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Research Article

Renewed Theories and Discourses of 21st Century; City Planning and Housing Design COVID-19 and Beyond, Sustainable, and Green Design

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Abstract

This research delves into the future housing theories of the 21st century, focusing on recent transformations in both urban planning and housing projects and models. Despite the world's anticipation of a vast sustainable transformation since the late 20th century, the first quarter of the 21st century was confronted with an unexpected event: humanity found itself amidst a pandemic that significantly transformed the world. The post-COVID-19 era has guided significant and enduring changes in various aspects from urban planning to living styles, working patterns, housing models, and typologies. This research presents renewed perspectives, based on theoretical dialogues, and discourses that aim to understand the transformation period with recent events specifically housing. The research also includes the perspective of housing in the past aims to contribute to comprehension of this new era and aid in shaping future urban and housing planning strategies. The theoretical basis is to investigate new methods and techniques in urban, and housing planning that have addressed climate-related issues since the 1980s and the subsequent pandemic period. According to the findings obtained in the research, COVID-19 and sustainability initially considered different phenomena, pandemic is essentially triggered and contributed to sustainable city planning, and housing design. While the public perception often distinguishes between COVID-19 and drivability as distinct design concepts, the research reveals a nuanced reality. Despite apparent differences, it is discerning that similar ideas and design principles aim for a healthier housing concept in airier, and greener areas both in terms of housing planning, and models. This intricates a close conceptual relationship between pandemic-induced design adaptations and sustainable concepts underscores the complexity of contemporary urban and housing planning paradigms.

Introduction

A span of almost a century has elapsed since the inception of E. Howard's groundbreaking ideas in the early 20th century. Today, as we tread the path of the 21st century, we find ourselves in the midst of shaping this era and those that follow. The 21st century, initially anticipated as an era of sustainable progress, took an unforeseen turn in its first quarter when humanity found itself engulfed in a global pandemic. This unanticipated turn of events, known as the pandemic, has not merely reshaped our way of life; it has also fundamentally and permanently transformed working patterns, and conditions, housing paradigms, typologies, and even the very nature of office spaces.

This unprecedented event radically changed aspects of

our lives, including our work environments, by introducing concepts such as remote and hybrid working. Thus, the changes experienced in housing, although they were almost universal in the 20th century and connected to a modern architectural past, were important in terms of sustainability, planning in housing models and typologies, using environmentally friendly materials, and offering holistic options that were compatible with the cities' ecosystem.

This research delves into past theoretical doctrines and discourses on housing plans and problems aiming to offer a fresh perspective on these established dialogues of sustainability and transformation period after the impact of COVID-19. It seeks to contribute to theoretical frameworks by investigating new perspectives, methods, and techniques in urban and housing planning, considering climate-related

challenges dating back to the 1980s. The issue of sustainability has been a prominent topic on the global agenda for nearly four decades until today, dating back to the 1980s. Various Earth summits draw attention to this critical matter. However, it was the advent of COVID-19 that truly underscored sustainability's real importance and was illuminated by this research. This revelation is emphasized as a noteworthy and intriguing aspect of the study.

The pandemic has rapidly changed and taken all well-known housing models to an unexpected level creating a worldwide global storm. However, the pandemic has rapidly taken all traditional known housing models to the next step accelerating moving from the city centers, and high-rise buildings to the countryside. The people started to demand that out of the city airy, greener areas in housing, models with plenty of balconies and terraces based on green architecture, such as an additional office room. Thus, the traditional housing model has undergone an unexpected revolution, even though we witnessed to come-back of the past housing models that E. Howard presented to us a century ago [1]. It has reshaped traditional office spaces, housing models, and typologies, leaving a profound and long-lasting impact on our way of life forever.

In this context, it seeks to contribute to theoretical frameworks by investigating new perspectives, methods, and techniques in urban and housing planning, considering climate-related challenges dating back to the 1980s. Furthermore, it endeavors to explore the evolution of COVID-19 after 2020, particularly within theoretical contexts, adding valuable insights to the ongoing discourse.

