



**NEW ZEALAND INSTITUTE FOR THE STUDY
OF COMPETITION AND REGULATION INC.**

Competition and Pricing The HVDC element of the Grid

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Lewis Evans

School of Economics and Finance, Victoria University
NZ Institute for the Study of Competition and Regulation

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Outline

- Discussion of peculiarly grid regulation issues
- A quick stock take of the state of “our market”: particularly concerning the interisland link
- Competition and pricing the HVDC interconnection



The Grid

- Has the **function** of transporting (large amounts of) electricity
- Has the **characteristics** of
 - Very large long-lived investments that are sunk
 - Uncertainty represented by changes of demand and generation in total and at locations
 - Poorly defined property rights rendering external effects
- In most jurisdictions there is a grid and it is regarded as a **natural monopoly** although it has competition from
 - Generation locating next to populations
 - Gas pipelines & discoveries



The Grid-Generator Game

- While the grid does not generate electricity it
 - Affects costs by affecting energy losses and congestion
 - Affects the availability of energy to any location by capacity provided for transport
 - Provides generator options to utilise a range of fuel sources
- The Grid and Generation are both
 - Substitutes for each other
 - Complements with each other
- There is thus a game about whether to expand the grid, transport of other fuels, and/or invest in generation at particular locations. These may all (more or less) be sources of competition at a location



Regulation By A Standalone Body Changes The Game

- The grid becomes a leader in the game: one that anticipates other players' strategies that in turn anticipate the grid's strategies
- It has the effect of changing the game, arguably, to one of commitment to grid plans that reduces uncertainty and risk leading to a more coordinated outcome of the grid-generator game, albeit one where the grid is the first mover (RMA willing).
- The grid provides the platform for loads and generators to transact
- We have three regulatory mechanisms: an efficiency objective for the grid owner, the EC and the CC



Grid Connection: the HVDC

- The HVDC is an inter-connector between two markets managed by the grid owner
- Charged to the South Island generators as a
 - fixed sum based on the ODV of the HVDC; less
 - loss and constraint rentals given by

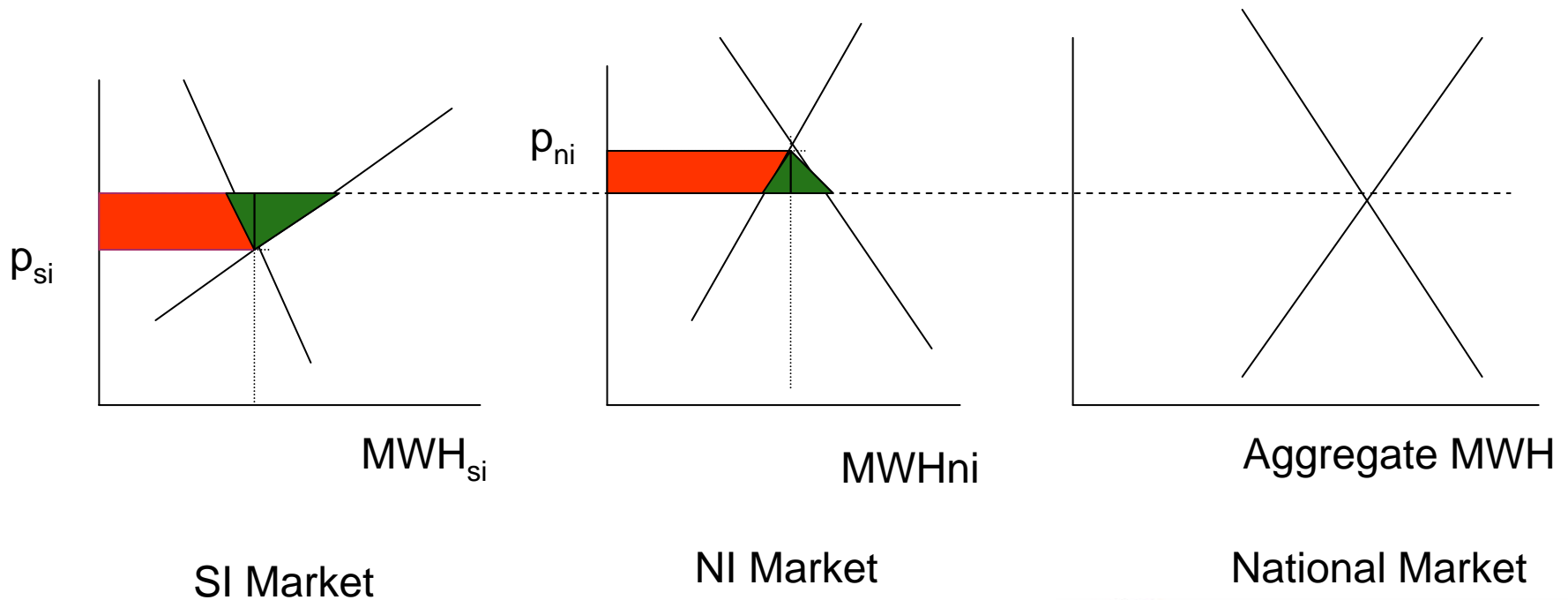
$$|P_{ni} - P_{si}| * \text{MWH trans-shipped (North or South)}$$

