ROBINSON BOWMAKER PAUL

2020 GSOO GPG FORECASTS

7 October 2020

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INTRODUCTION

Introduction

- The Gas services Information (GSI) regulations require AEMO to produce a Gas Statement of Opportunities (GSOO) on an annual basis
- The GSOO must include a 10-year forecast of gas consumption
- A key driver of gas demand is gas-powered electricity generation (GPG)
- AEMO have requested RBP to perform market modelling to forecast GPG gas demand for 2021-2030 calendar years
- The forecasts are for Base, Low and High gas demand scenarios, based on varying assumptions for:
  - Gas prices
  - Demand forecasts
  - Generator retirements and new build
  - Electric Vehicle uptake
  - Block load demand
- RBP has currently produced draft results for the Base scenario.

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METHODOLOGY

Methodology

- We use our in-house dispatch optimisation tool WEMSIM to conduct the analysis to produce the forecast.
- WEMSIM is a Wholesale Electricity Simulation model, developed from the ground up by PA Consulting Group (and its predecessors) and licensed to RBP
  - We have complete understanding of the model
  - We can adapt it to meet specific client requirements
  - We have made specific customizations to model the SWIS
- It is used to simulate outcomes in competitive electricity markets. Its applications include:
  - Simulating the effects of introducing a competitive market structure
  - Forecasting market prices
  - Forecasting a generator's future costs and revenue
  - Forecasting fuel use and emissions
  - Simulating the effects of regulatory changes, e.g. Nodal pricing, carbon taxes
  - Simulating the effects of infrastructure changes, e.g. Transmission upgrades
  - Calculating system reliability for a given reserve margin

Overview of WEMSIM

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Methodology

WEMSIM co-optimises energy dispatch and reserve provision using:

- Generation facility data such as capacity, outage rates, ramp rates, heat rates and cost information (fuel, VOM, FOM)
- Transmission data, either via the specification of thermal limits of generic constraints (as used in the NEM and for the WEM GIA)
- Reserve requirement and provision data.

WEMSIM outputs can include (but is not limited to):

- Fuel use by generators
- Hourly energy dispatch and reserve provided
- Locational price forecasts (i.e. nodal prices)
- Capacity utilisation of generation facilities
- Revenues earned and costs incurred by facility and participant
- Emissions

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INPUT ASSUMPTIONS

Input Assumptions - Introduction

Here we provide an overview of the input assumptions that go into our WEMSIM model of the SWIS:

- Generation
- Transmission network and constraints
- Demand
- Fuels
- Ancillary services

Input Assumptions - Generation

Assumptions for the technical parameters and operational costs of existing generators:

- From the publicly available AEMO Costs and Technical Parameter Review, completed in 2018 by GHD
- Refined in consultation with AEMO

Assumed retirements:

Unit	Retirement Date
MUJA_G5	1 October 2022
MUJA_G6	1 October 2024

Input Assumptions – Generation (2)

- For utility-scale intermittent generation (wind, solar and biogas), we have analysed historical generation data to derive hourly and monthly generation profiles for each facility. This ensures that intra-day and seasonal generation patterns are accurately modelled.
- Forced outages are simulated using historical outage data as a basis for facility-specific forced outage rates
- Actual planned outage schedules are provided by AEMO
- Specific operational constraints (e.g. seasonal availability of certain facilities) are provided by AEMO
- Facility-specific offer patterns (such as negatively priced offer tranches) are simulated, based on historical offer data.

Input Assumptions – Transmission Network and Constraints

- The WEM currently operates on an unconstrained basis, with GIA constraints used to manage the output of new GIA generators
- It is expected that on 1 October 2022, Security Constrained Economic Dispatch (SCED) will be implemented on the basis of a single region hub and spoke model
- We include this transition in our model
- Operational stability constraint:
  - A minimum of 565 MW of thermal generation must be maintained at all times
  - Should demand fall below 565 MW, the results will indicate an unstable level of system demand

Input Assumptions - Demand

- Demand forecasts are based on the 2020 WEM ESOO
- A 5-step process is followed to produce hourly demand forecasts for the 10-year horizon, including the effect of behind-the-meter solar generation and batteries:

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Input Assumptions - Fuels

To simulate dispatch of thermal plant, we need forecasts of fuel prices:

- Gas – to be provided by AEMO (draft results based on last year's forecasts)
- Coal – a flat price is assumed, based on data in the WA government's *2019 Major Commodities Resources Data* publication
- Distillate (i.e. Diesel) are forecast based on the historical correlation between global crude prices and Perth Terminal Gate prices from the AIP. By applying this correlation to the crude price forecast that underlies the gas price assumptions, distillate forecasts are obtained. Tax rebates and transport costs are also applied.

Input Assumptions – Ancillary Services

Our WEMSIM model ensures that ancillary service requirements are met:

Ancillary Service	Requirement
Spinning Reserve (SR)	70% of the largest generating unit
Load Rejection Reserve (LRR)	90 MW
Load Following Ancillary Service Up (LFAS Up)	105 MW (5:30 AM – 7:30 PM) 80 MW (7:30 PM – 5: 30 AM)
Load Following Ancillary Service Down (LFAS Down)	105 MW (5:30 AM – 7:30 PM) 80 MW (7:30 PM – 5: 30 AM)

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DRAFT RESULTS

Draft Results

The following are high-level results from the draft Base scenario modelling.

AEMO have been provided with detailed (down to hourly time resolution) results.

Draft Results – Fuel Offtake

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Draft Results – Generation by Fuel (1)

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Draft Results – Generation by Fuel (2)

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