Spatial demand forecasts

CitiPower and Powercor

Presented by Neil Watt

15 July 2015

Our forecasting process

Average demand
- Price
- Income
- Population
- Temperature

Maximum demand
- Temperature
- Calendar

Distribution of maximum demand

Top down

Econometric models for each terminal station

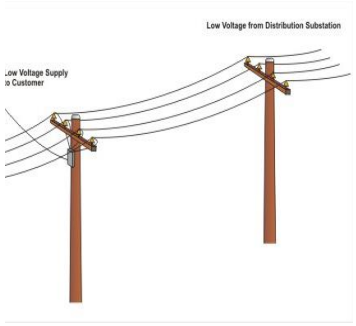
± Block loads

± Post model adjustments

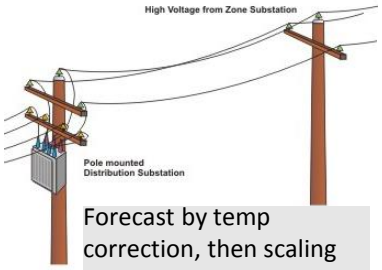
Reconciliation

Bottom-up

Smart meters



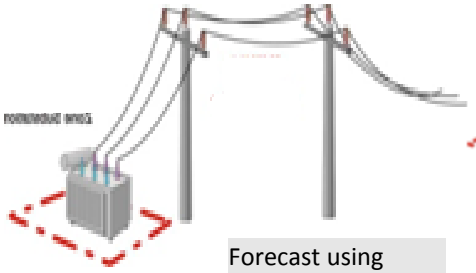
LV network



HV network

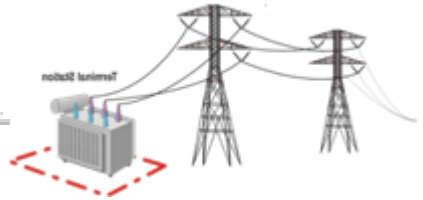
Forecast by temp correction, then scaling historic load growth, and:
- new connections
- embedded generation
- load transfers