The evolution of housing typologies and models

First sustainability started a slow transition beyond the known traditional and modern housing designs to a more innovative and environmental approach, compatible with urban eco-systems. The housing models, a typological development that continued until the end of the 19th century follows an order like this; From spontaneously developing law-story anonymous models which are seen in all small towns, villages, like English town-houses, in the cities from Roman insulae as an archaic apartment model, to Haussmann's French apartment-block typologies, [2] as a more advanced version, the development in housing models continued until the end of the 19th century. In the early 20th century, E. Howard introduced us to an innovative concept that will be a very common model their versions seen in nearly all of Europe [1] like; garden-cities in England, *cit -jardins* in France, and *Gartenstadt* or *Siedlungs* in Germany [3]. This model initiated a new living style outside the city and housing model with a garden, and in the period that developed with CIAM, Le Corbusier's standardized prototype models, which were applied all over the world and spread in a very short time, in Europe, States, and Brazil, Northern Africa and even Japan were like modern architecture [4].

Today, the cities continue to develop with uncontrolled urbanization by inevitable transnational migration and rapid population growth. Many cities' populations exceed 10 million,

including London, Beijing, Tokyo, Istanbul, etc. [5]. The compact and centralized city forms imposed high-rise housing as common housing models that shaped our cities today. At the end of the 20th century, 80% of the world's population lived in high-rise housing in urban and uncontrolled megalopolises, 75% of the world's resources were used, and 75% of its waste was produced in 2% of the world [6]. Their centers and quarters are invaded by high-rise housing buildings. The uncontrolled urban sprawl becomes a threat to their existing eco-systems. Although the climate crisis took center stage as the primary challenge for cities, the problems associated with inevitable growing urban centers were increasingly intertwined and complex. To find a solution to this over-urbanization of cities, steps have begun to be taken by developing more sustainable city and housing models to rehabilitate the ecosystems of cities. Although both the sustainability efforts, and the post-pandemic efforts impose airier, greener, more widespread, low-rise, settlements out of the city centers and housing models, and typologies, it seems very difficult to achieve such a goal in the short term in cities.

The climate-change issues in the context of the housing problem and models

From the 1980s onwards, the world agenda would focus on Climate-change issues and sustainability, as a more significant concept in the cities and housing problem. Until the beginning of the 21st century, climate issues and sustainability (Figure 1) continued to gain increasing importance with Earth-summits starting with the first in Brazil in 1992. About a decade later, in the 2000s, the term "Climate change" began to permeate the discussions [7]. Conferences and literature dedicated to raising awareness of the climate crisis continued to multiply.

The concerns about the problems of cities began to be voiced in the 1990s. Urban planning methods became more climate-oriented. To prevent further urban problems, including uncontrolled and unplanned urban sprawl resulting from the destruction of nature and encroaching on green areas and forests, it is imperative to include experts in the design process on the climate crisis, climate engineering, and even human health. However, they aimed to protect the cities' ecosystems and climate problems and addressed the issue of developing sustainable new eco-city models and housing projects [8].

Thus, although the climate problem seems to concern cities only on a city scale, it is also necessary to turn to new and

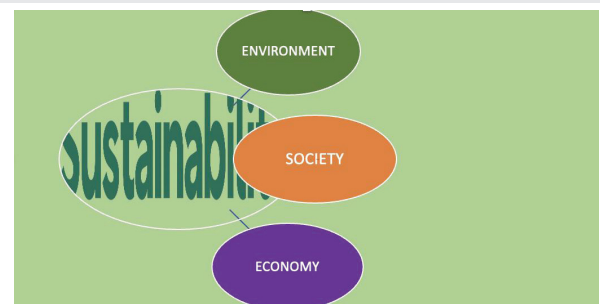


Figure 1: Sustainability Diagram. Diagram by Autor. Sustainable Logo on the Left, Sustainable Magazine.

innovative housing models on an architectural scale on housing problems, models, and typologies. In this context, new urban and housing models began to be developed. These sustainable city and housing models have emerged such as; sustainable city, eco-city, ecological city, smart city, low-carbon, zero-carbon, and resilient housing models [9] (Figure 2). Most of these come to the fore as urban and housing models that are suitable solutions to the problems caused by climate problems and better intact eco-systems [10].

The 21st century COVID-19 and transformation of city and housing planning

After the first quarter of the 21st century, the emergence of COVID-19 unexpectedly became a major turning point for climate change, an issue that has been trying to raise global awareness through various Earth-summits since the 1980s. Unlike global expectations of sustainability, COVID-19 brought climate change into sharper focus. COVID-19 has created a new level of awareness of climate issues especially because it directly affects human health, requires urgent measures, and attracts more attention.

