

# Renewable energy policy dialogue towards 2030 – Editorial of the special issue

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## Abstract

In view of the 2030 energy and climate objectives of the European Union, there is a need to evaluate the different options to shape the future framework for renewable energy sources (RES) policies and targets. The Special Issue focuses in seven papers on the following dimension of this future framework: (i) interactions between support for RES in the electricity sector and other climate and energy instruments in the European Union, (ii) challenges related to renewable energy technologies that have achieved a certain level of maturity, (iii) assessment of renewable and energy efficiency policies on natural gas markets and supply security, (iv) contribution of increasing district heating based on renewables to the renewable target achievements of Central and Eastern European, (v) how to support the successful achievement of renewable energy targets in the short and medium term and in a time horizon up to 2030, and how to share the efforts required among individual countries or groups of European Member States, (vi) influence of the rapidly increasing shares of variable renewable on the price on electricity markets as well as flexibility requirements in the electricity system, (vii) principal design features and context factors which increase or reduce the effectiveness and efficiency of RES-E auctions.

## Keywords

Renewable energy sources, energy policy, climate policy, greenhouse gas reduction, electricity markets

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## Introduction

In the 2013 European Union (EU) Green Paper on a possible 2030 climate and energy framework (COM (2013) 169 final), one core question was whether the envisaged increase in the share of renewable energy sources (RES) could be achieved with a target for emission reductions alone, or whether a sub-target for RES was required. In October 2014, the Council of the European Union finally decided in favour of a 2030 RES target of a proportion of at least 27% RES in the final energy consumption for the European Union as a whole. The target was not divided between the Member States (MS). The question of how the effort should be shared between the EU MS, in order to achieve this target, is still unresolved. There is a significant need to evaluate the different options to shape the future framework for RES policies and targets. Questions concerning the effort-sharing procedure and the design of the policy portfolio both need to be answered in order to achieve the post-2020 policy targets.

The core objective of this special issue is to align the latest practices, impact assessments and case studies with the academic framework and theories, and set a stable framework for EU policy on the renewable energy sectors, in order to achieve the 2030 target of 27%.

## Analyses in this special issue

The special issue begins with an assessment by Vicki Duscha and Pablo del Río González, of interactions between support for RES in the electricity sector (RES-E) and a wide array of other climate and energy instruments in the European Union. The instruments concerned, whose interactions are investigated, are grouped into three categories based on their primary contribution to the European Union's target system: (i) reduction of greenhouse gas (GHG) emissions (EU Emissions Trading System & New Entrants Reserve NER300, Energy Taxation Directive, Carbon Capture and Storage CCS Directive, Effort Sharing Decision), (ii) promotion of renewable sources of energy and promotion of energy efficiency, and (iii) reduction of energy consumption (Energy Efficiency Directive, Energy Performance of Buildings Directive EBPB, Ecodesign Directive & Energy Labelling Directive).

The analysis of the interactions of the different instruments follows a two-step approach: (i) the impact of the interaction of instruments on key economic variables such as prices and quantities, (ii) the information on interactions related to prices and quantities is used to assess the interactions according to different criteria (effectiveness, dynamic and static cost efficiency, distributional effects, social acceptance and political feasibility).

The analysis indicates that, despite a common perception that interactions result in conflicts, the picture may be different when the discussion is broadened to include different assessment criteria. Adding one instrument or policy to another may worsen one criterion, but frequently improves another. Conflicts can be mitigated by coordinating targets and instruments, and through the choice of instruments and design elements.

Ex-ante coordination between targets has been carried out, for example, in the European Union on the interactions between the EU ETS and RES-E support. At EU level, an ex-ante coordination between the cap-setting under the EU ETS and the cap-setting under an RES target was performed so that the effects of one target were reflected in the other target and vice versa. Coordination between RES-E and CO<sub>2</sub> targets would be easier under quantity-based RES-E instruments and design elements than under price-based ones. For example, quotas with Tradable Green Certificates (TGCs) as instruments, and generation caps as

design elements would be particularly successful in this regard, although they may have other weaknesses.

