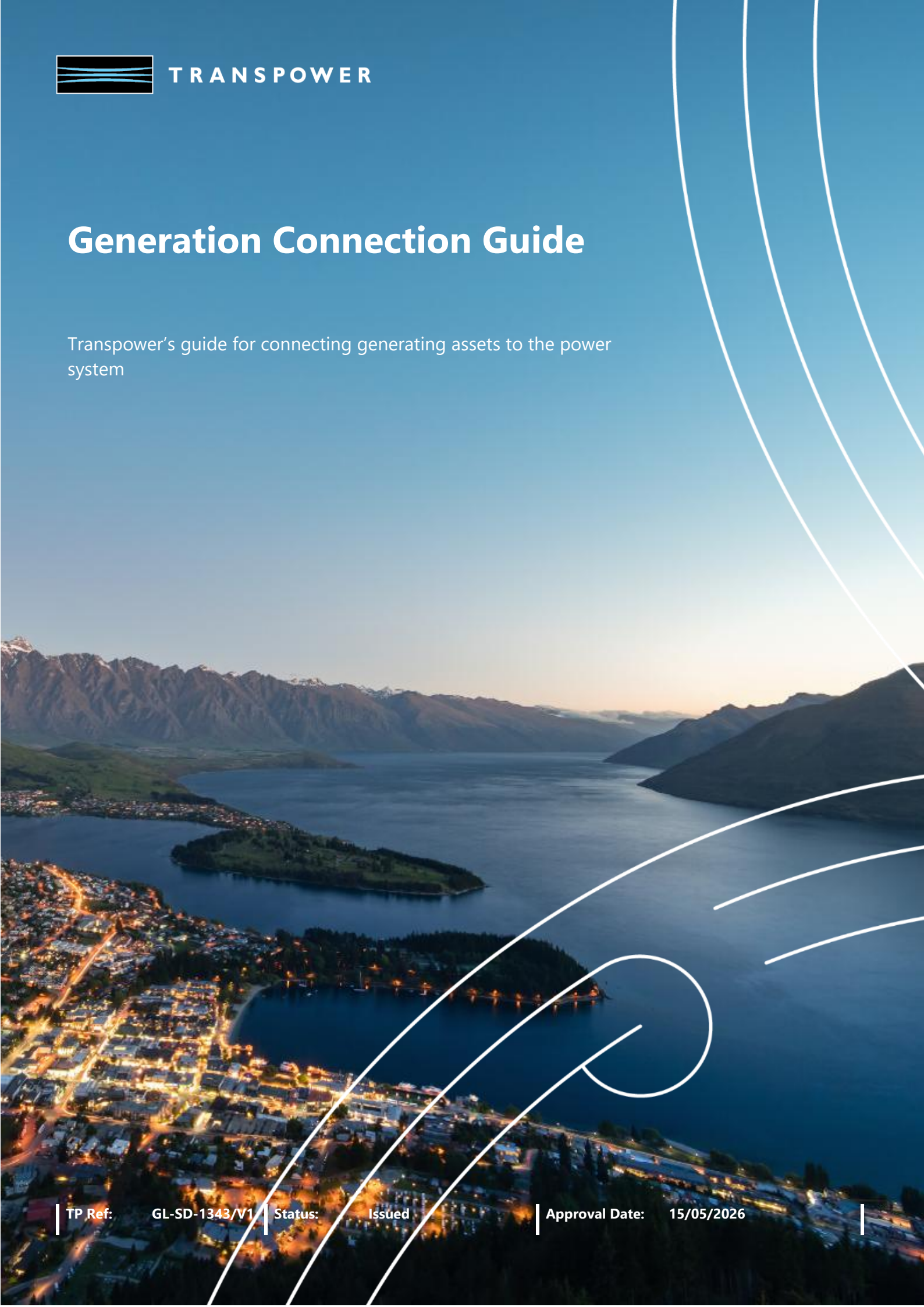
TRANSPOWER

Generation Connection Guide

Transpower's guide for connecting generating assets to the power system



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Contents

Introduction

This document guides generators through the processes of establishing a transmission connection to New Zealand's power grid, setting up operational connectivity, and commissioning generation. These workstreams are relevant for new generating units with an output over 1 MW. These processes are complex, requiring the coordination of activities between several parties. We have designed this guide to simplify the process by showing it from start to finish at a high level.

Our purpose at Transpower is "empowering the energy future for New Zealand", and we achieve this through our two distinct roles as Grid Owner and System Operator:

- As Grid Owner, we own, build, maintain, replace, and enhance the physical infrastructure that connects those who generate and those who need electricity to live, work, and play across the country.
- As System Operator, we operate the electricity market through a service provided under contract to the Electricity Authority under the Electricity Industry Participation Code (the Code), managing supply and demand for electricity in real time to ensure that the power system remains stable and secure.

Transpower's commitment is to deliver our objectives safely and efficiently to meet customer requirements and shareholder[1] expectations. We accomplish our aims while complying with the regulatory obligations and fulfilling our responsibilities to future generations of New Zealanders.

Transpower provides information on its future plans and on market conditions, including its *Transmission Planning Report* and *System Security Forecast*. Other useful documents are available from the Transpower website.

If you have any questions about the process or seek further clarification on the contents of this guide, contact *customer.solutions@transpower.co.nz*.

How to Read this Guide

We have designed this document to provide a 'big picture' view of the workstreams involved in connecting generation. There are several features to support comprehension:

- When the word 'you' is used, it refers to generators/asset owners.
- When the word 'we' is used, it refers to Transpower. We mention the specific role (either Grid Owner or System Operator) where the distinction is important.
- There is a glossary at the end for acronyms and initialisms used.

The activities in each workstream are presented in tables using the following visual elements:

The blue clock icon is an indicator of the approximate duration and/or expected timing of the activity. This time frame is provided as a guidance only.

