Expanding the policy theory behind the climate and energy package in Greece

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Abstract

The 20-20-20 EU targets, the relevant Directives and especially the so-called Climate and Energy Package in 2009 have been quickly adopted in Greece causing structural changes in the country's energy and climate policy over the last years. Moving towards and beyond 2020 targets, empirical insights need to be gained as to why policy instruments did not perform the way they were expected to. Building on the existing theory based policy evaluation, a multi-criteria assessment framework is adopted and applied on selected renewable energy support (RES) and energy efficiency (EE) policies in Greece. Within this framework the role of context, implementation and design in the efficacy of policy instruments moving from theory to empirics is discussed. Enabling and constraining factors to policy efficacy identified under the framework of analysis are: political and social acceptance, policy coherence, policy consistency and implementability. The evaluation approach demonstrated that the effectiveness of RES policies seemed to be less vulnerable to unexpected exogenous changes, while the performance of EE policies and measures has been more dependent on the general investment climate. Policy inconsistencies, distortion in competition and implementation hurdles characterize the performance of RES policies, whereas EE policies demonstrate notable fairness in their allocation of costs and principles as well as enhanced policy integration. Overall, in light of the revision of the national strategy and objectives regarding both the support for renewables as well as the promotion of energy efficiency improvement, understanding the factors that reduce the efficacy of policy instruments in practice, is crucial for the attempts to improve (ex-ante) policy design.

1. Introduction

The national targets established in Greece to conform to the 20-20-20 EU Energy and Climate Package was the reduction of GHG emissions by 4% in non-emission trading sectors compared to the levels of 2005, fostering national energy savings in final energy consumption up to 20% and the penetration of RES at a rate of 18% in final energy consumption. The National Policy Strategy for RES deployment was translated into the Feed in Tariff (FiT) scheme, initially introduced by Law 2244/1994, setting the legislative landscape for the development of RES and providing access to the grid for individual energy producers. The scheme begun to operate as an incentive-mechanism in 2006, through the national program for RES deployment, which established the fixed FiT system as well as the related licensing procedures for the period 2007-2009. At the same time, an incentive program promoting the installation of PV in buildings (up to 10KW) was launched in June 2009 and is planned to last until 31.12.2019 (FiT II). Yet the RES 18% share in the national energy balance, is not only expected to be attained through the combination of measures for the enhanced penetration of RES technologies in electricity production, and heat supply, but also through energy efficiency measures mainly in the building end-use sector.

The main pillar of enhanced energy efficiency efforts is Directive 2006/32/EC[1], under which the target of 9% energy savings in final energy consumption by 2016 has been set, and the National Energy Efficiency Action Plans (NEEAPs) provided a framework for the development of a Strategy

[1] Transposed into Greek legislation by means of Law 3855/2010

to further improve energy end-use efficiency through the application of concrete measures and policies in the various energy end-use sectors (2nd NEEAP, 2011). Such measures include standards and labels (building codes and certification), financial incentives traditionally in the form of investment subsidies (grants) and soft loans along with info-based instruments targeted in household or/and tertiary sectors.

However, the actual effectiveness of transposed national policies in delivering their intended target often appears to decline from the way they were expected to. Enabling and constraining factors to policy efficacy (i.e. the theoretical effectiveness) can be both attributed to the contextual framework the policy instrument is embedded in (economic, socio-political, technological/ infrastructure, environmental) and to failures in the inherent design of the policy instrument within the policy cycle. The aim of this paper is to provide an overview of what enables or constrains the anticipated policy instruments' outcomes within a given context based on empirical results and stakeholder perceptions. The analysis of the presented methodological approach is mainly based on the context of the project "Assessment of Policy Interrelationships and Impacts on Sustainability in Europe" (http://www.apraise.org). The objective of this project, was to empirically assess the existing and planned environmental policies in selected sectors of EU Member States and expand the existing databases on multiple parameters of environmental policies.

2. Framework of analysis

In order to explore the efficacy of policy instruments, an assessment is carried out emphasizing on the implementation step in the policy cycle, with the use of a multi-criteria evaluation framework. This is conducted on the basis of "theory based evaluation (TBE)" where policymaker's assumptions on a policy instrument's implementation and performance is reconstructed and compared to empirical observations. TBE helps to assess whether a policy intervention is designed in such a way that it can attain its intended effects (i.e. efficacy) and whether it has been implemented according to the theory implicitly or explicitly underpinning the intervention. Various assumptions about future contingencies are made in virtually all policy instruments' design procedures, which can negatively or positively affect policy performance during the implementation stage. The methodology thus builds on a multi-criteria approach targeting key hypotheses and assumptions, regarding policy instruments of the climate and energy package having recently been implemented in Greece.

