Locational price risk management – Proposal Briefing

23 September 2010

Agenda

Introduction

Session 1: The locational price risk (LPR) problem

Session 2: Proposed LPR solution

Session 3: How it might work in practice

Session 4: Panel discussion on proposed solution

Session 5: Breakout groups on proposed solution

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Learnings from MDP conference

- Do an integrated CBA of MDP projects
- LPR solution should be simple and flexible
- Different views on timing – scarcity pricing
- Integrate LPR solution with hedge market

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Integrated CBA

- Working draft on Commission website
- Assist further analysis of the MDP projects
- Establish common approach among projects
- Initial analysis only at this stage

Indicative timeline for MDP projects

	Consultation	Rules made	Rules live
Locational price risk	Sep 10	Feb 11	Feb 12
Consumer compensation	Sep 10	Dec 10	Apr 11
Scarcity pricing	Dec 10	Mar 11	Apr 12
Dispatchable demand	Feb 11	Jun 11	Dec 11
	Consultation	**Guidelines**	**TPM effective**
Transmission pricing	Aug 10	Jan/Feb 11	Apr 12

- Timeline is indicative only

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Session 1: The locational price risk problem

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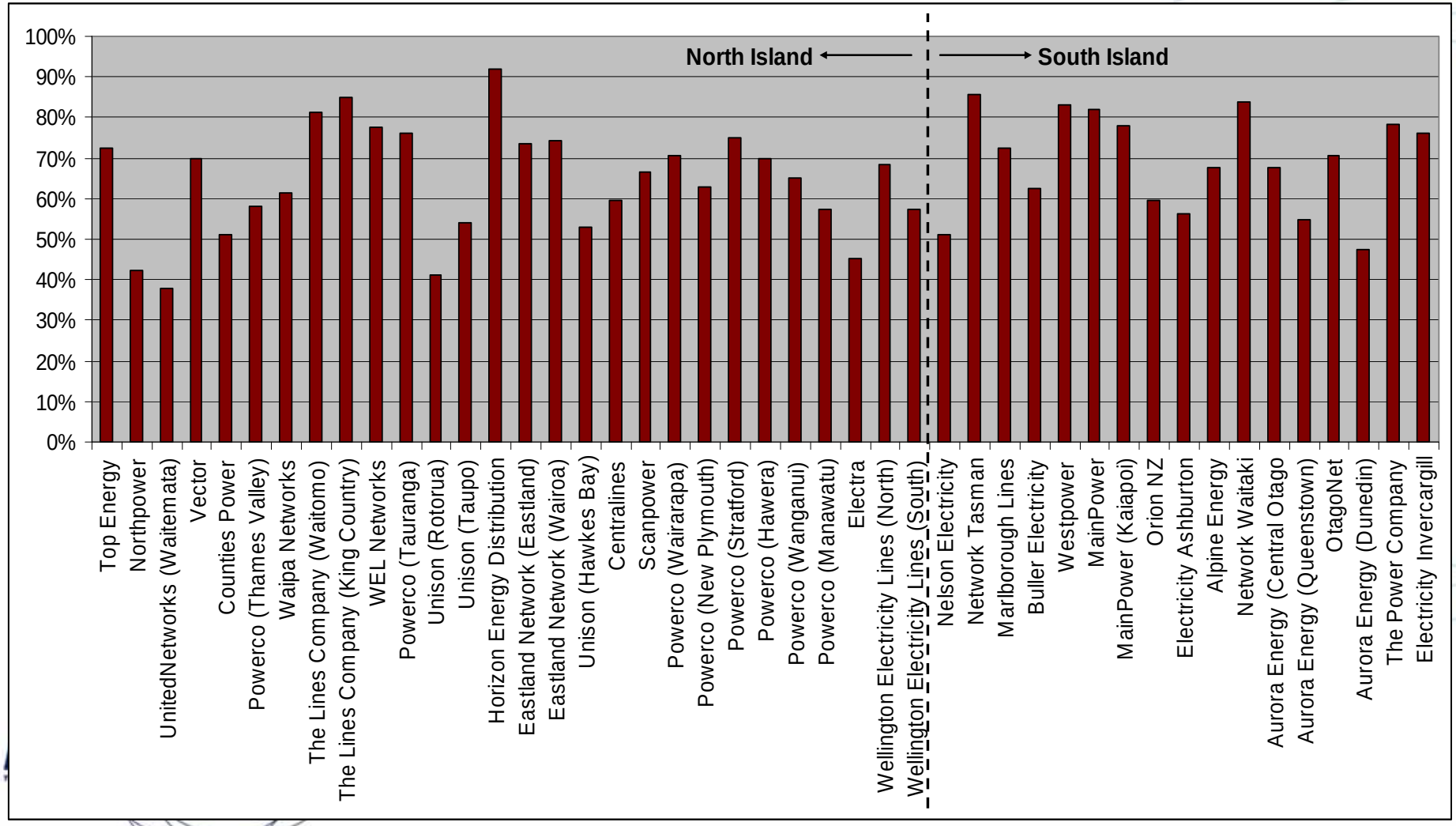
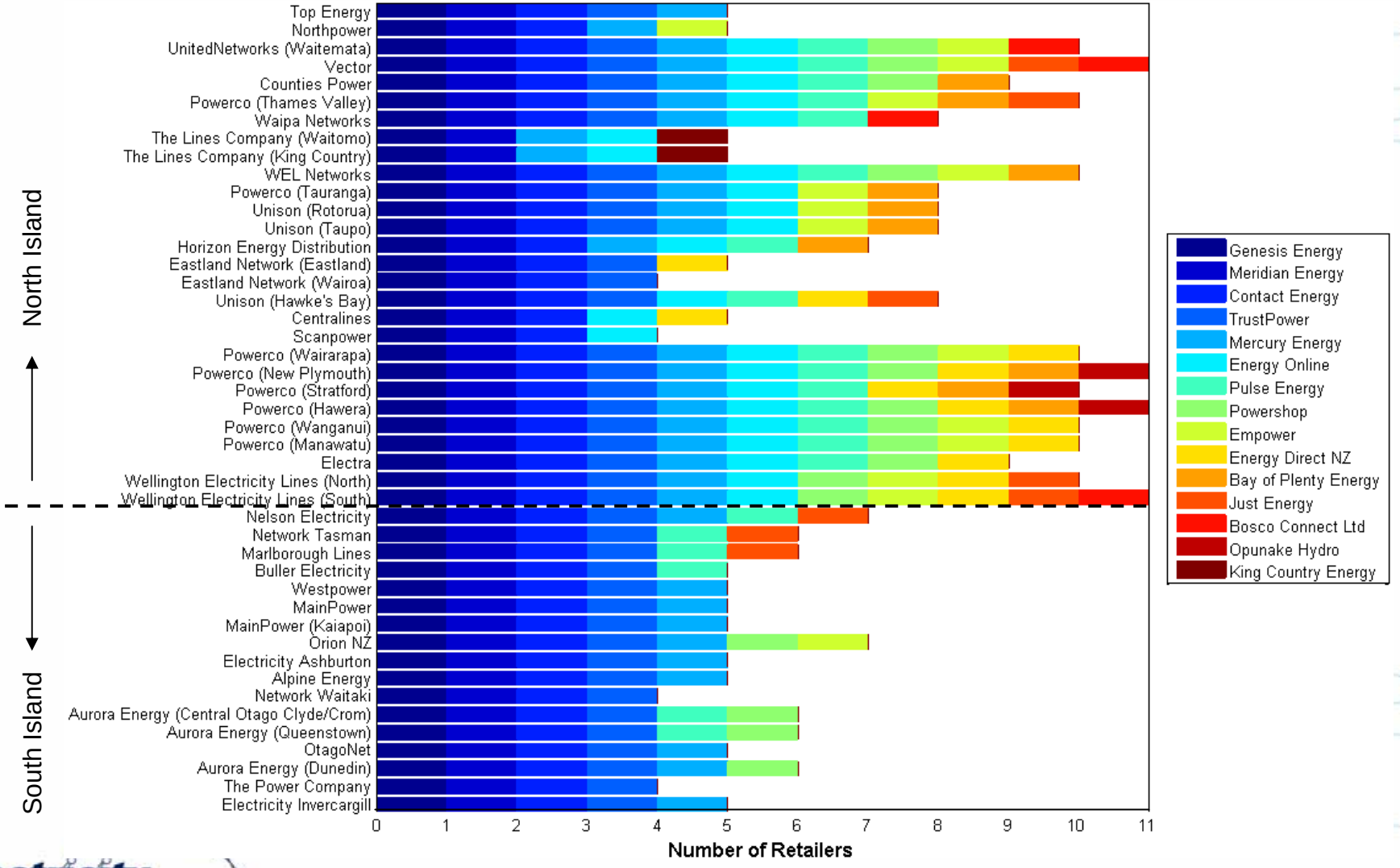
Market Share of Dominant Retailer by Line Company Area



Retailers operating in Line Co Areas

August 2010



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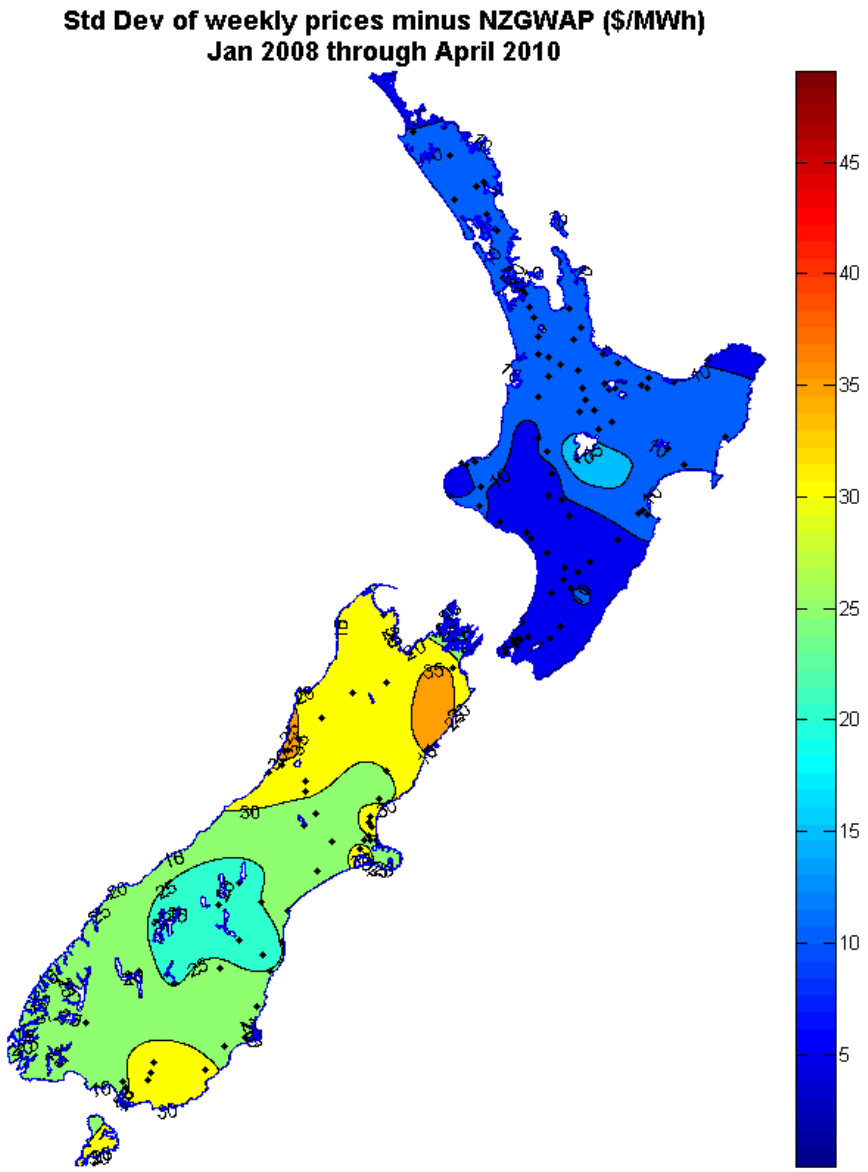
LPR greatest in South Island



