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How Can the Context Affect Policy Decision-Making: The Case of Climate Change Mitigation Policies in the Greek Building Sector

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Abstract: The influence of context dynamics in the course of the climate change mitigation policy instruments' (PIs) deployment cycle, usually causes a need for policy adaptation mechanisms to ensure that policies can meet the sector needs efficiently and effectively. In this paper, we argue that important contextual factors are the ones that are perceived to have a great impact over policy effectiveness by key related actors. By examining more thoroughly those effects over PIs, as perceived by policy and market actors, useful feedback on observed policy adaptations can be highlighted. In this context, the aim of this paper is to present a conceptual framework which seeks to investigate the impact of key external factors on policy decision-making. This framework is then applied to policies intended to foster sustainability in the Greek building sector. Contextual parameters that are influential over the effectiveness of the national energy conservation measures are identified through a stakeholder survey. Cluster analysis is then employed for the elicitation of three distinct decision-making priorities' scenarios. General macroeconomic trends, energy costs, characteristics of the building sector and socio-institutional factors are prioritized differently from various types of actors and induce certain types of PI changes. Distinguishing among the different types of PI change can help explain better under which contextual circumstances policy adaptations occur and provide guidance to other policy makers when found in similar decisional contexts.

Keywords: building sector; energy efficiency policy instruments; contextual factors; cluster analysis; policy instrument change

1. Introduction

Countries around the globe adopt a wide range of policy instruments (PIs) to support climate change mitigation and adaptation strategies. Considering the influence of context dynamics in the course of policy instruments' deployment cycle, policy adaptation mechanisms should be in place to ensure that support measures are able to meet the sector needs, effectively and efficiently. Similarly, dynamic trends, such as changes in the prices of electricity and natural gas, can significantly alter the effectiveness of support instruments, inducing the need for their re-evaluation [1]. The need to better understand the uncertainties in the technological, economic, natural resource availability and political context of a country has been recognized as critical for the implementation of investments [2–4], as well as the evaluation of climate change mitigation policies [5,6]. Indeed, the “Guidance document on *ex-ante* evaluation” released by the European Commission [7] outlines that policy evaluators should investigate whether external parameters altering the intended results are identified.

Focusing on the transition to sustainable buildings, the International Energy Agency [6] recognizes that different countries encounter different challenges for the reduction of energy consumption in

the building sector. The report points out a number of influential demographic variables for the household sector (e.g., changes in the number of households, income, ownership rate of appliances and equipment, *etc.*), while differences in energy consumption within the services sector tend to be more closely related to the economic activity of the sector. Both the household and the services sectors' energy consumption, however, can be correlated with a number of general external factors, such as the climatic conditions, energy prices and availability, building characteristics (*i.e.*, age, profile, size) and energy consumption profile. Some of the factors affecting the trends in energy consumption of the building sector will evolve differently by region and country and will subsequently have a direct impact on the policies and measures, which are induced to maximize energy efficiency (EE) and emissions reduction.

Papadelis *et al.* [8] adopted a micro-economic approach for policy evaluation by hypothesizing that transition dynamics are driven mainly by the choices of the agents involved. The need to more closely examine policy actors' perceptions of how the context will evolve, has also gained critical interest in policy instrument studies [9,10]. Accordingly, the selection of scenario parameters should be based on the influence of these parameters on the agents' policy decision making, which are, by extension, the ones with the greatest influence on the evolution of a policy. Following this line of thinking, the proposed methodological framework considers important contextual trends to be the ones that are expected to have a great impact over policy intended effects by key related actors. These in turn influence the process of policy (re-) design.

In this context, our work contributes to PI design research. It provides a framework for the empirical analysis of the influence of context dynamics along the process of policy decision-making, which is based on the perceptions of policy actors regarding the role of context dynamics in the effectiveness of PIs. This framework is applied to the Greek building sector by: (1) offering an overview of the contextual factors that influence outcomes of PIs in the field of sustainable buildings according to policy actors' perceptions and; (2) highlighting different actors' perceptions when involved in re-designing the PIs mix in response to those influences. This framework can be applied also to other national contexts within the building sector, as well as other sectors with untapped energy saving potential to inform policy formulation and adaptation processes.

The rest of the paper is organized as follows: in Section 2, we outline the rationale of the research approach, while data collection and handling methods are presented in Section 3. Data and empirical insights were collected through a stakeholder survey conducted among key actors of the Greek building sector. The case study assisted the demonstration of distinct differences in actors' perception—regarding the influence of contextual factors as well as to test the framework proposed to understand the influence of those perceptions over policy decision-making. Section 4 describes the challenges with reference to the climate change mitigation policy framework for sustainable buildings in Greece. In Section 5, we turn to analyze the stakeholder survey results while Section 6 provides insights, from an *ex-post* viewpoint, on how stakeholders' perceptions over the influence of context dynamics have induced notable policy adaptations. In Section 7, we discuss and interpret the results obtained by emphasizing on different actors' strategies when re-designing the policy instrument mix in response to external influences and contextual trends that affect them. Finally, the paper sums up the conclusions on the importance of gaining a better understanding of effects of external parameters over policy instruments, as perceived by policy and market actors themselves, as well as understanding how contextual changes may influence policy makers' decisions during the policy (re-) formulation stage (Section 8).

2. The Rationale behind the Research Approach

PI selection and (re-)design may often take place when variations in external conditions occur, changing the initially intended impact. Key actors' response to external influences can vary depending on individual priorities, perceptions as well as capacities [11]. Depending on their perceptions over the influence of such conditions, actors can choose to respond to such environmental changes in a variety of ways. Their inaction may cause a notable deviation of policy instruments from their intended effects (*i.e.*, lack of effectiveness), as prescribed by national targets and commitments.

Administrative capacities can also be essentially important, since weaknesses on those fronts in terms of both capabilities and resources can cause delays in necessary policy changes over time. In this paper adaptation of PIs is considered a feature of institutional change since both entail adjusting formal and informal aspects [11]. Departing from Mahoney and Thelen’s approach, presenting four types of institutional change—layering, drift, displacement and conversion [12]—we argue that in effect, policy actors’ strategies on climate change mitigation (based on their perceptions and capacities), when responding to contextual influences follow a similar principle. The rationale of the proposed research approach is illustrated in Figure 1.

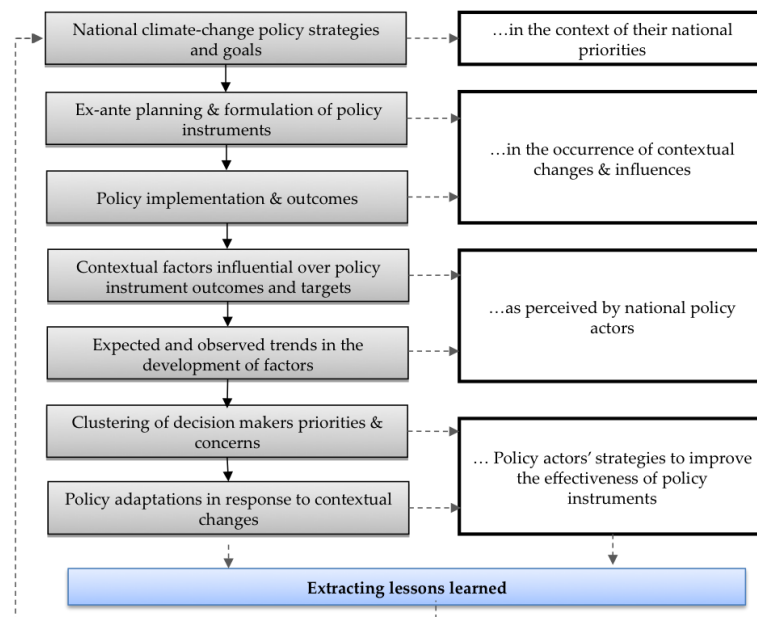


Figure 1. The research framework.

