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Identifying Public Policies to Promote Sustainable Building: A Proposal for Governmental Drivers Based on Stakeholder Perceptions

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Abstract: In recent years, research findings and pronouncements by international organisations have recognised the usefulness and timeliness of advancing public policies to promote sustainable building. However, in many parts of the world, governmental measures have limited their scope mainly to energy efficiency in housing use. In the same vein, some experiences in different countries have revealed the need to study further governmental or stimulation drivers that can boost sustainability in building, renovation, and dwellings. This paper aims to contribute to the design of public policies that promote sustainable building. Our paper seeks to identify specific drivers that can help governments boost sustainability in building, renovation, and dwellings through a multi-stakeholder survey. Our findings show the specific drivers to be of three types: fiscal, financial, and government interventions. It is the respondents' opinion that public policies can help promote sustainable housing. Financial drivers are the most highly rated, followed by fiscal drivers and then government interventions.

Keywords: tax drivers; financial drivers; government intervention drivers; sustainable building; stakeholders; sustainable development objectives

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1. Introduction

The construction industry is considered one of the main drivers of climate change and natural resource depletion [1–3]. The sector significantly impacts the environment, the economy, public health, and cities' well-being, which varies considerably depending on the type, location, and lifetime of the building being considered [4,5]. In the European Union (EU), buildings are responsible for 40% of energy consumption over their entire life cycle, 36% of all greenhouse gas emissions, 50% of all raw materials extracted, and 33% total water use [6]. Therefore, a residential building in the EU has a high impact. Over the last decade, the total number of households in the EU increased by 7%, with 195 million dwellings by 2019 and 5.3% of GDP invested in residential building. Almost 3% of land in the EU is used for residential purposes. Besides this, 11.8% of the population lives in a household where the total housing cost represents more than 40% of disposable income. On average, 20% of disposable income was spent on housing costs in the EU in 2019. However, 6.9% of the population cannot maintain their homes' thermal comfort [7].

Therefore, sustainable building has been advocated and promoted as a guiding paradigm for development in the construction sector [8]. In 1987, the Bruntland Commission (United Nations General Assembly) first defined the concept of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [9]. Such development can be achieved by simultaneously addressing economic, environmental, and social problems, i.e., the so-called "three pillars" of sustainability [10]. In this context, sustainable building was promulgated and promoted as a guiding paradigm for sustainable development in the building sector [8]. As expressed in a communication from the commission to the council, the European Parliament, the European economic and social committee, and the committee of the regions, on the issue of a thematic strategy for urban environment: "Sustainable building is the process in which all actors involved (owners, planners, constructors, specifiers, material suppliers, administration and users) integrate functional, economic, environmental and quality considerations to produce and renovate buildings and their environment".

Sustainable building involves a systematic approach that considers local climate and raw materials [11–13]. Besides this, sustainable buildings incorporate technologies that reduce resource use, ecological footprints [14–16], and associated life cycle costs [17]. The benefits of a sustainable building can be grouped into three aspects: environmental, economic, and social [14,18,19]. The environmental benefits consist of the conservation of natural resources and a reduced ecological footprint [20]. The economic benefits include higher returns on sales and rent, higher occupancy rates and productivity, and a reduction in long-term costs [21]. Finally, the social aspects concern environmental ergonomics and balance for all stakeholders [22,23].

Consequently, experts from industry, academia and society recognise the need for buildings to make cities inclusive, resilient, and sustainable [24]. Accordingly, the Sustainable Development Goals (SDGs) have integrated the following targets linked to sustainable building into the 2030 Agenda: substantially reduce the number of deaths and diseases caused by building malpractice; double the global rate of improvement in energy efficiency; increase inclusive and sustainable urbanisation, participatory planning and management; develop reliable, sustainable, resilient and quality infrastructure; significantly increase the efficient use of water resources, and create net gains from economic activities by reducing resource use, degradation and pollution, while achieving a better quality of life [25].

In this context, many countries are currently facing the challenge of adopting and implementing integrated measures, policies and plans aimed at inclusion, resource efficiency, mitigation, and adaptation to climate change in their building stock. For example, in January 2021, the New European Bauhaus initiative [26] was announced by President von der Leyen in her 2020 State of the Union address [27]. The New European Bauhaus is an environmental, economic, and cultural project aiming to combine design, sustainability, accessibility, affordability, and investment to deliver the European Green Deal. The core values of the New European Bauhaus are sustainability, aesthetics, and inclusiveness.

However, despite these exciting initiatives, one of the main problems for developing this new paradigm of sustainable building stock is the remaining concern about financing for housing acquisition, taxation, and long-term amortisation [28,29]. On the one hand, the high initial capital costs and low market value compared to conventional construction create a dilemma for stakeholders [30]. On the other hand, there is a lack of urgency in implementation, as the current generation of policymakers will be gone by the time the most severe effects of climate change are felt. Besides this, the dispersion of competencies between different government levels (central government, regional governments, and local governments) and many stakeholders in the process slows down the proper development of sustainable building [31–33].

In this sense, public authorities' involvement (responsible for policy formulation and implementing enforcement measures) is seen as an effective mechanism to promote sustainability criteria in construction [11,34]. However, it is not only governmental bodies that are stakeholders in sustainable building. In the context of sustainable construction, stakeholders are individuals or groups with a specific interest in sustainable housing projects because their decisions affect the development of these projects and may be affected by the outcome. Stakeholders include developers, construction companies, governments, homebuyers, banks, and public employees with responsibilities for urban planning [35].

On this basis, previous research findings and international pronouncements (such as the SDGs) acknowledge the environmental, social, and economic benefits of sustainable buildings, and recognise the need for government incentives to encourage the adoption of sustainability criteria in the building sector [11,36–40]. In general, an incentive can be defined as something that influences people to act in specific ways [41]. Moreover, stakeholders can influence and share control over development initiatives and measures and the decisions that most affect them [42–44]. Therefore, it is of great interest to consider the expectations and needs of all stakeholders in analysing the measures that governments can put in place as effective instruments for reducing the environmental impact of the building sector.

On this basis, considering the wide variety of instruments (from national to local and from fiscal to financial) available to governments around the world, it is necessary and timely to identify concrete drivers (or stimulating factors) that enhance the implementation of sustainability criteria from a stakeholder's perspective, including all three aspects of sustainability (environmental, economic, and social) throughout the whole life cycle of the building.

From this start point, this paper's main objective is to find drivers that governments could adopt to enhance sustainability in housing construction, renovation, and use, based on stakeholder perceptions. To meet this objective, we have conducted an opinion survey among various sustainable building stakeholders. Our findings are exciting and novel for designing public policies to enhance sustainability in housing construction and use; they may help countries interested in implementing governmental measures on sustainable building.

Although research on drivers in the construction industry is vast, no studies have been published covering the diversity of drivers of various categories related to the whole building's life cycle and from all stakeholders' perspectives. With its holistic and comprehensive approach, this work is an important step forward. It provides new knowledge that is highly relevant to developing a sustainable, inclusive, and resilient building stock from the perspective of all stakeholders. As such, our findings are very novel and represent an advance over previous research because they are helpful for the design of viable and effective housing policies to promote sustainability. The relevance of our findings relates to the holistic approach used (diverse points of view) and to or study's complete nature, simultaneously incorporating fiscal, financial, technical, political matters. This work aims to be a first preliminary advancement that, with an exploratory nature, provides a basis for continuing to advance in the design of public policies on sustainable building.

1.1. Previous Research

There are different approaches in the academic literature relating to the drivers (incentive measures) for developing sustainable buildings, depending on the type of instrument used. On the one hand, we have observed works associated with the option of implementing fiscal incentives, forcing compliance with specific conditions or requirements implemented by governments [45,46]. Works such as that by Kong and He [47] analysed China's incentive policies for sustainable buildings, highlighting their non-existence until 2013. On the other hand, authors such as Love et al. [48] defended the benefits of sustainable structures in terms of adopting sustainable construction practices. Thus, as Andelin et al. [49] pointed out, progress concerning sustainability in construction depends on people in the sector being aware of the importance and possibilities offered by sustainable buildings, and the ability and willingness to act on this knowledge.

Other authors, such as Rana et al. [50], reviewed the incentives, such as taxes, loans, grants and rebates, available for sustainable buildings in Canada, although they only focused on energy performance. The review by Circo [15] only describes incentives to encourage green building in the private sector in the United States. Falkenbach et al. [51] analysed sustainability drivers for real estate investors. Qi et al. [52] identified those incentives that influence contractors to adopt sustainable construction practices through a survey. Other works include critiques and strategies to improve government incentives. Zuo and Zhao [53] identified those incentives that influence contractors to adopt sustainable construction practices through a survey. Other works include criticisms and strategies to improve government incentives. Zuo and Zhao [53] pointed out that no comprehensive description has been offered of incentives as a tool to drive the adoption of sustainable building. Despite their differences, most researchers agree that tax-based and voluntary drivers can stimulate the adoption of sustainable buildings.

In addition, articles based on the analysis of qualitative and quantitative variables have also been found in the literature. Namely, Romano et al. [54] evaluated the performance of waste services in Tuscany, using external operational variables associated with the estimation of efficiency, and determining that the adoption of the zero-waste strategy is related to higher efficiency in the waste collection service, where privatisation is not associated with a significant improvement in performance results. Smith and Blizard [55] analysed the qualitative and quantitative variables in the effects of urban sprawl on economic mobility in the United States, finding that the spillover effects of social capital, poverty, access to employment, housing stock, and quality of life education are negative. Finally, Rodriguez et al. [56] focused on qualitative variables, analysing subjective responses to daylight changes in window views, based on an immersive experiment.

