

Grid upgrade public meetings

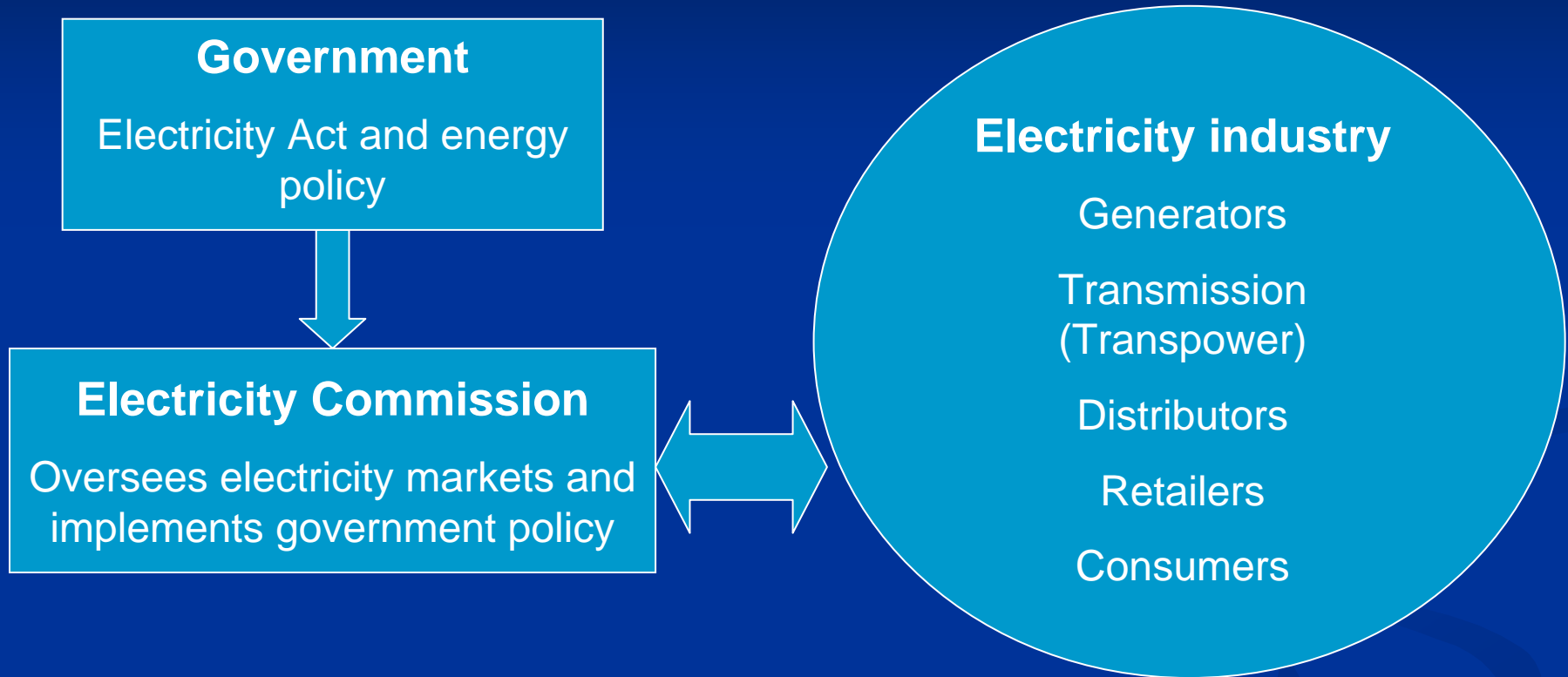
September 2005

Roy Hemmingway, Chair
Electricity Commission

Electricity Commission

- Established in September 2003 after failure of electricity industry self-governance.
- Full-time chair, four part-time commissioners.
- 40 staff.
- Oversees electricity industry and markets, ensures 'dry' year reserve, conducts electricity efficiency programmes, and regulates Transpower.

Electricity Commission's position



Regulation of Transpower

- Grid reliability standards.
- Contracting parties and content of contracts.
- Grid pricing methodology.
- Statements of Opportunities.
- Decisions on tactical grid upgrades.
- Decisions on major grid upgrades.
- Commerce Commission regulates overall prices.

Major grid upgrades

- Transpower proposes Grid Upgrade Plan (GUP) to Commission.
- Commission considers GUP against Grid Investment Test (GIT).
- Commission must consider and consult on alternatives.
- Commission decision for WKM-OTA 400kV, mid-2006.

Work to Date

- Initial Statement of Opportunities (SOO) published
 - Load forecast agreed
 - 2010 deadline affirmed
- First public meetings – June
- Consultations
 - Alternatives
 - Enabling alternatives

Commission's alternatives consultation process*

27 May 2005	Paper seeking submissions released.
13 July 2005	Close date for written submissions, assessment commenced.
Late Sept 2005	Publish initial review of submissions. Second series of public briefings.
* Nov/Dec 2005	Publish preliminary assessment and conclusions. Third series of public briefings.
* Feb 2006	Commission reaches draft conclusions on GUP, published for consultation.

