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Conditions for the cost effective combination of emissions trading and renewable energy support policies

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Abstract

This paper makes a case for using cost effectiveness (as opposed to efficiency) as key criterion when designing support policies for electricity generation from renewable energy sources in coexistence with an emissions trading scheme. Using the EU ETS and the German feed-in tariff system as examples, arguments against a stand-alone ETS are presented and necessary conditions for cost-effective support to RES-E in a deep decarbonization context are synthesized.

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Cost-effectiveness; Decarbonization; Emissions trading; Policy evaluation; renewable energy

1. Introduction

2015 marks the year of the 10th anniversary of the European Union Emissions Trading Scheme (EU ETS) and the 15th anniversary of the German Renewable Energy Sources Act (EEG). The EEG triggered the installation of renewable energy capacity so that the share of renewables in gross electricity generation increased from 6.6% in 2000 to 26.2% in 2014 [1]. At the same time the participants of the EU ETS achieved emission reductions at lower costs than anticipated. Thus, both instruments have proven to be *effective* with regard to their specific targets. In contrast, during their ten years of co-existence this policy mix has faced large criticism of being in*efficient*, mainly due to overlaps in the power generation sector [2]–[7]. At the centre of debate is the neoclassical economics argument, that the EEG did not have any impact on climate change as it did not alter the GHG emissions cap and, hence, did not result in

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additional emission reductions. Furthermore, it supposedly freed emission allowances (EUA) in the German power generation sector, which watered down the EUA price and shifted emissions to other sectors and other European countries ("leakage").

Not only neoclassical economists are sceptical of inefficient overlaps between ETS and support policies for electricity generation from renewable energy sources (RES-E). Working group III of the IPCC warns in its fifth assessment report of emissions leakages in case climate policies are introduced at a lower jurisdictional level than an ETS [8]. Other studies share the concern about the risk of leakage and inefficiencies, but also identify conditions under which RES-E support may be a useful addition to an ETS (cf. [2], [7], [9], [10]).

The argumentation around the inefficiency of the EEG has been rightly criticized for being too simplistic (cf. [11]–[13], and detailed arguments in section 3). From an evaluator's perspective, taking *efficiency* as key evaluation criterion runs the risks of reducing climate-energy policy to a purely economic question, a question of the costs and benefits of climate change mitigation. The dependence on uncertain cost benefit analyses (CBA), which heavily rely on contentious assumptions (cf. [14]–[16]), does not reflect the clear-cut demands that are set by science and institutionalized in political targets. These demands imply the nearly complete decarbonization of industrialized economies by 2050.

Cost effective policy, in contrast, starts off from the effect, i.e. reaching long-term mitigation targets, and then looks for the least costly way to get there. A similar differentiation has been made between short and long-term efficiency, and between static and dynamic efficiency [12]. This paper sticks to the terms efficiency and cost effectiveness, in order to highlight the shift from a CBA perspective to target achievement. Based on this shift, the paper proposes a set of necessary conditions that a cost-effective combination of RES-E policies and ETS has to meet.

2. Material and method

This paper contributes to the development of criteria for the design and evaluation of RES-E support policies in combination with an ETS. The differentiation between the economic criteria *efficiency* and *cost-effectiveness* is well established in evaluation literature [17], while outside the evaluation community the two terms are often used interchangeably.

A comprehensive literature review was carried out to research the efficiency and cost-effectiveness of a stand-alone ETS and an ETS in combination with RES-E support policies. Further information has been gathered by studying the German case.

The German EEG with its feed-in tariff (FiT) system is the largest and most salient RES-E support policy under an ETS. It has received criticism from mainstream economists and environmental economists alike. While in the specific German case also the choice of FiTs as the main RES-E support instrument is criticized (see [18] for a critical discussion), the focus here is on the question whether RES-E support under an ETS can be cost effective in general.

Empirical evidence from the transition of energy technology, infrastructure, markets, business models and institutions in German helped to induce conditions for a cost-effective combination of RES-E support and ETS. Note that meeting *necessary* conditions is not yet *sufficient* for warranting cost effectiveness.

3. Why an ETS alone is not cost effective

On the short-run, the EU ETS is both efficient and cost-effective. Despite its failure to create a reliable scarcity signal for CO2 emissions, it has worked rather well as a short- to mid-term clearing mechanism for well-proven and competitive abatement options [13]. While we cannot know whether an ETS alone