



# *Dispatch Based Transmission Pricing*

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# *Background*

Understanding the Project



## *HVDC Transmission Charge*

- ❖ Instead of assessing beneficiaries of the HVDC link, we have proposed a utilisation tariff
  
- ❖ Explore the effects this charge might have in the New Zealand market
  - Inefficiencies
  - Water values



## *HVDC Transmission Charge*

- ❖ Modelled the tariff under **static** market conditions through vSPD
- ❖ Modelled the tariff under **perfectly competitive** market conditions through DOASA

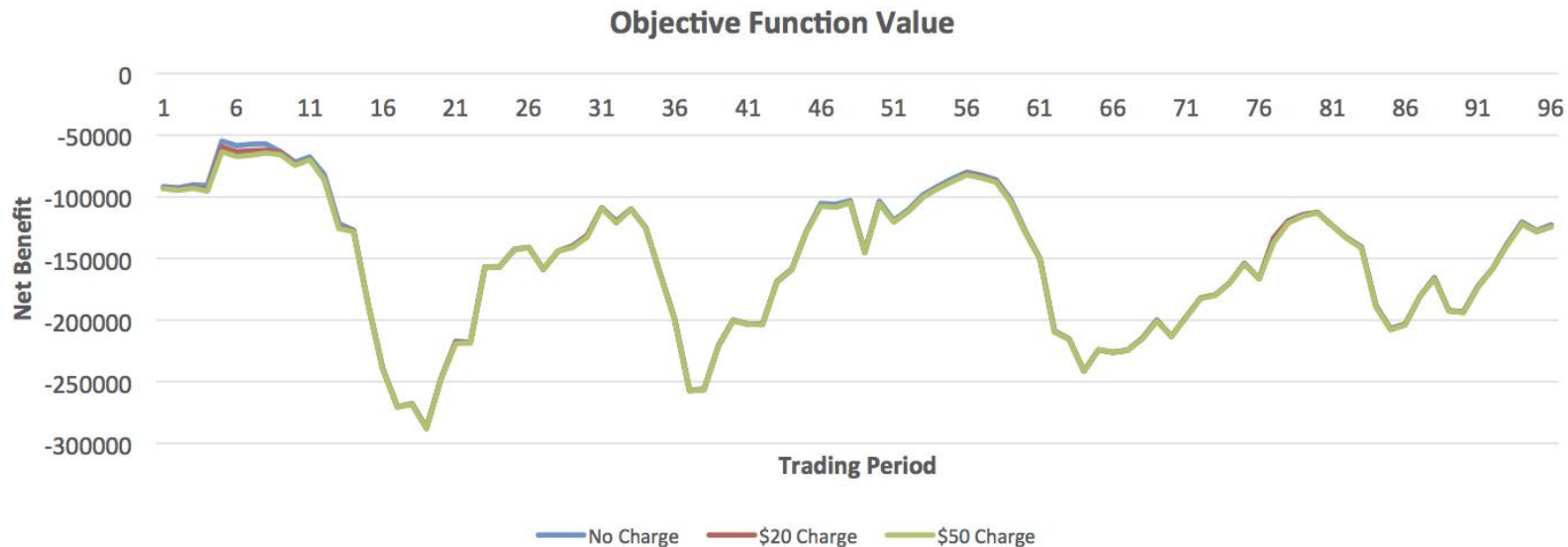
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## *Results*

- 1. vSPD - static market conditions*
- 2. DOASA - perfectly competitive market conditions*
- 3. Simplified SDP - investigation of water value*