The proposed framework highlights that all steps in the whole policy life cycle from planning to implementation can be affected by the consideration of contextual factors and forecasts on their development within which policies are embedded. Between policy planning and implementation, conditions affecting climate change policy-making may shift within a very short time span, inducing unexpected consequences in the effectiveness of the PIs [1]. This requires the timely response of policy actors for the adaptation of policies to the dynamic market and socio-economic conditions. The selection and (re-) design of policy instruments in principle reflects the realization of actors’ perceptions, priorities and intentions [13] involved in the decision-making process. In this line of thinking, the impact of external influences as perceived by key actors can be reflected on their expected and observed trends, their expressed significance as well as induced policy changes in the instrument mix.

More importantly, highlighting differences in actors’ perception in relation to different actor profiles helps to explain how different decision making strategies can be formed determining related policy adaptations. External conditions may prompt policy actors to reconsider certain aspects of the PIs in place, offsetting policy design features, for example through introducing amendments and additions in existing design provisions (*i.e.*, layering). In other cases, the existing PIs are preserved while new complementary ones are introduced to support policies compatible with the evolving implementation context. The PIs’ adaptation that we analyze relates primarily to contextual (*i.e.*, exogenous) influences recognized as influential by key policy actors themselves. In other words our research primarily provides a framework for understanding different instrument changes that occur when policy actors incorporate relevant information concerning the evolution of external factors and plan adaptations to limit the negative impact of those factors over intended policy effects. It may however be the case that policy adaptations are carried out owing to policy-related (*i.e.*, internal)

factors, such as revisions in European Directives in need of transposition. In such cases relevant factors are mainly related to consistency in policy design issues as well as coherence in policy processes [14].

3. Data and Methods

To demonstrate the influence of different actors' priorities (on the importance of contextual factors over policy effects) on their formulation and adaptation strategies, and test the framework presented above, we collected data and empirical insights through a stakeholder survey conducted among key actors for the Greek buildings sector.

Experts were chosen on the basis of their relevance with the policy context of the case study, as well as their capacity to provide credible information on the field of policy planning for energy efficient buildings overall. In fact, the expertise in the policy area under evaluation helped in determining a smaller sample size in addition to collecting exploitable outcomes [15,16]. A smaller sample size was also deemed necessary due to the vast literature and knowledge existing in the field of barriers to EE in buildings [17], while it also enabled the authors to conduct in depth consultations.

Seventeen (17) bilateral interviews with experts took place during February–June 2013. In order to maintain interviewees' anonymity, their affiliations are used instead. The participants in the stakeholder consultation, comprised four (4) respondents from the market sector (Energy Services Company, installers of RES/EE technologies and environmental consultants); ten (10) representatives from different departments of the Governmental Energy Agency and the Ministry of Environment, Energy and Climate Change (*i.e.*, the Special Service for the Coordination and Implementation of Actions in the sectors of Energy (EYSED EN/KA), Energy Inspectorate, *etc.*) involved in the design, implementation and monitoring of PIs under investigation; one (1) participant affiliated to the Owners of Buildings Association (in Greek: POMIDA) and two (2) senior advisors of Public Power Corporation Renewables (PPC Renewables) participating in the consultation as investors of both ground mounted and building based RES systems. During the conducted interviews, stakeholders were asked to answer close-type and open-ended questions enabling both the quantitative statistical analysis of the sample, and interviewees' flexibility to provide empirical evidence and substantiate on their expressed opinions on the list of indicators (especially on more ambiguous and difficult to quantify factors such as building arbitrariness and investment culture issues), respectively. The interviews were conducted with the assistance of a questionnaire. Although the discussion was focused on the design or implementation of the respective PI each stakeholder has been involved in, the impact of contextual factors was evaluated with regards to all national PIs (under consideration), promoting EE in the building sector, as a whole. Explicit insights on the effect of the context on specific PIs were integrated in the *ex-post* evaluation (Section 5). More specifically, the key research (closed-type) question feeding into the statistical analysis of this study was: "What was the impact of contextual factors on the effectiveness of PIs promoting energy savings and use of renewables in buildings?" As a final step, respondents were asked, through open-ended questions to identify key contextual factors whose actual development differed from what was expected, and to express their opinion as to if and how possible deviations in these factors influenced the effective implementation of the PIs. Interviewees' views regarding potential differentiation on the design/implementation of PIs taking into account the evolution of these factors were also integrated in the qualitative part of the analysis.

Survey results were then statistically analyzed using Ward's hierarchical cluster analysis method (using squared Euclidean distances) in order to recognize and group expressed stakeholder priorities over the impact of contextual trends on policy effectiveness. Priorities' clusters were formed containing similar views distinguishing those in distinct decision-making priorities' scenarios. Ward's method through squared Euclidean distance has been applied in energy and policy related issues (e.g., [18,19]) since, by maximizing the difference between different clusters, it usually avoids generating very small clusters, which are unlikely to show general patterns. Finally, empirical survey results were analyzed qualitatively regarding the observed influence of contextual parameters over policy planning and implementation as expressed by survey participants.

4. Application in the Greek Building Sector

4.1. Climate Change Mitigation Policy Framework for Sustainable Buildings in Greece

Buildings constitute one of the greatest energy saving potential areas [20,21], considering that they are responsible for 40% of total final energy consumption in countries of the European Union, with residential buildings representing around 75% of the building floor area [22]. In Greece, there are approximately 6.9 million residences (referring to household buildings) [23] accounting for 24% of the final energy consumption. According to a study produced by McKinsey [24] the building sector in Greece is the second larger contributor, following the power sector, as regards the technically feasible abatement potential of GHG emissions accounting for about 15% of the sector. The Energy Efficiency Directive (EED) 2006/32/EC, as well as the more recent one (2012/27/EU) constitute the main pillars for achieving the EU's target for 20% energy efficiency by 2020. Up to now (November 2015) only the first one has been transposed into Greek legislation by means of Law 3855/2010. In accordance to these Directives, each Member State is expected to submit a national strategy towards the improvement of energy end-use efficiency through the implementation of concrete measures and policies in the various energy end-use sectors. To this end, three National Energy Efficiency Action Plans (NEEAPs) have been prepared and submitted by the Greek government in 2007, 2011 and 2014 [25–27].

Pursuant to Law 3855/2010, the target was set at 9% energy savings in final energy consumption (*i.e.*, 1415.3 ktoe) by 2016, as compared to the average final energy consumption (of conventional fuels, RES and electricity) of the period 2001–2005, while the intermediate target for 2010 (438.5 ktoe) was also adopted. The energy savings refer to savings originating both from consumption of electricity and natural gas. Through an overview of all the measures proposed for the purpose of achieving the target, the 1st NEEAP lists a series of horizontal, cross-sectoral and sectoral measures (referring to the residential, tertiary, public, industry and transport sector) next to their intended contribution in terms of energy savings. The 2nd NEEAP (2008–2016) confirms the fulfillment of the interim final energy savings target for 2010. However, it points out that the interim target was reached due to the impact of the economic recession in final energy consumption, particularly for the residential and industrial sectors since 2009.

