Markets 101: Remembering the basics

Lessons learned from New Zealand's electricity market

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Markets 101 presentation

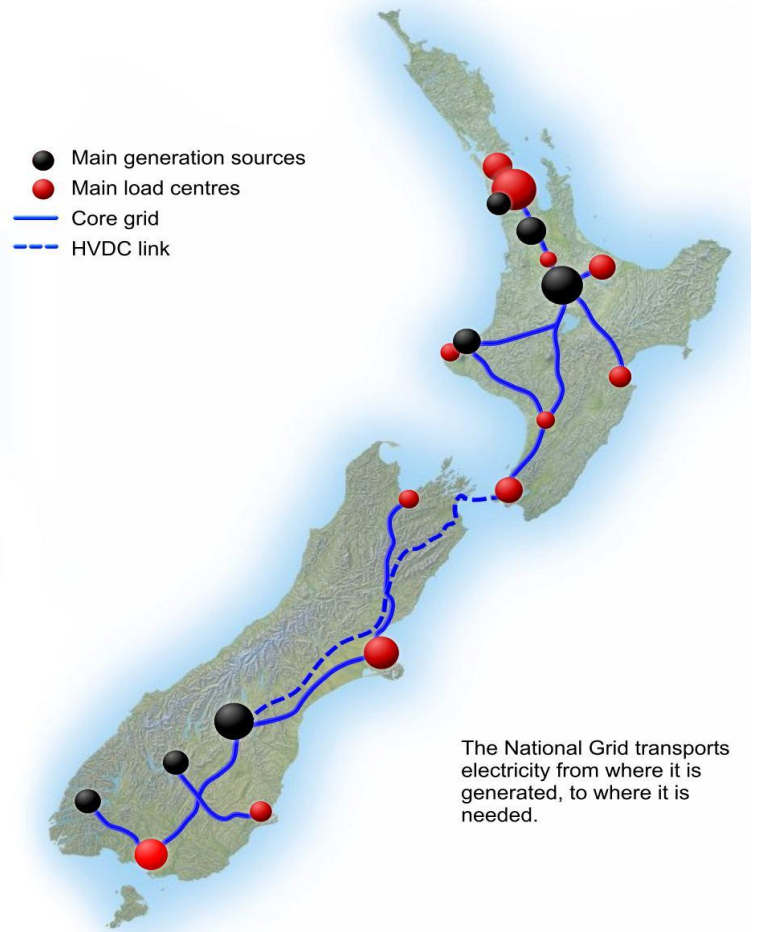
- This presentation unlikely to provide new information
- Instead intended as timely reminder for those parties designing the regulatory and commercial environments for a low carbon economy

- Views in this presentation are those of the author and do not represent the views of Transpower New Zealand Limited