However, no work has so far been published that thoroughly and comprehensively analyses a wide variety of drivers from the perspective of different stakeholders, which justifies the interest in our research in advancing knowledge on how to enhance the sustainability of dwellings, including construction, refurbishment, and use, in their life cycle.

1.2. The Role of Drivers around the World

Many countries around the world are implementing drivers to promote sustainable building. These drivers are usually fiscal (obliging the user to adopt specific sustainability criteria) or voluntary, providing incentives through subsidies or other sustainability mechanisms in buildings [57].

In Europe, governments in countries such as Spain have established subsidies and loans to construct new buildings and refurbish energy efficiency features. There is a building renovation scheme (the New Green Savings scheme, 2019) that has provided more than CZK 2 billion in subsidies to 9088 projects, focusing on energy renovations [58]. In Finland, the Energy Certificate Act requires owners to obtain an energy certificate and permit procedures for new buildings when selling or renting [59]. Besides this, the Building and Land Use Act ensures that land and water areas and construction activities create preconditions for favourable living environments, and promote ecologically, economically, socially, and culturally sustainable development. The enhanced capital allowance scheme in the UK allows a 100% deduction of the investment cost in qualifying for energy-saving technology, although there are no specific incentives for the building itself [60]. In France, there are some incentives for green building. Thus, buildings that have received a Low Energy Consumption in Buildings label are partially or fully exempted from property tax. Such exemptions are up to 100%, depending on the local authorities' decision, determining the exemption period. In the Netherlands, depreciation allowances are granted for environmentally friendly assets in arbitrary depreciation environmental investments (VAMIL). It is possible to deduct up to 36% of capital outlay from the taxable profit, in addition to regular depreciation [61,62].

In Poland, the National Fund for Environmental Protection and Water Management offers incentive programmes for constructing energy-efficient houses or purchasing energy-efficient flats [63]. Subsidies are granted in partial reimbursement of the bank loan for the construction/purchase of a home. Incentives are also available to construct new energy-efficient public buildings, collective residences, thermal efficiency improvements, and energy-saving investments. In Portugal, the property transfer tax can be exempted if a buildings' energy efficiency is upgraded in specific urban properties. Municipalities may also reduce the municipal property tax rate for urban properties considered "green" or "energy-efficient", based on energy consumption [64]. Switzerland's "Building Programme" incentivises house renovation to improve windows, walls, roofs, and floors [65].

On the other hand, regional programmes have been implemented in Canada, such as in Hamilton, where an exemption of up to 75% of the property tax is expected to accrue on a new, sustainable building [66]. Colombia has established minimum water and energy savings per year that new buildings must achieve, depending on their location. Municipalities and districts are also encouraged to develop incentives to increase these minimum water and energy savings rates. There is also a project underway to establish guidelines for the National Sustainable Construction Policy, in order to provide economic benefits and financial (and other) incentives to promote sustainable construction in Colombia [67].

In Mexico, there are no federal fiscal incentives for green building, although local incentives do exist. For example, Mexico City offers property tax reductions for certified sustainable buildings [68]. Similarly, in New Zealand, there are no significant government incentives for the construction or occupation of green buildings. Local governments must adopt a "sustainable approach to urban planning and build"; however, there is no further guidance or structure. The New Zealand Building Council provides resources and rating systems rather than incentives.

In Singapore, the government launched the Green Mark Scheme in 2005 to promote sustainability in the built environment and raise environmental awareness among developers, designers, and builders, from project conceptualisation and design through to construction. To encourage the private sector to construct buildings that achieve the highest Green Mark ratings, they have introduced a set of incentives, reimbursing up to 50% of eligible costs incurred exclusively to improve energy efficiency in buildings [69].

Thailand does not provide incentives for green buildings. However, the Energy Conservation Promotion Act establishes obligations and responsibilities (e.g., construction or retrofit criteria) for certain types of buildings with a total floor area of 2000 m^2 or more, such as hospitals, schools, offices, convention centres, theatres, hotels, entertainment venues and department stores. Besides this, certain types of buildings have additional obligations, for which non-compliance may result in special electricity charges and criminal fines [70].

The literature review shows different works that look at enhancing sustainable building through different incentives. However, most studies and policies have focused on one aspect of sustainability (i.e., energy efficiency) without considering the whole life cycle of the building. Amoruso et al. [71] quantified incentives for energy-efficient technical systems for new buildings and renovations in Korea. The findings identified current legislative privileges for new buildings. Sunikka-Blank and Iwafune [72] concluded on the need to introduce mandatory thermal regulations in housing in addition to market-based instruments to obtain more significant savings in the housing sector in Japan. Sayce et al. [73] discussed the possibility of stimulating, through the tax system, measures to reward sustainable practices in property investment and management in the UK, facilitated by a more open dialogue with government bodies. Bottero et al. [74] identified the cost-effectiveness of retrofit energy strategies to determine when it is optimal to encourage building retrofits and to what degree, investigating the role of incentives and their impacts on private investment decisions in the United States.

These works do not include a comprehensive study of the performance, cycle, use and monitoring of different water sources; the use, recycling, reuse and environmental impact of materials and resources; the reduction, control, consumption and use of energy, environmental ergonomics, designs, processes and strategies that promote sustainability in the built environment; the use of traditional local materials and techniques; the use of resources and reuse of building materials, systems and subsystems; and the ability of buildings to adapt to climate change (and its consequences) without damage.

Therefore, more research is needed to identify governmental drivers, considering the different government levels that can make decisions and the wide variety of instruments available to analyse the whole-building life cycle, which motivates the timeliness and interest of the present paper. Our empirical results show an advance on previous research findings, and are helpful for different countries.

2. Materials and Methods

To identify governmental drivers for sustainable building, we used the following methodological phases: (i) sample selection; (ii) selection of potential drivers; (iii) design and execution of the opinion survey; and (iv) analysis of the results.

This is a preliminary study, so it is necessary to carry it out in a territory where the respondents have a homogeneous ownership culture and socio-cultural context. For this reason, Spain was selected as a very appropriate territory for the empirical study. Moreover, the construction sector in this country generates a high percentage of gross domestic product (GDP); 5% in 2019. The importance of taxes derived from the construction sector and its preference for purchasing real estate capital over renting (77% of citizens are owners) is almost 10 points higher than the European average. Finally, the low percentage of investment in sustainable building and the tax burden on housing have made Spain one of the EU countries with the highest proportional tax on property ownership.

In Europe, there are three main approaches to public administration: Anglo-Saxon, Nordic and continental European [75]. Spain is integrated into the continental European approach [76]. Since the public management model for building in Spain is similar to that of other countries, our methodology and results should be an interesting reference for governments in other countries interested in promoting sustainable building.

Finally, the study focused on residential single-family and multi-family buildings that are entirely owned or are properties under loan. Residential buildings have the most significant environmental, economic, and social impact on building typologies [77,78]. Most buildings in Spain (66%) are residential [79]. Furthermore, 56.3% of the buildings were constructed before 1980, before the first energy-saving standards for buildings were approved [80]. Therefore, these buildings do not have any thermal insulation [81]. Gangolells et al. [82] studied 20% of the energy certificates issued in Spain for residential buildings until 2016, and found that the vast majority (94.3%) of residential buildings or building units constructed before 1980 were rated E or G on the CO_2 emissions indicator.

2.1. Selection of the Sample

The first phase of the methodology was to select stakeholders based on the so-called Stakeholders Theory. According to Freeman and Mcvea [83], a stakeholder is a group or individual that can affect or be affected by an organisation's efforts to achieve its objectives. This theory holds that management's goal (including government) is the long-term maximisation of stakeholders' welfare [84]. Friedman and Miles [85] stated that government policies should be guided by the needs of the people who can influence their decisions. According to these postulations, the academic literature highlights the importance of stakeholder participation in implementing sustainability criteria in buildings at all stages of the life cycle [4,86–89]. Thus, for the selection of those to be surveyed, the following questions were established:

- Who are the stakeholders that can influence (or be affected by) the environmental and socio-economic impact of the building, retrofitting and use of residential housing?
- Who can improve the sustainability of residential housing construction and retrofitting by the life cycle stage?

Thus, based on these issues, 19 types of stakeholders were identified; see Table 1. The 19 stakeholders represent the private and public sector and cover all actors involved in the building's life cycle.

Regarding the demographic data of the 19 types of stakeholders, all respondents have an average knowledge of green building. All respondents (technical professionals in building, builders, developers, and employees of financial institutions) have more than ten years of experience in some phase of the life cycle of the home, including design, construction, financing, use and renovations. The politicians belong to municipalities with more than 50,000 inhabitants, and develop legal frameworks in the matter of housing. In addition, the owners have a medium economic level, and they have purchased family homes in the last 10 years. In general, all those surveyed know the construction sector in Spain very well, since at some point they have had to make decisions about housing.

Table 1. Detailed composition of the panel of stakeholders.