Along the same lines, Article 7 of the new EED (2012/27/EU) recognizes the need for constant monitoring and tracking progress of the Member States towards the achievement of the national EE targets. Towards the reinforcement of the monitoring practices, energy audits and energy management systems are also explicitly mentioned, along with the importance of laying down rules on penalties in case of non-compliance. At the same time, the recast Energy Performance in Buildings Directive (EPBD) 2010/31/EU, transposed by Greek Law 4122/2013, sets out minimum energy performance specifications according to cost-optimal criteria, while it also specifies the time limits for meeting the “nearly-zero energy requirements” for new buildings. Greece is implementing measures to move towards nearly zero-energy buildings by 2020 through the transposition of the EPBD, the new EED (2012/27/EU) and the Renewable Energy Directive (RED 2009/28/EC). Indicatively, eighteen (18) alternative policy measures were specified during the submission of the 3rd NEEAP regarding the fulfilment of the requirements under Article 7 of the EED, out of which fourteen (14) measure (both existing as well as new ones) focus on the promotion of energy conservation measures and renewables in buildings. Finally, an incentive program promoting the installation of photovoltaic (PV) systems in buildings (small rooftop PVs up to 10 kW) through a guaranteed feed-in tariff (FiT), was introduced in June 2009 by Ministerial Decree OG B1079/4.6.2009 and is planned to last until the end of 2019 (FiT II for PVs on rooftops).

In the context of the present case study, a number of climate change mitigation PIs, induced for the attainment of targets in accordance to the imperatives of above Directives, has been identified for ex-post evaluation of their demonstrated effectiveness and overall performance. The selected PIs have been highlighted by stakeholders in terms of their critical role towards the achievement of the targets outlined in the NEEAPs. A summary is presented in Table 1.

Table 1. Summary of national PIs, their objectives and observed effects in accordance to EU Directives (partly adapted by [28]).

EU Legislation	National PIs	Vintage of PI	Policy Instrument Objectives	Policy Targets & Intended Outcomes
Energy Efficiency Directive, EED (2006/32/EC)	PI1: Energy savings at Homes (ESH program)	<p>Implementation period: February 2011–2015 Main amendments: March 2012:</p> <ul style="list-style-type: none"> - Higher incentives for lower income individuals - Removal of certain eligibility restrictions on buildings' age, use as primary dwelling, number of applications per citizen - Lengthening of loan period to increase loans approval 	To improve the energy performance of lower income family dwellings through subsidies/soft loans promoting the installation of RES and energy conservation measures.	<p>Target:100,000 entries to the program (interview with EYSED EN/KA, 2013) Observed outcomes: Estimated number of applications to enter: 70,000 ([27,29]). (Estimated) Final energy savings (calculated for the period 2014–2020): 80 ktoe ([29,30]). Creation of more than 3,000 new jobs annually (cumulatively at least 12,000) [31].</p>
	PI2: Integrated energy planning by Municipalities (Economize program)	<p>Implementation period: 2010–2015 Main amendments: March 2012: Extension of the program (Economize II) Eligible are local authorities that do not participate in the previous "Economize" program (139 municipalities approved). Implementation period: 2011–2015</p>	To aid municipalities via capital grants (70%) to put in place an integrated local plan to reduce GHGs emissions through energy conservation and RES use.	<p>Target (in reference to Axis I: Interventions to existing municipal buildings [26]): 0.96 ktoe/yr final energy savings in Municipal buildings [32] Observed outcomes: (calculated for the period 2014–2020): 28% target achievement. Estimated final energy savings in Municipal buildings: 1.87 ktoe [30] Estimated final energy savings in total: 3.7 ktoe [27]</p>
Energy performance of buildings Directive EPBD (2002/91/EC) recasted by Directive 2010/31/EU	PI3: Energy Performance for Buildings Regulation (EPBR)	<p>Implementation period: 2008–ongoing Main amendments: Enacted in 2008, was issued not until after 2 years of consultations. In 2010 amendments were made to include new requirements for nearly zero energy building, in accordance with the revised Directive on the Energy Performance of Buildings.</p>	To increase market demand for EPCs and energy efficient dwellings Every new and renovated building ($\geq 50 \text{ m}^2$) has to fulfill minimum specifications with respect to its energy efficiency performance. The final output of the auditing is the Energy Performance Certificate (EPC) which is mandatory in case of purchase, sale and lease of the building (residential and tertiary sector).	<p>Target: Annual Energy Savings for 2016 [25] Residential: 73.1 ktoe Tertiary: 96.7 ktoe Public: 7 ktoe Observed outcomes: Existing buildings: Up to May 2013: 17% out of the total 355,000 were issued under the "SHE" subsidy program (61% of the buildings audited in the context of the program were ranked at the H category [31]). The vast majority of EPCs were for buildings rented out (65%) or sold (17%). New buildings: only 0.3% of the EPCs were issued for new buildings [33]</p>

Table 1. Cont.

EU Legislation	National PIs	Vintage of PI	Policy Instrument Objectives	Policy Targets & Intended Outcomes
Renewable Energy Directive (2009/28/EC)	PI4: Feed-in tariff scheme for PV roof installations (FiT II)	<p>Implementation period: 2009–2019</p> <p>Main amendments:</p> <p>2012: Impairment of the tariff level from 495€/MWh to 250 €/MWh.</p> <p>2012: Impairment of the tariff level from 250€/MWh to 125 €/MWh.</p> <p>2014:</p> <ul style="list-style-type: none"> - The FiTs prices for PV plants established by the 04/2014 are adapted by reference to the date of activation of the plant. - Abolishment of the annual adjustment of FiTs 25% of the consumer price index of the previous year. - Expansion of the sales contract by 7 years at a price 90€/MWh and for an annual energy produced at 1400 kWh/kW. 	<p>To contribute to national 2020 targets of installed PV capacity.</p> <p>The installation of very small photovoltaic systems (up to 10 KW) on buildings to contribute to the realization of the goal of penetration of renewable sources of energy in the country's energy mix with the active participation of the citizens [25].</p>	<p>Target: Total installed PV capacity (2014) 1500 MW</p> <p>Effects: (310.93% of target achieved) [34]</p>

4.2. Identification of Key Contextual Factors

The intended effects of policy instruments such as the abovementioned ones promoting energy conservation and RES use in buildings, can often be influenced by the presence or absence of favorable or unfavorable factors traced in the broader context, such as environment, economic, social, and technological factors; or from national barriers (*i.e.*, institutional factors) [35]. Indeed, PIs employed do not always perform as successfully as expected in terms of attaining their intended aims due to various reasons, such as shocks in the development of external trends framing PIs [6]. The specificities of the general context, in terms of projected mid to long-term development of exogenous parameters (namely parameters not subjected to involved agents’ decisions), as well as the actors and the style of instruments’ choice have to be taken into consideration for concluding to effective policy designs.

Under the scope of the case study, a number of factors originating from the economical, socio-political, technological and institutional context affecting the policies promoting energy savings in the building sector in Greece has been identified on the grounds of extended literature review. The desk review focused on the body of literature concerned with associated barriers to EE policies across countries (a thorough review on barriers to EE can be found in Chai and Yeo, and Warren in the form of success and failure factors), as well as on national literature sources on EE in the building end-use sector in Greece [3,15,33,36–39]. The authors of this article believe that the factors discussed have had a great deal of influence in preventing or facilitating the overall performance of the selected PIs promoting energy efficient buildings in Greece. Interviewees had the option of adding factors not included in the initial list that were conceived to be influential, such as factors concerning transparency of procedures as well as the issue of building illegalities. The final set of evaluation factors, the sub-factors and the indicators selected as their estimators are summarized in Table 2.

Table 2. Summary of influential contextual factors, their sub-factors and related indicators as identified throughout the stakeholder consultation process (partly adapted by [28]).