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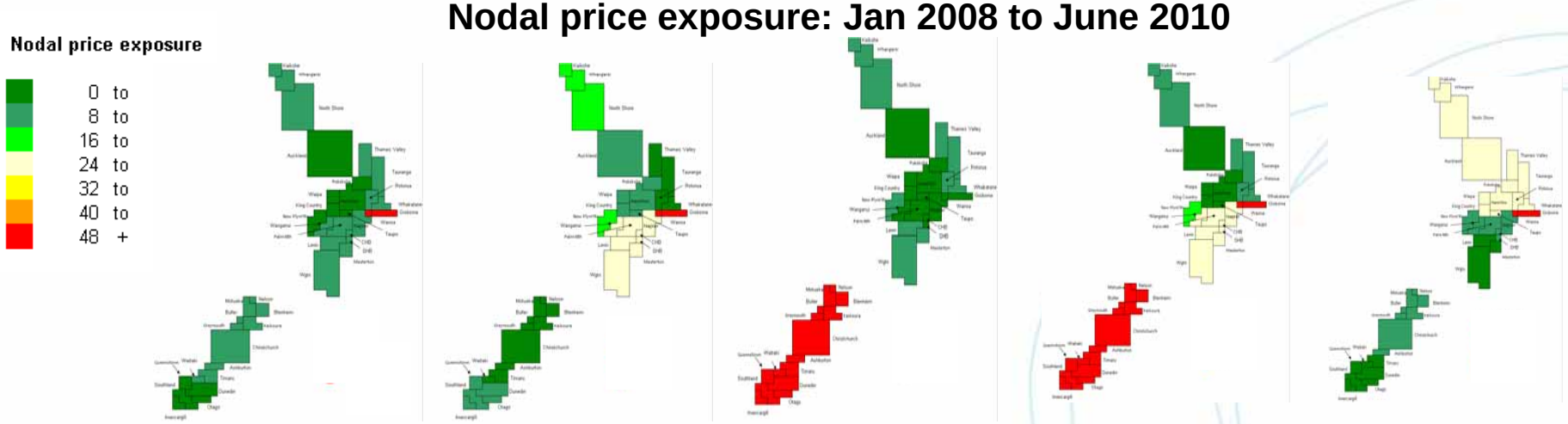
Strong relationship between nodal price exposure and relative market share

Nodal price exposure: Jan 2008 to June 2010

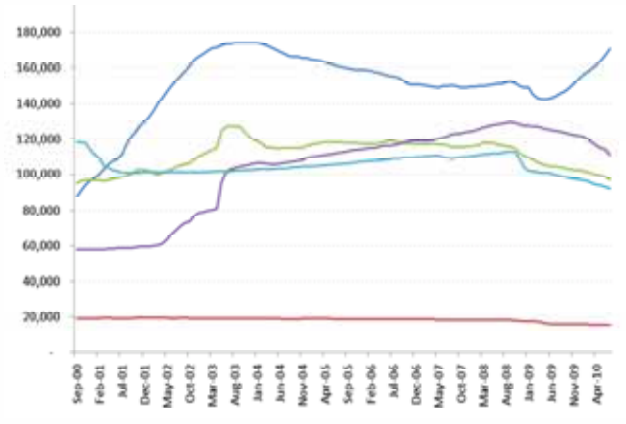


Contact **Trustpower** **Genesis** **Mighty River Power** **Meridian**

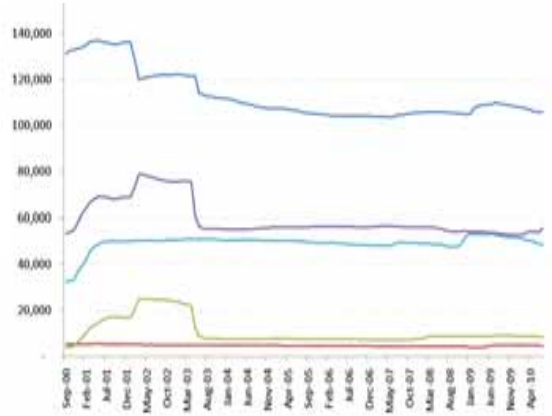
Extent over / (under) weight in ICPs compared to national market share

Relationship has persisted though some change in pattern more recently

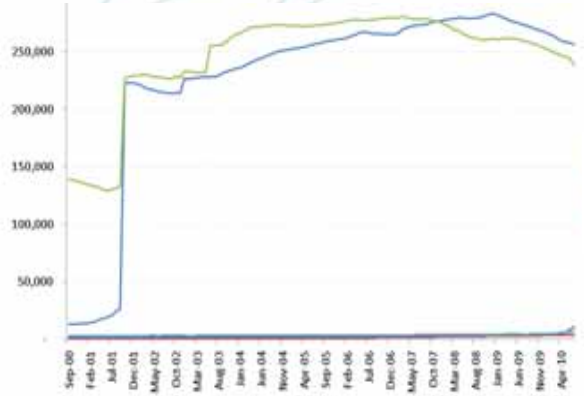
Contact

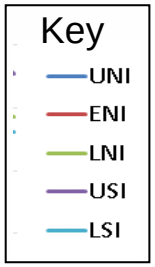


Trustpower

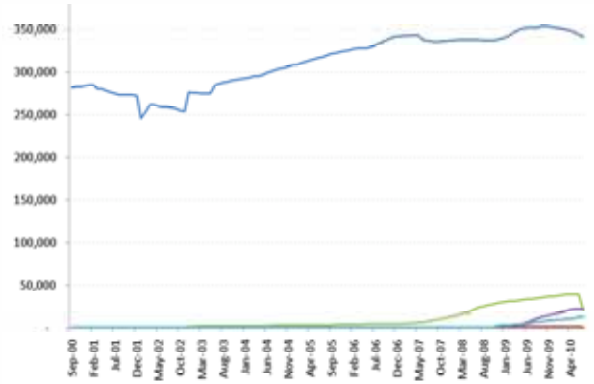


Genesis

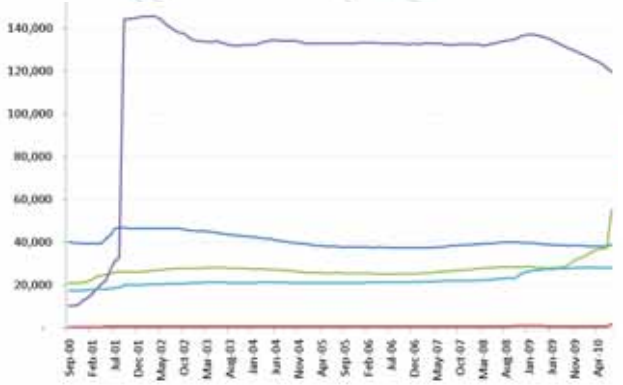




Mighty River Power



Meridian



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Current state of retail competition

- Generally, one dominant retailer in each network
- Correlation between LPR and retailer presence
- Persistence over time

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Sources of LPR - explanation

Constraints

- Branch rating (hard limit)
- Equation Constraints (hard limit)
- HVDC Reserve Constraints (economic limit)

Loss Effects

- Loss Rents (accounts for ~50% of price effect)
- Loss Costs (accounts for remainder)

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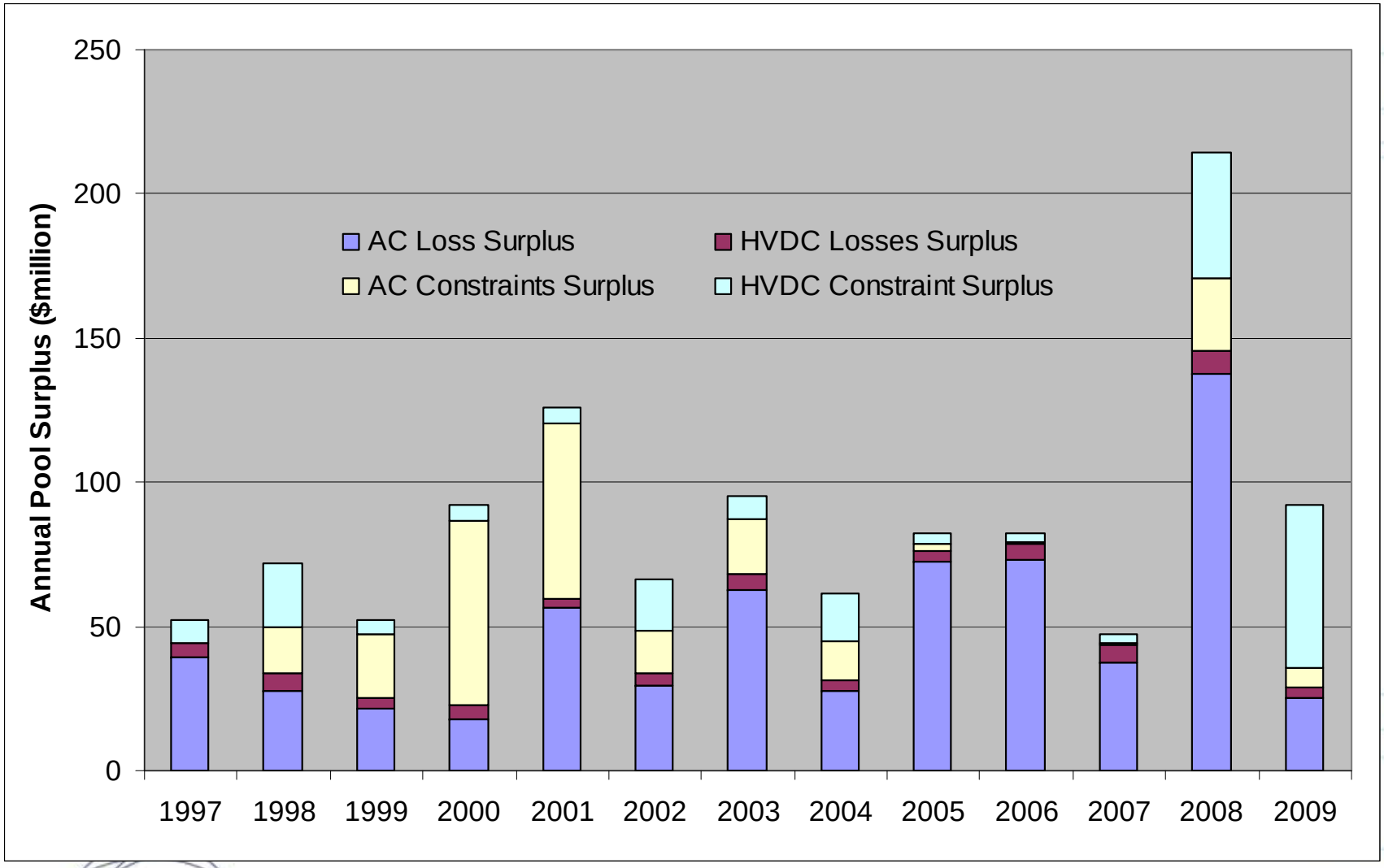
Rentals from different sources



Adapted from Energy Link Ltd, "Long Term Projection on the Constraints Surplus", March 2009