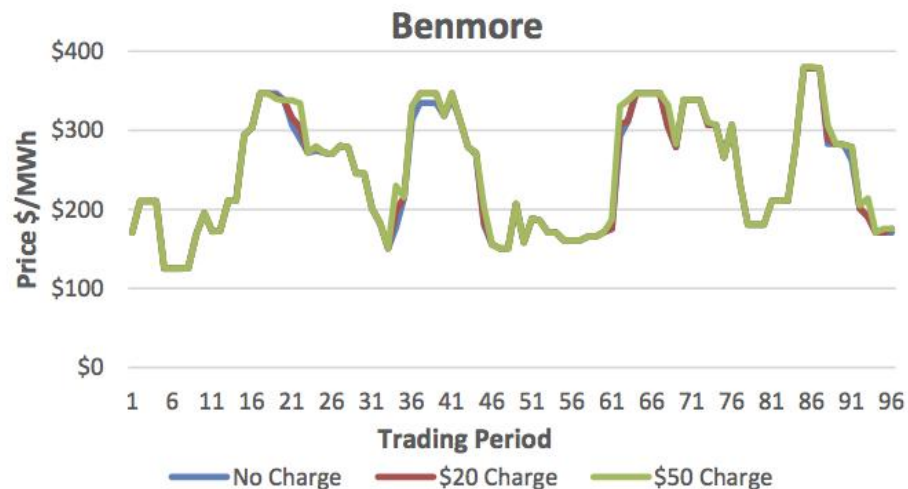
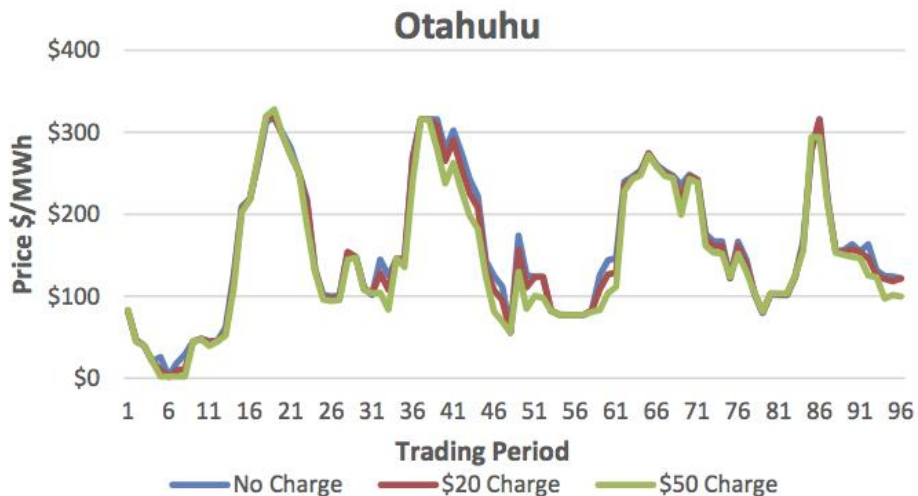


