Electricity Commission
Te Komihana Hiko

Briefing on

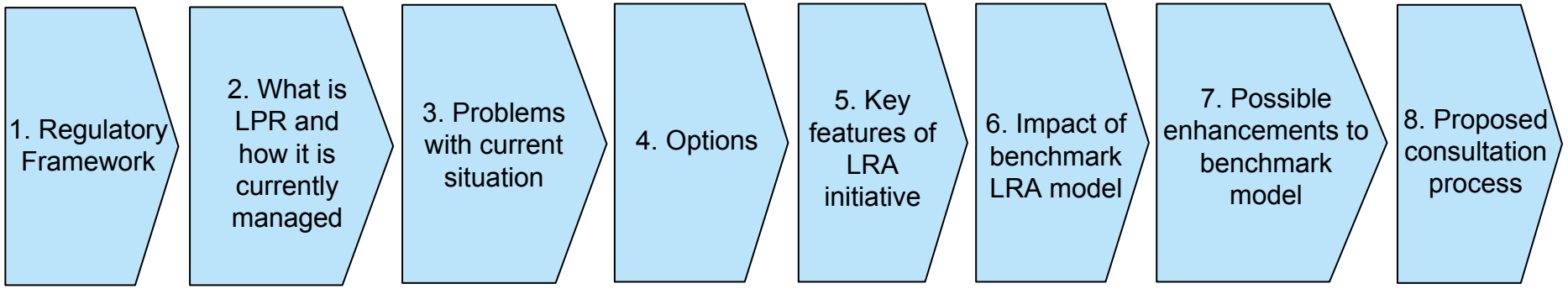
Issues for Addressing Locational Price Risk

12 August 2008

Purpose of briefing

- Provide information to assist with submissions:
  - the problem of locational price risk (LPR)
  - How locational rental allocations (LRAs) would address LPR
  - Results from benchmark locational rental allocation model
- Obtain initial feedback on whether LRAs should be investigated further

Outline of this presentation



Regulatory framework

Requirements of GPS

May 2008 GPS:

- *"The Commission should oversee the development of arrangements that will enable market participants to manage financial risk in respect of transmission losses and constraints.*

- *"The product developed should include the following broad principles:*

  - » *realistic long-term risk management mechanisms should be made available to all parties that face financial risks arising from spot price effects caused by transmission losses and constraints* ["transmission hedges"]*;*

  - » *economic efficiency, including the integrity of price signals, should be maintained or improved; and*

  - » *solutions should be pragmatic and not overly complex."*

Provision for transmission hedges in Rules

- **Part F, Section V of the Rules** *"provides for the future development of financial transmission rights, by establishing a process for their design and introduction in accordance with the Government Policy Statement".*
  - » But note May 2008 GPS

Why consider transmission hedges?

Hedge Market Development Steering Group (HMDSG):

- HMDSG's preferred package to improve operation of hedge market included transmission hedges – in particular, LRAs

Market Design Review:

- Main retailers have focused their mass-market retail activity into areas with lowest exposure to locational price risk (LPR)
- Access to transmission hedges would facilitate retail competition by improving retailers' ability to manage LPR where they do not have generation
  - » could allow main suppliers to broaden focus of their retail activity to areas of higher LPR, and enable entry of new retailers

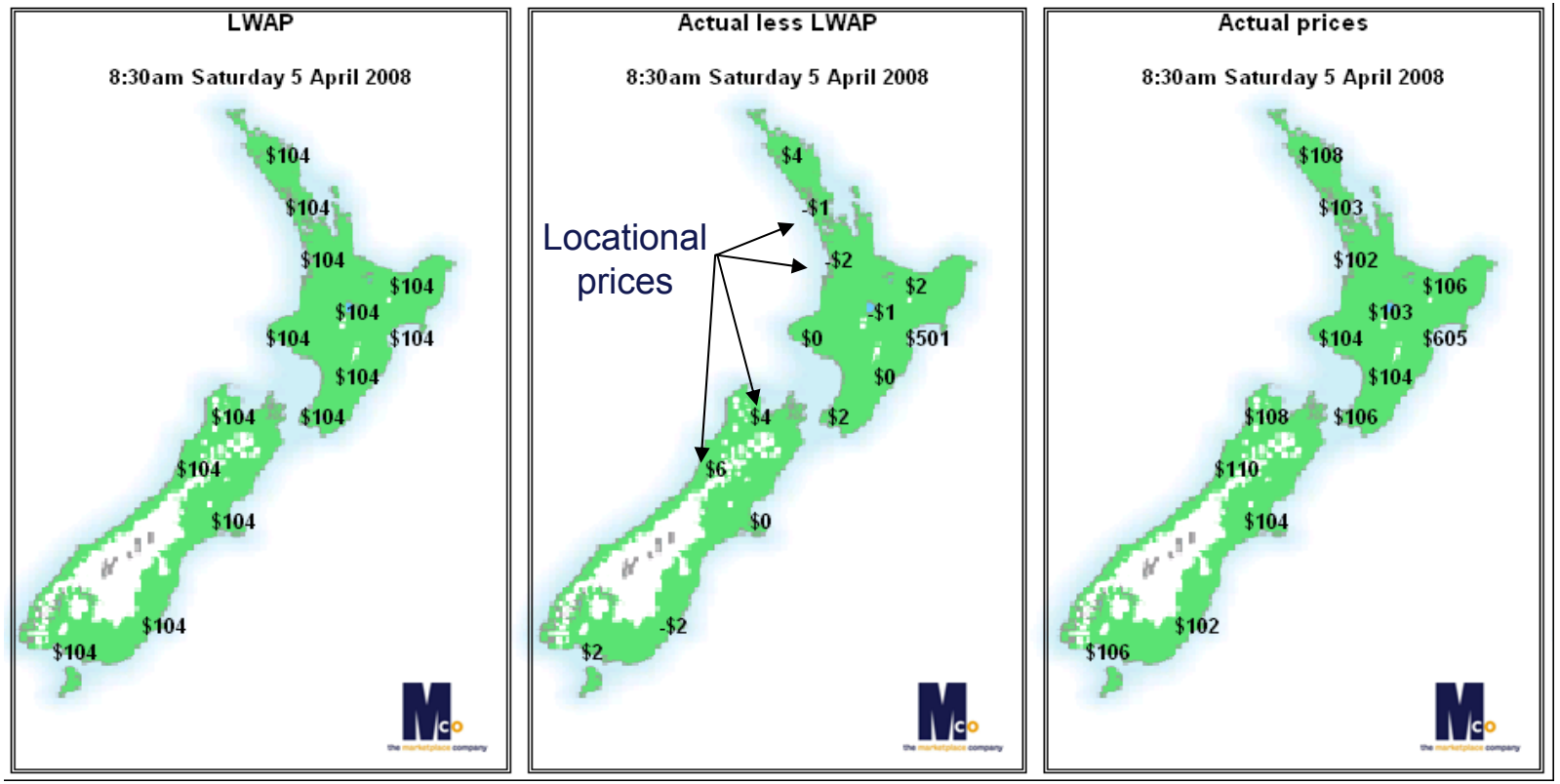
Locational price risk and how it is managed

Definition of locational price (LP)

LP for node = nodal price – LWAP

- Load weighted average price (LWAP) is the price purchasers would face if cost of losses and constraints was averaged across all load
- Above is a notional definition of LP as LWAP is only a proxy for the energy price

