'urban agglomeration' to estimate their city data, and another 12% only for their capital cities. As much as 39% of countries use the concept of 'city proper, about 6% use the concept of "metropolitan area" and about half of countries combine various definitions to estimate city and population data in their urban areas. [5]

The City Proper is often the smallest unit of analysis and refers to the area confined within city limits. [6] It is the single political jurisdiction which is part of the historical city center. With a few exceptions, the 'City Proper" is a very narrow

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[4] Romer, P. (2013) The City as Unit of Analysis. (https://paulromer.net/the-city-as-unit-of-analysis/).

[5] United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Methodology. Working Paper No. ESA/P/WP.252. New York: United Nations.

[6] UNDESA (2002). Demographic yearbook, 2000. United Nations Publications, 2002. p. 23. ISBN 92-1-051091-7.

administrative demarcation of the city and does not consider adjacent areas which affect the functionality of the city. Except for capital cities, many countries report on their urban populations using the statistical concept of "City Proper". This is the case for instance with Czech Republic, Egypt, Germany, Poland, Saudi Arabia. Other nations use a mix of statistical concepts, such as Brazil, Ecuador, The Netherlands. The use of the "City Proper" independently or combined with other conceptual definitions is an obvious source of recurrent controversy and tends to produce inaccurate information on the city population.

The Urban Agglomeration concept refers to "a contiguous territory inhabited at urban density levels without regard to administrative boundaries". In other words, it integrates the 'City Proper' plus suburban areas that are part of what can be considered as city boundaries. Also, an urban agglomeration sometimes combines two developed areas which may be separated by a less developed area in-between. In most cities where population data has been estimated using the "Urban Agglomeration" concept, *numbers tend to be higher than those produced using more refined concepts of analysis for the built-up area within the same urban extent.[7]* . The reason for this discrepancy is that in most cases, countries include populations in areas that do not meet the 'urban density levels' threshold, which largely constitute rural portions of the administrations (municipalities, boroughs, or communes) that are part of the conurbation. Regardless of this limitation, this concept comes closest to the spatial notion of the 'city' and produces more accurate data. For this reason, UN Population Division prefers to adjust, when possible, all definitions to this statistical concept.

The Metropolitan Area concept is much more complicated than the other two concepts. It has statistical, technical, administrative, and political meanings. The US Census Bureau, define it as a 'geographical region with a relatively high population density that is considered as a statistical area'. This concept is associated to a conurbation, which normally represents a densely populated urban core and less-populated surrounding territories. 'Metropolitan Areas' usually comprise of

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[7] Refer to the methodology of the study "Urban Expansion of Cities" and the Global Sample of Cities, UN-Habitat, New York University and Lincoln Institute of Land Policy, 2016.

multiple jurisdictions and municipalities, as well as satellite cities, towns and intervening rural areas that are socio-economically tied to the urban core.[8] In many countries the demarcation of the metropolitan area does not coincide with the urban extent of the city, making population figures differ greatly. There are few countries like Australia, Belgium, Italy, and Canada that mostly use 'Metropolitan Area' definitions.

1.4 The right to the city according to Lefebvre

The concept of the right to the city was first formulated by Henri Lefebvre in 1968 and represents a step within his thinking about urban and rural space, their production, and the spillovers they bring to politics and society (Stanek, 2011). The concept was immediately disseminated at the policy and academic levels.

The concept of 'right to the city' proves useful for thinking about urban space, especially for those who work on the conditions of life in cities, on the crisis of public space, on the appropriation by financial flows of urban spaces (through the financialization of space, tourism, city branding, major events, gentrification).

In The Right to the City (1976a) Lefebvre writes that the urban fabric is connected to urban society and built according to the rules that society itself gives itself. The industrial capitalism that flourished in those years had built a unitary project, improved the living conditions of some neighborhoods, in which hygienic conditions were very poor, but had made the city lose its general sense, making a space that before was characterized by identity, meaning and complexity become confused and conflicting (Lefebvre, 1976a).

The result of this phenomenon is the crisis of the city given by the fact that the city is not built and managed according to its use value, but through its exchange value, that is, the value on which capitalism is based. In opposition to the capitalist city organized based on exchange and economic values, Lefebvre focuses on the

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[8] Metropolitan Area definition, https://www.revolvy.com/ main.

social and not individual value of the city: the possibility of using space in a freeway, not regulated and in this way to enjoy a high quality of urban life.[9]

Through shared use, which translates into participation in urban life, people can satisfy their needs, which Lefebvre identifies as "social" and "anthropological", "opposite" and "complementary" needs: of intimacy and openness, of encounter and solitude, of security and adventure (Lefebvre, 1968).

Building the city as a product means building a banal city, whose use is standardized. The right to the city is a collective right (because the city is made up equally of space and social relations), second level (because it encompasses several rights, such as housing, play, opportunities), claiming (because it is based on the use and appropriation, or the possibility of using a good regardless of its ownership).

1.4.1 The right to the city in contemporary society

Since it was written, The Right to the City has changed social relations, the basis of the economy and the construction of urban space. If Lefebvre's city was the city of industrial capitalism, with the standardization of buildings, the contemporary city is that of financial capitalism. Municipal administrations tend to do large projects of international resonance, or organize large events, investing in them the resources they have or using public-private partnerships.

The lack of a collective design and the phenomena of gentrification, have reduced the general urban quality, building oases of quality reserved for people to whom it is sold as a 'real estate product' that can guarantee a status: "This is a world in which the neoliberal ethic of an intense proprietary individualism can become the model for the socialization of human personality" (Harvey, 2012).

If on the one hand there is a reformist recognition of the right to the city, on the other hand a radical declination has emerged, which moves from appropriation as an act in opposition to private property. The radical concept is since the city is a

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[9] The city and urban reality depend on use value. Exchange value, the generalization of the commodity produced by industrialization tend to destroy, by subordinating it, the city and urban reality, receptacles of use value, germs of a virtual predominance and a revaluation of use." (Lefebvre, 1968)

collective work, which belongs to its inhabitants, thus referring to that "right to use" of which Lefebvre speaks in his original definition.

Right to the city means right to the production and use of the city, a right in many cases denied by the ownership and closure of spaces. The right to the city therefore becomes a radical and reclaiming right insofar as it legitimizes movements of appropriation, re-appropriation, and modification of urban spaces.

The right to the city is "purposeful" (Harvey, 2012), that is, not exclusive, but reserved for all those who are dissatisfied with the current urban condition and is only achievable through an alliance between groups. "Does not demand all rights for all people" is not a generic demand for human rights for all is, instead, "The right to the city, not rights to the city."

In Harvey's words, "The right to the city does not end with individual freedom to access urban resources but is the right to change ourselves by changing the city. The right to the city becomes an issue that can federate the different instances of urban movements, the city being the end of the clash between the hoarders and the producers/appropriators of urban space. In this sense, Harvey argues that "Lefebvre was right in arguing that the revolution would be urban, in the broadest sense of the term, or not at all."

2 Comparison between different city models

Future urban design must address technology progress as well as the notion of sustainability as a feature of the next-generation city. What role does technology innovation play in the smart city's urban governance process? And what exactly does "urban sustainability" imply?

The employment of technology in the urban setting refers to the collecting of the vast amounts of data generated and their functional use in providing inhabitants with quick and efficient services. It is predetermined to pursue efficiency goals typical of government management. It has also been noted that when new technology become more widely available, urban systems increase proportionally.

The infrastructure element arises to construct a model of citizen interaction and conversation in the urban fabric, which must be linked to the element of data exploitation and collecting (big data) that emerges in the urban environment. Big data has evolved into a type of urban government, allowing authorities to manage human behavior and distribute resources. The capacity of machines to interpret, store, and analyze acquired data enables algorithmic governance. This means that the purpose is to create an algorithm that collects data in a way that supports, or does not support, a model of the strategy being pursued. However, e-governance needs an infrastructure and knowledge base.

Furthermore, others argue that a city's smart character is determined by a local government's ability to form public-private partnerships. In this regard, the collaboration between Waterfront Toronto and Sidewalk Lab[10], as defined by a Master Innovation and Development Plan (MIDP), for the planning of a new district in Toronto that is both sustainable and accessible, combining an innovative urban approach with the use of new technologies, is an interesting case.

Planning can be defined as sustainable if it succeeds in reconciling urban and environmental needs, analyzing, on the one hand, the knowledge of the elements that characterize the environment and, on the other, it is possible valorization, through plans that know how to manage resources.

2.1 Smart city

The smart city concept is defined by several qualities, including a key role for technology, urban government with specified goals, and collaboration with public and non-public players. The reasons for a city's desire to be "smart" are numerous, but three primary ones may be identified. To begin with, investing in technology necessitates the adoption of a more ecologically friendly policy, a task that has recently been a top concern for cities. Second, taking a strategic strategy involves attracting new investment and bolstering the local economy. Finally, all of this contributes to a rise in citizen quality, both socially and in terms of health.

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[10] *Innovation and Funding Partner Framework Agreement: Summary of Key Terms for Public Disclosure,*Sidewalk Toronto (Nov. 1, 2017)

To these motivations can be added other, more specific ones, adopted by some cities such as Barcelona (to improve administrative efficiency), Turin (to participate in EU calls for funding) and Vienna (to promote innovation).

Two opposing forces may be found in the quest for a smarter city. On the one hand, there's a suspicion that technology's usage isn't so neutral, and that it comes with implicit policy judgments and expectations. Do people in charge of the city's development process, on the other hand, have the necessary expertise to make the greatest judgments for residents? This topic is particularly pertinent in regions where there is a significant divide between digitalization specialists and end users. As a result, the smart city strategy advocates an urban governance model that includes all stakeholders, including local governments, private businesses, and people.

Those who feel that a city may be really "smart" if it considers all the interests and goods that come from a larger understanding of urban planning favor the implementation of multi-level policies. This includes so-called differentiated interests (landscape, environment, soil protection, etc.) for which some argue the need for a different planning method that flexibly shifts competence from time to time to the local, regional, or state administration closest to the care of that interest, overcoming municipal planning's strict reserve.

2.2 Sharing city

The term "sharing economy" includes a series of initiatives aimed at finding new ways to promote sustainability. Three characterizing elements can be identified: the presence of a PSS - product service system, of a redistributive market and of a collaborative vision of reality. The concept concerns the individual or organized exchange of information, goods, services, and talents. The project of the city of Seoul is exemplary. It has decided to adopt an urban governance strategy to strengthen communication and collaboration with citizens. From a regulatory point of view, it is interesting to note the "Seoul Metropolitan Government Act for Promoting Sharing"[11] in which we find the definition of the term "sharing" as the shared use of spaces, objects, or information to enhance their economic, social, or

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[11] Seoul Metropolitan Government Act No. 5396 (31 December 2012)

environmental value, regarding the benefits and conveniences of citizens" and at the same time encourage shared resources.[12]

The advances address the government's transformation into an "open administration," with an online platform that allows individuals to access public data and voice their opinions on papers and administrative activities. The construction of a Social Network Service (SNS) also serves as a vital point of connection with residents and aids in the formation of Seoul's "collective governance." Second, we must note the Sharing Cities project, which tests how new technologies concretely implement urban realities in three distinct cities (Milan, London, and Lisbon). For example, in Milan, the project seeks to improve energy efficiency, urban transportation sustainability, and greenhouse gas emissions by using a demonstration area as a model to provide a higher quality of life.

2.3 Eco city

Another strategy, known as Eco-City, is to create a city that invests in renewable resources and long-term urban development. The fundamental issue that emerges is how to put sustainability plans into effect. Howard's research on the «Garden city» as a model of harmonious and coordinated growth between the city and environment, whose implementation and aims may be pursued through an integrated planning strategy, are the source of the philosophy.

Ecological planning is defined as a strategy for achieving a sustainable city that can mediate between human activities and environmental processes. A city may be considered really «eco» if it does not consume more energy than it generates, creates less garbage than it can absorb, and so on. On the one hand, there is a widespread lack of knowledge of the relevance and extent of the issue of sustainability, and on the other hand, there is an insufficient infrastructure system focused on the sector rather than concentration and integration that is impeding the growth of this model.

The model's main characteristics are thus: planning as an essential element of eco-strategy, investment in ecological mobility, human awareness of the natural

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[12] C. IAIONE, *Governing the urban commons*, in IJPL, 1, 2015

environment that surrounds and characterizes the development of cities, an economy and industry devoted to sustainability and ecology, and social sustainability (understood as the absence of social conflicts).

2.4 Co city

The collaborative city (Co-city) concept builds on the experience of the Sharing city by analyzing and expanding about cooperation. According to this perspective, to successfully solve the difficulties, today's and tomorrow's cities must engage in collaboration and polycentric government. In this context, the quintuple helix theory is developed, according to which a smart city's urban government is collective, i.e., made up of at least five subjects: public administrations, private institutions, and cognitive institutions, as well as civil society, whether individual (active citizens, digital or urban innovators, etc.) or organized.

The founding principles of the co-city project are the presence of an enabling state/local administration that supports the local community in the development of urban ideas and projects; collective governance, as mentioned above, characterized by the presence of different stakeholders; a participatory and open economy creating new opportunities; urban experimentation as an innovative approach to define urban rules and policies, which therefore start from concrete cases; finally, the presence of a digital infrastructure that facilitates access, participation and social cohesion aimed at identifying processes of cooperation and co-creation of common goods.

Moreover, the co-city method was developed from the studies on the concept of common good by Nobel Prize winner Elinor Ostrom "Governing the commons"[13] which provides a different solution to that proposed by Garrett Hardin in the so-called tragedy of the commons[14].

The social community of reference, which takes care of the commons in a collaborative and self-organized manner, is a variable not considered by Hardin, but which is at the heart of Ostrom's research. The "common" goods are, therefore,

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[13] E. OSTROM, *Governing the commons,* Cambridge University Press, Cambridge 1990, 15
[14] G. HARDIN, *"The Tragedy of the Commons",* Science, vol. 162, 1968, 1243-1248

such because they are closely linked to identity, culture, and traditions of the territory, regardless of their public or private ownership[15]. They are recognizable based on a series of characteristics: universal usability and community involvement in activities connected to it and its maintenance.

The development of the so-called Co-city is a gradual one. There are six distinct stages that have been recognized. A first phase of low-cost talking to identify the common goods of a place and the community of reference, and thus to establish an initial network of relationships; a second phase of mapping the gathered experiences and defining a first line of experimental intervention; and a third practical phase whose main goal is to find a collaborative form between the community's projects and the local authorities. The goal of the fourth step, prototyping, is to define an innovative governance that represents the results of the previous phases and is tested in its outcomes.

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[15] C. IAIONE, *Città e beni comuni*, in *L'Italia dei beni comuni*, a cura di C. IAIONE E G. ARENA, 2012

CHAPTER 2
FROM THE KYOTO PROTOCOL TO THE PNRR

Abstract

Over the past few decades, cities have shown high levels of ambition about climate action. But accounts of their potential have often stopped short of a systematic valuation of the nature and impact of this networked dimension of this action. The pandemic has raised questions about the social model for many European citizens. The denial of the climate crisis has obscured the extent of industrial restructuring, the transformation of agricultural production models and the redevelopment of urban areas. The perception of the environmental costs of economic growth for the least advantaged and most precarious groups in Europe is becoming real. This integration is emerging as the condition for the success of the transition and the Green Deal.

The parameters of this green pact vary from continent to continent, from country to country, and even from city to city, but some parameters remain: distributed leadership allowing for better citizen participation, a variety of actors engaged beyond the political sphere, a multi-thematic project, a desire to bring more and more citizens together. These pacts are political vehicles that can help our societies move forward, not only on climate, but also on issues of discrimination, economic inequality, and identity conflicts. They are about changing political mores, putting collective deliberation at the centre, to reflect on changes in the economic paradigm, representations of the common good and progress, and to develop social projects based on concrete problems to be solved, such as spatial planning, energy, transport.

