



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

INTERVENTION IN ELECTRICITY INVESTMENT: REQUIRED, OR SELF-PERPETUATING?

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OVERVIEW

- Why is investment important?
- Some terminology
- What's special about electricity investment?
- Reminder about centralised investment planning
- Brief look at capacity schemes
- Capacity schemes and structural solutions compared
- New Zealand's position appraised



OVERVIEW – Cont'd

- Presentation draws on:

R. Meade, “Electricity Investment and Security of Supply in Liberalized Electricity Systems,” in Mielczarski, W. (ed), 2005, *Development of Electricity Markets*, Technical University of Lodz (downloadable from www.iscr.org.nz)

- Presages imminent release of:

L. Evans and R. Meade, 2005, *Alternating Currents or Counter-Revolution? Contemporary Electricity Reform in New Zealand*, Victoria University Press (in press)



WHY IS INVESTMENT IMPORTANT?

- Because liberalised electricity systems emphasise:
 - Decentralised decision-making
 - Market-driven investment choices
 - Investment risks being shouldered by investors
- Because the timing, level and type of investment affects:
 - The balance of supply and demand, and hence
 - The level, course and volatility of electricity prices
- Together these affect “security of supply,” and the politics thereof (in turn affecting investment ...)



TERMINOLOGY

- Important to distinguish *security* and *adequacy*
- Following Oren (2000) *et al.*:
 - *Security* – “ability of the system to withstand sudden disturbances”
 - *Adequacy* (aka “*security of supply*”) – “ability of the system to supply the aggregate electric power and energy requirements of the consumers at all times”
- This presentation focuses on the broader *adequacy*



ELECTRICITY INVESTMENT RESULT

- Established theory of peak pricing commonly predicts that competitive, energy-only electricity markets are sufficient to elicit the optimal level of investment, with prices
 - Reflecting marginal operating costs off-peak
 - *Also covering capacity costs at peak!*
- Optimal investment equates the marginal social benefit of avoiding unmet demand and the marginal social cost of supply → non-zero rationing can be optimal!
- Theory emphasises importance of the “scarcity rent” component in peak prices for funding peaking plant → beware price caps!
- But don’t we need interventions when markets “fail” ...?



ELECTRICITY INVESTMENT QUIRKS

- The usually-cited culprits:
 - Real-time balance required due to non-storability
 - Actions of one grid-connected party affects other parties
 - Selective demand curtailment is tricky
 - Physical and contractual electricity flows needn't coincide
 - Other possible suspects:
 - Inelastic demand
 - Inelastic supply
 - Oligopolistic competition
 - Illiquid forward energy trading
 - Electricity markets are immature/evolving, and participants are inexperienced
 - Regulation (e.g. price caps) to limit market power harm investment
- } Volatile and spiky spot prices



INVESTMENT QUIRKS – Cont'd

- More promising candidates – other types of “market failure”:
 - Security of supply is a *public good*
 - Security of supply involves *externalities*
- On market under-provision due to *public good* features:
 - Definition requires non-exclusion, non-exhaustion and non-rejection
 - But security of supply is exhaustible → CPR (Ostrom (2000))
 - Real issue is ability to secure revenue for security provision
- On public vs private benefits/costs (*externalities*):
 - Spot electricity prices incompletely internalise benefits/costs
 - But externalities are commonplace – are these ones material? (or the costs of remedying them even worse?)
- Diseconomies of scale and scope and information costs from reform



CENTRALISED INVESTMENT REVISITED

- Sinclair Knight Mertz (2003):

“Development is proceeding on an ad hoc basis. We do not know which schemes are the most beneficial to New Zealand as a whole and hence we cannot be sure that the most beneficial schemes are being developed.”

- But Galvin’s (1985) review of New Zealand investment planning:
 - Systematic and gross over-estimates of demand growth
 - Over-investment, commissioning delays, and cost over-runs
 - Political pricing (with significant, periodic corrections)
 - Still had blackouts
- Has the leopard changed its spots?