Illustration of locational prices



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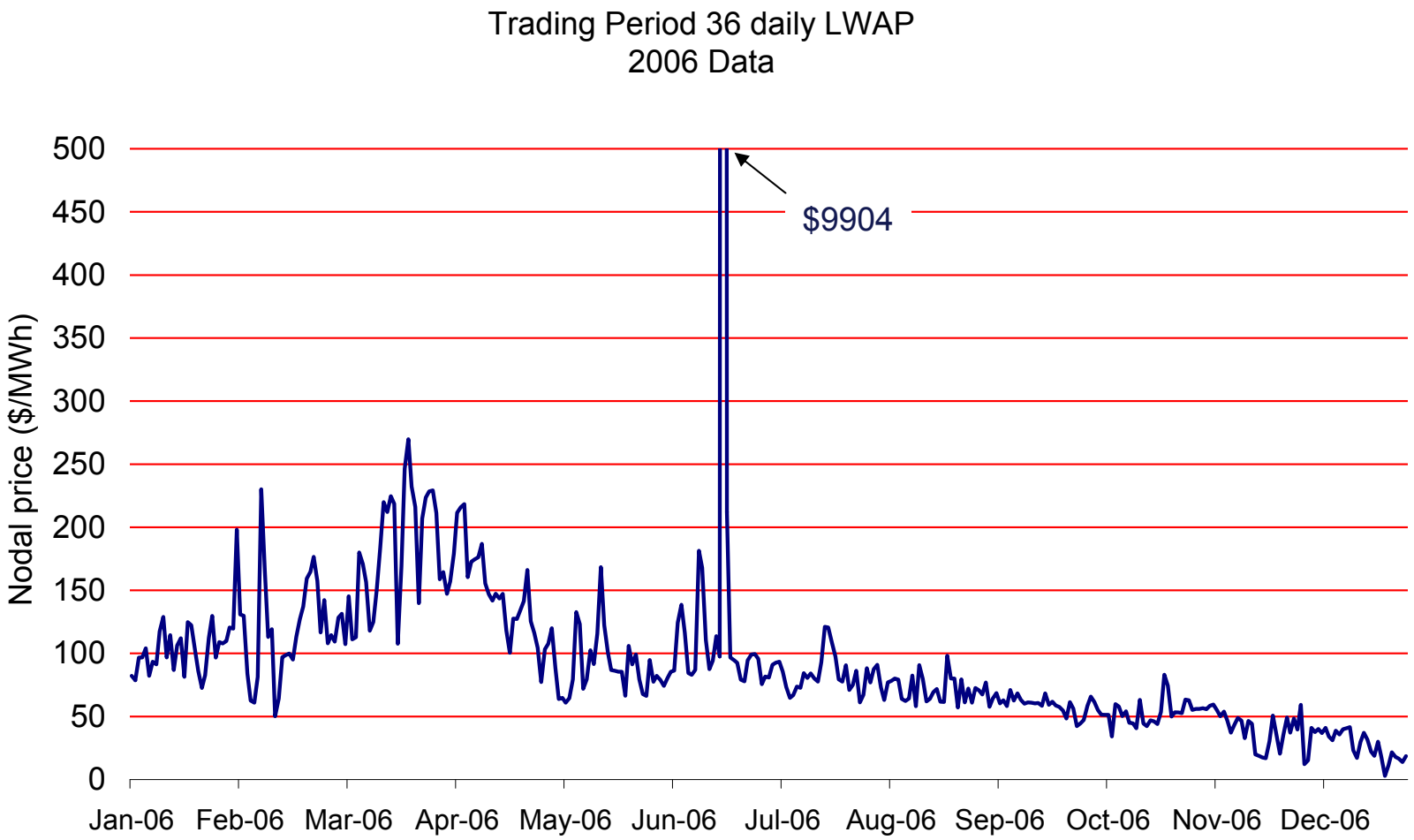
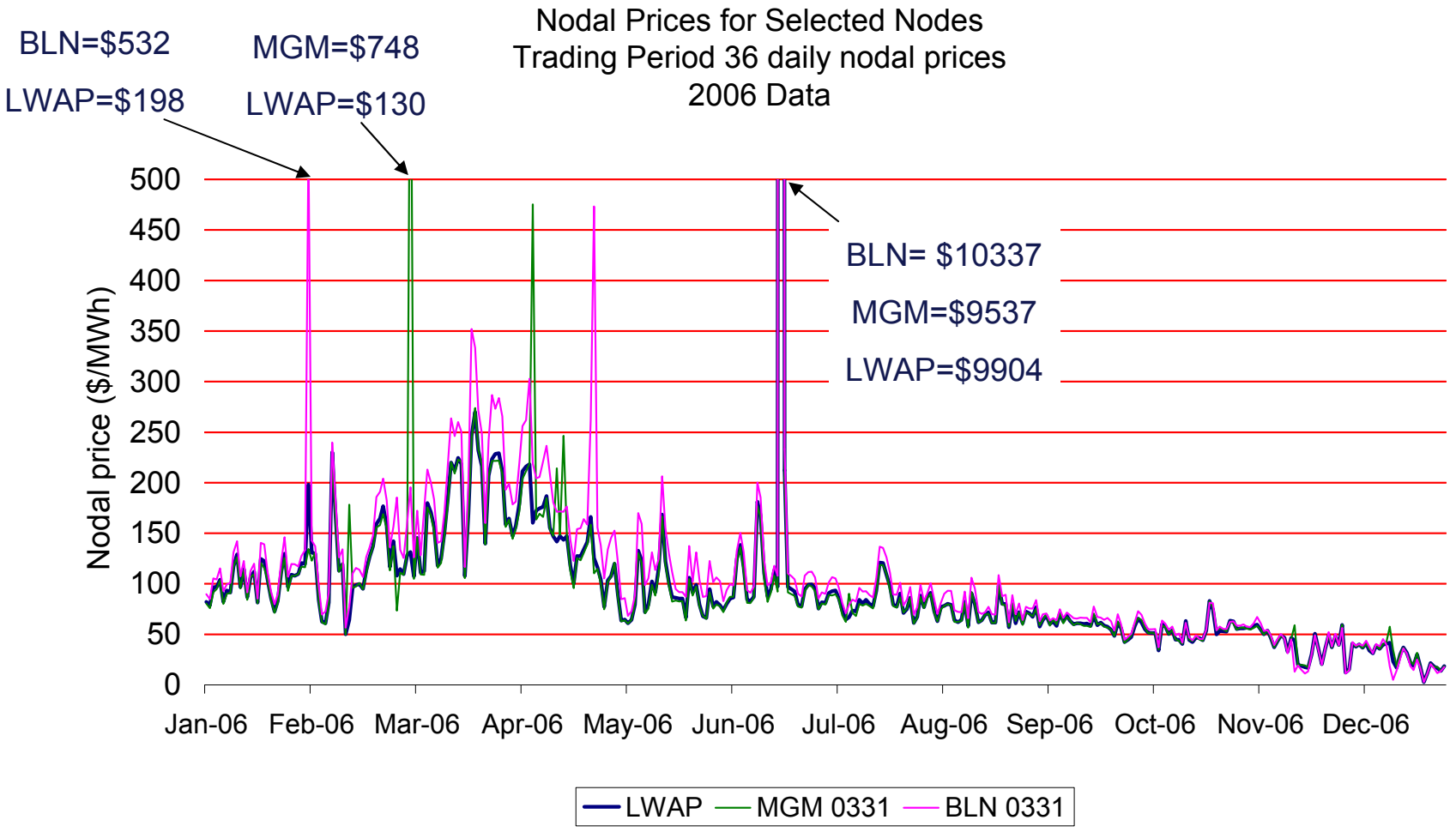
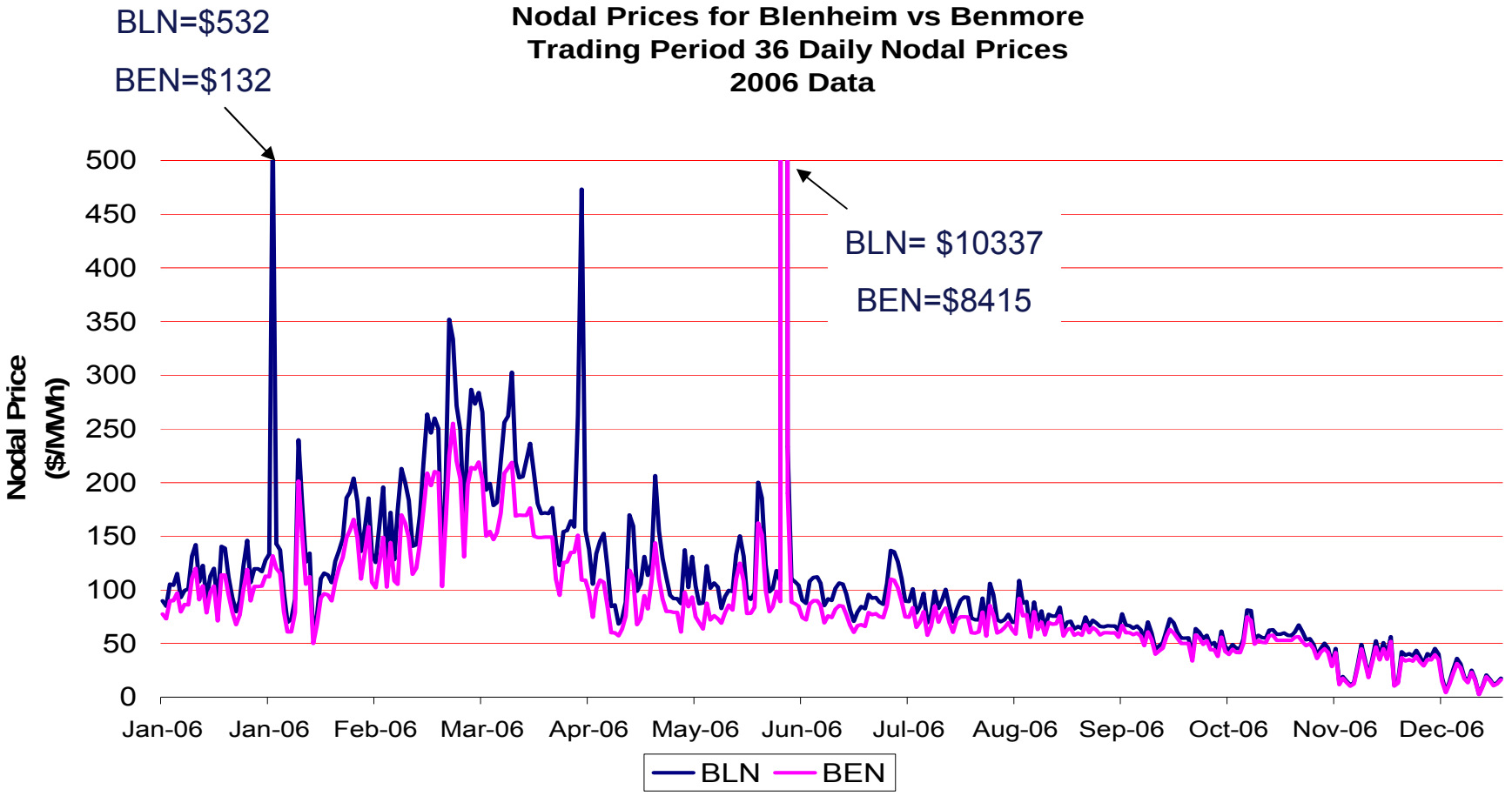
Energy price volatility



Nodal price volatility relative to LWAP



Nodal price volatility of purchaser node vs generation node



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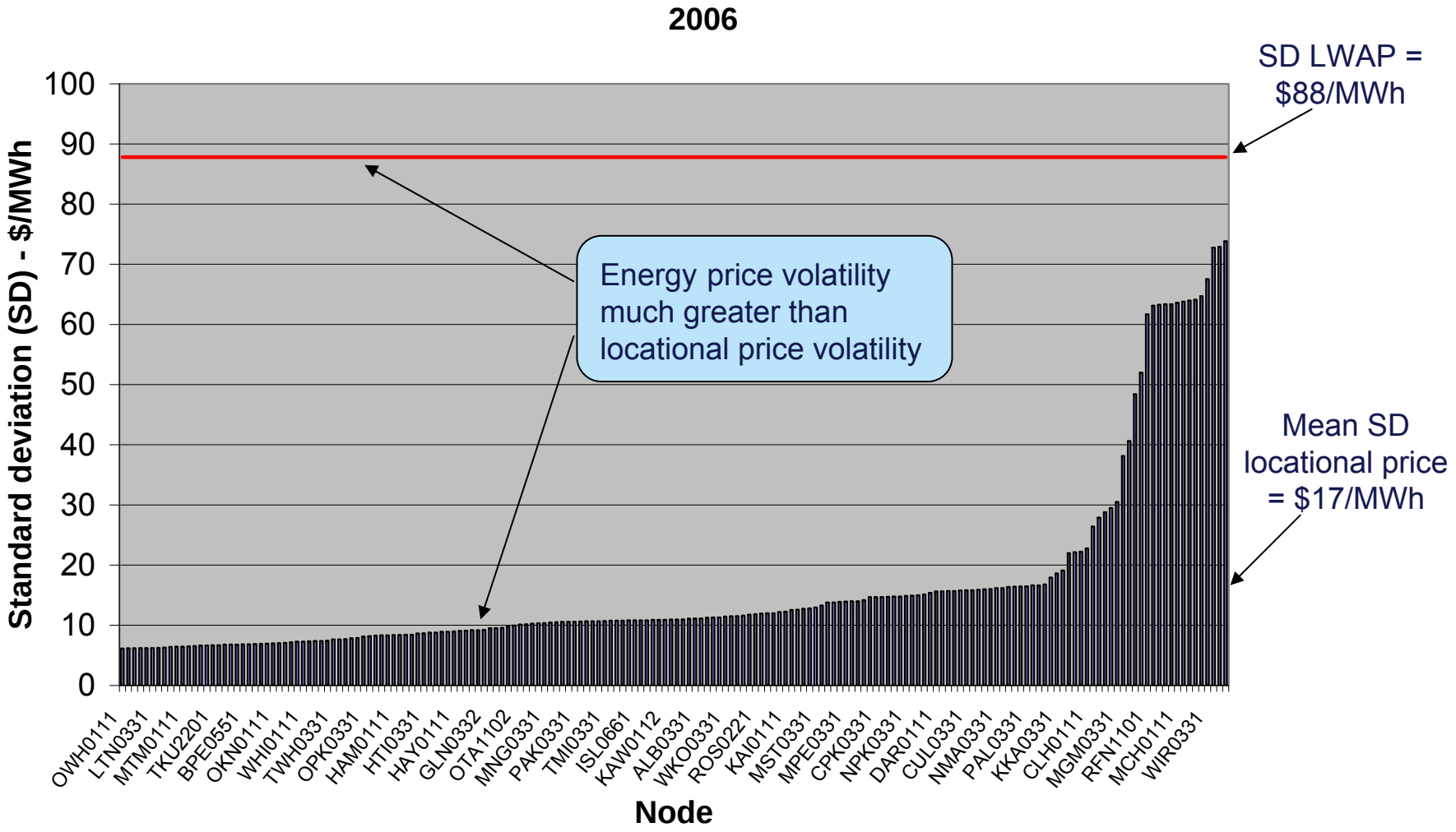
Energy price risk vs locational price risk