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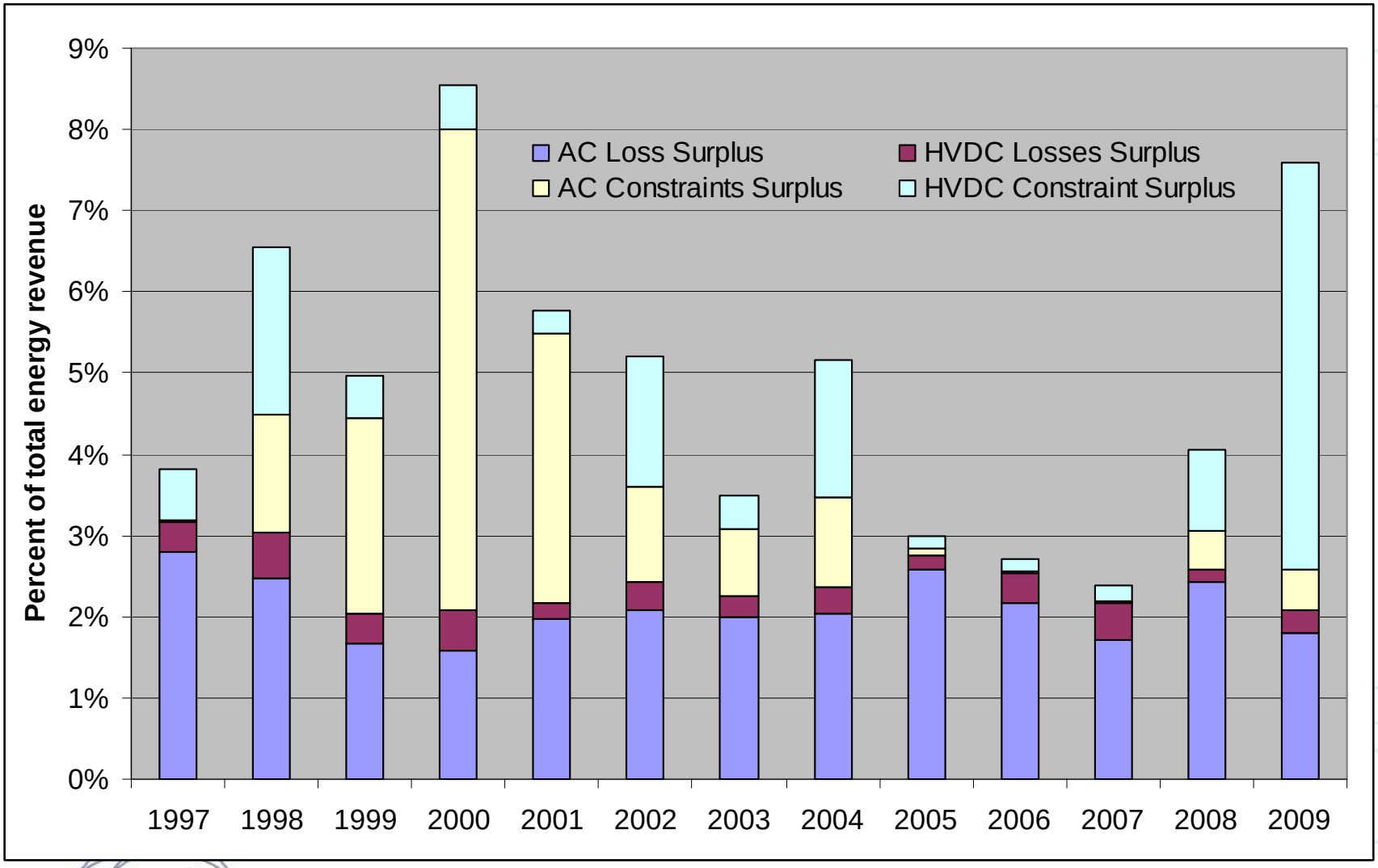
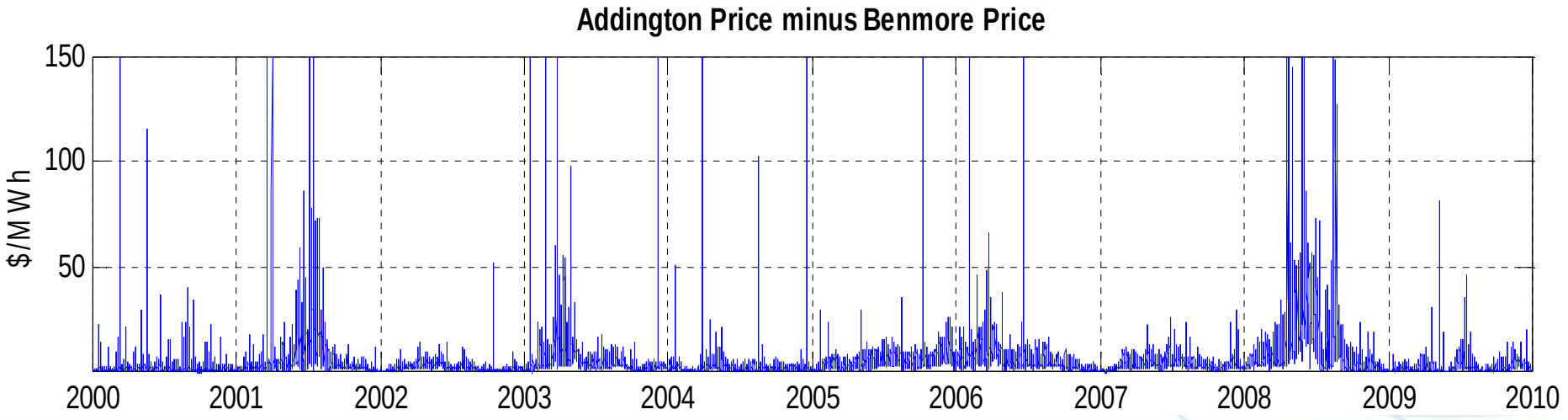
Rentals – percent of total cost



Adapted from Energy Link Ltd, "Long Term Projection on the Constraints Surplus", March 2009

Price volatility between major nodes and local nodes



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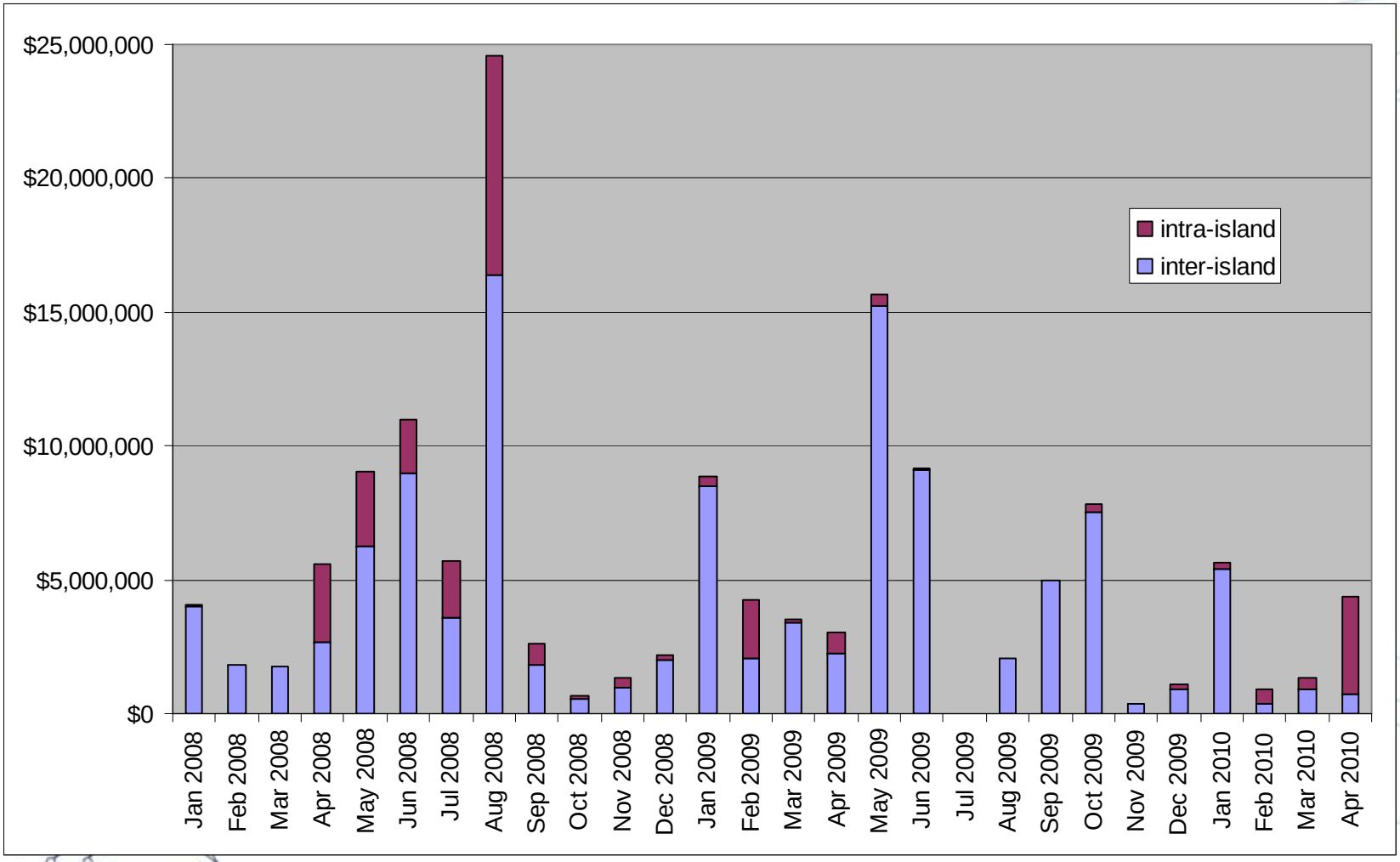
Inter-island versus intra-island Monthly Constraint Rentals



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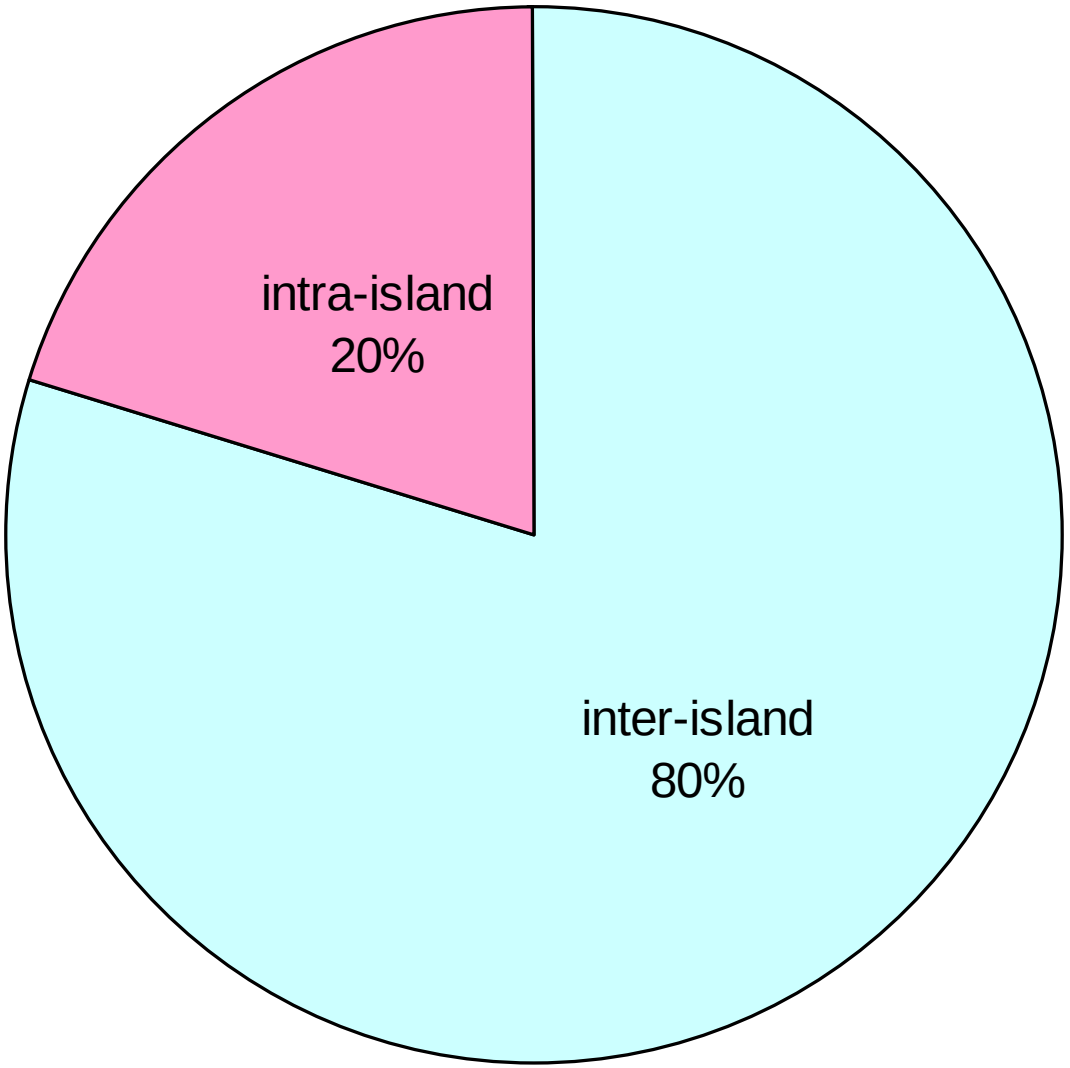
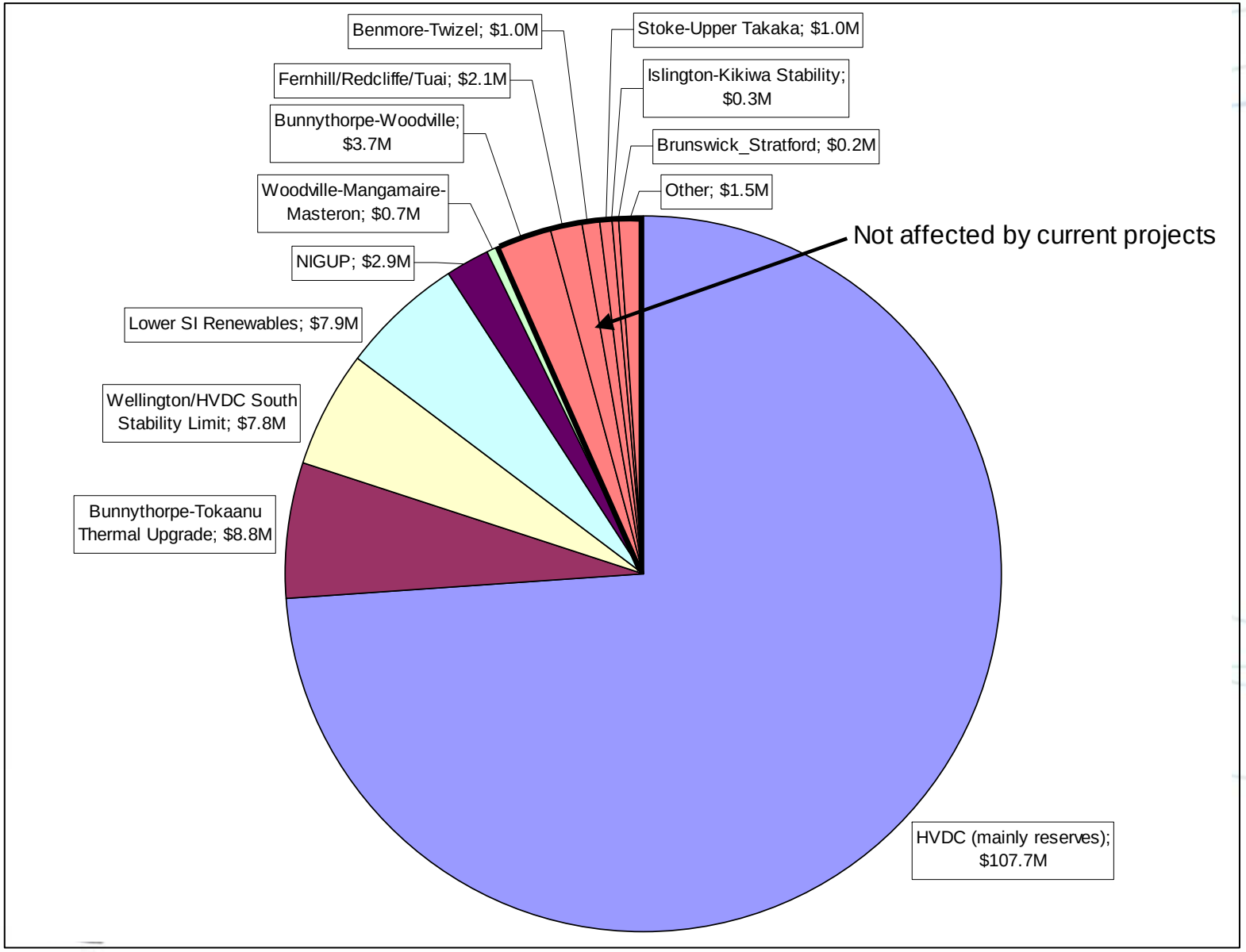
Inter-Island vs Intra-Island Constraint Rentals Jan 2008 through April 2010

