

Grid Planning Assumptions (GPA) February 2008 draft for consultation: Overview Paper

Prepared by Brian Bull and Brian Kirtlan

20 February 2008

Contents

1.	Introduction	1
1.1	Background	1
1.2	Purpose of this document	2
2.	Draft Grid Planning Assumptions	2
2.1	Demand forecasts	2
2.2	Generation scenarios	4

1. Introduction

1.1 Background

- 1.1.1 The Commission is required to publish a Statement of Opportunities (**SOO**), as part of its duties in overseeing aspects of transmission investment (Rule 9 of section III of Part F of the Electricity Governance Rules 2003 (**Rules**)).
- 1.1.2 Rule 9.1.2 states that the purpose of the SOO is to enable identification of potential opportunities for efficient management of the grid, including investment in upgrades and transmission alternatives. In practice, the SOO also has a wider role to play in informing stakeholders about the Commission's views of possible future developments in the power system.
- 1.1.3 Under Rule 9.1.1.2, the SOO must include the Grid Planning Assumptions (**GPAs**). The GPAs must include (amongst other things):
- (a) a reasonable range of credible demand forecasts by region or grid exit point (e.g. high, medium and low growth) (Rule 10.3.1.2); and
 - (b) a reasonable range of credible future, high-level generation scenarios (Rule 10.3.1.3).
- 1.1.4 These forecasts and scenarios are integrated with the power systems analysis (**PSA**) to form the Market Development Scenarios (**MDS**).
- 1.1.5 The Initial Statement of Opportunities was published in 2005.¹
- 1.1.6 In September 2006, the Commission developed draft GPAs as an initial step towards releasing a new SOO (originally anticipated to be released in 2007). This included the preparation and publication of demand forecasts and four generation scenarios for consultation with interested parties.
- 1.1.7 In May 2007, the Commission decided to delay the publication of the SOO until the New Zealand Energy Strategy was finalised. However, at the same time the Commission released the then-current drafts of the demand forecasts and generation scenarios that had been developed and consulted on in late 2006.²
- 1.1.8 Once the Government's climate change policies had been developed further and the New Zealand Energy Strategy was finalised, the Commission recommenced work on preparing the next SOO. As an initial step, the Commission revised the draft GPAs and released the revised drafts in October 2007.³

¹ <http://www.electricitycommission.govt.nz/opdev/transmis/soo/initial2005>

² <http://www.electricitycommission.govt.nz/opdev/modelling/gpas/May2007/index.html>

³ <http://www.electricitycommission.govt.nz/opdev/modelling/gpas/Oct2007/Generation/index.html>

- 1.1.9 The Commission now intends to publish a SOO in 2008. A new set of draft GPAs has been developed.
- 1.1.10 The Commission is seeking feedback from participants on these draft GPAs in advance of publishing the SOO, so that feedback can be taken into account before the PSA commences.

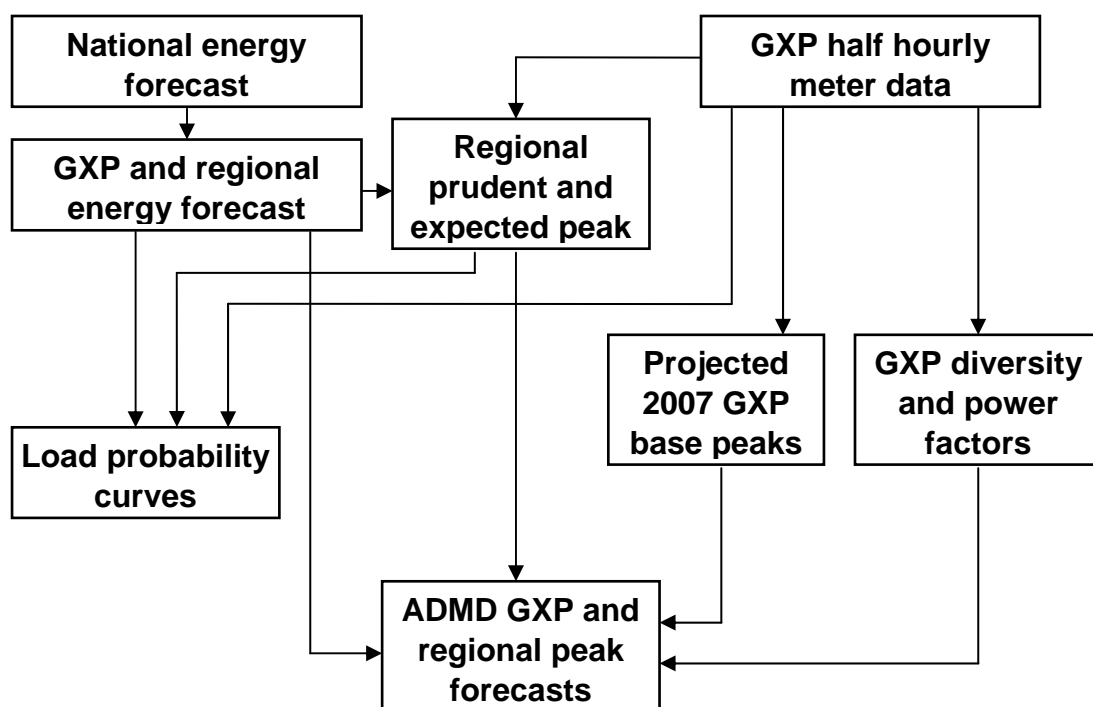
1.2 Purpose of this document

- 1.2.1 This document presents an overview of the structure of the draft GPA material and provides links to the various documents which describe the GPAs.
- 1.2.2 Parties who wish to provide feedback on the draft GPAs should refer to the Commission's website for instructions. In brief, the Commission invites written feedback on these GPA documents. The Commission has not posed specific consultation questions, but welcomes feedback in any format on any aspects of the material. Respondents should include data and/or analysis to support their feedback.
- 1.2.3 The Commission is also holding a technical workshop, which will include presentations on the GPA material and a question-and-answer session. The Commission considers this to be an important aspect of the feedback process and encourages stakeholders to attend.