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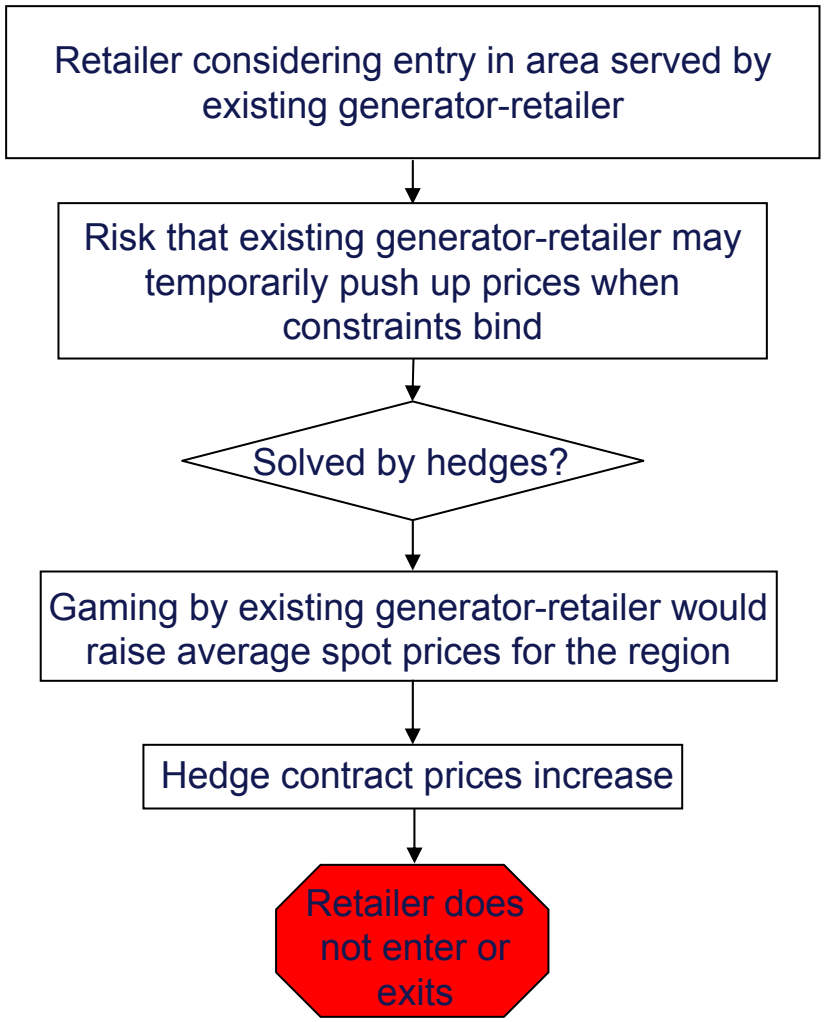
Locational price risk from gaming by generator-retailers



- **Locational volatility not just about short term volatility of locational prices**
- **Also about strategic risk**

Current approach to managing LPR

Self-hedging

- Vertical integration of retailer/generators where exposed to locational price risk
- Location of load close to main generation centre (in theory)
- Consumers build own generation

Hedge market

- Purchase a single contract to cover both energy and locational price risk
- But often purchasers can only obtain hedges at major (generator) nodes

  → Purchaser's energy price risk covered

  → Still some exposure to LPR

Impact of lack of transmission hedges

What problems does this cause?

Key Message #1: Lack of transmission hedges may inhibit development of the energy hedge market

- Lack of transmission hedges:
  - » Encourages costly self-hedging
  - » Encourages spot market purchasers to seek contracts as close as possible to their off-take node

    → disperses trading across many nodes rather than concentrating hedge trading at a few nodes to build liquidity

What problems does this cause?

Key Message #2: It may inhibit retail market competition

- Retailers unwilling to enter new markets because of high LPR
  - » Current players tend to have most of their customers close to their generation, which keeps their LPR lower than for a new entrant
- Australian retailers looking to enter NZ market have stated:
  - » the NZ hedge market functions poorly
  - » this is a major reason why they have not entered

Why doesn't the market solve the problem?

Key Message #3: Concerns about market power in spot market make parties unwilling to offer transmission hedges on "imported" power

- *Upstream generators:* exposed to offering strategies of downstream generators, actions of grid owner and system operator, high spring washer effects
- *Transpower:* exposed to offering strategies of downstream generators, high spring washer effects
- *Banks, other independent parties:* also exposed to these risks

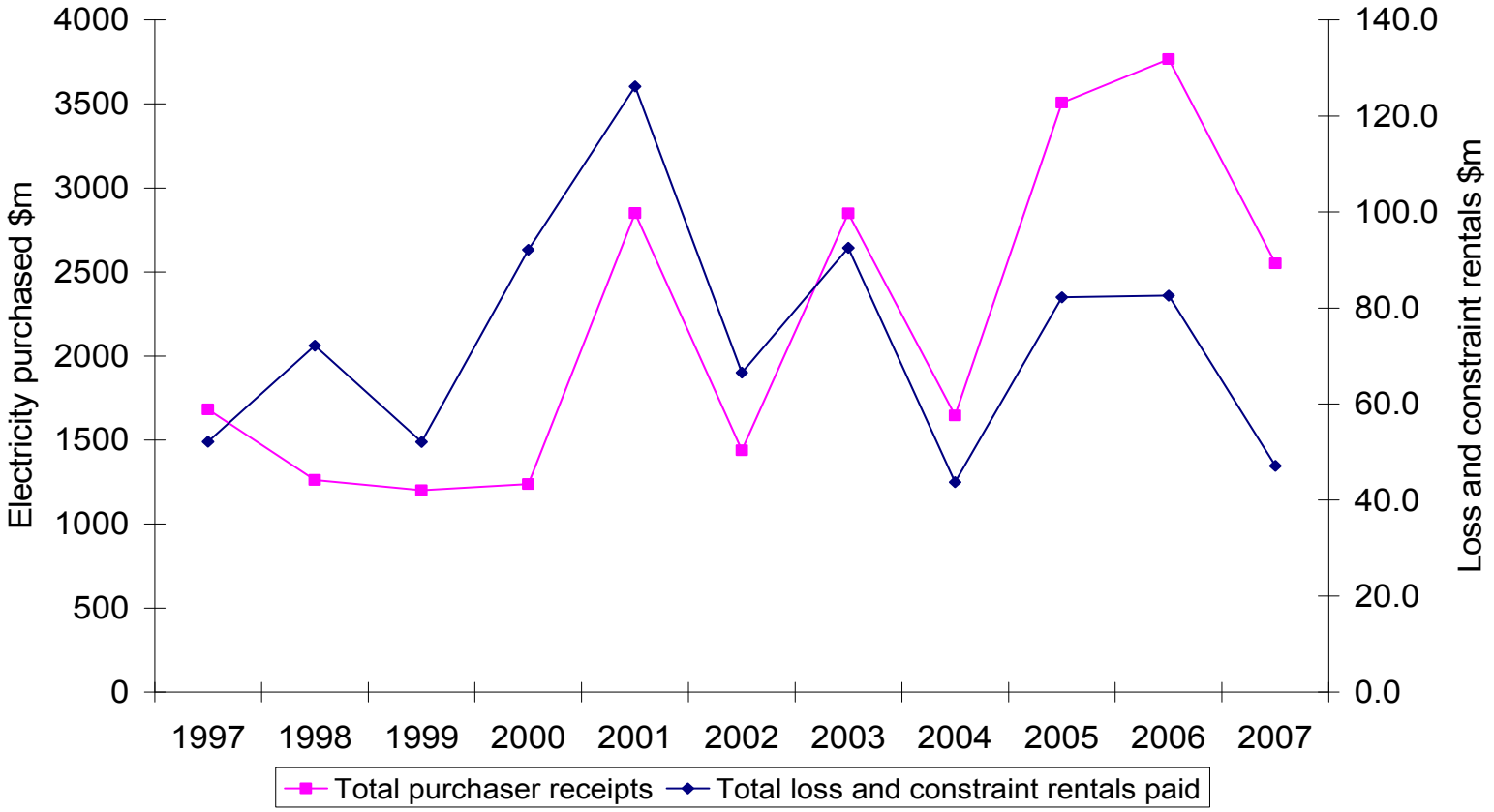
Why doesn't the market solve the problem?

Key Message #4: Firm access to loss and constraint (L&C) rentals is needed to address this problem

- … but this is a policy decision that the market can't solve on its own

Current allocation of L&C rentals

Total cost of electricity vs total rentals 1997-2007



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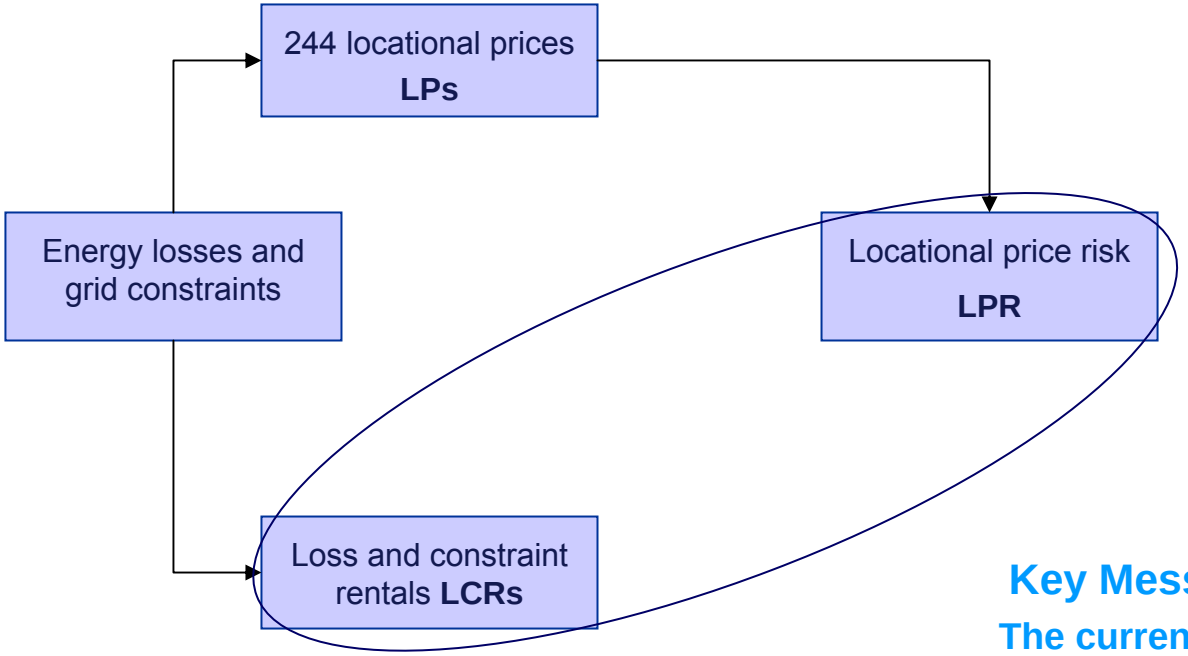
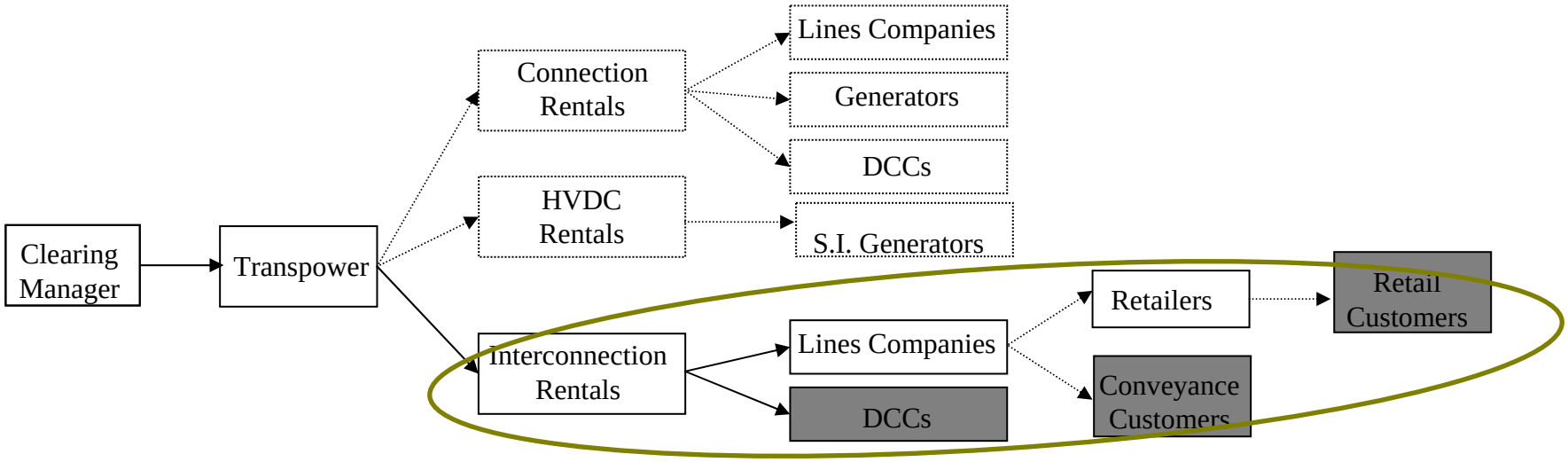
Current allocation of L&C rentals and locational price risk