Evaluation Factors	Sub-Factors	Indicators
Economic	Economic development	Annual GDP growth rate
		Market Liquidity
		Fuel prices (electricity and gas retail price)
		Final consumption of residential dwellings
		Households income and expenditure
	Technology updates and availability	Equipment stock and costs for RES and EE interventions
	Construction activity	N/A
Infrastructure Issues	Existence of specialized professionals	N/A
	Characteristics of the building sector	Building arbitrariness
Socio-Political	Political conditions	Stability in the legal framework/political support
	Environmental awareness	Local investment culture in EE/RES interventions
		Living habits
Institutional	Transparency of approval and licensing procedures	N/A
	Bureaucracy	N/A

5. Results and Case-Study Analysis

Determining Policy Decision-Making Priorities Scenarios Based on Stakeholder Preferences

In this section the survey data are analyzed aiming to identify potential priority bundles of contextual parameters that stakeholders tend to prioritize, while paying attention to the different profiles of stakeholder groups as formed. To determine group-weighting vectors (*i.e.*, priorities), the different actors’ profiles were considered along with the support of cluster analysis, a method used for statistical data analysis [40,41].

To avoid arbitrariness in specifying the initial number of clusters, a hierarchical clustering approach was adopted, since non-hierarchical methods require the user to determine the desired number of clusters in advance. By far the most commonly employed hierarchical clustering method is Ward's method, which has also been used for the Regional Innovation Scoreboard in 2009 and 2012 providing statistical facts on regions' innovation performance across different indicators including energy and resource efficiency indicators [19]. Hierarchical cluster analysis seeks to maximize variability between clusters and minimize variability within clusters. Hence the typical way to estimate the distance when using hierarchical cluster analysis is "squared Euclidean distance", whereby the measure of distance is squared in order to lend greater weight to distances that are further apart and to reduce the variability of observations within a cluster.

Determining the appropriate number of clusters can be undertaken through a variety of statistical methods. Yet the clustering should ultimately fit the purpose of this analysis [42] to validate their conceptual relevance. A three-cluster solution was thus adopted on the basis of the researchers' expertise through the empirical analysis and observations during the stakeholder consultation phase. The dendrogram in Figure 2 shows the sequence by which the observations and clusters were merged.

To observe the normalized standard deviations indicating the polarization of opinions within each group please refer to Table A1 in the Appendix. The resulting weighting of external factors has been rather diverse among the different stakeholders. Nevertheless, all stakeholders, across different clusters considered energy prices to be extremely influential. It became also apparent that certain exogenous factors were given similar priority (interdependent parameters), e.g., if the growth rate was assigned with a high weight, then other relevant factors such as market liquidity and households response (*i.e.*, households available income and expenditure) were ranked highly as well. According to group weights and their mean values, three decision-maker scenarios were created (see cutting line BB' in the dendrogram, Figure 2), signifying for rather standout positions in the spectrum of opinions:

(i) Concerned with general macro-economic trends: In the first group of actors a relative homogeneity is observed comprising by RES/EE installers, a representative from the Energy Efficiency Division of the Energy Agency, as well as regulators from the Ministry's Energy Inspectorate and the RES Service (MEECC). More emphasis is expressed on the influence of general macro-economic trends over policy effectiveness promoting EE in the Greek building sector. The concern over the evolution of general macro-economic trends is reflected in the high weights allocated to the growth rate, market liquidity and households' income and available expenditure (the household sector having been heavily impacted by the effects of the economic weakening).

(ii) Concerned with energy costs and infrastructure issues: The second group of actors, presents the highest homogeneity, with all respondents comprising representatives from the Special Service for the Coordination and Implementation of Actions in the sectors of Energy (EYSED EN/KA) of the Ministry. They allocate more emphasis on rising fuel and electricity prices as well as on infrastructure issues related to the state and peculiarities of the building sector; such as growth in the construction sector and legal issues with buildings. Their concern is expressed in high weights allocated to building arbitrariness and growth in construction activity. Regarding the latter factor, it is worthy of note that this cluster of regulators allocates more weight on the construction activity than other cluster groups represented mainly by market actors, but also considers its influence over EE policy effectiveness to be positive. Factors such as existence of specialized professionals and equipment costs were viewed as less influential.

(iii) Concerned with socio-institutional parameters: Finally, the last group considers the transition to energy efficient buildings to constitute a socio-political issue, prioritizing more factors such as environmental awareness and governance issues (*i.e.*, bureaucracy, transparency and stability in the legal framework). In fact the last group, comprises representatives from different departments of the Energy Agency, in addition to representatives from ESCOs, Environmental Companies and the Association of Building owners.

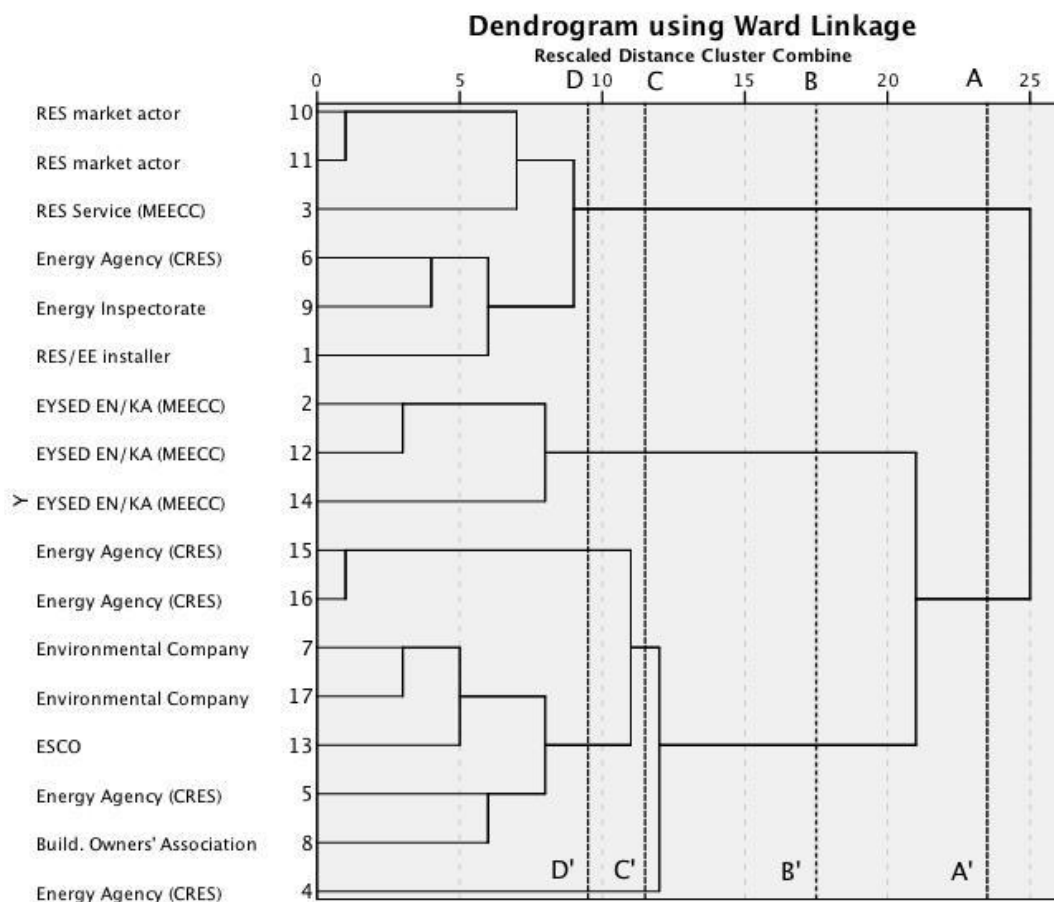


Figure 2. Dendrogram of clusters according to group weights. Group composition as delineated by the cutting line B-B': Group 1: RES market actors, RES service (MEECC), Energy Efficiency Division (CRES), Energy Inspectorate (MEECC) RES/EE installers, Group 2: Representatives from the EYSED EN/KA Department (MEECC) Group 3: Representatives from Environmental Companies, ESCO, the Energy efficiency Division (CRES) and Department of Energy Policy and Planning (CRES) and, Building Owners' Association.