2.1 A multi-criteria assessment framework linked to theory based evaluation

A number of criteria essentially relate to policy formulation and implementation (Jacquet-Lagre`ze & Siskos 2001) and a number of previous evaluation approaches have done so through a number of criteria relevant to their policy cycle (De Melo, Jannuzzi & Tropodi 2013). The proposed set of sub-factors (Table 1) aims to reflect how well the context of an individual policy instrument has been taken into account before the implementation stage, in terms of potential market and behavioral failures, its relationship with other policies and common implementation hurdles. A general rationale for proposing a policy action is formed articulating plausible capabilities of how instruments are expected to operate and perform and how they are actually implemented and perform in reality towards achieving their targets (Harmelink, Nilsson, & Harmsen 2008).

Table 1. Evaluation criteria-description

Factors	Sub-factors (criteria)	Description

Political & Social Acceptance	Incentive to invest/comply (Mot)	Strength of the yielded incentives to invest or comply due to policy intervention.
	Familiarity (Fam)	Public awareness associated with the policy instrument through information/ advertisements/ official websites.
	Fairness in its distribution principles (Eq)	Distributional effects associated with relevant benefits and compliance costs among target groups.
	Adaptability to exogenous changes (Adap)	Flexibility in case of exogenous market signals (required time for adjustment) and available options for participation / compliance.
Policy Coherence	Institutional management & Coordination (Coord)	Management structures existence of oversight bodies, coordination of policy targets, networks of communication and established information flows.
	Transaction Costs (Trans)	Additional costs accruing from potential barriers during policy implementation
Consistency	Compatibility with national policy strategy (Comp)	Addressing relevant market barriers in a way that, synergies and/or lack of contradictions among policies in pursuit of different policy targets and objectives are promoted.
Implementability	Institutional set-up and capacity (Inst)	Capacity (personnel, available technologies and previous experience of associated regulators) of regulatory authorities to administer and support the implementation of the instrument.
	Monitoring & control (MnC)	Sanctions, inspections and monitoring processes to identify barriers during the execution of the mechanism ensuring compliance are considered.
	Financial feasibility (Fin)	The ability of the mechanism to be implemented with low overall costs by regulatory authorities (Konidari & Mavrakis 2007).

A qualitative assessment was conducted at both an expected and observed level regarding the performance of policy instruments. Face to face semi-structured interviews were carried out with representatives of governmental authorities and agencies that participated in the formulation and or implementation of policies under assessment as well as principal target groups. Twenty stakeholders were requested to provide their expectations as well as ex-post observations regarding general contextual and policy specific implementation factors (i.e. evaluation criteria) influential to policy effectiveness. Their opinions were considered as providing insights into whether and why the actual policy induced effects in practice differ from policy goals. To avoid bias, the evaluation was validated by a review of national documents, papers, studies and reports related to EE and RES policy mechanisms implementation in Greece in recent years.

2.2. Adoption of the climate and energy package in Greece

In this section national financial incentive schemes highlighted by stakeholders as most critical towards the attainment of 20-20-20 targets during the last couple of years in Greece, are shortly described in terms of intended and observed effect. The intended effects or in other words, the theoretical effectiveness of a policy is reflected in its overarching objective as well as in individual estimated targets when available. Actual effects are then approached on the basis of secondary sources and results from stakeholder interviews. A summary is presented in Table 2.

Table 2. Summary of focal financial incentive instruments, intended and observed effects.

