Impact of HVDC cost allocation on SI Investment

TPAG Secretariat

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Summary

- **The Electricity Commission suggested that the current HVDC charges confer a competitive advantage to large incumbent SI generators as they face a lower marginal cost of increased capacity than other small generators and new entrants.**
  - **Marginal cost = C * (1- s_i) for a Generator with an s_i share of SI MW capacity, and C = average HVDC charge (around $40/kW/yr – based on around $150m/yr requirement).**
- **Ray Deacon (Rio Tinto) suggests that this is not true and that all generators face the same marginal cost of increased capacity (regardless of market share).**
  - **Marginal cost = C for all participants.**
- **This note shows that both claims can be true, depending on what the increment of SI capacity is likely to displace.**
  - **If the increment is certain to displace another increment of SI capacity (on a 1 for 1 basis) then Ray is correct and MC = C = $40/kW/yr for all SI generators.**
  - **If the increment does not displace/delay any other SI capacity then the Commission is correct and MC = C * (1- s_i) which varies by company**
  - **Otherwise the MC is between these two extremes.**

Analysis

- **The average HVDC charge = C = R / G ($/kW/yr)**
  - **The HVDC cost = R is fixed, and G = total SI generation MW.**
- **If there is an increment of SI generation then the new entrant picks up a share of the HVDC cost and all incumbents benefit from a reduction in C.**
  - **For a small increment the HVDC price is C**
    - The marginal benefit for incumbents is $s_i * C$
  - **If counterfactual is no SI investment by another generator:**
    - The net cost for an incumbent = cost – benefit = $C – s_i * C = C(1 – s_i)$
  - **If counterfactual is 1 for 1 SI investment by another generator:**
    - The net cost for an incumbent = loss of benefit without investment + net cost
    - $= s_i * C + C – s_i * C = C$
- **This analysis is agreed and only the counterfactual is in dispute:**
  - **NERA (NZ Transmission pricing Project Aug 2009,**
  - **Appendix to Q5 of Norske Skog submission on Transmission Pricing Review (Sep 2010), etc**

Most likely counterfactual

- **In the medium term NI generation options are likely to be lower than or close to the cost of SI generation options (excluding the HVDC charge).**
  - **Thus the cheapest SI generation options will be competing directly with NI options. There can be no certainty that a new SI investment project will displace another SI project.**
- **Example:**
  - **Suppose both Meridian and a new entrant have SI generation options with a project cost of $90/MWh (Capacity Factor=40%), and these are in competition with NI generation options at a cost of $97/MWh.**
    - The SI new entrant's marginal HVDC cost = $40/kW/yr = $11.4/MWh, so total cost = $101.4/MWh.
    - Meridian's marginal HVDC cost = (1-0.7)*$40 = $12/kW/yr = $3.4/MWh so total cost = $93.4/MWh (if it displaces the competing NI generator)
  - **It is clear in this case that if Meridian can compete with the NI option, a new entrant with the same cost will not, hence Meridian can build but the new entrant can't.**
    - This will result in a lessening of competition in the SI.
  - **Meridian can even build if its project cost is higher than the new entrant.**
    - Suppose Meridian had a project cost of $93.5/MWh, it could still just compete with a NI project with a cost of $97/MWh, whereas a new entrant with a lower project cost of $90/MWh would not be able to compete since its total cost including the HVDC charges is $101.4/MWh.

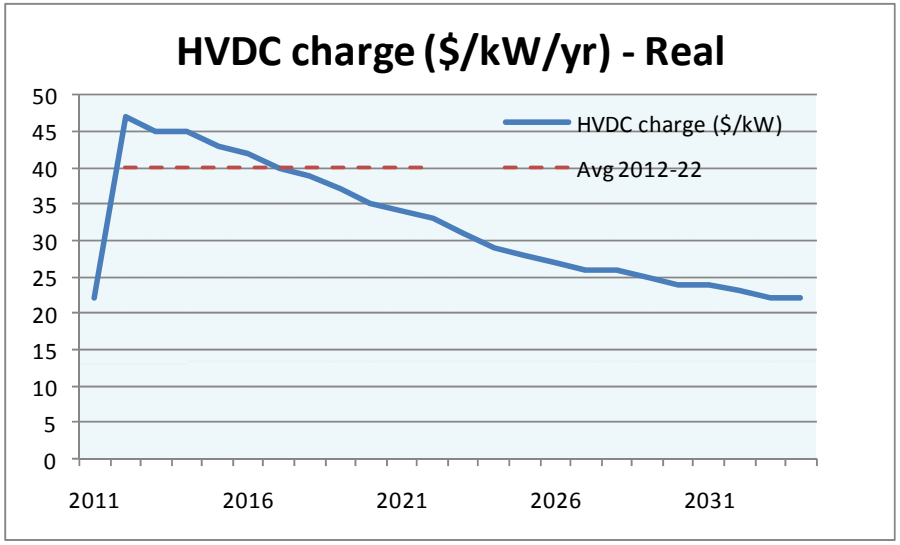
Ray Deacon's Counterfactual

- **The only situation where Meridian can be sure that Ray Deacon's counterfactual will occur is if:**
  - **there is a band of SI generation options which are all clearly cheaper (including the full HVDC charge) than the lowest cost NI options, or**
  - **there has been so little investment in the SI that SI reliability is threatened (even with maximum support from the NI via the HVDC) and new capacity is required in the SI.**
- **In these situations all SI generators face approximately the same HVDC charge = C.**
  - **Note that in this case SI energy prices must rise to cover both the project cost of the block of new SI capacity, and the full HVDC charge.**
  - **If the SI options have a 40% Capacity Factor then SI energy prices would need to be at least $11/MWh higher than the project cost to justify building.**
  - **If HVDC charges were recovered from customers rather than SI generators then:**
    - Competitive SI energy prices should be around $11/MWh lower than they would be otherwise be in the long-run
    - Customer Transmission charges should be around $4/MWh higher ($150m spread over total load)

Impact of Allocation on a MWh Basis

- **It is possible that the HVDC could be allocated on a MWh basis rather than HAMI.**
  - **The shares by company are similar to MW (see next slide).**
  - **The average MWh charge will need to be around $9/MWh (to recover $150m over around 16,300 GWh SI generation).**
  - **The full additional charge for new wind would be around $9/MWh compared with $11/MWh (assuming a capacity factor of 40%)**
- **The same broad conclusions as for a HAMI allocation hold with respect to impact on competition.**
  - **However:**
    - MWh allocation would reduce distortions in design of new hydro and wind (bias towards higher capacity factor design at cost of wind and hydro “spill”).
    - MWH allocation would reduce investment and competition distortions in very low capacity peaking capacity in the South Island.

Appendix



Estimated HVDC revenue requirement used in GEM runs.

We have used $40/kW/yr as representative of average charge for 10 years post Pole 3 commissioning.

SI Generation Shares	GWh	MW
Meridian	69.3%	70.8%
Genesis	6.0%	5.6%
Contact	22.3%	21.4%
TPW	2.5%	2.2%

The SI generation and MW shares are estimates based on publically available historical data.

Note that the cost allocation on a GWh basis appears to be similar to MW.