Zone substations



Sub-transmission

Forecast using powerflow analysis tool, PSS/E

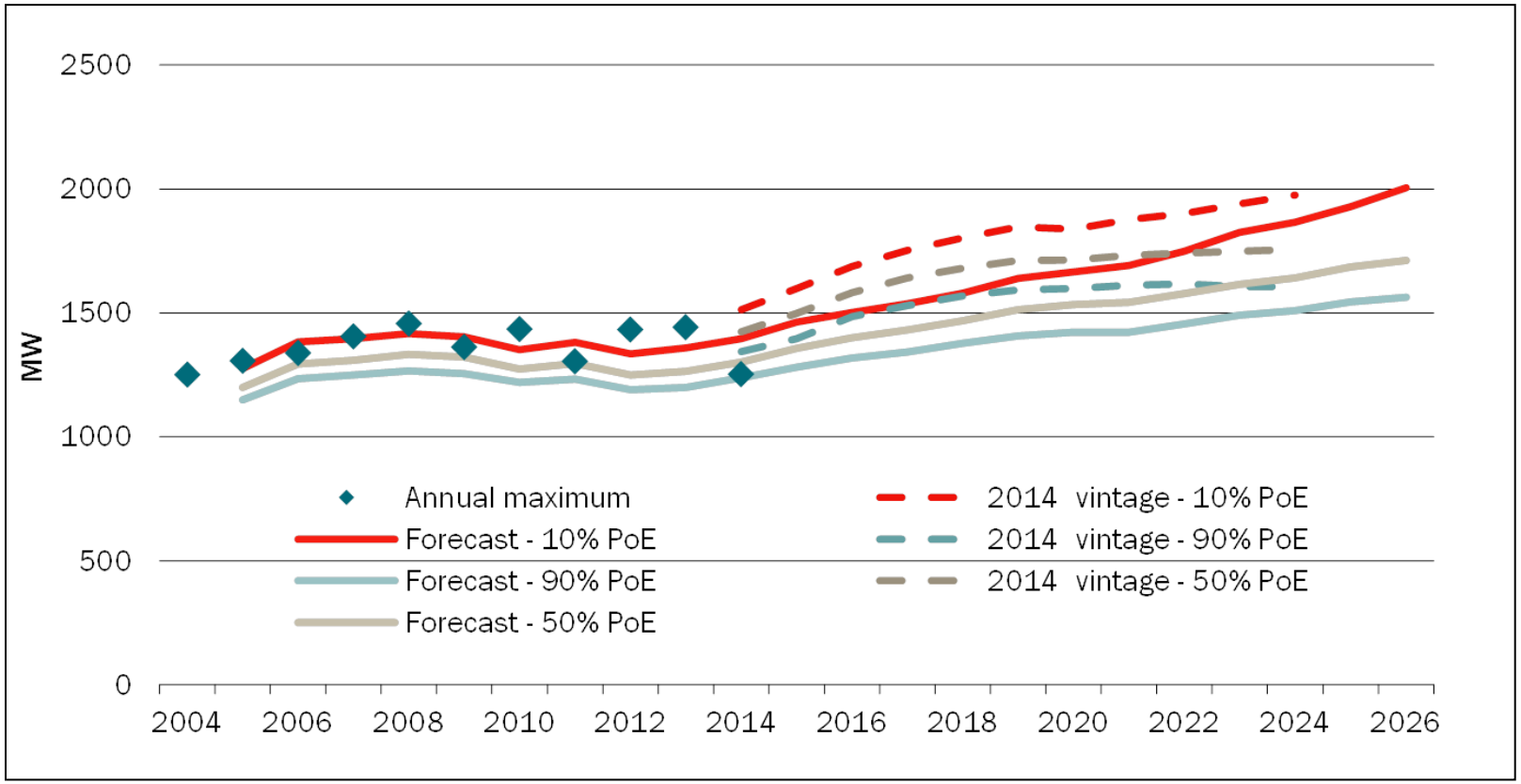


Terminal stations

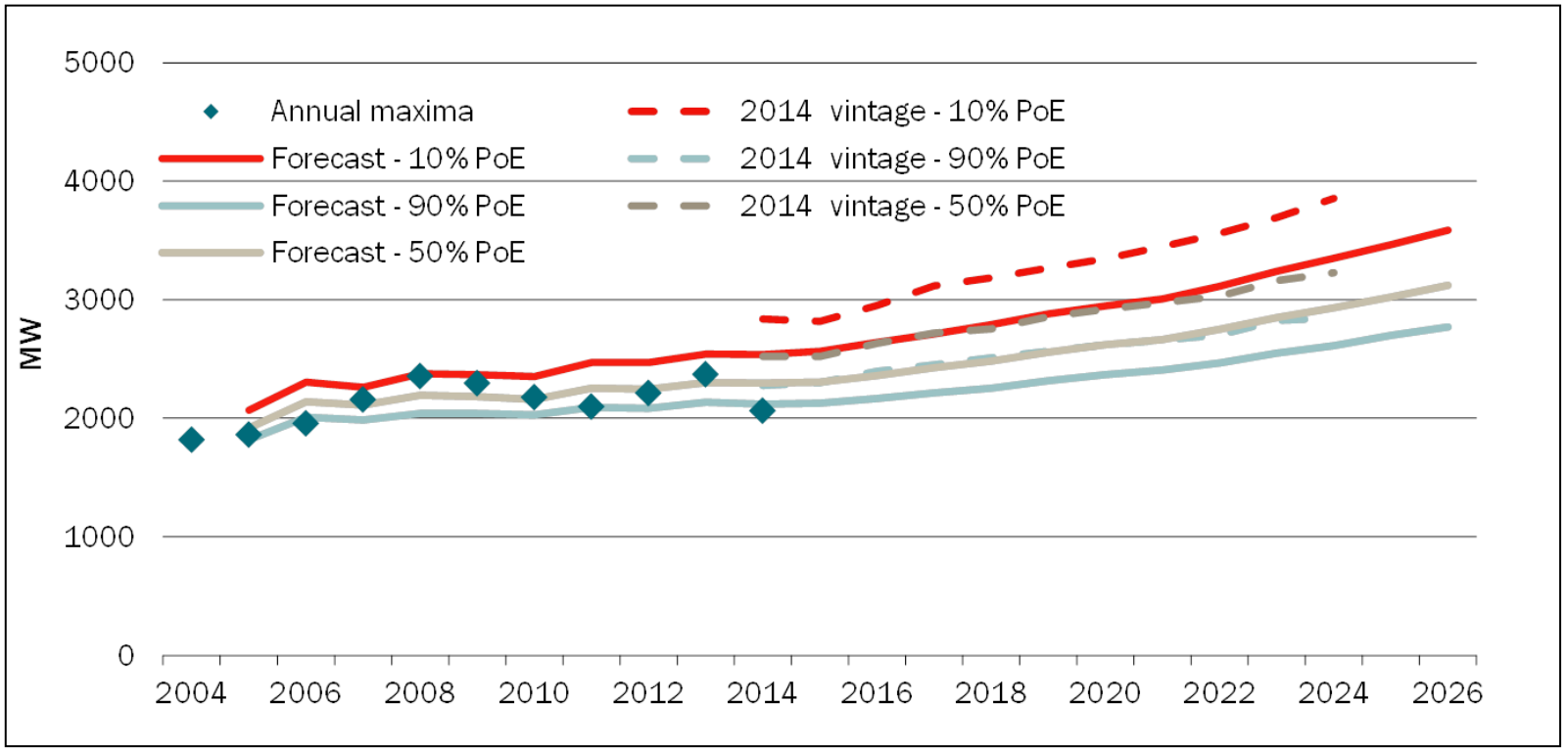
CITIPOWER

Powercor AUSTRALIA

Our 2014 and 2015 forecasts: CitiPower



Our 2014 and 2015 forecasts: Powercor



Comparison with AEMO process for Connection Point Forecasting

Areas of alignment

✓ Macro-economic factors used in top-down econometric process:

- State GSP
- Real Electricity Price index

Areas of misalignment

1. No consideration of regional factors
2. Separate models for energy and demand, which are not integrated
3. Post modelling adjustments
   - contribution of solar PV to peak demand (Melb Univ model for CP's?)
   - assumptions and application of forecast energy efficiency
4. PoE normalisation and terminal station forecasts starting point
5. Reconciliation of NEFR and transmission connection point forecasts

1. Consideration of regional factors

- CIE produces peak demand econometric models for each each terminal station, and at the total network level.
  - Drivers of peak demand in the regional forecast modelling include:
    - population growth
    - temperature characteristics
    - changes in peak to average demand
    - drivers by time of day

✓ CIE modelling reviewed by Prof Rob Hyndman in 2014

- AEMO only undertake econometric modelling at the State level
  - Baseline terminal station forecasts will not reflect:
    - local variation in population growth,
    - response to prices and incomes