Stakeholders		Selection Criteria	Demographic Data *	Ref.	First Round Answers	Second Round Answers
Building professionals (architects and engineers)	Technical building professionals	>10 years of experience	48,000 active architects in Spain	[90]	6	72
	Local administration technician	Municipalities with more than 50,000 inhabitants Knowledge of sustainability	149 municipalities in Spain with more than 50,000 inhabitants	[91]	1	14
	Technician of the autonomous administration	Knowledge of sustainability			5	9
	Technician from the state administration	Knowledge of sustainability			1	5
	Technician with political links	Knowledge of sustainability			1	3
Policy	Politician or policy at local level	Municipalities with more than 50,000 inhabitants			1	4
	Regional-level politician or policy	Included in areas directly related to the building or construction process			1	1
	Politician or politician at state level				1	1
Organisations	Professional associations		26 architects' colleges		2	47
	Universities and research centres	>10 years of experience			4	11
Owners and users	Homeowner with only one dwelling and in use	Medium economic level	25,793.323 dwellings for main use 19353.120 dwellings for non-major use		4	17
	Owner with two dwellings, both in use				2	9
	Owner with one empty dwelling				2	4
	Owner of a dwelling that is rented out				1	1
	Landlord/landlady				1	1
Financial institutions	Financial institutions	>10 years of experience	181,575 employees of credit institutions and financial credit institutions	[92]	2	8
Builders and developers	Builder	>10 years of experi-enceKnowledge of sustainability			2	9
	Developer				2	8
	Builder and developer				1	5
	Total				40	229

* Examples of demographic data.

In accordance with the Stakeholders Theory, our sample has been selected based on a holistic approach. So, we have chosen these types of stakeholders to obtain, collectively, the perceptions of a high diversity of people involved in the design, application, and effects of public policies on sustainable building. This approach is justified in the search for points of consensus to facilitate the viability and effectiveness of policies to promote sustainable building. Accordingly, our sample is not completely random, as we have tried to achieve the widest possible variety of perceptions, simultaneously incorporating matters fiscal, financial, technical, management and political.

2.2. Identification of Potential Drivers

In the second stage, the potential drivers for the promotion of sustainability criteria in housing were identified. Following previous research [45,46], the drivers can be fiscal, financial, and governmental interventions. Fiscal drivers take the form of rebates on the payment of certain tax obligations granted to taxpayers to promote the performance of specific activities considered of interest by the public sector. Financial drivers enhance sectors' interest in reducing cost and increasing market demand, e.g., setting a feasible price for energy, tax deduction programmes, efficient products, subsidy programmes, and financial support. The drivers of government interventions represent governmental bodies' role through education, training, information publication, and technical support [93]. In any case, we paid particular attention to the set of drivers to be assessed in the survey that meet the following requirements:

- clear, concise, and legally supported according to the territorial context of the application;
- covers the entire life cycle of the building, from the conceptual design stage to the demolition stage;
- covers all aspects of sustainability (environmental, economic, and social) and represent all possible casuistry, from fiscal to financial, without forgetting other drivers for promoting sustainability.

Based on the established criteria and following the regulations in force in the different areas [94], Table 2 identifies 41 drivers that different government agencies could adopt in Spain to improve the sustainability of residential construction, renovation, and housing, out of a total of 67. Once the selection was made, these were categorised according to their nature, typology, and legal basis into three categories: 30 fiscal drivers, divided into taxes and fees; five financial drivers; and six drivers related to government interventions. These drivers are based on the regulations that are in force and directly related to the building process in Spain.

Table 2. Drivers identified.

	Driver	Definition
		Fiscal. Deductions and allowances in Taxes
1	Personal Income Tax (IRPF)	Personal income tax or IRPF is a personal, progressive and direct tax on the income obtained in a calendar year by individuals' resident in Spain.
2	Corporate Income Tax (IS)	IS is a tax levied on the income of companies and other legal entities. Corporate income tax is a tax levied on the profits made by companies and other legal entities.
3	Urban Property Tax (IBI)	IBI is a compulsory, direct, actual, objective, and periodic local tax levied on real estate's value regardless of its product or income.
4	Tax on Increase in Value of Urban Land (IIVTNU)	The IIVTNU, also known as municipal capital gains tax, is a tax within the local tax system in Spain levied on the increase in value of urban land at the time of transfer.
5	Tax on unoccupied dwellings.	Whether in the city, on the beach or in the mountains, the owner of an unoccupied property must pay real estate income as personal income tax. The amount to be paid is calculated based on the property's cadastral value and depending on whether this cadastral value has been revised.

Table 2. *Cont.*

6	Tax on Economic Activities (IAE)	The IAE is a tax that forms part of the Spanish tax system managed by the local councils. It directly taxes the performance of any economic activity, both by individuals and legal entities. Unlike other taxes, its amount is constant regardless of the balance of the activity. It is a direct, compulsory, proportional, accurate and shared management tax.
7	Value-Added Tax (VAT)	Value-added tax (VAT) is an indirect consumption tax. It is levied, in the manner and under the conditions laid down by law, on the following transactions: the supply of goods and services carried out by entrepreneurs or professionals.
8	Tax on the manufacture of electricity	The electricity tax is fixed by law. This means that no one is exempt from paying it and that, even if no electricity consumption is made during a month, it will be applied to the contracted power. Therefore, the electricity tax can be controlled through consumption and contracted power since it is a figure obtained from a percentage of both terms. Besides this, the 21% VAT is also levied on this electricity tax, so that in the end, you are paying a much higher amount of Tax than was initially apparent.
9	Tax on constructions, installations and works (ICIO)	The ICIO is an optional tax, depending on the taxable event of the carrying out, within the municipality, of any construction, installation, or work. A building or urban planning licence is required, and the issuing is determined by the town council.
10	Transfer Tax and Stamp Duty (ITP)	ITP is an indirect tax levied on three taxable events. This tax is levied on the purchase of second-hand property and rentals and legal acts, such as the public deed of sale of a property or the deed of a mortgage execution.
Driver		
Fiscal. Reduction of taxes		
A fee or charge is a consideration for the provision of public service by local government bodies. A fee is a charge paid by the individual taxpayer for the provision and maintenance of public service.		
11		Water supply service charges
12		Sewerage service charges.
13		Refuse collection service charges
14		Waste treatment service taxes
15		Sewerage levy rates
16		Taxes for the provision of basic services
17		Taxes for planning permission
18		Taxes for certificates of occupancy and first occupation licences
19		Vehicle parking taxes
20		Vehicle entry taxes
Driver		**Definition**
21		Taxes for the opening of trenches and ditches.
22		Taxes for the occupation of public roads with temporary suspension of road traffic
23		Taxes for the use of a flight of stairs
24		Taxes for the execution of works
25		Taxes for urban development actions
26		Development taxes
27		Urbanisation taxes
28		Urban development taxes
29		Taxes on real estate rentals
30		Taxes on rentals of urban property

Table 2. *Cont.*

Financial. Granting of financial benefits.	
31	Climate bonds or green bonds
32	Non-repayable grants (subsidies)
33	Preferential low-interest financing
34	Long-term preferential financing
35	Financing of public services
Government interventions	
36	Increasing the level of buildability
37	The possibility of change of use of the building and/or part of it
38	The provision of sustainable design tools and decision support, and databases
39	Provision of technical support
40	Government procurement by the administration
41	Encouragement of public procurement programmes

2.3. Survey Design and Implementation

The third phase of the methodology consists of the design and execution of the survey. The questionnaire's design aimed to capture the diversity of stakeholder opinions, achieve a high degree of reliability, allow stakeholder participation, avoid the prominence of one or more experts over others, ensure balanced participation, and form a criterion with a high level of objectivity. To this end, two steps were established.

Step I. (preliminary study). A consistency test of the questionnaire was carried out with several items. The purpose of this test was to determine the coherence and usefulness of the items to identify and individually assess the drivers; to analyse the clarity, comprehensibility and objectivity of the drivers proposed; and to gather opinions from stakeholders on other possible interesting drivers that should be added to contribute to the research objective. Thus, the questionnaire test was designed with a 5-point Likert-type linguistic scale, ranging from total disagreement (1) to total agreement (5). Besides this, an open response option was left open. However, these survey results' relevance was not determined by the scores obtained in each item, but by the generation of information useful to directing a massive survey to a broader sample. Thus, for the consistency test's execution, interviews were conducted with a selection of respondents from each stakeholder identified. The interviews, each lasting approximately 30 min, were conducted by telephone. A total of 40 people were interviewed in this first stage. The transcripts and notes resulting from these interviews were analysed to identify respondents' doubts and perspectives, and it served as a basis for addressing the possible shortcomings of the pilot test.

Step II. Once the survey consistency test had been examined, suitability adjustments were made to obtain the final survey text. The final questionnaire sent to all respondents was structured in three parts. The first part described the objectives of the questionnaire. The second part recorded the credentials of the stakeholders, including personal, professional, and educational details. The third part consisted of several sections, with each section representing each category of driver. Thus, the respondent was asked to mark on a Likert scale from 1 to 5 (where 1 = "Strongly disagree" and 5 = "Strongly agree") his or her degree of agreement or disagreement with the implementation of the different drivers for the promotion of sustainable building and retrofitting in dwellings. A 1 meant that the respondent thought that the driver did not help promote sustainable building, while a 5 meant that the driver was considered valid. The respondent was also given the option of marking the questions' incomprehensibility, and a blank space was provided for expanding their opinion. Finally, the online survey was sent out en masse to stakeholders; a total of 229 responses were received (Table 2).

2.4. Statistical Instrument

Once the survey had been carried out, we performed a quantitative analysis of the data obtained. On the one hand, we performed a descriptive analysis of the respondents' total responses and the responses by driver category, regardless of their profile and previous knowledge of the subject. The following variables were used for this purpose:

- n, number of respondents who indicated this answer;
- p, percentage of the total number of possible respondents who gave this answer;
- a_D, the average score for each item, with 5 points for the highest degree of agreement and 1 for the highest degree of disagreement;
- a_C, the average score per category, with 5 points for the highest degree of understanding and 1 for the highest disagreement.