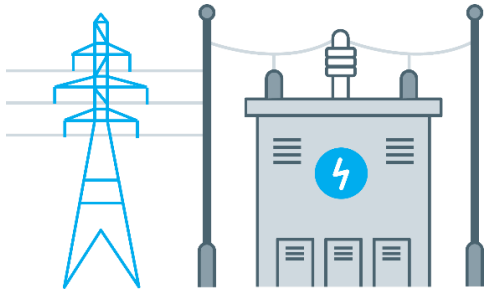
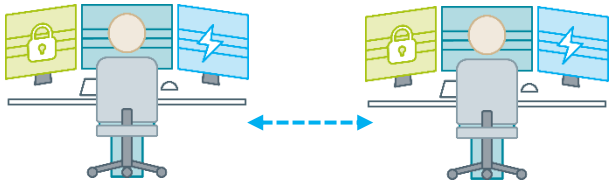
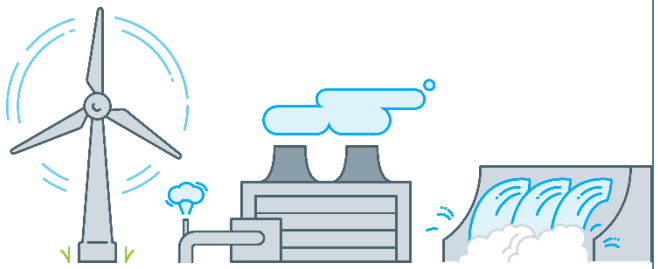
The red exclamation icon indicates that there are specific resources to consult when performing the activity, such as consulting a guideline or template.

The orange coins icon indicates that there is a cost associated with the activity. Specific details about that cost are included for your awareness.

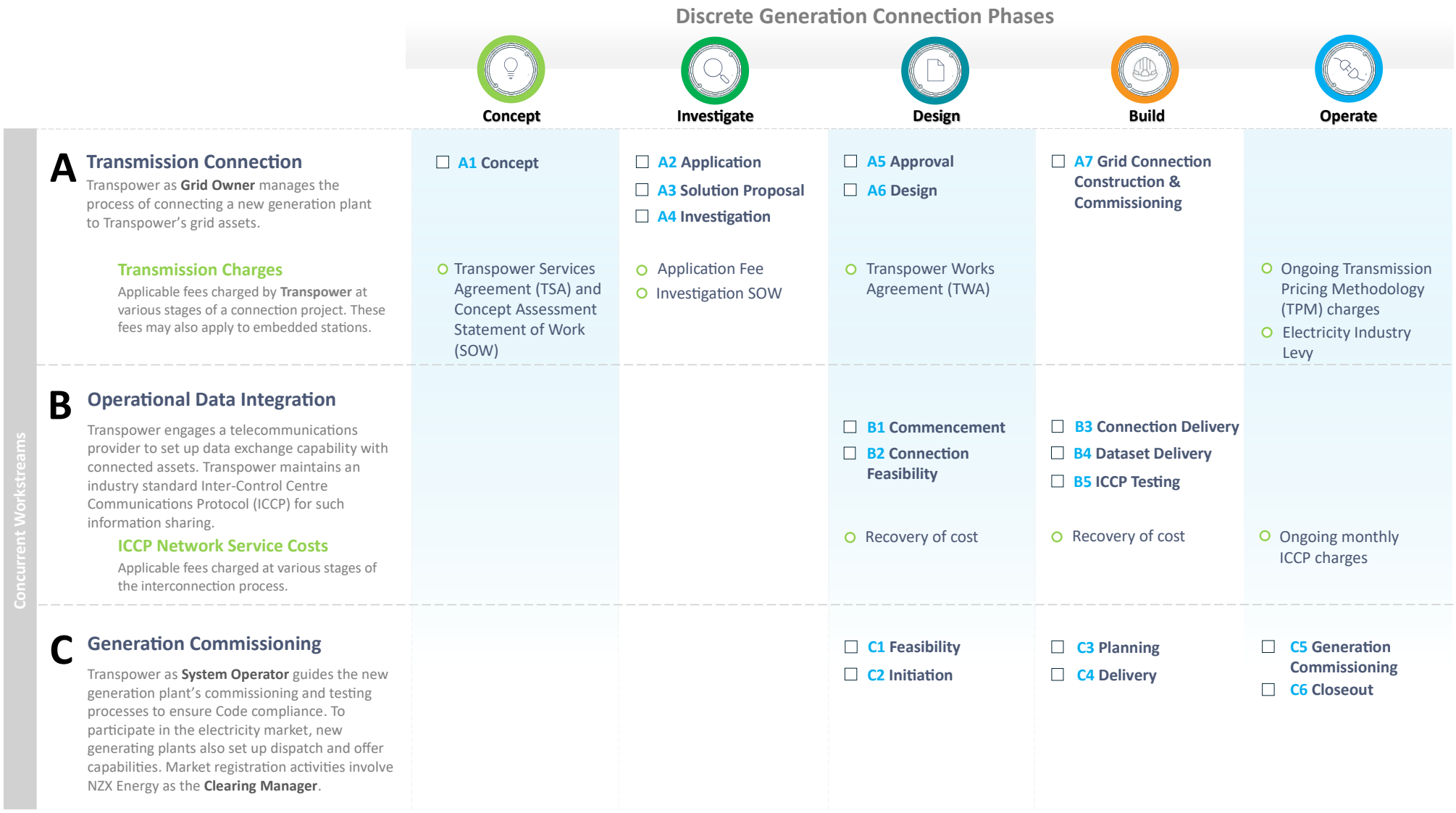
[1] Transpower is 100% owned by the New Zealand Government and operates under the State Owned Enterprises Act

Process Overview

The generation connection process is broken down into discrete phases that occur across three concurrent workstreams, as described below:

		Description of Workstream and Charges	Applicability
Transmission Connection		Concept, application, solution proposal, investigation, design, construction and commissioning of the Grid Injection Point (GIP) where the new generation station will connect to Transpower's assets. This is conducted by **Transpower** in its capacity as **Grid Owner**. Transpower charges for concept assessment, solution proposal, investigation, detailed design and construction work in this workstream and, once connected, through the Transmission Pricing Methodology (TPM) and Transpower Works Agreement (TWA).	Applies to all generation stations connecting directly to Transpower's assets. May or may not apply to generation equipment that connects within a distribution network.
Operational Data Integration		Setting up network connectivity to enable sharing real-time operational data and responding to dispatch requests; involves setting up Inter-Control Centre Communication Protocol (ICCP) infrastructure (if required) or modifying existing networks. This is conducted by **Transpower** and a **Telecommunications Provider**. Transpower recovers costs for delivery of the interconnection.	Applies to all generation units connecting directly to Transpower's assets. Also applies if connecting to a distribution network and if generating station has a capacity >10 MW.
Generation Commissioning		Monitoring commissioning and testing activities to check new generation meets Electricity Industry Participation Code's requirements. This is conducted by **Transpower** in its capacity as **System Operator**.	Applies to all generation stations with a capacity >1 MW.