CAPACITY SCHEMES IN BRIEF

- Price-based mechanisms, aka:
 - Capacity payments
 - Operating reserves
- Quantity-based mechanisms, aka:
 - Planning reserves
 - Operating reserves
 - Installed capacity markets (ICAPs)
 - Capacity requirements/obligations
- Other schemes:
 - Options-based
 - Capacity subscriptions with load-limiting devices (Doorman (2003))

Where markets involve price caps, such schemes can be necessary
(but are not always sufficient) to ensure adequacy



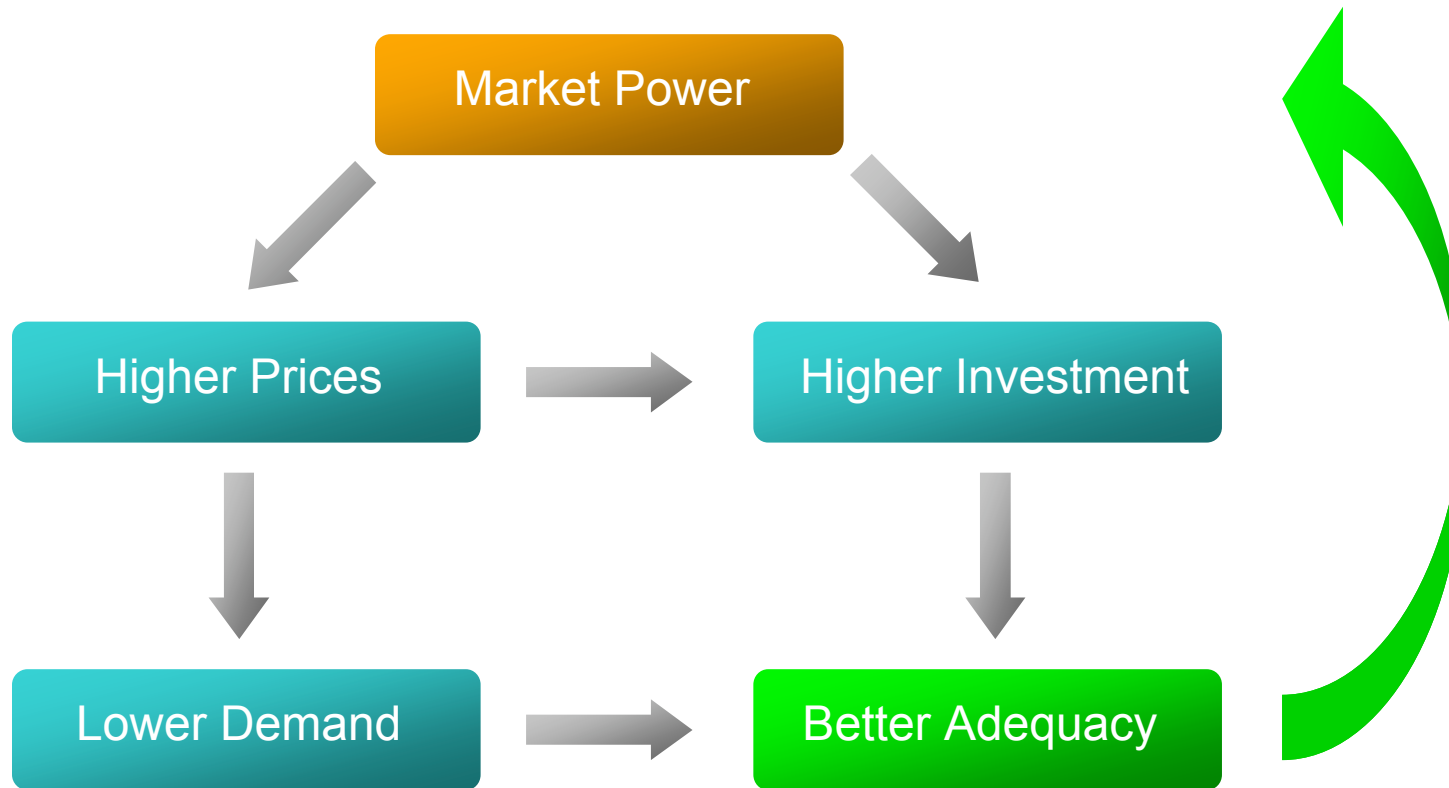
CAPACITY SCHEMES – Cont'd

- The good news:
 - Absent market power, and if demand is 100% price inelastic, these schemes can induce the same given level of adequacy as energy-only markets, but with smoother prices and generator profits, and lower price caps
 - Under certain conditions capacity schemes maximise social welfare
- The bad news:
 - Implementation problems risk welfare losses
 - Eliminating rationing altogether is too socially costly
 - Generator market power just jumps markets, producing same outcomes as in energy-only markets
 - TSO capacity contracting crowds out private peaking investments
 - Price suppression and crowding out mean schemes become self-perpetuating

Just another artificial and fallible quasi-market?