On the other hand, the dispersion of the data was measured between each driver's responses and between the average scores of each category of drivers. For this purpose, the standard deviation (SD) and Pearson's coefficient of variation were used (Equation (1)). This method has been used in similar studies in different research fields with categorical and quantitative variables [54–56,95–97]. The SD is a commonly used measure of variation and is defined as follows [98]:

$$SD = \sqrt{\frac{\sum_{i=1}^{n}(x_i \; - \bar{x}\;)^2}{n-1}} \tag{1}$$

where y_i is any measure of the set, which is the arithmetic mean of the sample, and n is the sample size. The lower the SD, the higher the significance of the results. Pearson's coefficient of variation (CV) (Equation (2) allowed us to compare the dispersions of two different distributions, provided that their means were positive; it is calculated as:

$$CV = \frac{SD}{\bar{x}} \times 100\% \tag{2}$$

where SD is the standard deviation, and $\bar{x}$ is the arithmetic mean of the sample. The higher the CV, the greater the degree of dispersion of the data. CV values above 50% are already indicative of high dispersion [99].

3. Analysis of Results

Following the established methodology, this section presents (i) a quantitative analysis of the responses of all drivers and (ii) a quantitative analysis for each driver category.

3.1. Quantitative Analysis of the Set of All Drivers

According to the responses of the 229 respondents (Table 3), an average of 32% of the stakeholders strongly agreed with the inclusion of drivers for the promotion of sustainability in buildings. However, 5% of the respondents would disagree with the idea of incentives. It is noteworthy that out of the total number of responses, only 2% did not understand the question, which corroborates the comprehensible and transparent character of the survey text. However, an average of 4% of the respondents added other answers to the total number of possible answers. These open answers reflect the concern of the respondents about the increase in other types of taxes; about the detriment of public systems due to the decrease in tax collection; about the environmental impact of the possibility of an increase in buildability or change of use; or about how a building will be assessed and certified as being truly sustainable.

On the other hand, the total average of the scores given to the 41 drivers was 3.62 (5 being the degree of total agreement and 1 the degree of total disagreement), which indicates that the stakeholders would agree with the drivers' implementation. Driver number 3 (Figure 1), which refers to the implementation of deductions and rebates in the urban property tax (IBI), stands out as the one with the highest average (ad = 4.43) and the lowest standard deviation (SD_d = 0.93). This is followed by driver 9, which refers to the tax on constructions, installations and works, with an average score of a = 4.40 and SD = 0.94. These results indicate a high degree of consensus among respondents regarding the implementation of these drivers. However, drivers 23 (reduction n development charges), 36 (increase in the level of buildability) and 21 (reduction in charges for opening coves and ditches), which refer to issues in the building process and the increase in the level of buildability, are the ones with the lowest average score (a) and highest SD (a = 2.66, 2.77 and 2.77, and SD = 1.62, 1.61 and 1.47 SD, respectively). There is, therefore, a very low degree of consensus among respondents in the refusal to implement these drivers.

Table 3. Statistical measures of stakeholder responses per driver and driver category.

	Category	(5)	(4)	(3)	(2)	(1)	(a)	(b)	Statistical Measures		
		p	p	p	p	p	p	p	a	SD	CV
average	fiscal	29%	32%	18%	8%	5%	2%	5%	3.55	0.45	13%
	financial	50%	35%	7%	2%	2%	1%	3%	4.15	0.21	5%
	governmental	30%	35%	14%	8%	4%	4%	4%	3.42	0.56	16%
Average total		32%	33%	16%	7%	5%	2%	4%	3.63	1.30	37%

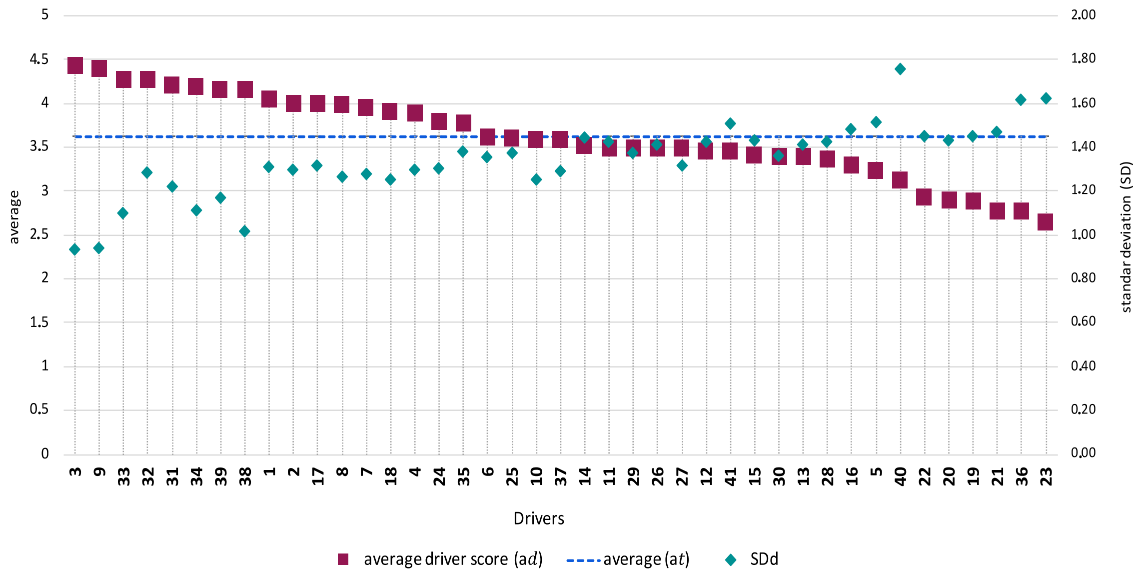

Figure 1. Average scores per driver (a_d) and standard deviation of each driver (SD_d).

On the other hand, if we analyse the data from the point of view of those drivers that have obtained a more significant number of responses of "Strong agreement (5)" or "Strong disagreement (1)" (Figure 2), then driver 32, which refers to the granting of non-refundable subsidies, is the one that has obtained the highest degree of total agreement, with 62% of respondents strongly agreeing with its implementation. On the other hand, driver 19, concerning reducing parking fees, is the one with the highest level of disagreement, with 13% of respondents being against its implementation.

Finally, as shown in Figure 3, there is a strong negative relationship between each driver's average score (ad) and the coefficient of variation of each driver (CVd). This indicates that those drivers with the lowest average scores coincide with the highest coefficients of variance. This denotes more significant variability among the responses and, thus, a lower degree of consensus.

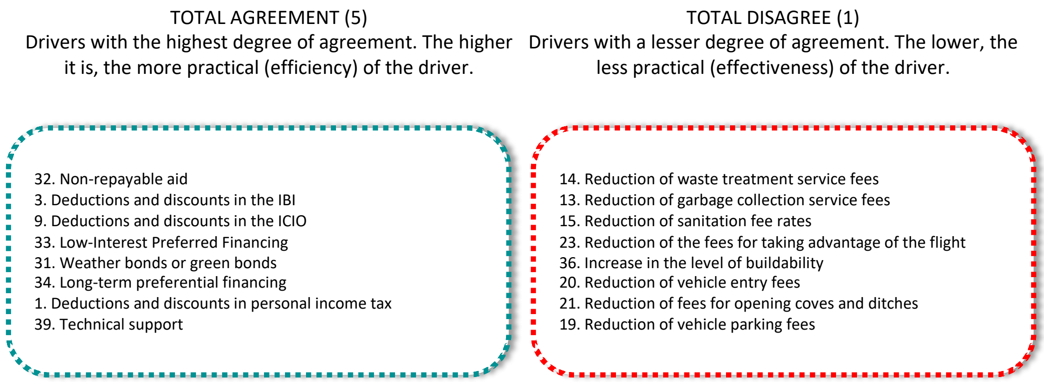

Figure 2. Drivers with the highest number of responses of "Strongly agree (5)" or "Strongly disagree (1)".

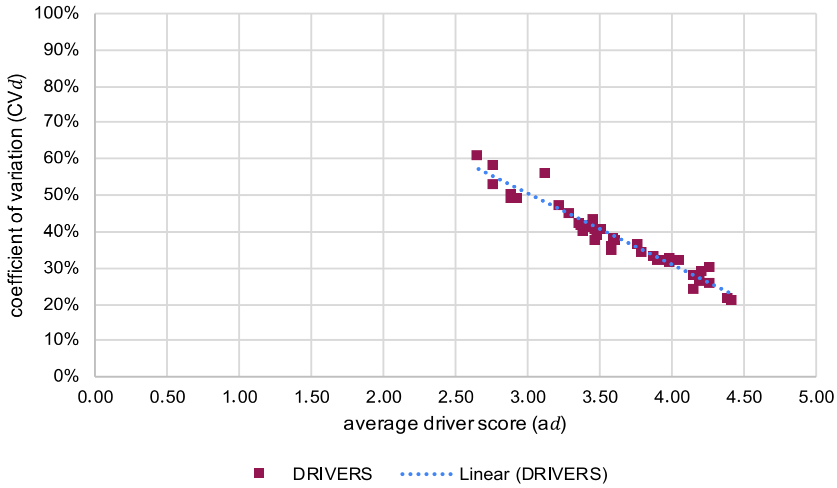

Figure 3. Ratio of average driver score (ad) to coefficient of variance (CVd).

3.2. Analysis of Results by Driver Category

The individual results of the three types of drivers considered (fiscal, financial and government intervention) are analysed below.