Policy instruments	Intended effects (Aim)	Actual effects
RES1: Feed-in-tariff scheme per kWh of electricity produced by RES (FiT I)	**Objective**: To enhance RES-E production through the diffusion of RES-E technologies. **Target:** Contribution to national 2020 targets of installed capacity per RES-E technology (2013)	**% of target achieved per RES technology (2013):** Wind: 48,73% Small Hydro: 130,95% Biomass/Biofuels: 57,50% PV: 310,93%
RES2: Feed-in tariff scheme per kWh of electricity produced by PV roof installations up to 10KW (FiT II)	**Objective:** "the placement of very small photovoltaic systems 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."(JMD: 2009) **Target:** Contribution to national 2020 targets of installed PV capacity	
EE3: "Energy savings at Homes" ('SEH' program)	**Objective: "**improving the energy performance of lower income family dwellings through subsidies/soft loans of the installation of RES and energy conservation measures in residential buildings" **Target:** 100,000 entries to the program	**Target achievement:** 70% (Estimated number of applications to enter: 70,000[2]) **Other effects:** - **(**Estimated) Primary energy savings[3]: 953 GWh - Creation of more than 3,000 new jobs annually (cumulatively at least 12,000) - Average reduction of energy consumption by 39 %
EE4: Integrated energy planning by municipalities ('Economize' program)	**Objective: "**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". **Target[4]:** 11.1 GWh/yr primary energy savings in Municipal buildings	Target achievement: 41% (i.e. 4.55 GWh/yr) (Estimated) Primary energy savings in Municipal buildings: 27.3 GWh[3]

In the course of our analysis, the above policy instruments are taken as the "unit of analysis" in order to appreciate the different design characteristics and implementation principles which yielded their actual effects. To this end, subsequent sections are devoted to the description of contextual (section 3) and design implementation factors (section 4) identified as most influential in the framework of the present analysis outlining their expected and observed trends along with their ultimate impact on the effectiveness of the policy instruments.

[2] Recent publication by the ministry of Environment, Energy and Climate Change. Available in Greek at: (http://ec.europa.eu/energy/efficiency/eed/doc/article7/2013_el_eed_article7_el.pdf)
[3] Calculated for the period 2014-2020
[4] Axis I: Interventions to existing municipal buildings (one of the five axes of action of the program) (NEEAP, 2011)

3. Overview of changes in the national context of implementation

In Greece, the economic crisis and the broader unfavorable economic environment has been a key parameter ultimately determining the contextual framework[5]. Unexpected unfavorable general economic conditions have resulted in liquidity problems and inability of sufficient funding from the Greek banking system restraining RES investments, whose rates of increase would have been even greater than the ones reported (for PV and Wind). In turn, the rate of decrease in households' consumption expenditure, was approximately twice as high as expected[6] (for years 2010, 2011). The decline in investment capacity and creditworthiness of households discouraged the participation of consumers in EE programs, whereas domestic PV installations not being as capital intensive as EE interventions were not impacted as such.

Higher energy costs in combination with the lack of liquidity subsequently impacted energy demand. Estimated total electricity consumption levels were considerable higher than the ones that actually evolved[7]. Reduced energy demand did not pose a direct effect on RES policy instruments, whilst the resulting impact on EE policy instruments is not straightforward, since the reduction in energy demand mostly relates to the combined effect of economic recession in households' available consumption expenditure and escalating energy costs, in the sense that residential end users responded by reducing their consumption levels (MEECC 2011) to the expense of their living comfort, since investing in energy efficiency improvements was not always financially feasible.

The building sector has been severely impacted by the recession leading to a significant decrease in the building activity since 2009 onwards[8]. Construction and building activity was mainly focused on building renovations while new buildings' construction activity was almost non-existent. As such, installations of PVs on rooftops were restrained to existing dwellings, while the financial incentives provided for the energy retrofit of households met resonance within the public. The building arbitrariness, which is quite common in urban environments in Greece over the last 50 years, posed yet another difficulty for the application and diffusion of small domestic PV rooftop systems[9]. On the other hand, individual peculiarities regarding legality and ownership of public buildings and other infrastructure, eligible for funding, under the 'Economize' program were not provisioned by the program causing long delays during the evaluation stage.

Regarding infrastructure considerations, it is worthy of note that the electricity transmission network appeared to be saturated in many of its parts due to the abundance of PV applications[10]. In addition the issue of interconnection of RES projects located in the islands is still pending. Overall the state of the transmission grid was expected to be relatively better than what actually evolved, since theoretical saturation and pending issues in the interconnection of islands to the main grid were not anticipated, affecting both the effective exploitation of national RES potential as well as the efficiency mostly of the FiT I scheme.

Finally when it comes to governance, as anticipated, a lack of transparency in the approval and licensing procedures of both RES (especially wind) and EE (especially the 'Economize' program) characterized the evaluation procedure of investment projects despite the efforts related to RES applications' priority[11]. In contrast, the involvement of the private financing sector positively

[5] Actual growth rates revealed a significant decreasing trend of -6% in average for the period 2010 to 2013(Eurostat).

