Energy for Sustainable Development 41 (2017) 1–13

Contents lists available at ScienceDirect

Energy for Sustainable Development

Designing auctions for renewable electricity support. Best practices from around the world

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ARTICLE INFO

Article history:
Received 3 January 2017
Revised 29 May 2017
Accepted 31 May 2017
Available online xxxx

Keywords:
Design elements
Auctions
Renewable electricity

ABSTRACT

Auctions have recently been regarded as a useful alternative to other support schemes for the setting of the remuneration of renewable electricity (RES-E) worldwide. However, whether auctions will fulfill the expectations depends on the choice of design elements. The aim of this article is to analyze the advantages and drawbacks of different design elements according to different criteria. We support our analysis with economic theory and identify best and worst practices in the design of RES-E auctions from around the world. Our findings show that a few design elements score better than the alternatives in some criteria, without scoring worse in others. These "best" practices include a schedule of auctions, volume disclosure, price ceilings, penalties, streamline of administrative procedures and provision of information to potential participants. Design elements usually involve trade-offs between criteria. Overall, these results suggest that the choice of a specific design element is not a win-win decision and depends on the priorities of the respective government.

Introduction

It is widely acknowledged that electricity from renewable energy sources (RES-E) brings many environmental and socioeconomic benefits for society compared to conventional electricity. However, since its costs are still generally higher than those of its conventional counterpart, it could not penetrate the electricity market in the absence of public support. This has been the rationale for the public promotion of RES-E everywhere. However, such support has increased substantially in many countries around the world, raising the concerns of governments about the social acceptability and political feasibility of the policies. These policies have usually been based on administratively-set feed-in tariffs (FITs) or premiums (FIPs), which guaranteed prices for RES-E generators, usually without a cap on the total support costs.

In this context, auctions have recently emerged as a useful alternative for the setting of the remuneration of RES-E projects. The aim is to induce further investments in RES-E without excessively burdening the consumers' pockets.

Some advantages of auctions with respect to administratively-set prices have traditionally been mentioned: they mitigate the information asymmetry problem when setting remuneration levels, they are particularly suitable to control costs, expansion and the technology mix and they are more likely to lead to allocative efficiency (Haufe and Ehrhart, 2015). Support cost savings can be considerable. For example, Del Río et al. (2017) show that a harmonization of support schemes in the European Union (EU) based on a tendering scheme could reduce support costs by 5% in 2030 compared to harmonization based on FITs (16.7€/MWh vs 17.6€/MWh) and by 23% compared to FIPs. However, whether those savings will materialize strongly depends on the market conditions in particular countries for particular technologies and on how auctions are designed. There is some evidence that auctions have led to reductions in support with respect to previous administratively-set FITs in Brazil (Elizondo et al., 2014; Wigan et al., 2016), Ontario (IRENA, 2017) and South Africa (Eberhard et al., 2014), although not in Germany (Tiedemann, 2015). However, Toke (2015) argues that costs reductions that are often associated with renewable energy auctions are not caused by the auctions themselves, but are related with the general declines in costs of renewable energy technologies.

Many countries around the globe have recently implemented auctions for RES-E. According to IRENA (2017), 67 countries had held RES-E auctions as of 2016, up from 6 countries in 2005. In the EU, competitive auctions will have to be implemented in order to provide support to all new installations from 2017 onwards (EC, 2014). As with other support schemes, the devil lies in the details, i.e. whether auctions will fulfill the expectations and result in a successful promotion of RES-E depends on the choice of design elements.

The aim of this article is to analyze the advantages and drawbacks of different design elements according to different criteria. We support our analysis with economic theory and case studies from around the world, identifying best and worst practices in the design of RES-E auctions.

Some analyses of RES-E auctions have been carried out in the literature. The main features of renewable energy auction schemes in five developing countries were described in IRENA (2013). IRENA (2015) aimed to advise policy makers on the implications of different

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http://dx.doi.org/10.1016/j.esd.2017.05.006
0973-0826/

approaches to RES auctions, offering choices and recommendations to support optimal decision-making. More recently, IRENA (2017) provides a brief assessment of some recent experiences with auctions from around the world. Ragwitz et al. (2014) examine the key conditions for efficient auctions, reflecting on some international experiences in this area. The authors highlight the most important design features. Some academic work has also been undertaken. Del Río and Linares (2014) analyze the functioning of different design elements in auctions for RES according to several assessment criteria. In addition, academic work on RES-E auction design has been carried out in the context of the EU-funded AURES project.[1]

Compared to the existing literature, this article advances theory and practice in several fronts. First, an overarching and systemic analytical/methodological framework is provided. The relationships between design elements and assessment criteria in order to judge the advantages and drawbacks of different design elements are outlined. These links are mediated by the impacts of design elements on bidders and markets.