3.2.1. Fiscal Drivers

In the case of the fiscal driver's category, as shown in Table 3, an average of 29% of respondents strongly agree with the inclusion of tax incentives to promote sustainability in buildings. However, an average of 5% of stakeholders would strongly disagree with implementing drivers to promote sustainability criteria. Of the respondents, only an average of 2% did not understand the questions, and 4% had doubts about implementing tax and fee reductions and rebates. They questioned whether the tax reduction would only affect high-income earners, how the correct implementation of sustainability criteria will be evaluated, and what types of government bodies will standardise, manage, and execute the drivers' correct implementation. Driver 3 (IBI deductions and rebates) stands out as the driver with the highest degree of agreement, with 46% of respondents strongly agreeing with its implementation. On the other hand, driver 19 (reduction in vehicle parking fees) is the driver with the highest disagreement level, with 13% of respondents in total disagreement.

From Figure 4, it can be observed that the average score given to the 30 fiscal drivers is ac = 3.55, with an SDc = 0.45. This implies that stakeholders advocate for the establishment of fiscal drivers. Only five drivers achieved below an average of 3 points: 22 (reduction in road user charges), 20 (reduction in vehicle entry charges), 19 (reduction in vehicle parking charges), 21 (reduction in road user charges) and 23 (reduction in road user charges).

Drivers 3 (IBI deductions and rebates) and 23 (reduction in taxes for air traffic use) are the drivers with the highest and lowest average scores, respectively. Finally, it is worth noting that the drivers with the lowest average scores coincide with the highest standard deviations and the lowest degree of consensus (Table 3).

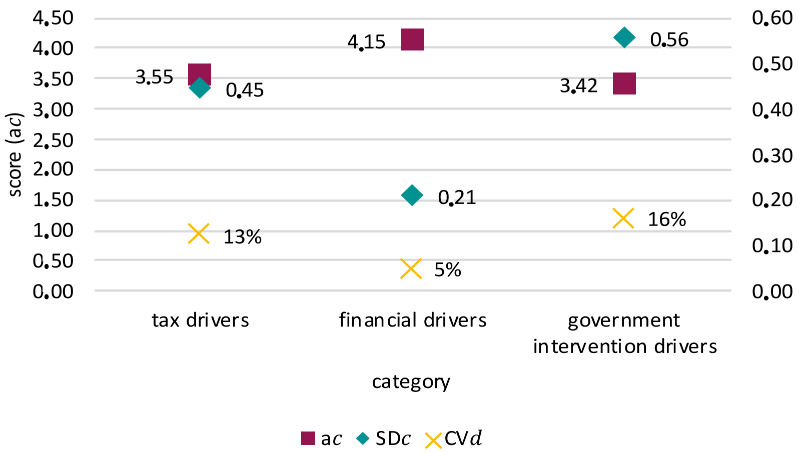

Figure 4. Average scores per category (a_c), standard deviation per category (SD_c) and coefficient of variation per category (CV_c).

3.2.2. Financial Drivers

In the case of the financial drivers category, as shown in Table 3, an average of 50% of the 229 respondents strongly agree with the inclusion of financial drivers for the promotion of sustainability in buildings; only an average of 2% of the stakeholders would strongly disagree with the idea of implementing financial drivers. It is noteworthy that out of the total number of respondents, only 1% did not understand the questions. However, an average of 3% of stakeholders expressed doubts about the implementation of drivers.

From Figure 4, it can be observed that the average score given to the fiscal driver category is $a_c = 4.15$, with an $SD_c = 0.21$, indicating that stakeholders would agree with the implementation of financial drivers. No drivers presented an average of 3 points. Driver number 33, referring to the granting of preferential low-interest financing, stands out as the driver with the highest average and lowest standard deviation, $SD_d = 1.10$, followed by driver 32 with an average score of ad = 4.27 and $SD_d = X$, referring to the granting of non-repayable grants, which indicates a high degree of consensus among the respondents. However, driver 35 (financing of public services) has the lowest score, with an average score of $a_d = 3.77$, and the highest standard deviation, $SD_d = 1.37$. These results show a more significant variability among the responses and a lower degree of consensus. Finally, as with the fiscal drivers, the higher the average score, the lower the standard deviation, indicating a high consensus among stakeholders.

3.2.3. Drivers of Government Interventions

In the case of government intervention drivers, as shown in Table 3, an average of 30% of respondents strongly agree with the inclusion of government intervention drivers. However, an average of 4% of stakeholders would strongly disagree with implementing government intervention drivers, do not understand the questions, or give different answers to those envisaged. Driver 39 (technical support) stands out as the driver with the highest agreement level, with 46% of respondents strongly agreeing with its implementation. On the other hand, driver 36 (increase in buildability) is the one with the highest level of disagreement, with 10% of respondents strongly disagreeing with the increase in buildability as an instrument to promote sustainability.

In Figure 4, it can be observed that the overall average of the scores given to the government intervention driver category is ac = 3.42, with an SDc = 0.56. This denotes consensus among stakeholders regarding the implementation of this category of drivers.

Driver number 39 (proportion of technical support) stands out as the driver with the highest average score and the lowest standard deviation obtained (SDd = 1.10). On the other hand, driver 36 (increase in buildability) has the lowest score, with an average of ad = 2.77 and SDd = 1.61. This denotes more significant variability among the responses and, therefore, a lower degree of consensus. Finally, as with the fiscal drivers, the higher the average score, the lower the standard deviation. This denotes a high degree of consensus among stakeholders.

4. Discussion

The analysis of the results in the previous section supports the fact that stakeholders agree with driver implementation to promote sustainability criteria in buildings, with a high degree of consensus. However, the less relevant drivers created quite a disparity among respondents.

Financial drivers stand out as the most relevant and as having the highest degree of consensus, which shows that financial subsidies can stimulate sustainable building development. In China, local economic fundamentals and subsidy-based incentive policies explain the construction of sustainable buildings [100]. The European Investment Bank is also actively financing housing affordability and sustainability. Similarly, banks favour sustainable buildings, whose cost amortisation over the life cycle of the building [30,101,102] would ensure a more manageable repayment of loans. Sustainable housing, therefore, offers life cycle cost savings to owners and occupants. Besides this, they are rented or sold faster, which thus offers higher profits [103].

Therefore, our results align with and build on previous research findings and analyses of experiences in other countries. Furthermore, these results suggest that the financial effort to implement sustainability criteria in housing could be compensated by the returns derived from measures adopted by both governments and private entities in the respondents' opinion. Therefore, our results support the interest in deepening the relationship between investment in financial drivers and the benefits derived from their effects as a basis for developing governance models aimed at promoting sustainable building.

Concerning fiscal drivers, the inclusion of deductions and rebates in the urban property tax (IBI) is of relevance. This type of driver is already being implemented in some regions of Spain, establishing a 50% reduction in the number of investments that improve housing quality and sustainability. However, these investments are restricted to housing actions, focusing on energy efficiency aspects, and neglecting the wider rebuilding of sustainable aspects already existent. The drivers that refer to specific aspects of the building process (i.e., occupation of public roads, trench openings or façade overhangs etc.) are the least relevant. This may be because these drivers refer to parts of the building, such as façade overhangs or ground trenches, that are either not considered relevant or are not considered part of the building's sustainability. However, from a fiscal point of view, they do count for tax purposes. In any case, our results represent an advance on previous research findings because we have identified government decisions on specific taxes as instruments to stimulate sustainable building.

Similarly, the drivers with the lowest degree of agreement among stakeholders are those related to government interventions. Thus, the driver relating to the increase in buildability creates controversy among respondents. Respondents expressed doubts about the increased environmental impact that this could have, and that it would not compensate for the other sustainable aspects. However, studies such as those by Kong and He [47] and Shi and Liu [104] show that floor area ratio rewards can also motivate developers to pursue innovations in green building technology. Moreover, such drivers are already being implemented in some regions (e.g., the Canary Islands) in hotel buildings. Each tranche of 20% of the annual energy expenditure generated by renewable means will entitle the builder to a 0.1 m^2c/m^2s increase in floor area over the standard [105].

As an advance on the findings of previous research, it is worth noting that in the case of government drivers, our results reveal how controversial this issue is and the doubts that all the agents involved have. This opens several research lines on how sustainable particular actions would be and how they could be balanced within the complex interplay of the concept of sustainability and resilience, the circular economy, and adaptation to climate change in buildings. This approach raises the question of whether specific criteria should be prioritised over others or whether, on the contrary, the success of the new paradigm of the building stock is based on equity between all environmental, economic, and social stakeholders.

Finally, it is worth noting the respondents' concerns about how compliance with sustainability criteria will be certified. This is where the concept of the sustainable building assessment method (SBAM) comes in. These instruments are based on criteria that provide quantitative and qualitative performance indicators from an environmental, economic, and social perspective [106,107]. However, the voluntary nature of these instruments [108] determines the potential of these tools as a precursor to sustainable building development [4].

5. Conclusions

Our empirical results are novel due to the high number of incentives analysed, covering the entire building life cycle and addressing all aspects of sustainability (environmental, economic, and social) by studying the opinions of a wide variety of stakeholders. Thus, the findings and methodology used can be interesting for governments of countries interested in implementing policies to promote sustainable building, as our results can be extrapolated.

The findings obtained show that stakeholders, in general, strongly agree with the implementation of governmental drivers as instruments to stimulate sustainability in the construction, renovation and use of dwellings. Furthermore, the most highly-rated drivers are those considered to be the most effective in driving sustainable building and can help guide the definition of public policies on sustainable housing.