1. Which are the issues that cities must face

More than half of the world's population presently lives in cities, with cities and their surrounding areas anticipated to account for 80% of the population by 2050. Cities and urban areas are hubs of economic activity, knowledge development, innovation, and new technology, as well as locations where people's quality of life may be felt immediately.

Climate change is causing problems in cities. Flooding, heat waves, droughts, and other extreme weather events have a physical impact on metropolitan areas and infrastructures, as well as on city people' health and mortality. They can also have an indirect impact on urban communities and economies by destroying essential assets and increasing uncertainty about the future, both of which reduce faith in social and financial capital investment. Inequalities in socioeconomic position should be viewed as a major roadblock to long-term urban regeneration. Rising energy and resource competition, along with the effects of climate change, is expected to disproportionately affect the poorest and most vulnerable people on a worldwide scale.

This is especially true in Europe's cities, where inequalities are widening due to a variety of demographic and economic factors, such as aging (with many elderly people less able to cope with environmental impacts), increasing ethnic diversity, and rising numbers of people living in poverty or social exclusion. These developments are inextricably linked, resulting in different environmental risk configurations in each city.

It is acknowledged that democratic countries' urban regeneration projects should involve governance mechanisms that engage a wide range of stakeholders, including citizens and other civic communities of interest. On the other hand, we constantly encounter unresolved tensions between what local communities want for their neighborhoods and what municipal officials want for their districts. Cities also serve as a hub for decarbonization efforts in energy, transportation, buildings, and even industry and agriculture. Because of their higher density of usage and infrastructure, cities offer a greater potential for cross-sectoral integration and sophisticated infrastructures such as smart grids. Cities also have better access to funding and knowledge, as well as the capacity to create the economies of scale needed for piloting and scaling up breakthrough ideas.

As a result, cities must deal with the climate issue. It must also be addressed by including citizens who are not just political participants in a government framework, but also users, producers, consumers, and owners. They may have a great influence on the environment and play an active part in their local

communities, associations, and houses in these capacities, accelerating the climate transition and enhancing the economy and the environment. Citizens and civil society must be given larger responsibilities, more platforms for action, and greater resources for the Mission to succeed.

Furthermore, cities have an important role in creating and delivering technical and social breakthroughs, as well as having an influence on the environment. As a result, they must embark on significant systemic transformative and dramatic changes to sustainability and carbon neutrality as soon as possible. The contribution—considering that the concepts of community resilience and urban transition have changed because of COVID-19—critically discusses innovative frameworks and funding opportunities that Horizon Europe will put in place to boost sustainable urban areas in Europe, driving a transition to 100 Positive Energy Districts and 100 climate-neutral cities by 2030.

Sustainable development of urban areas has become the prime challenge in the area of "Secure, clean and efficient energy", promoting transition to a competitive energy system around specific objectives such as energy consumption and carbon footprint reduction; low-cost and low-carbon electricity supply; a smart European electricity grid; alternative fuels and mobile energy sources; innovative knowledge and technologies; market uptake of energy and ICT innovation; robust decision making and public engagement.

1.1 The Kyoto Protocol

Europe is one of the world's most densely inhabited and industrialized areas, with the most extensive and concrete regulatory rules on environmental accountability (Fach Gomez, 2017; Wagner, 2009, Hinteregger, 2008) and a pioneer in renewable energy. They fully aim to confine their compliance to an endorsement of the objective and principle of greenhouse gas reduction without committing to any meaningful sanction's regime, based on their experience with voluntary and nonbinding recommendations approved by the other 156 UN Member States.

Only 79 of the minimum 144 countries have ratified the Doha Amendment pertaining to the Kyoto Protocol's second commitment period (United Nations Framework Convention on Climate Change, 2017). The Doha Amendment creates additional commitments for parties, updates the list of greenhouse gases, and modifies numerous Kyoto Protocol clauses.

The Kyoto Protocol has had a relatively modest impact on greenhouse gas emissions, according to scientific agreement (Clark, 2012). Its only relevance stems from the fact that Kyoto was the initial step in a decades-long succession of worldwide efforts to stabilize the climate system (Wigley, 2006). While the protocol's notion of national objectives has sparked debate, it does provide several flexibility options (international emissions permit trading, Joint Implementation, and so on).

Kyoto and preceding UNFCCC targets place a heavy emphasis on carbon emissions (UN Treaty Collection, May 9, 1992), and consequently on fossil fuels, providing perverse incentives. For starters, it opposes renewable biofuels, which emit carbon dioxide (Gray, 2010). Second, states with poor geographic locations for natural energy sources like solar, geothermal, and hydrothermal will be encouraged to migrate to nuclear power (Moniz, 2011).

Albeit nuclear power facilities do not produce considerable amounts of carbon, their dangers (while debatable) can have catastrophic short- and long-term implications (Nuclear Energy Institute, 2015, March; Bell, 2014,). Nuclear energy has been phased out by powerful industrialized nations, not least because it externalizes the costs and dangers of nuclear fuel reserves, as well as the costs and risks of nuclear weapons.

Governments have all vowed to curb global warming during the previous several decades. Countries pledged to decrease greenhouse gas emissions under the Kyoto Protocol and the Paris Agreement, but the quantity of carbon dioxide in the atmosphere continues to rise, warming the Earth at an alarming rate. Scientists warn that if global warming continues unchecked, most of the globe would face environmental disaster, including massive sea-level rise, record-breaking droughts and floods, and widespread animal extinction.

Recognizing the existence of several climate contracts indicates a pluralist or decentralized strategy to addressing climate change, as opposed to a unitary or comprehensive model that focuses on a single overarching regulatory framework to regulate climate change and its impacts on a global scale. The problem of climate change is conceived as one of a global common: climate change; greenhouse gases cause an overall warming or heating of the mean temperature of the atmosphere oceans.

According to scientists, this is mostly due to human actions such as burning fossil fuels and deforestation during the previous 150 years. These activities have resulted in a significant rise in the amount of heat-trapping greenhouse gases in the atmosphere, principally carbon dioxide, causing the planet to warm. The Intergovernmental Panel on Climate Change (IPCC), a UN organization founded in 1988, evaluates the newest climate research on a regular basis and provides country-specific assessments based on consensus. Officials have disputed which countries—developed or developing—are more responsible for climate change and, as a result, should reduce their emissions since the first climate negotiations in the 1990s.

Developing countries contend that, over time, affluent countries have released more greenhouse gases. They argue that because they were allowed to build their economies without restriction, these wealthy countries should now shoulder a greater share of the responsibility. Indeed, the US has produced the greatest emissions of all time, followed by the European Union (EU). China and India, along with the United States, are now among the world's top yearly emitters. Developed countries have argued that they must act sooner rather than later to combat climate change.

The way major climate accords approach carbon reductions have changed. Only rich nations were compelled to decrease emissions under the Kyoto Protocol, but the Paris Agreement acknowledged climate change as a global issue and called on all governments to establish emissions targets. The Kyoto Protocol was the first legally binding climate accord, signed in 1997 and coming into force in 2005. It established a framework to track nations' progress and required rich countries to cut

emissions by an average of 5% below 1990 levels. However, the pact did not oblige emerging countries, such as China and India, to act.

With the benefit of hindsight, Kyoto's purpose was to lower the bar so that consensus could be attained. It was more about public relations than it was about coming up with practical answers. The Paris Pact, the most major global climate agreement to date, compels all nations to make emissions-reduction commitments. Governments established objectives, known as nationally determined contributions (NDCs), with the goal of keeping global average temperature at 1.5°C and preventing it from reaching 2°Cover preindustrial levels. It also aspires to achieve worldwide net-zero emissions in the second half of the century, where the quantity of greenhouse gases emitted equals, the amount removed from the atmosphere.

Countries are required to examine their progress toward implementing the agreement every five years through a procedure known as the global stock take, with the first one scheduled for 2023. Countries set their own goals, and there are no systems in place to guarantee that they are met. The issue of climate change is viewed as a worldwide concern. The Kyoto Protocol, the most widely endorsed policy response to the problem of global climate change, is based on Hardinian logic of the tragedy of the commons and its prescription of "mutual compulsion".

A global and comprehensive approach to climate change seems to make sense. It appears to be the first-best solution to the problem of climate change. There are many real-world complications that reduce the appeal of these first best comprehensive solutions. To propose that it is somehow possible to establish a comprehensive solution of "mutual coercion, mutually agreed upon" at this scale is mind-boggling. International law has been used to address some global environmental problems, such as the phase out and banning of ozone-layer-depleting chemicals or reserving Antarctica against mineral or other exploitations. But it is incapable as a practical matter of adopting and implementing a far-reaching comprehensive regulation of the issue.[16]

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[16] Orts, Eric W. "CLIMATE CONTRACTS." Virginia Environmental Law Journal, vol. 29, no. 3, Virginia Environmental Law Journal, 2011, pp. 197–236, http://www.jstor.org/stable/24789320.

1.2 Background of the Paris Agreement

The Paris Agreement is a multilateral agreement aimed at spurring better worldwide action on climate change. One of its main goals was to "enhance the implementation" of the UN Framework Convention on Climate Change ('UNFCCC') by limiting long-term global average temperatures to "well below" two degrees Celsius above pre-industrial levels, and for parties to pursue efforts to limit temperature increases to 1.5 degrees Celsius. The agreement also intended to boost efforts to adapt to the effects of climate change in ways that did not jeopardize food supply. It also urged parties to encourage finance flows that are compatible with attaining low-emission development paths. [Art 2(1)][17]

The Agreement is an add-on to the United Nations Framework Convention on Climate Change (UNFCCC), which was signed in 1992. The agreement was supposed to start once the second commitment period of the Kyoto Protocol ended in 2020. However, after receiving ratifications from more than fifty-five countries, accounting for more than 55 percent of global emissions, it entered into force early on November 4, 2016. Some have lauded the agreement as a "historic turning point" (Warrick and Mooney), as well as the "world's greatest diplomatic success" (Harvey). Some civil society and environmental groups, on the other hand, have criticized the Agreement, calling it an "epic fail on a global scale" (Chivers and Worth).

The Agreement had several legal and institutional characteristics that set it apart from previous international climate agreements. First, it was intended to function as a legally binding instrument—albeit one with major non-binding elements—that gave its parties a great deal of leeway in determining and carrying

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[17] This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:
(a) Holding the increase in the global average temperature to well below 2°C above pre- industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre- industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.
(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and
(c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

out their treaty responsibilities. This contrasted with non-binding agreements like the Conference of the Parties Decision 2/CP.15 on the Copenhagen Accord.

Unlike the Kyoto Protocol's emissions reduction objectives, which exclusively applied to developed nations, the Agreement stated similar basic commitments that apply to all parties, regardless of whether they were otherwise categorized as 'developed' or 'developing' countries. The agreement had a 'bottom-up' strategy, in which national policy is "reflected rather than driven" (Roberts).

Implementation of the Agreement was intended to occur through a range of new and existing institutional arrangements. It established a new mechanism to 'contribute to the mitigation of greenhouse gas emissions and support sustainable development'. [Arts 6(4)–6(7)] As was the case with the new mechanism's predecessors—the Clean Development Mechanism ('CDM') and Joint Implementation ('JI'), both under the Kyoto Protocol—parties envisioned that this Agreement would generate emission reductions that another country could potentially use in fulfilment of its NDC.

The new sustainable development mechanism ('SDM') under the Agreement, unlike the CDM, was not confined to project-based reductions. Rather, its potential for generating tradable emissions reductions was expanded to include a wider range of greenhouse gas mitigation policies or initiatives. It might also provide fungible offsets for carbon reductions in both rich and developing nations, thereby integrating the CDM and JI functions. The parties were given the job of designing a supervisory body for the new SDM, as well as norms, modalities, and processes, based on the previous mechanisms' experience.

The topic of offering financial aid to underdeveloped nations to help them shift to low-emission development paths was equally contentious. Nonetheless, the Agreement did not significantly modify pre-existing climate financing institutional frameworks. It repurposed the UNFCCC's Financial Mechanism—along with its 'operational organizations,' the Global Environmental Facility and the Green Climate Fund—as its financial mechanism. The agreement also aimed to make these organizations more efficient. It recommended that 'approval procedures' be simplified and that'readiness support' be improved, particularly for poorer nations.

Similarly, the UNFCCC's Technology Instrument—which featured a Technology Executive Committee as well as a Climate Technology Centre and Network—was repurposed as the key mechanism for the development and transfer of low-emissions technology under the Agreement.

The Agreement offered each side great leeway in their conduct, allowing them to be led by their "diverse national circumstances." Some critics suggested that this signaled a shift away from the Kyoto Protocol's "binary" approach and toward more flexible kinds of differentiation (Bodansky). Others said that the Agreement weakened the effectiveness of earlier climate treaty compliance procedures. Indeed, the parties went to great lengths to ensure that they had plenty of leeway to avoid making precise promises and that the penalties for non-compliance were minimal. The institutional architecture of the Agreement did not foresee consequences or compel corrective actions against governments that aimed merely to take minimum steps to cut their emissions, or that did not comply with the Agreement's requirements.

The Agreement, unlike the Kyoto Protocol's compliance mechanism, did not establish any enforcement framework with the authority to impose fines on governments that failed to meet their responsibilities. Rather, the Agreement intended for treaty commitments to be implemented and enforced by an 'expert-based and facilitative' body. The committee would provide non-compliant parties with recommendations based on the CMA's 'transparent, non-adversarial, and non-punitive' approach. The Agreement mandated the committee to pay special consideration to the parties' "respective national capacities and circumstances" while providing advice to them. Because of these characteristics, some academics have characterized the Agreement as a mix of "hard, soft, and non-obligations" (Rajamani).

1.3 Policy Implications of the Paris Agreement

Urban climate change governance in the post-Paris era is increasingly about experimentation or testing innovative technologies and policies 'on the ground'. This is associated with increasingly complex patterns of city networking and driven by priorities going beyond those of the UNFCCC regime. Understanding this new

mode of governance as distinct from conventional local climate policy is necessary to harness its potential for global climate change governance.[18]

Cities alone will not be able to "rescue the earth." As a counterpoint to 'scaling out' as horizontal replication of experiments between cities, there must be a greater focus on vertical 'scaling up' urban climate change experiments to affect regional, national, and global policy.

Vertical links between players at different governance levels, including information and money flows, must be developed to enable paths for 'scaling up' urban experiments, such as through the UN New Urban Agenda's National Urban Policies framework.

Beyond technical 'solutions' to climate change, the social justice implications of the sorts of urban settings generated through experimentation must be explored more thoroughly. Experimenting with urban governance and politics has a lot of potential for reconfiguring urban systems to achieve climate change mitigation and adaptation, and city leaders should take advantage of it.

2. The city as a starting point for the European Union

The urban component has been the starting point for a European strategy that recognizes the role of cities in the Union's future growth throughout the previous decade. Europe is one of the world's most urbanized continents, with more than two-thirds of the European population residing in cities, and this trend is certain to continue.

Investing in what are seen as the European economy's engines implies helping the EU's development and growth. European strategies, on the other hand, assume that the biggest obstacles and issues to be solved are in cities. In addition to population growth, the stagnation of the slowly recovering economic environment, disparities in treatment and income, social polarization, and the rise in poverty, as well as uncontrolled urban development to the detriment of ecosystems, are the main problems of contemporary urban areas.