Previous work on the topic has either not considered assessment criteria in an explicit manner (IRENA, 2015) and/or included only a narrow set of criteria (IRENA, 2013, 2015; Ragwitz et al., 2014). This article analyzes the strengths and weaknesses of different design elements, using several criteria which are deemed relevant for this assessment from a policy-maker point of view. This approach helps to identify best and worst design practices when a specific goal (criterion) is pursued.

On the empirical front, we draw on more recent studies on the functioning of auctions for RES from around the world than those considered in the literature. Given that this is a highly dynamic field, an update of the more recent experiences provides additional empirical material from which conclusions can be drawn.

Accordingly, the paper is structured as follows. The next section provides the Analytical framework. Section 3 discusses the methodology (see Method). The results of the analysis are provided in Section 4 (see Main results). Section 5 concludes (see Conclusions).

Analytical framework

A crucial starting point in the analysis is that the links between specific design elements and criteria are mediated by the effects on bidders and the market. Therefore, these three components and their interrelationships are described and discussed below.

Design elements in auctions for RES

This section describes the minimum design elements in RES-E auctions.

Volume

There are three main ways to set the volume auctioned: capacity, generation or budget.

- Capacity targets: A total quantity in terms of MW is auctioned.
- Electricity generation targets: There is a goal of a total amount of MWh.
- Budget targets: There is an overall amount of support to be provided. It can be combined with the other two alternatives.

Whether or not to disclose the volumes is also a relevant design choice.

Timing

The length of the period between the announcement of the call for the auction and the time when the actual bidding occurs is a key feature of the auction, and may be set either too long or too short. Most importantly, the existence of regular rounds with a schedule is a critical design element. Setting the number of rounds in a year is a difficult, technology-specific issue.

Diversity

Policy makers may be willing to introduce design elements which increase diversity with respect to technologies, locations, actors and sizes of the installations for a number of reasons (see Del Río et al., 2015b for an extensive explanation). Diversity could be promoted in an auction by organizing different auctions per alternative (e.g., technology-neutral vs. technology-specific), by including minimum quota per alternative, by providing different remuneration levels for different alternatives or by lowering prequalification requirements or penalties for specific categories, i.e., small actors.

Participating conditions: facilitation and requirements

Several elements may facilitate the participation of actors in an auction, while others are rather requirements for this participation:

- Streamlining administrative procedures. Administrative procedures may severely restrict participation in an auction. Therefore, measures to streamline them may facilitate such participation.
- Supporting dialog with stakeholders and information provision. In some countries, policy makers meet with potential bidders to inform them about auction design and to get their feedback for improving such design. Providing information (e.g., renewable energy resource potentials) may also enhance participation in the auction.
- Prequalification requirements. They are required in order to participate in the bidding procedure and are applied in order to prove the seriousness of bids. They can refer to specifications of the offered project (such as technical requirements, documentation requirements and preliminary licenses) or to the bidders (providing evidence of the technical or financial capability of the bidding party) (Held et al., 2014). Financial guarantees by participants are often required. As with other elements, the challenge is to set them at appropriate levels (i.e., neither too stringent nor too lenient).
- Local content rules refer to the requirement to use renewable energy equipment which is manufactured by local firms.

Support conditions: types and forms of remuneration

Remuneration in an auction can be provided for generation (MWh) or capacity (MW). In addition, there are several instruments to set the remuneration for electricity generation, including FITs and FIPs:

- Under FITs, a total payment per MWh of RES-E generated, paid in the form of guaranteed prices and combined with a purchase obligation by the utilities, is provided.
- Under FIPs, a payment per kWh on top of the electricity wholesale-market price is granted. Within FIPs, a main distinction is between fixed and sliding FiPs. Fixed FiPs are set once and do not alter. The total remuneration thus depends on the market prices. Sliding FiPs are set at regular intervals to fill the gap between the average market price perceived by all generators of a given technology and the strike price set in the auction.

Selection criteria

Price-only auctions are organized using only one criterion, i.e., the bid price. In multi-criteria auctions, the price is the main criterion among other criteria which may include local content rules, impact on local R&D, industry and jobs and environmental impacts.

[1] AURES is an on-going project whose main objective is to promote an effective use and efficient implementation of auctions for renewable energy support in the European Union Member States, especially regarding their cost-efficiency. This paper partly draws from work carried by the author in the context of this project.