[6] A 9% deviation between expected and observed rates of change in final consumption expenditure for the following years 2012, 2013 was noted.

[7] Indicatively, the actual amount of electricity consumption in the residential sector in 2011 was almost 10% lower in relation to the foreseen amount (Eurostat)

[8] Indicatively, from February 2012 to January 2013, a 40% decrease in the number of building permits was registered (EL.STAT).

[9] A number of cases of individuals prone to place a PV rooftop system were hesitant to proceed with the administrative procedures, since their building was brought up illegitimately and was not part of the urban plan of the city.

[10] which created a theoretical saturation under the limits set for photovoltaic systems to national targets for 2020.

[11] Law 3851/2010 made some improvements by forcing the Distribution System Operator (DSO) to publish on a regular basis all required information needed about the grid-connection process of the submitted applications

affected the transparency of the evaluation stage of SEH program's applications.

RES support has been a priority in the political agenda since 2004 reflected in the frontloaded National Development framework for PV deployment and it was stated to be even higher than expected[12]. However, instability in the legal framework was greatly affected by the economic decline, resulting in a number of re-adjustments in the feed in tariff rates as well as in additional financial levies imposed in RES producers retroactively to compensate for high-feed in tariffs. Legal uncertainty associated with the tariff's terms induced great risk for prospect investors. On the other hand, EE institutional framework (national targets) was reported to be generally stable and oriented towards meeting with the requirements of the European Directive (2006/32/EC).

Table 3. Overview of expected and observed trends of contextual factors and their impact on the effectiveness of both RES and EE promotion policy instruments.

Contextual Factors		Trend development		Impact on effectiveness	
		Expected	Observed	RES support	EE promotion
Economic	Growth Rate	↑	↓↓		
	Fuel Prices	↑	↑		
	Retail El. prices	↑	↑↑		
	Electricity Demand	↑	↓↓		
	Households' consumption expenditure	↑	↓		
	Level of libearization & market access	↑	↓↓		
Technology - Infrastructure	Construction Activity	=	↓↓		
	Technology Innovation (PVs)	↑	↑↑		
	Transmission grid infrastructure	↓	↓↓		
	Building arbitrariness	↓	↓↓		
Socio-Political	Political Support/Legal stability	↑↑	↑		
	Transparency	↓	↓↓		
	Investment culture & awareness	↓	↓↓		

Sources:
Trend development projections: MEECC, 2009a, 2009b, 2010, 2011, 2012 and actual development: Eurostat, EL.STAT.
Note: Strength of impact is indicated with the use of a "traffic light" system where contextual factors' trend development lying in the red or dark green region have had a significant negative or positive impact and the amber or lighter green region represents lower strength of (negative or positive) impact on the effectiveness of policies respectively. Arrows represent the trend development of the contextual factors. As such, (↑↑): Steep Rise, (↑): Rise, (=): Steady, (↓): Decrease, (↓↓): Sharp decrease.

4. Design and Implementation factors

Apart from accounting for contextual factors we extend the policy content analysis to include the impact of features related to the policy design and implementation processes by analyzing policy makers' assumptions and observations regarding the performance of policy instruments against the outlined set of evaluation criteria. These criteria express each policy instrument's properties to

[12] i.e. higher FiT rates and increase in interim targets for PV installed capacity in 2014.

achieve its intended objectives and can be facilitating or limiting the efficacy of policy instruments.