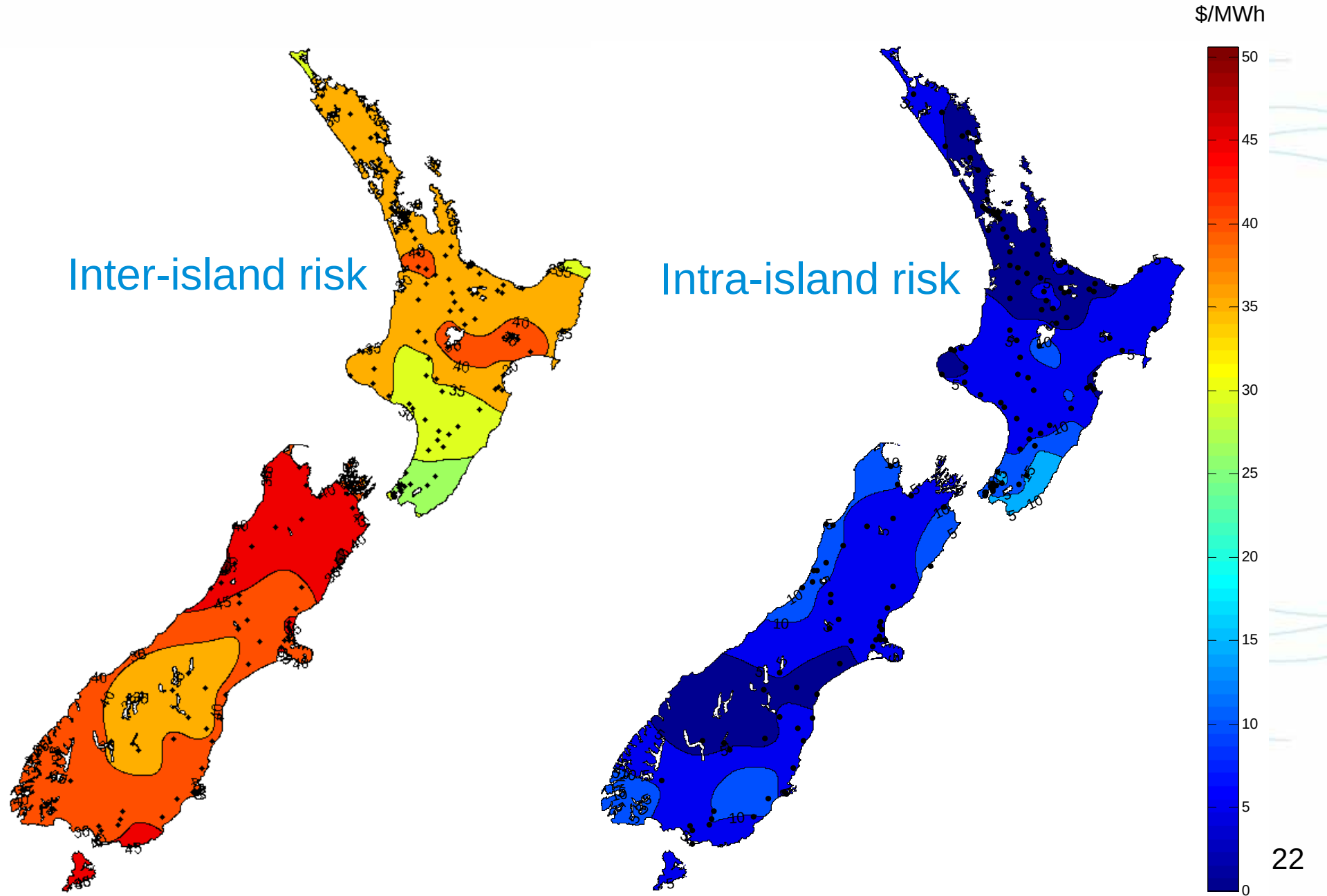


Constraint rentals by project/line

(Rents based on Jan 2008 through April 2010)



LPR: Inter-island vs. Intra-island



Losses

- Inter-island
  - Tidal flows – direction depends on hydrology
  - Price gradient bidirectional
  - Losses a significant component of price differential
- Intra-island
  - Flow direction essentially constant
  - From generation to load
  - Relatively constant price gradient

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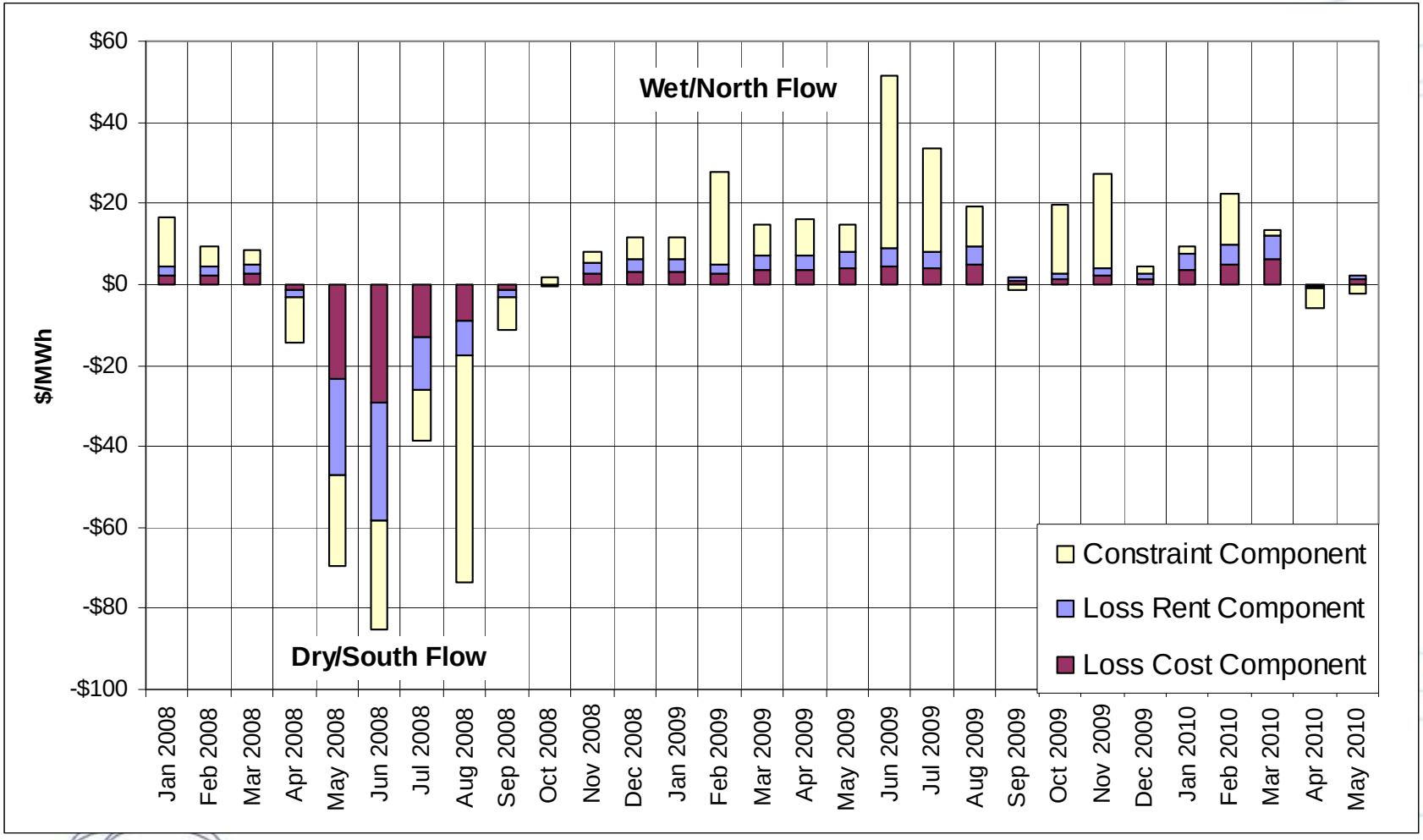
Components of Benmore-Otahuhu Average Monthly Price Difference



