Energy Policy 38 (2010) 4186–4195

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Is blending of energy and climate policy instruments always desirable?

V. Oikonomou[a,*], A. Flamos[b], S. Grafakos[c]

[a] Joint Implementation Network, Laan Corpus den Hoorn, 300 Groningen, The Netherlands
[b] Management & Decision Support Systems Laboratory (EPU-NTUA), School of Electrical and Computer Engineering, 9 Iroon Politechneiou street, National Technical University of Athens, 15780 Athens, Greece
[c] Institute for Housing and urban development Studies (IHS), Erasmus University Rotterdam, 3062 PA, Burgemeester Oudlaan 50, The Netherlands

ARTICLE INFO

Article history:
Received 28 September 2009
Accepted 18 March 2010
Available online 14 April 2010

Keywords:
Energy policy interactions
End users
Climate policy

ABSTRACT

In this paper we present an application of the Energy and Climate Policy Interactions (ECPI) decision support tool for the qualitative ex-ante assessment of ten (10) combinations of energy and climate policy instruments addressing energy end users. This tool consists of four (4) methodological steps, where policymakers set preferences that determine the outcome of policy instruments interactions. Initially, interacting policy instruments are broken down in into their design characteristics, referring to parameters that describe functions of each instrument. Policymakers can express in a merit order the significance they attribute to these characteristics when designing a policy instrument. Evaluation criteria for assessing these instruments individually are used and policymakers can assign weights on them expressing their preferences. An overall assessment of combined policy instruments based on these steps have illustrated policy interactions added value per criterion and overall. The user of the tool takes useful insights as regards the most preferable combinations of policy instruments, the less preferable ones and those who are conflicting.

1. Introduction

The EU and its member states are developing policies targeting at energy supply, energy demand, and environmental goals that are linked to energy use. As such, energy efficiency, renewable energy promotion and reduction of greenhouse gases (GHG) are considered as milestones that countries must pursue, under the obligations of each country in the framework of the Kyoto Protocol and other binding commitments (Flamos et al., 2008; Van der Gaast et al., in press). Within the context of Kyoto Protocol, several energy and climate policy instruments evolved, i.e. International Emissions Trading scheme, EU Emissions Trading Scheme (EU ETS), Kyoto Protocol project-based mechanisms, benchmarking, while countries have been experimenting with other national instruments, such as White Certificates (WhC), Green Certificates, command-and-control mechanisms, voluntary agreements, subsidies, taxes, and many others. As these policy instruments are designed and implemented in an already policy crowded environment, interactions between them are taking place. These interactions can take different forms and shapes and are considered as complementary, if they carry over positive impacts on the policy mix, or overlapping if they reduce the overall effects that each instrument stand-alone could generate in the market in achieving their objectives.

However, there is also a significant risk that different policy instruments might interact and undermine each other's objectives and credibility. This raises the issue of compatibility of different regimes, which is of crucial importance for further policy design. In this sense, policy interaction can affect the result of the overall targets of climate policy either positively or negatively. In general, this issue has not received the importance it deserves in the academic literature. Few studies have dealt with the issue of energy and climate policy interactions (see Sorrell, 2003; Konidari and Mavrakis, 2006, 2007; Oikonomou and Jepma, 2008 for a literature review). The tendency is to evaluate instruments as individual entities and to consider their characteristics in relative isolation (Peters and van Nispen, 1998). The partial effects of introduction of different instruments are in depth discussed (Agnolucci, 2007; Hoeller and Coppel, 1992; Boonekamp, 2006; Bovenberg and de Mooij, 1994; Mavrakis and Konidari, 2003; Morthorst, 2001; Bye and Bruvoll, 2008; Sorrell et al., 2009; Jensen and Skytte, 2002). Nevertheless, this approach is in marked contrast to the political context within which policy instruments and their interactions actually operate.

In literature, three types of interactions exist (Sorrell, 2003, Oikonomou and Jepma, 2008): (a) national or international; (b) same or different policy context; and (c) parallel functioning or combination. In the first case a basic distinction of interactions is made in terms of their field of application and spatial dimension.

* Corresponding author. Tel.: +31 645380712; fax: +31 503096814.
E-mail addresses: vlasis@jiqweb.org (V. Oikonomou), aflamos@epu.ntua.gr (A. Flamos), s.grafakos@ihs.nl (S. Grafakos).

0301-4215/$ - see front matter © 2010 Elsevier Ltd. All rights reserved.
doi:10.1016/j.enpol.2010.03.046

Policy context refers to interactions between instruments addressing differentiated sets of objectives and targets. The last form we distinguish is between combination of stand-alone instruments and their integration.

A trend in current climate and energy policy is to link many policy instruments, in principle those oriented towards market approaches (for instance EU ETS with Kyoto project-based mechanisms (Joint Implementation and Clean Development Mechanism). This is partly justified by mainstream economic theory, which assumes that the multiplicity of options generated by a high number of instruments can provide lower marginal abatement cost solutions to market participants, hence lowering the overall social costs of energy and climate policy instruments and achieving maximum benefits. Nevertheless, even though such interactions from an economic point of view can be desirable, a deeper analysis based on the specific energy targets and tradeoffs is deemed necessary, in order to select combinations of certain policy instruments that have more added value than others. Policymakers and policy advisors consult studies on policy interactions, which are often based on single economic criteria (mainly cost-effectiveness) and do not provide thorough results covering more details of each policy instrument's cycle (a literature review of these studies can be found in Oikonomou and Jepma, 2008).