The diagram below indicates how key activities from each workstream can be timed in parallel to ensure the timely and cost-effective delivery of the connection.



Transmission Connection Workstream

Workstream A: Transmission Connection

This section provides an overview of the process for generators who require a connection to Transpower's assets. This workstream applies to generating units that are connecting directly to Transpower's grid – it **does not** apply to generators that are connecting to a local **network**. However, the other workstreams in this guide will still apply.

Note: for significant new distributor-connected generation requiring new Transpower assets, the distribution company you are connecting to may need to undertake some or all activities with Transpower under this workstream.

Transmission connection comprises seven phases:

- Concept
- Application
- Solution Proposal
- Investigation
- Approval
- Design
- Construction and Commissioning

Each phase consists of actions that you will generally need to complete before moving on to the next phase.

Phase A1: Concept

In this phase, you engage with Transpower as Grid Owner and provide us with high-level details of your plans for your new generating unit. Transpower will then provide guidance on the connection process and assess your concept, covering feasibility, connection options, grid constraints, any operational considerations and likely timeframes.

A1.1	Develop concept
Description	You determine the need for a new connection to Transpower assets. To make your decision, you should consider the following: type and size of the proposed generation, location in relation to Transpower's assets, operating scenarios, desired connection resilience, and any consenting and property issues.
Responsible party	Generator
	Dependent on Generator

A1.2	Express interest
Description	The owner of the proposed new generation plant will contact Transpower's Customer Solutions Team. We will arrange a meeting with you to discuss the proposal. Transpower will provide guidance and information on the process required for generation connection. We will then appoint a contact person for the connection process.
Responsible party	Generator, Transpower's Customer Solutions Team
	Dependent on Generator

A1.3	Provide preliminary information
Description	After the initial meeting, you should submit a formal request for either a Concept Assessment workshop (see A1.4a) or Concept Assessment to be completed by desktop study (see A1.4b).
Responsible party	Generator
	Dependent on Generator
	Concept assessment questionnaires are available on request from Transpower's Customer Solutions team at *customer.solutions@transpower.co.nz* or +64 495 7000

Costs are incurred to the Generator from this stage on. You may also engage a suitably qualified third party to undertake steps A1.4a&b where they can provide an equivalent service.

A1.4a	Concept Assessment workshop
Description	Using the information provided by the Generator, Transpower arranges a Concept Assessment workshop to discuss considerations for connection options, site selection, estimated costs, environmental and property requirements, operational considerations and system constraints. This workshop can be in person or via video conference.

A1.4a	Concept Assessment workshop
	Generators who request this Concept Assessment method tend to have multiple options for their project and they wish to evaluate and narrow them down. Transpower will normally charge a fee for the workshop to cover costs (see below).
Responsible party	Transpower
	About 2 weeks
	**Transpower Services Agreement (TSA) and Concept Assessment statement of work (SOW)** Transpower and the Generator sign a Transpower Services Agreement (TSA) as a master agreement for the provision of Transpower Services, and for the recovery of costs by Transpower from the Generator. Transpower and the Generator will also sign a Statement of Work (SOW) under the master TSA. This defines the scope and cost of the Concept Assessment.

A1.4b	Concept Assessment desktop study
Description	Using the information provided by the Generator, Transpower prepares a Concept Assessment report covering the following aspects: connection options and feasibility, estimated timeline for connection, estimated costs and risks, environmental and property requirements, operational considerations, system constraints and next steps. This is a desktop study for a single project. Transpower will normally charge a fee for the Concept Assessment to cover costs (see below).
Responsible party	Transpower
	About 6-9 weeks
	**Transpower Services Agreement (TSA) and Concept Assessment statement of work (SOW)** Transpower and the Generator sign a Transpower Services Agreement (TSA) as a master agreement for the provision of Transpower Services, and for the recovery of costs by Transpower from the Generator. Transpower and the Generator will also sign a Statement of Work (SOW) under the master TSA. This defines the scope and cost of the Concept Assessment.

Phase A2: Application

In this phase, you review the Concept Assessment and decide whether to proceed with your project or not. This decision may involve several further discussions with Transpower before you are ready to commit to a connection application.

A2.1	Submit your application
Description	Following on from the results of Transpower's Concept Assessment, the Generator will decide whether to proceed with a detailed investigation. You must submit a completed application form along with supporting information to demonstrate that the project is viable and that you have completed sufficient due diligence to understand all aspects of the connection process. The application form, fee structure, and application instructions are available on *Transpower's website*. By submitting an application, you agree to pay the associated application fee (see A2.2 below) if Transpower accepts your application.
Responsible party	Generator
	Dependent on Generator

A2.2	Application review
Description	Transpower reviews your connection application and advises it has been accepted or rejected. If rejected, we will explain why it was not accepted. In this case, you may submit a modified application for the same project at a later date. If we accept your application, Transpower will invoice you the initial portion of the associated application fee (see below).
Responsible party	Transpower
	Up to six weeks
	**Application Fee** You must pay this fee to secure a place in Transpower's generation connection pipeline. There are limited situations under which the fee is refundable, but 100% of the fee can be allocated to a subsequent Transpower Works Agreement (TWA).

A2.3	Generation pipeline publication
Description	Transpower adds your project to Transpower's *generation and energy storage pipeline*, where we publish basic information on all accepted generation connection applications. This allows you to see where your project is against other competing generation developments. You should use this information to regularly assess your ability to compete against other generation projects for dispatch in the wholesale electricity market. By sequencing your application in the pipeline, you can see how long you will need to wait for Transpower resources to become available to start the next phase.
Responsible party	Transpower
	Updated Monthly

Phase A3: Solution Proposal

In this phase, Transpower works with you to confirm project needs and jointly agree on a single solution proposal to set out the high-level scope, costs and timing of the subsequent detailed investigation. Once Transpower has allocated available resourcing, this phase can commence.