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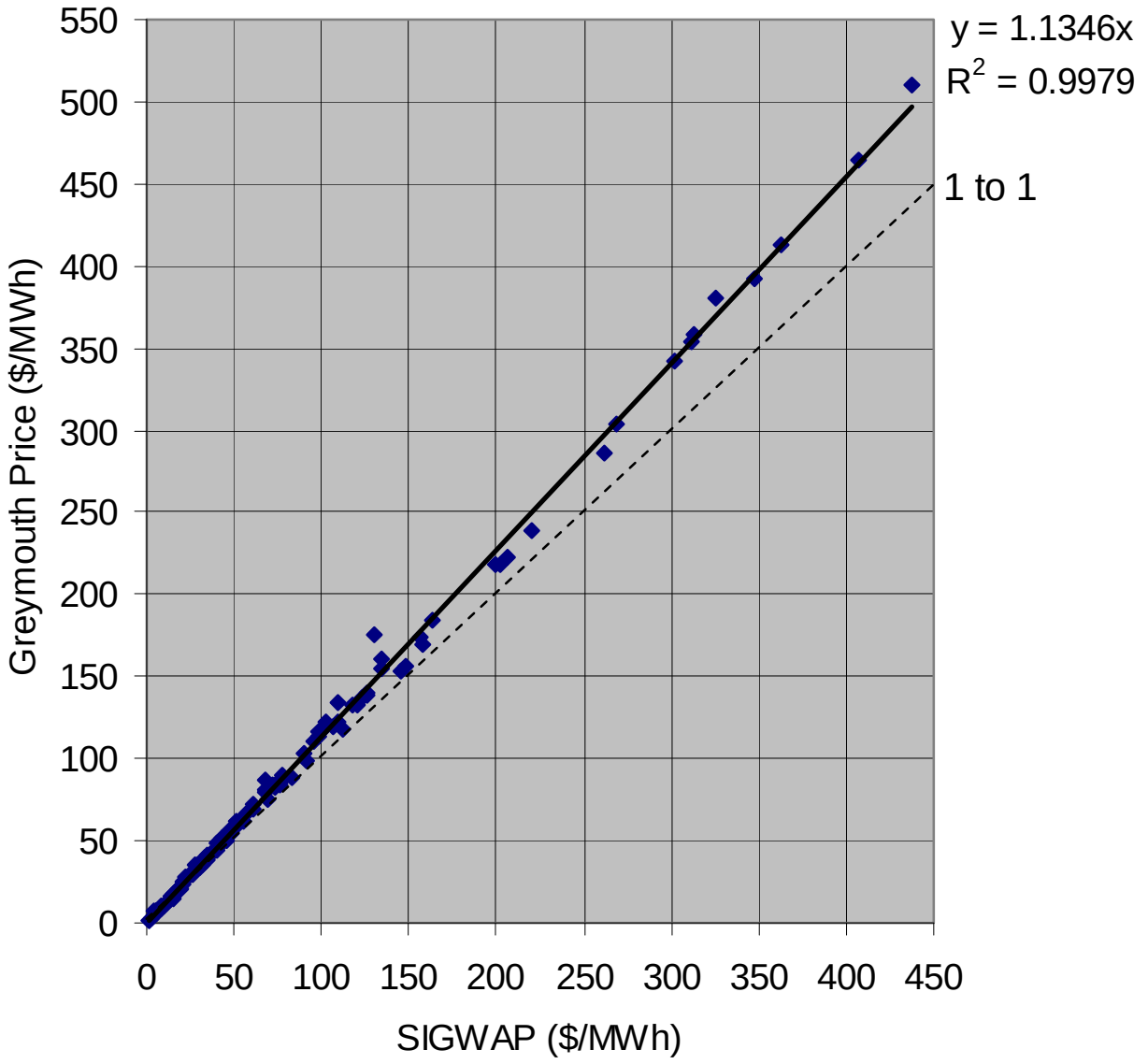
Greymouth weekly price - Correlation with SIGWAP



LPR in the Future

Impact of transmission investment

- Substantial grid investment approved or underway
- Will further reduce AC constraints
- Ongoing constraints from time to time
- Patterns may change
- HVDC constraints expected to reduce but still remain significant
- Market behaviour may change

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Ongoing “background” constraints due to:

- Extreme hydrological events
- Temporary issues due to rapid generation development/demand growth ahead of grid reinforcement
- Transmission outages during projects
- Force majeure type events
  (eg. Mt Ruapehu eruption,
  HVDC towers blowing over)
- Maintenance issues

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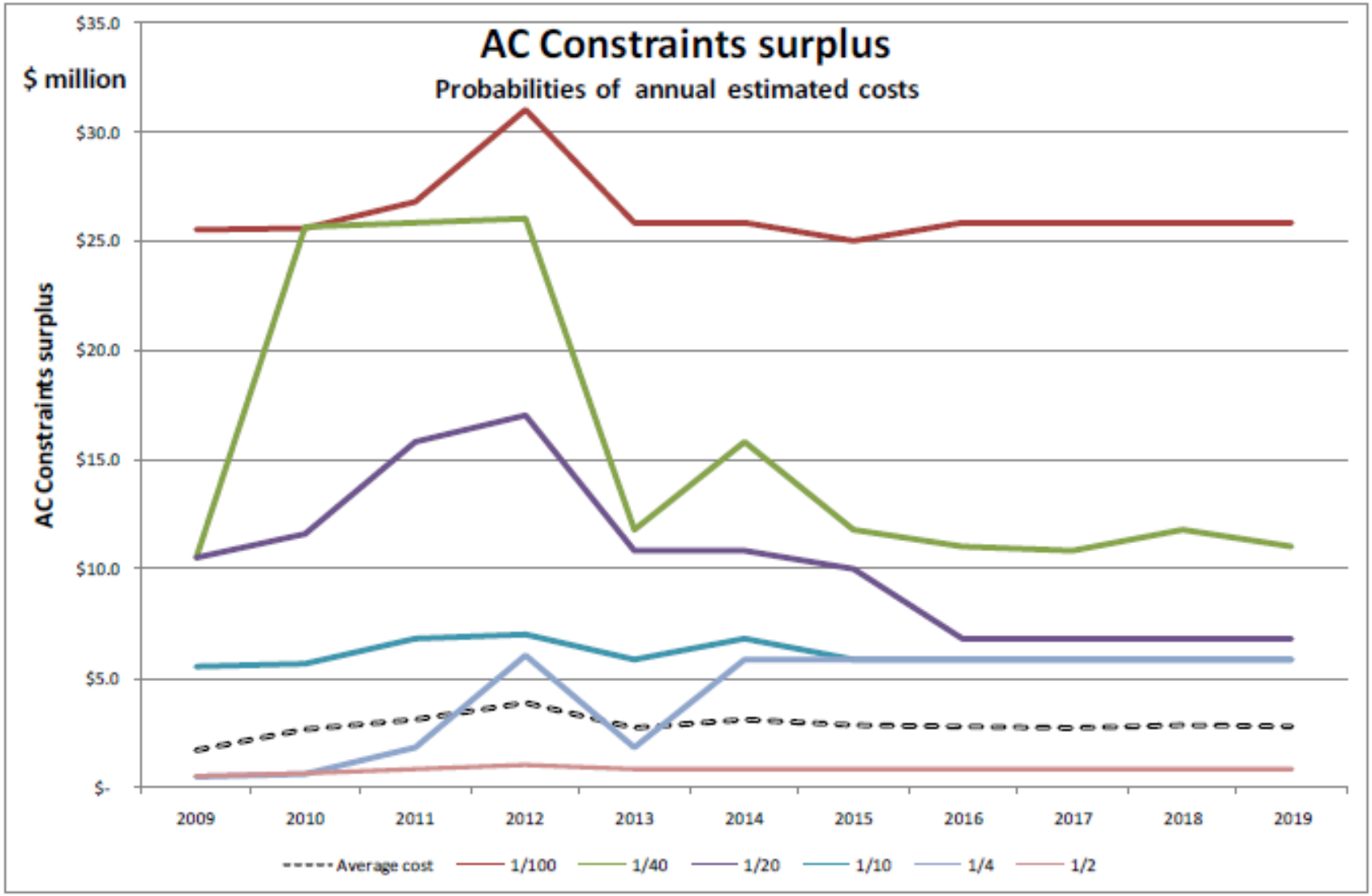
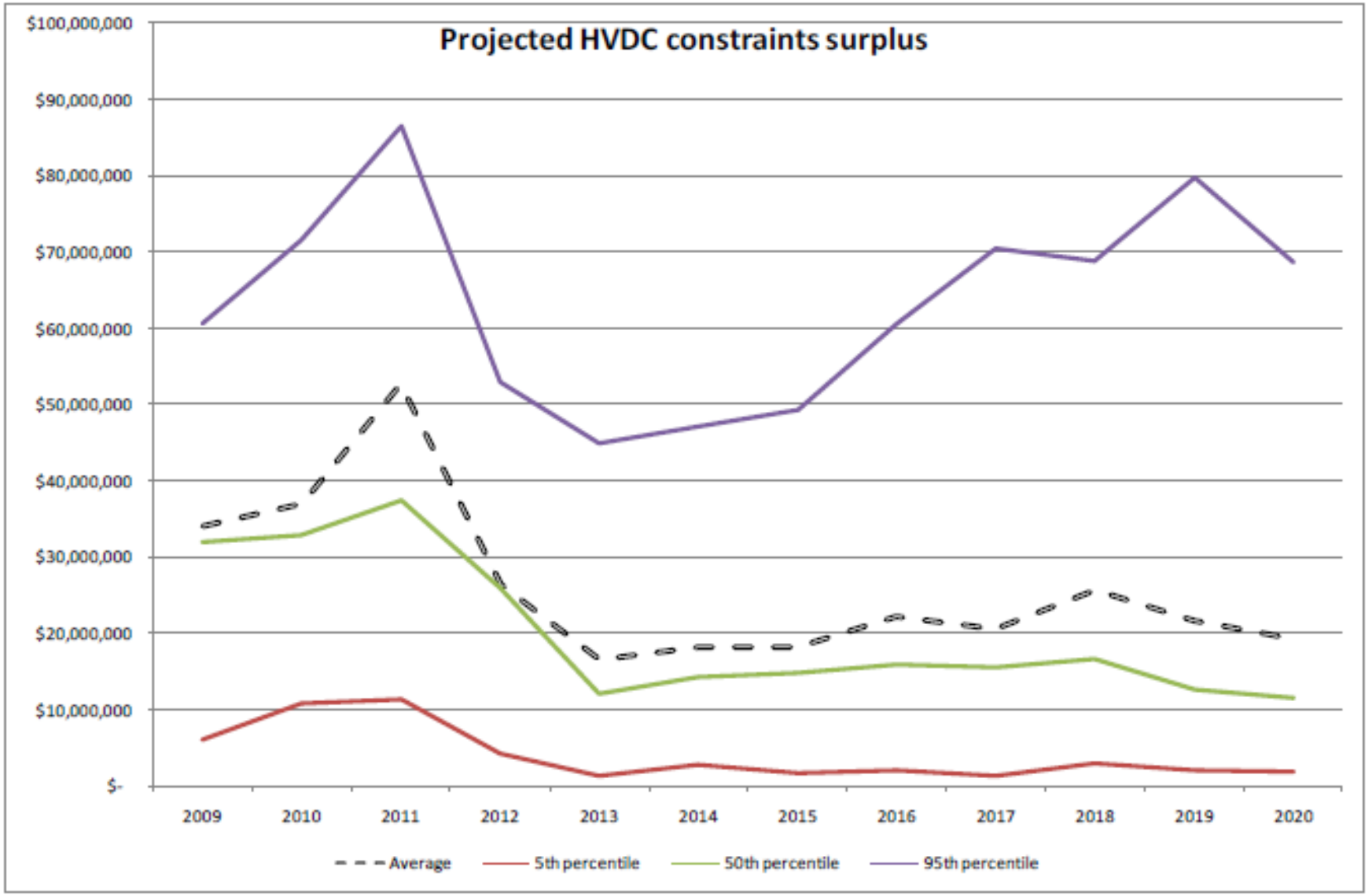


Source: Energy Link Ltd, “Long Term Projection on the Constraints Surplus”, March 2009



Source: Energy Link Ltd, “Long Term Projection on the Constraints Surplus”, March 2009

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Scarcity pricing

- Depending on granularity, could increase LPR
    - eg. Island, region, nodal

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Existing options for managing LPR high cost or ineffective

Option	Impact and comments
Hedge at central node	Distant from load node
Hedge at local node	High cost, unlikely to cover imports
Inter-generator swap	Need generation to be in a position to swap
Cut load	Loss of production and consumption
Increase price	Increases electricity cost, loss of production and consumption
Build own generation	High cost, but may increase generator competition
Exit market	Reduced competition, loss of production and consumption
Sell at spot to end users	Shifts risk to end users, loss of production and consumption

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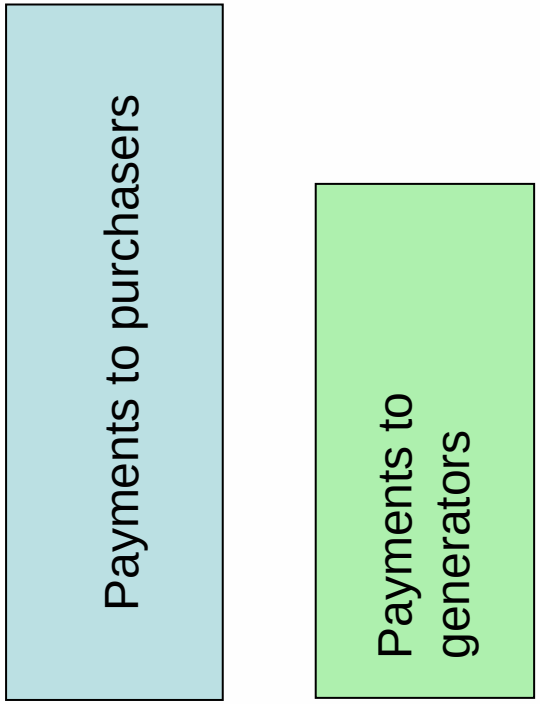
Fundamental problem: insufficient hedges available



Loss and constraint rentals

This proportion of risk taken out of system and distributed in a way unrelated to risk

Proportion of risk generators naturally willing to offer to purchasers or other generators

Volume of actual trading limited by generators' risk profile assessments,

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A voluntary market solution?

