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METHODS, TOOLS AND BEST PRACTICES

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The cover image shows a sea glacier ice that melts away.

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REVIEW NOTES – Town Planning International Rules and Legislation

Accelerate urban sustainability through European action, optimization models and decision support tools for energy planning

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Abstract
Starting from the relationship between urban planning and mobility management, TeMA has gradually expanded the view of the covered topics, always following a rigorous scientific in-depth analysis. This section of the Journal, Review Notes, is a continuous update about emerging topics concerning relationships among urban planning, mobility, and environment, thanks to a collection of short scientific papers written by young researchers. The Review Notes are made up of five parts. Each section examines a specific aspect of the broader information storage within the main interests of the TeMA Journal.
In particular: the Town Planning International Rules and Legislation. Section aims at presenting the latest updates in the territorial and urban legislative sphere. The theme of energy and its related energy consumption is a leading theme in the European scientific debate for the continuous pursuit of urban development. In this direction, the contribution of this review notes illustrates on the one hand optimization models and decision support tools produced so far to improve the energy organization at different urban scales and on the other highlights within the cards, strategies and actions carried out forward from the European Union to have a cognitive and operational framework on energy planning and on how to accelerate the sustainability of urban systems.

Keywords
Urban sustainability; Energy systems planning; European action; Optimization models; Decision support tools

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1. Energy systems planning

The topic of energy has become of particular interest both for supporting people's daily lives and for the ongoing pursuit of urban development (Amin & Gellings, 2006). In recent decades, the demand for energy resources has increased around the world, along with population expansion, economic development, and improved living standards (Grubler & Fisk, 2012). As a result, energy insecurity stemming from, depletion of fossil fuels, the limitations of new energy resources / technologies, as well as political concerns about the energy-induced environmental issue (in particular greenhouse gas emissions) have significantly weakened the capacities of urban systems to address the potential risks and impacts associated with supplying it (Marechal et al., 2005). The nowadays common international consensus is that energy resources can no longer be produced and consumed without addressing sustainability issues and a few associated problems (Seto et al., 2017). Urban systems represent the largest consumers of energy around 60-80% and at the same time 75% of carbon emissions (Cheng et al., 2021; Chang et al., 2016). The sudden and continuous manifestation of the effects of climate change require considerations and attention in defining actions, policies, and strategies in the reduction of greenhouse gas (GHG) emissions within energy management systems (Eckhoff et al., 2022). Furthermore, the rapid urbanization of both city centers and suburbs exerts immense pressure on climate, infrastructure, and access to basic services such as heating, cooling (Wiedmann et al., 2016; Seto et al., 2017). This underlines the need for an approach that aims to support the planning of such complex systems. However, such a planning exercise is extremely complicated, as it involves many social, economic, environmental, technical, and political factors and their interactions, together with complex temporal and spatial variability which in turn generates cascading effects (Sailor, 1997; Lin et al., 2009). Therefore, policy makers are called upon to respond more effectively to a range of energy-related problems and conflicts, as well as to the adaptation of greenhouse gas emissions within multiple scales of energy management systems (Lin et al., 2009). To try to have concrete results, it is necessary to focus on our cities, in accordance with the European directives and guidelines, in trying to make considerable efforts, accelerating the implementation of the technologies available in the areas of urban expansion or in the renovation of existing buildings and infrastructures (Hämäläinen, 2021). Today, technological advances have been made in the construction sector, offering a great opportunity for energy savings in terms of costs mainly due to the multitude of loans issued by the National Recovery and Resilience Plans (PNRR) (Gaglione & Ayiine-Etigo, 2021). According to International Energy Agency (IEA) it is expected that in 2050, there will be half of the energy savings in heating and cooling regarding the construction sector. Today there is an increasing need to know possible and future scenarios on energy, in the first place to know where and how energy is consumed in relation to the configurations of urban fabrics and the socio-economic characteristics of the city (Perera et. al., 2021). In addition, providing awareness of the use of energy to better allocate resources and direct policy interventions to reduce consumption and in turn identify economically efficient savings opportunities in all territorial contexts (Haberl et al, 2020). Having a meaningful and comprehensive picture of consumption patterns, reliable forecasts on energy use can define forecasts and modeling of policy scenarios over time. For planners, the ability to understand future energy demand is the prerequisite for changes in land use, urban development, and other technological and architectural aspects, especially in trying to update urban planning tools at different scales. For years, the scientific community has emphasized the desire to investigate energy consumption at different scales from the urban, neighborhood and building scales and above all emphasizes the importance of analyzing the relationships between energy policy and the physical-functional organization of urban systems (Gargiulo & Russo, 2017). Scientific research has produced a variety of methods, models aimed at improving the energy efficiency of urban areas, still outlining a completely fragmented picture. However, the difficulties of administrative management as well as economic resources indirectly lead to the need to think about how to "optimize" the energy possibilities and opportunities of urban systems. Optimization can become an effective tool for identifying optimal strategies within complex management systems (Sadeghi