P_{ni} will differ from P_{si} only if there is congestion on the link

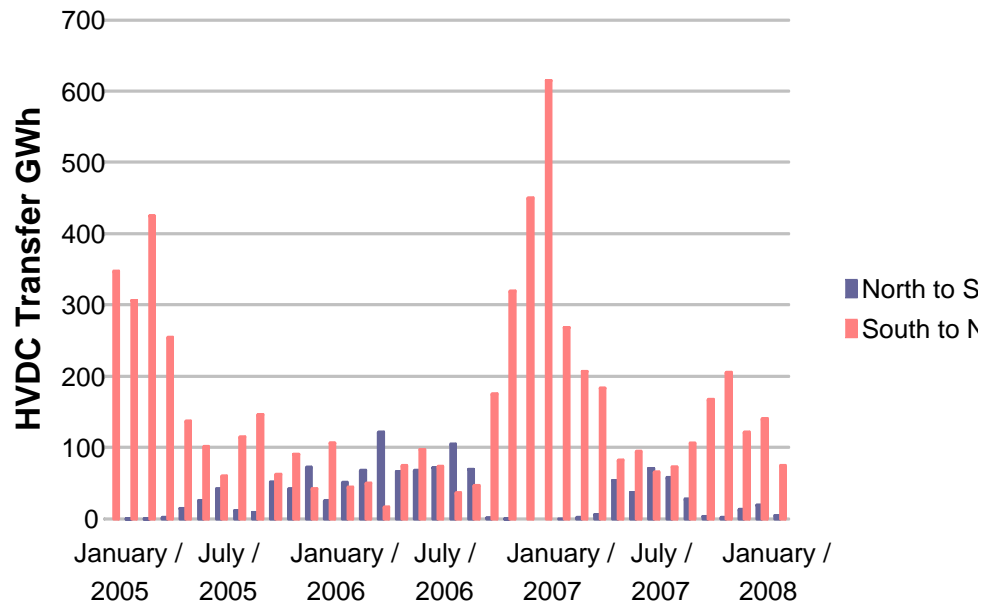
- Allocated among SI generators on the basis of highest grid injection over recent a defined period. New SI entrants draw a charge



Consumer-Producer Gain from Trade in Electrical Energy (North Flow)



Energy: South to North or North to South Actuals 2005 - 2008



Rentals have reduced the HVDC Charge by roughly 16% over 2003-2007.