- Parties currently receiving settlement surplus could offer locational hedge
- May be able to sell for a premium
- However, voluntary market solution has not emerged
- Without access to rentals, parties offering locational hedges vulnerable to actions that could influence LPR

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Solved by market maker requirements?

- Generator > 500MW capacity must provide market making service
- resulted in EnergyHedge agreement with ASX
- principal yardstick: 3,000 GWh unmatched open interest

- Should improve hedge market liquidity
- LPR solution should assist market makers
- But LPR remains
  - Source of risk not dealt with
  - Market still short by loss and constraint rentals

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Impact of asset swaps

Physical asset swaps:
- Tekapo A and B from Meridian to Genesis
- Whirinaki from Crown to Meridian

Virtual asset swaps:
- Meridian and Genesis swap 450 GWh/yr of energy
- Meridian and MRP swap 1000 GWh/yr of energy

- Adjusts LPR for SOEs up to volume of asset swaps
- Should improve hedge market competition, including access to swaps
- Does not address fundamental LPR problem
  - ie LPR remains for other parties including new entrants

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Problem definition: Conclusion

- Current mechanisms for managing LPR are either high cost or ineffective
- Market has not addressed the LPR problem
- New initiatives improve the situation but do not address the fundamental LPR problem
- Addressing LPR would promote success of new initiatives

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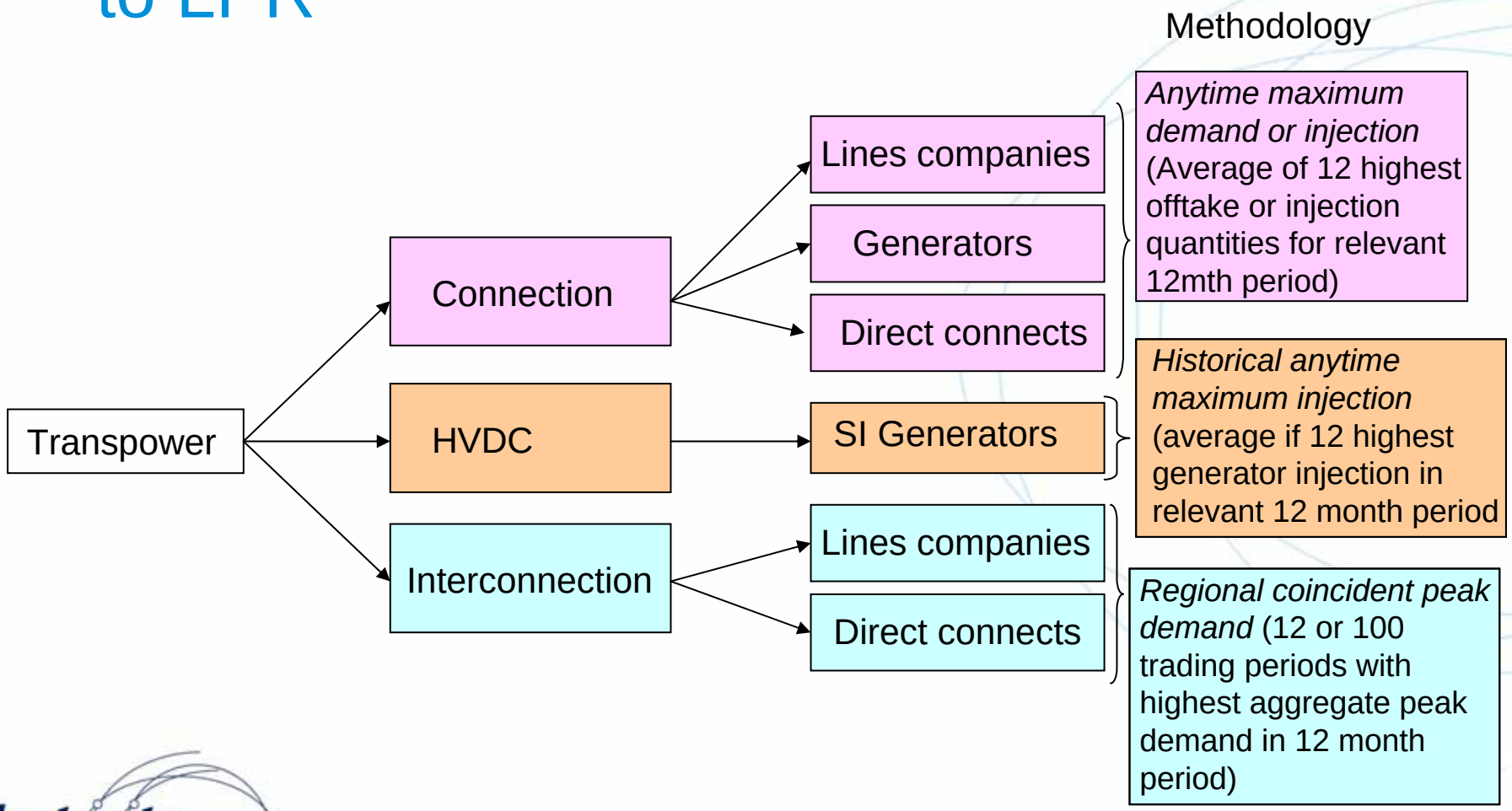
Current allocation of rentals: Not related to LPR



Implications of current allocation of rentals

- Current methods of rental allocation largely unrelated to LPR as purpose is to offset transmission charges
- Rental allocation not consistent across similar parties:
  - SI generators receive HVDC rentals but NI generators do not (but don't have to pay for HVDC)
  - Pass-through varies between line companies

    → retailers can get access to rentals in some areas but not in others

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Session 2: Proposed LPR solution

Session 3: How it might work in practice

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Session 2: Proposed LPR solution

1. Choice of an FTR-based proposal
2. Inter-island FTR
3. Dealing with market power concerns
4. Specification in Code
5. Implementation/further development

Analysis of locational hedge options

Options Paper – 4 broad options:
- FTR
- LRA
- Zonal pricing
- Hybrid

Supplementary analysis

Proposal Paper – 3 FTR-based options:
- Inter-Island FTR
- Augmented FTR
- Extended FTR

FTR-based options:
- flexible
- best at retaining efficient short-run price signals

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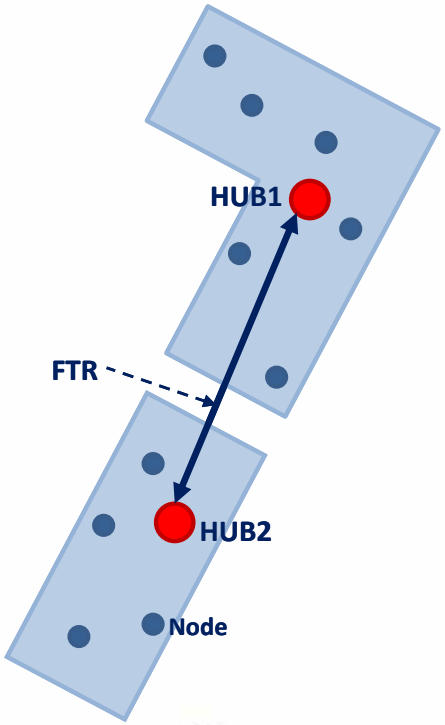
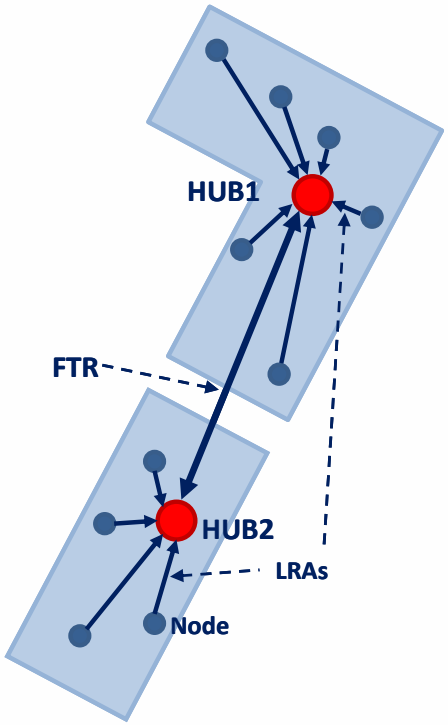
FTR options analysed

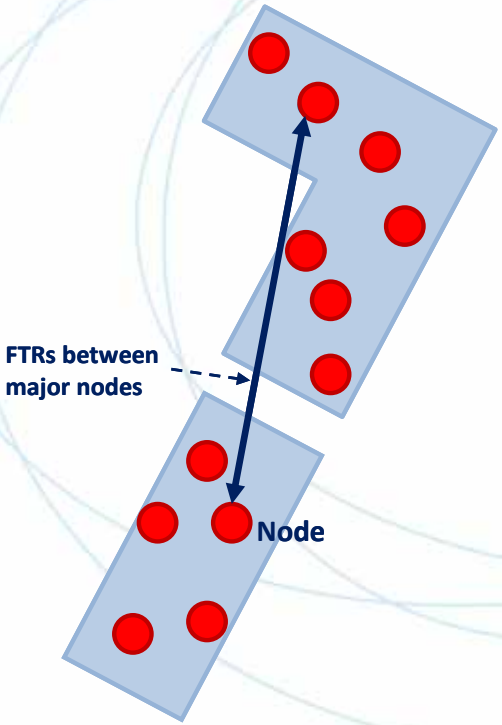
Inter-island FTR



Augmented FTR (hybrid)



Extended FTR (multi-node or hub FTR)



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Analysis of FTR-based options

3 FTR-based options:
- Inter-Island FTR
- Augmented FTR
- Extended FTR

CBA and other analysis

1 proposed option:
- Inter-Island FTR

Rationale for proposed option

CBA:

- options all provide large net benefits
- benefit largely from inter-island component

→ Incremental benefit of doing more is small

Qualitative evaluation:

Inter-Island FTR:

- is simple
- retains option value

→ Inter-Island FTR an appropriate starting point

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Session 2: Proposed LPR solution

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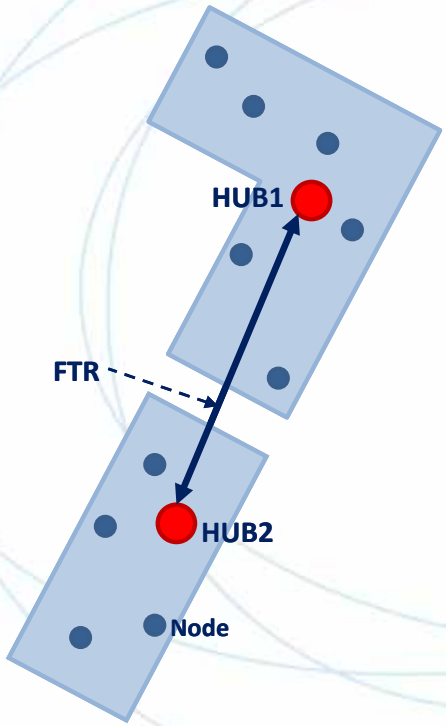
Inter-island FTR: Overview