Certain design elements can be used to counteract negative impacts between instruments: for example, floor prices in an emission trading system can help to prevent prices being too low in the case of high deployment of RES in reaction to RES-E support policies.

Anne Held, Tobias Boßmann, Mario Ragwitz, Pablo del Río, Luis Janeiro and Sonja Förster, assess the challenges related to renewable energy technologies that have achieved a certain level of maturity in terms of technological deployment, cost, and market penetration. This paper identifies the most relevant challenges, and shows the differences between the specific challenges for less mature renewable technologies. Three key challenges for continuous deployment of mature RES-E technologies were identified as follows:

- (i) uncertainty for potential RES-E investors resulting from an increasing occurrence of (grid and market-based) curtailment, retroactive policy changes and unfavourably designed support schemes; this uncertainty causes an increase in the revenue risk premium;
- (ii) the risk of falling market values of RES-E technologies, caused, for example, by the merit-order effect and a lack of system flexibility, resulting in lower profit margins; and
- (iii) non-economic barriers, such as administrative barriers, problems with grid connection or a lack of social acceptance that discourage RES-E investments despite their economic profitability.

Case studies analyse experiences with (i) negative electricity prices in Germany, (ii) a market situation characterised by overcapacity in Spain and (iii) the social resistance towards the construction of renewable power plants in the United Kingdom. The article suggests appropriate solutions, considering the changing framework conditions, in order to achieve the 2030 targets. They can be differentiated between those to be implemented at a national or European level. At both levels, these actions aim to make the electricity market more flexible.

Adrienn Seleí, Borbála Tóth, Gustav Resch, László Szabó and Lukas Liebmann present the outcomes of a model-based assessment that combines European energy efficiency and renewable energy policies with two potential gas market scenarios. Initially, the impact of EU energy efficiency and renewable policies on natural gas demand is quantified by making use of the Primes model 2014 Baseline projection, the Fraunhofer ISI Low Policy Intensity (LPI) Energy Efficiency scenario and the Green-X model for renewable deployment. An assessment of the effect of these policies on natural gas markets is also included based on the European Gas Market Model (EGMM). The authors examine scenarios for different positions on long-term gas contracts with Russia assuming different stages of European gas infrastructure development. The results demonstrate that dependence on Russian natural gas can be mitigated without triggering a large increase in natural gas prices for any single EU MS. Moreover, in an extreme scenario in which energy efficiency savings, higher RES deployment and the assumed positive gas market developments take place simultaneously, gas cost savings can reach as much as 37%. Benefits are not exclusive to the Eastern EU MS targeted in the study, but are visible across the gas markets of most EU countries. This underlines the links in the whole EU gas market, and the outcomes highlight the fact that gas security of supply is not only a challenge for new MS but is also an issue in broader European markets.

András Mezösi, Enikő Kácsor, Ákos Beöthy, Ágnes Töröcsik and László Szabó state that increasing district heating (DH) based on renewables could substantially contribute to the renewable target achievements of Central and Eastern European MS in which DH forms a significant proportion of the heat market. The countries examined face the dual challenges of high-level competition with other heating sources, including individual heating, and decreasing heat consumption resulting from sector-specific building-related energy efficiency improvements. The paper draws on a Hungarian case study, which attempts to identify the most efficient options to achieve the targets in the DH sector. A DH model is applied, covering the whole set of DH systems in the country and, assessing the available policy tools, determines the potential for increasing RES development and competitiveness in the sector. The assessment shows that investment grants and operational support generate an increase in RES shares and also improve efficiency in the sector. In contrast, end user price and renewable co-generation support in the electricity market leads to non-optimal outcomes.