2. Draft Grid Planning Assumptions

2.1 Demand forecasts

- 2.1.1 The Commission prepares and publishes long-term forecasts of total electrical energy (**energy**) and peak demand as part of the GPAs. These are distinct from the 5-year medium-term forecasts used for security of supply purposes.
- 2.1.2 The forecasts are carried out at the national, regional and grid exit point (**GXP**) levels.
- 2.1.3 The overall forecasting scheme is shown in the diagram below.



- 2.1.4 As mentioned, the Commission published draft demand forecasts in May 2007 and reviewed and re-published them in October 2007. The half-hourly meter data and the input series used for the econometric models were updated, and a number of small changes were made to the forecasting methodology.
- 2.1.5 The review of the national and regional total energy demand forecasts is documented in the [Electricity Demand Forecast Review February 2008](#) report (**Demand Forecast Review**).
- 2.1.6 Supplementary files to that report are:
- (a) [national and regional MATLAB models and input tables](#);
 - (b) [an Excel summary of national input data series](#); and
 - (c) [national and regional energy forecasts](#).
- 2.1.7 The national-level energy forecast has not changed significantly from the May 2007 draft, but there have been shifts in some of the regional forecasts as a result of the review. These trends are described in the Demand Forecast Review.
- 2.1.8 Regional prudent and expected peak demand forecasts have been updated and are described in the [Regional Peak Demand Forecast](#) report.

- 2.1.9 Supplementary files to that report are include [peak demand forecasts in text file format](#).
- 2.1.10 GXP-level After Diversity Maximum Demand (**ADMD**) forecasts have also been updated, based on the changes to regional energy and peak forecasts. The relevant files are:
- (a) [prudent ADMD forecasts](#); and
 - (b) [MATLAB code to produce ADMD forecasts](#).
- 2.1.11 The Commission has also prepared long-term load probability curve (**LPC**) forecasts, based on the regional energy and peak forecasts. It is not yet certain whether these forecasts will be included as part of the GPAs: however, they are included in this consultation package. They are presented in the [Regional Load Probability Curve Forecast](#) document.
- 2.1.12 Supplementary files are:
- (a) [LPC forecasts in text file format](#); and
 - (b) [LPC forecast plots](#).
- 2.2 Generation scenarios
- 2.2.1 The Commission prepares and publishes a range of future high-level generation scenarios as part of the GPAs.
- 2.2.2 Five draft scenarios have been developed. These scenarios, and the input assumptions used to develop them, are presented in the [consultation paper](#), “2008 Grid Planning Assumptions: Consultation material on draft generation scenarios”.
- 2.2.3 The five new scenarios are roughly evenly spaced along a continuum of renewableness:
- (a) the first ('Sustainable Path') is 90% renewable by 2025, in accordance with the Government's aspirational target;
 - (b) the second ('South Island Surplus') is about 85% renewable by 2025, with a bias towards South Island wind and hydro;
 - (c) the third ('Medium Renewables') is about 80% renewable by 2025, with more generation located in the North Island;
 - (d) the fourth ('Demand Side Participation') is about 75% renewable by 2025, with extensive demand side involvement and high electric vehicle uptake;
 - (e) the last ('High Gas Discovery') is approximately 70% renewable by 2025, with low gas prices due to indigenous gas finds.

- 2.2.4 In applying the Grid Investment Test (**GIT**) to a proposed investment, the Commission assigns weightings to each generation scenario. The weightings of each generation scenario are in practice also the weighting (probability of occurrence) of each MDS,⁴ which are used when calculating the expected net market benefit of a proposed investment (clauses 6 and 26 of schedule F4 of part F). At this stage, the Commission's view is that these five scenarios could all be assigned equal weight.
- 2.2.5 In parallel with consultation, Commission staff will continue to develop the scenarios. Ongoing work will include:
- (a) updating GEM input data based on:
 - (i) information gathered as part of the Transmission to Enable Renewables project; and
 - (ii) a consultant report that has been commissioned to gain more information on the possible costs and locations of future marine generation projects;
 - (b) further developing price forecasting methodologies and applying them to determine whether the scenarios are revenue-adequate; and
 - (c) further developing the GEM model, including:
 - (i) co-optimisation of generation and transmission;
 - (ii) modelling the effect of hydrological variation on new hydro generation projects;
 - (iii) modelling energy requirements at peak time and when wind output is low (these issues are currently dealt with via generic 'capacity constraints');
 - (iv) improving the treatment of the potential of electric vehicles to store energy off-peak and release it back to the grid at peak times; and
 - (v) improving the treatment of constraints on intermittent (primarily wind) generation.
- 2.2.6 A further set of scenarios will be produced by 3 April 2008, taking into account feedback on the draft GPAs. The scenarios will then be integrated with the PSA, as described in paragraph 1.1.4 of this paper.

⁴ Clause 6 of the GIT provides that the MDS must be the possible future scenarios outlined in the SOO unless the Board determines that the MDS proposed by Transpower, the proponent of a transmission alternative or the Board are more appropriate. If the Board determines that MDS other than the MDS in the SOO are more appropriate, then weightings for those other MDS will also have to be determined.