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Electricity Network Charging for Flexibility

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Michael G. Pollitt

In this paper we focus on the particular problem of how to charge for the electricity distribution network in the light of rising amounts of PV, EVs and distributed electrical energy storage (so called distributed energy resources or DERs). We begin with a discussion of charging principles (cost reflective, public service pricing, platform market and customer focussed business model); proceed to examine the problem of fixed cost recovery; present a case study of how rapidly distortionary charging can become a material issue and note the potential for over-incentivisation of flexibility.

We conclude that the principles of how to charge for electricity networks are various and complicated. Any charging methodology for an electricity network has to deal with the issue of fixed cost recovery. This is effectively a tax, which needs to be levied on network users. The tax rate on an individual network user could be higher or lower, but network fixed costs need to be recovered in aggregate and this will lead to some clear incentives on heavily taxed users to make investments driven by tax avoidance advantages. Given that, in the medium run, up to 90% of network costs are fixed this is a problem.

The rise of DERs offers increased opportunities to exploit the existing system of network charges in ways that were not originally envisaged. Fundamentally changing the basis of charging may be necessary. We discuss an example from South Queensland in Australia that shows how quickly the existing charging basis, based mainly on kWhs, can become a significant issue. One can envisage rapid uptake of PV, EVs or distributed storage posing such charging problems at either the household or business customer level. It seems highly

likely that poorer customers will be disadvantaged by their inability to invest in the sort of flexibility that might be required of customers in the future to keep their bills down.

A final significant issue, we identify, is that new investors in flexibility could capture such a large share of the system benefits that they produce that no net benefit to the existing customers. Going forward, there must be some general advantage to increasing DERs on the electricity system, thus it would be reasonable to expect new DERs to prove that they can deliver wider system benefits, not simply cannibalise existing network revenue. A worst-case scenario is that an increasingly flexible system is one characterised by no lower costs, relative to the status quo, but with a much worse distribution of payments between network users.

There is good news, in that new uses of the network creates opportunities for reallocating charges to new users and away from existing users who may be poor and/or vulnerable. It may also be that solutions as to how to change the charging basis are easily to hand, because we are simply seeing the extension of well-known issues from higher to lower voltages on the network. Where this latter phenomenon is the case, we may straightforwardly need to introduce new dimensions to network charging (such as per maximum kW export / import tariffs) which already exist at the transmission level at lower voltages. However electricity regulators would be well advised to carefully assess the impact of any potential changes to the basis of charging under a large range of potential DER uptake scenarios as part of their future proofing of existing charging methodologies. Such scenario analysis should examine permutations of both the basis of charging (i.e. fixed, per kW import/export, per kWh import/export etc.) and the uptake of multiple DER technologies (i.e. PV, EVs, distributed storage, air source heat pumps etc.).

Contact m.pollitt@jbs.cam.ac.uk
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