



Auckland 400kV alternatives

Public meeting

*December 2005*



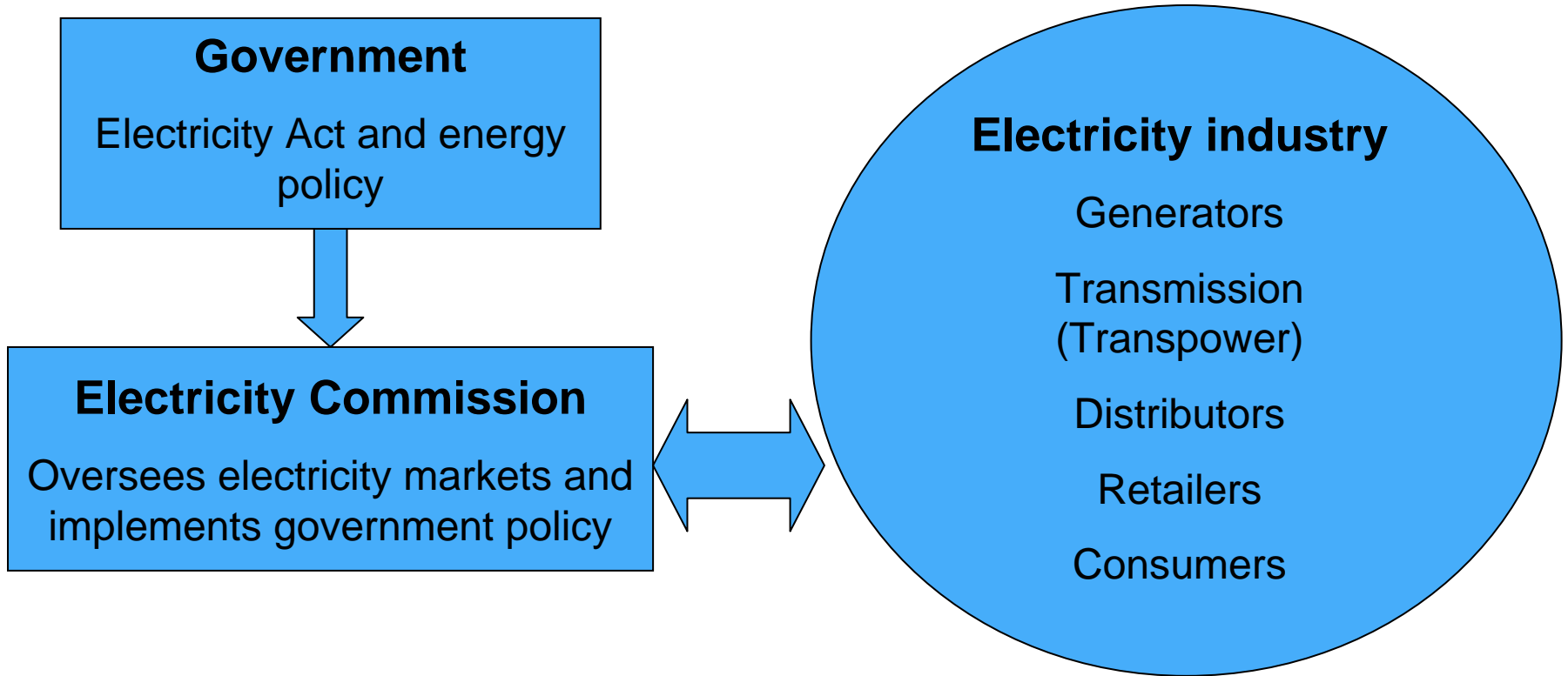
## Purpose of this session

- Re-cap of process so far.
- Describe 'short short-list' of potential alternatives to Transpower's 400kV.
- Describe further decision-making on Transpower's 400kV proposal.

## Electricity Commission

- Established in September 2003 as a Crown entity.
- Full-time chair, four part-time commissioners, 40 staff.
- Primary functions:
  - oversees electricity industry and markets;
  - ensures dry-year reserve;
  - conducts electricity efficiency programmes; and
  - regulates Transpower.

# Electricity Commission's industry position



# Transpower

- Owner and operator of national grid.
- Transpower proposes Grid Upgrade Plans (GUPs) to Commission.
  - GUP contains proposals for transmission upgrades (including proposed 400kV Whakamaru-Otahuhu).
- Commission considers GUP against Grid Investment Test (GIT).
- Transpower must follow RMA process. Commission not involved in that process.
- Commission also has no role in Public Works Act process (compensation).