& Hosseini, 2006; Mavrotas et al., 2003). In detail, the contribution of this review notes illustrates on the one hand the decision support models and tools that have been produced so far in the energy sector on different scales and on the other hand to outline within the cards, instead, the European actions at to have a cognitive and operational framework on energy planning.

2. Optimization models at different urban scales

In recent decades, the scientific community has developed numerous optimization models to support the energy organization of territorial contexts. Models have been widely used to define an optimal allocation of energy resources, technologies, and relevant services within one or more administrative objectives. The studies can be summarized in three major lines of research.

A first line of research placed on trying to coordinate the interactions between energy, environment, and economy both in urban contexts and in areas destined for productive settlements. Most of the studies propose linear programming methods based sometimes on dynamic models related to energy supply on a national scale (Farzaneh et al., 2016; Pantaleo et al., 2014). Further studies, on the other hand, have proposed a non-linear programming method to identify optimal energy consumption patterns/programs within production factories (Ostadi et al., 2007). Considering that energy consumption is a very important quality index in most manufacturing industries. Indeed, Beck et al., (2008) propose a modeling approach to support optimal planning of energy networks such as that of regional-scale electricity generation by combining global optimization and agent-based modeling tools. The approach was demonstrated through a case study of regional management of electricity generation in South Africa. Liu et al., (2021) have proposed an optimization methodology to improve the efficiency of energy use in the transformation industries. A series of software have also been developed to support these studies, such as the long-range energy alternatives planning system (LEAP), the New Earth 21 model (NE21), the national energy modeling system (NEMS) and the energy 2020, which were developed to assess the environmental and economic effects of energy activities (Papagiannis et al., 2008).

A second line of research has focused its attention on defining optimal solutions on an urban scale. In detail, bottom-up statistical methodologies combined with GIS techniques were used to show how the impacts of behavioral and technical changes in the building stock can be assessed and visualized in the residential sector in cities (Mattinen et al., 2014) and to give priority to the implementation of energy requalification measures for the residential stock of cities (Mastrucci et al., 2014). Other studies have posed their investigations into urban transport as it plays a vital role in final energy consumption, largely due to the heavy dependence on fossil fuels and a significant growth in demand for mobility. The studies aim to define optimization modeling frameworks for energy management within small electrical power systems (SEES), including vehicle-to-grid systems (V2G), which are expressed through an algorithm of linear programming, allow to evaluate the contribution to the management of green energy resources (Guille & Gross, 2009). The Heyen, & Kalitventzeff, (1997) study adopts an energy system model (ESM) for the design and optimization of existing or newly designed urban energy systems while outlining identifying a set of indicators suitable for addressing a variety of aspects of sustainability. These indicators can be used as target variables in optimization models by minimizing them or maximizing them mathematically to define and organize sustainable urban energy systems.