New Zealand electricity system

- **Demand:**
- ~ 8000MW
- ~ 40000GWh per annum

- **Generation:**
- ~ 65% hydro
- ~ 20% thermal
- ~ 15% other renewables



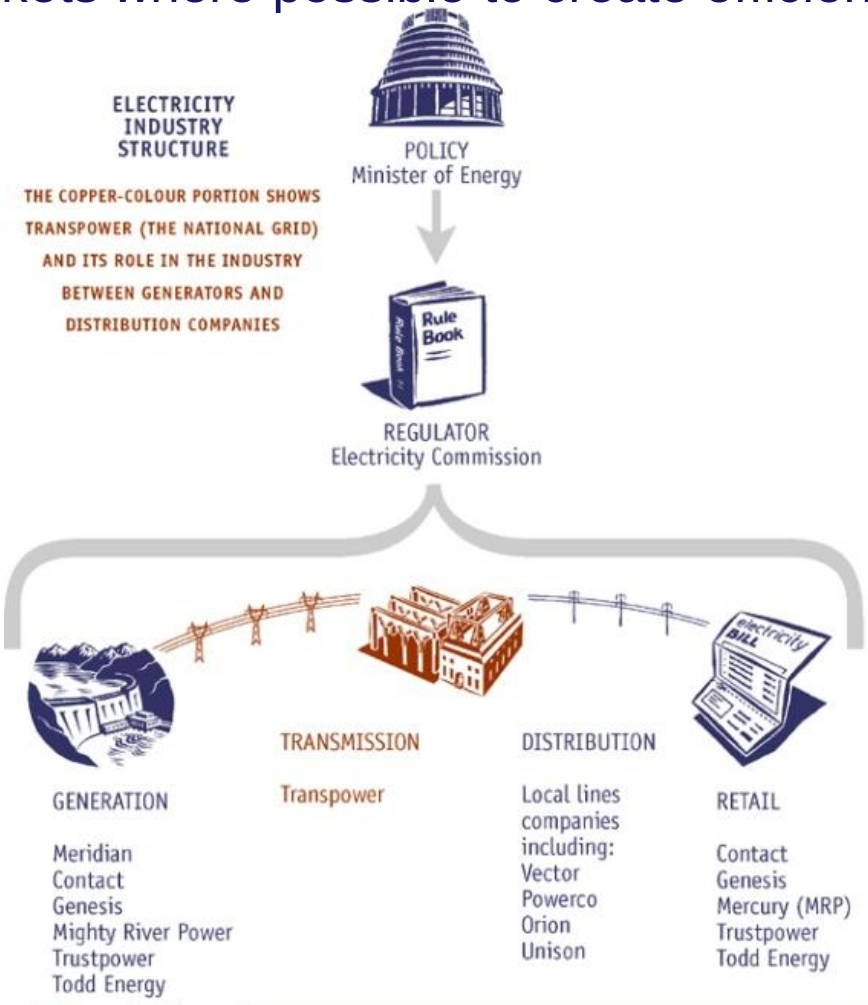
The National Grid transports electricity from where it is generated, to where it is needed.

History New Zealand electricity system

- Pre 1990 – single state-owned electricity supplier
- 1990 – Transpower split off
- 1996 – Wholesale market established
- 1999 – Generators split up
  - 3 state owned, 3 privately owned
- 2003 – Electricity Commission established
- 2010 – Electricity Commission disestablished, Electricity Authority established

New Zealand electricity industry

Utilises markets where possible to create efficient outcomes



New Zealand market design

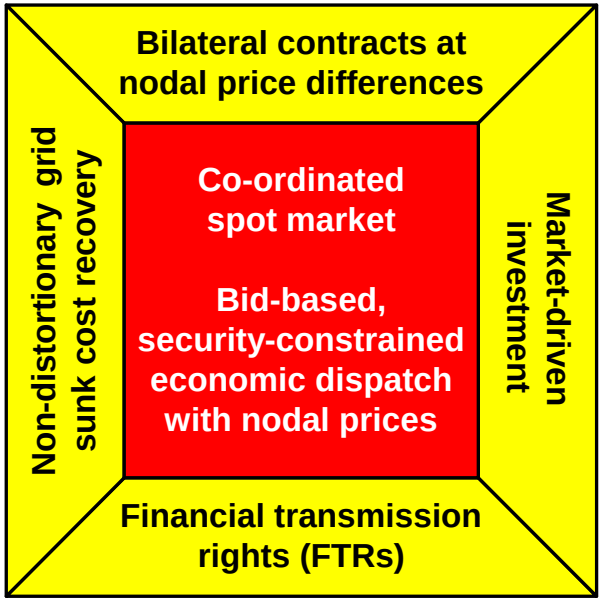
NZ market design originally based on Standard Market Design (SMD) developed in USA by Prof William Hogan

Assumes market participants responsible for investment decisions including new transmission investment

Important principle of SMD is that integrated set of costs or prices must be signalled to the market in order to ensure efficient decision-making