In the opinion of the stakeholders surveyed, the most valuable drivers to boost sustainability in housing are financial drivers, followed by fiscal drivers and government interventions. This reveals the opportunity for governments to exercise their legal powers to implement measures aimed at implementing these three types of instruments (financial, fiscal and government interventions), and their interest in doing so.

For the financial drivers, our results show that the most effective government measures would be to provide non-repayable subsidies, facilitate preferential low-interest financing for sustainable homebuyers, and provide climate bonds for homeowners and non-homeowners.

In terms fiscal drivers, government policies should mainly be directed towards legally regulating rebates and deductions in property tax, building and construction tax, income tax (buyers), corporate tax, value-added tax (construction companies and developers), and fees for habitability and first occupancy licences. These policies may involve decisions at different government levels, such as local governments and central governments, which should act in a coordinated manner in their measures to promote sustainable building.

On the other hand, in terms of government interventions, public policies should be based on priority, technical support mechanisms, the implementation of housing design support tools, the facilitating of access to databases, and the providing of subsidies to finance public services.

These findings show the need for governments to take legal, fiscal, technical and social measures to promote sustainability in housing construction, renovation and use, using a comprehensive and integrated approach to balance the economic, environmental and social aspects of housing provision.

In parallel, our results suggest that the effectiveness of the measures require coordinated planning between the policies to be adopted at different levels of government (central government, regional governments, and local governments). In this sense, it could be interesting for national governments to regulate possible fiscal and financial incentives and, on that basis, for regional and local governments to implement specific drivers adapted to the peculiarities of the socio-economic context of each territory. More specifically, fiscal policies for sustainable building should focus on direct and indirect taxes rather than fees.

Our findings are very novel and represent an advance over previous research for three reasons. First, we employ a holistic approach (unprecedented so far), based on the joint analysis of perspectives from various stakeholders, obtaining useful knowledge to design viable and effective public policies. Second, our analysis includes aspects related to the home's entire useful life, not only to construction. Third, our results are much more complete than those of the studies carried out so far, since we simultaneously include subjects of a very diverse nature (fiscal, financial, technical, political, etc.). Thus, in the conclusions section, we have added why and how our findings advance and deepen the conclusions of the previous research, providing very useful knowledge for the design of public policies on sustainable housing.

Finally, our results also support the idea that sustainable building could be promoted through other governmental measures aimed at increasing the visibility of its benefits among citizens, and at improving the transparency and reliability of the drivers to be applied, such as:

- analysis and dissemination of the economic effects derived from tax rebates;
- study and publication of the environmental impact of the increase in buildability and change of use;
- definition of procedures and methodologies to assess and certify the sustainability of buildings.

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References

1. Wen, Q.; Chen, Y.; Hong, J.; Chen, Y.; Ni, D.; Shen, Q. Spillover Effect of Technological Innovation on CO_2 Emissions in China's Construction Industry. *Build. Environ.* **2020**, *171*, 106653. [CrossRef]
2. Resch, E.; Andresen, I.; Cherubini, F.; Brattebø, H. Estimating Dynamic Climate Change Effects of Material Use in Buildings—Timing, Uncertainty, and Emission Sources. *Build. Environ.* **2021**, *187*, 107399. [CrossRef]
3. Hurlimann, A.C.; Warren-Myers, G.; Browne, G.R. Is the Australian Construction Industry Prepared for Climate Change? *Build. Environ.* **2019**, *153*, 128–137. [CrossRef]
4. López, C.D.; Carpio, M.; Martín-Morales, M. A Comparative Analysis of Sustainable Building Assessment Methods. *Sustain. Cities Soc.* **2019**, *49*, 101611. [CrossRef]
5. Darko, A.; Chan, A.P.C.; Ameyaw, E.E.; He, B.-J.J.; Olanipekun, A.O. Examining Issues Influencing Green Building Technologies Adoption: The United States Green Building Experts' Perspectives. *Energy Build.* **2017**, *144*, 320–332. [CrossRef]
6. European Commission. *European Union Level(s):Taking Action on the Total Impact of the Construction Sector*; Publications Office of the European Union: Luxembourg, 2019; p. 16. [CrossRef]
7. European Union (EU). *Housing in Europe*; European Union Commission: Brussels, Belgium, 2020.
8. Dobson, D.W.; Sourani, A.; Sertyesilisik, B.; Tunstall, A. Sustainable Construction: Analysis of Its Costs and Benefits. *Am. J. Civ. Eng Arch.* **2013**, *1*, 32–38.

9. Brundtland, G.H.; Khalid, M.; Agnelli, S.; Al-Athel, S.; Chidzero, B. *Our Common Future*; WCED: New York, NY, USA, 1987; Volume 8. Available online: https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf (accessed on 7 May 2021).
10. Boutros-Ghali, B. An. *Agenda for Development 1995: With Related UN Documents.*; United Nations: New York, NY, USA, 1995; ISBN 9211005566.
11. Díaz-López, C.; Carpio, M.; Martín-Morales, M.; Zamorano, M. Defining Strategies to Adopt Level(s) for Bringing Buildings into the Circular Economy. A Case Study of Spain. *J. Clean. Prod.* **2021**, *287*. [CrossRef]
12. Thomas, T.; Praveen, A. Emergy Parameters for Ensuring Sustainable Use of Building Materials. *J. Clean. Prod.* **2020**, *276*, 122382. [CrossRef]
13. He, Q.; Hossain, M.U.; Ng, S.T.; Skitmore, M.; Augenbroe, G. A Cost-Effective Building Retrofit Decision-Making Model—Example of China's Temperate and Mixed Climate Zones. *J. Clean. Prod.* **2021**, *280*, 124370. [CrossRef]
14. John, G.; Clements-Croome, D.; Jeronimidis, G. Sustainable Building Solutions: A Review of Lessons from the Natural World. *Build. Environ.* **2005**, *40*, 319–328. [CrossRef]
15. Leoto, R.; Lizarralde, G. Challenges in Evaluating Strategies for Reducing a Building's Environmental Impact through Integrated Design. *Build. Environ.* **2019**, *155*, 34–46. [CrossRef]
16. Andersen, C.E.; Ohms, P.; Rasmussen, F.N.; Birgisdóttir, H.; Birkved, M.; Hauschild, M.; Ryberg, M. Assessment of Absolute Environmental Sustainability in the Built Environment. *Build. Environ.* **2020**, *171*, 106633. [CrossRef]
17. AbouHamad, M.; Abu-Hamd, M. Framework for Construction System Selection Based on Life Cycle Cost and Sustainability Assessment. *J. Clean. Prod.* **2019**, *241*, 118397. [CrossRef]
18. Marjaba, G.E.; Chidiac, S.E.; Kubursi, A.A. Sustainability Framework for Buildings via Data Analytics. *Build. Environ.* **2020**, *172*, 106730. [CrossRef]
19. Wen, B.; Musa, S.N.; Onn, C.C.; Ramesh, S.; Liang, L.; Wang, W.; Ma, K. The Role and Contribution of Green Buildings on Sustainable Development Goals. *Build. Environ.* **2020**, *185*, 107091. [CrossRef]
20. Bastianoni, S.; Galli, A.; Niccolucci, V.; Pulselli, R.M. The Ecological Footprint of Building Construction. *WIT Trans. Ecol. Environ.* **2006**, *93*, 345–356. [CrossRef]
21. Dell'Anna, F.; Bottero, M. Green Premium in Buildings: Evidence from the Real Estate Market of Singapore. *J. Clean. Prod.* **2021**, *286*, 125327. [CrossRef]
22. Dirisu, J.O.; Adegoke, D.D.; Azeta, J.; Ishola, F.; Okokpujie, I.P.; Aworinde, A. Ergonomics of Domestic Building Structure on Occupants' Health. *Procedia Manuf.* **2019**, *35*, 1262–1266. [CrossRef]
23. Balaban, O.; Puppim de Oliveira, J.A. Sustainable Buildings for Healthier Cities: Assessing the Co-Benefits of Green Buildings in Japan. *J. Clean. Prod.* **2017**, *163*, S68–S78. [CrossRef]
24. Johnston, R.B. Arsenic and the 2030 Agenda for Sustainable Development. Arsenic Research and Global Sustainability. In Proceedings of the 6th International Congress on Arsenic in the Environment, AS 2016, Stockholm, Sweden, 19–23 June 2016; pp. 12–14. [CrossRef]
25. United Nations. *UN General Assembly Transforming Our World: The 2030 Agenda for Sustainable Development*; United Nations: New York, NY, USA, 2015; Volume A/RES/70/1.
26. President, E.C.; Gabriel, M. *New European Bauhaus: Commission Launches Design Phase*; European Commission: Brussels, Belgium, 2021.
27. State of the Union Address by President von Der Leyen. Available online: https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_20_1655 (accessed on 7 May 2021).
28. Zhang, L.; Chen, L.; Wu, Z.; Zhang, S.; Song, H. Investigating Young Consumers' Purchasing Intention of Green Housing in China. *Sustainability* **2018**, *10*, 1044. [CrossRef]
29. Chan, A.P.C.; Darko, A.; Ameyaw, E.E. Strategies for Promoting Green Building Technologies Adoption in the Construction Industry-An International Study. *Sustainability* **2017**, *9*, 969. [CrossRef]
30. Salem, D.; Bakr, A.; El Sayad, Z. Post-Construction Stages Cost Management: Sustainable Design Approach. *Alex. Eng. J.* **2018**, *57*, 3429–3435. [CrossRef]
31. Borg, R.; Gonzi, R.D.; Borg, S.P. Building Sustainably: A Pilot Study on the Project Manager's Contribution in Delivering Sustainable Construction Projects—A Maltese and International Perspective. *Sustainability* **2020**, *12*, 162. [CrossRef]
32. Campisi, D.; Gitto, S.; Morea, D. Shari'ah-Compliant Finance: A Possible Novel Paradigm for Green Economy Investments in Italy. *Sustainability* **2018**, *10*, 3915. [CrossRef]
33. Shi, Y.; Wang, G. Changes in Building Climate Zones over China Based on High-Resolution Regional Climate Projections. *Environ. Res. Lett.* **2020**, *15*, 114045. [CrossRef]
34. Dobrovolskienė, N.; Pozniak, A.; Tvaronavičienė, M. Assessment of the Sustainability of a Real Estate Project Using Multi-Criteria Decision Making. *Sustainability* **2021**, *13*, 4352. [CrossRef]
35. Parmar, B.L.; Freeman, E.R.; Harrison, J.S.; Wicks, A.C.; Purnell, L.; de Colle, S. Stakeholder Theory: The State of the Art. *Acad. Manag. Ann.* **2010**, *4*, 403–445. [CrossRef]
36. Adabre, M.A.; Chan, A.P.C.; Darko, A.; Osei-Kyei, R.; Abidoye, R.; Adjei-Kumi, T. Critical Barriers to Sustainability Attainment in Affordable Housing: International Construction Professionals' Perspective. *J. Clean. Prod.* **2020**, *253*, 119995. [CrossRef]
37. Li, Q.; Long, R.; Chen, H.; Chen, F.; Wang, J. Visualized Analysis of Global Green Buildings: Development, Barriers and Future Directions. *J. Clean. Prod.* **2020**, *245*, 118775. [CrossRef]