The most significant turning point in the evolution of housing until the 21st century was seen during the COVID-19 period. This was an unforeseen situation. Perhaps it was the most unexpected phenomenon to affect housing typologies very suddenly because of the urgency of the disease problem. The extremely strict measures and new lifestyle imposed by COVID-19 were particularly effective in this. Also, this is not a temporary condition, and these could come back again at any time. The idea of living in green areas and garden houses outside the city, where people were quite satisfied even though they had to get used to the lifestyle imposed by the pandemic.

Some European countries are managing COVID-19 better, but some European countries have acted [11]. In Europe, a 15-minute city, a French concept of *hyper-proximité* (extreme proximity) was first intended to be temporary in Paris [12]. Mayor of Paris A. Hidalgo divides the city into certain areas [13] like the old zoning plan of the 20th century [14]. In this city model of the pandemic, in close vicinity of daily human



Figure 2: The Diagram of Sustainability and Sustainable Design with its Four Derivative sub-Ideas and Terms.

activities, there also is a need for a new housing model or suitable building-blocks [15]. This model is in the realm of sustainable cities, emphasizing the significance of creating business and residential environments accessible within a 15-minute walk or bike ride. This approach not only addresses the challenges posed by COVID-19 but also promotes and presents us with a sustainable and healthier urban lifestyle for the future [14].

Considering housing models and typologies, the impact of COVID-19 on urban life was initially perceived to be limited to cities and emerged as a sustainable solution that needs implementation in the future. The post-COVID-19 shift in housing demand has a substantial increase in the desire for residences supplying healthy living standards (the specific term emerged in the pandemic period, also signified healthy living, especially in some European countries) in airy green areas with gardens, or housing spacious balcony or terraces. This unexpected change has not only affected the old and traditional urban forms but also transformed temporary arrangements into permanent solutions.

Contrary to popular belief, COVID-19 has acted as a catalyst for many cities, including Paris and London, prompting them to reconsider their urban planning and housing design approaches. Prioritizing sustainability, health, and resilience has become a focal point in their plans. In response to this paradigm shift, various legislations, and measures implemented in countries like Italy, Spain, the Netherlands, India, etc. [16]. Italian cities allowed the measures based on socio-economic and environmental factors air pollution, urban ventilation, and population density, which are challenging to measure but can serve as proxies for social interaction [17]. The post-COVID-19 era has ushered in significant transformative changes, leading to depopulation in some American cities while European cities, Spain, the Netherlands, and India, witnessed a substantial decrease in working and social mobility government restrictions [18]. These changes have profoundly impacted living, work, and social life, giving rise to new working patterns remote or hybrid working. Consequently, new office and housing planning models have emerged in response to these shifts.

In countries like Italy, Spain, and the Netherlands, COVID-19 is viewed positively, and considered as an opportunity to make new arrangements in cities and housing [16]. Indeed, it can be argued that the pandemic accelerated the process initiated by sustainability in the planning of cities and housing. This acceleration contributed to a transformation that benefits human health by designing greener, airier cities and residences.

Could E. Howard's early 20th century model be a new model for COVID-19?

The housing models, at the beginning of the 21st century, E. Howard's early 20th century garden-city model would come to the agenda again with COVID-19. Recently, there has been a resurgence of the garden-city concept in England, by the renovation of the iconic Welwyn garden-city of E. Howard. This



highlights a growing demand for airier, healthier, greener, and more spacious houses with gardens. In the post-pandemic era, city dwellers have witnessed a transformation from the 20th century car-centered cities to cities planned with immediate access to facilities and houses within the vicinity, adhering to COVID-19 restrictions. After the pandemic, housing and city planning theories have come to the agenda in response to people's new demands. E. Howard's, Welwyn City has recently been undergoing a sustainable redesign in the UK [19,20]. During the COVID-19 pandemic, people's housing preferences have shifted towards residences with gardens, ground-floor access to gardens, or large terraces and balconies, akin to the planning principles of Welwyn City. These theories initially gained prominence under the banner of sustainability in recent years, they have become even more prevalent, in the wake of COVID-19.

Today, we recognize that urban and housing planning has evolved in significantly different ways compared to just a century ago, necessitating various disciplines, architects, and urban planners, also climate and mechanical engineering, medical doctors, and public health experts. In this period spanning a little more than a century, traditional urban planning methods and housing models require a multi- and interdisciplinary approach. In the future, humanity will likely confront various and diverse scenarios. Initially, a health issue, COVID-19 has demonstrated its capacity to influence not only people's health but also their lifestyle and work patterns, along with urban and housing planning. This uncertainty raises questions about the potential emergence of new diseases in the future. We need to remember that; COVID-19 might be just the beginning, and humanity must prepare for even more severe scenarios, as highlighted by warnings from figures like Bill Gates [21].