A3.1	Sign a seed funding statement
Description	You and Transpower agree and sign a seed funding statement of work under a Transpower Services Agreement (TSA) to fund a senior Transpower team to collaboratively develop a Solution proposal with you.
Responsible party	Transpower / Generator
	3 months prior to Transpower's investigation resources becoming available
	**Residual Application Fee** At this stage, you will need to pay the remainder of the application fee (see section A2.2 above).

A3.2	Develop the Solution Proposal
Description	Transpower reconfirms your project needs, works through any connection optioneering, and develops a single solution proposal aligned with our connection guidelines linked

A3.2	Develop the Solution Proposal
	below. The solution proposal documents the high-level scope, cost and schedule for the subsequent investigation activities.
Responsible party	Transpower / Generator
	3 months
	Review our *connection guidelines* for your reference.
	**Investigations Statement of Work (SOW) under master Services Agreement** See above for how this might be structured and discuss it with Transpower if you have questions. You pay the costs captured in the SOW as the project progresses – some of this cost would be incurred as part of A4.1.

A3.3	Review the Solution Proposal
Description	Transpower internally approves the solution proposal and presents it to you for your agreement. You review and countersign the solution proposal. Once agreed, the high-level details of the solution proposal cannot be relitigated by either party unless new information comes to light proving the agreed solution proposal to be infeasible.
Responsible party	Transpower / Generator
	1-2 weeks

Phase A4: Investigation

Once you have agreed to the Transpower Solution proposal, the investigation commences.

A4.1	Agree and sign Detailed Solutions Development (DSD) statement of work
Description	You and Transpower sign a Detailed Solution Development (DSD) statement of work (SOW) under a Transpower Services Agreement (TSA). There is a charge for this, as noted below. The DSD is based on the solution proposal and records the scope and cost of work to produce a Solution Study Report (SSR).

A4.1	Agree and sign Detailed Solutions Development (DSD) statement of work
	Depending on the complexity of the project and your internal decision points, we may structure this either as one large statement of work or as multiple statements we agree on stage by stage.
Responsible party	Generator / Transpower
	About 2 weeks
	**Investigations Statement of Work (SOW) under Master Services Agreement** See above for how this might be structured and discuss it with Transpower if you have questions. You pay the costs captured in the SOW as the project progresses – some of this cost would have already been paid as part of A3.2.

A4.2	Agree on land acquisition and environmental approvals
Description	You and Transpower agree on the process and responsibilities associated with environmental and property processes and approvals for the new Transpower connection point. Our preference is to obtain a designation for short and long-term flexibility. Designations can only be applied for by Transpower. In some instances, we may be able to rely on regional consents or other environmental approvals obtained by the Generator (subject to Transpower's requirements being met). There is some flexibility regarding whether it is you or Transpower who obtains property rights (on condition that Transpower's property requirements are met). We expect you to include the resultant agreements as appendices to the Transpower Works Agreement (TWA) in Phase A5.2.
Responsible party	Generator / Transpower
	2 weeks

A4.3	Solution Study Report (SSR)
Description	Transpower engages a design consultant to prepare a Solution Study Report (SSR). The SSR will typically cover the conceptual connection design, system impact, wide area protection impact, and detailed cost and timeline estimates. We will review this report and then provide you access to it once it is finalised.

Responsible party	Transpower
	About 4-12 months, depending on complexity (note: this may run in parallel with A4.4)

A4.4	Environmental and property investigation
Description	Transpower or the generator engages a planning consultant to undertake an environmental assessment. The assessment would typically identify the approvals required under the Resource Management Act and Heritage New Zealand Pouhere Taonga Act, as well as issues, risks and potential timeframes for obtaining the approvals. Once available, Transpower will provide you with the information regarding the approvals that are required, the risks and timing.
Responsible party	Transpower or Generator (by agreement)
	About 6 months (note: may run in parallel with A4.3)

Phase A5: Approval

When ready to proceed, you enter a contract with Transpower to cover the cost of constructing the new Transpower connection facility.

A5.1	Proceed with construction
Description	Following on from the results of the SSR, you must decide whether to proceed with construction or not, and advise Transpower accordingly.
Responsible party	Generator
	About 2 to 3 months for Transpower approval

A5.2	Agree and sign Transpower Works Agreement (TWA)
Description	Transpower and the Generator agree and sign a Transpower Works Agreement (TWA). The TWA is Transpower's standard contract covering the terms and conditions for Transpower's provision of new infrastructure to enable customer projects, and the recovery of costs.
Responsible party	Generator / Transpower
	About 2 months
	**Transpower Works Agreement (TWA)** The TWA is a bilateral contract between a connected customer and Transpower to cover the costs of any new Transpower assets required to enable the Grid. This is an unregulated revenue stream for Transpower. Normally any ongoing maintenance or operating costs associated through these assets will be recovered through the Transpower Pricing Methodology (TPM).

Phase A6: Design

Transpower undertakes the detailed design of the new connection on behalf of the Generator.

A6.1	Detailed design
Description	Transpower prepares the detailed design for the construction and commissioning of the new connection. The design work will typically happen concurrently with the consenting process (Phase A6.2).
Responsible party	Transpower
	Varies depending on the complexity of the project

A6.2	Obtain environmental approvals
Description	The party or parties designated in Phase A4.2 secure the necessary environmental approvals to enable the construction, operation, maintenance and upgrade of the new connection. Gaining approvals will likely occur in stages. Some may be obtained based on SSR level engineering detail. Others will require detailed design and civil design aspects (Phase A6.1).

A6.2	Obtain environmental approvals
Responsible party	Generator or Transpower (dependent on Phase A4.2).
	Varies depending on the complexity of the project

A6.3	Arrange compliant metering installation
Description	The Generator must arrange a metering installation that complies with the Code. Grid-connected Generators must provide Transpower with a copy of their metering installation design for review and comment. You should note that the Code contains other obligations on collecting and providing data to the market–refer to workstreams B and C.
Responsible party	Generator / Transpower
	6 months before commissioning
	Part 10 (Metering arrangements) of the Code includes metering installation requirements Part 15 (Reconciliation) of the Code includes requirements for collection and provision of metered data to the market

Phase A7: Construction and Commissioning of Grid Connection

Transpower undertakes the construction and commissioning of the new grid connection on behalf of the Generator. For clarity, this activity does not relate to commissioning of generation assets (that is covered in Workstream C).