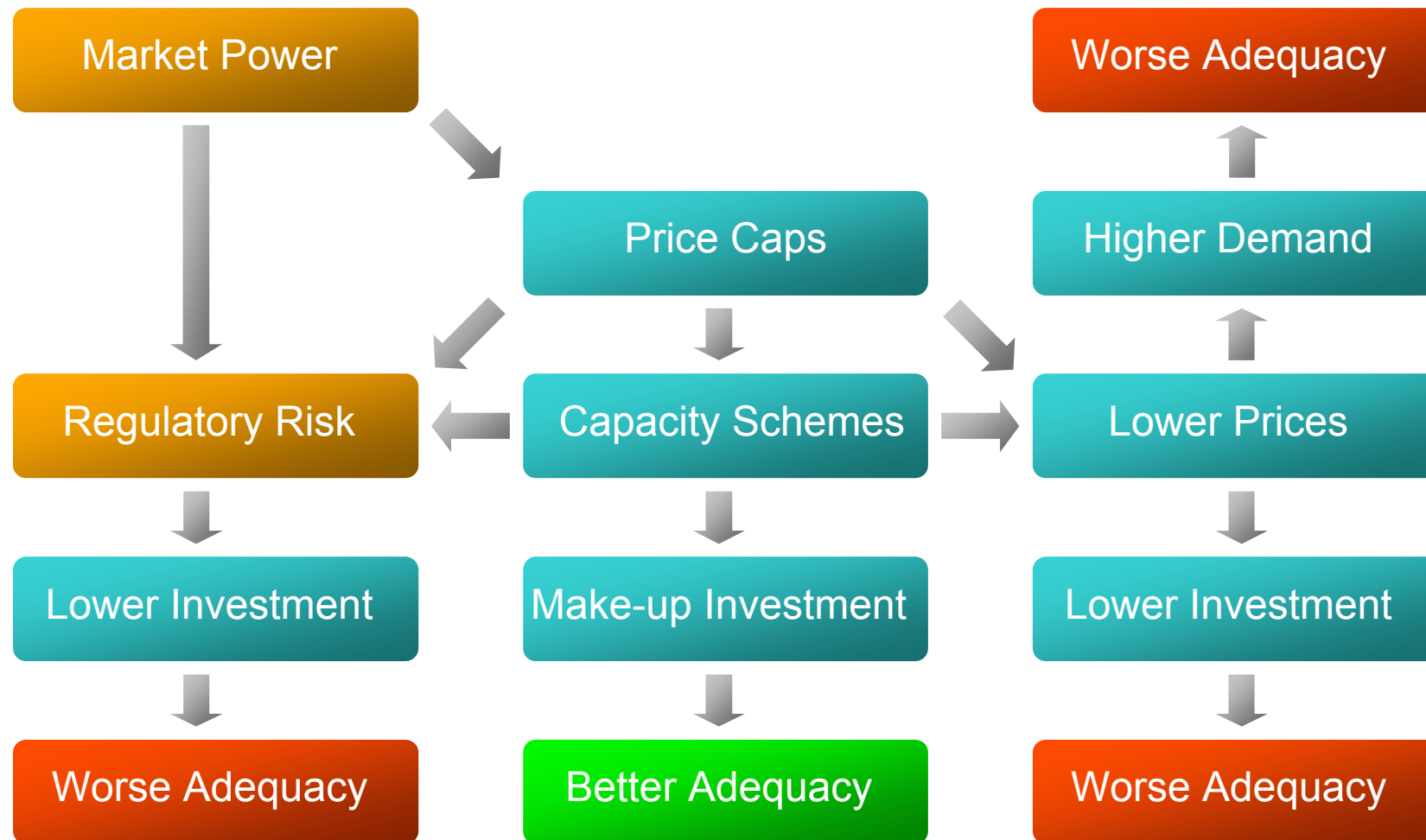
MARKET POWER AND ADEQUACY