6. Evidence of the Ex-Post Evaluation

A more detailed view on the most impactful parameters, as determined by the three policy decision-making priorities scenarios above, is provided in the following sections. The observed and projected trends by regulators in Greece, as well as the remarked influences of these parameters over policy outcomes is analyzed qualitatively on the grounds of the survey results and empirical data. The analysis is complemented by a discussion on how stakeholders' concerns over contextual parameters have induced notable policy adaptations shaping policy actors' strategies in terms of policy planning and (re-)design.

6.1. General Macro-Economic Trends

6.1.1. Economic Downturn: The Main Hindrance

In 2009, Greece entered a deep economic crisis resulting in lack of liquidity and halting investments by both private and public sectors. Despite the positive GDP growth rates registered until 2007 (outgrowing most other European countries [43]), real GDP growth rates turned negative from 2008 onwards. Projected GDP growth rates amounted to -2% for 2011, slowly turning into positive values in 2012 and thereafter [44]; instead, actual annual growth rates remained negative and obtained a lowest value in 2011 (-7%) [45].

The unfavorable economic environment shaped the context of implementation of the PIs under consideration, since consumers became skeptical on whether to invest in EE interventions, despite the economic benefits in the long run. This conclusion was the unanimous opinion of all interviewees participating in the stakeholder consultation. The luring feed in tariff rates, together with the falling technology costs for small PV installations rendered such investments extremely profitable attracting a considerable number of non-professional investors, which resulted in total installed PV capacity more than three times above the target.

Naturally, the recession also impacted the average household's income and final consumption expenditure. Initially (for years 2010 and 2011), a moderate decrease in final consumption expenditure was expected. From *ex post* observations the decrease registered was higher (namely the projected rate of change amounted to -4% and -3.7% [44], while the observed reduction rates in final consumption expenditure were -6.8% and -7.2% , respectively). During the following years (2012 and 2013) the deviation between expected and observed rates of change amounted to 9% .

Meanwhile, by the end of 2012, the total installed capacity of small PV installations on rooftops amounted to 298 MW, which increased to 348 MW by April 2013 demonstrating an enormous demand for domestic PV installations, since investments have until then remained attractive [34]. It was not until recently that investment activity was moderated following the depreciation of the FiT rates (*i.e.*, 0.125 €/kWh or 1453.7 €/toe). Unlike the advantageous case of the FiT for domestic PVs against the unfavorable investment climate, participation rates in the Energy savings at Homes (ESH) program were held back merely due to the strict creditworthiness criteria imposed for the approval of the bank loans. Up to April 2013, the number of applications for loans that had been pre-approved reached almost half the total applications submitted (116775). Banks were very cautious in approving loans, given the economic recession and the current investment climate. Likewise, regarding the Economize program, municipalities were actually reluctant to fund even the rest of the 30% of the budget largely due to their exhausted resources and the general lack of liquidity.

6.1.2. Policy Adaptations Related to General Macro-Economic Trends

Stakeholders' response to concerns over the development of macro-economic trends can be reflected into adaptability provisions, adjustment in procedures as well as new policy additions. Several law amendments regarding re-adjustment of support levels over time, extension of the compliance period, and re-definition of eligibility and participation terms, were deemed necessary by the regulators in Greece so as to strategically redeploy subsidy programmes and enhance participation levels. Indicatively, in order to enhance the creditability of applicants for a loan approval from the participating banks under the ESH program, regulators readjusted the participation terms offering the ability to assign a guarantor when applying for a loan. Furthermore, the loan repayment period was extended to 5–6 years, instead of the initial 4 years, along with the reform of other terms within the loan agreement that would reduce the risks of participating banks. Finally, the main amendment of both financial programs (*i.e.*, ESH and Economize) was enacted with the establishment of higher incentives and looser participation criteria in order to adapt policy instruments to fit the new purposes of supporting lower-income categories of consumers and increase the number of applications received. Indeed, while only 2000 applications had received full financing from July 2011 until March 2012, after the re-design of the ESH program the rate of received applications increased progressively to more than 1000 per month, resulting in almost 40,000 entries by October 2013 (interview with EYSED EN/KAN/KA 2013).

6.2. Energy Costs and Building Characteristics

6.2.1. Rising Energy (electricity and Natural gas) Costs Acting as an Enabler?

Despite the downward projections in international fuel prices until 2015, derived from the baseline scenario of World Energy Outlook [46], the actual prices of gas and electricity have been gradually growing during the last years due to the higher basic price, levies and VAT increase. Based on Eurostat's

news release, Greece experienced one of the highest electricity price increases in the residential sector in relation to the EU 28 between the second half of 2012 and 2013 [47]. At the same time, although natural gas has been available from 2001 onwards to retail consumers [48] at a moderate price level in comparison to other European countries, taxes on natural gas consumption have increased substantially due to the economic crisis in 2010. As such, between the second half of 2012 and 2013, the adjusted for purchasing power gas price for homeowners in Greece has been ranked as one of the highest in EU28 (0.10 €/kWh or 1163 €/toe).

The majority of interviewees agreed with the assumption that the rise of energy prices in conjunction with the government's incentive mechanisms has increased the willingness of landlords to invest in energy retrofitting (mostly referring to end-users not belonging to vulnerable households' category). Yet, upward energy prices in combination with vast cuts in household income (key factors contributing to energy poverty) have urged many end-users to burn poor quality firewood, biomass products and various old wooden or plastic materials into their fireplaces in order to heat their houses (especially during the winter of 2012 and 2013). Inevitably, environmental problems from generated hazardous airborne particulates and other pollutants in the atmosphere [49] appeared (the phenomenon of smog). In figures, measurements from the National Observatory of Athens and National Centre of Scientific Research "Demokritos" in December 2012 have registered significant increase over the limits of particulate matter (PM10) concentrations in various regions of Athens, namely between 110 and 190 mg/m³ while security levels provided by the World Health Organization is 50 mg/m³. In essence, residential end-users facing enormous escalations in their energy bills either switched from more expensive fuel to cheaper ones or reduced their consumption levels [26] at the expense of their living comfort, since investing in EE improvements was not always financially feasible.

6.2.2. Declining Construction Activity: An Opportunity for Retrofits?

The substantial decrease in the construction activity (see Figure 3) was more or less provisioned by market actors ensuing not only from the economic decline (the construction industry has undergone a contraction of 80% from early 2006 until late 2012 [50]) but also from the saturated construction potential; yet even lower trends have been reported.

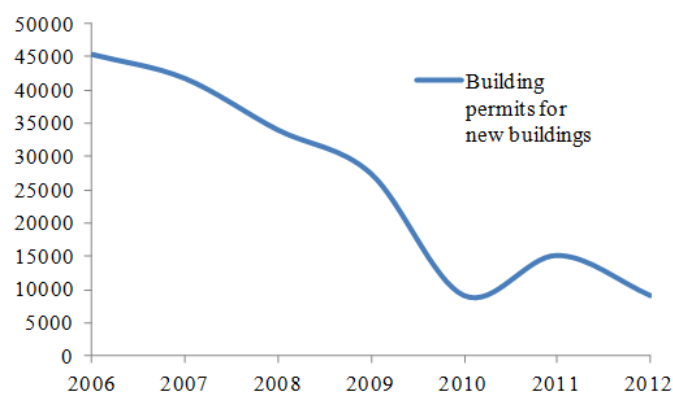


Figure 3. Number of building permits for new buildings per year, from 2006 to 2012 in Greece (Source: [50]).