A third line of research has focused its studies on energy systems optimization models looking at the city from the bottom up to support the formulation of policies relating to the sustainable use of energy. In particular, the study by Peippo et al., (1999) adopted a multivariate numerical optimization procedure with the aim of identifying the optimal technology and resource mixes for the design of energy-conscious buildings. The Energy Flow Optimization Model (EFOM) was established as an engineering-oriented bottom-up model for planning energy management systems and has been widely used in European countries. Further studies such as Ascione et al., (2021) on the other hand, examine the energy performance of buildings, in particular the energy retrofit of them trying to optimize the different solutions in terms of costs. These studies use artificial neural networks (ANNs) to predict the energy behavior of all buildings in each category. The ANNs are generated in MATLAB using simulation software such as Energy Plus. The goal is a reliable assessment of the overall cost of air conditioning, as well as the potential global cost savings produced by energy requalification measures for buildings in each category. ANNs are the most used artificial intelligence models in the application of the energy forecast of buildings (Ascione et al., 2021). Over the past two decades, researchers have applied ANN networks to analyze various types of building energy consumption under a variety of conditions, such as heating / cooling load, electricity consumption, operation, and component optimization. sub-level, the estimate of the parameters of use. Research focuses primarily on applying these models to new prediction problems, optimizing the model parameters or input samples for better performance, simplifying problems, or developing models, comparing different models under certain conditions. However, the use of optimization models leads to the definition of sub-optimal scenarios that in most studies aim at a single objective without examining the problem with a multi-criteria approach to aim for a more holistic optimization and planning of sustainable urban energy systems.

3. Decision support tools in energy policies

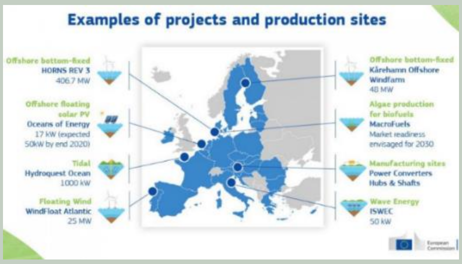
The possibility of having scenarios in the different territorial contexts on where and how to intervene can be useful in defining planning strategies and actions. Decision makers must systematically evaluate the economic and environmental performance of energy technologies, resources and services and choose a desired plan for each component of the urban system. In recent decades, numerous research efforts have been made in the management and improvement of urban energy systems. Therefore, support tools based in turn on scientific modeling tools have been developed to support decision-making processes (Moghadam & Lombardi, 2019; Cherni et al., 2007). One of the first decision support tools (DSS) was developed in 1989 by Harhammer & Infanger, (1989) useful for operational planning and to assist decision makers in planning multi-scale energy systems. In succession, Liu et al., (1992) developed a computerized DSS to evaluate the improvement of the quality of life, as well as the technological and environmental impacts of planning and energy consumption. Support tools such as optimization models have also developed on the one hand to support planning choices at macro (regional, urban) or micro (district or single building) scales. Most of these decision support tools on the one hand consider computerized territorial characteristics through Geographic Information Systems (GIS) capable of acquiring and managing spatial data and on the other hand they also incorporate multi-criteria assessments to help decision makers to explore and solving problems that require trade-offs between multiple and conflicting objectives (Buffat et al., 2017 Hettinga et al., 2018). One example is Yue & Yang, (2007) who established a DSS to strengthen the use of renewable energy resources and meet new international environmental requirements and provide self-sufficient domestic energy supplies to Taiwan to encourage private and investor investment if the investments in the exploitation of local renewable energy sources are economically feasible. Noorollahi et al., 2016 analyzed a multi-criteria decision support system to define wind energy resources. Wind energy is an option to improve economic conditions in the region and reduce the environmental impact. This study applied the geographic information system to determine the potential of wind energy in the Markazi province of western Iran. Cherni et al., (2007) developed a new multi-criterion DSS to identify the most appropriate set of energy options to provide sufficient energy to meet local demand and improve rural livelihoods. The study by Arampatzis et al., 2004 outlines a decision support tool integrated in a Geographic Information System (GIS) for the analysis and evaluation of the various transport policies. The aim of the tool is to help transport administrators improve the efficiency of the transport offer while improving environmental and energy indicators (Cottrill & Derrible, 2015). The tool works on three levels. The first analyzes the transport network, the second evaluates energy consumption and polluting emissions and the third evaluates the various policies selected. Sztubecka et al., (2020), have developed a support tool to provide information to energy consumers on the location of the potential for energy efficiency improvement. This potential has been identified as the possibility of introducing low-energy buildings and the use of renewable energy sources in the Zielona Góra neighborhoods. The proposed operating system can be used by local decision makers, enabling better action to adapt cities to climate change and protect the environment to build the most favorable energy scenarios in urban areas. This brief overview outlines how the application of a new concept tool can positively influence some planning choices, but it certainly requires technical knowledge and skills to be applied. This information can be useful examples for finding feasible solutions to concrete problems, as well as for the implementation of targeted national government programs that optimize energy and technological resources. While on the one hand the scientific community is trying in every way through methods and tools to help improve energy planning, albeit still with a sectorial and non-systemic look at the different urban scales, it is contributing in the scientific debate to propose operational and concrete solutions for different territorial contexts. Instead, what are the directives and funding possibilities issued by the European Union today and which can act as a driving force between the scientific community and local decision makers?