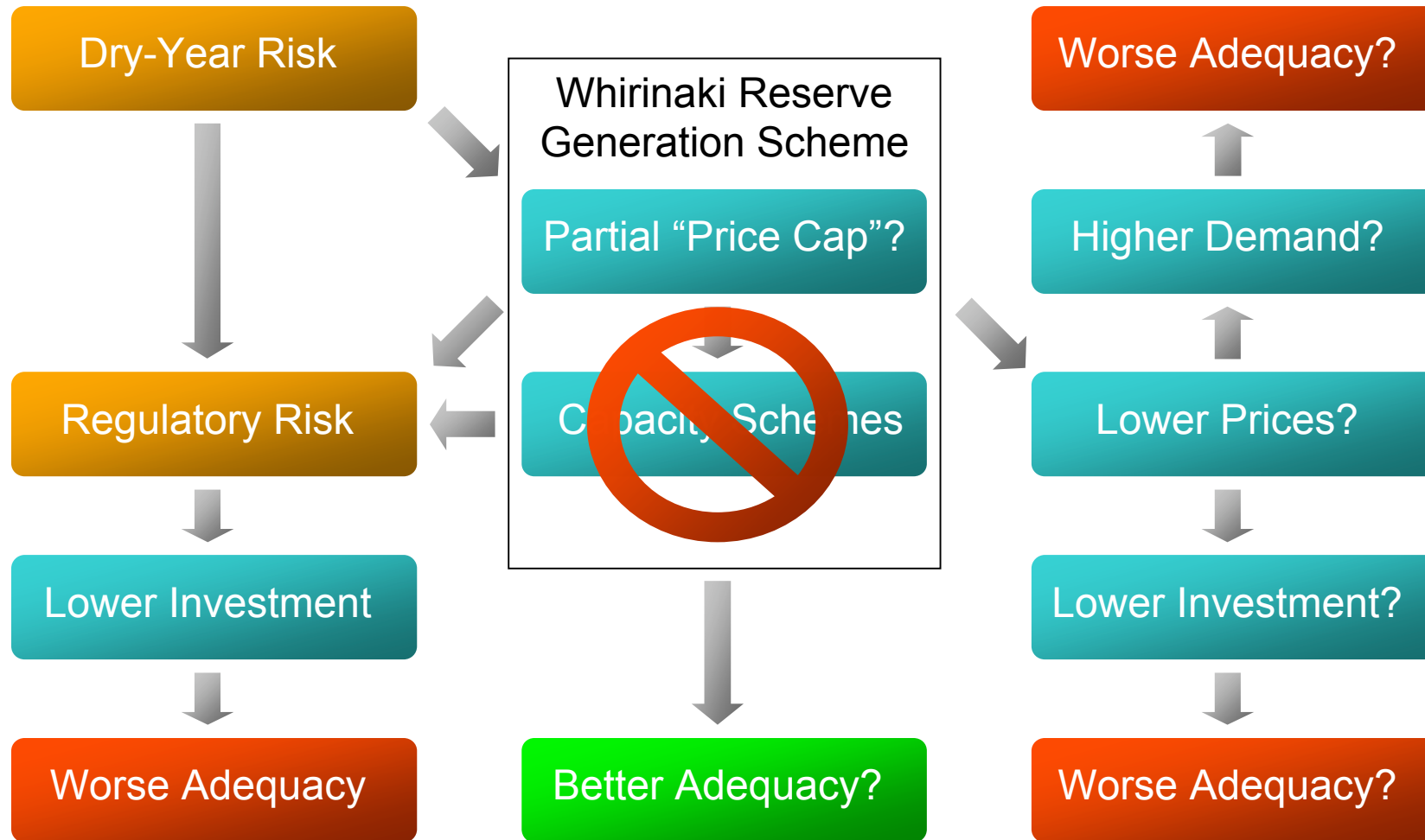
Improved adequacy in turn constrains market power