The COVID-19 pandemic has indeed reshaped the world, revealing that what was initially perceived as a temporary situation has had lasting effects on humanity and urban environments. This crisis has prompted a reconsideration of urban planning dynamics, emphasizing the importance of habitable cities, human well-being, sustainability, and resilience in the face of ongoing challenges.

The research gap

The aim of this research is to explore, especially from a theoretical perspective, new perspectives, methodologies, and techniques in urban and housing planning that have emerged in response to climate-related challenges since the 1980s. Moreover, it attempts to decipher the emergence of COVID-19 after the 2020s and its conceptual differences and similarities with sustainability. In this context, the changes in housing models and typologies, especially in the recent period, due to climatic problems that have come to the forefront of unexpected situations such as COVID-19, and their reflections on housing are discussed. Although both the pandemic and COVID-19 issues have been frequently the subject of research in academic circles, there are many publications especially on urban

studies, but fewer on housing. Nevertheless, especially in the COVID-19 period, there is a lot of information and publications on European, American, and Asian cities. This research aims to shed light on the transformations experienced in this area, both during the sustainability and COVID-19 periods, through a general non-analytical evaluation.

The methodology

The methodology employed in this study focuses on exploring concepts such as sustainability, green design, and the innovations introduced to urban and housing planning due to COVID-19, especially in response to recently planned and unplanned situations. The research offers a fresh perspective by examining new urban planning methods and techniques, along with investigating new housing models and typologies.

In this research, the methodology primarily focuses on a theoretical framework, comparing urban and housing planning responses to climate-related issues since the 1980s with those emerging in response to COVID-19 after the 2020s. This comparative analysis aims to identify differences and similarities in the contributions of these two periods to urban and housing planning. Additionally, the study intends to present and develop a novel perspective, along with new methods and techniques, within this context.

In this context, research was conducted based on past theoretical discourses. This research aims to bring a new perspective to these past theoretical discourses after COVID-19, as well as to make a new and additional discursive contribution to these past discourses.

Climate change, sustainability, systematize the green design and green planning

The 1980s and 1990s became a turning point for cities and urban planning. Now, world design and planning have begun to evolve towards a new, innovative, and green world, going beyond the traditional norms known up to that day.

A significant phenomenon of this period was the increasing dominance of liberalism worldwide, shaping urban planning and architectural design dynamics. The 1980s marked the onset of the neoliberal phase, ushering in a dominant urban model focused on structural adjustment, advocating for the alignment of economies and societies with global markets [22].

In the 1980s, the world was significantly shaped by the global with the adoption of liberal policies. Concurrently, the 1990s brought forth new and uncharted perspectives in global design, influenced by a different paradigm. A significant milestone occurred in 1992 with the inaugural "Earth Summit" held in Rio de Janeiro, Brazil, organized by the United Nations. During these deliberations, the concept of "sustainable planning" took center stage, eventually manifesting into Agenda 21 [23]. After the climatic concerns were first addressed in 1992 at the Earth Summit the discussions centered around operationalizing sustainable planning for Environment and Development [24].



In the 21st century, a transformative era has emerged, necessitating the creation of innovative city models with novel approaches [7]. This period marked the emergence of the term "sustainability," prompting gradual steps toward a more sustainable future (Figure 1). The urban planning realm in the early 21st century liberated itself from the constraints of old explanatory models [25]. Planning dynamics for cities underwent radical changes, giving rise to new design paradigms. Humanity now faces an uncertain era where essential resources such as energy, water, and food are critical and this reality, shaped by technological advancements, has become increasingly unpredictable [26].

Indeed, these first studies on climate issues had a great impact around the world, would become more common after the first Brazilian Earth Summit in 1992, and would turn into summit meetings to be held almost every few years. The main topic of these meetings, where the framework of sustainability was gradually determined, was to draw attention to the concept of sustainability in the world and to build a greener, cleaner, and healthier environment.