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[18] CIT DOC

At the European level, there is a lack of specific provisions in the Treaties that recognize the institutions' competencies in urban policy. Therefore, it is through documents such as the Leipzig Charter and the Toledo Declaration, as well as through acts of soft law, that a hard core of European urban principles is defined.

The objective is to build a city that is both sustainable and supportive of its residents. Cities play an important role in the European development strategy "Europe 2020." Creating a new urban government that takes into consideration the new demands of democracy, particularly the participatory dimension, is one of the major problems. As stated in the Commission's "Cities of the Future" statement, it is critical that these new governing structures be capable of adjusting to changing circumstances.

The Commission, moreover, has been invited by the UN Human Settlement Programme (Habitat) to make its contribution to a global debate on the future of urban development.[19] And in this context, The Commission has weighed in, highlighting the need of a European Urban Agenda. The latter would help the EU reach closer to its residents by improving the quality, efficiency, and effectiveness of urban programs through improved coordination. The so-called Amsterdam Pact, which was agreed on May 30, 2016, and establishes the principles of the new EU Urban Agenda, is relevant here. The realization of the defined objectives, which revolve around the completion of 12 partnerships with critical difficulties for urban areas as its focus, would require a deeper understanding and the search for new channels of funding and regulation.

Circular economy, local economy jobs and professional skills, climate change adaptation, energy transition, sustainable land use and nature-based solutions, urban mobility, digital transition, innovative and responsible public procurement, migrant and refugee integration, air quality, and urban poverty are some of the topics covered. Cities, Member States, EU institutions, and relevant stakeholders can work together to find solutions to the above concerns through partnerships.

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[19] Conferenza delle Nazioni Unite sull'housing e sullo sviluppo urbano sostenibile, HABITAT III, 2016

2.1 The European green deal, according to the European commission

Achieving the European Green Deal requires rethinking clean energy policies in all sectors of the economy: industry, production and consumption, transport, agriculture, buildings. To achieve these goals, it is essential to increase the value placed on protecting and restoring natural ecosystems, on the sustainable use of resources and on improving human health. This is where profound change is needed and potentially most beneficial to the EU's economy, society, and natural environment. The main objective is to do one's part to limit the increase in global warming, which, according to the estimates of the UN Intergovernmental Panel on Climate Change, must remain within 1.5 °C in order not to cause enormous damage to the planet and thus to the human species. Other more specific objectives follow on from this main objective.

The first will be to clean up electricity production, which currently accounts for 75% of greenhouse gas emissions in the European Union. It means boosting the spread of renewable energies and stopping incentives for the use of fossil fuels: this will be a problem especially for Eastern European countries, where the spread of renewable energies is still limited. Poland still obtains 80% of its electricity from coal, one of the most polluting fuels still in circulation: therefore, it is the only country that has not yet officially agreed to reduce its net emissions to zero by 2050.

Another objective will be to make a whole range of human activities that currently consume a large amount of energy or produce too much pollution more sustainable: i.e. to introduce new rules for building or renovating houses and industries around Europe, to make production processes less polluting, to increase public and rail transport, to promote biodiversity - i.e. physically protect forests and animal species from extinction - to make the circular economy even more widespread, and to reserve a set share of European funds for sustainable initiatives.

The EU relies on European industry to lead the transition to climate neutrality and digital leadership. The aim is for EU industry to become an accelerator and driver of change, innovation, and growth. The Council followed up on its May 2019 conclusions by presenting a vision for European industry in 2030. Recovery should be equitable and based on the principles of competitiveness, single

market integration, sustainability, cohesion, inclusiveness, solidarity, circularity and environmental protection and respect for social standards. Decoupling economic growth from resource use and moving towards circular systems of production and consumption are key to achieving EU climate neutrality by 2050.

Therefore, the European Green Deal emphasises the need to take a holistic approach in which all EU actions and policies contribute to the Green Deal's objectives. Furthermore, all current policies related to the goal of climate neutrality will be reviewed and, where necessary, revised as part of the Green Deal, in line with the climate ambitions.

In the 'traditional' climate and energy pillar, it means increasing climate ambition, changing the source of our energy, creating a circular economy, constructing, and renovating our buildings, accelerating the transition to sustainable mobility, developing a new food system, preserving biodiversity, and removing toxic substances from the environment. In addition to these traditional climate action policies, the Green Deal promises to promote green finance and investment and to ensure a just transition, to green national budgets and send the right price signals, and to activate education and training.

The EU has introduced a Just Transition Facility to provide financial support and technical assistance to the regions most affected by the transition to a low-carbon economy. With a total budget of EUR 17.5 billion, the Just Transition Fund is the first pillar of the mechanism. The JTF provides tailor-made support to mitigate the socio-economic costs of the green transition for regions dependent on fossil fuels and high-emission industries. It supports investments in research and innovation; clean energy technologies and emissions reduction; retraining of workers and job search assistance. The EU will continue to promote the Paris Agreement and multilateralism, engage all its partners to accelerate climate action, use trade policy as a platform for dialogue on climate action and continue its commitment to an international financial system that supports sustainable growth.

The Green Deal, being an economic and technological project, but also a social and international policy project, is a rallying point and a concrete direction for the European project. By setting itself the objective of coherence for all policies implemented, the Green Deal becomes the standard of measurement and reference. This is a logical development, given the scale and scope of the actions to be undertaken, but it is also a real revolution in European governance. For the notion of a European Green Deal to work it must inspire international, European, national, regional, and local actions. It is about creating new reference points and enabling every level of decision and action to contribute to the common goal. The Green Deal is a metamorphosis of European identity, a new definition that reflects the aspirations of its citizens.

2.3 Reconciling social and climate justice

The consequences of the COVID-19 crisis are not yet fully visible. However, pre-existing inequalities have been reinforced by the crisis, particularly for the most vulnerable individuals. The European Green Deal, as a project for society, must anticipate the impacts and accompany the rapid changes in all sectors, and this is the major difficulty. In general, the decarbonisation of the European economy and the reduction of greenhouse gas emissions to zero have known technical scenarios: zero-carbon energy production, electrification of energy use, changes in agricultural and food practices, recycling of resources, etc. These scenarios lead to economic upheavals. These scenarios lead to economic and social upheavals: industrial restructuring, the need for new infrastructure, occupational transitions, a different distribution of wealth in the economy.

Further decarbonisation of the energy system is key to achieving the 2030 and 2050 climate targets. An energy sector largely based on renewable sources needs to be developed, with the simultaneous rapid phase-out of coal and decarbonisation of gas. In line with the Energy Union Governance and Climate Action Regulation, these plans should include ambitious national contributions to the EU targets. The transition to clean energy should involve consumers and benefit them. The decarbonisation of the gas sector will be facilitated by improving support for the development of decarbonised gas through the design of a competitive

decarbonised gas market and measures to address energy-related methane emissions. The transition to climate neutrality also requires smart infrastructure.

The Green Deal is a new promise: taking a social approach to the ecological transition is not simply about anticipating the negative effects of public policies or checking that they are working properly. It is about anticipating the problems that will impact citizens during the transition – whether they are related to the climate transition or not. It is a question of discussing the social foundations and conditions for society's acceptance of this future at a time of historical reorientation of the economic and technological system. This debate is at the same time European, national, and local, and must be conducted on the different scales, without opposing them.

2.4 Integrating climate action definitively into macroeconomic policies

The issue of European budgetary governance is of great importance and can have a long-term impact on climate action. The Green Deal and its means of implementation have macroeconomic consequences and depend on decisions and rules that lie outside climate and energy policies. The Resilience and Recovery Fund was a response, as was the creation of the Just Transition Fund. The question that arises is that of its repayment and the status of the debt of European eurozone countries. The transition to climate neutrality requires investments in infrastructure that will weigh on public budgets and in one way or another on taxpayers. Climate is considered 'macro-critical', as Christine Lagarde has said. This belief is more shared by academic macroeconomists and central bankers. The problems are no longer just sectoral; to solve them, the ecological transition mobilises resources on a large scale and makes large transfers.

Following the economic support measures implemented by European countries during the Covid-19 pandemic, this debate is taking on new dimensions. The Franco-German initiative for a joint recovery plan led to the creation of a fund of more than EUR 800 billion available to the Member States. The possibility for the Commission to borrow money on the markets to finance the recovery plan has broken taboos and demonstrated real solidarity between European countries.

The macroeconomic implications of the transition to a climate-neutral economy have not been sufficiently considered. If economic growth continues in Europe, there is no doubt that its composition will change. Will there be a reduction in private consumption and an increase in public and other investments? Where will the resources to finance these investments come from? From the increasing use of carbon tax mechanisms?

In their publication last September, Zsolt Darvas and Guntram Wolff showed that European governments have not yet been able to reconcile an investment programme capable of implementing the Green Deal with deficit consolidation.[20] To overcome this dilemma, the authors examine three solutions: 1. a general relaxation of the rules, 2. the creation of a centralised European investment capacity to finance the transition through the markets, 3. the removal of green investments from sovereign debt accounting, a solution that would safeguard this necessary expenditure. It is an entire debt philosophy that needs to be rethought, at a time when younger generations are clamouring for climate policies to preserve their future.

The debate, as posed by Darvas and Wolff, must also include the political dimension. Citizens have little confidence in the future and in their governments. Yet this confidence is the basis for the consent to taxation. Budget consolidation will be achieved by increasing taxes. At the same time, extending carbon pricing to areas that affect citizens, such as transport and heating, risks creating the impression of a one-way policy. Citizens would only be good for paying and repaying debts. It is necessary to create an agreement with citizens, to discuss the fairness and equity of contributions and the collective priorities on the common goods to be provided. The compromise for the future must be handled with collective deliberation. There is a risk that rising energy prices and taxes, coupled with a lack of opportunities in the labour market, will be blamed on climate policies.

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[20] Zsolt Darvas et Guntram Wolf, « A green fiscal pact: climate investment in times of budget consolidation », Policy Contribution, Vol. 18, Septembre 2021, Bruegel.

2.5 Towards a diplomacy aligned with the European Green Deal

The European Green Deal implemented in the Member States will have real economic repercussions both at the level of citizens and internationally. It offers a great opportunity for Europe to demonstrate its climate leadership on the world stage. Since COP21, carbon neutrality has become a benchmark for governments, local authorities. In September 2020, Chinese President Xi Jinping followed suit, announcing China's goal of carbon neutrality by 2060 and the achievement of peak emissions before 2030. While references to carbon neutrality by mid-century are increasingly widespread, most suffer from a lack of precision on trajectories to achieve this goal, which is at the heart of the Paris Agreement. To date, more than 100 countries have committed to achieving carbon neutrality by 2050, according to the 2015 Paris Agreement. However, the new targets (NDCs) for 2030 would lead to a 16% increase in global emissions compared to 2010. This compares to the 45% reduction needed to have a chance of keeping the global temperature rise below 2°C.[21]

The Green Deal is currently the most precise decarbonisation pathway project of the three major global polluters. It gives the EU the means to show leadership in climate diplomacy. The available political resources are mobilised by the internal negotiation of the Green Deal, whose diplomacy is needed to make it possible, since it implies a reorganisation of many financial and trade relations. To understand the magnitude of the ongoing transition, almost three-quarters (72.2%) of the EU's total energy needs are currently covered by fossil fuels and three-fifths (61%) of the EU's energy is imported. To achieve a 55% reduction in emissions by 2030, the EU will have to undertake a radical overhaul of its energy dependencies, with profound implications for its diplomatic partners. This is the case for Mediterranean, Balkan, and Central Asian countries.

The Ready for 55% package includes a proposal to revise the Directive on the promotion of renewable energy. It proposes to introduce or increase sub-targets and sectoral measures in all sectors, with a particular focus on those sectors where

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[21] Framework Convention on Climate Change, « Nationally determined contributions under the Paris Agreement. Synthesis report by the secretariat », 17 septembre 2021.

progress in integrating renewable energy has been slower so far, namely transport, buildings, and industry. EU energy ministers welcomed, during the December Energy Council, the progress made on the proposal in the Council, based on a report prepared by the Slovenian Presidency. They discussed the balance between the need to support the potential of renewable energies as cost- efficient energy sources and the need to recognise national circumstances and different starting points.

The Green Deal sets a target of 40% renewable energy by 2030, up from 20% today. A significant part of European energy will come from imports, requiring new partnerships with neighbouring countries and beyond. Combined with the planned application of the Carbon Border Adjustment Mechanism (CBAM) to these energy imports, this dynamic will have regional and global knock-on effects.

Due to World Trade Organisation rules, the CBAM will only be applicable to primary industrial products (steel, cement, fertilisers, or aluminium) for which 'carbon leakage' is a real risk. In the Commission's proposal, the mechanism would mainly concern Russia, Turkey, Korea, India, and China. The CBAM and the extension of the carbon market to aviation and maritime transport have the merit of putting a spoke in the wheels of the free riders of climate action. The EU needs to explore opportunities for positive international cooperation - support for transition, standards for measuring carbon content, markets for carbon neutral products, etc. - with special provisions for less developed countries. The Green Deal can become a powerful diplomatic tool for European leadership.

2.6 The application of the PNRR

According to estimates by the Istituto Superiore per la Protezione e la Ricerca Ambientale (Institute for Environmental Protection and Research), in 2017 12.6 per cent of the population lived in areas classified as highly dangerous for landslides or prone to flooding, with an overall worsening compared to 2015.[22] Behind the Italian economy's difficulty in keeping pace with other advanced

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[22] (Ministry of Economic Development, n.d.) p2

European countries and correcting its social and environmental imbalances is the trend in productivity, which is much slower in Italy than in the rest of Europe.

Among the causes of the disappointing productivity performance is the inability to seize the many opportunities linked to the digital revolution. This delay is due both to the lack of adequate infrastructure and to the structure of the productive fabric, characterized by a prevalence of small and medium-sized enterprises, which have often been slow to adopt new technologies and move towards higher value-added production.

The National Recovery and Resilience Plan, finally approved on 13 July 2021, envisages a series of investments and reforms in response to the pandemic crisis. This plan is envisaged for the 2021-2026 timeframe and is part of a broader framework of funding sources, including not only the Next Generation EU (EU investments and reforms in favor of ecological and digital innovation, worker training and equity) but also funding from the European Cohesion Policy for the 2021-2027 period, ordinary state resources and additional resources dedicated to interventions complementary to the PNRR. The PNRR is a programme that envisages investments and reforms to accelerate the ecological and digital transition; improve the training of workers; and achieve greater gender, territorial and generational equity.

To access funds from the Next Generation EU (NGEU), the European Union's new recovery instrument that complements the Multiannual Financial Framework for the period 2021-2027, each Member State must prepare a National Recovery and Resilience Plan (NRP) to set out a coherent package of reforms and investments for the period 2021-2026. The plan should detail the projects, measures and reforms envisaged in the policy areas under six key pillars: (1) green transition; (2) digital transformation; (3) smart, sustainable and inclusive growth, including economic cohesion, employment, productivity, competitiveness, research, development and innovation and a well- functioning single market with strong SMEs; (4) social and territorial cohesion; (5) health and economic, social and institutional resilience; and (6) policies for the next generation, children and youth, including education and skills.

The National Recovery and Resilience Plan aims to address the immediate consequences of the pandemic crisis. But not only. With the NRP, the Italian Government aims to resolve and unravel the various structural knots that have slowed national economic and social development over the last 20 years. First and foremost, the weak investment dynamic and the weak administrative capacity of the public sector, but also a series of structural factors such as income, gender, generational and territorial disparities.

The National Recovery and Resilience Plan, divided into six Missions and 16 Components, benefits from the close dialogue that has taken place in recent months with the Parliament and the European Commission, based on the RRF Regulation. The Plan's six Missions are: digitalization, innovation, competitiveness, culture, and tourism; green revolution and ecological transition; infrastructure for sustainable mobility; education and research; inclusion and cohesion; and health.