Market actors argued that the sharp decline in the construction industry (particularly strong from 2009 onwards) has restrained the installation of PVs on residential roofs only to existing buildings, while the number of new buildings constructed under the specifications of the REPB was remarkably low. As such, by May 2013, only 0.3% of the Energy Performance Certificates (EPC) were issued for new buildings [33]. Nevertheless, programs providing subsidies and soft loans appeared to have implicitly benefited from the declining construction industry in the sense that retrofit works became a basic pillar for the construction sector and received strong interest from the construction companies. Accordingly, labor costs became more competitive with the national Labor Costs Index

Price demonstrating a constantly declining trend from 2010 onwards (EL.STAT). The implicit effect of the downward construction activity over energy conservation policies in residential buildings has been reported mostly by policy makers, presuming that in cases where construction of new houses is more or less “financially prohibited”, policies targeted at the EE upgrade of the existing building stock should take over.

6.2.3. Characteristics of the Building Stock and Legality Issues Traced in the Greek Building Sector

Greek buildings are poorly ranked in terms of their energy performance (27% of buildings with very low energy category H, (see Figure 4)) mostly due to the fact that they are old (60% having built before 1970) and therefore have not built-in modern technologies [29,51]. Adoption of sustainable buildings in Greece was severely hindered due to the absence of urban and land planning throughout the last 30 years [15], leading to the occurrence of very dense constructions. Another characteristic of the Greek building stock is the existence of “informal buildings”. Illegal construction is a common characteristic traced in several regions of Greece and according to a statistical study, performed for the period 1991–2001, the annual percentage of informal buildings over the total number of constructions amounted to 25%, with 40% located in the area of Attica [52]. For newly constructed residences it is estimated that the ratio of illegitimate *versus* legal buildings remains at the same level [23]. As regards the effect of informal settlements on the selected PIs, the majority of interviewees argued that this factor has had a substantial impact on EE subsidies for residential end-users, since it induced a number of bottlenecks throughout the licensing procedures. Naturally, the installation of a photovoltaic system on the roof of a building is permitted, provided that the building is legitimate. This requirement rendered a number of home-owners and small businesses, whose property was brought up illegally, hesitant to proceed with the administrative procedures.

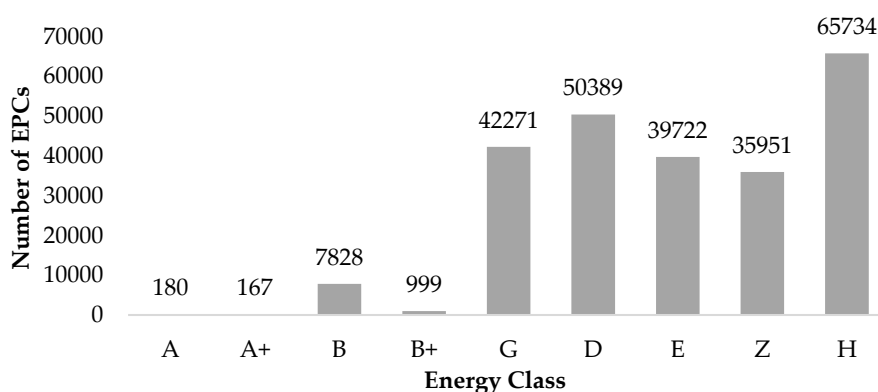


Figure 4. Distribution of EPCs by Energy Class (Source: [53]). The energy performance of buildings is classified according to predetermined energy label classes starting from A+ which corresponds to the most efficient classification, A, B+, B, G, D, E, Z to H corresponding to the most energy intensive building category.

6.2.4. Policy Changes Related to Energy Costs and Characteristics of the Building Sector

Rising fuel prices and additional charges, imposed on residential electricity end-users, have influenced policy planning mainly by steering revisions and additions in financial schemes targeting at the residential sector, subsidizing more efficient, and thus less costly (in the long-run) thermal technologies, reflecting market demand. Indicatively, the use of power gas has been largely favored by the legislative framework and emerging financial incentives. A case in point was also the recent amendment made to the Technical Directive 20701-1/2010 already in force, to include energy efficient fireplaces burning solid biomass-wood as an eligible technology under the ESH subsidy scheme, after the occurrence of smog due to the massive switch of households from expensive heating oil to poor quality firewood. More recently another subsidy programme was introduced to mitigate the remaining

problem of smog, covering 60% of the costs associated with the replacement of oil with a natural gas boiler. In addition, opposing reactions from environmental organizations and property federation organizations were also raised against the upsurge of retail electricity prices due to charges related to RES (based on the results of a survey an increase by 119% was imposed on retail electricity prices between 2012 and 2013 [54]). In response to these concerns, the Ministry of Energy (MEECC) has gradually impaired the Fit support level with several re-adjustments in the feed in tariff rates from 495 €/MWh in 2012 to 125 €/MWh in February 2013. More recently, the amended Law 4203/2013 on regulation of RES-related issues and other provisions, was amended to include the enactment on installations of small PV and wind power plants from auto producers (*i.e.*, net metering). Finally, notable concerns expressed over the peculiarities of the building sector (*i.e.*, building arbitrariness) constantly obstructing the uptake of EE measures, have only recently triggered the introduction of a new EE policy by regulators in Greece through the implementation of Article 20 of Law 4178/2013 (Government Gazette 174, 08.08.2013—“Tackling the illegal construction—Environmental Balance and other provisions”), whereby 90,000 homeowners will take the advantage of offsetting the fines for illegal houses with EE measures.

6.3. Social and Institutional Factors

6.3.1. Public’s Environmental Awareness and Living Habits

Environmental awareness refers to the familiarity of the public with the benefits of energy conservation from a financial as well as an environmental viewpoint. In Greece, one of the major obstacles in the adoption of environmentally sustainable interventions in the building sector has been the lack of environmental consciousness and culture [15]; especially in the households sector. Regarding the Fit scheme, publicity campaigns were mainly held by companies, while limited advertisement from the side of the state was noted. The need for wider promotion campaigns undertaken by governmental authorities in order to increase public awareness regarding the benefits of energy conservation measures has been well recognized [36,37]. Publicity through media and collaborative banks was expected to render householders adequately familiar with the benefits associated with their participation in the ESH program. However, market actors agreed that the public was not adequately familiar with the terms and actual provisions of the program [3]. Additionally, the social acceptability of the EPCs under the Regulation of the Energy Performance of Buildings (in 2011) was deemed low by the majority of household owners [36], who viewed EPCs as another “toll” and/or encountered significant difficulties in understanding its content. The cost of EPCs in Greece varies according to the size and the type of the building. The cost for the inspection of an apartment is 2 €/m² (120–200 € for an average household 60–100 m²), while for a whole block of apartments the amount is 1 €/m². The inspection of a detached house costs 1.50 €/m² (90–150 € for an average household) [39].

In reference to the living habits of the population, according to the statute of Horizontal-Property Act Law, the “communal” sites in the building (such as the rooftop) are sites of common ownership. Consequently, difficulties in the installation of photovoltaics on rooftops along with the participation in the “SHE” program arose since a 100% consensus of all owners in the building was pre-requisite according to programs’ terms for interventions installed in “communal” sites.

6.3.2. Transparency and Bureaucracy Issues

In Greece, administrative procedures are in general characterized by arduous bureaucratic licensing processes inducing significant delays in the implementation of PIs. On the one hand, ESH program has been detained due to a shortage of funds and arduous bureaucratic procedures; the Ministry of Development and Competitiveness outlined that the second round will only kick off (beginning of 2015) once the time-consuming bureaucratic procedures are managed [55]. On the other hand, market actors characterized the involvement of the banks in the administrative set up of the Program as beneficial in terms of adequate transparency throughout the evaluation

and monitoring procedures of the program. Participating banks were involved not only in the loan approval procedures, but also in the assessment of applications. However, transparency in the approval and licensing stages of the program “Economize” has been questioned by market actors. Radical delays framing the licensing procedures (lasting more than two years), impeded the implementation of interventions. Reportedly, those delays were also the result of bottlenecks during the coordination of an external Register of Evaluators (by the MEECC), as well as due to deficiencies in the documentation and local action plans developed and submitted by municipalities according to program application requirements.

