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The role of distribution network operators in promoting cost-effective distributed generation: Lessons from the United States of America for Europe

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ABSTRACT

This paper explores the different competitive mechanisms applied by electric utilities from the US in promoting cost-effective Distributed Energy Resources (DER) – with a focus on Distributed Generation (DG) – and the challenges that electric utilities are facing due to the increase in DG connections. Cases studies from California, Oregon, Colorado and New York have been selected. The case studies refer to two kinds of competitive mechanisms: Request for Proposals (RFP) and auctions (Renewable Auction Mechanism). A similar behaviour is observed across electric utilities in the way in which competitive auction mechanisms are being managed; however the more sophisticated auction designs are observed in the RFPs. The study proposes a set of auction design elements with a focus on the UK context and examines the role of energy regulators in the design of well-structured auction mechanisms. We think that the experience cited in the four case studies can be replicated by Distribution System Operators (DSOs) from Europe; however unbundling rules established in the European Commission third energy package need to be taken into consideration.

Contents

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1. Introduction

The achievement of renewable targets is one of the main drivers influencing the design of specific mechanisms for procuring renewable Distributed Generation (DG). Different procurement mechanisms respond to different needs, requirements and policy objectives. Electric utilities are (or should be) searching for cost-efficient methods that allow them greater flexibility in meeting their specific needs and future demands. Some of these mechanisms are based on competitive solicitations and auctions and others are based on specific subsidies.

In addition, based on the European Commission's (EC) third energy package about unbundling (Directive 2009/72/EC – Electricity Directive), the members are required to ensure the separation of the vertically integrated energy firms. This means that the Distribution System Operators (DSOs), serving more than 100,000 customers, shall be independent from other activities not relating to distribution (generation, transmission and supply). Following [1], the majority of countries have fully implemented the third package. Great Britain is among the countries that has transposed into national law Article 28 of the Directive and has completed the unbundling mandate.[1] Thus, its Distribution Network Operators (DNOs)[2] are not allowed to procure DG. The distribution licences require DNOs to connect generators on a first-come first-served basis without any discrimination between different types of generation. One of the main problems that DNOs are facing now is the significant increase in the number of connection applications and the low rate of acceptance of DG connections. The elimination of the up-front assessment and design fees has contributed to this increase [3].

The current regulatory framework in Great Britain mandates common national policies for the connection of DG customers (set in the Distribution Licence). DNOs are not encouraged to lead specific competitive processes for the connection of more DG with a focus on small size DG projects. We are aware of the transaction costs that this kind of mechanism may add, especially to small-scale projects, however we are also aware of the benefits that competitive mechanism may provide in the integration of DG into the distribution grid. The implementation of this mechanism can help the DNOs deal with the increase of DG queries and the low rate of connection offer acceptance, and can encourage more efficient use of the electric infrastructure. This approach may require detailed negotiations between the DNOs and each project that helps to fit the needs of both parties and to reduce unnecessary transaction costs. However, this has worked successfully elsewhere. Even though Feed-in Tariff and quota systems are the most popular renewable support mechanisms, with the number of states, provinces and countries that have respectively adopted them as of 2013 being 98 and 79; the global trend in feed-in schemes is centred on reduction (or even removal) of support [4]. Tendering or auctions are becoming more important: a total of 55 countries have turned to public auctions as of early 2014, in comparison with 9 countries in 2009. Central and South American countries remain the global leaders in renewable energy tenders [4].

This study explores different experiences that promote the connection of cost-effective energy projects (with a focus on DG) by electric utilities and identifies the advantages and disadvantages of the different competitive methods applied. The paper focuses on competitive mechanisms and evaluates the design elements and the associated regulatory framework. In contrast with other studies, which mainly refer to centralised auctions including those related to system adequacy [5,6], this one refers to decentralised competitive mechanisms; those carried out by electric utilities instead of government or energy regulators. This study contributes to the literature on decentralised competitive mechanisms applied to small scale DG. We discuss four case studies from the US. The US is one of the few countries where the actual competitive mechanisms for the procurement of distributed energy resources[3] are well-documented. The case studies refer to competitive mechanisms with a focus on small and medium size renewable generators. Based on the evaluation of the US experience, we identify and discuss the lessons from competitive mechanisms and the way DNOs in Great Britain – as an example of an EU country – may implement a similar approach while taking into account the EU third package mandate.

The structure of the paper is as follows. Section 2 describes the most common competitive mechanism practices for the procurement of renewable generation. Section 3 explores four different case studies from the US with a focus on competitive mechanisms. Section 4 discusses the main findings and lessons of the case studies and proposes the design elements of the competitive mechanism applicable to Great Britain which can also be replicated by other European countries following the EC third package rules. Section 5 sets the conclusions of this study.

2. Current procurement strategies for distributed energy resources

This section introduces the most common practices for the procurement of distributed energy resources by electric utilities using competitive mechanisms. A description of the main opportunities and challenges that each approach offers is presented. Two categories of procurement methods have been identified: Request for Proposals (RFP) and auctions. The RFP is the category that applied most widely in the US. The Feed-in-Tariff (FIT) is also among the most popular schemes for allocating renewable generation capacity. Even though it has advantages (e.g. guaranteed payment, certainty to generators, lower administrative costs), one of its main drawbacks is that FIT prices do not target the most cost-efficient projects. This may have a negative impact on electricity customers. FIT prices are set administratively, thus the chance of overcompensation is high. An extended explanation of additional categories, including FIT, can be found at [7].

2.1. Requests for proposal (RFP)

RFP is one of the main mechanisms in the US used to achieve a state level mandatory Renewable Portfolio Standard (RPS) in the promotion of renewable energy generation. RPS, a quota system support scheme, is the main regulatory instrument that promotes generation of electricity from renewable resources in the US. As of March 2013, 29 states have adopted a RPS, 8 states and 2 territories have adopted renewable portfolio goals.[4] Other countries such as the UK, Belgium, Chile and Italy have also adopted this mechanism [8]. RFP involves a bidding process that can take different forms (i.e. pre-qualification following by single round of sealed bids and then selection based on “Least-cost/Best-Fit”[5] basis). Its design and

[1] Around 50% of the countries have already transposed this article into national law [2].

[2] This term refers to DSO in Great Britain. DNOs hold a licence that enables them to operate in a monopoly regional distribution service area.

[3] Distributed energy resources is a broad concept that includes not only small scale off-grid power generation (distributed generation) but also energy storage and energy management.

[4] See: http://www.dsireusa.org/documents/summarymaps/RPS_map.pdf.

[5] The Least-cost best-fit is specific RPS statute applicable in California that helps to rank the selection of least cost and best fit renewable resources. Least cost bids are those with the lowest costs (direct and indirect including those for the integration of the resource and transmission investment) that fit the best to their