* indicative dates

Submissions

- Submissions on alternatives consultation paper closed 13 July.
- 135 submissions received, wide range of ideas.
- High-level assessment carried out by Commission staff to filter alternatives, then place into categories for further investigation.
- Submissions summary and responses on web:
 - <http://www.electricitycommission.govt.nz/opdev/transmis/transalternatives>

Alternatives categories

- **Category A1** — potentially feasible within 5 year timeframe and may be installed by 2010.
- **Category A2** — potentially feasible within 5–10 year timeframe and may be installed by 2015.
- **Category B** — potentially feasible within 10–20 year timeframe with technological development and may provide option value.
- **Category C** — Commission will not investigate further as it believes these are unlikely to occur in the next 20 years or do not improve supply security in Auckland.

Category A1 alternatives

Transmission

- 400kV options include:
 - partial undergrounding of the 400kV line from Otahuhu to Whakamaru along a number of alternate routes namely:
 - Otahuhu to Hunua (approximately 30 km);
 - Otahuhu to mid-Hunua Valley.

- Voltage increase options include:
 - convert the existing Whakamaru-Otahuhu 220kV A, B, and/or C circuits to 330kV.
 - use the proposed 400kV line route from Whakamaru to Otahuhu to install double circuit 220kV.

Category A1 alternatives

Transmission cont'd

- HVDC options include:
 - install underground HVDC voltage sourced converter (VSC) from Huntly to Otahuhu;
 - use the proposed 400kV line route from Whakamaru to Otahuhu to install HVDC overhead Monopole or Bipole.

Category A1 alternatives

Transmission cont'd

- Miscellaneous augmentation options include:
 - re-conductor existing Whakamaru-Otahuhu 220kV A and B circuits;
 - connect Whakamaru-Otahuhu 220kV circuits at Huntly;
 - connect Whakamaru-Otahuhu 220kV circuits at Hamilton;
 - install series capacitors on 220kV circuits;
 - install phase shifting transformers;
 - install shunt compensation at 220kV busbars;
 - thermally upgrade existing circuits.

Category A1 alternatives

Generation

- 400MW CCGT generator at Otahuhu.
- 385MW CCGT generator at Rodney.
- 320MW coal fired generator at Marsden.
- install additional cooling towers at Huntly.
- 200MW OCGT generator in Auckland.
- reciprocating engines to manage peak in Auckland.
- move Whirinaki to Auckland.
- 20MW waste-to-energy plant in Auckland.

Category A1 alternatives

Demand-side

- interruptible load in Auckland.

Category A2 alternatives

Transmission

- 400kV options include:
 - full undergrounding of the 400kV line;
 - partial undergrounding along a number of alternate routes, namely:
 - underground along Waikato River;
 - install underground tunnel along the main trunk railway line to install lines/cables to supply Auckland;
 - route through Hunua Ranges to avoid urban areas;
 - through all urban areas.

Category A2 alternatives

Transmission cont'd

- HVDC options include:
 - overhead HVDC extension from Haywards to Otahuhu using existing 220kV corridor;
 - underground conventional HVDC or HVDC VSC from Whakamaru to Otahuhu;
 - overhead HVDC from Whakamaru to Otahuhu using existing 220kV corridor;
 - overhead HVDC using existing Stratford-Huntly 220kV corridor.

Category A2 alternatives

Transmission cont'd

- Voltage increase options include:
 - convert existing Arapuni-Hamilton-Bombay-Wiri 110kV line to 220kV and extend by overhead to Whakamaru and underground to Otahuhu;
 - install new 220kV double circuit from Whakamaru to existing Stratford-Huntly 220kV double circuit line;
 - replace existing 220kV line from Whakamaru to Otahuhu with 400kV overhead line.

- Miscellaneous augmentation options include:
 - use ACCC conductor to upgrade existing AC lines

Category A2 alternatives

Generation

- Co-generation plant at Marsden.
- Wind generation.
- Integrated gasification combined cycle (IGCC) coal-based generation.

Category A2 alternatives

Demand-side

- Distribution network load management.
- Gas substitution.
- Energy efficiency improvements in areas such as:
 - residential lighting;
 - residential heating (insulation);
 - industrial measures (furnaces and refrigeration);
 - commercial measures (heating and lighting);
 - street lighting;
 - residential appliances.

Category B alternatives

Generation

- Geothermal.
- Landfill gas generation.
- Micro-turbines.
- Stirling engines.
- Fuel cells.
- Biomass fuelled generation.
- Marine energy generation.
- Large scale solar generation.
- Domestic-scale solar (photo-voltaic).

Category B alternatives

Demand

- Energy efficiency improvements in areas such as:
 - improved building design.

Category C alternatives

- Examples of alternatives the Commission will not consider further include:
 - Deep hot rock geothermal;
 - Hydro plant in Northland;
 - Various storage technologies,
 - Nuclear power; and
 - Load relocation out of Auckland.

Next steps — Summary

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|--------------|--|
| Sep 2005 | Initial analysis, publish shortlist of feasible alternatives. |
| Nov–Dec 2005 | Publish preliminary assessment of alternatives.
Third series of public briefings. |
| Feb 2006 | Publish draft decision on Grid Upgrade Plan for consultation. |
| Feb–Apr 2006 | Public conference and consultation process. |
| Apr–Jun 2006 | Finalise decision on Auckland GUP. |

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