Range
5.8% - 31%
The higher figures with higher flows



Benefits From The HVDC Connection

- There are national efficiency gains from South to North flow as well
- Energy MWH is not the only benefit: capacity (MW) is a benefit too since it provides access to (responsive hydro) reserves. [the HVDC can be a reserve risk too]
- Other benefits include competition in one market



The role of One Market

- At least between 1996 and 2004 there was “one market” to a close approximation (Evans, Guthrie and Videbeck)
- Facilitates coordination/substitution of fuels with particular characteristics via a national electricity market
- One market means that
 - Load pockets are circumscribed in extent and over time
 - Contracts across nodes can be “confidently” entered into; and
 - Some reliance can be placed on reserves across the country (national market)



One Market and Market Power

- One market mitigates market power:
 - forward contracts and vertical integration reduce dependence on the spot market;
 - contracts across nodes reduce dependence on the spot market
 - reducing load pockets reduces market power in the spot and contract markets
- With one national market competition is determined by the diversity and number of suppliers and the responsiveness of demanders



The State of One Market

The possibility of “one” market is reduced by the de-commissioning of pole 1 (at least 30% the HVDC MW capacity).

Even if, as is planned, capacity is increased by 1/2 pole. Although addition will be useful for NI reserves purposes.



Pricing the HVDC

The interconnection contract produces a nationwide “transaction” platform. So does literature on transactions platform prices inform us about the nature of the contract? Is there a two sided market?



Pricing the HVDC The Present Situation

- South Island generators are charged for the total ODV cost of the link;
- Both consumers and producers are net beneficiaries
(percentages are qualitative indicators only)
 - Consumers (80% NI 20% SI) energy
 - Producers (20% NI and 80% SI) energy and reserves
- Conclusion: it is not user pays pricing



Pricing the HVDC: Static Efficiency I

Efficiency is determined by decisions taken given plant in place

In the short term the fixed charge is a lump sum tax on SI generators and will not materially affect behaviour

Although the loss and constraint rentals are variable in the short-run; they are largely out of the control of SI generators

Suggests not much static inefficiency



Pricing the HVDC: Static Efficiency II

The NI price $>$ SI price affects SI generators in two ways

Providing loss and constraint rentals:

Selling in the SI spot market at a lower price than it pays for energy purchased (net of SI owned contracted NI generation) for resale in the NI

(actual position will be affected by hedges and volatility of the price separation)

Suggesting reductions in participation in the NI (SI) market by SI (NI) gentailers => reduced competition in that market

This result stems from price separation rather than pricing. Decisions might be influenced by the loss and constraint rentals if they became significant



Pricing the HVDC: Dynamic Efficiency

Dynamic efficiency is affected if the timing, amount, or location of investment are affected

The effect of charges on SI generators may well affect plant/entrant location decisions where the “fuel” benefit of location is not strong (locating in the NI instead, may not be closer to demand and may not provide desired reserve characteristics)

It would also be inefficient if it incentivised overt delays in investment (in the HVDC and in generation) as may be the case where SI generators had full control of the HVDC: they do not

Given that the benefits shared throughout the country: if location is affected by the HVDC charges it will not be dynamically efficient



Pricing Variable or Fixed

The optimal charge for large sunk assets is typically a two part tariff approximating the cost structure: dynamically it may not be: particularly where the fixed cost is harder to identify with the user than variable cost

Lump-sum charges are not dynamically efficient where costly actions can be taken for avoidance

Variable (postage stamp) charges while not statically efficient may well be dynamically efficient as the user pays: again identification with actual “use” is a problem in a network (pool), and there is an issue about paying for capacity vs energy



Transaction Platform Economics

The HVDC joins two energy transaction platforms (NI and SI)

Transaction platforms facilitate transactions between buyers and sellers

In the case

- of no indirect interaction in demand it doesn't matter much whether the transaction cost is paid by the buyer or seller: it is cost based (e.g. a universal postage stamp charge)
- Where there is interaction in demand tangential/external to the basic transaction the charge will be affected by demand and may efficiently differ between agents transacting.

External Effects: a) Fast-start reserve for NI generators: does reserve pricing capture this?
b) competition for consumers



THE HVDC

- Is an interconnection between two markets and is critical for a national electricity market
- It is an integral part of the transaction platform that is the Grid and is managed as such: why should its pricing be so different?
- Has direct (energy) benefits consumers and producers nationwide
- Has indirect (reserve capacity) benefits
 - in the NI market particularly
 - competition effects for load
- Present pricing is not user-pay: some form of market wide user pay is almost certainly more dynamically efficient.





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