Key Message #5

The current method of allocating LCRs is not related to LPR for load parties

Current allocation of LCRs



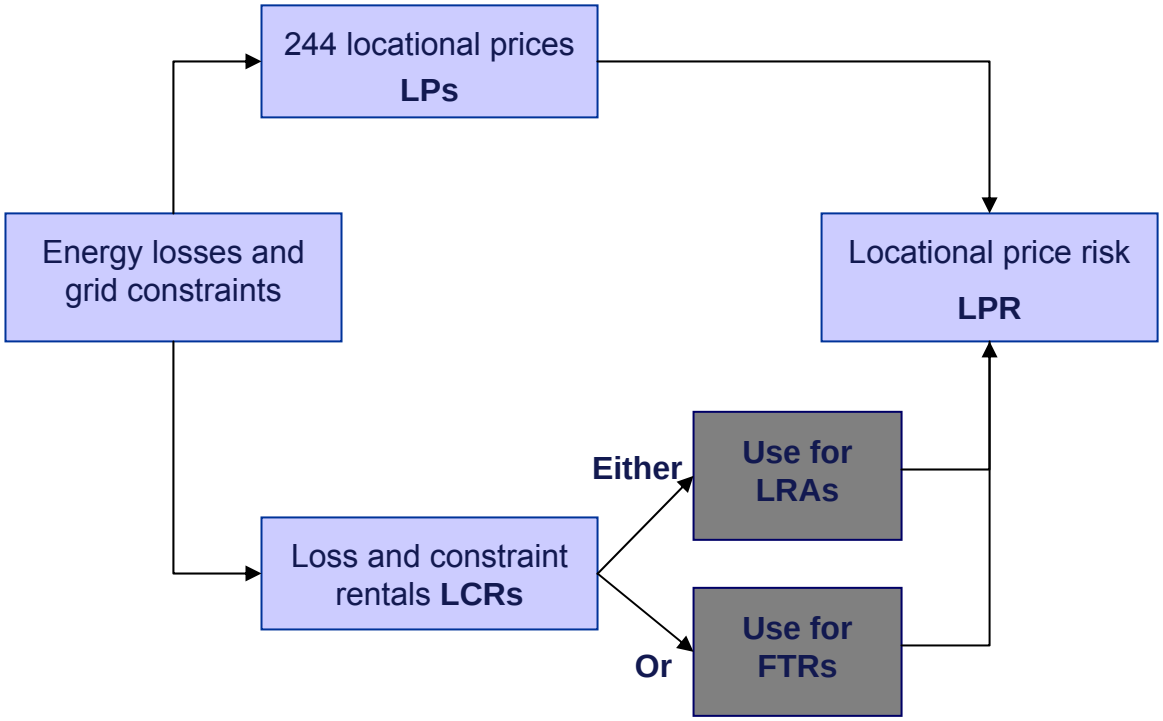
Key Message #6: Not all interconnection rentals are passed through to consumers

Key Message #7: 2006 proposal: use only interconnection rentals for LRAs as already paid to load parties

- Can ignore impact on allocation of connection and HVDC rentals

Options for managing locational price risk

Two main options



LRA model

Objectives of the LRA initiative

- Reduce obstacles to Participants contracting for hedges at centralised nodes
- Enhance retail competition
- Promote economic efficiency
- While minimising administration and compliance costs
  - » Project currently excludes analysis of HVDC and connection rentals

Locational rental allocations (LRAs)

- In simple terms, if nodal price > reference price then:

Rebate = (nodal price – reference price) x purchaser's gross load x balancing factor

- Reference price determines:
  - » which nodes receive rentals
  - » how thinly rentals are distributed across the country

Balancing factor

- Balancing factor for each trading period is defined as:

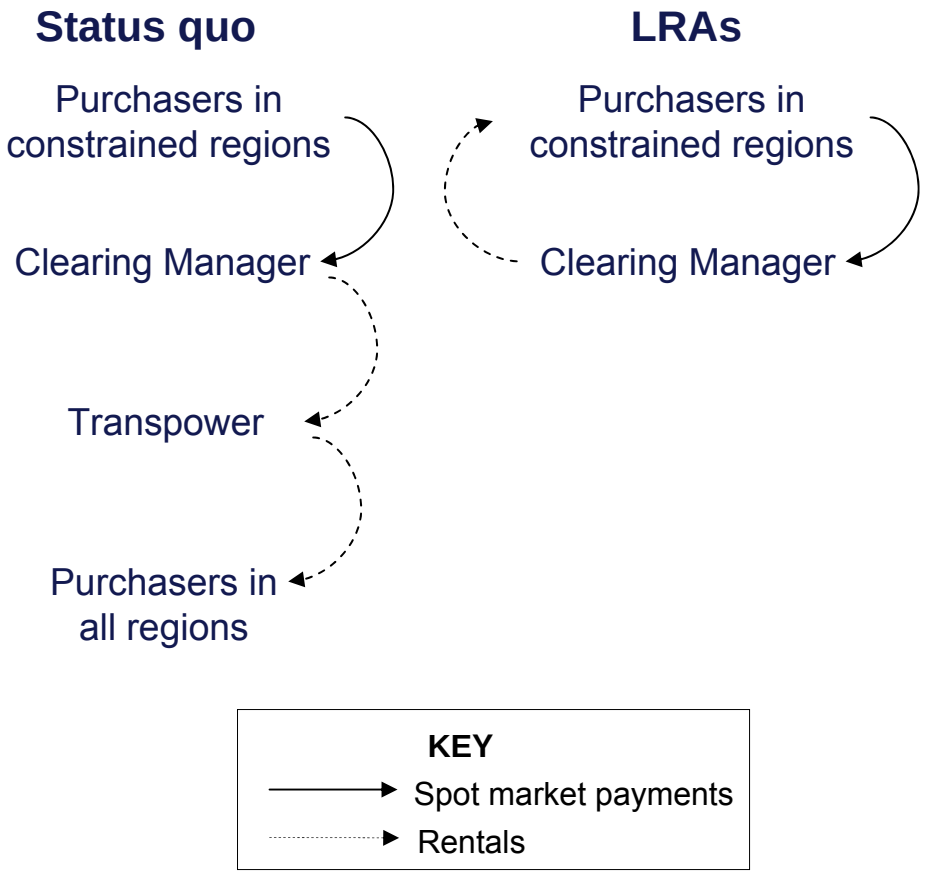
$$Balancing\ \ Factor\ \ = \frac{Total\ \ rentals}{\sum_{eligible\ \ nodes}\left(Nodal\ \ price\ at\ eligible\ \ nodes\ -\ reference\ \ price\right)\times Load\ \ at\ \ eligible\ \ nodes}$$

- Balancing factor ensures the pool of rentals is fully allocated

Money flows with LRAs

Key Message #8

- **LRAs alter net money flows**
- **LRAs reduce average EMPs**



Flow through of LRAs to end consumers

- LRAs paid to wholesale purchasers – DCCs and retailers
- A key benefit of LRAs is potential to minimise LPR for retailers. If successful, this will assist in promoting retail competition
- Commission therefore proposes to rely on competition to ensure benefits of LRAs flow through to end consumers

Impact of LRAs on effective marginal prices (EMPs)

$EMP_{current}$ = *nodal price + impact of market power (if any) – marginal interconnection rentals payment*

- Marginal interconnection rental = 0 for all but 12 or 100 trading periods (depending on region)

EMP_{LRA} = *nodal price + impact of market power (if any) – marginal LRA payment*

Key Message #9: LRAs reduce EMPs for purchasers

Impact of reduction of EMP from LRAs

Participant	Market Power?	Impact on EMP	Impact on Efficiency	Reason
Purchaser	Yes	Reduced	✓	▶ EMPs too high under status quo
	No	Reduced	x	▶ Reduced incentive to reduce load when prices high
Generator	Yes	Unchanged	✓	▶ Don't receive LRAs therefore no impact on EMP
Generator	No			▶ Can source hedge closer to injection point
Generator-Retailer	Yes (Generation)	Increased	x	▶ LRAs may increase incentives to game prices
	No (Generation)	Reduced	x	▶ Reduced incentive to reduce load when prices high

Treatment of losses

- LRA payments in benchmark model include loss rentals – as do current interconnection rental payments
- Inclusion of loss rentals in LRA payments reduces EMPs for purchasers
  - » Whether this is an advantage or disadvantage depends on degree of purchaser market power
- Commission is investigating LRA models that limit or exclude losses
- Even if LRA payments limited to constraint rentals only, EMPs for purchasers will still be reduced – but this is the case for any payment of rentals to purchasers

Results of simulations of LRA benchmark model

Model used for simulations

- Paper provides simulations of benchmark model only. This involves:
  - Simple LRA formula (ie does not involve participation factors)
  - Reference price = Generation-weighted Average Price (GWAP) adjusted for losses
  - Current period load
  - LRAs allocated every trading period
  - Nationwide allocation of rentals

Overview of simulations

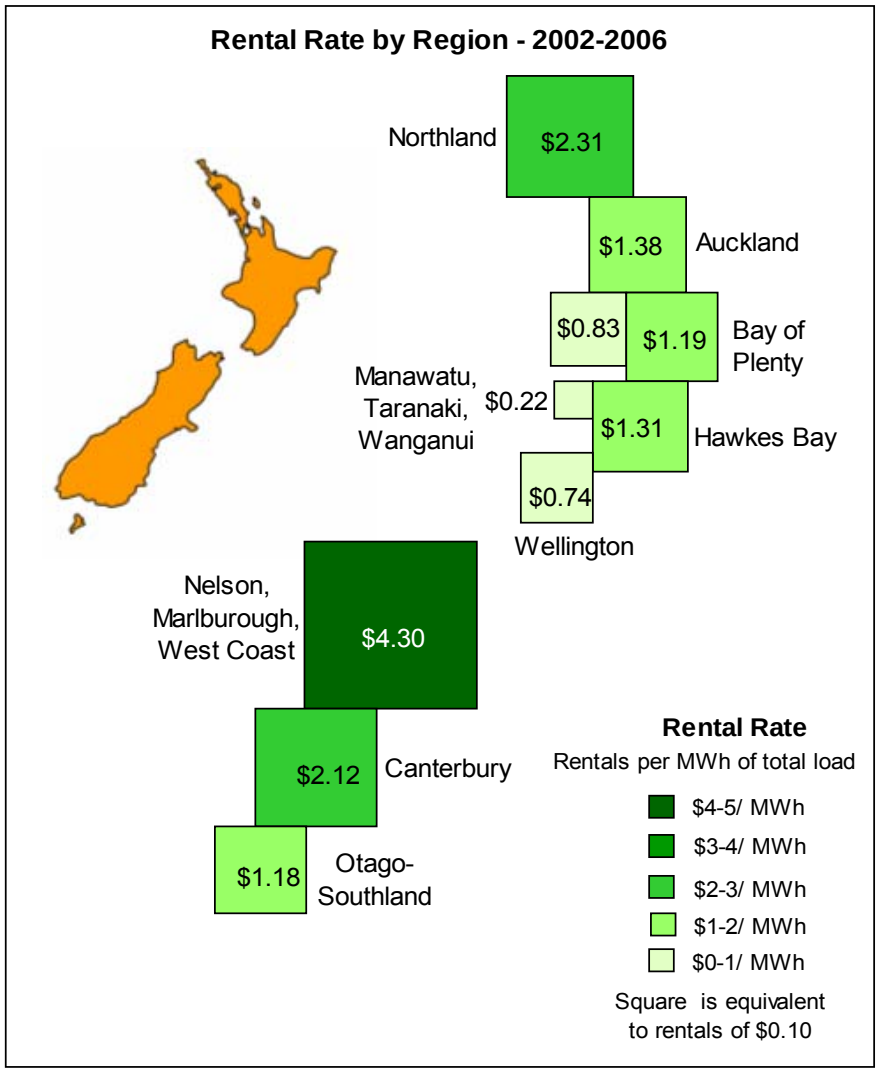
1. 2002-2006
   - Geographic distribution of rentals
   - Impact on standard deviation of locational prices
   - Impact on locational value at risk (LVAR)