Powering a climate-neutral economy: An EU Strategy for Energy System Integration, COM (2020) 299 final

The new strategy of the European Union is based on sectoral integration aimed at optimizing and modernizing the energy system. It aims to strengthen carrier bonds electricity, heat, cold, gas, solid and liquid fuels with each other and with the end-use sectors, such as buildings, transport, or industry. In turn, to want to create the conditions that allow and encourage further integration, in which different energy sectors can compete on an equal footing and take advantage of every opportunity to reduce emissions. Furthermore, it aims to improve the energy system to achieve cost-effective decarbonization of the EU economies. The goal is also to build a more flexible, more decentralized, and digital energy system, in which consumers will have the power to make their energy choices. System integration will likely follow different paths in each EU country, depending on their respective starting points and policy choices. Some of these are already reflected in the national energy and climate plans 2021-2030. The European document is divided into four parts. The first part outlines the strategic vision aimed at accelerating the transition to a more integrated energy system, in support of a climate-neutral economy at the lowest possible cost in all sectors, while strengthening energy security, protecting health and environment, and promoting industrial growth worldwide. To transform this strategic vision into reality, a resolute and timely action is required, placing in agreement and in line with the EU objective of reducing greenhouse gas emissions by 2030 at least to 50% and towards 55% of the levels 1990. The underlying idea is to create stronger connections with the aim of offering low-carbon, reliable and resource-efficient energy services at the lowest possible cost to society. This idea embraces three complementary and synergistic concepts. Firstly, a more circular energy system, centered on energy efficiency, in which priority is given to less "energy-intensive" choices. Secondly, greater direct electrification of the end-use sectors. Thanks to rapid growth and competitive cost, the production of electricity from renewable sources can meet the demand for energy to an ever-greater extent. Third, the use of renewable fuels and low-carbon fuels, including hydrogen, for end-use applications where direct heating or electrification is not feasible, is not efficient or is more costly. Elevated renewable gases and liquids produced from biomass, or renewable and low-carbon hydrogen can offer solutions that allow for the storage of energy produced from intermittent renewable sources, exploiting the synergies between the electricity sector, the gas sector and the end use sectors. It could also ensure a more efficient use of energy sources, reducing energy needs and the related climate and environmental impact. The strategy identifies six pillars in which coordinated measures are outlined to address existing obstacles to the integration of the energy system. In particular, the six pillars are: (i) a more circular energy system, centered on energy efficiency; (ii) accelerate the electrification of energy demand, on the basis of an energy system based mainly on renewables; (iii) promoting renewable fuels and low-carbon fuels, including hydrogen, for sectors that are difficult to decarbonize; (iv) prepare energy markets for decarburization and distributed resources; (v) a more integrated energy infrastructure; (vi) a digitized energy system supported by an innovation framework. In this review box, those that directly and indirectly affect urban systems are examined. The actions present within the more circular energy system pillar, focused on energy efficiency, are based on the one hand on wanting to apply the principle of energy efficiency in the best possible way and to educate the member states and on the other on how to make the principle operational. energy efficiency across the energy system in the implementation of national and EU legislation. In turn, promote the principle of energy efficiency in all future methodologies (e.g. in the context of the European Resource Adequacy Assessment) and fully recognize energy efficiency savings due to the use of electricity and heat to be renewable sources, as part of the review of the Energy Efficiency Directive. In turn, build a circular energy system by promoting the reuse of waste heat from industrial sites and data centers thanks to stricter requirements for connection to district heating networks, energy performance accounting and contractual frameworks, as