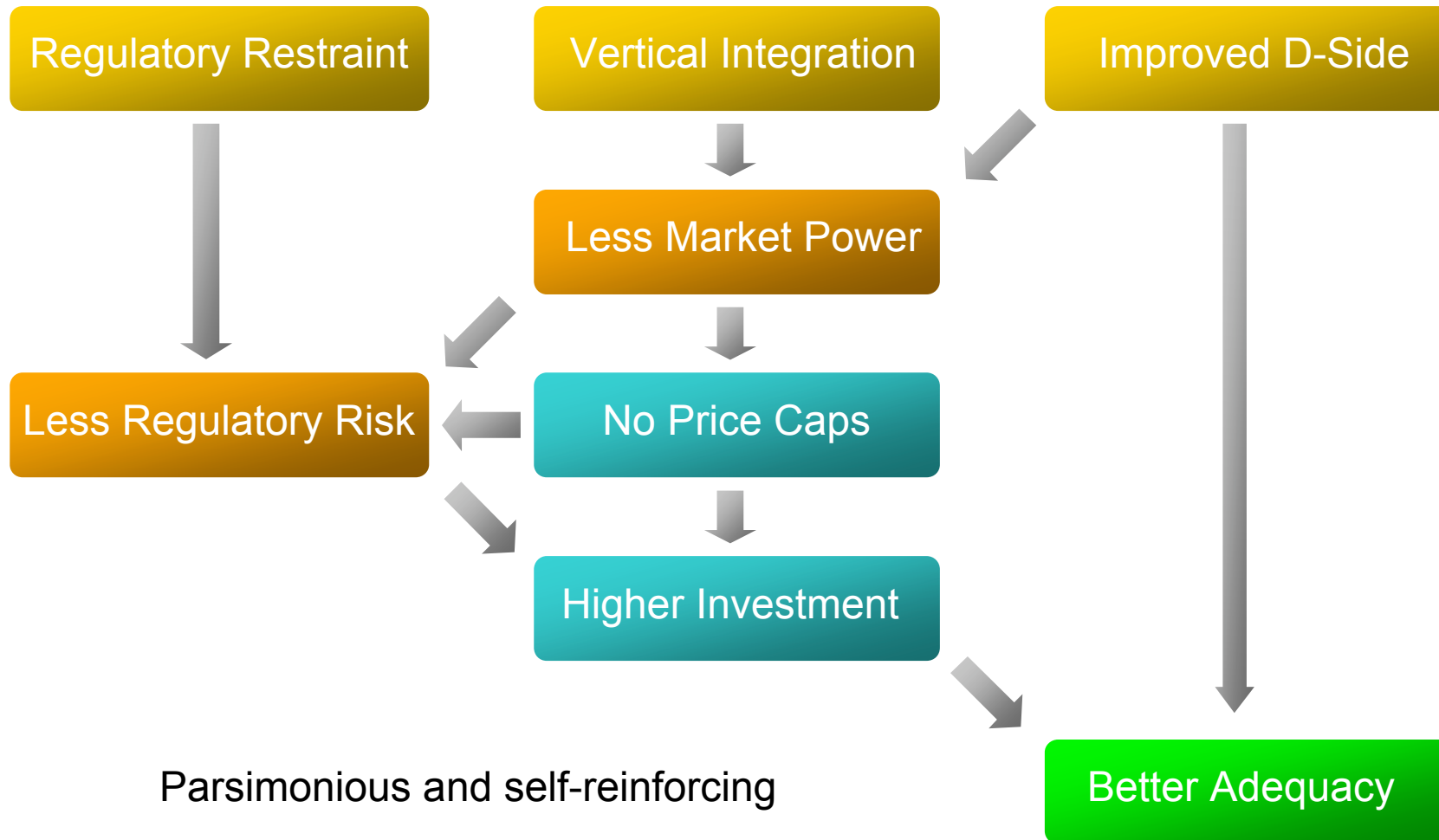
PRICE CAPS & CAPACITY MECHANISMS



NEW ZEALAND AT PRESENT



STABLE STRUCTURAL ALTERNATIVE?



Parsimonious and self-reinforcing



ON IMPROVING THE DEMAND SIDE

- Holy grail for many is the widespread introduction of real-time pricing
- RTP is only first-best where consumers are risk neutral, which seems unlikely given common customer preference for hedging (plus small household spend)
- Development of power exchanges for successively smaller customers likely to be important (tap upside)
- Capacity subscriptions with LLDs worth a good look



NEW ZEALAND'S ARRANGEMENTS

- A bob neither way, or central planning “lite”? – partial price cap, but limited reserve generation, and no general capacity scheme
- “Activist government,” and Electricity Commission with widening regulatory discretions – you think demand forecasting is hard?
- Politicisation of generation technology choice, and moral hazard created by government sabre-rattling
- SOE investments compete, but questions re sub-market investment returns, and ad hoc, non-contested Genesis gas risks underwrite
- Regulation of forward contracting at expense of vertical integration
- Inevitable and bumpy slide to increasing state dominance of future generation investment?



Thank you – any questions?



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