   } Two measures of LPR

   - Impact on effective marginal price
2. Constrained trading periods
   - Geographic distribution of rentals
   - Impact on standard deviation of locational prices
   - Impact on effective marginal price
3. Dry periods

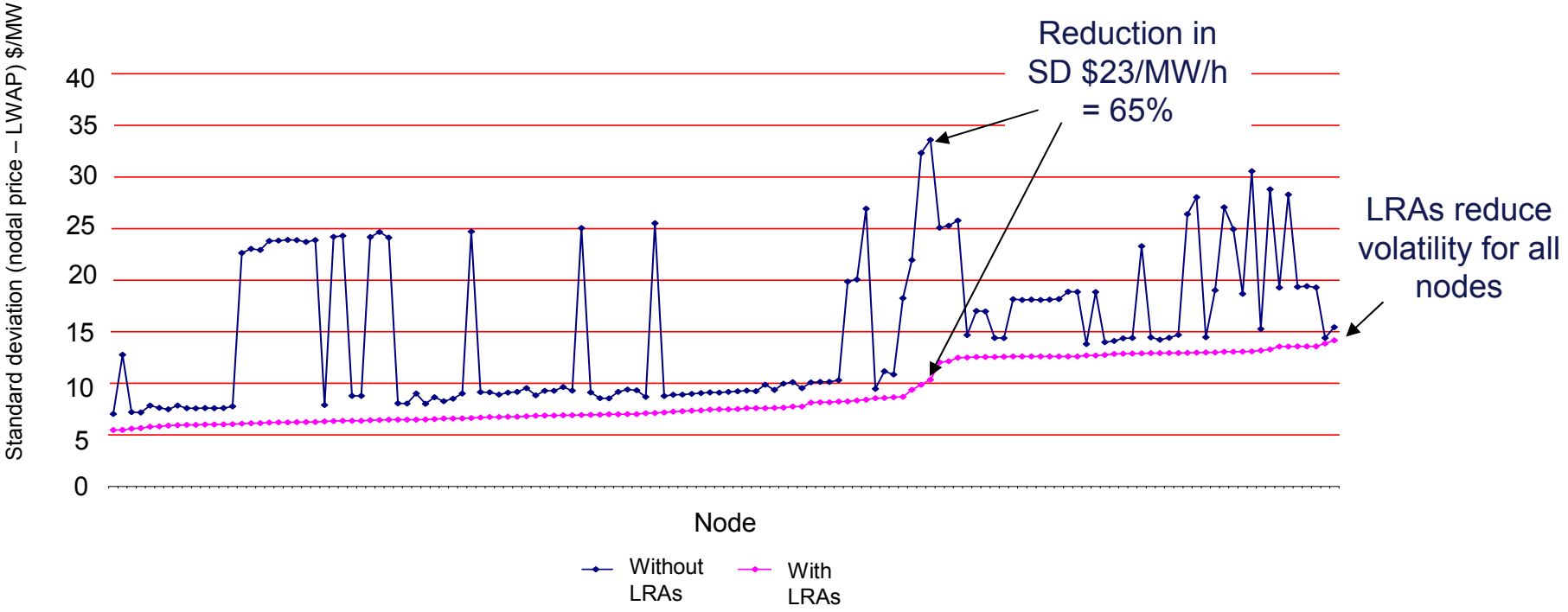
2002 - 2006

Geographic distribution of LRAs: 2002-2006



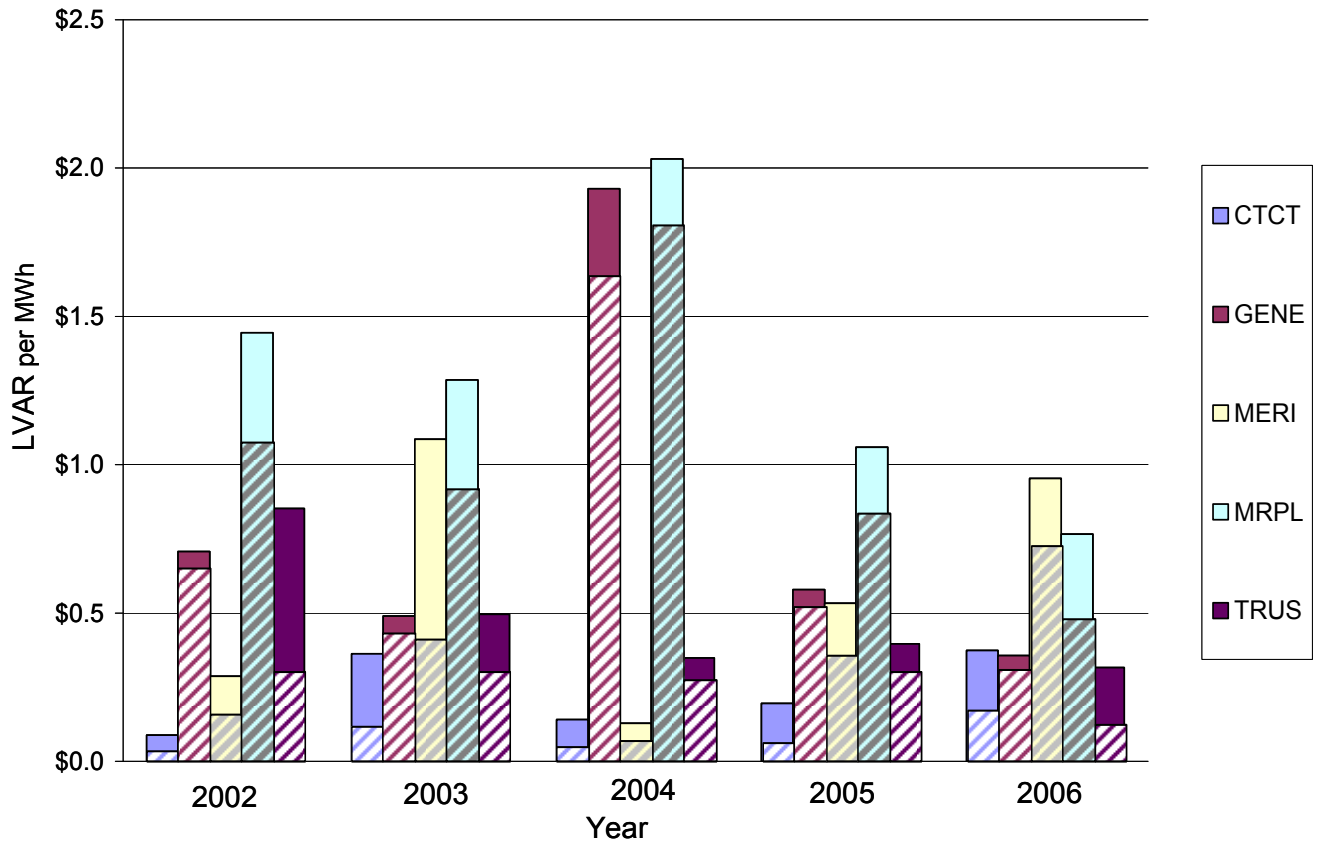
- Nelson-Marlborough-West Coast receive the highest rental rate
  - » Over double the next highest (Northland)
- West and south of the North Island receive the lowest rental rate

Impact on standard deviation by node: 2002-2006



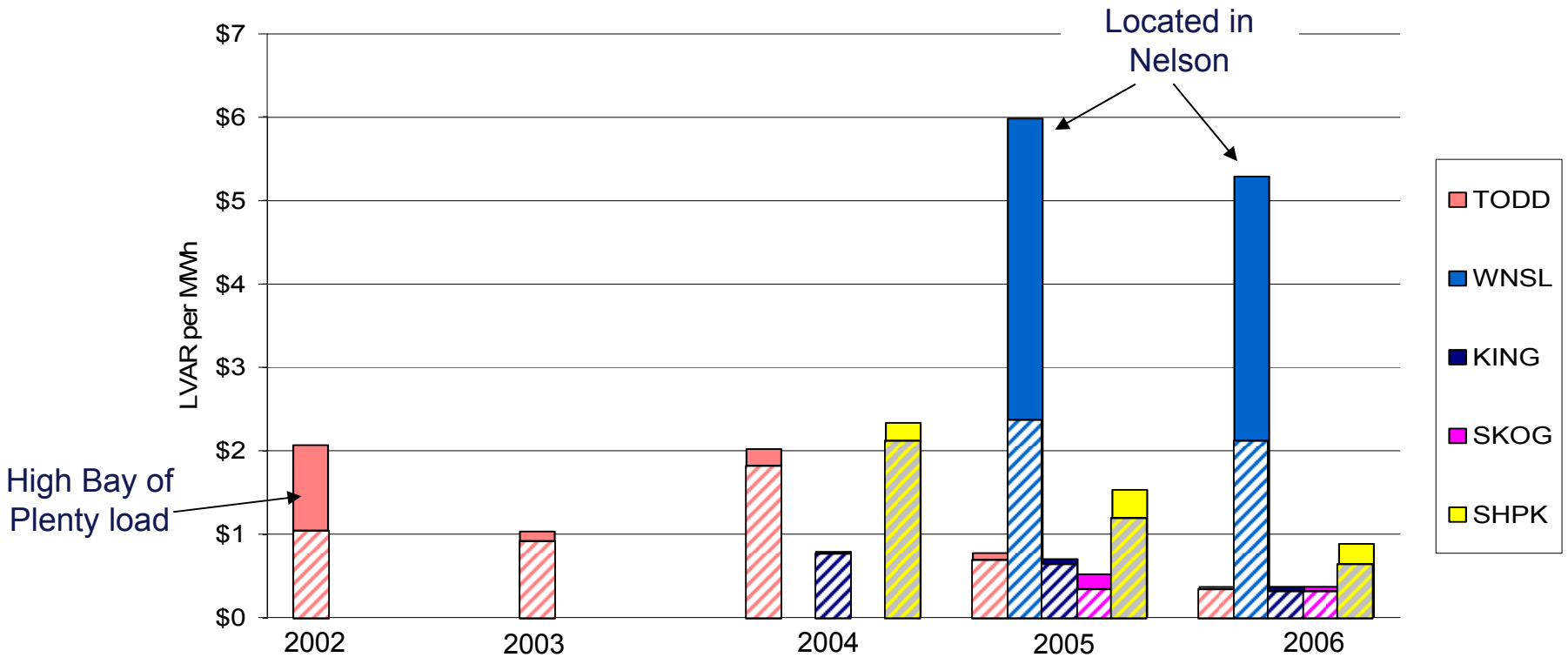
	Pre LRAs	Post LRAs	Reduction
Range	$7 - $34	$5 - $14	
Median	$14	$7	46%

