

Resource persistence forecasting interpretation – guidance material

Purpose

The purpose of this document is for the Electricity Authority to provide clarity to intermittent generators on how to correctly interpret resource persistence forecasting requirements.

Intermittent generation is electrical energy that is not continuously available due to external factors that cannot be controlled. Sources of intermittent generation include wind and solar energy.

Any electricity offered into the spot market that is generated from intermittent sources is based on forecasts. Currently, intermittent generators in New Zealand are required to generate forecasts to estimate their electricity production for each trading period starting approximately 36 hours ahead of real time.

Improved forecasts are a key building block to ensuring intermittent generation makes the best possible contribution to a renewables-based electricity system that delivers sustainable, reliable and affordable electricity to consumers.

Current requirements

Through monitoring of resource persistence forecasting, there are various ways that some generators are interpreting the Electricity Industry Participation Code's provisions. This section sets out the relevant provisions and how they should be interpreted.

Clause 13.6 of the Code outlines the requirements for all generators when submitting offers.

13.6(1) *Each generator with a point of connection to the grid, and each embedded generator required by the system operator to submit an offer under clause 8.25(5), must—*

(a) *submit to the system operator an offer for each trading period in the schedule period, under which the generator is prepared to sell electricity to the clearing manager; and*

(b) *ensure that the system operator receives an offer at least 71 trading periods before the beginning of the trading period to which the offer relates.*

Clause 13.9B states that:

Each offer submitted by an intermittent generator must, in relation to the generating plant that is the subject of the offer,—

(a) *not exceed the nameplate capacity of the generating plant; and*

(b) *include a forecast of generation potential for the trading period to which the offer relates.*

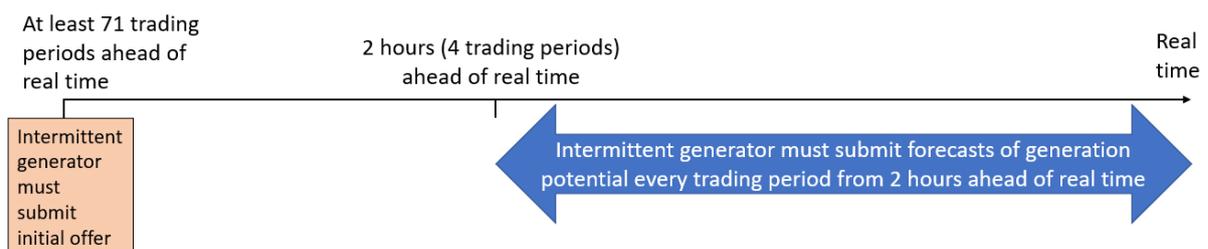
Clause 13.18A outlines the requirements for when intermittent generators must revise offers and what these offers must be based on.

13.18A(1) During the 2 hours immediately preceding the trading period to which an offer relates, each intermittent generator must submit to the system operator a revised forecast of generation potential for the relevant intermittent generating station for the trading period at a frequency of at least 1 revised forecast per trading period.

13.18A(2) A revised forecast of generation potential submitted under subclause (1) must be based on a resource persistence model, unless otherwise agreed with the Authority.

13.18A(3) For the purposes of this clause, a resource persistence model means a method for producing a forecast of the intermittent generator's generation for a trading period, in MW, that is derived from the expected availability and capability of generating plant forming all or part of the relevant intermittent generating station, on the assumption that the variable resource conditions at the time at which the forecast is prepared will persist throughout the trading period to which the forecast relates.

The figure below illustrates the current offer requirements that apply to intermittent generators.



Some intermittent generators have agreed with the Authority that their revised forecast of generation potential can be based on an alternative to a resource persistence model, as allowed under clause 13.18A(2).

Forecasts of generation potential

In 2019, clause 13.18A(3) was amended to make it clear that the forecast of generation potential (FOGP) should be based on “*expected availability and capability of generating plant*” rather than what the wind/solar farm is currently generating at the time of submitting an offer.

FOGP is a defined term in the Code:

Forecast of generation potential means, in relation to an intermittent generating station, an intermittent generator's estimate of the electricity (specified in MW) it will generate during a trading period, if—

(a) the system operator issues dispatch instructions to the intermittent generator for the intermittent generating station for the trading period; and

(b) none of the dispatch instructions are flagged in accordance with clause 13.73(1A).

Key misinterpretation

The Authority's monitoring of resource persistence forecasting and conversations with intermittent generators has shown that some may be misinterpreting clauses 13.18A(1), (2) and (3) of the Code.

Clause 13.18A(1) states the timeframes at which intermittent generators must submit FOGPs to the system operator.

Clause 13.18A(2) states that an intermittent generator's FOGP must be based on a resource persistence model, unless otherwise agreed with the Authority.

