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:


• Presages imminent release of:

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
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

\{\text{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

- Market Power
  - Regulatory Risk
    - Lower Investment
      - Worse Adequacy
  - Price Caps
    - Higher Demand
      - Lower Prices
        - Lower Investment
          - Worse Adequacy
  - Capacity Schemes
    - Make-up Investment
      - Better Adequacy
  - Lower Prices
    - Lower Investment
      - Worse Adequacy
NEW ZEALAND AT PRESENT

Dry-Year Risk

Regulatory Risk

Lower Investment

Worse Adequacy

Whirinaki Reserve Generation Scheme

Partial "Price Cap"?

Capacity Schemes

Better Adequacy?

Worse Adequacy?

Higher Demand?

Lower Prices?

Lower Investment?

Worse Adequacy?
STABLE STRUCTURAL ALTERNATIVE?

- Regulatory Restraint
- Vertical Integration
- Improved D-Side

Less Regulatory Risk → Less Market Power
No Price Caps → Higher Investment

- Parsimonious and self-reinforcing
- Better Adequacy
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?