LVAR per MWh for five largest purchasers

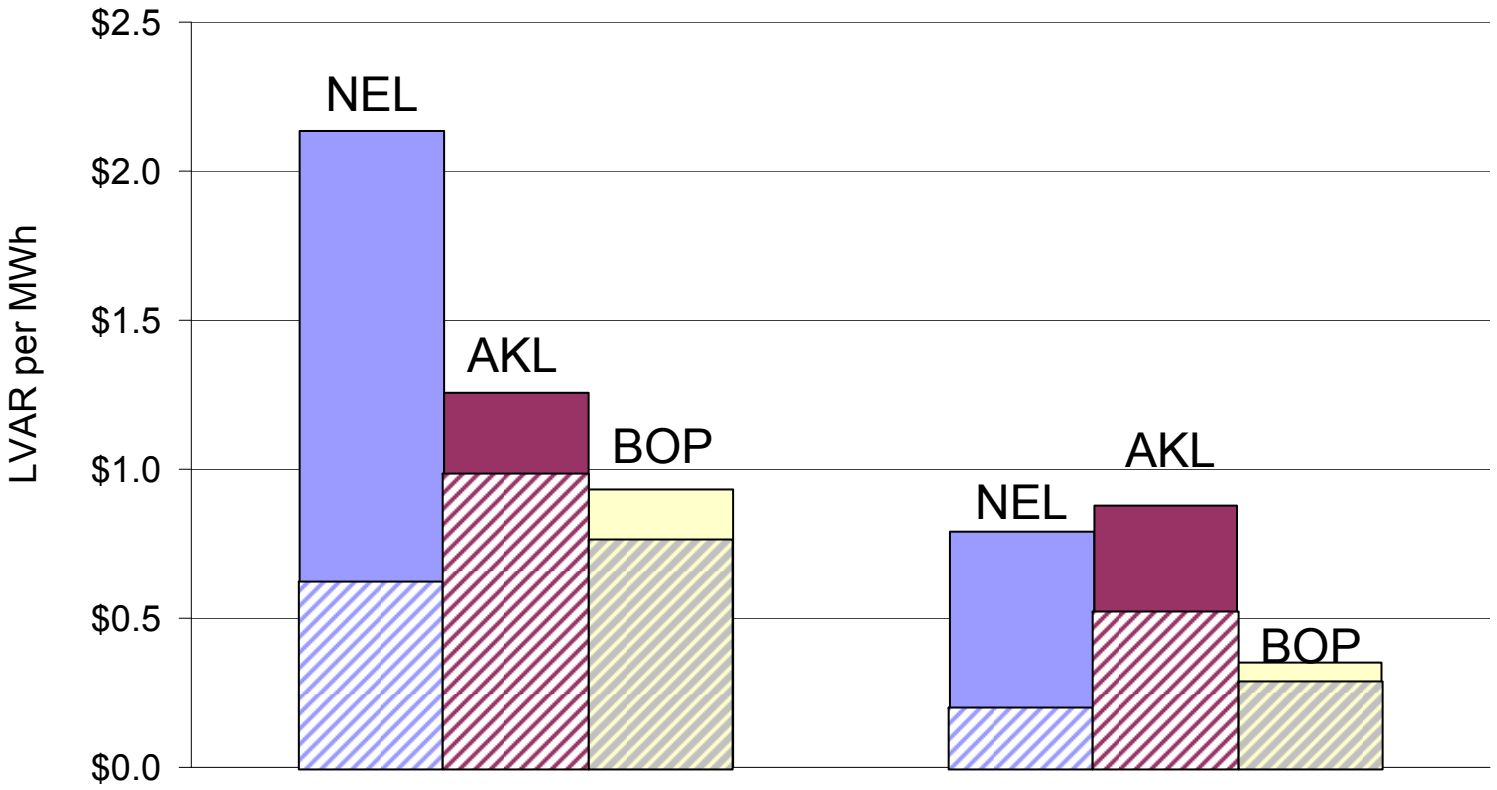


Purchaser	Contact	Meridian	Trustpower	Mighty River Power	Genesis
% reduction in LVAR	60%	40%	39%	21%	9%

LVAR per MWh for other purchasers



LVAR per MWh for hypothetical retailers



Hypothetical Retailer	Nelson	Auckland	Bay of Plenty
% reduction in LVAR 2005-06	71%	27%	12%

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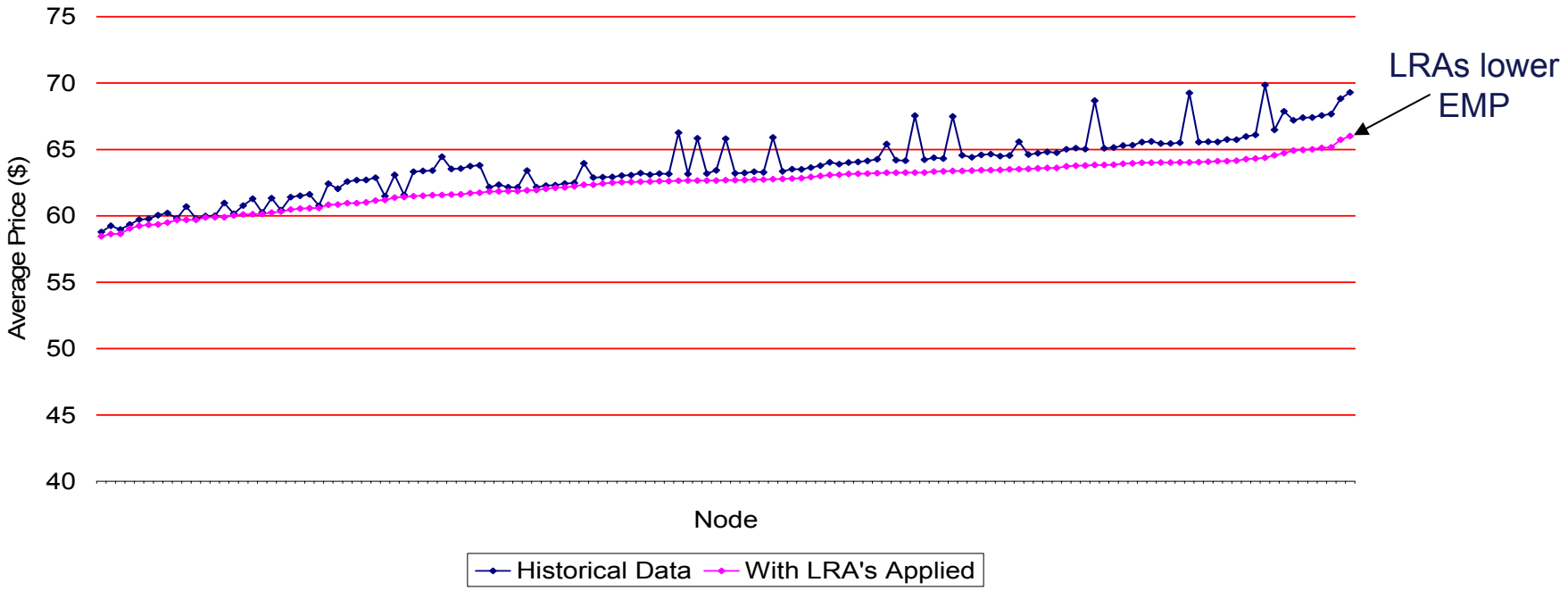
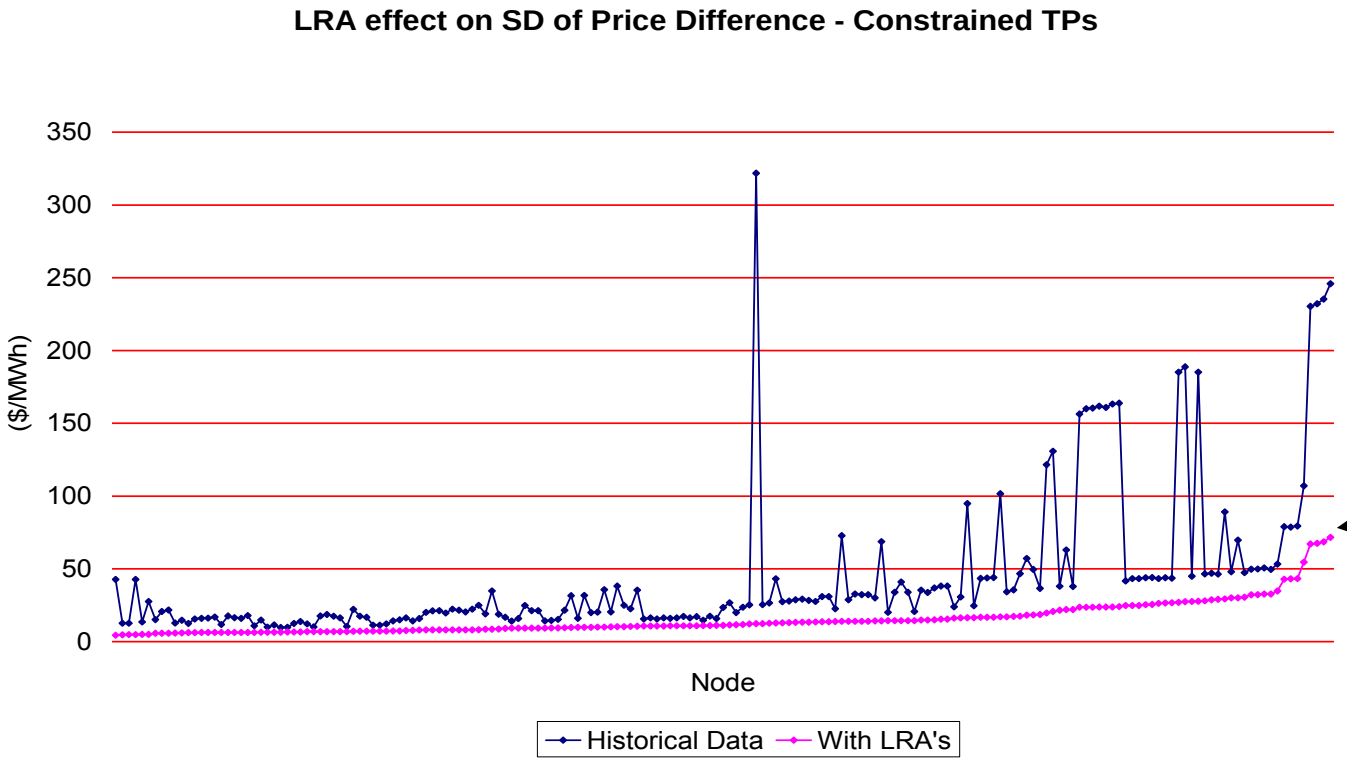
Impact on effective marginal price: 2002-2006



- Mean nodal price without LRAs: $64/MWh
- Mean EMP with LRAs: $62/MWh

Constrained trading periods

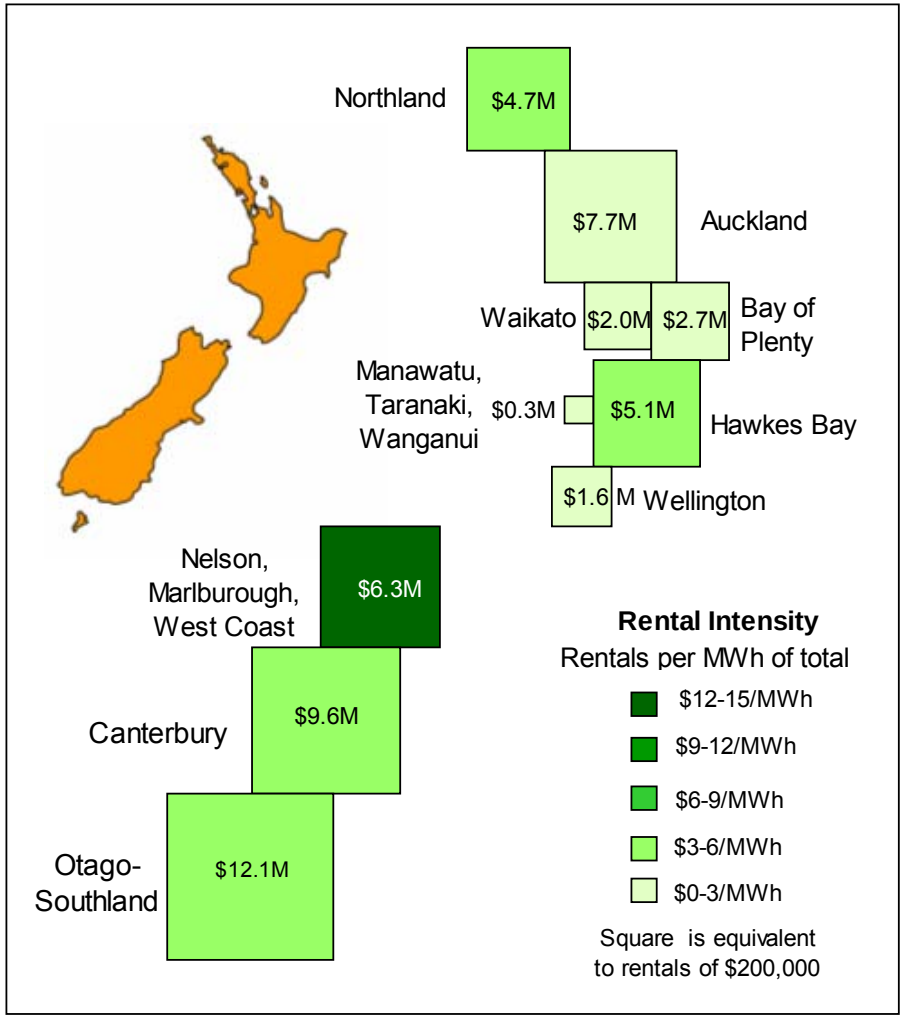
Impact of LRAs on volatility during constrained trading periods: 2006