38. Martek, I.; Hosseini, M.R.; Shrestha, A.; Edwards, D.J.; Durdyev, S. Barriers Inhibiting the Transition to Sustainability within the Australian Construction Industry: An Investigation of Technical and Social Interactions. *J. Clean. Prod.* **2019**, *211*, 281–292. [CrossRef]
39. Martiskainen, M.; Kivimaa, P. Role of Knowledge and Policies as Drivers for Low-Energy Housing: Case Studies from the United Kingdom. *J. Clean. Prod.* **2019**, *215*, 1402–1414. [CrossRef]
40. Yang, X.; Zhang, J.; Shen, G.Q.; Yan, Y. Incentives for Green Retrofits: An Evolutionary Game Analysis on Public-Private-Partnership Reconstruction of Buildings. *J. Clean. Prod.* **2019**, *232*, 1076–1092. [CrossRef]
41. Kemmerer, F.N.; Thiagarajan, S. What Is an Incentive System? *Perform. Instr.* **1989**, *28*, 11–16. [CrossRef]
42. Fan, K.; Wu, Z. Incentive Mechanism Design for Promoting High-Level Green Buildings. *Build. Environ.* **2020**, *184*, 107230. [CrossRef]
43. Yang, R.J.; Zou, P.X.W. Stakeholder-Associated Risks and Their Interactions in Complex Green Building Projects: A Social Network Model. *Build. Environ.* **2014**, *73*, 208–222. [CrossRef]
44. Li, H.; Ng, S.T.; Skitmore, M. Stakeholder Impact Analysis during Post-Occupancy Evaluation of Green Buildings—A Chinese Context. *Build. Environ.* **2018**, *128*, 89–95. [CrossRef]
45. Aliagha, G.U.; Hashim, M.; Sanni, A.O.; Ali, K.N. Review of Green Building Demand Factors for Malaysia. *J. Energy Technol. Policy* **2013**, *3*, 471–478.
46. Perkins, M.; Mcdonagh, J. *New Zealand Local Government Initiatives and Incentives for Sustainable Design in Commercial Buildings*; European Real Estate Society (ERES): Nottingham, UK, 2012.
47. Kong, F.; He, L. Impacts of Supply-Sided and Demand-Sided Policies on Innovation in Green Building Technologies: A Case Study of China. *J. Clean. Prod.* **2021**, *294*, 126279. [CrossRef]
48. Love, P.E.D.; Niedzweicki, M.; Bullen, P.A.; Edwards, D.J. Achieving the Green Building Council of Australia's World Leadership Rating in an Office Building in Perth. *J. Constr. Eng. Manag.* **2012**, *138*, 652–660. [CrossRef]
49. Andelin, M.; Sarasoja, A.-L.; Ventovuori, T.; Junnila, S. Breaking the Circle of Blame for Sustainable Buildings—Evidence from Nordic Countries. *J. Corp. Real Estate* **2015**, *17*, 26–45. [CrossRef]
50. Rana, A.; Sadiq, R.; Alam, M.S.; Karunathilake, H.; Hewage, K. Evaluation of Financial Incentives for Green Buildings in Canadian Landscape. *Renew. Sustain. Energy Rev.* **2021**, *135*, 110199. [CrossRef]
51. Falkenbach, H.; Lindholm, A.L.; Schleich, H. Environmental Sustainability: Drivers for the Real Estate Investor. *J. Real Estate Lit.* **2010**, *18*, 203–223.
52. Qi, G.Y.; Shen, L.Y.; Zeng, S.X.; Jorge, O.J. The Drivers for Contractors' Green Innovation: An Industry Perspective. *J. Clean. Prod.* **2010**, *18*, 1358–1365. [CrossRef]
53. Zuo, J.; Zhao, Z.Y. Green Building Research-Current Status and Future Agenda: A Review. *Renew. Sustain. Energy Rev.* **2014**, *30*, 271–281. [CrossRef]
54. Romano, G.; Ferreira, D.C.; Marques, R.C.; Carosi, L. Waste Services' Performance Assessment: The Case of Tuscany, Italy. *Waste Manag.* **2020**, *118*, 573–584. [CrossRef] [PubMed]
55. Smith, R.M.; Blizard, Z.D. A Census Tract Level Analysis of Urban Sprawl's Effects on Economic Mobility in the United States. *Cities* **2021**, *115*, 103232. [CrossRef]
56. Rodriguez, F.; Garcia-Hansen, V.; Allan, A.; Isoardi, G. Subjective Responses toward Daylight Changes in Window Views: Assessing Dynamic Environmental Attributes in an Immersive Experiment. *Build. Environ.* **2021**, *195*. [CrossRef]
57. Camarasa, C.; Kalahasthi, L.K.; Rosado, L. Drivers and Barriers to Energy-Efficient Technologies (EETs) in EU Residential Buildings. *Energy Built Environ.* **2020**. [CrossRef]
58. New Green Savings Programme—SFŽP ČR. Available online: https://www.sfzp.cz/en/administered-programmes/new-green-savings-programme/ (accessed on 21 March 2021).
59. Åkerman, M.; Halonen, M.; Wessberg, N. Lost in Building Design Practices: The Intertwining of Energy with the Multiple Goals of Home Building in Finland. *Energy Res. Soc. Sci.* **2020**, *61*, 101335. [CrossRef]
60. Malinauskaite, J.; Jouhara, H.; Ahmad, L.; Milani, M.; Montorsi, L.; Venturelli, M. Energy Efficiency in Industry: EU and National Policies in Italy and the UK. *Energy* **2019**, *172*, 255–269. [CrossRef]
61. MIA and Vamil | RVO.Nl. Available online: https://english.rvo.nl/subsidies-programmes/mia-and-vamil (accessed on 23 March 2021).
62. Majcen, D.; Itard, L.; Visscher, H. Actual Heating Energy Savings in Thermally Renovated Dutch Dwellings. *Energy Policy* **2016**, *97*, 82–92. [CrossRef]
63. Woźniak, J.; Krysa, Z.; Dudek, M. Concept of Government-Subsidized Energy Prices for a Group of Individual Consumers in Poland as a Means to Reduce Smog. *Energy Policy* **2020**, *144*, 111620. [CrossRef]
64. OECD. *Taxing Energy Use 2019*; OECD: Paris, France, 2019.
65. Promoting the Swiss Federal Building Program | EBP | Swiss. Available online: https://www.ebp.ch/en/node/1190 (accessed on 23 March 2021).
66. Sustainability—Hamilton City Council. Available online: https://www.hamilton.govt.nz/our-services/environment-and-health/Pages/Sustainability.aspx (accessed on 23 March 2021).
67. Zabaloy, M.F.; Recalde, M.Y.; Guzowski, C. Are Energy Efficiency Policies for Household Context Dependent? A Comparative Study of Brazil, Chile, Colombia and Uruguay. *Energy Res. Soc. Sci.* **2019**, *52*, 41–54. [CrossRef]