For each Mission, the sector reforms necessary for a more effective implementation of the interventions are indicated, as well as the most relevant profiles for the pursuit of the Plan's three transversal priorities, identified as Gender Equality, Youth and Territorial Rebalancing. These transversal priorities are not entrusted to individual interventions limited to specific Missions but are pursued in a widespread manner within all the Missions of the Plan.

In line with the indication formulated at the European level, the NRP proposal provides an assessment of the macroeconomic impact of the planned investment and structural reforms. The estimate is limited to considering the effect of additional investment and incentive spending with respect to that already included in the public finance trend scenario, and is based on the assumption that more than 70% of the additional funds will be allocated to financing highly efficient public investments, that most of the remaining 30% will be allocated to business investment incentives and to reducing tax contribution on labor, and that public administrations will be progressively more efficient in implementing the projects[23]

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[23] *Ibidem*

2.7 Next generation EU: resources, objectives, and strategic scope

The Covid-19 pandemic came at a time when there was already a consensus on the need to adapt the current economic model towards greater environmental and social sustainability. The pandemic, and With the National Recovery and Resilience Plan, the Government intends to address not only the immediate health, social and economic consequences of the pandemic crisis, but also the structural nodes of the Italian economy and society that have contributed to setting the country on a declining path since the early 1990s. The subsequent economic crisis prompted the EU to formulate a coordinated response, both conjunctural, with the suspension of the Stability Pact and substantial economic support packages adopted by individual Member States, and structural, with the launch in July 2020 of the Next Generation EU programme.

The NGEU initiative channels significant resources to countries such as Italy that have suffered from low economic growth and high unemployment. The NGEU programme comprises two instruments to support Member States. REACT-EU was conceived with a shorter-term perspective to help them in the initial phase of revitalizing their economies. REACT-EU has been designed with a shorter-term perspective to help them in the initial phase of the recovery of their economies. In contrast, the RRF has a duration of six years, from 2021 to 2026.[24]

The digital pillar of the NRPs must include the rationalization and digitalization of public administration and the development of digital public services. The costs for users must be sustainable and the speed of network deployment must be increased. The digital skills of citizens and workers must increase, as must their ability to access digital tools and services, particularly for vulnerable social groups. The Plans must respond to the economic and social consequences of the pandemic crisis through economic strategies that lead to a rapid, robust, and inclusive recovery and improve potential growth. They should contribute to improving productivity, competitiveness, and macroeconomic stability, in line with the priorities outlined in the Annual Sustainable Growth

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[24] *Ibidem*

Strategy. The plans should promote a change in labour policies, also with a view to facilitating and accelerating structural changes such as green and digital transitions.

3 The potential of urban climate ambition

Over the past decades, cities have demonstrated high levels of ambition about climate action. Dating back at least to the early 1990s, global climate governance has been marked by a distinct proliferation in the range and scale of actions taken by local governments around the world to demonstrate their potential to advance climate change mitigation and adaptation. Much of this action has been facilitated by a sprawling genus of city networks (Acuto, 2013; Bouteligier, 2013).

Much of the crucial ambition for climate change governance has progressively emanated from cities in the last five years, particularly around the time of the UNFCCC's 21st Conference of the Parties. If this was evident after the multilateral failures of Copenhagen in 2009, when networks such as the C40 Climate Leadership Group made substantial strides toward 'alternative' options for global action, cities took even more of the focus during COP21 in Paris.

The prevailing discourse regarding urban climate action in the media and policymaking is that it holds much promise: by means of bypassing national and intergovernmental governance, cities can independently take climate policy action, with city networks allowing for peer learning and replication of 'best practice' (Bloomberg and Pope, 2017). By 'leading by example' and demonstrating the extent of action that it is possible to deliver, cities have aspired to raise the ambition levels of national and international climate governance (Bloomberg, 2015).

In the aftermath of Paris, the focus of urban climate ambition has shifted from displaying action to 'scaling up' action, with the Paris Agreement recognizing that this is the fundamental promise that sub-state actors must achieve. Cities are being urged to "intensify their efforts and support steps to decrease emissions" as non-party stakeholders. (UNFCCC 2015, p. 19).

3.1 Networked urban experimentation

In terms of urban climate governance, the 'second generation' (Kern and Bulkeley, 2009) has seen a significant number of policy interventions delivered 'on

the ground' in hundreds of communities throughout the world. As a result, urban climate governance has infiltrated most policy domains, manifesting itself in interventions such as energy-efficient buildings, bike-sharing networks, and behavior-change campaigns.

The expansion of such activities has been dubbed "urban climate change experiments" by Bulkeley and Castan Broto (2013). The authors claim that experiments "function as a way of managing climate change in the city" through "various sites and kinds of intervention," and that understanding urban climate governance "is not merely a question of analyzing the evolution of strategy, language, and policy."

Understanding urban climate governance in the post-Paris period necessitates a wider knowledge of governance that unpacks how a variety of urban experiments are controlled in the city. Experiments must be distinguished from traditional urban climate policy and, indeed, from urban planning.

Another distinguishing aspect of urban experiments as climate change "purposive interventions" is that they are attempts to "test out new ideas and methodologies in new situations where they are deemed to be creative" and "explicitly strive to capture new kinds of learning" (Castan Broto and Bulkeley, 2013). For example, Stockholm's congestion charge program was originally established as a six-month test, after which it was made permanent and extended. Experiments differ from traditional urban policy in that they are experimental, 'pilot'-type initiatives that are 'new' in each city, rather than commonly utilized policy instruments conducted through established procedures of urban policy, planning, and procurement.

Even though Bulkeley and Castan Broto (2013) outline three different conceptual strands for thinking about urban climate change experimentation: governance experiments, socio-technical experiments, and strategic experiments. The two authors focused on with the two former strands.

In discussing the first, Hoffmann (2011) argues that networked urban climate action might be viewed as a type of 'governance experimentation' in controlling climate change at the global scale, motivated by frustration with

international climate discussions. Others have characterized sustainability governance experimentation as a change in "the structure of decision-making" through "experimentation in governance methodology" (Bos and Brown, 2012).

Bulkeley and Castan Broto (2013) discuss the second by referring to the literature on sustainability transitions, which conceptualizes experimenting with sustainable, radically innovative technologies within the framework of socio-technical systems (Schot and Geels, 2008; Sengers et al., 2016). The study on urban climate change experimentation is just one strand of research into urban experimentation with mitigation and adaptation technology.

It's useful to distinguish between socio-technical experiments, which are material interventions in urban socio-technical systems intended at evaluating new sorts of interventions, and governance experiments, which are interventions aimed at evaluating new ways of regulating such systems. The term "systems" refers to certain metropolitan infrastructures and sectors, such as energy, transportation, and waste management. In the case of transportation, a socio-technical experiment may entail piloting a bike-sharing program, while a governance experiment might entail temporarily giving the Mayor of London control over suburban commuter trains.

3.2 Networking and experimentation

City networks are central to urban experimentation and should thus form an integral part of the research agenda. Urban climate governance grew from the early 1990s because of urban policy entrepreneurs and the establishment of city networks (Bulkeley, 2010), and those cities collectively organize in networks to have a voice in global governance arenas.[25]

In recent research with ARUP and C40 cities, between 2011–2015, the growing number of 'climate actions[26] in C40 members has been accompanied by a

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[25] (Smeds & Acuto, 2018)

[26] Climate actions are defined as 'the measures and initiatives cities take to reduce the severity of climate change (mitigation), or their exposure to the effects of climate change (adaptation)' (as per C40 and ARUP, 2015a, p. 18). Based on our experience with the workings of the C40 network we would argue that these qualify as urban climate change experiments in the sense of Bulkeley and Castan Broto (2013).

growth in the importance of city- to-city collaboration: in 2015, 30 per cent of all climate actions in (66) C40 cities were being delivered through city- to-city collaboration, of which 44 per cent involve collaboration via a specific C40 network (C40 and ARUP, 2015a).

Local governments use networking to enable information exchange and learning, which might provide political leaders with new ideas and the courage to try out new things. In this way, London may benefit from Stockholm's experience, either through informal networks of mayors and local government experts or official networks like C40. More comparative study is needed, however, to understand how networks impact the types of climate change experimentation carried out in cities, as well as the governance processes and institutions connected with such experimentation.

The third point is that networked urban experimentation is not primarily motivated by a desire to compensate for or compete with the global climate regime's flaws. According to Hoffmann (2011), networked urban experimentation is arising in reaction to dissatisfaction with the sluggish pace of UNFCCC treaty discussions.

Since the 1990s, the multilateral climate regime's direct effect on networked urban experimentation has increasingly waned. Local governments are experimenting with climate change in the post-Paris era in response to a variety of strategic pressures and incentives, such as experiencing tangible vulnerabilities from climatic events and responding to demands from urban electorates for better air quality, housing, and transportation services; but also, by desires to brand cities as progressive and liveable, and foster economic competitiveness spun out of low-carbon and "smart" urban development. (Bulkeley et al., 2012; Hodson and Marvin, 2007).

3.3 Scaling urban experiments

In the post-Paris period, urban climate ambition has shifted to an emphasis on'scaling' action, which is intimately related to the concept of climate governance'linkages' across scales and actors. The COP21 resolution called for cities to "scale up their efforts and support steps to decrease emissions" as "non-

party stakeholders" (UNFCCC, 2015), and Bai et al. (2018) recently highlighted that scaling of "successful local innovations" is critical.

The long-term consequences of experiments are a major issue for policymakers and researchers. The most common understanding of how experiments may have a larger influence comes from the literature on sustainability transitions, where 'deepening,' 'broadening,' and 'scaling up' are theorized as processes by which trials can finally alter a 'socio-technical regime' (van den Bosch and Rotmans, 2008).

The basic typology provided by Luederitz et al. (2016, p. 6) is useful for distinguishing between '"scaling out" which refers to repeating the experiment in the same context' and '"scaling up" which refers to integrating and applying the experiment at a higher system level'.

'Scaling up' can be thought of as vertical scaling: integration of elements of the experiment (e.g., a technology or policy intervention) into policy at urban, regional, national, and global levels of governance. Scaling out thus corresponds to the idea of cities learning from and emulating each other through replicating similar interventions, whereas scaling up entails interventions causing policy change and attracting investment to gradually be implemented city-wide, regionally, nationally, or globally.

Scaling up an experiment inside a given city would be the first 'stage.' C40's research on trials (dubbed 'actions') in its member cities gives a clear illustration: each action is classified on a four-tier scale typology: suggested, pilot, substantial, and city-wide (C40 and ARUP 2015a). Scaling up in the transportation sector, for example, would require extending a BRT system from one or a few lines to a city-wide network of lines. While the C40 typology relates to geographical scales inside a city, it is more crucial to consider if experiments can scale up to result in urban policy reform that reconfigures urban systems (transport, energy, garbage, and so on) at a city-wide level.

The second 'stage' of scaling up would be in the context of multi-level governance: from the urban level to regional, national, and global levels of governance. The theory of change associated with urban experimentation is that it

allows low-carbon technology and policies to be tested quickly 'on the ground,' with lessons derived from such trials establishing learning processes at various scales, supporting scaling through other actors' implementation. While this is encouraging, given the surge in networked urban experimentation over the previous decade, it is vital to evaluate the possible hazards.

3.4 Scaling 'up' or 'out'?

The scale dynamics of networked urban climate change experiments may be studied using data from C40 member cities as a starting point. The C40 network, which consists of networked experiments carried out by C40 member cities, has reached its limit in terms of scaling up to city-wide urban policy. Overall, this networked urban experimentation leads to the 'scaling out' of trials internationally, rather than the 'scaling up' of experiments beyond the urban level of government.

Experiments that are networked do not always scale 'upwards' to become ingrained in regional, national, or worldwide policy. Instead, through the C40 network, unique climate change experiments are reproduced across member cities, allowing for 'scaling out.'

Scaling up above the city level of government is rare but scaling out is abundant. This is predictable given that local governments have the authority to scale up trials inside city limits and may exchange knowledge about experiments through networks, allowing for scaling out to other cities. Cities and city networks, on the other hand, do not have the authority to influence national policymaking or international players like treaty secretariats or technological standard-setting bodies. Cities and municipal networks currently have few options for lobbying national and global policy frameworks successfully.

Cities and city networks can 'bypass' states by experimenting with climate change without the involvement of national governments (Bouteligier, 2014). However, rather than 'scaling up,' this networked experimentation frequently leads in 'scaling out.' Trials are reproduced between cities but scaling up urban climate change experiments beyond local government to result in policy change at higher levels of government is uncommon.

Scaling up climate change experiments is difficult and infrequent, according to existing empirical evidence (Hoogma et al., 2002; Bouteligier, 2014; Kivimaa et al., 2017). While experiments provide a 'safe haven' for innovation by being on the outskirts of urban policymaking, they are frequently isolated initiatives that are poorly integrated into existing metropolitan or national policy frameworks. As described by van Buuren et al. (2018) in the context of Dutch climate adaption programs, this raises obstacles for scaling up.

Experiments can be carried out by small groups within local governments, which must generate interest in the experiment by involving a variety of stakeholders and disseminate experiment lessons through policy networks to persuade urban and national decision-makers that investment in scaling up is justified (van Doren et al., 2016).

It is critical that the obstacles associated with scaling up trials be not underestimated for successful climate governance at all scales. Fuhr et al. (2017) propose a new three-part typology of 'embedded upscaling': horizontal upscaling (between actors at the same level, such as cities), vertical upscaling ('upwards' from city level to national level, national to global level, and directly between city and global level bypassing national), and hierarchical upscaling (from global level 'downwards' to national and city level).

3.5 Encouraging transformative experimentation

The second major flaw is a lack of diversity in the kind of experiments conducted, as well as a lack of ambition in experimenting with governance and local politics, rather than merely climate-proofing technologies.

Most of the networked urban experimentation is of a socio-technical character, rather than experimenting with alternative governing models. This backs up Castan Broto and Bulkeley's (2013) findings from a global assessment of climate change experimentation in 100 cities, which indicated that 'technological' innovation was the most common.

Scaling up is not the only requirement for global networked urban experimentation; additional experimentation of a more diversified character is also required, notably more governance experimentation, not merely governance by socio-technical experiments. The distinction is that, while innovation has been used to control the city to attain sustainability goals, there are few experiments in the form, character, and purpose of urban governance itself at the center of this networked form of urban climate regulation. However, to be politically transformational, urban climate ambition would have to be translated into urban politics innovation. Cities with a cosmopolitan base of constituents, such as the C40 member cities, are ideal for this since they have an outward-looking 'international' leadership and an innate cosmopolitan base of people.

Establishing new institutions, such as experimentation units and programs inside local and national governments, to institutionalize experimentation as a style of governance, raise financing, and encourage learning, capacity, and network-building, might be part of governance experimentation.

Cities and other international players may have a unique opportunity to think through how basic pillars of the international system, such as citizenship, sovereignty, and territory, are thought of and used for the global commons, thanks to networked urban governance.

Without dismissing the value of socio-technical experimentation, governance experimentation should be exploited for its revolutionary potential. Governance experiments may be radical enough to elicit the types of systemic political changes required to prevent and respond to climate change hazards. The current ambition for networked urban experimentation has the potential to raise ambition around shared goals and messages, break institutional inertia in climate governance, and broaden the toolkit available to cities in addressing climate change, but it also has the potential to limit the 'transformative' ambitions of urban climate change.