- ❖ In the dry year, 2008, the tariff has almost no effect on efficiency



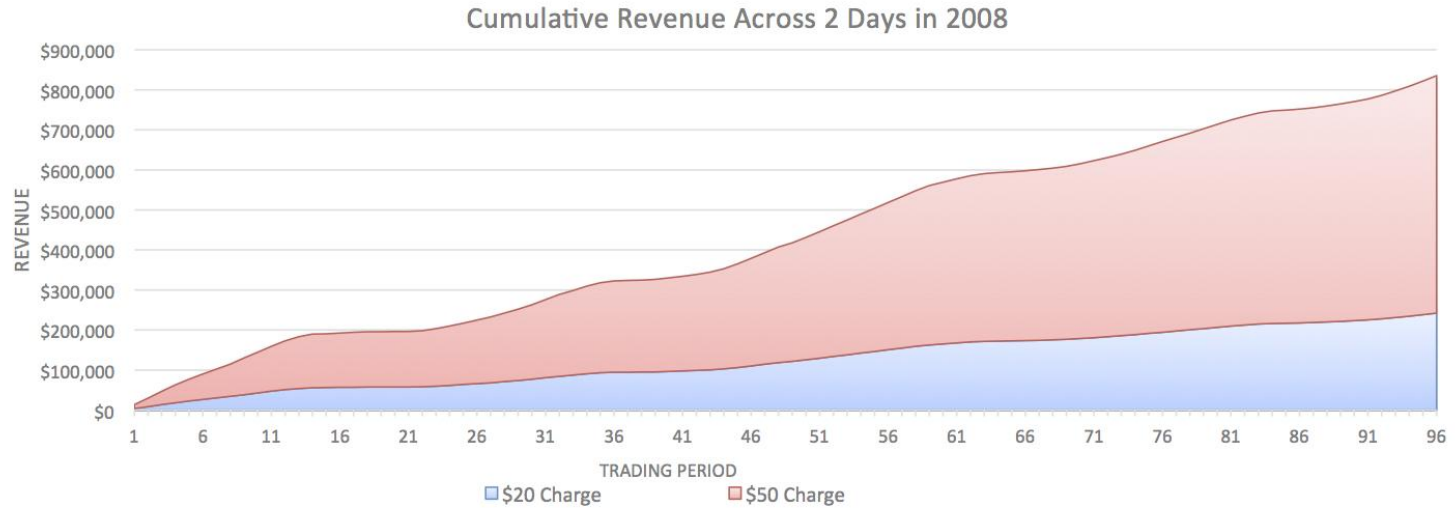


❖ In 2008 the price effects of the tariff are small





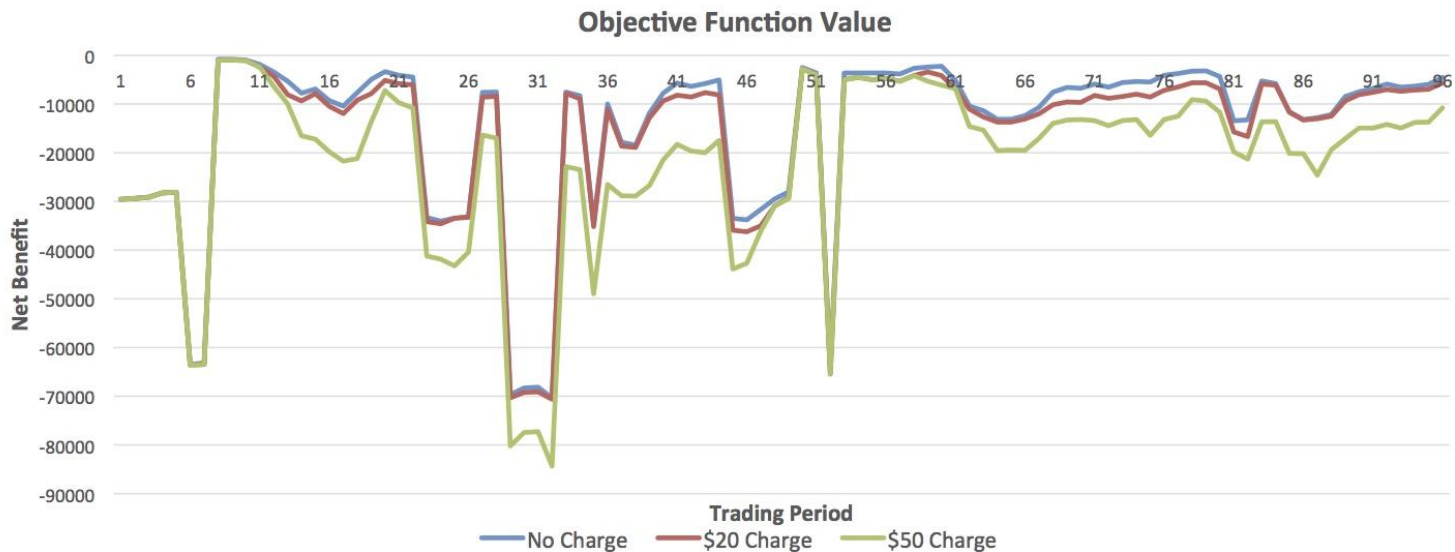
❖ With restricted dispatch, revenue generation for the line isn't an issue in 2008