part of the revision of the Renewable Energy Directive and the Energy Efficiency Directive. The second pillar is based on trying to accelerate the electrification of energy demand, based on an energy system based mainly on renewables. The main actions aim on the one hand to define a strategy for offshore renewable energies and the consequent ones as well as to ensure a cost-effective planning and dissemination of electricity from offshore renewable sources which also constitutes the deepening of the review box of this work. In addition, to assess the mandatory minimum criteria and objectives for green public procurement in relation to electricity from renewable sources financed under the LIFE program and at the same time to address the remaining obstacles to achieving a high level of electricity supply from renewable sources in accordance with the directives in force. Further accelerating the electrification of energy consumption indirectly involves promoting the further electrification of building heating (through heat pumps), the diffusion of energy from renewable sources produced in the building itself and the installation of charging points for electric vehicles. Develop more specific measures for the use of electricity from renewable sources in transport and for heating and cooling in buildings and industry. For urban mobility, the strategy also takes action to review CO_2 emission standards for passenger cars and light commercial vehicles, to ensure a clear path from 2025 towards zero-emission mobility. In addition, to finance pilot projects for the electrification of low temperature thermal processes in industrial sectors through Horizon Europe and the Innovation Fund. Accelerating the roll-out of electric vehicle infrastructure involves: (i) supporting the roll-out of one million charging points by 2025, using available EU funding, such as the Cohesion Fund, InvestEU; (ii) use the forthcoming Alternative Fuel Infrastructure Directive to accelerate the deployment of alternative fuel infrastructure, including for electric vehicles; (iii) adopt corresponding requirements for charging and refueling infrastructures in the revision of the regulation for the trans-European transport network (TEN-T) and examine possible greater synergies through the revision of the TEN-E regulation in view of possible support (related to the energy network) to the high-capacity cross-border charging infrastructure and, where appropriate, to the infrastructure for refueling hydrogen; (iv) develop a network code on demand-side flexibility 35 to unlock the potential of electric vehicles, heat pumps and other electricity consumption in order to contribute to the flexibility of the energy system (starting from the end of 2021). The document places a specification in pillar five called the most integrated energy infrastructure where it also emphasizes the scope and governance of the ten-year grid development plan in order to ensure full coherence with the EU's decarburization objectives and the cross-sector infrastructure planning in the framework of the revision of the TEN-E regulation (2020) and other relevant legislation and accelerate investments in smart, highly efficient and renewable energy-based district heating and cooling networks, where appropriate by proposing stricter obligations through revision of the Renewable Energy Directive and the Energy Efficiency Directive and the Financing of Flagship Projects. Finally, in the Pillar Prepare energy markets for decarburization and distributed resources by promoting equality between all energy sectors by seeking to align taxation of energy products and electricity with EU environment and climate policies and to ensure that the signal transmitted by the carbon price is more coherent in all energy sectors and in all Member States. In turn, review the regulatory framework to create a competitive decarbonized gas market, suitable for renewable gases, and to empower gas users by providing them with more information. A further priority of the strategy is to put consumers, ie citizens, an information campaign in support of solutions based on an integrated energy system, on the technological options available and on the associated carbon emissions and environmental footprint.

In the next review boxes, two in-depth analyzes are carried out on two other European energy strategies. One aimed at the environment and exploiting the potential of offshore renewable energy for a climate future neutral, on the other hand, the other aimed at the built environment and Renovating the EU building stock will improve energy efficiency while driving the clean energy transition.