Only 26% of urban climate change experiments in the 100 cities studied by Castan Broto and Bulkeley (2013) included environmental justice issues. On a global scale, urban climate action in the form of experimentation results in actual

material changes to cities and the people who live in them. If the nature of the trials is incompatible with democratic or fair climate action, the stakes are significant.

Extensive physical retrofits to cities throughout the world are being fueled by networked urban experimentation, resulting in material infrastructures that are frequently considerably more long-lasting than the political agendas that generated them.

CHAPTER 3

THE CLIMATE CONTRACT

Abstract

The Natural Social Contract views society as a social-ecological system, with humans as members of a community and contributors to the natural environment. It focuses on long-term sustainability and general wellbeing by merging human and natural resources and recalibrating our unbridled attitude to infinite economic development, overconsumption, and over-individualization.

A Natural Social Contract is a multi-dimensional theoretical framework that aims to start a conversation on how to enhance the present social contract to achieve a more sustainable, regenerative, healthy, and just society. Starting from the analysis provided by Eric W. Ortis, we can understand how climate contracts can be the tool of the future.

1. The first approach to a climate contract

The thesis proposed by Eric W. Orts analyses a wide range of "climate contracts" to be signed at various societal levels, from global to transactional. These climate contracts comprise not just international treaties, but also national and regional rules, public-private partnerships facilitated by non-governmental organizations, and day-to-day business transactions.

It is just inadequate to act locally while thinking globally. We rely on global resources and services in our daily lives, and the stresses and effects of our local consumption are felt disproportionately over the globe. We must measure our progress in sustainability against the planet's environmental limitations, not 'business as usual,' since we are on a road to badly exceed them no matter how we measure it.

Some of these issues may appear abstract and far distant from the traditional scope of urban regeneration projects, which emphasize a "restorative" approach. This will include going beyond more efficient resource utilization to dramatically reducing our overall resource consumption. It will entail more than just adapting to the consequences of climate change and environmental degradation; it will also

include building social and economic resilience to the accompanying upheavals, which we already know are coming.

Because Europe is the world's most densely populated continent, the environmental decisions we make in cities in the next years will be crucial in resolving the worldwide sustainability problem. Increased resilience to climate change impacts, as well as improved quality of life for residents, will benefit cities – healthier and more active urban lifestyles, more localized urban economies with new economic opportunities, and more inclusive urban societies in terms of age, income, mobility, and other factors. Because these possible benefits will be more tangible than the hazards posed by climate change and other environmental limits, residents and stakeholders will need to be educated about them.

1.1 A non-comprehensive climate contract

Climate contracts are a collection of responses to a climate problem that do not aim at imperial comprehensiveness. Climate change solutions that mix public and private sectors have been implemented at many sizes, ranging from global to transactional. International legislation and international organizations continue to play an essential role, particularly in terms of reporting, information collection, scientific knowledge expansion, information verification, and the establishment of international standards.

Eric W. Orts has debated that the "second-best" or secondary-level institutional solutions may give a better long-term path for real success than expecting for an extremely unlikely worldwide treaty negotiation. Depending on the conditions, the scope and goal of various climate contracts will differ. Climate change solutions will be delivered in an ideal world by a broad collection of climate contracts that collaborate, extend, and adapt. Because of the complexity of regulatory and commercial experimentation that occurs, climate change solutions will be robust and resilient.

The major error of comprehensive methods is to believe that because climate change is a global concern, all facets of the complicated issue must be tackled at the worldwide level. Instead, it's better to categorize distinct aspects of the problem and solutions to it, and then select which regulatory measures are appropriate at

which jurisdictional level. A successful mix of climate contracts will follow the basic principles for handling common problems identified by Elinor Ostrom, how recommends the following basic strategies: 1) agreement about the need to change behavior; (2) sharing responsibility for the future; (3) providing information that is reliable and easily available, (4) monitoring actual behavior, and (5) facilitating good communication among participants. Ostrom agrees that climate change is a global collective-action problem, it is one that should be addressed at multiple scales and through diverse policies.[27]

Proponents of global regulation believe that less comprehensive approaches will result in fragmented solutions with undesirable implications. A variety of strategies will result in conflicts, overregulation hazards, and other difficulties. There is no other realistic alternative than to proceed on a partial basis.

Although many of the effects of climate change are global, the causes are behaviors carried out on a much smaller scale by individuals, families, and actors. Regulations at the national, regional, and state levels are usually reasonable, even if they are prone to free riders and other concerns when seen from a global perspective.

It makes sense to pursue regulatory options at the national, regional, and state levels because these governments are more likely to have the ability to act; additionally, they may play a more manageable secondary role in terms of making judgments about permissible or impermissible measures and practices justified on the grounds of global climate protection.

1.2 Why the climate contract is an important tool

Adapted to the specific circumstances of each city, a Climate City Contract will include goals and targets, strategies, and the roadmap for achieving the transition, while mapping out involved stakeholders and responsibilities. This will be driven by demand, thus putting the cities at the centre of the transformation process, and allowing them to determine the scope, activities, and timeline of the

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[27] Orts, Eric W. "CLIMATE CONTRACTS." Virginia Environmental Law Journal, vol. 29, no. 3, Virginia Environmental Law Journal, 2011, pp. 197–236, http://www.jstor.org/stable/24789320.

Contract.[28] A Climate City Contract should be a legally binding contract that outlines all the mission's components. The local administration, the Commission, and the relevant national or regional authorities will all sign it. Other municipal stakeholders, such as business, academia, and civil society, will be invited to participate as necessary components of the strong governance required to develop and implement the Contract in and for the city.

The lack of capacity to bring all urban area stakeholders together in a coordinated manner, leveraging financial resources and technology breakthroughs to produce systemic transformation, is the most significant climate policy problem. The mission will use a challenge/objective-driven approach to municipal innovation, in addition to standard supply- or demand-driven techniques. This implies that the intended aims and difficulties will be at the core of innovation efforts, determining which types of innovation will be required to attain climate neutrality in that city. This will guarantee that the mission's efforts are consistent with its overarching goals for achieving carbon neutrality. Furthermore, city innovation should not be seen just from the standpoint of technological advancement, but also from the standpoint of social advancement.

Modern urban development is a complex process comprising a diverse group of stakeholders with competing ambitions and interests. The Mission seeks a more thorough systemic reform than the typical top-down approach. Instead, it relies on horizontal collaboration between municipal stakeholders and people who agree on a shared vision, objectives, actions, and synergies to share and mitigate their climate impact. This is an important step in the creation and implementation of climate policy, as well as our overall aim.

Citizens' participation in various capacities as political actors, users, producers, consumers, or tourists is critical to the mission's success - hence the moniker "by and for the citizens." Citizens may play an active part in driving the transition to climate neutrality as co-designers, co-creators, co-implementers, and co-beneficiaries in various capacities. Citizens have prioritized transportation, energy, urban infrastructures and buildings, circular economy, and behavioral

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[28] **100 climate neutral cities by 2030 by and for the citizens pag 4/12**

change in various remote consultations with the Board hosted by cities around Europe, for example.

Citizens and civil society will play an active part in the Climate City Contract, and as a precondition, they will be given new platforms and improved resources to plan and implement climate initiatives – thus the need for a clear governance roadmap in the Climate City Contract. Furthermore, social inclusion will be a key component of the contract, ensuring that all inhabitants are able to participate in the co-creation process. In this regard, active citizen engagement will be one of the selection criteria for cities to join the Mission, with social inclusion as a significant required component.

A new governance model must feature a public administration that can evolve from its traditional siloed working methods to a more cross-cutting, integrated and citizen-driven way of working. Without this clear evolution, a systemic transformation towards climate neutrality will not be possible. It is important that these new forms of governance are developed and adapted to the circumstances and traditions of each city.

A new city governance model capable of driving a systemic shift toward climate neutrality should also encourage the concerned public administration to move away from its traditional silo-based working culture and organization and toward a more strategic, cross-cutting, integrated, citizen-driven approach. To eliminate bottlenecks and optimize synergies in publically sponsored programs, the Commission is working to coordinate policy goals across different levels of the EU's governance structures. This includes pooling funds from various European, national, and local sources across the whole "value chain," from research and development to planning, investment, and execution.

As the population of a city grows, so does the demand for services and the strain on resources. This demand places a strain on energy, water, and transportation systems, all of which are critical to a city's profitability and long-term viability. At the same time, towns and communities are undergoing a digital transformation that must be implemented properly.

To achieve the EU's "twin green and digital revolution," we must make our cities and communities carbon neutral and smart. The spread of information and communication technology (ICT) is critical for driving economic growth and enhancing economic activity in cities. Europe's digital policies and efforts (the new Digital Europe program) will help cities and communities move to digital sustainability by constructing high-quality connectivity infrastructure and fostering a digital economy.

1.3 The transition to sustainability

The transition to sustainability constitutes a search for a new social contract. The purpose of the social contract is to serve the common good or greater to ensure the sustainability of the society in question and to protect the individuals within it. In other words, the social contract is expected to provide security and justice for all.[29]

The call for fundamental social change aimed at sustainability is at the top of local, national, and international agendas. At the global level, the United Nations has set sustainable development goals as part of its 2030 Agenda, which encompasses both the socio-economic and environmental dimensions of sustainability. Over the past two decades, the European Union has introduced a large body of environmental legislation, which has been successful in reducing air, water, and soil pollution.

However, many problems remain and need to be addressed in a structured way. To solve these problems and achieve the goals set out in environmental policy, the EU will need to make far-reaching changes in its production and consumption systems

Any change in society will provoke resistance and attempts to change established patterns are always met with resistance, and/or normative questions about the legitimacy of the new approaches. Society is usually stuck in its old structures, so that the transition to sustainability is characterized by complexity and

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[29] Huntjens P. (2021) Sustainability Transition: Quest for a New Social Contract. In: Towards a Natural Social Contract. Springer, Cham

uncertainty. The term "transition" or "transformation" presupposes a fading away to something new, a new state of mind, or a new social contract.[30] Moreover, dealing with complexity and uncertainty requires adaptive planning and governance, whereas a social learning process is process-oriented rather than fixed goal-oriented.

The literature on global environmental policies questions whether meeting the Sustainable Development Goals should be considered the goal of the transition to sustainability. Reicher and Hopkins argue "that images of society's future are important for shaping social change. Social action must be animated by a vision of a future society and by explicit value judgments regarding the character of this future society" [31]

2. What Is a Social Contract?

The transition to sustainability constitutes a search for a new social contract. The basic philosophy of a social contract is that the members of a society enter an implicit contract with the goal of living a better and safer life together.

The social contract theory has a long history in political philosophy. Despite their differences, what these contract thinkers all have in common is that they tried to explain human society based on the idea that people once lived in a state of nature with no rules and unlimited freedom. In Hobbes' thinking, humanity naturally lives in a state of war, while Rousseau believed that humans were peaceful and timid in their pre-social state of nature, with social cohesion created through consensus. According to Rousseau, the social contract allows humanity to pursue self-preservation by joining forces with others and sacrificing some individual freedoms for the will of the people.

Some scholars argue that the nature of the environmental problems we face today requires new roles for states, while pointing out several limitations of current social contracts: they may exclude those who may not recognize the legitimacy of

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[30] Ibiem

[31] Reicher, S., & Hopkins, N. (2001). Self and nation: Categorization, contestation, and mobilization. London, UK: SAGE.

government, and they may be influenced by undemocratic lobbying by powerful actors, and future generations are not represented.

A social contract is a coherent set of freedoms, rights, rules, and obligations that all residents have in relation to health, education, work, as well as in relation to our living environment, food, energy, water. For example, all EU citizens have the right to the protection of fundamental rights, freedom of movement and residence in the EU. The social contract, therefore, is fundamental to the structure and functioning of our society[32]. Every part of society can play a role in shaping and influencing the social contract, not only through our democracy, but also through bottom-up governance through civil society involvement, a participatory and inclusive society, transition management and citizen engagement. For each of these processes, it is necessary to identify how the governance of a societal transformation toward a Natural Social Contract can be designed, facilitated, and implemented in effective and legitimate ways. Attempts to change established models are always met with resistance, rigidity, and/or normative questions about the legitimacy, rightness, methods, and direction of the transition.

2.1 Human Progress Without Economic Growth?

The social contract is not only about our rights and freedoms as enshrined in the constitution, but also about how we distribute the costs and benefits of what we produce and consume in a country and a broader definition of well-being. As if that were not enough, there is a correlation between inequality and social and political instability. The problem, as Joseph Stiglitz argues[33], is that inequality can ruin democracy itself. The growing inequality of wealth and the global credit crisis of 2008 are only symptoms of a systemic crisis. Since the global credit crisis of 2008, the list of counterproposals to unlimited economic growth has grown rapidly.

The English term 'degrowth' was 'officially' introduced at the 2008 conference in Paris on economic degrowth for ecological sustainability and social equity, which also marked the birth of degrowth as an international research area.

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[32] Huntjens P. (2021) Sustainability Transition: Quest for a New Social Contract. In: Towards a Natural Social Contract. Springer, Cham
[33] Ibidem

The key propositions of this degrowth literature are that economic growth is not sustainable and that human progress without economic growth is possible. More specifically, it argues that a fair reduction in production and consumption increases human well-being and improves ecological conditions locally and globally, in the short and long term. According to Schneider et al.[34] degrowth theorists and practitioners advocate an extension of human relations instead of market relations, demand a deepening of democracy, defend ecosystems, and propose a more equitable distribution of wealth.

The purpose of the social contract is to serve the common or greater good to ensure the sustainability of the society in question and protect the individuals within it: it should provide security and justice for all. Climate change and its effects are linked to complex issues of security and justice and therefore relate directly to the social contract.

A broader transformation of society is needed to affirm a sustainable and healthy future. In current social contracts, natural resources are seen as being used exclusively by man, to meet the needs of humanity and the needs of our current economic systems with focus on economic growth. A natural social contract allows humanity to pursue self-preservation and higher levels of well-being, while putting an end to unlimited economic growth, excessive consumption.

2.2 Dimensions and Crossovers Within a Natural Social Contract

Every society, and therefore every social contract, is made up of different dimensions, including an economic, social, ecological, and institutional dimension.[35] Each of these dimensions is made up of a multitude of interconnected components; change or problems in one dimension therefore affect all dimensions and vice versa. However, here we will analyze only two of the four categories: social and institutional.

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[34] Ibidem
[35] ibidem

Social Dimension

Relevant to a natural social contract is an emphasis on the natural state of a human being as a social animal living in the family, as a member of a group, community, or company. In this context, "sharing" is an important evolutionary trait of human beings.

The reciprocity of people with their social environment depends on union, mutual understanding, clear communication and, depending on the goal to be achieved, requires collective action and effective cooperation. The society must be reorganized to allow for greater problem-solving at the community level and forming new coalitions in horizontal innovation networks. In this context, people intend to engage more in environmental protection when they believe that future societies at risk from climate change will be more benevolent.

The transition to sustainability requires a rethinking of one's citizenship, which could involve a behavioral shift towards a more sustainable lifestyle or participation in collective actions for sustainability. "The role of residents could shift from receiving services and granting rights to becoming more active in their immediate living environment and being subject to duties' (cf. Wittmayer et al. 2017).

Institutional Dimension

A natural social contract requires governance at a level of scale that does more justice to the complexity of socio-ecological systems, for example, through polycentric governance. The principle of subsidiarity, one of the cardinal principles of European law, prescribes the governance of social and political issues at the most appropriate level. In this context, adaptive governance of socio-ecological systems generally involves polycentric institutional arrangements, 'which are nested, quasi-autonomous decision-making units operating on multiple scales. (Ostrom 1996; McGinnis 2000). They involve both local and higher organizational levels and aim to find a balance between decentralized and centralized control.

