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Take-or-pay contracts for renewables deployment

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Abstract

Renewables require support policies to deliver the European 20% target. We discuss the requirements for least-cost development and efficient operation and quantify how different schemes (i) allow for the development of a renewable energy technology portfolio; (ii) reduce rent transfers to infra-marginal technologies or better than marginal resource bases and (iii) minimise regulatory risk and thus capital costs for new projects.

Long-term take-or-pay contracts minimise regulatory uncertainty, create appropriate incentives for location and operation, allow for efficient system operation and seem compatible with European state aid. We discuss how property rights legislation protects existing renewables investors, and thus can ensure ongoing investment during a transition towards the new scheme.

JEL classification: L50; L94; O31; P14

Keywords: Renewable support policy; Transition; Regulatory risk

1. Introduction

The UK target is to produce 15.4% of electricity from renewables by 2015 and has expressed an aspiration to source 20% of its electricity from renewable generation by 2020 (DTI, 2003). If the government also aims to achieve the recently announced 30% emission reductions by 2020, a larger share of renewables will be required. Further reductions, e.g. towards the 60% reduction target by 2050 (DTI, 2003) will greatly rely on the mixing of different renewable technologies. Yet, experience in the UK and in other European countries suggests that the current UK policy instrument for the promotion of renewables deployment, the Renewables Obligation (RO),[1] struggles to deliver on deployment effectiveness, cost efficiency and technological diversity.

First, the support is not differentiated for different resource quality and thus the RO either pays too much for deployment at very favourable locations or too little for deployment at slightly less favourable locations or off-shore. In theory, the RO scheme could be banded to provide different support levels for different technologies or locations. This would create additional flexibility for the regulator but make the practical prediction of future ROC prices virtually impossible for investors.

Second, investors face significant regulatory risk. (a) It is difficult to anticipate the future value of ROCs as this is subject to future policy decisions like the renewables target, the eligibility of different technologies and of co-firing, and the possible implementation and subsequent adjustment of banding schemes. (b) While renewable technologies are not directly participating in the European Emission Trading scheme, the scheme affects the marginal generation costs of fossil generation, and new entrant allocation and closure

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[1]The RO came into force in April 2002 and it obliges all licensed electricity suppliers in Great Britain to supply a specific proportion of their yearly electricity sales from renewable sources. To prove that they have supplied their UK customers with an MWh of green electricity suppliers have to present Ofgem with a Renewable Obligation Certificate (ROC). If they cannot match their requirements with ROCs, suppliers have the choice to 'buy out' their obligation at 3 p/kWh (rising annually with RPI). The funds raised are redistributed to the suppliers that complied with the obligation using certificates.

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conditions can also influence the scarcity value of generation capacity. As the ongoing evolution of the scheme is uncertain together with future scarcity prices of allowances, it is difficult to anticipate future power prices and thus revenue. (c) The UK electricity market design is most likely to evolve to allow an efficient operation with increasing penetration of intermittent generation and new flow patterns. This will expose individual actors to the cost of congestion management, locational losses and will improve the system's response to intra-day re-scheduling and balancing demands. Renewable technologies are relatively more exposed to these changes. Many renewable technologies exhibit low capacity factors such that grid costs are relatively more important, and the prediction of wave, solar and wind output is less accurate such that they are more exposed to intra-day and balancing costs. Consequently, the regulatory risk from changes to the market design is significantly higher for renewable technologies than for conventional technologies. This makes it difficult for independent project developers to finance renewable projects. Thus, the involvement of utilities is required, either as counter-party for long-term contracts to back independent project development or to conduct investment themselves. The risk results in a premium on the capital costs, or rate of return, that is required and thus increases the costs per turbine by 30% (Butler and Neuhoff, 2004, updated 2007).

In environments with significant regulatory risk, the power sector has a long tradition of power purchasing agreements (PPAs). These are long-term contracts between the owner of a power station and the national power sector or the respective government. Most of the investment in the UK power system after liberalisation was financed on the back of such PPAs between regional electricity suppliers and combined cycle gas plants. In the 1990s the non-fossil fuel obligation (NFFO) also offered long-term contracts to renewable projects. The arrangement was changed, not because of the contract structure, but because of the way the contracts were allocated.

Therefore, we suggest that the UK should revisit the idea of long-term contracts for renewable power investment. They need to be evolved in two dimensions, as we will discuss in more detail below. First, the contracts need to be formulated as take-or-pay contracts. This ensures an efficient dispatch of the UK power system without exposing investors to regulatory risk. Second, the timing of selling the contracts has to be adjusted. We suggest that the government or implementing body (e.g. Ofgem) announces on an annual basis a set of take-or-pay contract prices for different technologies and resource sites. Any plant that will be commissioned within 18 months of that day can sign such a contract and then operate under the specifications of the contract for 20 years.

For small-scale projects, the volume of contracts that can be signed should not be limited—thus ensuring that all projects that are viable at the specified contract price and provisions can go forward. This allows project developers to focus on gaining the local support and planning consent, secure in the knowledge that they subsequently will be able to sign the take-or-pay contract. If the contracted volume is unexpectedly high in 1 year, then the specific technology can be made less attractive in subsequent years by reducing the contract prices offered at that time. This allows a smooth targeting of the mid-term deployment objectives for different technologies.

For large-scale projects, like an off-shore wind park, the volume of contracts that would be signed could be limited and market participants would bid in an auction on who is prepared to implement a project at least cost. Under the NFFO auctions, used to subsidise renewables in the UK during the 90s, the 'winner's curse' was a dominant feature. Project developers that bid to provide electricity at lowest costs frequently noticed that they could not deliver at this price and thus the projects were never implemented. Thus we think some obligation to deliver a project—probably using some collateral—would be necessary. It will be a challenging decision as to how much collateral project developers have to post: low posting increases the risk of under-delivery, while high posting increases financial risks for project developers and thus overall project costs. Such requirements are a feature of many large construction projects, and the transaction costs involved can be justified if they are low relative to the overall project volume. As only a limited number of participants will propose off-shore wind parks, such auction might involve price ceilings to avoid exercise of market power (similar to price floors in auctions to access to the UK gas network at terminals that are supplied by few producers). The transaction costs, uncertainty and collateral involved in such an auction restrict the application to large-scale projects.

We suggest that the counter-party for all the take-or-pay contracts will be the grid operator, currently National Grid Transco. The grid operator is in the best position to manage the intermittent supply of energy and determine when to call different renewable generators to produce electricity, provide spinning reserve or remain on standby. The prices to be paid to renewable generators for the provision of these services would be specified in the long-term contracts so as to avoid financial risks. The grid operator would then sell energy produced by renewable energy generators in the wholesale electricity market. This could involve sales in auctions or bilateral sales where the grid operator faces incentive schemes to maximise sales revenue. The remaining difference between sales revenue and costs incurred with the take-or-pay contracts is added to network usage charges, preferably on a per MWh basis. Thus, the result for final consumers would be similar to the current support scheme of the RO, where supply companies add the additional costs of providing renewable energy to customer bills.

Take-or-pay contracts can include differentiated payments according to technology or locally available resource base. As these payments are fixed with the long-term contracts the differentiation does not create regulatory