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The Role of Distribution Network Operators in Promoting Cost-Effective Distributed Generation: Lessons from the United States for Europe

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The cost-effective integration of distributed generation (DG) in the electricity grid is challenging for Distribution Network Operators (DNOs). DNOs play an important role in DG integration and are required to look for different procurement mechanisms in agreement with their needs and regulatory environment. In Europe, Distributed System Operators (DSOs or DNOs in the UK) are subject to specific unbundling rules based on the 2009/72/EC-Electricity Directive). The Directive requires the separation of the vertically integrated energy firms, from those activities not related to distribution such as generation, transmission and supply. DSOs with less than 100,000 customers are excluded from the Directive.

In the UK, DNOs are dealing with a substantial increase in DG connection applications and a low rate of acceptance of connection offers. Potential DG customers that apply for connections are required to be considered on a first-come first-served basis. National policies do not allow the implementation of competitive mechanisms by DNOs for the integration of DG within the distribution grid.

We explore different experiences of decentralised competitive mechanisms to promote the connection of renewable capacity with a focus on distributed generation. Four case studies from the US have been analysed. The procurement methods used by different electric utilities operating in California, Colorado, Oregon and New York have been evaluated. Two methods have been identified: requests for proposals (RFP) and auctions. Both methods are examples of competitive mechanisms, however there are some important differences. RFP, the main regulatory instrument that promotes generation of electricity from renewable sources in the US, involves a more complex evaluation process. This process is subject to qualitative and quantitative evaluation criteria and, in many cases, requires the use of computer modelling to identify the most cost-efficient portfolio. In addition, an individual RFP

may refer to a specific renewable energy resource or a combination of both renewable and non-renewable energy resources. RFP is also associated with the procurement of renewable generation for large-scale generators. Three out of the four electric utilities evaluated use the RFP approach. A renewal auction mechanism (RAM) is applied in California and similar to the other three cases, the mechanism is approved by the Public Utility Commission. RAM is mainly focused on small and medium scale-generators and the selection of bids is mainly driven by price alone. In both cases the bid price (non-negotiable) includes not only the energy price but also any additional costs such as transmission upgrade costs (if required), O&M, ancillary services. This encourages the selection and implementation of the least expensive projects in terms of tariffs and connection costs. Additionally, both mechanisms require the appointment of an independent evaluator to manage the bid solicitation and also requires the online publication (in advance) of specific power purchase agreements (for each type of technology in some cases) which helps to accelerate the evaluation of the different offers.

RFP and RAM represent two different well-developed competitive mechanisms that allow the selection of the most cost-efficient DG projects. For instance, in RAM it has been shown that the average bid price from consecutive auctions has decreased over time. These two schemes also represent well-documented decentralised competitive mechanisms carried out by electric utilities. Thus, we believe that a similar auction design can be put in practice by European DSOs, taking into account the EC third package rules regarding unbundling. We propose an auction mechanism that allows the allocation of the available DG capacity at a particular Point of Connection (POC) to be determined by the utility. Each DG bids a maximum willingness to pay per MW of connected capacity, subject to a minimum value which covers the cost of connection. Scarce connection capacity can be allocated on the basis of the highest firm bids for connection at each POC. However, the option of including in the bid price the cost of energy is also possible in association with third party purchaser of energy (i.e. local suppliers). For those with less than 100,000 customers, EU unbundling rules do not necessarily apply and a similar process to California's RAM can be followed.

In general, similar behaviour is observed in both RFP and RAM in the way in which competitive mechanisms are managed. The bid prices should reflect the overall costs/benefits in order to make proper comparisons among competitors. The four case studies refer to vertically integrated electric firms however we discuss how such mechanisms can be applied to DSOs taking into consideration the EU third package. Competitive mechanisms can not only contribute to the selection of the most cost-efficient projects but also help DSOs to manage the increase in the number of DG connection enquiries.

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