This creates layers of actors that interact with each other: (1) across different levels of governance (vertical coordination); (2) between relevant actors at the same level (horizontal coordination at central or sub-national level); or (3) on the net.

This relationship exists independently of the constitutional system and has an impact on the implementation of public order responsibilities.

Finally, on the issue of governance, many of the institutional arrangements relevant to a natural social contract are reflected in the principles of good governance, developed, and adopted, among others, by the United Nations and the Council of Europe, which cover issues such as ethical conduct, rule of law, efficiency and effectiveness, transparency, sound financial management and accountability. The core values of a natural social contract should be spelled out and discussed in any transformative socio-ecological innovation process.

Common values in a natural social contract could be tuned to specific characteristics of local geography, ecology, economy, and cultures, but also include a certain level of universality. Common values appear when one looks at the general models of modernization and the human need for a social order. Authors Schwartz and Bilsky (1987) hypothesized that "universal values would refer to three different types of human needs: biological needs, social coordination needs, and needs related to the well-being and survival of groups". This concept can be understood in two different ways. First, it could be that something has universal value when everyone finds it valuable. Second, something could have universal value when all people have reason to believe it has value. "(Jahanbegloo 1991)

In general, a natural social contract reserves a central place to fundamental values such as solidarity, unity, collective well-being, democracy, social and environmental justice. The overall goal of a natural social contract is to promote human and environmental security, social and environmental justice, and the health of the planet. This vision must include gender equality and interventions to ensure that women have the same perspectives and opportunities as men and interventions to protect the sick, the vulnerable and minorities of all kinds. Agreement on these ethical and regulatory issues is important for holding coalitions of actors together during a transition process and could be achieved through deliberation on shared beliefs and values, shared speeches, common interests, procedural justice, and options for creating multiple value and mutual earnings.

2.3 Development of a Natural Social Contract at Multiple Governance Levels

The development and implementation of a Natural Social Contract might take place at various governance levels, ranging from the local to the national and international level:

At the local level it is often difficult to see systemic change in-the-making, although change is often initiated at the local level through niches or front-runners, for example, in pilot projects where local entrepreneurs, citizens, and/or other parties work together to put an innovative concept for sustainability into practice. In many cases, this requires strategic niche management (Kemp et al. 1998; Schot and Geels 2008), transition management or governance, or other types of long-term support and upscaling before systemic change can be consolidated.

A transformation of society towards a natural social contract at the national level is a complex multilevel governance challenge, requiring the development of top-down policies and visions with important bottom-up processes. Sustainable development, particularly the Sustainable Development Goals and the Paris Climate Agreement, has entered public opinion, national laws, and policies, although both agreements are not legally binding.

In Europe, "a good and healthy life in 2050 within the ecological boundaries of our planet" is a fundamental component of environmental policy (EU, 7th Environmental Action Program 2013). This view has also been incorporated into other EU policy lines. Over the past two decades, the European Union has introduced a large body of environmental laws, which has managed to significantly reduce air, water, and soil pollution. **The "Green Deal"** represents a unique opportunity for the EU to move from a fragmented climate change policy to a comprehensive and coherent policy framework.

On the global level, however, the international processes associated with sustainable development have not led to a legally binding framework at the international level that addresses the challenges we face. However, important developments on a global scale include the adoption of the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement on climate change, although none of them are legally binding. Both agreements emphasize

consensus building and allow for voluntary and nationally determined goals. Likewise, a global deal on nature is currently in the works, which should lead to a Global Deal for Nature at the Beijing Biodiversity Summit in 2021. This is an important step towards a major reorganization of the entire economic and financial system. a global change towards sustainability that must go hand in hand with the fight for the conservation of biodiversity and the fight against climate change. In general, the values on the relationship between man and nature are becoming important and internationally recognized in various ways.

3. Urban experimentation

According to John Dewey's theory[36], the main challenge that the public authorities face within the promotion of urban experimentalism, whose main variables are the territory and technological innovation, concerns the ability to change and update continuously. Are an experimental approach means developing a system that can be constant and well-motivated about the tests submitted to the activities it carries out, but also capable of revising itself rapidly and flexibly in the light of those observations[37]. Experimentalism reflects the practice of "learning by monitoring" in which the difference between making rules and applying them is rejected and the system according to which rules must be subject to constant revision during their application is accepted.[38]

An effective regulation is one that is capable of adapting and re-adapting itself to respond to local conditions[39] where the local dimension can refer to the municipality, province, region, or state. Experimentalism is characterized by being temporary and derogatory from the provisions in force[40]. Furthermore, speaking of experiments, the phase of evaluating the results and comparing the effects with those produced by the legislation in force is fundamental.

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[36] J. DEWEY, *The Public and its Problems*, Henry Holt, and Company, 1927
[37] *Ibidem*
[38] F. SABEL & W. H. SIMON, *Minimalism and Experimentalism in the Administrative State,* The Geo. L. Journal, 100, 53, 2011.
[39] M. C. DORF & C. F. SABEL, *A Constitution of Democratic Experimentalism,* 98 Colum. L. Rev., 2, 1998
[40] S. RANCHORDÁS, *The whys and woes of experimental legislation*, 1 (3), Theory and Practice of Legislation, 2013, 415-440

The theory of experimentalism has been extended to other areas, including the urban one, as an attempt to overcome some system blocks. In urban planning, the problems concern, on the one hand, the search for solutions for public and private spaces that are increasingly abandoned and abandoned, increasing the overall state of degradation of the territory, and on the other, the need for a new way to plan that allows the cities of the future to be resilient.

The issue of resilience is not only linked to naturalistic phenomena but, in general, a system can be defined as resilient if flexible and with a high ability to adapt to crises while maintaining the same basic structure and functions. Urban planning, to date, does not yet allow this speed.

Urban resilience has three implications. The first is the ability of cities not only to adapt but to self-organize, to be centers of knowledge and innovation with an adaptive governance system. The second concerns the overall vision, resilience is not linked to a single aspect but rather within the urban context. The third implication is that resilience does not end within the confines of the single city but strictly involves the network of cities. It is an integrated system. To hypothesize models of resilience it is necessary to experiment. For this reason, the cases analyzed are all urban experiments or leave the development of a territory to experimentation.

Urban regeneration has a double objective: one of a predominantly urban-building nature, of recovery and redevelopment, and another of a social nature, preordained in the search for solutions of social innovation. For this reason, some authors have tried to elaborate theories of governance that go beyond the model of mere public-private negotiation. Etzkowitz and Leydesdorff[41] initially theorized the "triple helix" model where universities, industry and public administrations collaborate to promote the economic innovation of society.

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[41] L. LEYDESDORFF AND H. ETZKOWITZ, Triple Helix as a model for innovation studies, 23, Science and Public Policy, 3, 1998

The intent of this discussion is to demonstrate the advantageous effect, taking into consideration the Public Administration, which together with businesses and universities, has approached the interests of citizens and, at the same time, more responsible for the administered resources, having been directed to activate more efficient and innovative solutions and tools, capable of producing quality services at possibly standardized costs, controllable by the recipients themselves.

Thanks to the Triple Helix theory (Etzkowitz, Leydesdorff 1997), it has been accepted that the potential for innovation and economic development in a society must be sought by giving a more important role to academia and the combination of the characteristics of the University, businesses, and government, to generate new institutional and social formats for the production, transfer, and application of knowledge. This vision includes not only a natural dynamic innovation (Schumpeter, 1942), but also the creative renewal that arises within each of the three institutional spheres of the University, Industry and Government.

The triple helix concept is based on three main ideas: (1) a more important role for the University in innovation, on a par with industry and government in the Knowledge Society; (2) a propensity for collaboration between the three main institutional spheres, in which innovation policy is always the result of interaction rather than a prescription by the government; (3) in addition to fulfilling their traditional functions, each institutional sphere also assumes "the role of the others" (new roles are performed in addition to its traditional function). The strengthening of the role of the University in the Knowledge Society arises from some characteristic's specifications.

First, the recent addition of the academic "third mission" - involvement in socio-economic development, alongside traditional teaching and research missions, is the most notable, being a consequence of the "second academic revolution" (Etzkowitz, 2003) This is largely the effect that government policies implement to strengthen links between universities and the rest of society, especially business, but also the effect of a tendency to use universities and businesses for the purposes of government, which redirects part of the funding to the universities themselves (Slaughter, Leslie 1997).

The collaborative link with the other actors of the Triple Helix have increased the importance of universities to produce scientific research over time (Godin and Gingras, 2000). Second, the ability - held by universities - to constantly provide new ideas to students has become an important asset in the Knowledge Society. Students are not only the new generations of professionals in various disciplines of science, business, culture etc., but they can also be trained and encouraged to become entrepreneurs and founders of the company, contributing to economic growth and job creation.

Third, the ability of universities to generate technology has changed their position from a traditional source of human resources and knowledge to a new energy source, with ever-increasing organizational capabilities, capable of formally producing and transferring technologies rather than relying solely on on informal ties. Rather than just serving as a source of new ideas for existing businesses, universities are combining their research and teaching skills in new formats to become a source of training for new businesses, especially in the advanced fields of science and technology.

The entrepreneurial university takes a proactive stance in putting knowledge to use and expanding entry into academic knowledge creation. Thus, it operates according to an interactive model, rather than a linear model of innovation. Moreover, this has a direct effect on companies, which increase their technological level, commit themselves more and with higher levels of training and sharing of knowledge.

The government acts as a public entrepreneur. The interaction between different dynamics leads to the birth of an interactive model of innovation. Globalization becomes decentralized and takes place through regional networks between universities as well as through multinational companies and international organizations. With the help of the development of new dynamic links, discrete pieces of intellectual property can be combined for co-exploitation. In the current international competitive circumstances, innovation has expanded from a process within companies to an activity involving institutions not traditionally thought of as having a direct role in the field of innovation, such as universities. Collaboration

in this sense, however, is also indispensable for the effects it creates within citizens, as regards the construction of adequate public accountability systems, together with those for implementing the social budget according to automatic and permanent methods, as well as for the realization of participatory democracy.

The "quadruple helix"[42] was subsequently proposed, adding to the scheme the subjects belonging to civil society but basically attributable to two categories: that of the media and culture. Finally, the proposal of the "quintuple helix"[43] model. According to the latter, the collaborators for intelligent urban governance are public institutions, businesses, cognitive institutions and civil society, this time with reference to the organized one of the so-called third sector and the unorganized one such as active citizens, social innovators, etc. [44]

In this sense, most of the theories on the smart city all consider collective governance and collaboration with citizens as fundamental elements. We perceive the conviction that the characteristics of the smart city lie not only in the promotion of technological innovation but also in the development of innovative paradigms of the local administrative apparatus which must be increasingly able to guarantee solutions of daily subsidiarity, where citizens are given the possibility of intervening concretely in identifying solutions to the problems of the community.[45]

3.1 Fundamentals of the theories of the triple and quadruple helix

The foundation of these theories lies in the three constitutional principles of horizontal subsidiarity, civic collaboration, and commonality of interests.

The principle of horizontal subsidiarity has a bidirectional nature,[46] in the sense that the care of the general interest is entrusted both to the administration and

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[42] E. CARAYANNIS AND D. F. J. CAMPBELL, 'Mode 3' and 'Quadruple Helix': Toward a 21st century fractal innovation ecosystem, in International Journal of Technology Management, 46 (3/4), 2009
[43] C. IAIONE AND E. DE NICTOLIS, The quintuple helix as an approach to governance of social innovation, cit.
[44] Ibid
[45] C.IAIONE, Civic collaboration for the administration, governance, and economy of common goods, in the age of sharing, edited by G. ARENA AND C. IAIONE, Carocci Editore, 2015
[46] C. IAIONE, Social Security Funds, in Digest of Advertising Disciplines, 2017

to civil society, but the dynamic of reference is that of "civic subsidy"[47] to the public administration. The principle protects the so-called civic[48] volunteering actions allowing a passage from the public-private to the public-civic scheme but does not represent the legitimizing principle of the practices developed around the urban commons.

To go beyond the public administration-community binomial, the principles of civic collaboration and the commonality of interests must be considered, where the former operates in an enabling key of forms of endosocial collaboration between the administration and civil society, organized, and the second, which is placed in a genus a species relationship with the first, recognizes the right of the social aggregations to produce goods and services of general interest.

In general, for the recovery of cities from the multiple crises they have faced in recent years (including climatic conditions, pollution, economic crisis, unemployment, and public power crisis), the search for collaborative solutions with the community seems to be the way to bet and invest. Moreover, for the success of the collaborative dimension, some cases have taken into consideration a further variable: the "neighborhood" territorial dimension.

To regenerate urban areas, some projects have identified a perimeter of action that is different from the entire municipal area and free from criteria of a legal nature (as in the case of districts) or of a political-social nature (e.g., community of interest). More flexible criteria are sought, based on the concrete life experience of people and on the phenomenological dimension of human action, on the concept of territory as a physical space in which projects and relationships between people are manifested, the place of spatial transposition of public policies designed and implemented together with citizens to improve the quality of life of the community.

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[47] C. IAIONE, Urban collective action and public-community partnership, in La Co-city. Urban law and public policies for urban regeneration, social innovation, the collaborative economy and common goods, cit.
[48] Ibidem

Therefore, the size of the neighborhood, due to its functional and social connotations, could become the new urban planning area to experiment with the aim of improving the quality of life of the inhabitants, if it is therefore capable of "understanding" the city as well as to monitor it[49]. Technological innovation linked to urban planning and governance raises some doubts with reference to the principles of administrative activity of transparency, good performance and legal certainty. Indeed, it has been noted that there is a gap between local administrative regulation and date-based regulation. This is since technological innovation is confronted with rigid legal contexts that prevent it from combining innovation with urban reality, in addition to the fact that, moving towards "data-driven"[50] or increasingly automated systems, in fact, it limits and increasingly thins the margins of discretion of the public administration.

3.2 Governing the sustainable city

In urban redevelopment, the interests, and objectives of a wide range of urban stakeholders might collide or come together. Concerns about the environment tend to divide individuals into supporters of a program or initiative and those who are affected by it - usually groups of citizens. In recent decades, the concept of governance has been employed in municipal and urban government to bring together a variety of institutions with varied interests and purposes. A move away from top-down decision-making logics and toward a more horizontal, multi-stakeholder approach to coordination and collaboration has been made to address these disagreements and move toward win-win solutions.

Environmental movements and citizen protests in response to issues such as environmental degradation, development pressures on green spaces and natural habitat, resource consumption, and waste in urban environments, to name a few, have forced cities across Europe to deal with a growing number of new governance challenges. Existing municipal governing models are put to the test by such

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[49] D. L. MCCLURE, Electronic Government: Federal Initiatives Are Evolving Rapidly but They Face Significant Challenges., Testimony Before the Subcommittee on Government Management, Information and Technology, Committee on Government Reform, House of Representatives, 2000.
[50] S. RANCHORDAS AND A. KLOP, Data-Driven Regulation and Governance in Smart Cities, cit. Ibid

difficulties, underscoring the need for new city government models. Some of these new ideas appear to have spread across European cities, focused on citizen empowerment, participation of all important players, and creative use of social and institutional capital.

The integration of various (spatial and administrative) levels of government, institutions, politics, and power, such as municipal, city, regional, and national government, institutions, politics, and power, is known as vertical governance integration. Horizontal governance integration may be seen in two ways. One refers to civil society (NGOs, corporations, and city residents in general) participating alongside the government in decision-making and execution.

The second is the coordination and integration of multiple local agencies to provide long-term urban regeneration with consistency and direction. Improved synergy between a series of new urban economies emerging across Europe and environmental regeneration programs have been cited as a significant facilitator by public officials' ability to collaborate across disciplinary boundaries.