  except to the extent reflected in historical trends

2. Separate modelling of energy and demand

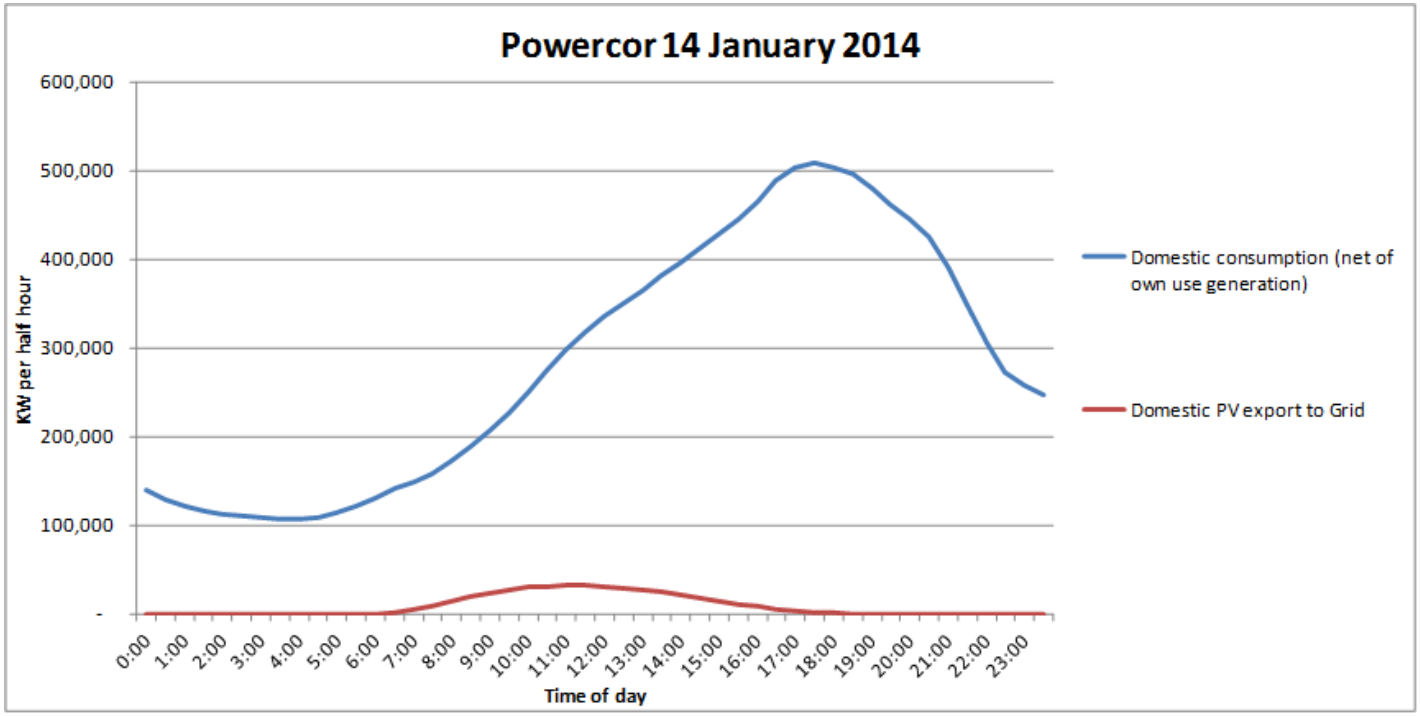
2014 NEFR

- CIE/Oakley Greenwood, and GHD did not observe any integration of demand and energy forecast models
- AEMO forecasts had average demand growing faster than peak demand
    - this is contrary to strong historical trend

2015 NEFR

- Trend between average and peak demand is still indicating higher average demand growth than max demand growth
    - In the short term, average demand grows at 1.7% p.a., while max demand declines at 0.1% p.a.

3a. Post model adjustments: solar PV



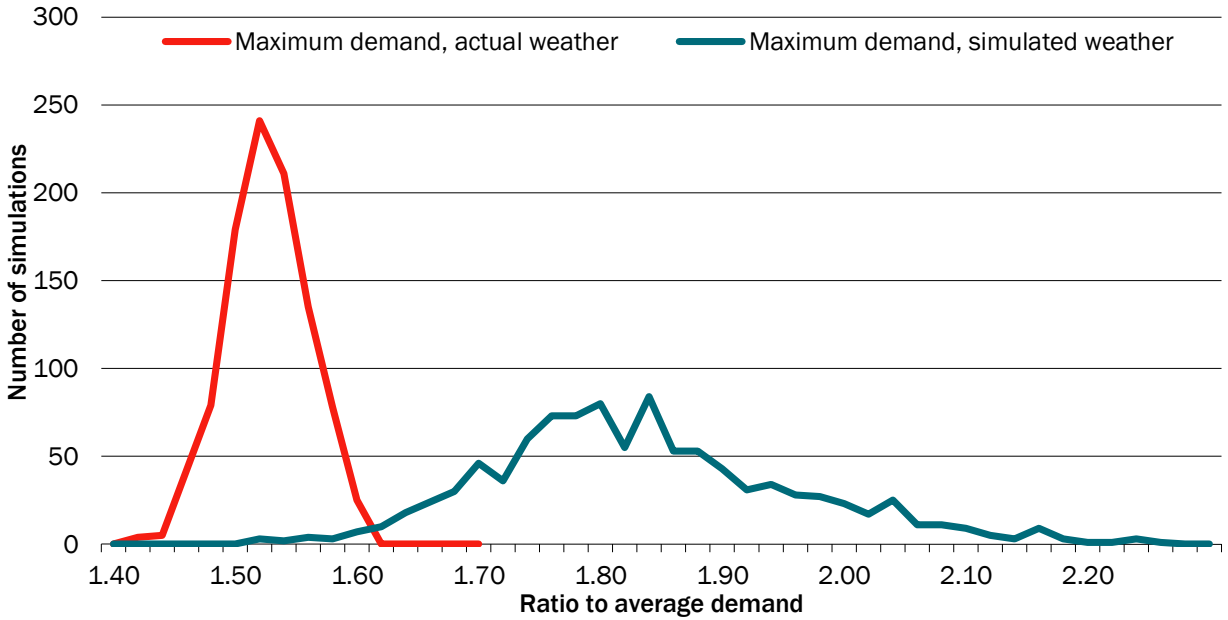
- Analysis of domestic consumption and solar PV output data for 14 January 2014 (the peak day for Powercor's network) illustrates the very small contribution made by solar PV to domestic demand
- The NEFR appears to be inconsistent in their 10% and 50% POE solar PV demand forecasts
- Our AMI data does not confirm solar export making a significant contribution to meeting the peak demand