- FTRs between North and South Island hubs
- covers transmission and reserve constraints, loss rentals, scarcity pricing
- hub price of island generation-weighted average price (GWAP)
- parties bid in auction for rights to rentals between two hubs
- If necessary, use surplus revenue to ensure revenue adequacy



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Inter-island FTR: LPR sources covered

- AC and DC transmission constraints
- Reserve constraints
- Loss rentals but *not* loss costs
  - → In absence of constraints per MW payout on FTR is roughly half the price difference between hubs
  - → avoids having to find new source of funding for loss costs

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Inter-island FTR: Example of FTR payout

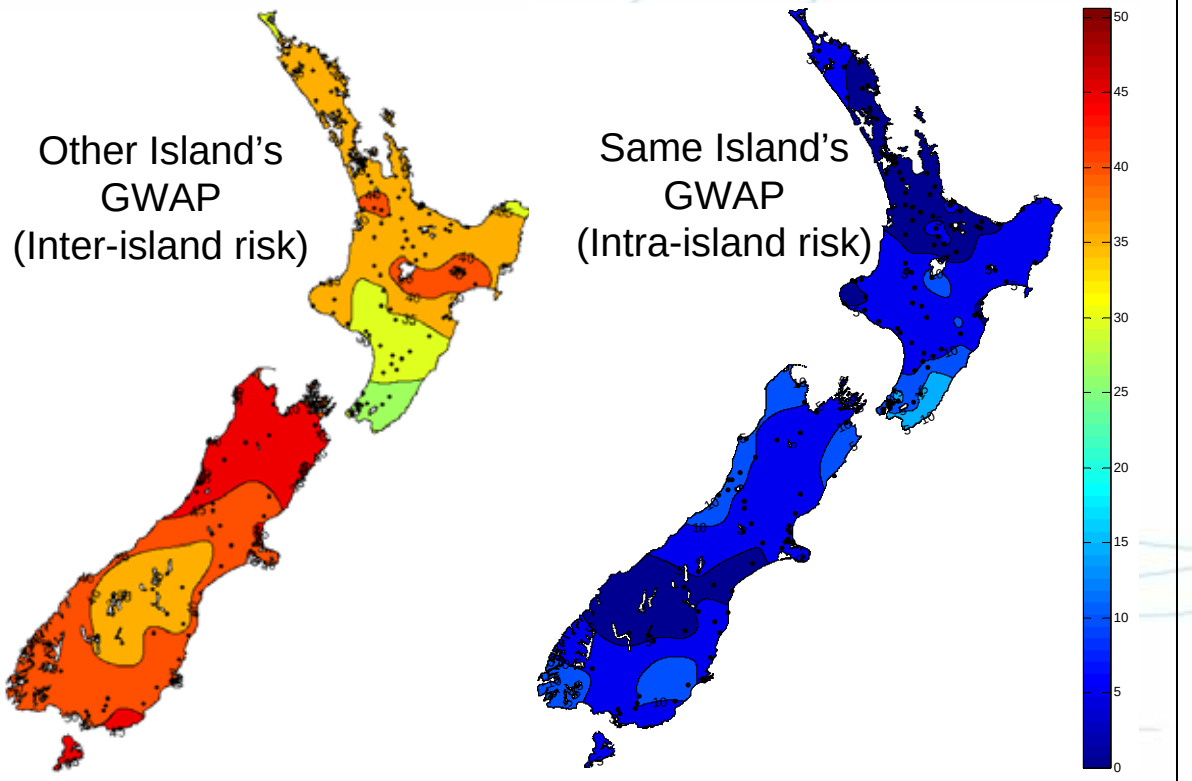
	Constrained trading period: TP 3 on 25/08/08	Unconstrained trading period: TP 38 on 01/06/08
NIGWAP	$13.10	$296.35
SIGWAP	$195.87	$354.52
Price difference (SIGWAP-NIGWAP)	$182.77	$58.17
FTR payout/MW	**$176.89**	**$29.08**

Difference between price difference and FTR payout is loss costs

Coverage: Inter-island vs intra-island

- Initially inter-island only
- Provider may propose intra-island if there is a demonstrated need

Volatility of weekly average nodal prices relative to same and other island GWAP (Jan 2008 – Apr 2010)



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Inter-island FTR: Choice of hub

What

- Hubs: North and South Island generation-weighted average price for each trading period
- Dynamic – recalculated every trading period
- Pricing Manager to publish IGWAPs prior to introduction of FTR

Why

- Neutral – does not favour any party
- Because is an average price it lends itself to offering:
  - Generators could offer hedges at Island GWAP and cover their intra-island LPR with swaps
- Dynamic hub means intermittent generation included in IGWAP

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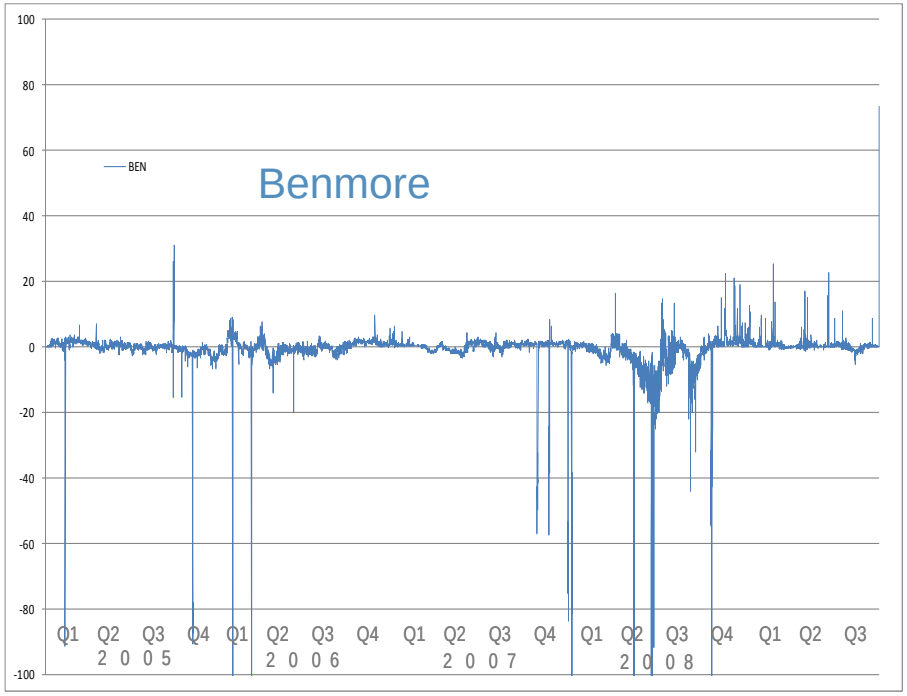
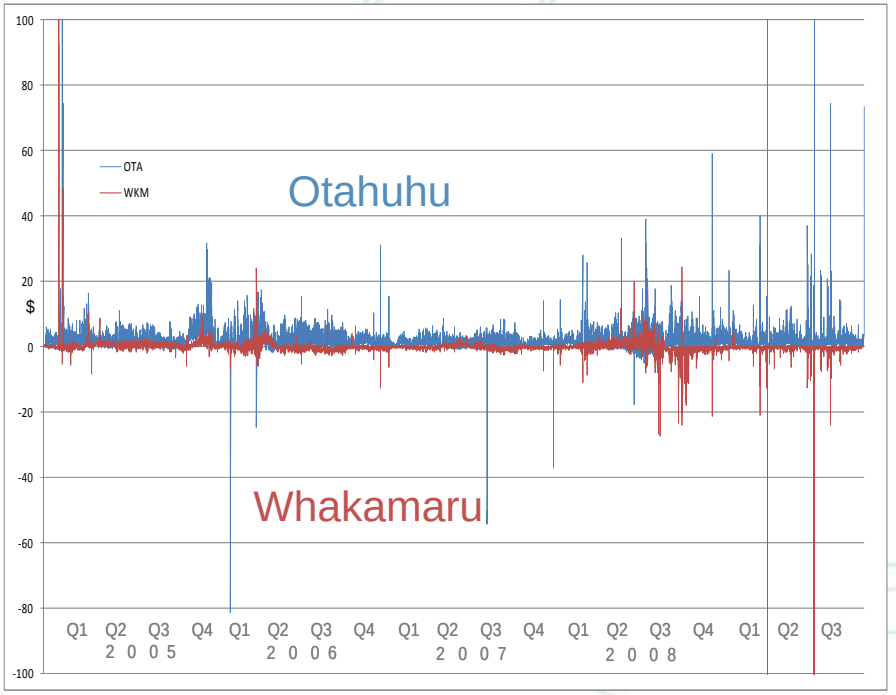
Reasonably close relationship between IGWAPs and major trading nodes

Price difference between IGWAPs and Benmore, Whakamaru and Otahuhu: January 2005 – August 2009





- Close relationship but major trading nodes do not have properties of GWAP

Inter-island FTR: Proposed FTR products

- Obligation FTRs: payout for flows in one direction, obligation to pay for flows in the other
- Option FTRs: payout for flows in direction of FTR only
- Initially constant MW only
- Peak FTRs later

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Inter-island FTR: Other product details

- Minimum size: 0.1 MW
- Duration: 1 month
- Availability horizon: 12 months for first year, 24 months thereafter.
  - Limited to 25% of possible FTRs.
  - Limit required to help ensure revenue adequacy

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Inter-island FTR: Auction design

- FTR provider to develop auction design, including auction frequency, in consultation with industry
- Auction design critical to key outcomes – auction revenue, market power

→ auction design must meet:

  - requirements of the Code; and
  - contract between Authority and FTR provider

- FTR auction design relatively standardised

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Overview of FTR auction designs in US markets (Sun, 2005)

	PJM	New York	New England	California	Texas	Midwest
Auction frequency	Monthly	Seasonal	Monthly	Annual	Annual, monthly	Annual, quarterly, monthly
Single/ multiple round	Single	Multiple	Single	Multiple	Single	Not specified
Price	Uniform	Uniform	Uniform	Uniform	Not specified	Not specified
Other					24 simultaneous combinatorial auction	

Sun, J (2005): US Financial Transmission Rights: Theory and Practice. Iowa State University Working Paper #05008

Participation requirements

- Must meet prudential requirements
  - Needed for obligation FTRs
- No other participation restrictions
- Manage issues like undesirable bidding behaviour through auction design

FTR trading

- FTR trading permitted provided:
  - Trade recorded through FTR registry
  - Parties meet FTR participation requirements
- Surplus FTRs can also be offered in FTR auctions

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Inter-island FTR: Management of revenue adequacy

- Revenue adequacy: ability to pay full value of rentals a holder is entitled to

  = MW value of FTR x value of inter-hub rentals/MW

- Potentially an issue when major asset not available but FTRs were awarded on basis it would be
- In first instance, manage through design of FTR grid

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Inter-island: Management of revenue adequacy: Sources of funding

- over time, have Transpower fund a proportion of revenue adequacy attributed to its actions
- use surplus inter-hub loss and constraint rentals from prior months
- FTR auction revenue
- if necessary, scaling

Implies holding residual for a period to ensure an adequate buffer

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Inter-island FTR: Allocation of residual revenue

- Residual revenue:
  - intra-island rentals
  - unallocated inter-hub rentals + auction revenue *after* addressing revenue inadequacy
- Allocated to transmission customers using Transpower's rental allocation methodology, consistent with TPM

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Inter-island FTR: Settlement