## Why is Commission involved?

- Load in Auckland growing.
- A solution needed to meet demand at peak times by about 2010.
- Transpower requires Commission approval to be able to pass costs of investment on to its customers.
- Commission must decide if Transpower's proposal is best solution. Assessment includes application of GIT.
- Commission must ensure other options have been analysed, including generation and demand-side alternatives.

## Process so far

Minister of Energy's letter	April 2005
Consultation paper published	May 2005
Public briefings to explain process	June 2005
135 submissions received	July 2005
'Long short-list' of alternatives produced, public briefings on 'long short-list'	September 2005
'Long short-list' further analysed and 'short short-list' produced	November 2005
Public briefings on 'short short-list'	December 2005

## Re-cap – phase I analysis (September 2005)

- Ideas filtered into four categories on basis of scale, location, timeframe, and technical development:
  - 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 — no further investigation as unlikely to occur in next 20 years, or do not improve supply security in Auckland.

## Phase II analysis (November 2005)

- Detailed analysis of Category A1, A2 and B alternatives including:
  - capacity improvement;
  - cost; and
  - technical feasibility.
- Work advanced enough to determine ‘short short-list’, but not yet sufficient to enable accurate comparison with Transpower’s 400kV proposal.

# Short short-list of alternatives

*Dates given for alternatives should be regarded as indicative*

# Generation alternatives

# Generation alternatives

## **G1 – Baseload co-generation**

(84MW co-generation at Marsden by 2010.)

## **G2 – Baseload coal generation**

(320MW coal generation at Marsden by 2010 and 320MW additional coal generation at Marsden by 2016.)

## **G3 – Baseload gas generation**

(385MW CCGT at either Rodney or Otahuhu by 2010 and 2 x 200MW gas generators in Auckland by 2010, and 400MW CCGT at either Otahuhu or Rodney by 2015, and 400MW CCGT in South Auckland by 2025.)

## Generation alternatives – continued

### **G4 – Wind generation**

(75-150MW of wind generation in Auckland region by 2015.)

### **G5 – Relocation of Whirinaki**

(155MW Whirinaki re-located to Auckland by 2010.)

### **G6 – Peaking plant**

(Peaking diesel generation in Auckland by 2010.)

### **G7 – Alternative technologies**

(200-250MW of emerging generation technologies from 2015.)

# Demand-side alternatives

# Demand-side alternatives

## **D1 – Interruptible load (IL)**

(Up to 200MW of IL by 2010.)

## **D2 – Distribution network Load Management (DNLM)**

(130-245MW DNLM by 2015 and 15MW ripple control replacement by 2010.)

## **D3 – Energy substitution**

(70MW gas substitution in Auckland by 2015 and 1-22MW solar water heating from 2015.)