4.1. Political & Social Acceptance

Due to the significant experience at the time the FiT begun to mature in the Greek electricity market (2006), ambitious expectations of high success rates were set. From an ex post view, the market signal turned out to be far higher than expected especially for PVs. Indicatively, PV investment in 2012 were estimated to be equal to 539 million euros, whereas actual investments at the end of the year amounted to 1,86 billion. As characteristically stated the initial planning and operation of the policy instrument were guided by "rough assumptions" instead of target-setting and cost accounting estimations. Regarding the FiT II, initial average depreciation of the investment was estimated at seven years (without loans), which immediately descended to three and a half years. In the later years of the FiT implementation, low public awareness with regard to other RES technologies and investment prospects (other than PVs and wind) led to an excess growth in wind and PV investments, neglecting other RES of high potential (e.g. geothermal and biomass). Whereas for the second scheme, public awareness was mainly driven by market companies holding publicity campaigns, validating in a sense the need for further advertisement from the side of the state. As regards fairness in its distribution principles the FiT I performed less fairly than expected by policy makers since the case of PV political support became exceptionally frontloaded[13]. As such fairness in the distribution principles of the mechanism proved to be inherently low due to: (i) higher rates for PV power generation (Law 3468/2006), (ii) distorted deferral provisions (Ministerial Decree oik.19598), (iii) tardy responses of the state to integrate exogenous factors and (iv) inherent distortions in the electricity market. The same equity issues relates to the second FiT scheme as well, for which it was remarked that financial support should have been in the form of soft loans to avoid market overheat and additional costs for consumers. Finally, the mechanism was expected to be marginally flexible due to the possibility of re-adjustments through Ministerial Decisions; however, the monitoring and adjustment system was too slow to make appropriate adjustments (i.e. phasing out) on time.

Subsidies and soft loans packages for EE interventions in the household and tertiary sectors were expected to attract significant participation rates. However, Municipalities were actually reluctant to fund the rest 30% of the budget largely due to the general lack of liquidity impeding the effectiveness of the program. Following the evaluation of the 'ESH' program by the Ministry, more attractive financial incentives and looser participation criteria were induced[14] in order to increase the number of applications received[15], since it was expected to be higher by policy makers. As far as the familiarity of the EE programs is concerned, publicity through media and collaborative banks was expected to render householders adequately familiar with the program. However, according to market actors, the public was not well-informed about the terms and actual provisions of the program. In the case of the public tertiary sector, internal communication and joint cooperation between the Ministry and the Central Union of Greek Municipalities assured adequate familiarity. High equity, in terms of participation principles and allocation of benefits, characterized both EE programs since the amount of total approved budget of 'Economize' was a function of the density of the Municipalities population (i.e. capitals and over 10,000 population), while in the case of the 'ESH' program, lower income category beneficiaries were explicitly favored. However, market actors reported that the program did not promote adequately innovative technologies (of higher energy saving potential) and this fact had a negative impact on market competition. Adaptability was reflected in the variety of eligible interventions and technologies in targeted Municipalities' end use

[13] On a more aggregate level, the frontloaded national program (i.e. i, ii, iii, iv) on PV undermined growth for other RES technologies (i.e. the money spent for PV is not anymore available for wind).
[14] Only 2,000 applications were received, while the initial target was 100,000 applications
[15] The rate of received applications increased to 1,000 per month or more than 30 per day, resulting by October 2013 in almost 40,000 entries in the program.

sectors, whereas the program would also take into account the rearrangements and reforms accompanied by emerging regulations[16]. For the household sector, the corresponding program also offered a variety of EE interventions according to the auditing recommendations.

4.2 Policy Coherence

Reportedly, policy coherence issues in terms of complexity featuring the licensing process due to the large number of token-competent authorities of the central government, the devolved administrations and regions with non-uniform evaluation and authorization of RES projects, have overshadowed progress of RES plants. Subsequent delays and considerable costs for loss of business in RES project implementation were however foreseen and endured by both policy makers and business actors due to the inherently poor public administrative structure. Accordingly, transaction costs featuring the licensing and administrative processes of implementing the scheme, evolved higher than estimated due to the unprecedented demand for PVs during the period 2007-2012[17]. On the other hand, the licensing procedure for the installation of PV rooftop systems is rather straightforward. Finally after the establishment of Law 3851/2010 licensing procedures were ameliorated simplifying to some extent coordination and management issues among institutional bodies.

The institutional set up of EE programs has been less complex than RES but it still appeared to have elements of incoherence during the evaluation and approval procedures which was expected in a lesser extent by the involved parties. The institutional set up of the 'Economize' program was questioned due to the long delays during the evaluation and approval of the documentation (mostly from the MEECC's part and the coordination of the external Register of Evaluators) submitted by Municipalities. Room for improvement was also reported to exist on the coordination between cooperating Banks and the Ministry during the implementation of the 'ESH' program[18] leading to delays in the diffusion of Ministry's decisions[19]. No significant deviation took place with regard to how transaction costs evolved compared to what was expected for the 'Economize' program. For 'ESH' program, transaction costs turned out to be higher than expected due to the additional eligible cost of 250€ per application form for technical counselling services.