6.3.3. Policy Changes Regarding Awareness Issues

Greece has had limited experience with energy conservation measures and energy performance standards, prior to the issuance of EPCs in 2011, while inadequate informative actions taking place sporadically shaped household owner’s lack of trust in the content and value of an EPC. Thus far, concerns over the public’s limited awareness and familiarity have received less attention since educational or informative measures have been hardly prioritized during the policy planning stage [15] or have been partially implemented with limited resources from the state-budget attributed to educational purposes. Nevertheless, in the recent national notification report pursuant to Article 7 (paragraph 9) of the EED 2012/27/EU, alternative measures addressing awareness problems are planned to be adopted, such as the installation of electronic and intelligent metering of electricity in 80% of residential households as well as educational and training activities in employees of the tertiary and public sector.

7. Discussion

As emphasized by Capano and Lippi, policy instrument selection and policy formulation processes are inextricably linked to policy makers and related actors’ perceptions on how policy instruments would perform within a constantly changing context. Hence policy instruments are introduced and designed through strategies grounded on the context, driven by different policy actors concerns and priorities [56]. They among others [8–10] conclude that studies on policy instruments need to more closely examine the context surrounding choices and policy actors’ perceptions of how the context will evolve.

Different factors or conditions may facilitate or hinder effective implementation of policy instruments as so much depends on the political, economic and social context. For instance local difficulties (*i.e.*, building peculiarities) may be more relevant for the effective implementation and response to a policy tool than international pressures (*i.e.*, energy prices). However capturing policy actors’ perception of contextual factors’ influence and impacts over policy instrument effectiveness, rather than the impacts themselves, remains an important source of knowledge in policy decision-making strategies [57]. This is supported by the fact that the selection and design or adaptation of policy instruments in principle reflects the realization of implementation of actors’ perceptions, priorities and intentions [13].

The most impactful contextual parameters over policies regulating sustainability in the Greek building sector, as perceived by policy and related market actors participating in the survey, relate to general macro-economic trends, rising energy costs, peculiarities of the building sector, awareness as well as institutional issues. This is in line with a number of literature sources investigating critical dynamic market conditions over energy conservation measures in the building sector suggesting that according to the economic theory, consumption, residential and non-residential investment, together with the GDP, move together positively. It is hence expected that investments in refurbishments are likely to be higher when the economy performs well [58]. Additionally, it is argued that when energy prices are low, energy efficiency improvements are likely not to be cost-effective enough [58,59]. Lack of awareness as well as institutional barriers are also indicated as important barriers against energy efficiency interventions in the literature [58,60,61].

Policy makers from different ministerial departments were clustered almost equally between the first two decision-making scenarios. This reflects their tendency to prioritize more over general macro-economic trends, rising energy costs and local peculiarities of the building sector rather than governance and awareness issues. In fact the need for wider promotion campaigns undertaken by governmental authorities in order to increase public awareness regarding the benefits of energy conservation measures in the Greek building sector has been well recognized [36,37].

Interestingly enough, regulators from the Special Service for the Coordination and Implementation of actions in the sectors of Energy (EYSED EN/KAN/KA) whose expressed priorities were all merged in the same cluster (2nd), considered crucial infrastructure issues to relate mostly to the state and peculiarities characterizing the Greek building sector. Technical issues related to technological performance, updates and required technical skills of market actors have been cited as most impactful over the implementation of EE measures across different countries [62]. Nevertheless, regulators from EYSED EN/KAN/KA, considered crucial infrastructure issues to relate mostly to the state and peculiarities characterizing the Greek building sector. This can be partially explained by the fact that adequate technological expertise exists in Greek energy services and construction market. Whereas, inadequate quality assurance for market professionals and especially energy auditors has been reported to relate to inadequate training and certification from the government's side [39].

On the other hand, representatives from different departments of the Energy Agency demonstrate similar priorities with stakeholders coming from the Energy Service Market (*i.e.*, ESCO, environmental company and building owner's association). This can be explained by the fact that energy agencies facilitate the formulation of tailor-made policies at a lower policy level than regulators, adjusting the policy instruments to the needs of the market, adopting perceptions closer to market actors' position.

The analysis has shown that despite the occurrence of significant shocks in the development of external trends (e.g., macro-economic trends), small policy adjustments were undertaken for the fine-tuning and calibration of the existing policy instrument mix. While, reportedly fewer modifications took place in the institutional arrangements of the instrument mix. This contradicts the general perception that crisis events usually trigger significant policy change [63].

Unsurprisingly, the findings for the first scenario demonstrate the close perceived relationship between final energy consumption levels, targeted by energy efficiency policies, and growth indicators such as GDP and income level, as also identified in the literature [64,65]. Surprises in the development of economic trends were considered to have predominantly affected participation levels in EE subsidy programmes and restrained compliance with the EPBD regulations. Concerns over those trends triggered observed policy adaptations, in terms of layering in policy instrument setting through revisions and amendments in existing laws and regulatory acts revising the scope of financial programs in terms of widening the compliance period, loosening eligibility criteria and adjusting the level of state-funding. In the occurrence of a prolonged economic recession, policy actors in Greece operating in understaffed state services and extreme budget constraints [39,66], have thus primarily opted to work with the existing subsidy schemes by revising or adding new rules on top of existing rules. Such a re-design process of financial support schemes, follows a more conservative "test and see" logic, which controls for opportunistic or herd behaviour and avoids any short-term market overheat. This strategy is usually adopted when policy actors lack capacities and resources to remove a policy instrument entirely setting up an explicit alternative one [12].

Rising energy costs—due to rising global fuel prices and additional charges, e.g., RES levy added through electricity bills—in Greece have primarily induced policy instrument adaptations under the same tactic (*i.e.*, layering). Soft loans and grant schemes were adapted to prioritize over vulnerable consumers as well as to include additional efficient but less expensive thermal technologies. Another important amendment was the enactment of net metering, aiming to reduce consumers' costs for their energy needs and to protect them from future costs from possible increases in electricity consumption tariffs [67].

In fewer cases the incumbent instrument mix was complemented with new instruments, formulated to be relatively narrow in scope usually to remove a particular type of barrier or externality. As such concerns on escalating fuel poverty issues as well as air-pollution side effects triggered the introduction of a grant scheme subsidizing the conversion of oil boilers to natural gas boilers in households. The offset of fines on illegal buildings with energy upgrades was also initiated to tackle the issue of building illegalities promoting the energy efficiency of buildings [27]. This type of ad-hoc policy instrument additions was observed to take place to mitigate adverse impacts or externalities (e.g., distributional effects) not addressed by the existing policy mix. These instruments were introduced within a short timeframe to provide incentives for EE interventions as well as to correct inequalities in the misallocation of cost and benefits.

Finally, non-policy makers seem to be more concerned with the rationalization of the administration system. In addition, they emphasize more on the associated actions needed to reduce bureaucracy and improve institutional coordination among governmental authorities than state regulators. Observed changes in the institutional settings of policy instruments were minor, mainly focused on the involvement of local actors (*i.e.*, cooperating banks) to share some of the administrative burden, adopted though only for one individual scheme. Changes in the institutional setting of policies may face resistance from actors, who are in privileged positions and existing structures, or actors can develop preferences towards particular institutional arrangements and be reluctant to change [68]. This is particularly true for the case of the public administration system in Greece, whereby lack of coordination and management among pertinent authorities was characterized to be the “symptom” of great inertia and resistance to change. Reportedly actions to rationalize the system for administering policy instruments have also been constrained due to shortages in terms of budgetary resources and staff [39,66].