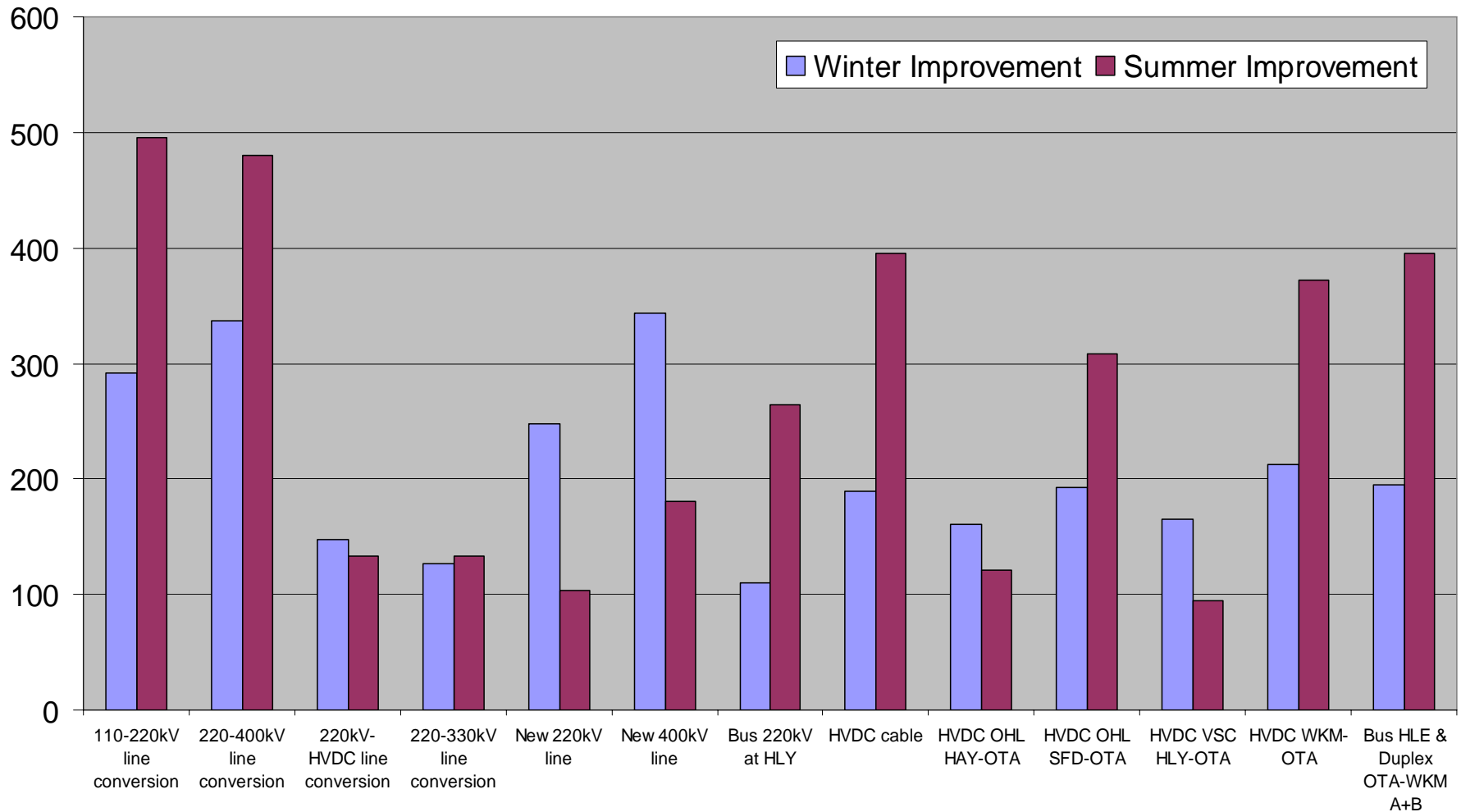
## **D4 – Energy efficiency measures**

(Range of measures including 25MW residential lighting by 2010, 17-63MW residential heating by 2015, and 25MW commercial measures by 2015.)