A7.1	Construction & commissioning of new connections to Transpower Assets
Description	Transpower undertakes the construction and commissioning of the new connection to its assets. We will provide monthly project progress reports to you. You may arrange progress meetings if and when required.
Responsible party	Transpower
	Varies depending on the complexity of the project

A7.2	Co-locate equipment on Transpower sites
Description	You may need to install some of your assets on Transpower sites as part of this phase. To do this, you must follow our Access and Occupation (A&O) process (linked below). This process is designed to manage health and safety on our sites for the initial installation and ongoing operation and maintenance of your equipment.
Responsible party	Generator / Transpower
	6-12 months before your planned generation commissioning date (Workstream C)
	Read and view information about our Access and Occupation process *here*.
	**Recovery of Costs** A separate services agreement and SOW will normally be required to recover Transpower costs associated with this work. Note: At Transpower's discretion, cost recovery may not be required for very minor requests.

A7.3	Transmission Agreement
Description	All parties connected to Transpower assets are required to have a transmission agreement, which stipulates the terms and conditions of the connection. The form of the standard transmission agreement, known as the Benchmark Agreement, is set out by the Electricity Authority in the Code. Generators with an existing transmission agreement do not require an additional agreement. In that situation, we will add new information to the schedules of the existing agreement.
Responsible party	Generator / Transpower
	4-8 weeks
	A copy of the Benchmark Agreement is available on Transpower's *website.* Reference to the Benchmark Agreement can be found in Part 12 of the Code.

Ongoing Charges

Once your generation asset is connected to the power system, there are two ongoing fees that apply. Note that these may apply to assets connected to the Grid as well as to a Distribution network.

	Description
	**Transmission Pricing Methodology (TPM)** Transpower's business is subject to price and quality regulation under Part 5 of the Commerce Act 1986. This regulation determines the amount of revenue Transpower can recover, while the methodology by which Transpower allocates the annual revenue requirement is regulated by the Electricity Authority under Schedule 12.4 of Part 12 (Transport) of the Code: this is known as the Transmission Pricing Methodology (TPM) Information on TPM charges can be found on our *website*. Information to estimate TPM charges for a new connection are also available *here*.
	**Electricity Industry Levy** All registered market participants are required pay an electricity industry levy to cover the cost of the Electricity Authority's activities. The levy is payable in monthly instalments to NZX Energy as the Clearing Manager.

Operational Data Integration Workstream

Workstream B: Operational Data Integration

This section provides an overview of the process for generators to build and configure an Inter-Control Centre Communication Protocol (ICCP) interconnection for their asset. **This workstream applies to all generators**.

Our *Operational Data Integration webpage* provides further information about this process. To set up your dispatch system to make offers to the electricity market, refer to our *About Generation Offers and Dispatch* webpage. Note that you may choose either ICCP or Web Services for dispatch – if you want to use Web Services, refer to the above webpage for further clarity.

Enabling this ICCP capability involves five phases:

- Commencement
- Connection Feasibility
- Connection Delivery
- Dataset Delivery
- ICCP Testing

The Connection Feasibility and Delivery phases (B2 and B3) only apply if you are either building a new ICCP interconnection or changing existing infrastructure to ICCP. Find below a summary of key activities involved in this workstream.

Phase B1: Commencement

In this phase, you inform Transpower of your asset's communication infrastructure needs.

B1.1	Submit ICCP request
Description	Complete Transpower's *Operational Data Integration Work Request Form* to signal you are ready to commence the process of establishing your generation asset's communication system. In the form, you must indicate whether you intend to: ▪ build a new ICCP connection for your asset, or ▪ update existing ICCP infrastructure to use with your asset, or ▪ change your existing communications infrastructure to utilise ICCP. Our customer team will reach out with a response or request for more information, before proceeding with the next steps. Once approved, if you are updating existing ICCP infrastructure to use with your asset, you may skip phases B2 and B3 and proceed with phase B4.
Responsible party	Generator
	5 business days

	Click the link to access the *Operational Data Integration Work Request Form*.

Phase B2: Connection Feasibility

In this phase, you engage Transpower to investigate and support the building of your ICCP infrastructure. This workstream applies if you are changing an existing "legacy" communications infrastructure to ICCP or if you are building a new ICCP connection.

B2.1	Feasibility Investigation
Description	Transpower engages a telecommunications provider to conduct a site investigation to determine the feasibility and costs associated with delivering those services. Transpower presents these to you for your consideration. Work beyond this step continues only with your agreement.
Responsible party	Transpower / Generator / Telecommunications Provider
	1-6 months depending on site location and connectivity availability
	**Recovery of Cost** You must pay a fixed fee for Transpower to allocate resources to your interconnection project and engage with the telecommunications provider on your behalf. Further details of this charge are explained in a letter we provide you, along with the projected monthly ongoing costs.

B2.2	Network design
Description	Transpower and the telecommunications provider complete a network design for the necessary network services.
Responsible party	Transpower / Telecommunications Provider
	2-4 weeks

Phase B3: Connection Delivery

This phase continues from phase B2; you proceed with the connectivity implementation if you have approved the previously provided connectivity solution and related costs outlined in B2.1.

B3.1	Build network connectivity
Description	Transpower's Delivery Services and Infrastructure & End User Services teams collaborate with the telecommunications provider to complete the network build, including installation of the requisite network equipment. Transpower coordinates with you throughout the process. Once delivery of the network connectivity is complete, ongoing monthly charges apply.
Responsible party	Transpower / Telecommunications Provider
	Depends on feasibility investigation (B2.1); can last 12 months

B3.2	Complete bench testing
Description	Transpower coordinates with you to undertake bench tests to ensure that Transpower ICCP gateways can communicate with your ICCP gateways without interference of network and firewall components, thus reducing the risk with subsequent ICCP testing. For this reason, bench testing occurs on site (either at Transpower or your site). This activity is not mandatory, but we do recommend it. It normally takes place once your network has been built (step B3.1). It is possible to conduct this testing independently of the data connectivity being built. If we determine that a bench test is not required, this step can be skipped.
Responsible party	Transpower / Generator
	The bench test typically takes 2 days, and should occur at least 6 weeks prior to first sync date

Phase B4: Dataset Delivery

In this phase, we collaborate to confirm the ICCP dataset consisting of measurements, indications, and dispatch tags associated with your asset. We then build this dataset into our SCADA systems.