Eventually, in the early 2000s, the term "Climate change" gained worldwide usage, marking the emergence of "green-urbanism" theories for the 21st century. These theories aimed to transform existing cities from fragmentation to compaction, as outlined [7]. This ecological challenge was applicable to cities of all scales, from villages to mega-cities, urging a reevaluation of building practices, transportation, work, consumption, and leisure activities and this new urbanism represents an approach that originated [25]. In the 1980s, initially a place-making initiative to counter suburban sprawl and increase density by promoting compact urban development.

Towards the new urban planning ideas and introducing climate change to the world

The first Earth Summit held in Brazil, in 1992 by the United Nations debates started to focus on new urban problems explained that "sustainable planning" would later be formulated as Agenda21.

Towards the end of the 20th century, certain world cities, often hosting populations exceeding 10 - 15 million, expanded significantly beyond their historical boundaries. These cities, exemplified by metropolises such as Tokyo, Sao Paulo, Mexico City, Mumbai, Calcutta, Shanghai, and Beijing, became vast, sprawling urban landscapes, evolving into what the United Nations terms megacities for populations surpassing 10 million people [27]. This rapid expansion posed challenges for orderly planning and strategic regulation, leading to complex urban landscapes that defied conventional planning approaches [7].

As a matter of fact, concerns about the problems of cities began to be expressed in the 1990s. These concerns will gradually develop towards the ideal of a more sustainable world and cities.

Indeed, in the early 1990s, in his 1994 essay, Rem Koolhaas rightly asked 'What ever happened to urbanism?' and later, in 2000, the term 'Climate change' has been getting widely

introduced [7]. After that a newly emerged and developed term the sustain and Green Urbanism theories for the 21st century, which aims to transform existing cities from fragmentation to compaction.

This problem is gradually starting to create serious problems in cities and is making cities increasingly uninhabitable in terms of human health. The solution to this condition will be explained as "sustainability" and planning more "sustainable" cities after the 1980s.

The overpopulated cities started to develop countryside and outside of the city centers, so new housing plans became a threat to green areas, forests, and urban ecosystems. The solution is the cities should plan innovative residential areas that can be integrated with green areas and existing ecosystems abandoning the traditional housing planning systems and models.

Following the inaugural "Earth Summit" in 1992, a wave of new urban planning concepts and theories emerged, with a particular emphasis on climate-related concerns (Table 1). This era saw the evolution of urban and housing planning, giving rise to innovative living spaces, novel dwellings, and varied housing models and typologies. The planning of these housing models and settlements drew inspiration from international neighborhoods, serving as practical examples for implementation [28].

Green design and sustainable design principles have ushered in new transportation models for cities, focusing on efficient traffic circulation. The Charter of New Urbanism advocates for walkable urbanism as a key strategy to minimize environmental impacts in planned environments and foster the development of smart cities that support sustainable transport. In these sustainable cities, the planning of urban transport is considered a fundamental study, serving as a core indicator of the development of advanced planning systems [29].

Indeed, while sustainability and eco-based concepts and innovative planning theories are widely accepted globally, there are still significant challenges in terms of institutional and organizational implementation. Urban development and sustainability remain pressing concerns not only for academics but also for policymakers, practitioners, consultants, think tanks, environmental industries, and non-governmental organizations.

The new urban planning ideas and models of the 21st century; the green-design, sustainable-city, smart city, eco-city, etc.

The growing interest and focus on sustainability in

Table 1: The Sustainability and The Main Principles of Sustainable Ideas and Plannings.

The Main Principles of Sustainability and Sustainable Ideas and Planning
• Adopting Holistic concepts for settlement areas
• Based on international projects for successful developments
• Specify strategies for practical urban implementations

urban planning and design has led to the introduction and development of new terms and concepts previously unfamiliar in these fields. Academic circles have taken significant steps, leading to increased attention to sustainability on the world agenda. This heightened awareness has spurred the publication of numerous books dedicated to exploring and explaining various aspects of sustainability in urban contexts. These publications serve to enrich the discourse and contribute to the ongoing evolution of sustainable urban planning practices.

Recently, excellent compilations of research on sustainable cities have been published by Satterthwaite, Wheeler, and Beatley, and in the meantime, Sustainability Science has emerged as a conceptual and theoretical basis for a new planning paradigm [7] (Figure 1).