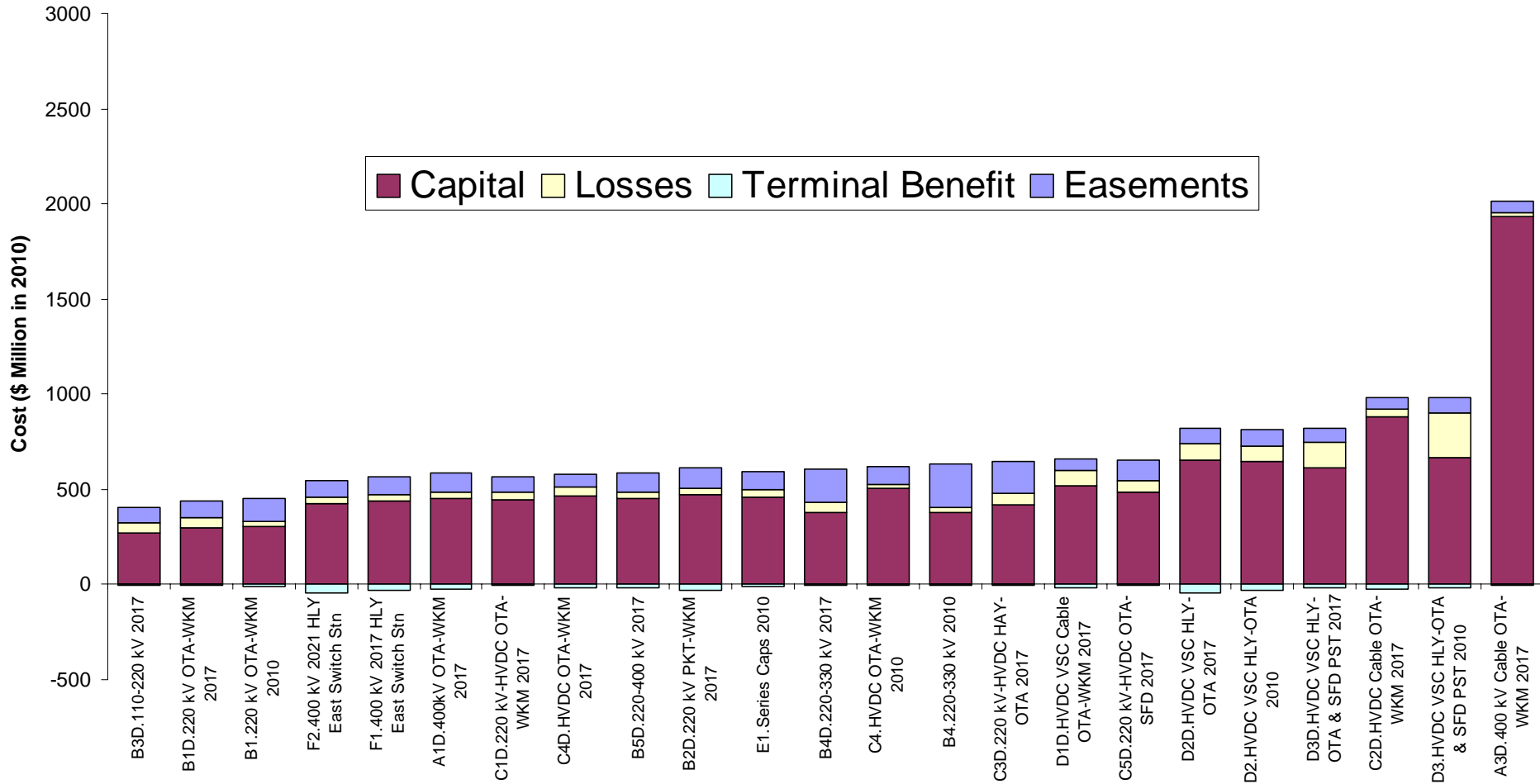
# Transmission alternatives

# Selected transmission alternatives capacity improvements

MW



# Ranked transmission alternatives



# Transmission alternatives

Analysis suggests many transmission options of similar cost, but a 'short short-list' of four representative options selected.

- **T1** – thermally upgrading then duplexing the WKM-OTA 220kV A and B lines, then install **400kV** between WKM and OTA in **2021**.
- **T2** – thermally upgrading the existing WKM-OTA 220kV A and B lines, then install **220kV** between WKM and OTA in 2017.
- **T3** – thermally upgrading the existing WKM-OTA 220kV A and B lines, then install **HVDC** between WKM and OTA in 2017.
- **T4** – thermally upgrading the existing WKM-OTA 220kV A and B lines, then install **400kV** between WKM and OTA in **2017**.

# Intermediate investments

Short short-listed transmission alternatives require intermediate investments to ensure supply security into AKL to about 2017:

- New switching station at HLE (Huntly East) connecting OTA – WKM Line C;
- Upgrading OTA – WKM Line A and B by re-tensioning (246MVA to 323MVA);
- Bussing OTA – WKM Line C second circuit at HAM by underground cable;
- Adding 2 x 100MVAR capacitors at HLY to provide further reactive support; and
- Installing Phase Shifting Transformers on the 110kV network (ARI – PAK, ARI – BOB, HAM – WES – BOB).

## Summary and next steps

- Assessment of 'short short-list' of alternatives (generation, demand-side, and transmission) by applying GIT (now underway).
- Comparison of short-listed alternatives and Transpower's proposal (January 2006).
- Draft decision on Transpower's proposed 400kV project (February/March 2006).
- Consultation (March/April/May 2006).
- Final decision (June 2006).

## Big picture

- If Commission says 'yes':
  - Transpower still needs approval under RMA.
  - Transpower still needs to secure easements.
- If Commission says 'no':
  - Transpower will need to come back with an alternative proposal.
  - An alternative proposal may not necessarily be a Commission 'short short-listed' alternative.
  - Any alternative proposal also needs RMA approval and easements.