Aikaterini Papapostolou, Charikleia Karakosta and Haris Doukas highlight the growing need to tackle climate change and mitigate greenhouse gas emissions which has led to strong interest in renewable energy sources (RES) and the setting of specific RES targets in countries and regions within Europe. Recent political discussions have largely revolved around the question of the most effective and efficient RES target and how to achieve it. In this context, European and national policy makers have to address difficult issues: (i) how to support the successful achievement of renewable energy targets in the short and medium term and in a time horizon up to 2030, and (ii) how to share the efforts required among entities, i.e. either individual countries, or groups of European MS.

The authors present a multi-criteria approach based on an extension of the Fuzzy Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) for group decision support in order to evaluate alternative policy scenarios to achieve the 2030 renewable energy target. Different effort-sharing arrangements among MS are evaluated to determine the optimal burden sharing of the common renewable energy target between countries.

The authors identify the policy scenario ‘indicative national RES targets with incentives for over commitment’ as the optimal solution. This policy scenario provides flexibility for a country to adapt it to national circumstances and plans. Indicative targets are more attractive than binding ones, especially to less ambitious MS. This specific scenario also features incentives for greater commitment, such as supercredits that can be applied, for instance, to the amount pledged above the benchmark target, to the amount realised using certain technologies, or to the amount realised in cooperation with other MS.

The scenario ranked second is ‘binding national RES targets through free pledging’. This binding target creates certainty for investors, lowering the necessary support levels. In addition, this alternative provides a clear division of responsibilities which helps in the implementation of corrective measures in the case of the target being missed. MS are free to accept any indicative benchmark suggested by the EU Commission or pledge a higher or lower target, which they have to accept as legally binding.

The results and conclusions obtained can help to reduce uncertainty in the field of energy and climate policy, and assist policy makers in designing effective policies based on the findings.

Jenny Winkler, Rouven Emmerich, Benjamin Pfluger and Mario Ragwitz depart from the observation that the proportion of renewable energy has rapidly increased in many countries during the last few years. Due to the specific characteristics of variable renewables, this development influences the price on electricity markets as well as flexibility requirements

in the electricity system. New developments regarding market liberalisation and support schemes for renewables encourages the active participation of renewables in the electricity market. The authors analyse the effects of such participation in different segments of the electricity market. In particular, they investigate how the active marketing of renewables on the day-ahead, intra-day, balancing and futures markets dampen their effects on markets and systems. Using German data for 2013, the authors determine the effect of direct marketing on average market price levels and price volatility, the possible contribution of renewables to balancing, the profitability of flexible generation from biomass, and the additional revenues that renewables can generate from participating in different markets. Price effects of shifting renewables between markets, and limits in intra-day market liquidity are included in the assessment.

The final paper, conducted by Malte Gephart, Corinna Klessmann and Fabian Wigand, contributes to the European policy debate by exploring the principal design features and context factors which increase or reduce the effectiveness and efficiency of RES-E auctions. European MS increasingly use tenders combined with competitive bidding to allocate RES-E support payments to RES-E market actors. Volume control is among the key aims of utilising an auction, but potentially low project realisation can mean the targeted volume is missed. Qualification requirements and/or penalties are useful auction design elements to increase the implementation rates of selected projects. However, there are risks associated with these measures, which in turn increase prices. Auctions also aim to increase (static) cost-effectiveness of RES-E support, which may be influenced by three main factors: (i) the level of competition in the auction; (ii) the mitigation of speculative over- or under-bidding; and (iii) the level of allocation and delivery risks borne by the bidders. The article explores the fundamental trade-off in auctions between encouraging high project implementation rates (to ensure volume control) and minimising the bidder's risk (that may result in higher bidding prices). Based on theoretical insights and supported by empirical RES-E auction examples, it identifies factors that can influence the success of an auction. It also shows, however, that there is no exact blueprint for the design of a good auction.

As guest editors, we hope that this special issue contributes to the support of the RES policy dialogue for the period up to 2030.

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