After the first Earth Summit later a book was published by Richard Register first time mentioned the new term "eco-cities" [8]. This presented a new urban model that included human settlements modeled on the self-sustaining resilient structure and function of natural eco-systems", as defined by the builders (a non-profit organization started by Richard Register who first coined the term)

This book represents a pioneering work in establishing the foundational theories of sustainability within urban planning, laying the groundwork for subsequent theories and terminologies in the field. As one of the significant models the "eco-cities" embody an ecologically healthy urban environment, integrating urban planning, ecology, and public participation to formulate design concepts that prioritize healthier cities [30]. The World Bank defined "eco-cities" as cities that promote the well-being of citizens and society through integrated urban planning and management, harnessing the benefits of ecological systems while safeguarding and nurturing these assets for future generations. This concept encapsulates an ecologically planned, healthy urban environment, emphasizing the intersection of urban planning, ecology, and public engagement in the creation of innovative designs focused on environmentally sustainable housing and living areas [30]. These have discursively emerged as beneficial formations for their inhabitants which ecologically improve their living conditions rather than landscape for wider socio-environments [31].

The World Bank introduced a new definition of eco-cities, describing them as well-planned urban areas that enhance societal well-being through innovative urban planning, integration of ecological systems, and safeguarding assets for future generations [32]. The overarching concept of sustainability has since evolved, encompassing diverse topics within the field. Subsequently, various terms and labels emerged under the umbrella of sustainability and sustainable cities, including but not limited to sustainable city, eco-city, ecological city, smart city, low carbon, zero carbon, and resilient [9]. Even if a specific term is mentioned, people generally understand it as related to sustainability, even without explicit clarification (Figure 2). The advancement in urban planning

techniques has led to the evolution of urban and housing planning concepts, giving rise to new types of dwellings, neighborhoods, and housing models. Innovative methods have inspired the planning of cities with specific focuses such as green cities, eco-cities, smart cities, and digital cities [31,33]. These designations signify urban areas that integrate innovative technologies and sustainable practices to create more efficient, environmentally friendly, and technologically advanced living spaces.

Indeed, as mentioned the Eco-city theory, focuses on adjusting the relationship between the city and nature. The urban sociologists and urban theorists, including Ulrich Beck, Saskia Sassen, Richard Sennett, Jan Gehl, Manuel Castells, Anthony Giddens, Herbert Girardet, Thomas Sieverts, to name just a few, are exploring wider areas such as globalization, urban sustainability, ecology, network systems, information and communication technologies, and other related fields as well as the Federico Butera, Ken Yeang, Richard Burdett, Jaime Lerner, and Jeffrey Kenworthy also made some important contributions to the discussion of sustainable urban planning [7].

The early period sustainable ideas and theories and its development

The early ideas and theories that emerged from urban planning pioneers like E. Howard and Reyner Banham laid the foundation for future city planning and the development of concepts such as "green urbanism" and "green architecture." E. Howard's vision of the *Garden City of Tomorrow*, presented in his 1902 book, showcased a holistic approach to urban planning, emphasizing the integration of nature, human needs, and social well-being. Similarly, in 1969, Reyner Banham pioneered the idea that technology, human needs, and environmental concerns should be integral aspects of architectural design and these early concepts have experienced a resurgence, becoming crucial components of modern urban planning methodologies and sustainable city development [7].

The urban and architectural theories, in the 21st century, are derived from "garden-cities," particularly the concepts put forth by E. Howard, which have regained significance due to the challenges posed by uncontrollable urban sprawl into green areas and countryside. Howard's vision advocated the localization of secondary and primary sectors (factories and agricultural activities) in the periphery, while the tertiary sector would be established in the center, encircled by inalienable rural green belts [34]. However, these models were designed based on the scale and conditions of 20th-century cities, raising questions about their applicability in contemporary urban contexts. As urban areas continue to expand and environmental concerns intensify, there is a need to adapt and reinterpret these early concepts to meet the demands of modern cities.

In the 21st century, people find themselves in an entirely new context, demanding the creation of novel city models [7]. Humanity has entered an era of uncertainty, where the supply of essential resources like energy, water, and food is critical. We now inhabit a world marked by unpredictable complexity;

a reality that advances in technology have helped shape at an astonishing pace [26]. Natural ecosystems, self-organized systems with extensive histories of adaptive capacity developed through evolution, selection, and migration, offer invaluable lessons for sustainability science and these ecosystems would provide humanity with profound insights for creating sustainable urban environments [35].