If you are changing an existing "legacy" communications infrastructure to ICCP or building a new ICCP connection, you can complete this phase in parallel with the Connection Delivery phase (B3).

B4.1	Provide initial ICCP dataset
Description	Transpower collates any existing remote terminal unit (RTU) interconnection data within the scope of your project and supplies it to you in a pre-populated spreadsheet. We will ask you to verify a pre-populated dataset, and to include any additional data points before sending it back to us. Note that you must provide the **final** dataset to Transpower in accordance with the timing in Chapter 1 of the *Connected Asset Commissioning, Testing and Information Standard*.
Responsible party	Transpower / Generator
	Must complete this step at least 4 months before the planned generation commissioning date (see Workstream C), or risk delays

B4.2	Review and confirm final ICCP dataset
Description	Multiple teams within Transpower review your provided dataset to ensure it is accurate, correct, and compliant. The System Operator's compliance teams check that no unacceptable commercial advantages are created through the dataset. They also assess the potential network model and operational impacts that may result from the addition or loss of the provided data points. Once reviewed and approved, Transpower sends you a copy of the final dataset.
Responsible party	Transpower
	1-2 months

	**Recovery of Cost** You may be charged a fee for the work required to organise and prepare your dataset, depending on the complexity of your ICCP connection. *Note: If you completed step B2.1 Feasibility Investigation and paid the associated charge, you will not need to pay the charge for this step.*

B4.3	Build SCADA model and configure parameters
Description	Transpower's Real Time Systems and SCADA Support teams assess the RTU impact of the ICCP dataset. We then specify the parameters for the ICCP connection and provide these to you to facilitate the configuration of your system. If configuration changes are necessary, we engage the respective teams to deliver these changes. Once ICCP connection data is finalised, we model the dispatch data and finalise the SCADA model before generating certificates.
Responsible party	Transpower / Generator
	4 weeks prior to first sync date

Phase B5: ICCP Testing

In this phase, you formalise the ICCP interconnection by signing an agreement and working with us to complete pre-commissioning tests that enable us to commission the connection.

B5.1	Sign ICCP interconnection agreement
Description	Transpower sends you an ICCP interconnection agreement (IIA) which includes the estimated ongoing charges, the finalised dataset and a diagram of your network.
Responsible party	Transpower / Generator
	Determined by the Generator

B5.2	Perform pre-commissioning testing

Description	Transpower undertakes the point-by-point testing of the ICCP dataset. Controls are also tested at this time, and you can also test your dispatch systems via ICCP if you are using it for dispatch (see C5.3). All parties must agree on the successful testing outcome before proceeding.
Responsible party	Transpower / Generator
	Typically 2 business days

B5.3	Finalise ICCP commissioning
Description	Following successful pre-commissioning testing, SCADA and market dispatch models are migrated to our real-time production environment. Your onboarding into real-time is managed through the relevant change request (CRQ) process, which includes migration of the SCADA and market dispatch models into the production environment, along with your migration of the ICCP connection to real-time using the approved real-time configuration and ICCP model. The customer team will then be in touch with you to close out the project. Finally, to facilitate ongoing operational support, ensure you provide your operational team's contact distribution lists and phone numbers to the Transmission Application Team at *CSTA.support@transpower.co.nz*.
Responsible party	Transpower / Generator
	Typically 2 weeks

Ongoing Charges

Once your generation asset is connected to the power system, a fee applies for the use of ICCP connection infrastructure.

	Description
	**ICCP Charge** To provide the network service to all asset owners, Transpower incurs reasonable external costs, including overhead costs involved in procuring third party components (i.e. one.govt services).

Generation Commissioning Workstream

Workstream C: Generation Commissioning

This section outlines the process for generators who want to commission generation and connect to the power system, whether the grid or a local or embedded distribution network. **The process applies to all generators**. However, some phases may be simpler for smaller generators (in terms of MW output) due to them having fewer performance obligations (AOPOs). Transpower, in its role as System Operator, will help guide you on your requirements and obligations.

Generation commissioning is made up of six phases:

- Feasibility
- Initiation
- Planning
- Delivery
- Commissioning
- Closeout

Each phase consists of activities that must be completed before moving to the next phase. The specific details and expected durations or timings for each of these activities are available in the *GL-EA-404 Generation Commissioning Process* document. Refer to the System Operator's *Commissioning Generation webpage* for the 'big picture', and the *Connected Asset Commissioning, Testing, and Information Standard* for more information on your obligations related to commissioning. Find below a summary of key activities involved this workstream.

Phase C1: Feasibility

Irrespective of whether your generator connects to Transpower assets (during stages A1 and A2 of this guide) or Distribution assets, you should get to know your obligations and study the generation commissioning process using published guidance documents from the System Operator. Once familiar with these, you should engage directly with consultants and then the System Operator to provide visibility of your project. These may impact the generator's planning, design, procurement and business case. This is especially important for investments in new generating technologies and should occur early in the project to avoid unforeseen complications during commissioning and operation.

C1.1	Educate yourself on the process
Description	Read operational guidance available on Transpower's website and assess operational obligations under *the Code*. Seek advice from a consultant on the specific ways the Code may apply to your generator in its context.
Responsible party	Generator
	You should also familiarise yourself with the commissioning generation process by exploring the *Commissioning Generation webpage*.

C1.2	Complete feasibility prerequisite milestones
Description	Read the first section of the *GL-EA-404 Generation Commissioning Process* and work to achieve all those prerequisite milestones. The System Operator will not engage with you about starting the commissioning process until those prerequisites have been met.
Responsible party	Generator
	Dependent on the Generator, but we recommend these milestones be completed at least 12 months before the date you are planning to connect to the power system for the first time.

Phase C2: Initiation

The initiation phase is a brief phase in the generation commissioning process. You begin this phase by confirming to the System Operator that you have met your feasibility prerequisites. The System Operator then allocates internal resources to begin supporting you through the rest of the process.