Clause 13.18A(3) states that intermittent generators' resource persistence models should be based on *expected* resource conditions for the trading period to which the offer relates, and not just the *actual* output at the time of submitting an offer (ie, the intermittent generator should be able to generate the amount it stated in its FOGP if dispatched by the system operator).

Currently, intermittent generators tend to submit their FOGP as though the resource will persist for the next four trading periods (ie, conditions will not change for two hours). The Code requirement is that intermittent generators make the assumption that the resource will persist within each individual trading period for the next four trading periods.

The key test is that the FOGP part of the offer, for each trading period offered, must be an estimate of the level of generation a generator could inject if dispatched by the system operator. For example, a solar generator provides a persistence offer that crosses sunset. The FOGP for trading periods after sunset should be 0MW for a solar farm as there is no reasonable expectation that the system operator could dispatch that solar farm after the sun has set.

In summary, the persistence offer obligations for intermittent generators are: every half an hour, an intermittent generator must provide a forecast, by trading period, for the next four trading periods that represents an expectation of their ability to meet a dispatch instruction from the system operator in each trading period.

Scenarios to illustrate clause 13.18A(3) is being misinterpreted and guidance on how to correctly interpret it

When 13.18A(3) is misapplied, based on forecast schedules, either:

- a) less wind is dispatched than the market expects, resulting in reliance on other forms of generation to make up for the supply shortfall at short notice; or
- b) more wind is dispatched than the market expects, resulting in some plant being turned on (at a cost to the plant owner) but not being dispatched.

There are three key scenarios that create issues in offering as a result of interpretation of 13.18A(3):

1. When the underlying resource is changing
2. When plant is returning from outage
3. When plant is constrained by the system operator.

Scenarios

The following scenarios illustrate how clause 13.18A(3) should be interpreted.

Scenario 1: Change in underlying resource

A wind generator's forecast shows its wind farm will be able to generate 100MW during trading periods 21–22. Over trading periods 23 and 24, the generator's forecast shows there will be a noticeable drop in wind speed, reducing the amount that could be generated to 70MW.

Incorrect interpretation

During the current trading period (20), the generator submits revised offers, including its FOGP, to the system operator for the next four trading periods (21–24). The FOGP states the wind farm output will be 100MW for each trading period. These offers do not reflect the forecast reduction in wind speed.

Correct interpretation

The wind farm's FOGP at trading period 20 should reflect that it expects to be able to generate 100MW during trading periods 21 and 22, and 70MW during trading periods 23 and 24.

Scenario 2: Plant returning from outage

Shortly before trading period 21, a wind generator submits its FOGP to the system operator for trading periods 21–24. At the beginning of trading period 23, some turbines will return from being on outage. The generator's forecast shows its wind farm will be able to generate 100MW during trading periods 21–22, and 140MW during trading periods 23–24.

Incorrect interpretation

The generator submits revised offers, including its FOGP, to the system operator that the 100MW it is generating at trading period 20 will persist for the next four trading periods. The FOGP does not reflect that during trading periods 23 and 24, the wind farm will be able to generate an additional 40MW.

Correct interpretation

The wind farm's FOGP at trading period 21 should reflect that it expects to be able to generate 100MW during trading periods 21 and 22 and 140MW during trading periods 23 and 24.

Scenario 3: Generator constrained down

A solar generator receives a constrained dispatch instruction from the system operator that limits its output during trading periods 20–22 to 0MW.

Incorrect interpretation

In trading period 20, the solar farm updates its FOGP based on its current output of 0MW. As a result, the FOGP indicates that during trading periods 21–24, output will remain at 0MW rather than the 40MW generation potential of the available solar resource based on the solar generator’s forecast.

When the FOGP of 0MW is entered into Transpower's scheduling, pricing, and dispatch model, the system may conclude that no constraint would be required for the plant. Once the constrained flag is removed, the wind farm may return to normal operation using the available resource, which in this case, is 40MW. This un-signalled increase in generation can impact power system stability and security.

Correct interpretation

The solar farm’s FOGP should be 40MW during trading periods 21–24, reflecting the expected resource and dispatch capability, and ignoring its current (constrained) output.

Review of forecasting provisions for intermittent generators

In May 2023, the Authority published an issues and options paper on forecasting provisions for intermittent generators ([Review of forecasting provisions for intermittent generators in the spot market](#)). In this paper, we sought feedback on shifting to a centralised forecasting arrangement. We also sought views on whether resource persistence forecasting should be disallowed.

On 11 July 2024, final decisions on this project were announced. Under the new forecasting arrangement, the Authority will be ‘process neutral’ and not specify the methods and the hours before real time that a forecaster should use a particular forecasting method.

The Authority will be reviewing the Code for the new forecasting provisions. This is expected to be consulted on in October 2024. Intermittent generators must ensure they correctly interpret and comply with the existing clause 13.18A(3) while it is in the Code.