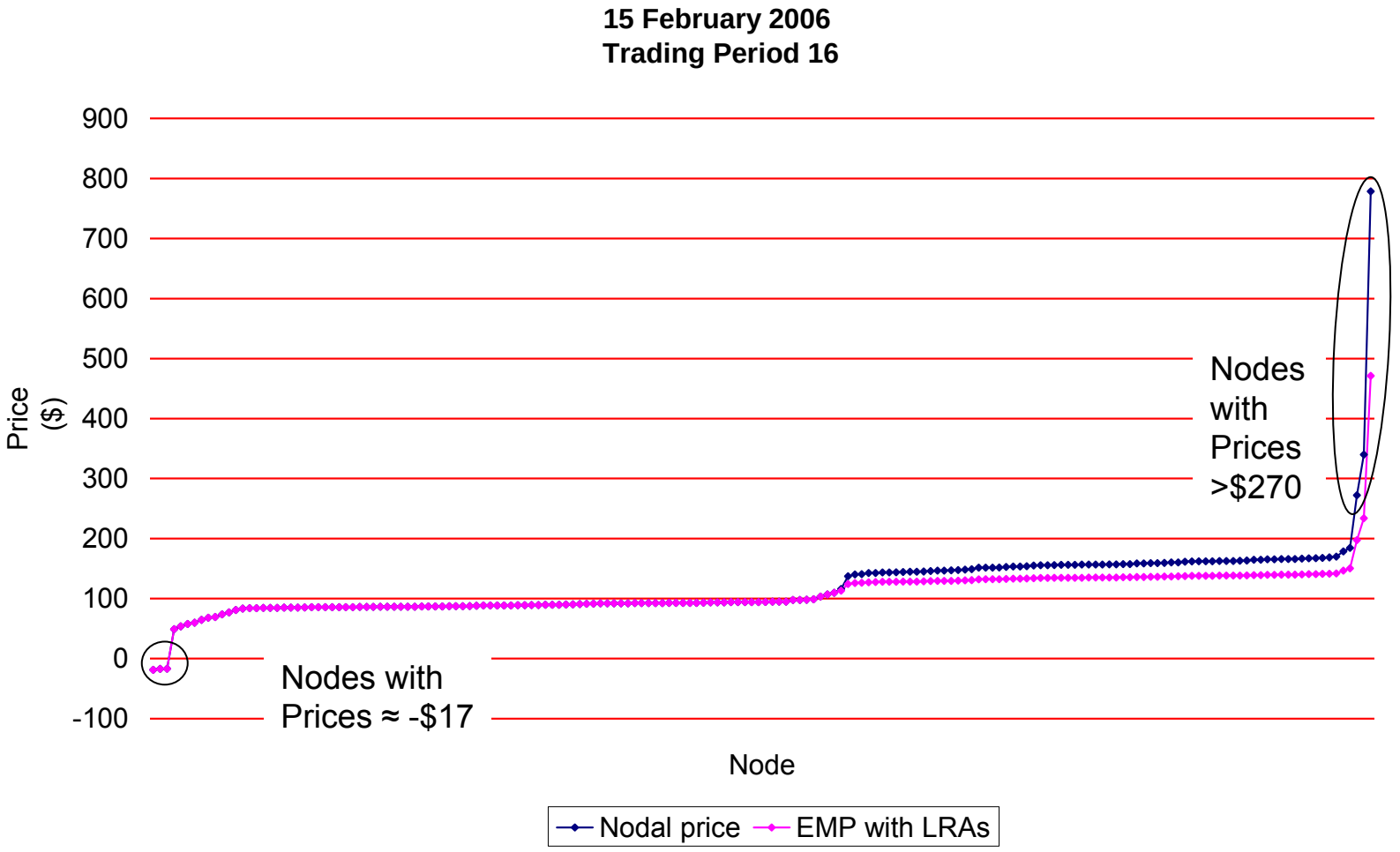
LRAS reduce volatility for all nodes

	Pre LRAs	Post LRAs
Nodes with SD>$50	16%	3%
Nodes with SD>$20	65%	20%

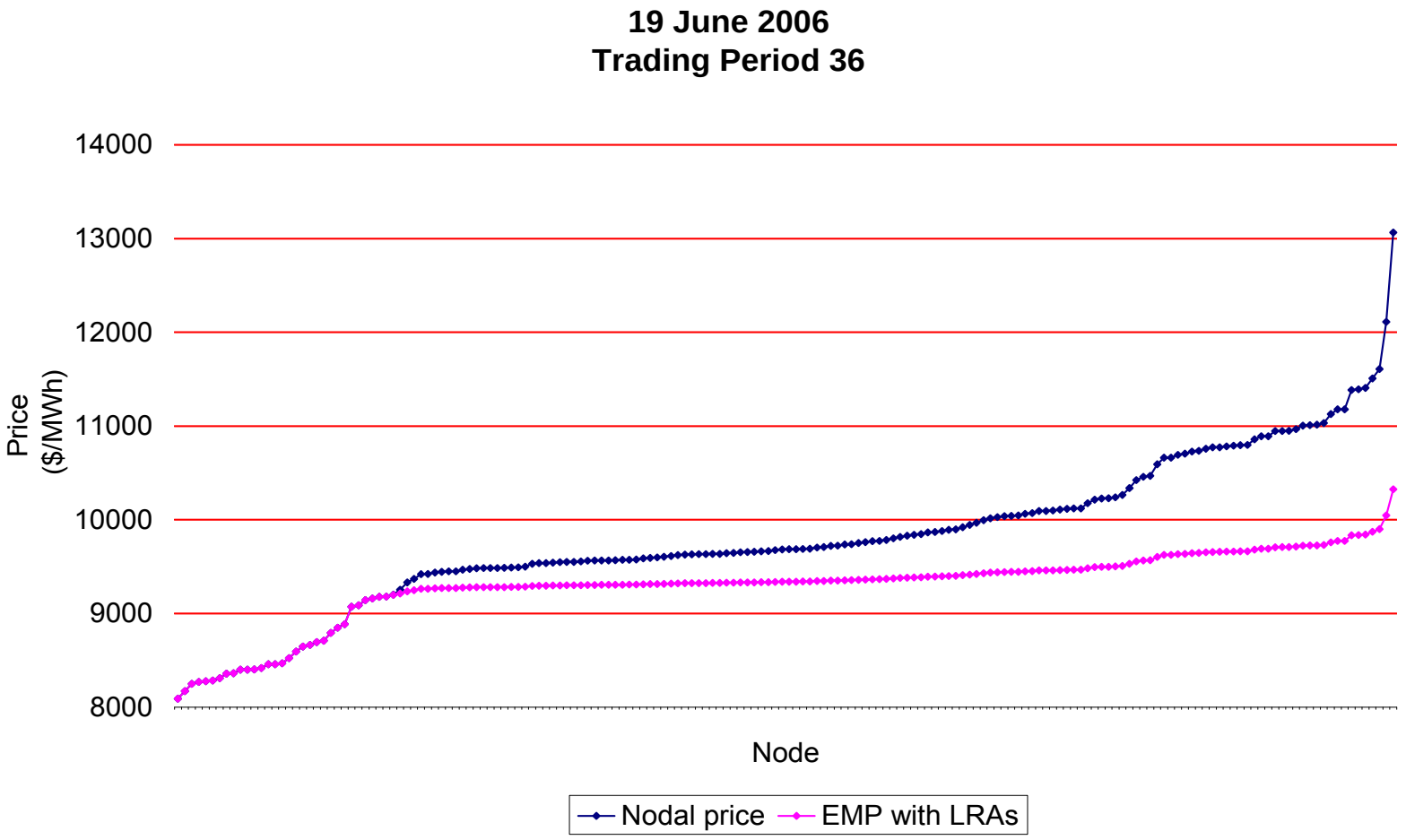
Distribution of rentals during constrained trading periods: 2005-06



Impact on effective marginal price: Constrained trading period (1)



Impact on effective marginal price: Constrained trading period (2)



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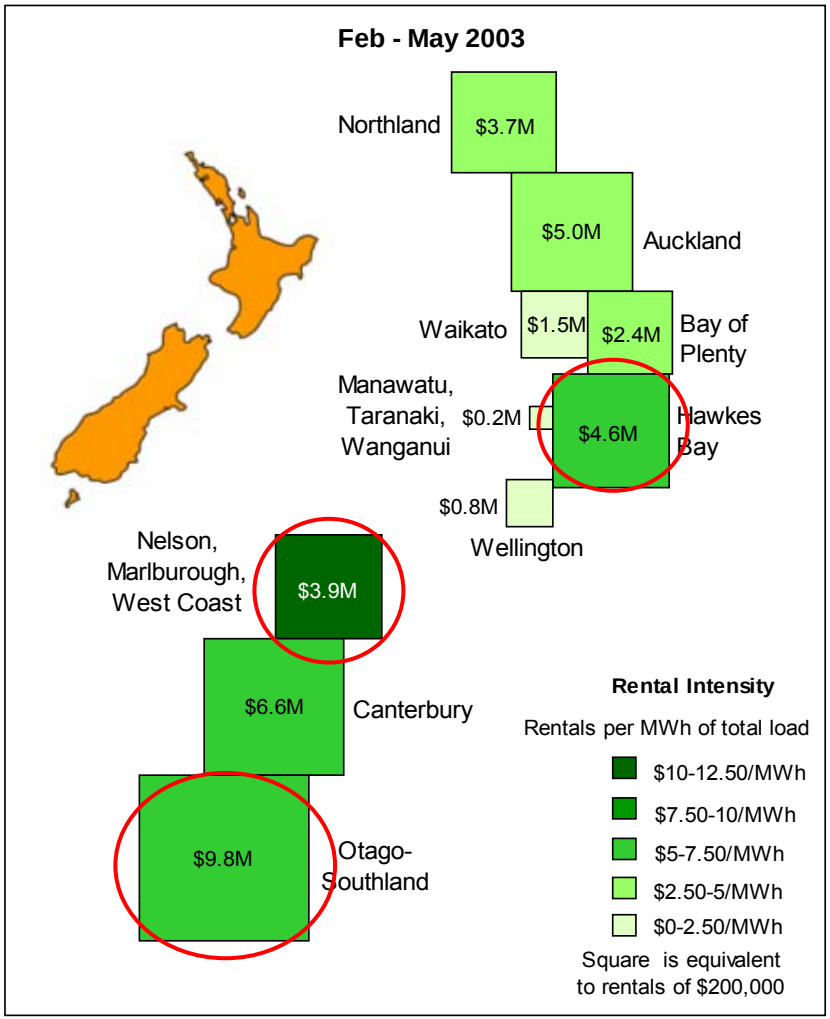
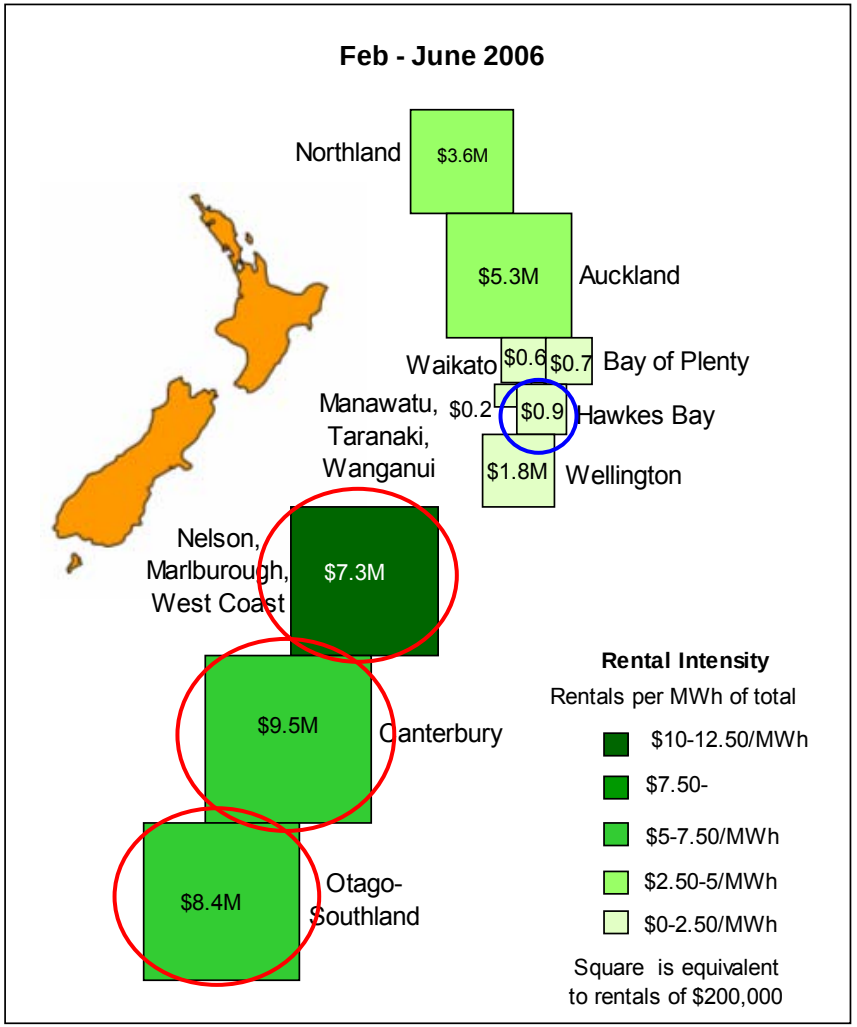
Dry years