C2.1	Consult with the System Operator to prepare for commissioning
Description	Complete the *form* on the System Operator website to signal that you have completed your feasibility prerequisites and are ready to formally engage with the System Operator to begin organising commissioning. While Transpower reviews your application and allocates internal resourcing to your project, you should continue to familiarise yourself with the documents listed in section two of *GL-EA-404 Generation Commissioning Process*. As part of this, you may need to request a three-letter site code if your generation station requires operational communications such as dispatch (see link to the form in the Resources row below).
Responsible party	Generator
	Engage with the System Operator to begin commissioning using *the initiation form*. Request a three-letter site code using *this form* if required.

Phase C3: Planning

The System Operator meets with you to discuss and agree key aspects of your commissioning project. They will also highlight the information, long-lead items, studies and approvals required to ensure there are no delays to the process. The planning phase is a collaborative effort and sets the foundation for a successful project. A key outcome of this phase is the project plan which will act like a roadmap to commissioning. Refer

to section three of *GL-EA-404 Generation Commissioning Process* to clarify timing expectations during this phase.

C3.1	Agree on a project plan
Description	At the kick-off meeting, the System Operator will provide a structure for the generation commissioning process. This will include a project plan, which lists all the deliverables from the following phases mapped against expected timings.
Responsible party	Generator
	Find a general version of the project plan in the *DT-EA-1146 Code Commissioning Meeting Minutes Template*.

C3.2	Submit planning Asset Capability Statement (ACS)
Description	Generators are required under the Code to submit an Asset Capability Statement (ACS) to the System Operator. The ACS contains the technical details of the new generation plant. This is the first stage of an iterative process, with more detail added to the ACS as the project progresses toward commissioning. This Planning version may include provisional data such as static and dynamic models.
Responsible party	Generator
	Information on Asset Capability Statements is available on the *Asset Capability Statements (ACS)* webpage.

C3.3	Identify protection coordination requirements
Description	The protection systems on both sides of a grid interface must remain coordinated after your generator connects to the power system. Whether you are connecting directly to the grid, or to a distributor, it is your responsibility to proactively engage with the appropriate parties to organise this coordination. This may involve scoping protection studies, which is why it may be a long-lead item for your project. Consult with the appropriate parties to begin this process. **Before commissioning can begin, the System Operator requires written confirmation that protection coordination has been agreed upon.**
Responsible party	Generator for grid connected projects or Distribution Company for embedded generation projects / Transpower as Grid Owner

C3.3	Identify protection coordination requirements
	See *this document* for more details, including a grid protection coordination statement example.

C3.4	Identify ancillary services capability
Description	You should have an awareness of ancillary services that you might want to offer to the electricity market through your generator. You will have signalled this using the commissioning initiation form (C2.1). If you want to provide ancillary services, you must demonstrate your generator's capability to offer these services through testing. Then, depending on the service, you may need to participate in a tender. If your tender application is successful, you will sign contracts with the System Operator to provide the ancillary service for a contracted period. After consulting the information available on our website (linked below), reach out to *market.operations@transpower.co.nz* with specific queries about ancillary services.
Responsible party	Generator
	Organising the work for some of these services makes this a long-lead item, so refer to *GL-EA-404 Generation Commissioning Process* for information about timing expectation. You might coordinate your activities so that some of this testing occurs during generation commissioning.
	Visit the *Ancillary Services* webpage for information about each service, the procurement process, and essential documents to consult.

C3.5	Prepare operational and market communications capability
Description	Your generator may need to send operational data to Transpower via Inter-Control Centre Communications Protocol (ICCP) depending on the generating station size. The process of enabling this capability is covered in Workstream B of this Connection Guide. If you are planning on responding to dispatch requests yourself, you will also need to set up a robust dispatch system, which could be done via ICCP or Web Services. It is possible for another participant to respond to dispatch requests for you, in which case their dispatch system must be adequately set up. Contact the Market Operations team at *market.operations@transpower.co.nz* for specific queries, and refer to *GL-EA-404 Generation Commissioning Process* for how this step fits into the larger process, including in terms of timing.

C3.5	Prepare operational and market communications capability
Responsible party	Generator
	If you need to build new infrastructure for this, it will take a significant amount of time, making this another long-lead item.
	Refer to the Operational Data Integration webpage for more information on the process.

C3.6	Prepare connection studies and models for case studies
Description	Scope and plan connection studies to assess the impact of your new generation on the power system. These analyses ensure you can meet your AOPOs and Technical Codes. You will also need to provide mathematical models for case studies so the System Operator can understand your generator's internal workings. You will eventually be required to validate the models in the closeout phase.
Responsible party	Generator
	Refer to *GL-EA-953 Connection Study Requirements* for support with connection studies, and to our Modelling Requirements documents for modelling guidance (available, along with more information, on our *Power System Studies and Modelling* webpage).

C3.7	Install metering infrastructure
Description	You must install Code-compliant equipment to measure your generating asset's output and consumption.
Responsible party	Generator / Transpower as Grid Owner or Distributor
	This could take 3 months or longer if changes need to be made to the design once drafted.

Phase C4: Delivery

Delivery is the longest phase of the generation commissioning process and it requires you to coordinate with all stakeholders and prepare all necessary documentation for System Operator review. You will follow through

with all the long-lead items from the planning phase. The System Operator will provide comments on the information you share to ensure that your new generation plant is compliant with the Code. You must satisfy all 'show-stoppers' before commissioning and testing of the generation plant can begin. Refer to section four of *GL-EA-404 Generation Commissioning Process* for clearer detail on what is required and when.

C4.1	Develop and submit Code compliance documents
Description	There are five key essential documents that you must prepare to prove your generator's capability to fulfil your performance obligations: 1. Code commissioning plan (draft, then a final version) 2. Engineering methodology (draft, then a final version) 3. Pre-commissioning stage ACS (update) 4. Connection study report (draft, then a final version) 5. Operational Test Plans Review *GL-EA-404 Generation Commissioning Process* to coordinate the timings, as delays in submissions will very likely cause delays to commissioning. Note that you can make necessary preparations to demonstrate ancillary services capability (from C3.4) within the above documents.
Responsible party	Generator
	See sections 4.1 and 4.2 of *GL-EA-404 Generation Commissioning Process* for links to webpages, guidelines and templates that will help.
	Mandated timings can be found in the latest *Connected Asset Commissioning, Testing, and Information Standard*. The timings for these vary, but they are listed in the above GL-EA-404 link above.