- Settlement by Clearing Manager
- Monthly settlement
- FTR holders receive:
  - MW value of FTR x rentals/MW

  less

  - MW value of FTR x payout/MW for reverse flows (if obligation FTR)

  less

  - Any adjustment for revenue inadequacy if scaling required

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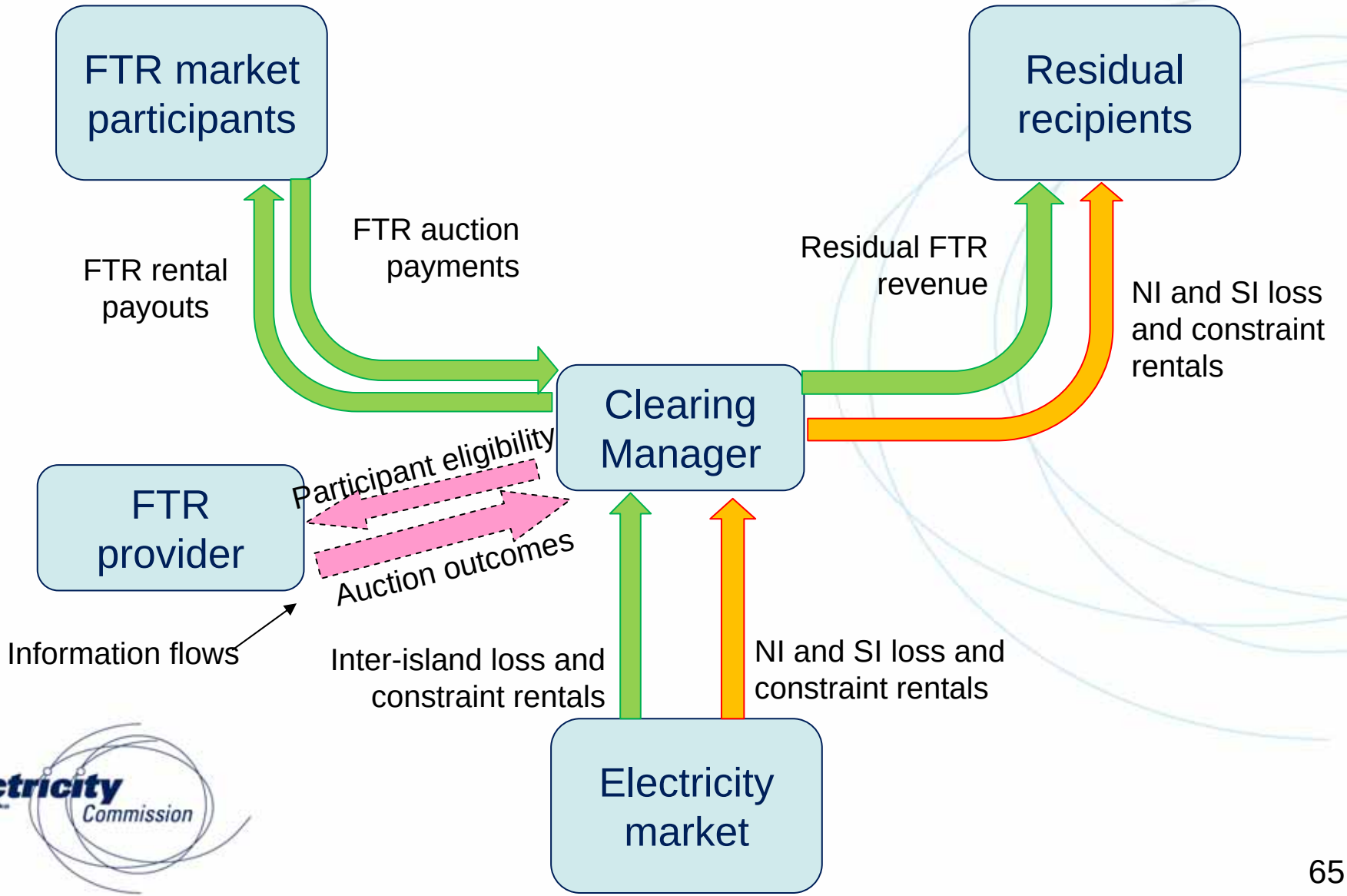
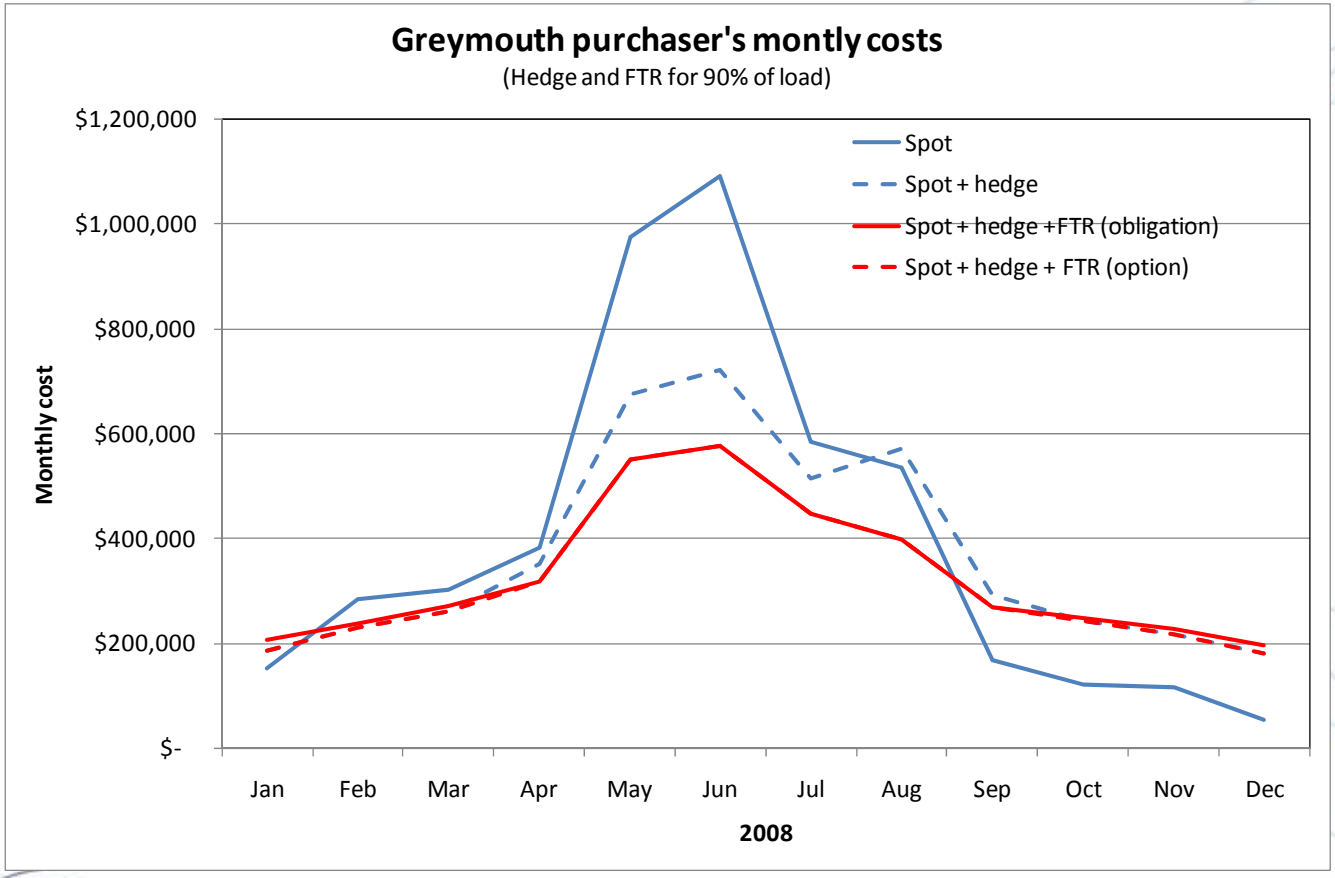
Money flows under Inter-Island FTR



Inter-Island FTR: a Greymouth purchaser (90% hedged)



Hedge is a CfD at Huntly with a strike price of $100

Inter-island FTR: Provider responsibilities

FTR provider:

- auction design
- auctioning FTRs
- operating FTR registry
- notifying Clearing Manager of FTR holdings

Clearing Manager:

- identifying whether parties meet prudential requirements
- receiving auction payments
- FTR settlement
  - Identifying revenue adequacy
  - Allocating residual revenue to address this

Pricing Manager:

- Publishing NIGWAP and SIGWAP

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Inter-island FTR: Funding

- FTR Provider paid a fee for services
  - as with other service providers
- Costs of implementing and operating FTRs funded by Electricity Industry Levy
- Alternatively, Service Provider could charge fee but have yet to work through practicalities

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Session 2: Proposed LPR solution

1. Choice of an FTR-based proposal
2. Inter-island FTR
3. Dealing with market power concerns
4. Specification in Code
5. Implementation/further development

What is market power?

From one (academic) perspective market power is “exercised” whenever prices deviate from SRMC

- But this is generally not “abuse” of market power;
- And may often be necessary to recover standing costs, particularly for peaking plant

Does market power exist?

Market power must exist at many times and places under the status quo, but

- It is not necessarily “exercised” let alone “abused”
- It is greatly influenced by transmission constraints, load/contractual obligations, and the implicit prospect of intervention
  - So it is actually quite difficult to determine robust “oligopolistic equilibria”

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Does transmission system rental allocation impact market power?

ANY allocation of transmission system rents to participants will affect participants effective nett contract positions, and hence impact on (locational) market power

- A fixed MW rental allocation between a hub and a node will have basically the same impact on market power in the spot market, whether it is bought as an FTR or allocated via a (non-distortionary) LRA formula

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Market power under status quo

Under the status quo:

- To the extent rentals are passed through, all participants get rents from (something like) island GWAP hubs to (something like) island LWAP hubs
- Those who pay for HVDC get all HVDC rents in direction of flow
  - This is effectively a pair of “option” FTRs protecting both export and import positions, with no obligation to support FTRs for competing/counter-flow traders

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Managing (spot) market power

The status quo rental allocation must impact on market power in the (energy) spot market, but this has not previously been of major concern

- It is not clear why a different allocation would increase market power concerns in this market
- And one might think that ancillary services markets had more impact on inter-island rents
- But FTR holdings are only one factor in determining participant positions, to be considered as part of the spot market monitoring regime

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Managing (retail) market power

A locally dominant party could acquire more "import" FTRs to strengthen its own retail position and exclude others

- This seems less problematic for the HVDC than for regional bottleneck lines
- It seems unlikely that any party could acquire a more advantageous FTR position than some parties enjoy under the status quo
- But (mis-) alignment of FTR holdings with retail positions could be monitored

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Managing (FTR) market power

Concern has also been raised with respect to possible manipulation of the FTR market itself

- It is unclear why trading of FTRs would be any more problematic than trading of cfds of similar terms
- But cfds are created on the basis of, and hence in proportion to, participant assets, whereas FTRs are simply “released” onto the market
- So the auction process needs to ensure that one party can not surreptitiously “corner the market”

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Specification in Code: Rationale

Need to balance:

- timely introduction
- limiting risks
- ensuring flexibility
- providing for matters that require decision by an independent party

Specification in Code and FTR provider contract

Matters are specified in 3 key places:

- **Code** – absolutely mandatory elements of FTR
- **Schedule to Code** – key design elements
- **FTR provider contract** – FTR provider specific elements and practical considerations

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Matters specified in Code

Code

Mandatory elements of framework, eg:

- allocation of residual revenue
- role of Clearing Manager
- revenue adequacy mechanism
- participant requirements
- monitoring provisions
- review process
- limits on holdings
- secondary trading requirements

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Matters specified in schedule to Code

Code

Mandatory elements of framework, eg:

- allocation of residual revenue
- role of Clearing Manager
- revenue adequacy mechanism
- participant requirements
- monitoring provisions
- review process
- limits on holdings
- secondary trading requirements

Schedule to Code

Mandatory design elements, eg:

- hub definitions
- minimum FTR size
- FTR duration
- availability horizon
- initial product details

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Matters specified in contract with FTR service provider

Code

Mandatory elements of framework, eg:

- allocation of residual revenue
- role of Clearing Manager
- revenue adequacy mechanism
- participant requirements
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Schedule

Mandatory design elements, eg:

- hub definitions
- minimum FTR size
- FTR duration
- availability horizon
- initial product details

FTR service provider contract

Requirements for FTR service provider, eg:

- implementation timeframe
- service standards
- matters to consult on
- provision of specifications by FTR provider
- FTR provider payment

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Implementation - timeframe

- Introduce by winter 2012
  - prior to introduction of scarcity pricing
  - Pole 3 Commissioning
- Consult on amendments to Code Q1 2011
- Service provider contracts Q1-Q3 2011

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Further development

- FTR could be extended:
  - To include loss costs as well as loss rentals
  - With new FTR products, eg peak FTRs
  - beyond two hubs with:
    - Further FTRs; or
    - LRAs
- FTR provider can propose extensions
- Extensions will require consultation and be subject to approval of authority
- Review?

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Agenda

Introduction

Session 1: The locational price risk (LPR) problem

Session 2: Proposed LPR solution

Session 3: How it might work in practice

Session 4: Panel discussion on proposed solution

Session 5: Breakout groups on proposed solution

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