An EU Strategy to harness the potential of offshore renewable energy for a climate neutral future



The EU strategy for offshore renewable energy has as its main action to increase Europe's offshore wind capacity: from the current 12 GW to at least 60 GW by 2030, and to 300 GW by 2050. The Commission intends to integrate this capacity by 2050 with 40 GW coming from oceanic energy and other emerging technologies, such as wind power and floating photovoltaics. The EU Commission highlights that «Today offshore wind produces clean electricity capable of competing with existing technologies on fossil fuels, and sometimes even less expensive. European industries are developing a range of technologies that can harness the power of our seas to produce green. In these sectors, Europe has already acquired considerable technological, scientific, and industrial experience and can already count on strong capabilities along the entire supply chain, from production to installation. The European strategy for offshore renewable energies "establishes" a more ambitious goal of spreading offshore wind turbines (both commercial and floating), where the activity is already well underway. Furthermore, the Commission will seek to define more specific and targeted rules, ensuring that the review of the State aid guidelines for environmental protection and energy and the Renewable Energy Directive facilitate the deployment of offshore renewable energies. In turn, to create a platform dedicated to offshore renewable energies as part of the Clean Energy Industrial Forum, which brings together all those involved and facilitates the development of the supply chain. To achieve these goals, 800 billion investments will be needed by 2050 for large-scale offshore renewable energy technologies. Of these, around two thirds will be used for grid infrastructure and one third for offshore electricity generation. In addition, 37% of the Recovery Fund will be allocated to the green transition and can be used, as part of the flagship Power up initiative, also to support reforms and investments in offshore renewable energy. Given that the funds defined in the recovery and resilience plans will have to be committed in a short time which is 2023, it is essential that Member States submit a pipeline of mature projects, in close cooperation with companies that are preparing to invest. In addition to the Recovery plan, there are some possible forms of financing that can be drawn on, such as: (i) the InvestEU program, through its various lines of intervention, can provide support and guarantees to accelerate private investments in emerging technologies; (ii) the Connecting Europe Facility can be used as a support tool to promote the development of the grid infrastructure, but also for cross-border offshore renewable energy projects; (iii) Horizon Europe, through the first work program of 2021 and 2022, will promote research and innovation activities in the offshore renewable energy sector. In addition to implementing specific measures in the various links of the offshore wind value chain, the Commission will work side by side with Member States and regions to coordinate the use of available funds for ocean energy technologies (e.g. wave motion and tides), in order to achieve a total capacity in the EU of 100 MW by 2025 and around 1 GW by 2030; (iv) the Innovation Fund under the allowance trading scheme emission standards (EU ETS) can support the demonstration of innovative clean technologies on a commercial scale, such as ocean energy, new floating offshore wind technologies or projects connecting offshore wind farms to battery storage facilities or production facilities hydrogen; (v) the modernization fund under the EU ETS will also be used to support the development of offshore renewable energies in the 10 eligible Member States. Offshore renewable energy is one of the most promising avenues to increase future energy production in the coming years in a way that meets Europe's decarbonization goals and the expected increase in electricity demand in an affordable way. Europe's oceans and sea basins hold vast potential, which can be exploited in a sustainable and environmentally friendly way by integrating other economic and social activities. The success of offshore renewable energy can deliver major benefits for Europe, can ensure that the EU achieves a sustainable energy transition and put Member States on a realistic path to zero pollution and climate neutrality by 2050. It can also make an important contribution to the post-COVID-19 recovery, as a sector in which European industry has the world leadership and which is expected to grow exponentially in the coming decades.