3b. Post model adjustments: energy efficiency

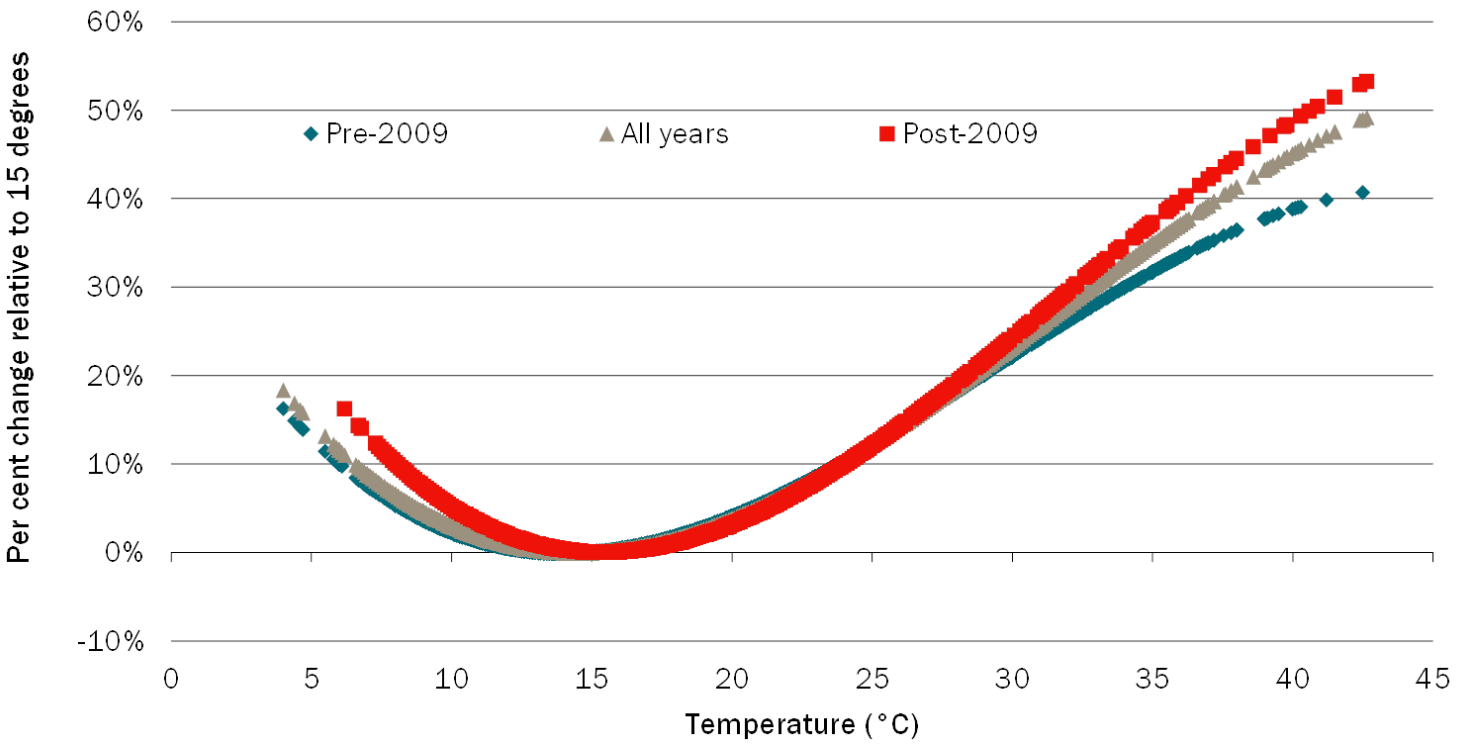
- CIE forecasts do not make a post-modelling adjustment for energy efficiency
  - changes are included in the forecasts to the extent that they reflect historical changes in policies, and outcomes continue at the historic rate
    - it is not clear what change in historical demand has resulted from energy efficiency policies
    - relationship between price and energy efficiency is not clear
    - any reintroduction of the VEET is unclear in timing, and in what form the scheme may be introduced. An estimate by OGW on the possible impact is that it would only reduce growth by 0.1%
- AEMO forecasts
  - 2015 NEFR impacts include reintroduction of a VEET (?) increase in Federal energy efficiency schemes based on an unpublished 2013 Pitt & Sherry report, which assumes future schemes are introduced

