File Note

Teleconference with:	**Professor William (Bill) Hogan of Harvard University**
Authority attendees:	**Brent Layton, Susan Paterson, Allan Dawson, Lana Stockman, Carl Hansen, Roger Procter, Jo Mackay, Blair Robertson, Tim Sparks, Barbara Sole**
Date and time:	**17 May 2018**
File note prepared by:	**Tim Sparks**

Application of beneficiaries-pay transmission charging to existing grid assets

Key take-outs

- The Professor spoke with approval of the transmission pricing proposal that the Authority released in 2016.
- The Professor said that there was nothing that he was aware of to suggest that there was anything inefficient or inappropriate in applying beneficiaries-pay charging to existing assets, provided no incentives for inefficient entry or exit are created. He also noted that such incentives can be avoided by using the tools we have considered (such as provision for optimisation of under-utilised assets).

Background

Authority Board members invited Professor Hogan to discuss the merits, or otherwise, of applying a benefit-based charge to existing (historical) assets in the transmission network as well as to future assets. Board members wished to hear from Professor Hogan directly to inform their consideration of this matter, on the basis of his international leadership in the policy debate on cost allocation for transmission networks.

Before the discussion took place, Authority staff provided Professor Hogan with a paper on the pros and cons of applying an area-of-benefit charge to existing grid assets in the New Zealand context (attached).

Discussion

Professor Hogan (Hogan) explained that a key distinction between NZ and the US was that the US does not have a “postage stamp” system whereby costs are socialised throughout the entirety of a system operator’s area (PJM, for example). Instead, the US has a “licence plate” system, whereby prices vary by state.

Hogan approved of the fact that in setting benefit-based charges for transmission investments the Authority was proposing a one-off, ex-ante allocation. That means that the allocation wouldn’t be revisited every year, which makes it a different approach from what happens in the US. He considered this was not trivial; it was an important difference (as it minimises incentives for grid users to inefficiently avoid charges).

Hogan said that if circumstances were to change and the benefits of an investment were no longer as apparent as they were at the time the AoB charge was set, the best principle to apply is "rough justice". He said beneficiaries-pay is a forward-looking concept. This is the counterfactual problem. What to do about the allocation when there is a material change in circumstances is a very difficult problem. You need to have a safety valve. But changing the allocation needs to be rare. You don't want people to be constantly advocating for changes to transmission charges.

Hogan said that in California there has been a chicken-and-egg problem regarding wind farms and transmission lines: you can't get one without the other, but which goes first? This led to a public policy category of investments where the risk is socialised: if they built a transmission line and no wind farms arose, they would socialise the cost. But in the event wind farms did appear they would not socialise the eventual recovery (costs would be paid by the wind farms). Hogan said that if he were advising them, he would do the allocation based on forecast. So if 10 farms were forecast, the first one would get allocated 10%, and so on. It would all be done based on forecast when you do the allocation at the beginning in the original investment case. The remaining 90% is not socialised, just deferred. Collection of funding is phased over the timescale of the arrival of the wind farms. Funding is only socialised if it turns out the wind farms don't show up. You would have a cut-off date.

Turning to recovery of the costs of existing assets, Hogan said that you want to try to find ways to collect that money in ways that are fixed and not a function of volumes. You want charges to be between standalone cost and incremental cost. You want to recover the revenue without affecting decisions at the margin. So look at the aggregate benefits and make sure that fixed charges are allocated in such a way that you don't exceed producer surplus and consumer surplus so there is no incentive to exit and also no barriers to entry. The general expectation is that for an existing transmission asset, there's a lot of room to manoeuvre: these charges are a lot less than the aggregate benefits of being connected to the grid. So you can set these charges in a variety of ways. You can apply beneficiaries-pay charges to existing assets without having egregious effects on efficiency. It's also good to have a safety valve like the prudent discount policy to avoid efficiency problems.

He said there was nothing that he was aware of that was inefficient or inappropriate in applying beneficiaries-pay to existing assets, provided no incentives for inefficient entry or exit are created. He also noted that such incentives can be avoided using the tools the Authority has considered (such as provision for optimisation of under-utilised assets). You want the market to be able to sort out entry and exit without distortions. He said he would only be concerned if the proposal was to redo it [revise the allocation] every year. He noted that there was an arbitrary aspect to this, because of difficulties in setting the counterfactual with regard to historical investments. But the advantage you have here is that the benefits of remaining connected to the grid significantly exceed the costs of the existing assets.

Regarding the possibility that a benefit-based charge could inefficiently distort location decisions, Hogan said that this was a theoretical possibility but probably not a problem in practice. The situation you want to have is that the benefits of being connected to the grid are at least as great as the transmission charge. The benefits will differ depending on where you locate. So having an HVDC charge on South Island generators (for example) doesn't necessarily make it inefficient: you need to look at the net, not just the gross charge. The problematic situations where a beneficiaries-pay charge could inefficiently distort location decisions really don't arise. It's true that there is less incentive to locate somewhere and you certainly want to avoid encouraging someone to locate elsewhere and incur higher costs, but it's unlikely to occur in practice. If you compare bus by bus, [the location distortion problem] is a reasonable statement but it becomes less true as you aggregate up to the level of a region.

Regarding the idea that making maintenance decisions subject to a benefit-based charge could improve the efficiency of maintenance decisions, Hogan said that this was a very good point but you should recast it as: “maintenance is functionally equivalent to new investment”. So you should just treat it as new investment. It’s not an exception, it’s just part of the main story. Hogan said that it may be possible to achieve this improvement in efficiency without applying the AoB charge to existing assets. He said that an alternative way to achieve this improvement in efficiency could be to specify in the TPM that the AoB charge will apply to expenditure on maintenance of existing network assets (as well as future investments).

Hogan said that a key underlying issue that you’re wrestling with is the economist’s assumption that we have a way of charging for residual costs in a way that has no efficiency effects at the margin. Of course this is impossible, and what you’re doing is an approximation to that. The RCPD approach is similar to the approach in Texas, where they have a method called 4CP, which is based on four coincident peaks. You don’t know when they will be before the fact. So there are about 100 hours where it might be the peak. So a cottage industry has developed under which consultants advise people on how to avoid the peak (including by using DG etc). But the system is not constrained, so there is no congestion.[1] Hogan did a report last year on the Texas market with another academic.

Hogan said that in the US, the RTOs all want arbitrary rules, like DFAX [a cost allocation method used in the US that is based on estimated usage, determined via flow tracing]. They want a rule that has a formula that you just apply with no thinking required.

Hogan said that for investments going forward: allocation must be to both generation and load. For sunk costs: this is a question of second-order objectives and making sure you don’t violate constraints about efficiency. There is no specific rule for residual costs.

Hogan said that he did not approve of allocation based on MW-miles. He wouldn’t advise using that approach. Anything that is built around power flows is to be avoided. Eg, Artificial Island. Power flows do not have anything to do with benefits. He said you should be very careful about simplified views of how the electrical system actually works.

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[1] Hogan advised that the 4CP method in ERCOT (Texas) has produced material changes in demand when the system is not constrained. Hence there is a real efficiency loss. And the case provides visible evidence that load responds to prices that are a function of their loads.