C4.2	Set up and verify operational systems
Description	To meet the communication requirements of the commissioning period and beyond, you must submit an ICCP dataset that includes indications and measurements (along with dispatch tags, if you are using ICCP for dispatch). This process is covered in Workstream B within this Connection Guide. The System Operator will then coordinate with you to implement the datasets into Transpower's production SCADA and dispatch environments to be ready for commissioning.

C4.2	Set up and verify operational systems
	You will also need to submit a notice of *intention to connect* to provide information required for scheduling and dispatch.
Responsible party	Generator / Transpower as System Operator
	Refer to section 4.3 of *GL-EA-404 Generation Commissioning Process* for links to webpages, guidelines and templates that will support you.

C4.3	Set up and test offer and dispatch systems
Description	If your generator is required to submit offers, you will need to submit them via WITS (see C4.4), or you will need to have someone else manage this on your behalf. The Market Operations team (reachable at *market.operations@transpower.co.nz)* can offer you advice and direct you to consultants to support you with the set-up and testing of your offer systems, as it is not managed by Transpower. You can also contact WITS support at *wits@nzx.com*. Prior to commissioning, you'll also need to set up dispatch systems, unless another participant is receiving and responding to dispatch instructions for you (see C3.5); you can use ICCP (as signalled in C4.2) or Web Services for this, which the System Operator will model in our systems. You must then collaborate with the Market Operations team to test your dispatch functionality.
Responsible party	Generator / System Operator / Developer (in some cases)
	6 months, once communications link is set up (see C3.5)
	Visit our *About Generation Offers and Dispatch* to review key information. You may also find the scheduling information useful on *this webpage*.

C4.4	Complete market registration
Description	All new Generators must register as market participants, except two classes of industry participant. To register as a market participant, go to the Electricity Authority's *Participant register* webpage, and click on 'Apply'.

C4.4	Complete market registration
	After registering as a market participant, you must advise the System Operator of your dispatch requirements. Within two months of the commissioning phase, you must then: • Submit a *FM-EA-008 Notice of Initial Offer*. • Register for WITS (the wholesale information and trading system) with the Clearing Manager (NZX Energy) if you have not already done so. For more information, contact *cadmin@nzx.com*. See also the *WITS access policy*. • Advise the Clearing Manager of your upcoming generation connection so that you can be added to the system for clearing in the market each month. Reach them at *cmanager@nzx.com*. • Advise the Reconciliation Manager (NZX) of your upcoming generation connection. They may require contracts for purchasing and/or selling energy. Reach them at *rm@nzx.com*.
Responsible party	Generator
	Refer to the Electricity Authority's website for more information: *New industry participants*

C4.5	Advise protection coordination has been confirmed at grid interface
Description	As previewed in section C3.3 above, both parties at the grid interface need to advise the System Operator in writing that protection coordination has been agreed upon. You will need to arrange this before the planned commissioning date. **This is a show-stopper. If this has not occurred, commissioning will be delayed.**
Responsible party	Generator / Distribution Company (for embedded generation projects) / Transpower as Grid Owner
	Protection coordination must be completed at the latest 2 weeks before the planned date for electrical connection to the power system.

Phase C5: Commissioning

During commissioning, you adhere to the timelines agreed in the Code commissioning plan, engineering methodology, and all the other documentation prepared in section C4.1 above. Your generator commissions and performs the agreed-upon tests. During this period, your generator must comply with all relevant

Electricity Market Trading Arrangements. This includes complying with offer and dispatch provisions (unless agreed otherwise in an approved operational test plan) and managing your generator's assets to ensure they are dispatched to the loads necessary for commissioning. At the discretion of the Generator this may also include bidding into the must run dispatch auction or offering the unit at $0.01/MWh.

C5.1	Perform tests and provide test results
Description	Your generator performs the tests according to the specifications and timing agreed upon in the Code commissioning plan, engineering methodology and operational test plans. The System Operator may request to witness AOPO tests as required. You need to then provide test results and data to demonstrate compliance with your AOPOs and Technical Codes.
Responsible party	Generator / System Operator

Phase C6: Closeout

Following commissioning, you must provide updated test results to the System Operator, who reviews and provides a final assessment of compliance. Your generator must adhere to all the ongoing obligations as set out in the Code. Consult section six of *GL-EA-404 Generation Commissioning Process* for more details, including about timing of activities.

C6.1	Complete closeout activities
Description	1. Provide a final updated ACS following commissioning and testing. 2. Submit final test reports and data. 3. Submit validated models and a modelling report. If any potential non-compliances are identified during commissioning, testing, or production of the test reports, you must inform the System Operator.
Responsible party	Generator

C6.2	Demonstrate final compliance with the Code
Description	After submitting all your compliance documentation above, gather and submit evidence that you have fulfilled your Code obligations throughout commissioning by filling out the *CL-EA-1147 Final Compliance Checksheet*. The System Operator will then review.
Responsible party	Generator

Glossary

ACS	Asset Capability Statement
AOPO	Asset Owner Performance Obligation
Code	Electricity Industry Participation Code 2010[2]
FTR	Financial Transmission Rights
GIP	Grid Injection Point
Grid	The system of transmission lines, substations and other works, including the HVDC link used to connect grid injection points and grid exit points
Grid Owner	Transpower acting in its role as Grid Owner, where Transpower develops, owns and maintains grid assets.
GXP	Grid Exit Point
ICCP	Inter-Control Centre Communications Protocol
NZX	NZX Energy (currently the Clearing Manager, Pricing Manager, WITS Manager and Reconciliation Manager)
PPO	Principal Performance Obligation
RCPD	Regional Coincident Peak Demand
SCADA	Supervisory Control And Data Acquisition system
SSR	Solution Study Report
SOW	Statement Of Work
System Operator	Transpower acting in its role as System Operator
TPM	Transmission Pricing Methodology
TSA	Transpower Services Agreement
TWA	Transpower Works Agreement
WITS	Wholesale and Information Trading System

[2] See www.ea.govt.nz/code-and-compliance/the-code/

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