4.3 Policy Consistency

Evidence of regulatory and legislative inconsistencies exists in environmental policy evaluation studies, which coincides with the majority of stakeholder views, expressed during the participatory part of the analysis. Interviewees were unanimous in strong criticism towards inconsistencies[20] and overlaps between the Fit scheme and the incumbent policy mix owing to the large number of legislative and regulatory acts, which often contradicted each other. Indicatively in October 2010, a Ministerial Decree (oik19598) re-established the desired ratio of installed capacity and its allocation in time, among the various RES technologies, amending the linear interpolation of the RES trajectory previously described by the NREAP for meeting the 2020 binding targets, uplifting interim targets for PV installation capacity and driving a market overheat. Interestingly enough, the majority of interviewees, both policy makers and market actors, noted lack of

[16] For example, the program 'Kalikratis', L.3852/10 administrative division of Greece in 2011 reformed and redefined the boundaries of local and regional units inducing changes relating to the transfer of management responsibilities among local governments.

[17] Indicatively for photovoltaic stations legal - administrative procedures require on average 33 % of total development time of the project and correspond to 23 % of the total labor cost (PV legal, National Report for Greece, 2011)

[18] The first evaluation step is implemented by the participating Banks, that evaluate the completeness of the relevant file and verify the eligibility of the application on the basis of supporting documents submitted (http://exoikonomisi.ypeka.gr/).

[19] This problem has been intensified upon the revision of the program in March 2012.

consistency and contradictions with other policy frameworks despite the provisions in place, due to significant monitoring and control deficiencies severely impacting the schemes' efficiency. As far as the Fit for domestic PV rooftop system is concerned, discrepancies with the horizontal ownership of buildings included in the building code have been pointed out to delay or even halt investment prospects altogether.

As far as EE policies are concerned, 'Economize' was reported to operate in significant synergy with the Covenant of Mayors initiative, while in the household sector similar inconsistencies were identified to the ones restricting the diffusion of the FiT for PV rooftop systems. Additional difficulties in the implementation of the 'ESH' policy instrument arose from the fact that a 100% consensus (for interventions considered "communal") of all owners in condominium stood as a pre-requisite according to the terms of the program.

4.4. Implementability

Administrative requirements of the permitting processes are in general much higher in the industrial ground-mounted RES development segment. As demonstrated from the results of the PV legal research, Greece presents one of the most resource-hungry processes for industrial PV and wind power plants. However, administrative hurdles as stated by the majority of market actors interviewed were anticipated and endured due to high returns on their investments offered by the favorable FiT scheme I. Regarding monitoring and enforcement processes, the same logic characterized the implementation of both FiT schemes. The majority of interviewees remarked that the RES trajectory should have been closely monitored in order to identify delays and barriers in the RES deployment path or increasing social costs expressed by the add-on on electricity bills (i.e. RES-E levy) reflecting also the financial feasibility of the scheme. Interestingly, interviews from MEECC as well as from the business community stated that the RES levy burdening electricity consumers was initially expected to be rational. High compensation rates and the unexpected steep increase in the diffusion and development of solar power production overcharged the Special RES account. However the cost of FiT system escalated during the past years, also due to the lack of equal transparency on the cost of conventional power generation reflected to electricity bills, in comparison to RES and especially PVs. The growing deficit was thus amplified, and has thus far been passed on to consumers[21]. Regarding the second FiT Scheme its financing also adds on the RES-E levy imposed on electricity bills. Most interviewees commented that the tariff support under the scheme until 2012 could be considered as excessive and unjustified, considering the exaggerated profitability of planned domestic PV projects in contrast to decreasing installation costs, while one respondent specifically stated that financial support should have been in the form of soft loans to avoid market overheat and additional costs for consumers.

Administrative burden of the 'ESH' program was considerably alleviated by cooperating banks, which were highly involved not only in the application evaluation and loan approval stage, but also in the implementation and monitoring of the projects. As such, banks instructed the projects to electrical/construction contractors and materials/equipment suppliers, while they were also responsible for the monitoring of the implemented interventions. This fact predisposed the successful operation of the administration mechanisms, verified by market actors also in the sense of adequate transparency throughout the evaluation procedures and progress tracking. The financial feasibility of 'ESH' program is related to the consumers' credit ability for loan approval according to the internal regulations of the cooperating Banks. The number of loan approvals was less than expected thus limiting the overall success factor of the program (amounting to 19% according to market actors). In the case of 'Economize' program, however, administrative capacity has been questioned due to the unexpectedly long delays during the evaluation and approval of the documentation. The financial feasibility of the program mainly concerns the percentage of 30% to be funded by Municipalities'