The “green design” and “sustainable design” also offer new transportation models for cities that had been planned to depend on traffic circulation in the 20th century’s modernization-based techniques so, new transportation models emerged for “green cities”. Thus, the most clearly defined form of walkable urbanism is known as the Charter of New Urbanism which is an approach for successfully reducing environmental impacts by altering the built environment to create and preserve smart cities that support sustainable transport.

In the 2020s, the issues of sustainability and green architecture, which had been prominent since the 1980s, were overshadowed by the COVID-19 pandemic, especially in the 2019–2020s period. Thus, the pandemic has become more significant than just “green” and “sustainable” architecture and housing planning [16]. It profoundly impacted various aspects of our lives, including living, and working conditions, dietary habits, and the education system. These influences permeate the design spectrum, from the planning of entire cities down to individual homes, workplaces, schools, hospitals, shopping malls, and more. The pandemic has necessitated a reevaluation and redesign of spaces at all scales, considering the implications for human behavior and well-being.

Sustainable urban planning, which has been deemed significant for the last 30 years – 40 years, has encountered the challenge of coexisting with the reality of a pandemic. It appears that we will persist in this new reality for many years to come. Consequently, it is imperative to develop new planning parameters or enhance existing ones to address this ongoing challenge effectively. The intersection of sustainability and pandemic-responsive planning becomes crucial for shaping the future of our cities and ensuring the well-being of their inhabitants. This requires a multidisciplinary approach, integrating insights from public health, architecture, urban planning, and social sciences to create resilient, adaptable, and healthy urban environments.

From sustainable urban and housing design ideas to the COVID-19

When examining various sustainable planning initiatives worldwide, particularly those rooted in ecological design principles, similarities with pandemic-responsive strategies become apparent. Examples like Chicago's Urban Rivers organization, Rotterdam's Recycled Park featuring luxury housing, and Amsterdam's artificial floating island suburb of IJburg all showcase innovative approaches [34]. Also, some examples from Asian cities such as Sino-Singaporean, and eco-cities like Tianjin in China exhibit more similar urban

and housing design characteristics as well as some other eco-city projects in various parts of the world [10]. Also, the cities including Masdar in Abu Dhabi, serving as a specific model for an ecological city in a different climate [37].

These exemplary sustainable city projects share common goals of creating airier, greener, and healthier urban environments planned out of the city, green areas, and less CO also observed similarity in design principles with COVID-10. Their planning and housing settlements, along with the principles and tools employed, align with the concept of pandemic-responsive planning, emphasizing adaptable, resilient, and health-oriented urban spaces. The integration of these strategies with sustainable urban planning principles can pave the way for cities to navigate the challenges posed by also pandemics effectively.

Likewise in Istanbul, a notable development occurred in the 2010s around K. Çekmece Lake's natural ecosystem considered to present a healthy living environment in an airy, green area same pandemic period. While parts of the area had been developed with buildings, a rehabilitation initiative was launched based on an architectural concept competition aimed at preserving the ecosystem. Renowned architect Ken Yeang played a significant role in designing this project [10,38–40]. The planning embraced the “eco-city” concept, tailored to the natural environment of K. Çekmece lake.

In Europe, particularly in Italy, the onset of COVID-19 was seen as an opportunity to reconsider residential design principles, architectural concepts, and building typologies and model planning with green design elements. This re-evaluation emphasized creating residences with semi-private and collective open spaces, supporting health and physical distancing, with a design approach parallel to sustainable design principles. Houses with terraces, green, and private open and collective spaces, and shared courtyards. These design adaptations aimed to support daily physical activities while maintaining social distance during the pandemic [41].

In Europe, during the pandemic period, a planning approach in which green areas, spacious balconies, and terraces are the main elements of sustainable urban and housing planning, was used extensively in some American, and Canadian cities developed. Green-based elements such as green areas, gardens, and green roofs have emerged as considerable design concepts for sustainable cities and have come to the fore as essential planning tools during the pandemic.

The cities such as Chicago and Seattle in the United States, and Toronto in Canada, as well as Paris and other European cities, have implemented urban-scale projects focused on increasing the number of green roofs to improve the overall quality of life [42]. Green roofs offer physical and visual benefits by serving as areas for vegetable gardens, playgrounds, or quiet relaxation and reading areas, influencing new structures to adopt similar typological solutions [41]. Like some of the American cities and Canada and Europe, following the onset of COVID-19, significant transformations occurred within

Türkiye's real estate market, particularly in housing models and typologies [43]. The pandemic prompted a shift in Turkish people's preferences for housing models, leading to changes in demand. The Turkish Builders Association (*Türk İnşaatçılar Birliği*) announced plans to develop new sustainable projects tailored to meet the evolving demands of the populace [44].