❖ In the wet year, 2009, the tariff negatively impacts efficiency

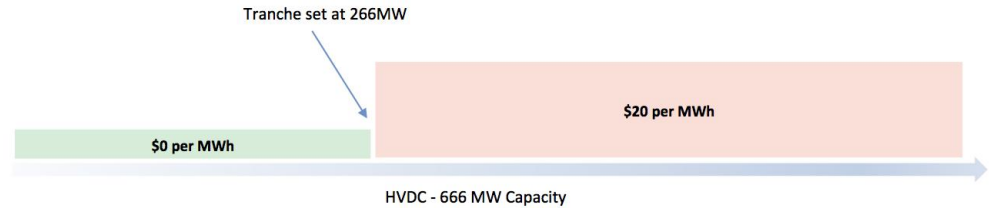


*vSPD*

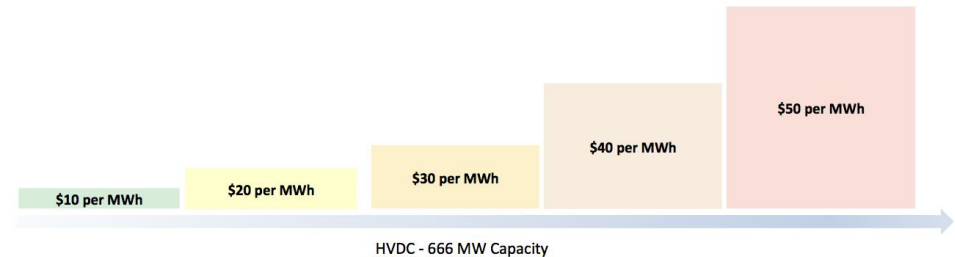
- ❖ How do we fix this?
  - Introduce a tranching tariff model to be used during wet years

❖ Two models:

➤ Two Tranche Model

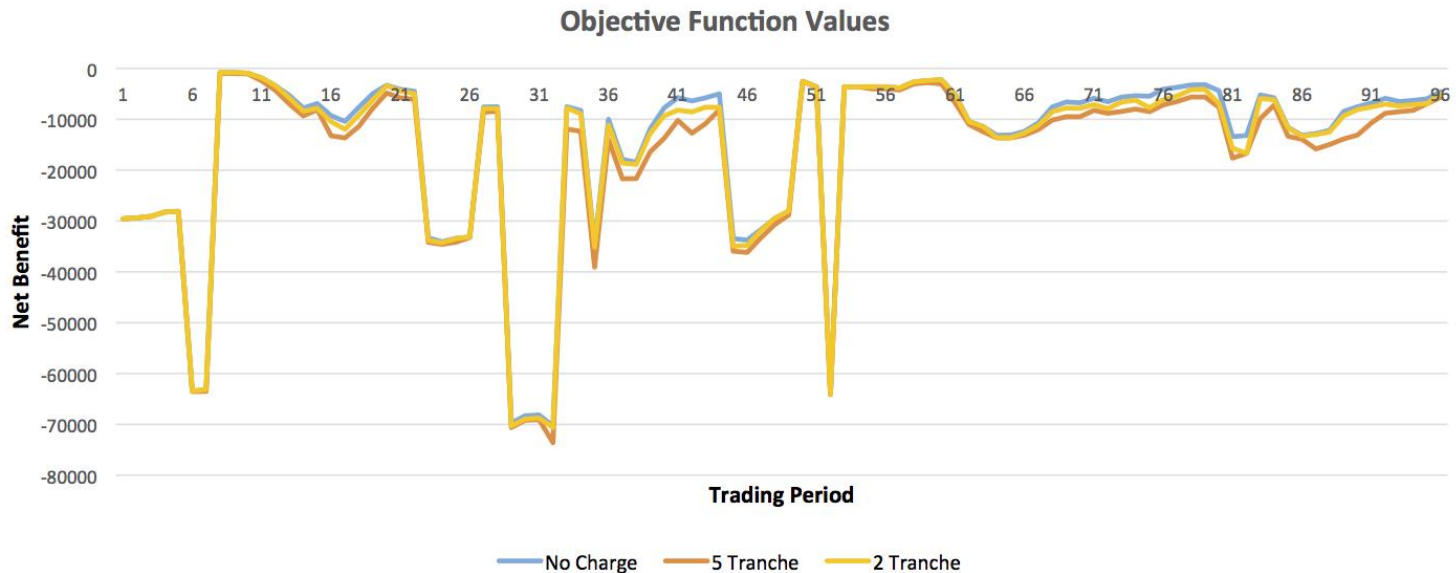


➤ Five Tranche Model



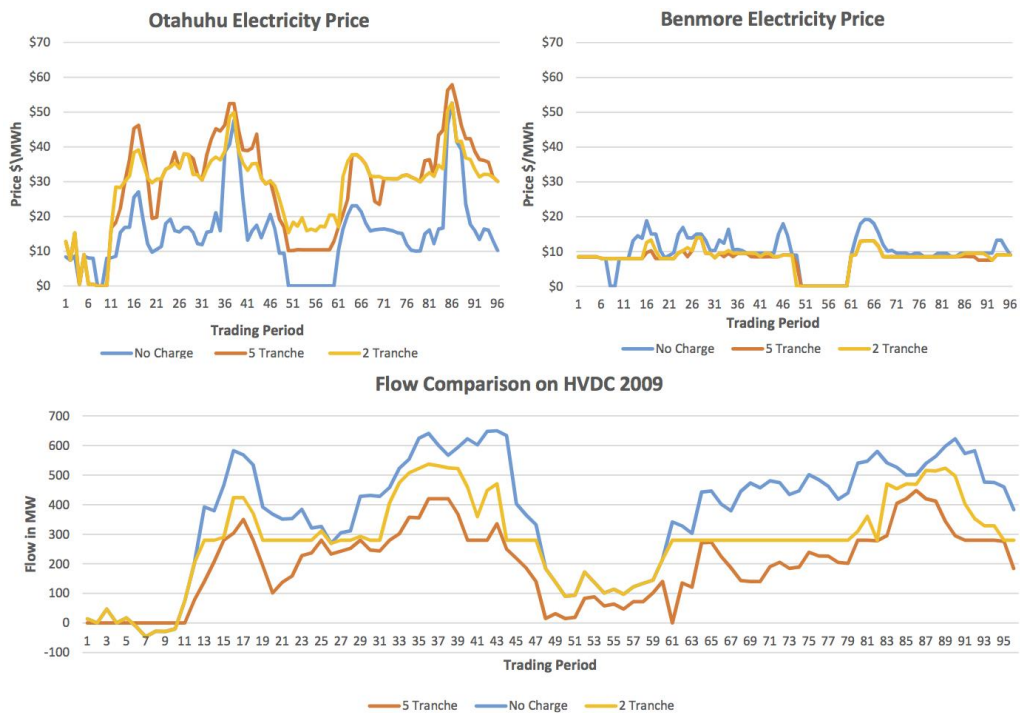


- ❖ With the tranching model, there is an improvement in efficiency loss as shown below