Distribution of rentals during dry periods: 2003 and 2006





Conclusions on simulations

- Benchmark LRA model reduces LPR substantially, especially for purchasers in areas with high LPR
- Could therefore assist in reducing barriers to entry in retail market
- Benchmark model reduces EMP significantly in some scenarios
  - » Is this a problem?
  - » If yes, can alternative LRA models address it?

Enhancements to benchmark LRA model

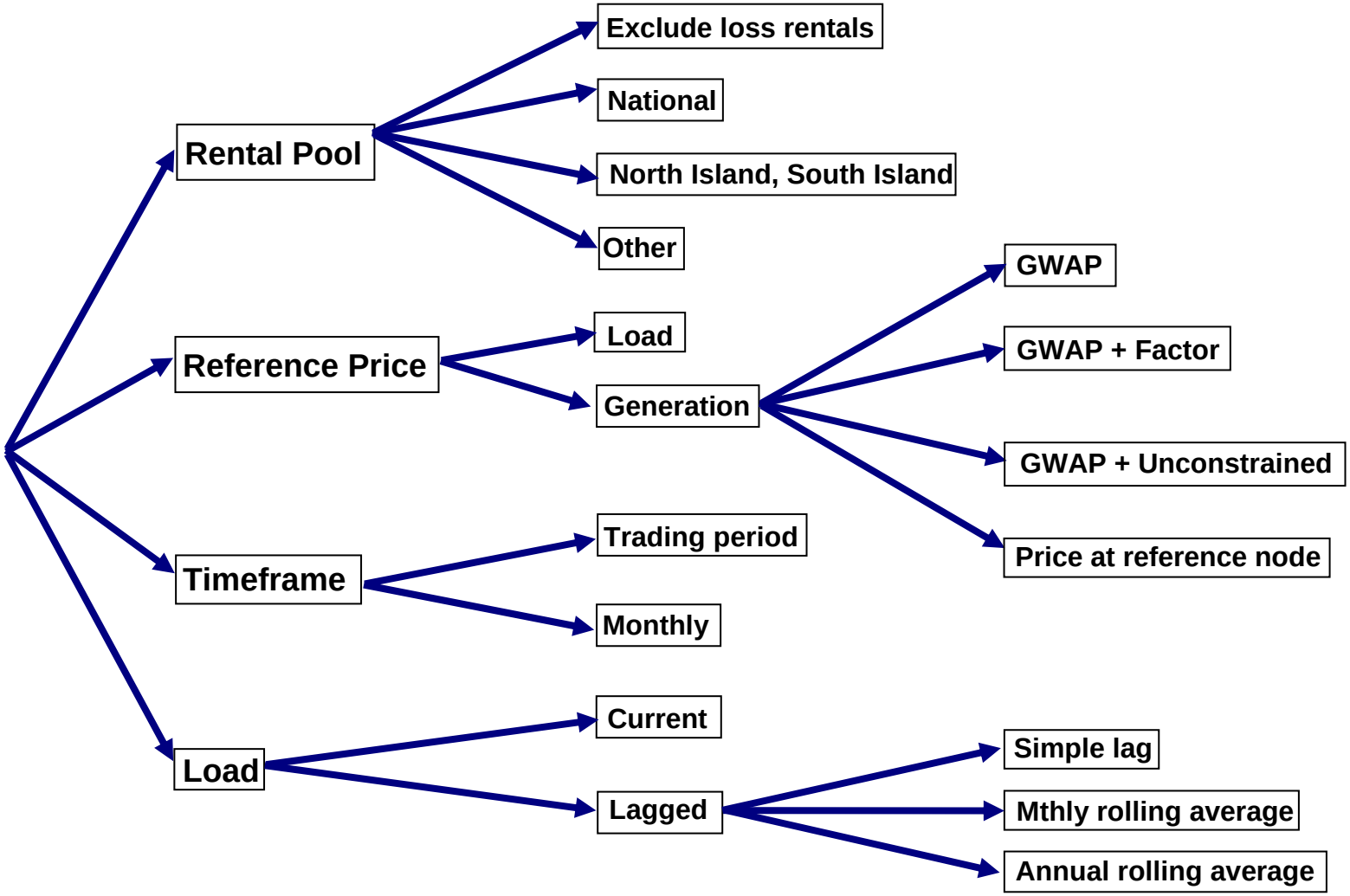
Participation factors (PFs)

- When there are multiple constraints binding in SPD
  - » Multiple rental pools are created
  - » Using PFs in the LRA model ensures each rental pool is allocated to nodes in accordance with impact each constraint has on each node
  - » Approach could (in theory) be extended to losses

Availability of participation factors

- Are PFs readily available to use for LRA initiative?
  - » PFs were not used for simulations in Issues paper
  - » Discussing with Transpower about whether and how PFs can be made available for LRAs
- Is it necessary to use complex model?
  - » Using simple LRA model would lump all rentals into one pool, over-allocating rentals to some nodes and under-allocating to others
  - » Simple model may turn out to be all that can be practically done – simulations indicate significant reductions in LPR for nodes and spot market purchasers

Key policy/parameter choices



Consultation

Proposed approach to consultation

Step 1: Issues paper

- Detailed information on LRA initiative
- Seeks feedback on whether submitters agree LRAs should be further investigated
- Two month consultation period

Step 2: Detailed Options paper:

- Describe alternative LRA parameter options
  - show impact on LPR, marginal price signals
- Identify key issues, judgements for selecting preferred LRA option
- Propose an initial preferred option for formal CBA and rule-change consideration
- Obtain industry feedback on key parameter choices

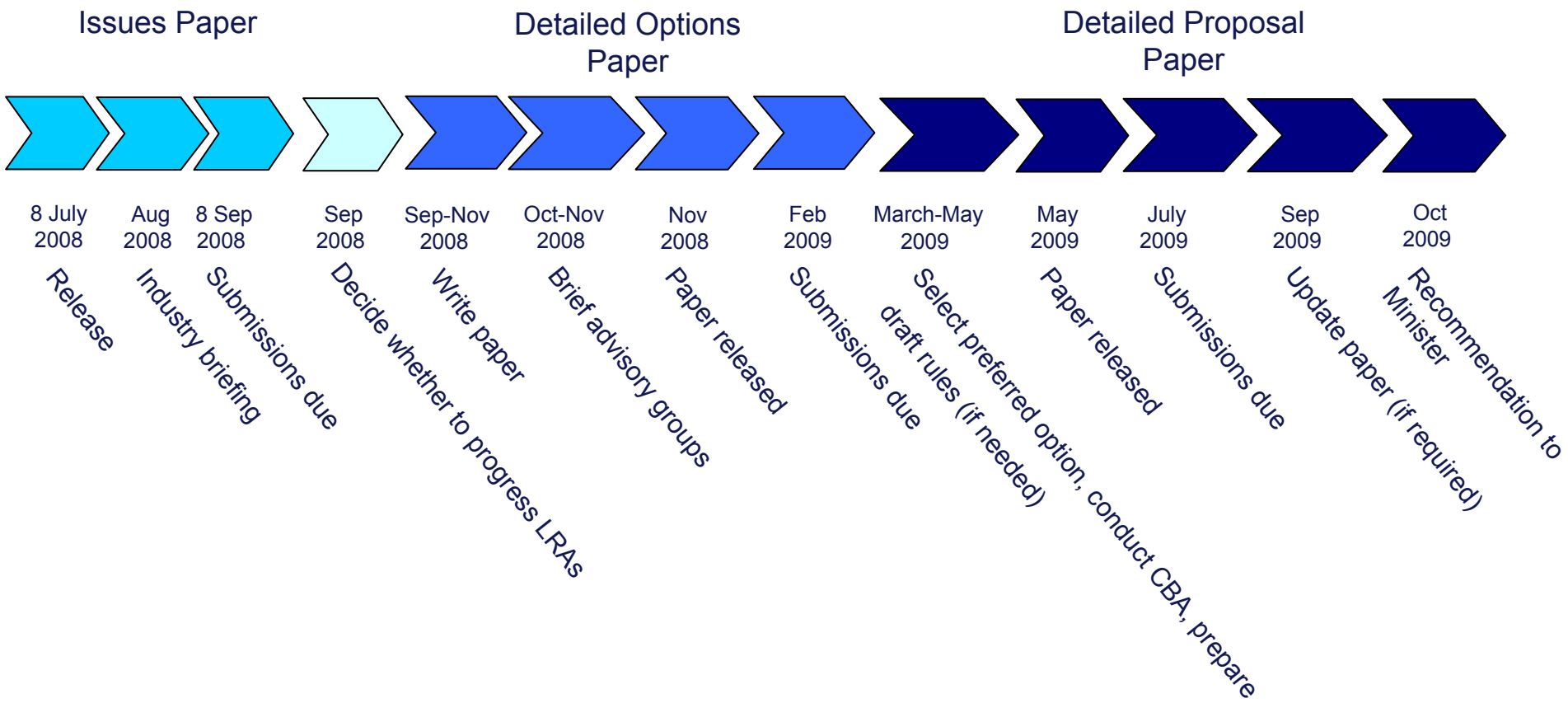
Step 3: Detailed Proposal paper

- Identifies Commission's preferred approach to addressing locational price risk, taking into account submissions
- Full cost-benefit analysis
- Assesses effect of preferred approach on market participants
- Consideration of practical alternatives
- Assessment against EC objectives
- Draft rules, if appropriate

Recommendation to Minister

Subject to submissions

Timeline: three step consultation



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Discussion and Questions