In the post-COVID-19, period housing demand in Türkiye transitioned from high-rise buildings to lower-rise structures, in airy and green areas outside the city.

In general, considering the housing model and typologies, in the COVID-19 and post-COVID-19 shift in housing demand has a substantial increase in residences having healthy living standards (the specific term emerged in the pandemic period, also signified healthy living, especially in some European countries) like most preferred low-story housing with spacious balcony or terraces or houses with additional room using for office in the remote or hybrid working conditions. (Figures 3,4)

Conclusion

The 21st century, initially anticipated as an era of sustainable progress, took an unforeseen turn in its first quarter when humanity found itself engulfed in a global pandemic. It reshaped traditional office spaces, housing models, and typologies, marking a profound and lasting impact on our way of life forever. While the issue of sustainability has been on the agenda of cities for almost a century and the cities and housing are in a slower transforming and progressing process, COVID-19 has created a very sharp change effect. This has led to the emergence of new living and working conditions, living in the countryside, towns, and the garden-city which was a project that had been a thing of the past until then, coming back after almost a century. The findings derived from the theoretical exploration conducted in this research highlight a significant correlation between COVID-19 and sustainability, challenging the initial perception that these were disparate



Figure 3: Istanbul, the General View of A Low-Rise Green Based Settlement Model Planned by Government Emlak Konut and A Private Company Specifically After COVID-19. <https://www.emlakkonut.com.tr/tr-tr/projelerin-hava>.



Figure 4: Istanbul, the General View of A Low-Rise Green Based Settlement Model Planned by Government Emlak Konut and A Private Company Specifically After COVID-19. Photo, <https://www.emlakkonut.com.tr/tr-tr/projelerin-hava>.



concepts. Remarkably, the pandemic has served as a catalyst, propelling sustainable city planning and housing design into the forefront. Additionally, traditional urban and housing models like the garden-city model, in the airy and green areas also signified pandemic's healthy living have experienced a resurgence in relevance post-pandemic, underscoring the dynamic shifts in urban planning paradigms influenced by the global health crisis. When urban planning and architectural housing design are considered, it was found that the basic principles of sustainability and COVID-19 are like each other in many aspects and aim for almost the same goals and ideals (Tables 2,3), (Figures 3-7).



Figure 6: China, Tianjin, Lay out Plan of A Sustainable city Model.

Table 2: Main Principles of The Sustainability for Green-Urbanism and Urban Theories.

Urban Ecologies and Eco-Systems	Vicinity of Neighborhood, No Car& CO Cities, Greener, Clean, and Quiet Neighborhood
Urban Environment Establish&Enhanced Synergy Surroundings	Establish Synergies & Location Optimized Natural Energy Sources; Sunlight, Wind. Nature-Friendly Regional and Local Materials, Prefabricated Modular Construction Systems
Realistic Future Nature &Project	Green and Eco-Design Strategies and Solar Architecture
The Eco-Neighborhood	Arranged with Vicinity of Neighborhood, (15 Minutes City Concept) Quiet, Walkable Neighborhood, Clean, and Healthy Microclimate
Urban Circulation system	Eco-Friendly, Well Organized
Using Future Technology	Future Ecosystem of a closed-loop based on recycling, reusing, remanufacturing, and composting



Figure 7: China, Tianjin, the General View of A Sustainable city Model.

Table 3: Main Principles of The Sustainability for Green-Architecture.

Eco-Architecture Large-Scale Architectural Project	Integrate Nature, Natural Landscape, Project Arrangement with More Green areas, and Parks, Garden-City Planning
Eco-Architectural Design Building-Scale	Integrate Nature to the Building, Natural Landscape, Green-areas, Gardens, and Green-Terraces, Green-Balconies, Green-Roofs.
Integrating Nature into Architecture	Well integrated the Existing Nature and Cultural Identity Nature-Friendly Regional and Local Materials, Prefabricated Modular Construction Systems
Realistic Future Nature &Project	Green and Eco-Design Strategies and Using Solar and Recycling Systems in Architecture
Using Future Technology	Future Ecosystem Using Materials Recycling, Reusing, Remanufacturing, and Composting



Figure 5: From Sustainable City towards to Post Pandemic era 15 Minutes City Concept.

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