The instrument choice and design is highly dependent on the political sphere and on power struggles between the public and private actors of the regulated sector ([69], page 617). Based on the framework presented it would be of added value to continue this research with a larger sample, assuring that stakeholders from different governance levels as well as with more civil society representatives participate. Should this analysis be replicated in another national context, it would be essential to consider other contextual factors that relate to energy efficiency policy maturity and tradition whereas more emphasis should be placed on behavioural and life-style factors. We consider the latter as crucial over the transition to sustainable buildings; however, in the past behavioural measures have received little attention from the government side, also due to the methodological challenges in estimating and measuring their intended impact. Finally, an analysis based on theories of what sustains policy instruments over time accounting for cases when exogenous factors or shifts stimulate different types of policy change could further advance our understanding of how exogenous changes can affect policy decision making.

8. Conclusions

This paper presents a conceptual framework that aims at looking into the influence of key exogenous factors along the process of policy decision-making. The conceptual framework is, accordingly, applied to a case study involving policy instruments employed to energy conservation in the Greek building sector. The case study draws attention to a number of empirical insights regarding deviations between the estimated and actual development of key exogenous factors and their perceived impacts thereof, which can prove beneficial for future policy adaptations of national climate change mitigation strategies addressing the building sector.

In light of the new climate regime established through the Paris agreement, Member States (MS) are likely to face additional and potentially stricter requirements when introducing and implementing PIs towards a low carbon economy. Policies to incentivize low emission buildings and to increase renovation rate in the building sector have also a major role to play towards this transition. To improve compliance and participation in climate change PIs, policy makers need to thoroughly understand

the context in which PIs operate. To this end, they should take into account both the economy-related exogenous trends and the specific national needs and characteristics [70]. Such contextual factors are crucial in the analysis of effectiveness and related efficiency of policy instruments. Neglecting those could lead to a bias when measuring policy performance and disorient policy makers when making necessary policy adaptations. In essence, such conditions can be translated as effective instruments to help improve the effectiveness and efficiency of policy instruments. A case in point was the new scheme on offsetting of fines on illegal buildings with energy upgrades, that was recently introduced by Greek policy makers to tackle the issue of building illegalities promoting the energy efficiency of buildings [25,27]. Flexible adjustment in the elements of existing policy instruments are crucial to overcome similar local difficulties and improve the overall performance of the mix. To do so, the monitoring system acquiring data from external market trends thus needs to be strengthened along with the establishment of policy performance indicators in order to gain a better understanding on the linkages among context dynamics, policy instrument performance and related policy instrument change.

Finally what our findings show is that, in effect, important contextual factors, including surprises in their development, are the ones that are perceived to have a great impact over policy effectiveness by key related actors. By examining more thoroughly those effects over policy instruments, as perceived by policy and market actors themselves, useful feedback on observed policy adaptations can be highlighted [56]. Investigating under which external circumstances different types of PIs adaptation occur may, effectively, enhance policy learning and guide other policy makers when found in similar decisional contexts.

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Author Contributions: Spyridaki Niki-Artemis, Ioannou Anastasia and Flamos Alexandros conceived and developed the methodological framework. Spyridaki Niki-Artemis and Ioannou Anastasia developed the questionnaire and conducted the interviews. Spyridaki Niki-Artemis conducted the statistical analysis. Spyridaki Niki-Artemis, Ioannou Anastasia and Alexandros Flamos analyzed the results of the interviews. Spyridaki Niki-Artemis, Ioannou Anastasia and Alexandros Flamos wrote the paper.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix

Table A1. Descriptive statistics according to group weights.

Criteria		Cluster 1	Cluster 2	Cluster 3	Total
Annual GDP growth rate	Minimum	−0.400	−0.200	−0.400	−0.400
	Mean, Standard Deviation.	−0.400, 0.000	0.200, 0.000	−0.150, 0.233	−0.247, 0.194
	Maximum	−0.400	−0.200	0.200	0.200
Market Liquidity	Minimum	−0.400	−0.400	−0.400	−0.400
	Mean, Standard Deviation.	−0.400, 0.000	−0.267, 0.115	−0.125, 0.149	−0.247, 0.166
	Maximum	−0.400	−0.200	0.000	0.400
Fuel prices	Minimum	0.200	0.400	0.000	0.000
	Mean, Standard Deviation.	0.333, 0.103	0.400, 0.00	0.200, 0.150	0.2829, 0.142
	Maximum	0.400	0.400	0.400	0.400

Table A1. Cont.

Criteria		Cluster 1	Cluster 2	Cluster 3	Total
Final consumption of residential houses	Minimum	−0.400	0.000	−0.200	−0.400
	Mean, Standard Deviation.	−0.133, 0.242	0.267, 0.231	0, 0.107	0.000, 0.224
	Maximum	0.200	0.400	0.200	0.400
Households Incomee and expenditure	Minimum	−0.400	−0.400	−0.400	−0.400
	Mean, Standard Deviation.	−0.400, 0.000	−0.267, 0.115	−0.150, 0.141	−0.259, 0.154
	Maximum	−0.400	−0.200	0.000	0.000
Equipment stock and costs for RES and EE interventions	Minimum	−0.200	0.000	−0.200	−0.200
	Mean, Standard Deviation.	−0.033, 0.082	0.000, 0.000	0.050, 0.141	0.012, 0.111
	Maximum	0.000	0.000	0.200	0.200
Construction activity	Minimum	−0.400	0.000	−0.400	−0.400
	Mean, Standard Deviation.	−0.133, 0.207	0.267, 0.231	−0.150, 0.177	−0.071, 0.244
	Maximum	0.200	0.400	0.000	0.400
Existence of specialized professionals	Minimum	−0.400	−0.200	−0.200	−0.400
	Mean, Standard Deviation.	−0.133, 0.163	−0.200, 0.0	0.100, 0.214	−0.035, 0.215
	Maximum	0.000	−0.200	0.400	0.400
Building arbitrariness	Minimum	−0.200	−0.400	−0.200	−0.400
	Mean, Standard Deviation.	0.033, 0.197	−0.400, 0.000	−0.125, 0.104	−0.118, 0.201
	Maximum	0.400	−0.400	0.000	0.400
Stability in the legal framework	Minimum	−0.400	−0.400	−0.400	−0.400
	Mean, Standard Deviation.	0.167, 0.151	−0.267, 0.231	−0.125, 0.149	−0.165, 0.162
	Maximum	0.000	0.000	0.000	0.000
Local investment culture in EE/RES interventions	Minimum	−0.200	−0.200	−0.400	−0.400
	Mean, Standard Deviation.	−0.033, 0.151	−0.067, 0.115	−0.275, 0.149	−0.153, 0.181
	Maximum	0.200	0.000	0.000	0.400
Living habits	Minimum	−0.400	−0.200	−0.400	−0.400
	Mean, Standard Deviation.	−0.133, 0.163	−0.067, 0.231	−0.075, 0.149	−0.194, 0.160
	Maximum	0.000	0.200	0.000	0.200
Transparency of approval and licensing procedures	Minimum	−0.400	0.000	−0.400	−0.400
	Mean, Standard Deviation.	−0.200, 0.179	0.000, 0.000	−0.075, 0.212	0.106, 0.189
	Maximum	0.000	0.000	0.200	0.200
Bureaucracy	Minimum	−0.400	−0.400	−0.400	−0.400
	Mean, Standard Deviation.	−0.367, 0.082	−0.200, 0.200	0.250, 0.141	−0.282, 0.142
	Maximum	−0.200	0.000	0.000	0.000

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