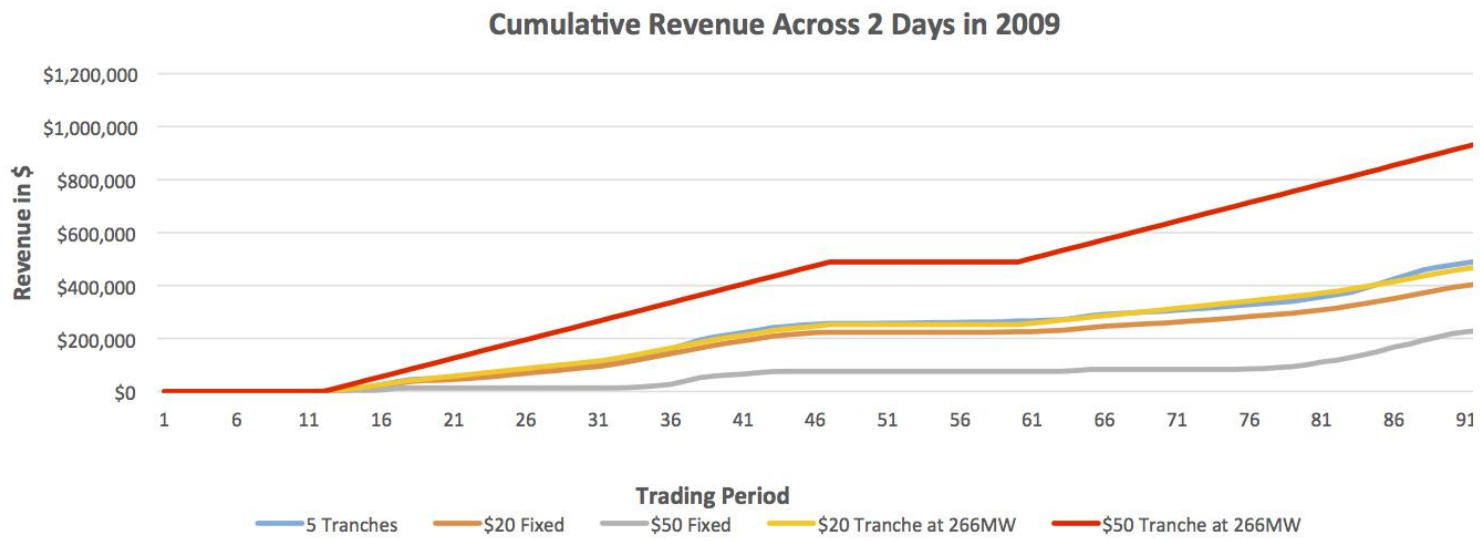


- ❖ The tranching model also has lesser price impacts than the fixed tariff model





❖ The tranching models also generate sufficient revenue in the wet years





### *vSPD Conclusion*

- ❖ In the dry year, the tariff has very little impact on efficiency in the short-term
- ❖ In the wet year, a fixed tariff isn't suitable and a tranching model should be used
- ❖ It would make sense for the system operator to adapt the tariff model to suit conditions within years



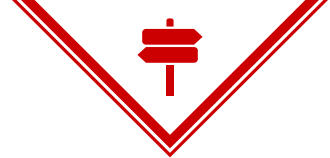
## *DOASA*

- ❖ DOASA is an implementation of the SDDP algorithm for thermo-hydro scheduling in New Zealand
- ❖ Introduced a fixed tariff on the line connecting Benmore and Haywards
- ❖ Investigate in a perfectly competitive market, how the tariff affects water values and efficiency



- ❖ DOASA shows no significant loss of efficiency measured in thermal burn for 2007, 2008 and 2009
  
- ❖ Investigated water value in a simplified Stochastic Dynamic Programme
  
- ❖ Simplified SDP shows different water value surface
  - When lakes are at reasonable levels, water values are lower reflecting lower future value
  - Ensures similar dispatch, however wealth transfers result





## *DOASA and SDP Conclusion*

- ❖ In a perfectly competitive market the tariff doesn't induce any long-term inefficiencies
- ❖ Simple SDP characterises how the water value adapts with the tariff
- ❖ By altering the water value surface, hydro offers recalibrate meaning water is used in a similar way



# *Discussion and Questions*