68. Saldaña-Márquez, H.; Gómez-Soberón, J.M.; Arredondo-Rea, S.P.; Gámez-García, D.C.; Corral-Higuera, R. Sustainable Social Housing: The Comparison of the Mexican Funding Program for Housing Solutions and Building Sustainability Rating Systems. *Build. Environ.* **2018**, *133*, 103–122. [CrossRef]
69. Chiu, P.H.; Raghavan, V.S.G.; Poh, H.J.; Tan, E.; Gabriela, O.; Wong, N.H.; Van Hooff, T.; Blocken, B.; Li, R.; Leong-Kok, S.M. CFD Methodology Development for Singapore Green Mark Building Application. *Procedia Eng.* **2017**, *180*, 1596–1602. [CrossRef]
70. Damrongsak, D.; Wongsapai, W. Personnel Responsible for Energy Capacity Building Programs for Sustainable Energy Efficiency in Thailand. *Energy Procedia* **2017**, *110*, 59–64. [CrossRef]
71. Amoruso, F.M.; Sonn, M.H.; Chu, S.; Schuetze, T. Sustainable Building Legislation and Incentives in Korea: A Case-Study-Based Comparison of Building New and Renovation. *Sustainability* **2021**, *13*, 4889. [CrossRef]
72. Sunikka-Blank, M.; Iwafune, Y. Sustainable Building in Japan—Observations on a Market Transformation Policy. *Environ. Policy Gov.* **2011**, *21*, 351–363. [CrossRef]
73. Sayce, S.; Ellison, L.; Parnell, P. Understanding Investment Drivers for UK Sustainable Property. *Build. Res. Inf.* **2007**, *35*, 629–643. [CrossRef]
74. Bottero, M.; D'Alpaos, C.; Dell'Anna, F. Boosting Investments in Buildings Energy Retrofit: The Role of Incentives. *Smart Innov. Syst. Technol.* **2019**, *101*, 593–600. [CrossRef]
75. Ebbinghaus, B. Welfare Retrenchment. In *International Encyclopedia of the Social & Behavioral Sciences*, 2nd ed.; Elsevier Inc.: Amsterdam, The Netherlands, 2015; pp. 521–527. ISBN 9780080970875.
76. Kennett, P.; Lendvai-Bainton, N. *Handbook of European Social Policy*; Kennett, P., Lendvai-Bainton, N., Eds.; School for Policy Studies, University of Bristol: Bristol, UK, 2017; ISBN 978-1-78347-645-9.
77. González-Vallejo, P.; Marrero, M.; Solís-Guzmán, J. The Ecological Footprint of Dwelling Construction in Spain. *Ecol. Indic.* **2015**, *52*, 75–84. [CrossRef]
78. González Vallejo, P. *Evaluación Económica y Ambiental de La Construcción de Edificios Residenciales: Aplicación a España y Chile*; Universidad de Sevilla: Seville, Spain, 2017.
79. ERESEE 2017 Actualización 2017 de la Estrategia a Largo Plazo Para la Rehabilitación Energética en el Sector de la Edificación en España, doi:10.1790/052530. Available online: https://www.mitma.gob.es/recursos_mfom/pdf/24003A4D-449E-4B93-8CA5-7217CFC61802/143398/20170524REVISIONESTRATEGIA.pdf (accessed on 7 May 2021).
80. INEbase. Demografía y Población. Cifras de Población y Censos Demográficos. Censos de Población y Viviendas. Últimos Datos. Available online: https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176992&menu=ultiDatos&idp=1254735572981 (accessed on 7 June 2021).
81. Monzón-Chavarrías, M.; López-Mesa, B.; Resende, J.; Corvacho, H. The NZEB Concept and Its Requirements for Residential Buildings Renovation in Southern Europe: The Case of Multi-Family Buildings from 1961 to 1980 in Portugal and Spain. *J. Build. Eng.* **2021**, *34*, 101918. [CrossRef]
82. Gangolells, M.; Casals, M.; Forcada, N.; MacArulla, M.; Cuerva, E. Energy Mapping of Existing Building Stock in Spain. *J. Clean. Prod.* **2016**, *112*, 3895–3904. [CrossRef]
83. Freeman, R.E.; McVea, J. A Stakeholder Approach to Strategic Management. *SSRN Electron. J.* **2005**. [CrossRef]
84. Freeman, R.; Rusconi, G.; Dorigatti, M. (Eds.) *Teoria Degli Stakeholder*; EEUU: Filadelfia, PA, USA, 2007.
85. Friedman, A.L.; Miles, S. *Stakeholders: Theory and Practice*; Oxford University Press: Oxford, UK, 2006.
86. Fu, Y.; Dong, N.; Ge, Q.; Xiong, F.; Gong, C. Driving-Paths of Green Buildings Industry (GBI) from Stakeholders' Green Behavior Based on the Network Analysis. *J. Clean. Prod.* **2020**, *273*, 122883. [CrossRef]
87. Abreu, M.I.; Oliveira, R.; Lopes, J. Attitudes and Practices of Homeowners in the Decision-Making Process for Building Energy Renovation. *Procedia Eng.* **2017**, *172*, 52–59. [CrossRef]
88. Lee, Z.P.; Rahman, R.A.; Doh, S.I. Key Drivers for Adopting Design Build: A Comparative Study between Project Stakeholders. *Phys. Chem. Earth* **2020**, *120*, 102945. [CrossRef]
89. AlWaer, H.; Kirk, D. Building Sustainability Assessment Methods. *J. Proceed. Inst. Civil Eng. Eng. Sustain.* **2012**, *165*, 241–253. [CrossRef]
90. Research, N. Architects' Council of Europe 2020. Available online: https://www.ace-cae.eu/ (accessed on 7 May 2021).
91. Los Colegios de Arquitectos. Available online: https://www.cscae.com/index.php/colegios-arquitectos60 (accessed on 9 June 2021).
92. Banco de España—Estadísticas—Boletín Estadístico. Available online: https://www.bde.es/webbde/es/estadis/infoest/bolest4.html (accessed on 7 June 2021).
93. Shazmin, S.A.A.; Sipan, I.; Sapri, M. Property Tax Assessment Incentives for Green Building: A Review. *Renew. Sustain. Energy Rev.* **2016**, *60*, 536–548. [CrossRef]
94. Spain Royal Legislative Decree 2/2004, of March 5, by Which Approves the Revised Text of the Law Regulating the Treasuries Local. Treasury "BOE" no. 59 of March 9, 2004 Reference: BOE-A-2004-4214. Available online: https://www.global-regulation.com/translation/spain/1449388/royal-legislative-decree-2-2004%252c-of-5-march%252c-which-approves-the-revised-text-of-the-act-regulating-the-local-haciendas.html (accessed on 7 May 2021).
95. Fang, B.; Wu, J.; Ni, S. Correlation Analysis of Spatial Variability of Soil Available Nitrogen and Household Nitrogen Inputs at Pujiang County. *Shengtai Xuebao Acta Ecol. Sin.* **2012**, *32*, 6489–6500. [CrossRef]

96. Chumnanvanichkul, P.; Chirapongsananurak, P.; Hoonchareon, N. Power Baseline Modeling for Split-Type Air Conditioner in Building Energy Management Systems Using Deep Learning. In Proceedings of the APCCAS 2019: 2019 IEEE Asia Pacific Conference on Circuits and Systems: Innovative CAS Towards Sustainable Energy and Technology Disruption, Bangkok, Thailand, 11–14 November 2019; Institute of Electrical and Electronics Engineers Inc.: Piscataway, NJ, USA, 2019; pp. 198–201.
97. Kwon, Y.J.; Lee, D.K.; Kim, J.-H.; Oh, K. Improving Urban Thermal Environments by Analysing Sensible Heat Flux Patterns in Zoning Districts. *Cities* **2021**, *116*, 103276. [CrossRef]
98. Mendenhall, W.M.; Sincich, T.L. *Statistics for Engineering and the Sciences*; CRC Press: Boca Raton, FL, USA, 2016; ISBN 1498728871.
99. Pardo, A.; Ruiz, M.; San Martín Castellanos, R. *Análisis de Datos En Ciencias Sociales y de La Salud*; Editorial Síntesis: Madrid, Spain, 2009; Volume I.
100. Zou, Y.; Zhao, W.; Zhong, R. The Spatial Distribution of Green Buildings in China: Regional Imbalance, Economic Fundamentals, and Policy Incentives. *Appl. Geogr.* **2017**, *88*, 38–47. [CrossRef]
101. Gilbert Silvius, A.J. A Maturity Model for Integrating Sustainability in Projects and Project Management Sustainable Development and Project Management View Project the Human Factor in Sustainable Project Management View Project. Available online: https://www.academia.edu/23716222/A_Maturity_Model_for_Integrating_Sustainability_in_Projects_and_Project_Management (accessed on 7 May 2021).
102. BCA Center. *Proceedings of the SB 13 Singapore-Realising Sustainability in the Tropics*; BCA Center for Sustainable Buildings and National University od Singapore: Singapore, 2013; ISBN 978-981-07-7377-9.
103. Hwang, B.G.; Ng, W.J. Project Management Knowledge and Skills for Green Construction: Overcoming Challenges. *Int. J. Proj. Manag.* **2013**, *31*, 272–284. [CrossRef]
104. Shi, Q.; Lai, X.; Xie, X.; Zuo, J. Assessment of Green Building Policies—A Fuzzy Impact Matrix Approach. *Renew. Sustain. Energy Rev.* **2014**, *36*, 203–211. [CrossRef]
105. Canary Government. *LAW 2/2013, of May 29, for the Renewal and Modernization of Tourism in the Canary Islands*; Canary Government: Canary Islands, Spain, 2013; pp. 13415–13456.
106. Acampa, G.; García, J.O.; Grasso, M.; Díaz-López, C. Project Sustainability: Criteria to Be Introduced in BIM. *Valori Valutazioni* **2019**, *2019*, 119–128.
107. Haapio, A.; Viitaniemi, P. A Critical Review of Building Environmental Assessment Tools. *Environ. Impact Assess. Rev.* **2008**, *28*, 469–482. [CrossRef]
108. Díaz-López, C.; Carpio, M.; Martín-Morales, M.; Zamorano, M. Analysis of the Scientific Evolution of Sustainable Building Assessment Methods. *Sustain. Cities Soc.* **2019**, *49*, 101610. [CrossRef]