To this extent we have developed the Energy and Climate Policy Interactions (ECPI) Decision Support Tool (Oikonomou et al., 2008), which identifies interactions in climate and energy policy instruments, and assesses qualitatively combined policy instruments upon qualitative criteria. It can assist policymakers discover effective policy instrument mixes, depending on their preferences. Our aim is not to guide policymakers into deciding best policy instruments, but merely to demonstrate whether a policy instruments combination is in accordance with their preferences. By employing ECPI tool, our main target in this paper is to provide insight on the added value of implementing combinations of selected energy and climate policy instruments in order to achieve the desired objectives, as the latter are being expressed by criteria preferences. We focus on the energy end use sector, as it falls under the umbrella of numerous EU and national policies, and its enormous energy efficiency potential can be untapped with the use of fine-tuned policy instruments' mixes.

Following this introduction, Section 2 describes the methodology employed in ECPI tool and its basic characteristics in a nutshell. In Section 3 we run ten (10) indicative scenarios testing the combination of various energy and climate policy instruments and present their respective results. Finally, in Section 4 we end up with main conclusions of the paper.

2. ECPI methodology outline

The ECPI Tool provides a qualitative framework for analyzing interactions among policy instruments in various policy mixes through developing a whole policy cycle and the instruments' respective pairwise combinations. The key concept is that policymakers select instruments to be examined for interaction and demonstrate their preferences, when assessing options of integrating various schemes. In the tool we make use of a traditional policy condition, which assumes that an optimal policy solution preconditions the relationship one policy instrument for one policy target (Tinbergen, 1952, 1954; Arrow, 1958; Lindblom, 1958). The core assumption is that policy formulation should in principle target to the maximization of the social welfare function, which can be replaced by prescribing fixed values of some variables and attribute them as targets. Furthermore an analytic and policy problem arises, where the analytic part consists of solving for the targets the terms of policy instruments and the policy problem of fixing targets and solving for the instruments (Arrow, 1958). Lindblom (1958) lists the Tinbergen's theorem cases: (a) for fixed targets the number of instruments must be equal to that of targets and hence this relation is within boundary conditions, (b) for fixed targets inequality between number of targets and instruments leads to infinite number of policy solutions or a coincidental solution, and (c) flexible targets where a maximization problem consists of side conditions. In ECPI the first condition has been used, hence it is assumed that an optimal policy solution preconditions the relationship one policy instrument for one policy target. In other words if there is one efficient instrument that achieves a desired environmental target, it does not make sense to introduce an additional for the same target (Johnstone, 2003). A similar concept is followed by IPCC (2007), which states that in a perfect functioning market a single policy instrument is sufficient to address a specific target. Nevertheless, in the existence of market failures a mix of policy instruments can be desirable.

ECPI tool consists of four methodological steps. Initially, policymakers select policy instruments, differentiated on the grounds of their type, scope, level of targets, and target groups from an inherent database. At the second step, these policy instruments are broken down to their design characteristics, where complementary, overlapping, or indifferent elements of their combinations are identified. The third step refers to the evaluation of each policy instrument upon criteria, which have been selected based on a literature review. Furthermore the selected criteria have been categorised in five areas of general policy objectives which are: climate, energy, financial, macroeconomic, and technological. Following a bottom up approach we reviewed several studies (IPCC, 2001; 2007; OECD, 1997; Bondansky, 2003; Oikonomou and Jepma, 2008; Gaiza-Carmenates et al., 2010) and based on certain conditions (measurability, understandability, operationality, value relevance, minimum size, decomposability, reliability, completeness, non-redundancy) that criteria should meet (see Grafakos et al., in press), we selected 14 evaluation criteria that are clustered into five main categories:

(1) *Climate*: Climate criteria have been emphasized broadly in the respective literature as the main criteria able to capture the extent that a policy instrument achieves the climate change mitigation goal, such as "GHG emissions reduction" (IPCC, 2001, 2007; Bondansky, 2003; Oikonomou and Jepma, 2008). This criterion addresses the question of how an instrument creates incentives to improve products or processes in ways that reduce GHG emissions. Furthermore, OECD (1997) and Bondansky (2003) identify 'soft' effects, which relate to the impact of climate policy instruments on changes in attitudes and awareness. Thus "climate awareness" is an additional criterion which complements the criterion of "reduction of GHG emissions" in climate category.

(2) *Energy*: Blyth and Lefevre (2004) carried out a quantitative study on the interactions between energy security and climate policies highlighting the significance of "security of energy supply" as an evaluation criterion. Security of energy supply can be also translated as the share of domestic fuels required for energy needs of the end users and the economy (through this way we do not employ a separate criterion for renewable energy market penetration, as renewable energy can be imported). Decoupling economic growth and energy use is one of the main EU policy objectives and thus "reduction of energy intensity" has also been added as a criterion in this category.