Climate connections provide a much-needed counterbalance to the long-standing inclination among many policymakers to insist on top-down or bottom-up approaches to regulation in this area. Comprehensive methods often use a top-down approach, with scientists diagnosing the problem and then recommending regulatory remedies in a series of high-level international conferences by an elite group of policy specialists. This strategy hasn't worked out that well.

Instead, a bottom-up strategy is preferred since it is decentralized and provides for a variety of different sorts of solutions to progress various social and governmental levels with the participation of many patriations, including many ordinary people. The global regime is beginning to shift from a top-down to a more flexible bottom-up approach, becoming more plural, decentralized, and fractured. One way to think about this more flexible approach is through climate contracts.

A positive conclusion is warranted if research continues to demonstrate the possibility of substantial climate damage. People from all walks of life may participate in climate contracts and perceive themselves as "part of the solution."

Due to political interests expressed at the level of multiple nation-states, any attempt at a single global comprehensive regulatory solution to climate change trends will almost probably fail. When you consider the political divide between rich and poor nations, it's easy to understand why a global program that would impose significant and uneven economic obligations on many countries would fail.

The evidence for climate change has become stronger, and the need for action has grown more urgent. While the rate of resource usage has increased exponentially, the capacity for ongoing emissions and other environmental impacts is dwindling until tipping points are reached, beyond which there is a considerable risk of catastrophic consequences. With mounting evidence of rising environmental harm, cities must increase their knowledge of environmental boundaries at all levels and develop stronger plans to account for the pressures and repercussions that are driving them to and beyond these boundaries.

This information must be used to direct efforts in neighborhoods, cities, and regions, as well as nationally and worldwide. Recent studies have identified several environmental restrictions, including biodiversity loss and land-use change, as well as climate change. The 'think global, act local' message fails to capture the gravity of the situation cities are now in; it's frequently used to support localized and incremental improvements on current environmental practices, rather than unlocking the systemic change required at the neighborhood, city, regional, and national levels to meet the scale of the challenge as it is now understood.[51]The framework of interactions between individuals and the legitimacy of the direct intervention of citizens within the decision-making process also from a legal point of view, allows for a further step in the analysis of collaboration. In this sense, it may be useful to address the issue that gravitates around collaborative governance. John D. Donahue tries to reconstruct it, outlining eight descriptive dimensions: formality; duration; focus; Institutional diversity; Valence; Stability versus Volatility; Initiative and Problem-driven versus Opportunity-driven

According to Antonio Russo "the top-down approach that characterized the process of defining and implementing public policies was accompanied by an

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[51] (Sustainable regeneration in urban areas, 2015)

approach based on governance, a modality of regulation of public policies based on the involvement of a multiplicity of subjects, suitable to reflect the fragmented articulation that characterizes all spheres of social life [...] "(Russo, 2011).

As explained by Russo, and as already anticipated in the triple helix model, for there to be collaboration in a perspective of innovation, it is necessary that there is an agreement between the various actors who compete to achieve public policies, with the added value of the presence of so-called "producers of innovation" and businesses. This type of choice would strengthen the idea of belonging to the territory for those who are recipients of the policies and would increase the sense of participation in the community. This turns out to be the wish of Iaione, who in the essay Civic collaboration (2015) defines this arrangement as a state-community (or state-collectivity), asserting that the natural evolution for a state of the future passes from forming constant partnerships. and permanent with the communities, for the definition of harmonious and virtuous collective institutions.

Multilevel governance

Bulkeley (2010, p. 233) states: "It is no longer adequate to consider urban governance of climate change exclusively from the point of view of municipal authorities, but it is necessary to consider how, why and with what implications other actors are trying to govern the climate through the city ". Bulkeley (2010, p. 240) goes on to describe multilevel governance as "the stage on which the drama of urban responses to climate change takes place".

Vertical governance refers to the way in which local authorities interact with higher governance bodies on a regional, national, European 12, and international scale. This is particularly important in climate change governance, as many decisions made at higher levels of government affect the ability and resources of a local authority to adopt or implement urban climate strategies (Bulkeley, 2010; Corfee-Morlot et al.., 2009). Although vertical governance often refers to how higher levels of decision-making influence (enable and constrain) local action, it also includes the role and actions of local or regional authorities to influence and shape national or international governing bodies to adapt their strategies on climate change or other political hotbeds (Corfee-Morlot et al., 2011).

Horizontal governance refers to how local authorities collaborate horizontally with other local authorities (in other cities), sometimes across borders, for learning and lobbying (e.g., representation in national / international fora such as 'UNFCCC to solicit financial and legal resources dedicated to local climate action) (Bouteligier, 2012; Bulkeley, 2010; Burch, 2010). It includes interactions between local authorities with stakeholders in each city, with other local authorities in neighboring cities in a region or province, as well as interactions in (trans) national city networks. Such networks can facilitate learning between cities, as well as perpetuate a city branding strategy where a city or local authority attempts to commercialize an innovative climate strategy or presents itself as a leader in urban climate governance; this can sometimes bring external resources to a city (Bulkeley, 2010).

Governance capacity

Bulkeley (2010) refers to several factors that influence the governance capabilities of local authorities, including their internal organizational dynamics and the resources and rules available. Capacity alone is not sufficient to enable urban climate governance (Jänicke, 2007; Westerhoff et al., 2011). Likewise, it is important to consider the components that support local authorities in implementing climate strategies, including using the resources and knowledge of external stakeholders to enhance existing capacities, thus leading to greater climate action (Westerhoff et al., 2011).

This thesis refers to those components such as: tapping into the rules and resources of other authorities (i.e., at vertical or horizontal levels) and tapping into the resources of local stakeholders (i.e., the resources of citizens or stakeholders in a city). Environmental departments coordinate climate strategies; however, as climate change is a cross-cutting issue, it requires the involvement of multiple departments (e.g., transport, finance) (Bulkeley, 2010).

Some local authorities install a climate manager to coordinate departments; others issue a steering committee with tasks well divided by respective department or stakeholder (den Exter et al., 2014). Resources and rules enable the implementation of urban climate strategies. These include access to sufficient

financial and human resources, as well as knowledge, information, and skills on how to deal with a particular problem (Burch, 2010; Bulkeley, 2010; Fünfgeld, 2010). Methods for improving skills include training courses, hiring new staff or drawing on the resources of other city departments (Hinkel et al., 2009). Similarly, the ability of a local authority to implement and regulate urban climate strategies is influenced by its relative autonomy from higher levels of government (Bulkeley, 2010).

Governance theory must address growing globalization, which involves transnational economies, private organizations and communities interacting with each other. The interconnected nature of a global system makes it essential to seek a legal and effective governance structure that encourages collaboration.

The question that arises is whether goods can, together with urban resources, transform cities into collaborative ecosystems that allow collective action for common goods. The current model of local government would not allow effective collaborative governance. Freeman (1997) argues for the need for a specific framework for producing collaborative governance, including: 1) a problem-solving orientation; 2) the participation of interested parties in the decision-making process; 3) provisional experimental solutions; 4) the empowerment of private and public institutions; 5) a flexible foreign body to address.

Attention to the governance of common goods allows us to underline the importance of the institutional methodology. Ostrom says self-government of collective resources may be the solution to avoiding the tragedy of the commons announced by Hardin. The concept of urban commons is linked to the quality of urban life (Iaione 2012). Given the increase in urbanization, access, and the quality of urban commons, it is essential to determine the quality of urban life. The challenge for municipalities is to find some governance mechanisms for the collective management of urban commons.

Of this opinion are Foster and Iaione (2015). CO-Cities are collaborative cities based on urban commons. The CO-Cities protocol, developed and tested in five cities in Italy so far (infra), is divided into three main phases: seeding, co-design

and prototyping. Each field of experimentation offers peculiar characteristics according to the cities in which it is expressed.

The purpose of the first phase of the protocol, the seeding phase, is to understand the socio-economic and legal characteristics of the urban context. The second phase, the co-design process, is a "field of collaboration" in which synergies are created between the identified common goods and the city. In the second phase, co-working sessions are organized to test the possible synergies and alignment between the projects and the stakeholders involved. These culminate in a Collaboration Day - which could take the form of a demonstration, for example, or a civic party, or even the temporary use of disused urban spaces - to test, experiment and coordinate the ideas that arise from co-working sessions.

The third phase, the prototyping phase, is different for each experiment. The results of this phase lead to the design of governance tools more suited to local conditions. The protocol is the necessary step to create an environment more conducive to innovation, sharing and collaboration. The key is to transform the entire city or some parts of it into a laboratory, assisted by the creation of a legal and political ecosystem suitable for the installation of a collaboration and polycentric urban governance systems. This democratic process of experimentalism conceptualizes urban governance, creating a legal framework for the rights of the city.

Evolutionary perspectives

Speaking of evolutionary perspectives, we do not want to have the presumption of giving urban solutions to the city's crises, but rather to identify the elements on which we should invest to stimulate the search for roads that lead to the so-called smart city.

The starting point is the observation of the fact that, despite the legal system providing for cases to promote subsidiarity and meeting with citizens, the administration has nevertheless decided to adhere to the innovative models we have talked about. This position expresses the intent of the public administration to want

to experiment with a new way of being an administration that is equal and non-authoritative. This involves investigating the ways in which the non-authoritative activity of the public administration can take place pursuant to Article 1 co. 1 bis of the law on administrative procedure.

In the context of urban planning and collaborative urban regeneration, how and through what tools can the equal administration be developed and conducted? Taking up the Co-city approach, as a model of a collaborative and polycentric city, we can see a tool that has been developed, with the aim of establishing the fixed points of principle and method, useful for directing all the experiences that would have joined. to the approach.

In this regard, it is important to refer to the "Methodological protocol for the Co-city". The latter was conceived as a support tool for the transition to the CO-city (collaborative, polycentric and cooperative), and is the result of experimented practical and theoretical acquisitions. It is a tool that aims to create the most favorable environment for promoting innovation, by dividing the city into laboratories that experiment with the legal-administrative and political ecosystem most suited to the co-governance scheme.

The protocol consists of three elements: the principles, the process, and the tools.

As regards the principles, five "design principles" have been identified: the presence of a governance that is shared or collective or collaborative, capable of involving the subjects of the quintuple helix; a new vision of the state, no longer "state-apparatus" but "state-community", enabling and facilitating collective action; adherence to an open and sustainable economy model; the promotion of urban experimentalism; access to technology as an opportunity to create local development and social cohesion.

The Co-city process develops in six phases (knowing, mapping / co-designing, experimenting / practicing, prototyping, modeling and finally evaluating) which are adapted according to the characteristics of the local context. It is a circular process and therefore continuous and updatable. Finally, the institutional-legal, economic-financial, and digital tools that can be used to promote

the co-city process are identified. In this sense, for example, the tools of urban law represent the most direct example of collaborative urban planning.

The function of the protocol is to act as a theoretical grid from which the administration and citizens develop urban transformation projects towards the Co-city. The protocol is fundamental, at the district or neighborhood level, to create networks between the administration and the civic, social, economic, cognitive, and institutional forces "to innovate traditional urban schemes, urban welfare models and forms of local or sub-local economic development, the production and management of community services and collaborative services ».

The methodological protocol offers the element of flexibility. Defining the principles and procedural characteristics of a process and then letting it develop in a different way according to the local context of reference, means, on the one hand, guaranteeing procedural and principal uniformity but, above all, on the other, promote differentiation and stimulate experimental solutions to the different problems that can arise in city districts.

CHAPTER 4
EXAMPLES OF SMART CITIES IN ITALY AND IN THE WORLD

Abstract

Starting from the Italian experience, and taking up the discussion on co-cities, in what follows I analyze both the city of Bologna and Reggio Emilia, two pillars of Italian innovation. With a look at foreign cities, I took into consideration the city of Malmo, a pioneer that has always been recognized both at European and international level for its application and adherence to green projects.

In Italy

CO- Bologna

In Italy, the founding project on CO-Cities is that of Bologna. It constitutes an example of collaborative governance, outlined thanks to the use of a peer-to-peer network. The Regulation on collaboration between citizens and administration for the care and regeneration of urban commons was the basis for suggesting the ways of building local institutions. In this sense, it is useful to consider that each district should have its own local headquarters; in the present case, the project was divided into parts, each of which is the responsibility of the plaintiff persisting in the reference area.

Pilastro: in the Pilastro district, the project concerns the creation of a hyper-local agency that puts the various existing collaborative realities online - like a sort of Town Hall. This has a variable geometry structure because it must immerse itself in the territorial reality, for which different aggregation tools are needed.

The Polytechnic of Common Goods: it is a control room that serves to systematize the CO-Bologna path, with the aim of working in the medium-long term. On the one hand, its task is therefore to synthesize a unitary thought, on the other hand it consists in making it possible to establish a group of experts who can coordinate among all the social and institutional innovators of the city. The Polytechnic has the function of coordinating all this, it must be a control room in

direct contact with the mayor - it must therefore be embedded within the Public Administration, but it must also have special powers. It is a question here of rethinking the structure of the Public Administration from within.

Following the principle according to which innovation must arise from practices, CO-Bologna has opened three experimentation sites from which practices are born that will lead to an evolution of the governance scheme that is the basis of the regulation. The construction sites are based on the three pillars of Collaborare è Bologna: doing together; to live together; grow up together. From here two other pillars are added: governing together; imagine together.

How do you design the administration from the inside to be able to imagine the future with the citizens? How do we move from shared governance to collaborative (public) governance of the commons? For this step, it is essential that the Public Administration is a community glue, in which it must have an active role and become the director of these processes.

An application manual on citizen participation processes was drawn up in Bologna, which only makes the process more difficult and is not an effective tool. To evade a bureaucratic burden, the project envisages that the polytechnic become an internal body of the Public Administration that acts as an accompaniment in a fundamental sector, that of territorial governance. The starting point is the territorial information systems. The polytechnic must help in the public connection between the center and the various network hubs.

The polytechnic must be the experimentation of a technical body in support of the Public Administration. The polytechnic must be the closing point between political coordination and technical coordination. It must help to act as a link between the various departments and the technical offices. The different strategies insistent on the territory should be differentiated in their intensity, depending on the effect to be created (moving from lighter strategies to increasingly decisive strategies) to develop the same toolbox.

Reggio Emilia

A further element of perspective can be drawn from the Reggio Emilia experience. In the "Neighborhood, common good" program, a new collaborative procedural structure is promoted for the conclusion of the projects that are elaborated from time to time in the citizenship laboratories of the different neighborhoods. By comparing the procedural phases of urban planning (which in turn are borrowed from those relating to the administrative procedure), also in this case we can identify a phase of initiative, investigation, decision-making, and integration of effectiveness but with different characteristics.

The initiative can be ex officio or partisan (citizens or associations) and is established in the so-called citizenship laboratories, places where direct confrontation between the administration and the inhabitants of the neighborhood takes place, which is accompanied by an investigation phase of technical and economic feasibility, carried out by the Municipality Services. Based on these two moments of dialogue - with the citizens and the administration services - the neighborhood architect draws up a proposal for an agreement. The contradiction with the interested parties is expressed in this case in a real confrontation with the citizens and the stakeholders through open meetings in which the proposed agreements are shared

At this point, the approval of the municipal council arrives, the central moment of the procedure, to emphasize that the role of the municipal administration is not overridden but rather placed at the center of the entire process. The decision-making phase, on the other hand, takes the form of the assumption of respective responsibilities, through the signing of the citizenship agreement (or collaboration agreement or other collaborative planning tool).