4a. PoE normalisation: Powercor

- Following the very mild recent summer, we observed that actual demand was a PoE in the order of 90+%, depending on the region
- AEMO have stated 2014/15 peak demand was closer to 50% PoE, with unexplained drop in demand forecast for 2015/16

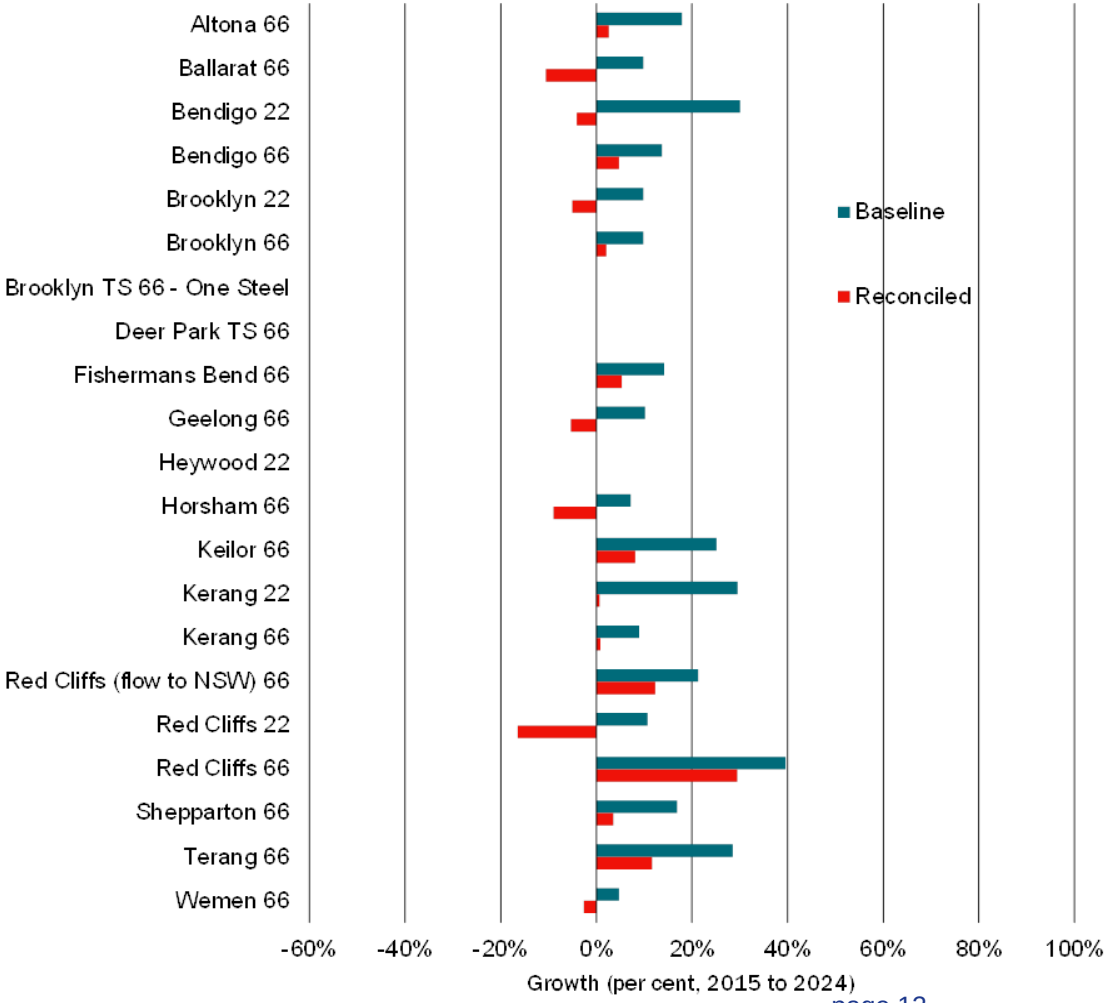


4b. Regional temperature sensitivity



Regional long term temperature modelling has highlighted increasing temperature sensitivity of demand

5. Reconciliation of NEFR and connection point forecasts



- Reconciliation process raises concerns regarding allocation of NEFR to connection point forecasts
- Process results in substantial reductions from baseline forecasts, based on historical growth, to reconciled forecasts
- Reconciliation should only be used to identify and rectify inconsistencies in forecasting approaches, not for major changes

Powering growth