[21] Indicatively, the levy increased by 118% for residential consumers, from 9.53 euros per 1.000-kilowatt hours to 20.80 euros.

own contribution for the project which proved to be more difficult than expected. Finally expectations regarding the monitoring mechanisms did not deviate substantially from what was observed; CRES supported the monitoring and evaluation of the progress of projects in close cooperation with beneficiaries Municipalities, taking initiatives for corrective actions.

5. Discussion

The policy evaluation focused on the implementation stage in the policy lifecycle (i.e. policy process), aiming to identify factors explaining deviations between the efficacy and effectiveness of energy and environmental policy instruments under assessment. However detecting causality proved to be challenging especially in the case of specific sectoral policies (e.g. energy efficiency) where no data to establish causality exist in micro-studies and rebound effects are evident. In addition, the criteria established were inclusive of key relevant aspects describing the different functions of the various environmental policies when addressing the diverse set of associated barriers respectively. This means that their relevance and usefulness varied according to the sectoral scope of policy instruments in question. In addition they involved various overlaps inter se, owing also to the interconnected nature of barriers (Chai & Yeo 2012). For instance institutional coordination and management is partially (but not totally included) in the institutional capacity criterion. In turn policy consistency explores whether a policy performed consistently towards attaining its own targets taking into account other policy targets, while depending upon monitoring and control as well. Therefore interactions between different assessment criteria and the relevant perspectives of the assessment of policies need to be considered in a more holistic manner in future policy evaluations.

6. Conclusions

The difference between aim and effect for policy measures promoting RES and EE over the last years in Greece has been explained according to economic, socio-political and technological context changes, as well as deviations between planning and practice of the policy design elements and implementation structures featuring each instrument under assessment. Table 4 below summarizes empirical knowledge gained on the performance of RES support and EE promotion policy instruments across aforementioned policy specific factors that comprise the general concept of the efficacy of policy instruments.

Greece's eminent support for RES started and maintained substantially since 2004 marking the context of their development despite mistakes and failures in design observed since then. The FiT I scheme demonstrated unilateral effectiveness towards only a few RES technologies and overall limited efficiency. Over attainment of targets, for both FiT schemes can be primarily attributed to those design characteristics (i.e. high fixed rates and long term contracts) that attracted investments regardless of contextual implications. Moderation in wind and other RES technologies coincided with the surge in PV technology and was also greatly affected by recent political instabilities and infrastructure factors resulting in a low rate of the actual capacity additions. Administrative barriers and failures in design, related primarily to inconsistencies due to overregulation governing the licensing process and coordination issues impacted mostly the first FiT, since administrative requirements of the permitting processes are in general much higher in the industrial ground-mounted RES development segment. On the other hand, the increased efficacy of EE subsidies and soft loans was offset mainly by the recessionary environment that often made investments non feasible. The results of the analysis also indicate that the inclusion of the private sector to deliver administrative procedures enhanced the implementation of EE programs, while in the case of 'Economize' program lengthy evaluation procedures were mostly the outcome of building arbitrariness as well as the financial feasibility of the measure. Overall, the implementability of the

EE policy instruments was relatively more enhanced than RES support schemes, although policy incoherence featured the implementation of both types of policy instruments across governmental levels.

The empirical evaluation of EE and RES financial support schemes highlights that identifying the game changers within each context of implementation, and establishing useful interim targets, as well as alternative mechanisms (e.g. funding, coordination) to address unexpected market and potential policy failures, becomes critical. On the whole attention needs to be drawn from targets to underlying policy mechanisms, process and contextual trends that affect them. Policy objectives should be redefined in a more qualitative way based on the broader efficacy knowledge framing the implementation of policies.

References

Conrado Augustus de Melo, Gilberto de Martino Jannuzzi, Aline Ferreira Tripodi 2013. "Evaluating public policy mechanisms for climate change mitigation in Brazilian buildings sector." Energy Policy, October: 1200-1211.

Eric, Lacquet-Lagre`ze and Yiannis, Siskos 2001. "Preference disaggregation: 20 years of MCDA experience." *European Journal of Operational Research* 130 (2), 233 - 245.