The difference lies in the fact that this process is not only phased, but also circular and continuous. Once a procedure is concluded, a new one is opened within the citizenship laboratory with a new listening phase[52]. Moreover, providing for forms of participation and collaboration that are more significant and broader in the context of urban planning and programming procedures would not even be hindered

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[52] N. LEVI, *Quartiere, bene comune, un'esperienza di città collaborativa a Reggio Emilia*, cit.

by the law on administrative procedure which, in Article 13, underlines that for the acts issued in such procedures " without prejudice to the particular rules that regulate its formation ".

By combining these two elements - the provision of a methodological protocol and a new collaborative procedural vision - that first step would be taken to promote the paradigm of the so-called "Adaptive law"[53]. The model, proposed by the two scholars Arnold and Gunderson, tries to overcome the rigidities that characterize most of the legal systems that remain unable to adapt in the face of rapid and unexpected changes. Conversely, a legal system can be defined as "adaptive" if it pursues multiple and articulated objectives (adaptive goals); if it has a polycentric, multimodal, and integrationist structure (adaptive structure); if it adopts "adaptive" methods based on flexibility and standards (adaptive methods); finally, if it provides for iterative legal proceedings between multiple participants rather than linear decision-making processes (adaptive process). According to the two authors, the resilience of a city depends a lot on the legal system that is adopted, indeed, it can be said that the adaptive capacity of legal norms is the prerequisite for being able to move to a resilient system.

The methodological protocol and the collaborative process must be supported by a further element of resilience, operational decentralization. In both situations, in fact, the neighborhood is the starting point for urban regeneration and for the construction of a new adaptive and equal system. Promoting decentralization at the neighborhood or district level allows the development of a transversal integration capable of involving anyone interested, while, on a larger scale, such integration would be difficult to implement and selective with respect to the subjects who can afford to participate, returning to a scheme of mere consultation and non-collaborative.

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[53] *Adaptive law*, in *Social-Ecological Resilience and Law* (a cura di) A. S. GARMESTANI E C. R. ALLEN, 2014

IN THE WORLD

The city of Malmo

　　While action at various levels is required to combat climate change, urban
areas are critical; over half of the world's population lives in cities, altering man's
relationship with nature: modern cities are defined by a concentration of economic
activities, infrastructure, and intensive human interaction (UNFPA, 2007). Cities,
on the other hand, not only produce emissions, but also initiatives to reduce climate
change via regulations, technological investments, and public awareness
(Hoornweg et al., 2011; Kern and Alber, 2008; UN-Habitat, 2011).[54]

　　Even though mitigation and adaptation techniques differ in terms of
geographical and temporal dimensions, it is becoming increasingly clear that
coordinated mitigation-adaptation strategies will be required when vulnerability
and long-term sustainable development are considered. This is especially true in
cities, which both contribute to and are already sensitive to the effects of climate
change. Large expanses of non-porous surfaces abound in cities, increasing the
danger of flooding and urban heat islands. Complementary climate policy,
planning, and design methods inside cities can help cities make better use of their
resources and services while reducing vulnerability and increasing quality of life
(e.g., air quality, reduced travel times).

While local governments are not the only players in urban climate governance, they
oversee coordinating urban planning and design, transportation, and building, in
other words, all sectors that are crucial to mitigation and adaptation. The ability to
respond to climate change and the policies that result is dependent on unique local
variables and organizational characteristics.

Addressing the issues of the urban climate is not a one-time implementation
strategy due to the various complexity and uncertainties; rather, urban climate
policies must be adaptive and adaptable (McEvoy et al., 2010). Local governments
must address the interdependencies and interconnections among various actors and

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[54] ("Urban Climate Governance the Role of Local Authorities", 2015)

activities by establishing an institutionalized ability to learn and adapt in response to climate change: they must become learning organizations (Senge, 1990).

Tackling climate change locally through learning

To supply services and handle difficulties, local governments have been asked to adapt their structure, skills, and duties. New Public Management (NPM) tried to modernize the public sector in three ways in the 1980s: lean governance, the adoption of private sector management ideas, and the enhancement of local leadership's innovation and adaptability (Wollmann, 2004). The concentration on market norms has reduced local governments' regulatory power (Rose and Sthlberg, 2005; Katusiimeh et al., 2012).

Meanwhile, the function of municipal governments has moved from one of regulation and service supply to one of facilitation. A second factor is a general tendency in Europe toward decentralization of power, which involves giving local institutions more duties, extending participatory rights, and boosting public accountability at the same time (Wollmann, 2004).

Learning organizations, according to Senge (1990), are those in which new ideas are encouraged to flourish, and where people and the entire organization are always learning. Learning companies are seen to be better equipped to deal with complex difficulties including a high degree of uncertainty, especially in instances where adaptation and flexibility are necessary to translate incoming data into effective solutions.

Personal mastery, mental models, group learning, developing a common vision, and systems thinking are the five disciplines that Senge believes are necessary to construct a learning organization. The first four disciplines, which demonstrate their interconnection, serve as antecedents to the fifth, systems thinking. "The five disciplines grow as a totality," according to Senge (1990). Individual, group, and organizational learning are identified as three stages of learning (Senge, 1990; Yeo, 2005).

Personal mastery, on the other hand, comprises a personal dedication to learning, especially among people in positions of leadership. Mental models develop concepts and principles that provide meaning to the internal dimensions (inside an organization); group learning comprises discourse, training, and goal setting. Internal communication and organizational capabilities are stressed in urban climate governance (Klein and Huq et al., 2007; Rogers, 2009).

In terms of the external dimension, individuals and organizations become aware of expectations and find direction when they develop a shared vision. Finally, systems thinking enables individuals and organizations to consider an issue in its whole. It's about how a local government operates inside a multi-actor, multi-level system in our situation. Communication and involvement with people and stakeholders, as well as horizontal and vertical partnerships with other cities and levels of government, are all important in urban climate governance (Bulkeley and Castán-Broto, 2012; Kern and Bulkeley, 2009). Systemic learning happens when learning occurs at all levels or dimensions, and it is what an organization should aspire towards.

It is feasible to build a framework to analyze if a local authority has the traits to embrace and institutionalize learning in its ability to address climate change using Senge's definition of learning organizations. This paradigm aids in comprehending a local government's role in climate governance as a learning organization. The disciplines of learning organization are related to the governance characteristics of the urban climate one by one in this framework. Disciplines and factors, on the other hand, are interrelated and overlap.

External dimension - Communication and participation to build a shared vision

Building a common vision in which local governments and stakeholders (e.g., civil society and the commercial sector) participate can result in a more genuine climate strategy; moreover, its implementation will be dependent on stakeholder support (Klein and Huq et al., 2007). Effective external communication is required to promote stakeholder curiosity and comprehension, as well as involvement to generate stakeholder engagement. Participants understand what is expected of them when a shared vision is created, they become a part of the process,

and they accept ownership (Fünfgeld, 2010; Senge, 1990). Continuous learning is required for participation; an organization must learn to balance competing demands and speeches while retaining accountability and legitimacy (Bulkeley and Castán-Broto, 2012). When done correctly, this can help to build confidence in local government institutions.

Active engagement guarantees that local talents are not overlooked, and that scientific knowledge is strengthened (McEvoy et al., 2010). It can combine commercial and public sector knowledge and interests to deliver innovative solutions to shared problems while gaining political backing. To balance conflicting expectations, some informality, flexibility, and an emphasis on learning by doing are required to facilitate participation (Folke et al., 2005; Glaas et al., 2010; Rogers, 2009).

The four previous disciplines, according to Senge (1990), predate the fifth, systems thinking, which focuses on developing a better organization both internally and externally. Understanding how an organization - a local authority - interacts with other actors, how internal actions impact external organizations, and vice versa, is made easier using systems thinking (da Silva et al., 2012; Fullan, 2004).

In urban climate governance, a city does not operate in a political vacuum, but rather as part of a multilevel system that includes both vertical (e.g., higher government) and horizontal (e.g., city networks, neighboring cities) interactions that influence a city's ability to incorporate and institutionalize climate policies (Bouteligier, 2012; Bulkeley, 2010; Burch, 2010). Given the complexity of climate change, urban climate policy might benefit from vertical assistance (e.g., legislative frameworks, financial subsidies) and external knowledge (e.g., higher government, scientific organizations) (McCormick et al., 2013; UN- Habitat, 2011). Horizontally, as various stakeholders learn to share resources, conversation, and collaboration within city networks and with adjacent municipalities can help to minimize spatial misalignments (Kern and Alber, 2008). Local governments, on the other hand, should be cautious about relying too heavily on external resources such as political parties or priorities.

Sweden has one of the most powerful systems of local government in Europe, both politically and operationally, including the ability to levy income taxes (Lidström, 2011; Wollmann, 2004). Local governments have the authority to establish an organizational structure that is better fit for carrying out these activities under the Local Government Act of 1991 (Lidström, 2011; Wollmann, 2004). Sweden was also one of the first countries to embrace Local Agenda 21 and has a long history of supporting local climate action through national policy guidelines and financial aid (Eckerberg and Forsberg, 1998; Smedby and Neij, 2013).

Malmö was once known as an industrial city because of the Kockums shipyard. When Malmö's industries failed in the 1980s and 1990s, this altered. Despite the difficulties, this provided city authorities with a chance to rebrand Malmö. The building of the University of Malmö, the resund bridge between Malmö and Copenhagen, and the development of Bo01, Sweden's first 100 percent renewable energy urban zone in its western port, kicked off Malmö's change. Malmö has been addressing sustainable development and climate change for over 15 years through technical (e.g., food waste and sewage sludge converted to biogas), institutional (e.g., municipal regulations, communication, and participation), and large-scale experimental initiatives (e.g., Bo01). Even though mitigation is a top priority, Malmö is prone to flooding as a lowland coastal city.

Malmö has opted against enacting a climate policy. Mitigation and adaptation are instead included into a variety of policies to guarantee that climate targets are met across sectors and ministries (Dowding-Smith, 2013). The Environmental Program (2009) and the Master Plan both address climate change (2011). Malmö's environmental policy aspires to make it Sweden's "most climate-friendly metropolis" (e.g., by 2020 all public buildings and procurement will incorporate renewable energy and energy efficiency; by 2030 l entire municipality will use 100 percent renewable energy). The long-term objective of the Malmö Master Plan (2012-2032) is for Malmö to become "a sustainable and beautiful city."

Neither of the documents is legally enforceable. According to the interviewers, there is also a high level of compliance: around 95% of city projects match the set standards. Malmö also has an adaptation action plan, which includes an emphasis on "climate adapted planning" and refers to many EU-sponsored projects 40 on adaption trials in Malmö, since adaptation is a relatively recent policy topic.

Because of the many complexities and uncertainties associated with climate change, local governments should create and execute (long-term) urban climate policies that are adaptable and flexible. Local governments must develop an institutionalized capacity to learn and adjust their tactics on a continuous basis, transforming themselves into learning organizations. We looked at what it means for a local government to become a learning organization in terms of urban climate governance.

In dealing with climate change, the Malmö local government appears to have embraced several features of a learning organization, as well as its organizational structure and working practices. Its climate concerns are reflected in the primary guiding papers as well as its ambition to become a "socially, ecologically, and economically sustainable city." The problem is climate change; the answer is to keep focusing on sustainable development and learning. Following the economic crises of the 1980s and 1990s, Malmö might have taken a totally different path. Instead, climate policy objectives and implementation have been accelerated thanks to leadership, a shared, internalized, and widely publicized vision of sustainability, and an organizational structure that prioritizes learning.

Malmö's learning capacity is enhanced by the priority for debate, communication, and (internal and external) partnerships, which allow people and private actors to engage in the formulation and co-implementation of a common climate vision. Malmö facilitates its climate policy through vertical and horizontal collaborations, such as national / EU assistance, participation in municipal networks, and collaboration with regional partners. Malmö demonstrates the learning organization theory and governance elements of the urban environment, while certain factors are more important than others. Malmö's success and, in many

ways, its status as a trailblazer in urban climate regulation is due to the interplay of numerous elements (rather than a single component). This is like learning organization theory's concepts of linked disciplines.

The futuristic project of Sidewalk Toronto, founded on the idea that the neighborhoods of the future develop around a digital "layer", takes a clear position on what should be the use of technologies in urban planning. Leaving aside the problems related to the protection of privacy and data governance for which, despite the agreements being reiterated several times, that the goal is to guarantee maximum privacy for citizens, to date, it is not very clear how this goal will be pursued, I would like to focus on how the urban planning paradigm would change if this prototype were adopted in the future.

First, the privatization of the procedure. The initiative and development of the project was the work of two private entities while the intervention of public entities was subsequent and merely enabling. Not only that, but also the very idea of the administrative authority of the "regenerated" neighborhood changes radically. It is significant that we speak of public administration as an "app" where policies and responsibilities are pushed to the limit of an infrastructure network that is managed by someone else.[55]

Citizen services and city administration become applications for the user, driven by the digital platform. By handing the "pen" to the Sidewalk company to draw the master plan of the Toronto neighborhood, a company was granted the opportunity to exercise the public planning function. The next step is the creation of a network of interconnected neighborhoods where the planning function never stops, even on the built for the continuous modeling of the city according to the needs of the community.

A further element is the aim that is intended to be pursued through this digital platform. The intent is to use public data to catalyze economic market activities. This intent can be pursued in two ways: by favoring the public / general interest or rather profit and market sharing. The purpose in the project under consideration has not yet been specified. In fact, privatization and "platformization" risk placing those

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[55] E. P. GOODMAN AND J. POWLES, in Urbanism under Google: Lessons from Sidewalk Toronto, ci

who manage the information and data of the digital platform in a position of domination by not going beyond the vertical public administration-citizens scheme that still characterized urban governance, but by identifying a new private planner

CONCLUSIONS

This thesis presents new frameworks and ways to help shift priorities, habits, and decisions for decades to come, including the notion of transformational socio-ecological innovation and a natural social contract.

Between 2000 and 2050, the 'Great Mindshift' (Göpel 2016) or the next 'Great Transformation' will be remembered as a move towards sustainability (Schellnhuber et al. 2011). The COVID-19 pandemic in 2020-2021, which follows the global finance crisis of 2008, has once again revealed the world's severe vulnerabilities.

A natural social contract plan serves as a counterproposal to existing social contracts. A natural social contract entails a fundamental shift in humanity's way of life and interactions with its social and natural environments. Fundamental values such as solidarity, communal well-being, democracy, and social and environmental justice are all prioritized in a natural social compact. A natural social contract highlights the necessity of social and environmental management.

The Natural Social Contract is a new way of thinking about poverty, inequality, social exclusion, and environmental degradation. A natural social contract fosters creative thinking and puts our institutional and economic models to the test in terms of long-term viability.

The governance of a socio-ecological system, from an institutional standpoint, necessitates new ways of coping with complexity, ambiguity, and distributed power in social change, such as adaptive, reflective, and deliberative approaches to governance.

Adaptive spatial planning in urban and rural settings, polycentric governance of the commons, and sustainable co-management of natural resources, urban commons, and cultural resources are all examples of ecology-based institutional design. Biological and institutional variety both contribute to resilience. As a result, a natural social contract should be tailored to the unique qualities of a given location's geography, environment, economy, and culture.

"Systemic changes in existing patterns of activity and structure, including formal and informal institutions and economies, that contribute to sustainability, health, and justice in all socio-ecological systems"[56] is how transformative socio-ecological innovation is characterized.

In a natural social compact, society cannot rely solely on the market or the state to solve communal issues, nor can it delegate responsibility to individuals. The implementation of a Natural Social Contract will necessitate a rethinking of how society is organized to tackle issues at the most suitable level (the subsidiarity principle) and through new alliances through horizontal networks of innovation.

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