Integrated price signalling

- Prof Hogan developed a framework to ensure consistent price signals would be provided to market participants



Market design not complete

- Nodal pricing (otherwise known as locational marginal pricing or LMP) implemented (240 nodes)
- Transmission pricing methodology developed

BUT

- No Financial Transmission Rights (FTR's) and
- No market driven transmission investment

Market driven transmission will not work

- Multi-lateral decision-making framework developed for electricity industry self-governance in 2002
- Self-governance arrangement not successful
- Electricity Commission established in 2003
- As in other countries establishing electricity markets, market driven transmission investment too difficult
- Transmission investment decisions now made by regulator. Similar outcomes possible if regulator considers it has primary role of ensuring an efficient market, as opposed to being a central planner…

FTRs not implemented

- Complex for fledgling market
- Market participants could not hedge locational risk
- Only independent retailer could not negotiate hedge contracts
  - Dry year in 2001 and went bust
- Generators/retailers vertically integrated to manage risk and evolved into regional retailers
  - Reduced competition in each region
- Reasonable behaviour in oligopoly
- FTR's likely to be introduced in 2011

Lessons (1)

- If using markets to enhance competition and create efficiencies, employ the Prof Bill Hogan's of this world to develop a comprehensive and integrated market design

- Implement all elements of the design

- Regulate to ensure this is the case. Do not assume market participants will deliver of their own accord

Security of supply

- New Zealand electricity supply dominated by hydro. In drier years security of supply concerns
- Markets oscillating from over to under-supply. Not concerned about under-supply unless money in it
- Government response after 2001 was to purchase and own large diesel peaking plant
- Permanently offered into market at SRMC
- Effect was to introduce a price cap

Security of supply (2)

- New Zealand moving from being energy constrained to peak constrained and needs peaking plant built
- Unintended consequence of fixing security of supply issue was to distort market signal for peaking plant
- Government selling peaking plant and scarcity (VoLL) pricing being introduced to encourage investment in plant to cover security of supply
- May also provide incentives for peaking plant

Lessons (2)

- If under-supply not acceptable – regulate
- Be careful to consider wider implications of regulatory response
- Do not distort market eg no price caps
- An alternative response for regulator may have been to require all retailers to contract for 1.2 times sales volume
- Key difference is that in this approach regulator sets public good requirement but less distortionary and does not tell market how to deliver it

Align Incentives

- Locational signalling to generators
  - In New Zealand generators do not pay for core interconnected grid. Hence no locational signal
  - Recent work shows overall electricity costs would reduce approx 2% if such costs signalled
  - Equivalent to 40% reduction in transmission required for new generation
  - Suggestion rejected as generators didn't want and lobbied regulator who is pro central planning

Align Incentives (2)

- Customers making service/price trade-offs
  - Transmission reliability standard prescribes level of reliability individual customers entitled too
  - Individual customers do not pay
  - In one region potential high growth in irrigation which would be good for regional economy but customers want higher level of reliability
  - Standard says customers not entitled to high standard
  - No mechanism in place for offering customers higher level reliability if they pay

Changing behaviours

- Appealing to peoples consciences
  - Appealing to peoples consciences about energy efficiency or the need for a low carbon economy is a generational approach ie the next generation will believe it, not ours
- Step changes
  - To effect behaviour in short term will require other means. Just as in influencing culture in an organisation by restructuring, exaggerated change required:
    - Orion pricing
    - Demand-side trials
  - May need to throw money at it

Lessons for low carbon economy planning

- Markets will not deliver public good outcomes
- The outcomes required should be regulated and if using markets to achieve efficient outcomes:
  - Start with an integrated market design
  - Implement all elements of the design
  - Do not distort the market. Market participants must be left unimpeded

  ie tell the market what to do, but not how to do it
- Ensure elements of regulation and the market design align incentives appropriately
- Distortions may be acceptable to instil cultural change. Manage interaction with markets carefully

Questions?