Jayanta, Deb Mondol. and Nikos, Koumpetsos 2013. "Overview of challenges, prospects, environmental impacts and policies for renewable energy and sustainable development in Greece." *Renewable and Sustainable Energy Reviews* July: 431-442

Kah-Hin Chai, Catrina Yeo 2012. "Overcoming energy efficiency barriers through systems approach — A conceptual framework." *Energy Policy*, July: 460-472.

Popi Konidari & Dimitrios Mavrakis. (2007). "A multi-criteria evaluation method for climate change mitigation policy instruments". *Energy Policy*, December: 6235-6257.

Mirjam Harmelink, Lars, Nilsson, Robert, Harmsen 2008. "Theory-based policy evaluation of 20 energy efficiency instruments." *Energy Efficiency*, May:131–148

Ministry of Environment, Energy and Climate Change (MEECC) 2009a, Committee 20-20-20, "National Renewable Energy Action Plan in the scope of Directive 2009/28/EC." Athens, June.

Ministry of Environment, Energy and Climate Change (MEECC) 2009b, Committee 20-20-20, "National Energy Efficiency Action Plan pursuant to Directive 2006/32/EC." Athens, June.

Ministry of Environment Energy and Climate Change (MEECC) 2010. Committee 20-20-20, Analysis of Energy Scenarios Penetration of RES in the energy system and achieving national targets for 2020 using MARKAL, ENPEP, WASP and COST models, July (in Greek).

Ministry of Environment, Energy and Climate Change (MEECC) 2011, Committee 20-20-20, "Second National Energy Efficiency Action Plan." September.

Ministry of Environment, Energy and Climate Change (MEECC) 2012, Working Group under Ministerial Decision P.E./F1/875/oik.6292/19.03.2012. "First Progress Report on the Promotion and Use of Energy from Renewable Sources in Greece." April.

Pablo, Del Rio. and Michael, Howlett 2013. "Beyond the "Tinbergen Rule" in Policy Design: Matching Tools and Goals in Policy Portfolios." *Annual Review of Policy Design*, December 2013.

Table 4: Summary of expected and observed performances of RES support and EE promotion policy instruments against evaluation criteria.

PIs	RES support				EE promotion			
	FiTs I		FiTs II		'ESH' program		Economize program	
Criteria	Performance (Exp) / (Obs)	Cause of deviation	Performance (Exp/Obs)	Cause of deviation	Performance (Exp/Obs)	Cause of deviation	Performance (Exp/Obs)	Cause of deviation
(Mot)	(+) / (++)	**D, C**	(+) / (++)	**D**	(++) / (+)	**C**	(++) / (+)	**C**
(Fam)	(-) / (-)	No deviation	(+) / (+)	No deviation	(+) / (-)	**D, C**	(++) / (++)	No deviation
(Eq)	(-) / (--)	**D,C**	(-) / (--)	**D,C**	(++) / (+)	**D, C**	(+) / (+)	No deviation
(Adap)	(-) / (--)	**D**	(-) / (--)	**D**	(+) / (+)	No deviation	(+/-) / (+)	**C**
(Coord)	(--)/(--)	No deviation	(++)/(++)	No deviation	(+/-)/(-)	**D**	(+/-)/(-)	**D**
(Trans)	(+/-) / (+)	**C**	(+/-)/(+/-)	No deviation	(+/-)/(+)	**D**	(+/-)/(+/-)	No deviation
(Comp)	(-)/(--)	**D**	(++)/(+)	**D**	(+)/(-)	**D**	(+)/(+)	No deviation
(Inst)	(-) / (-)	No deviation	(-) / (-)	No deviation	(+) / (+)	No deviation	(+/-) / (--)	**D**
(MnC)	(-) / (--)	**D**	(-) / (--)	**D**	(+) / (++)	**D**	(+) / (+)	No deviation
(Fin)	(+/-) / (-)	**C,D**	(+/-) / (-)	**D, C**	(+) / (-)	**C**	(+) / (-)	**C**

Note: Strength of impact is indicated with the use of a "traffic light" system where criteria lying in the red or dark green region have had a significant negative or positive impact and the amber or lighter green region represents lower strength of (negative or positive) impact on the effectiveness of policies respectively. (++): Very High, (+): High, (+/-): Neither High nor Low, (-): Low, (--): Very Low. "D": Failure in policy design, "C": Contextual change