Renovating Wave for Europe - greening our buildings, creating jobs, improving lives, COM/2020/662 final

The Renovation Wave is the European strategy that has as its key objective the recovery and energy requalification of existing buildings to improve the environmental performance of the construction sector. Unfortunately, still today, in Italy and in Europe in general, there are many inefficient and highly energy-intensive buildings, as they were built decades ago, before the development of rules and regulations attentive to the issue of energy and sustainability. According to the European Union, about 75% of European buildings are inefficient and in turn responsible for about two thirds of the CO_2 emissions produced on the continent. These numbers are strongly in contradiction with the climate neutrality objectives set for 2050, which are based precisely on the reduction of emissions into the atmosphere, also through energy efficiency strategies. For this reason, the "Renovation Wave" was born, the wave of restructuring that is linked to the European New Green Deal. There are six main actions on which the strategy is based: (i) strengthen regulations, standards and information on the energy performance of buildings, so as to establish better incentives for public and private sector renovations, including phasing in mandatory minimum energy performance standards for existing buildings, updated rules for energy performance certificates and a possible extension of building renovation requirements for the public sector; (ii) ensuring the possibility of financing through the flagship initiatives “Renovate” and “Power Up” of the mechanism for recovery and resilience in the framework of NextGenerationEU, facilitating the rules for combining various funding streams; (iii) increase the skills to implement restructuring projects, from technical assistance to national authorities with the aim of training a class of workers to tackle the work in a more sustainable perspective; (iv) expanding the market for sustainable construction products and services, including the integration of new materials and nature-based solutions, the revision of legislation on the marketing of construction products; (v) creation of a new European Bauhaus, an interdisciplinary project led by an advisory board of external experts, including scientists, architects, designers, artists, planners and civil society. By summer 2021, the Commission will conduct a broad participatory process that will lead to the creation in 2022, of a network of the top five Bauhaus in various EU countries; (vi) developing proximity solutions for local communities integrate renewable and digital solutions by creating zero energy districts, where consumers become prosumers who sell energy to the grid. The strategy also includes an initiative to promote affordable housing for 100 districts. This strategy is also supported through a series of projects on the renovation of buildings within an urban area through its Horizon Europe research programs. A significant example is the 4RinEU project, which aims to provide new tools and strategies to encourage large-scale renovation of existing buildings and promote the use of renewable energy such as the BUILD UP Skills initiative, which aims to increase the number of skilled construction professionals across Europe capable of carrying out energy-efficient building renovations and constructing new nearly zero-energy buildings. Finally, the strategy aims to tackle the energy poverty of around 34 million Europeans, particularly for vulnerable groups of the population by reducing their energy bills, as outlined in the Commission Recommendation on Energy Poverty, which is also part of the wave strategy renovation.

4. Conclusions

The topic of energy has entered prominently in the scientific and political debate. A common and recurring thought emerges in the reading of European strategies and in the optimization models and decision support tools for energy planning that can be enclosed in two keywords "optimize" and "accelerate". Today there is a need to want to optimize the energy organization of each component of the urban system. As can be seen in the review box 1, European policies aim in their strategy at a sectoral integration that aims to connect the various energy sectors such as construction, transport, or industry. In turn, the scientific community for years, has been trying to propose methodologies and models aimed at finding an optimal allocation of energy resources, technologies, and relevant services within one or more administrative objectives. In turn, decision support tools can be that element of conjunction between the scientific community and public decision makers trying to provide the possibility of having current and future scenarios in the different territorial contexts on where and how to intervene that can be useful in defining planning strategies and actions as can be seen in paragraph § 3 of this work to improve the energy consumption of urban areas. The efforts made so far by the scientific community in providing theoretical and applicative knowledge must not remain closed in a drawer but must serve as a technical-scientific support for any planning exercise. At the same time, today there is a need to speed up and streamline planning processes. Cities, especially the users who live there, need to receive immediate answers in accordance with the first paragraph of this work and the review boxes. Surely this was accentuated more after the setback that the covid-19 pandemic caused. European funding and those of recovery and resilience plans can be the starting point for the reconstruction of present and future cities.

Author Contributions

The work, although the result of a common reflection, was divided as follows: Federica Gaglione, paragraphs Energy systems planning, Optimization models at different urban scales, Decision support tools in energy policies and review box of Powering a climate-neutral economy: An EU Strategy for Energy System Integration, COM(2020) 299 final, and David Ania Ayiine-Etigo, review box of An EU Strategy to harness the potential of offshore renewable energy for a climate neutral future, COM(2020) 741 final and Renovating Wave for Europe - greening our buildings, creating jobs, improving lives, COM/2020/662.

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