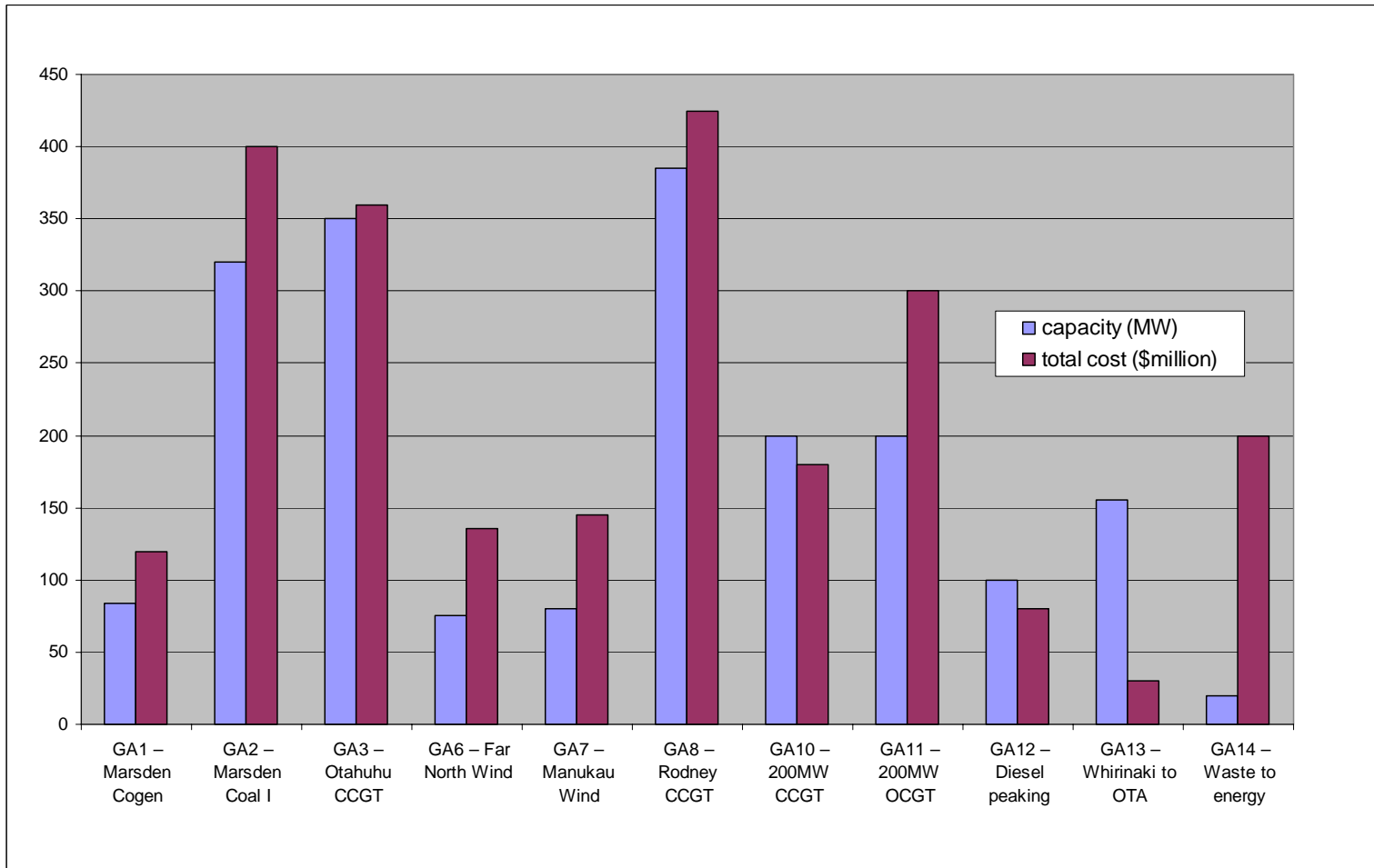
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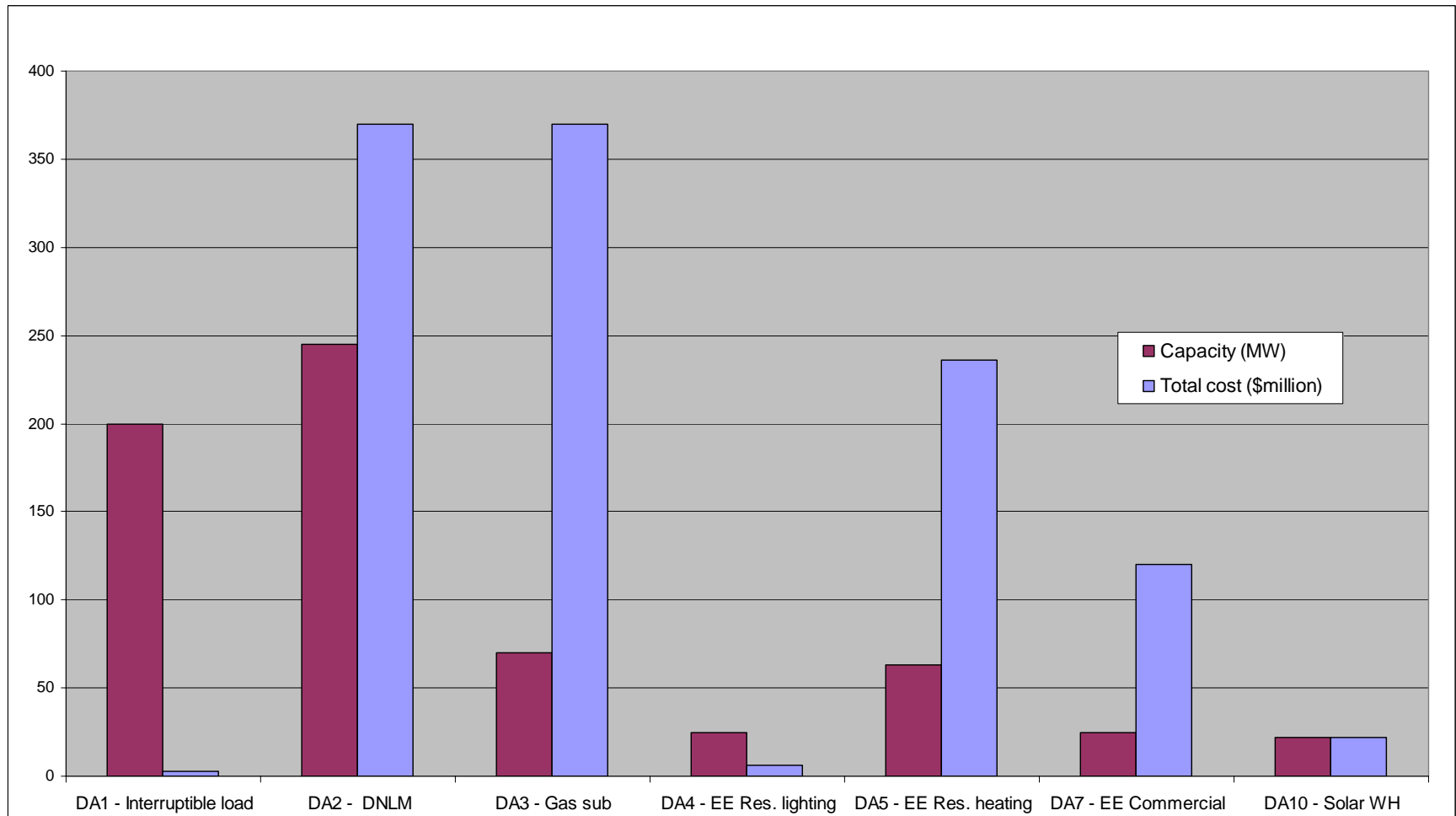


Auxiliary slides

# Capacity, cost, and timing of generation alternatives



# Capacity, cost, and timing of demand-side alternatives



## Process so far – continued

- The 135+ proposals for alternatives put forward now reduced to small group of transmission, generation, and demand-side options.
- ‘Short short-list’ contains:
  - 7 generation alternatives;
  - 4 demand-side alternatives; and
  - 4 transmission alternatives.

# Phase II analysis (November 2005) – demand-side and generation alternatives

## Demand-side alternatives

- External advice used to assess Category A1, A2 and B alternatives for likely cost, capacity and timing.

## Generation alternatives

- Category A1 and A2 alternatives assessed in conjunction with Initial SOO generation scenarios which must be used in GIT application.
- External advice used to assess Category B alternatives for likely cost, capacity and timing.

## Phase II analysis (November 2005) – Transmission alternatives

- Category A1, A2 and B alternatives combined to make up 32 possible investment streams that would ensure secure supply to 2025. High-level power systems analysis used to do this.
- Investment stream costs analysed:
  - Capital costs (including construction costs) determined by PB Associates and some Transpower input.
  - Approximate cost of transmission losses.
  - Indicative easement costs.
- Investment streams ranked on basis of net present value in order to determine ‘short short-list’.