Multiple Frequency Keepers Project Plan

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Approvals

Darryl Renner

Project Sponsor

Signature	Date

EC Project Manager

Signature	Date

Version control panel

Date	Version	Author	Comments and/or description of changes
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Glossary of abbreviations and terms

AGC	Automatic generation control
EC	Electricity Commission
GO	Grid Owner
SPD	Scheduling Pricing and Dispatch software

Contents

1. Introduction and purpose of this project plan

1.1 Introduction

1.1.1 This project plan is the primary management tool for this project. It sets out all key information including the scope, resources, risks, deliverables and timetables. Where more detailed information about the project is relevant, the plan will reference this information. The plan is signed off by the project sponsor or steering committee.

1.2 Purpose of this project plan

1.2.1 Monitoring and reporting against a project, including the closure report, is against the project plan.

1.2.2 Any changes to the plan must be approved through the change control process. The original plan is retained (as a baseline for the project) and a new version of the plan is issued to reflect approved change requests.

2. Rationale—why do this project?

2.1 Introduction and background

2.1.1 This project has come about because the cost of frequency keeping services on the New Zealand power system has increased significantly in recent years. There is an underlying concern that the number of providers able to meet the current frequency keeping requirements remains limited, with only one company in each island being selected in each half hour period using the current frequency keeping methodology. In addition, the quantity of frequency keeping required is expected to increase in future years as more generation that is unable to support system frequency is added to the power system.

2.1.2 As a result, the Electricity Commission (EC) has undertaken a strategic review of development options regarding the provision of frequency keeping ancillary services on the New Zealand Power system. The review identified potential enhancements that could be made including the possibility of extending frequency keeping duty to multiple power stations (frequency regulation). At present, New Zealand does not have a centralised automatic generation control (AGC) system able to support the co-ordinate and operation of market for this type of service.

2.1.3 Investigations carried out by the Commission included a review of the technical options for extending the frequency keeping service to multiple providers using an AGC system, including the use of the HVDC to transfer services between the North and South Islands. Building on these technical investigations, the Commission developed and assessed the feasibility of a straw man market model for the procurement of frequency regulation services.

2.1.4 In this project plan, the term frequency regulation is used to distinguish proposed market arrangements from the current frequency arrangements.

2.2 Purpose

2.2.1 This project is to develop a more competitive procurement arrangement than the present frequency keeping services by developing a frequency regulation ancillary service involving:

(a) in a first stage, the implementation of a basic AGC system by the System Operator (SO) to co-ordinate the frequency keeper in each island along with the HVDC link;

(b) improvements to the existing dispatch systems to support transfer automated AGC control signals from the SO to generating stations;

(c) development of station control systems by generators to accept automated AGC control signals; and

(d) in a second stage, development of a multi-provider frequency regulation ancillary service involving the co-optimisation of frequency regulation with energy and instantaneous reserves (IR) offers.

2.2.2 The Commission is not an asset owner and as such is not in a position to construct an AGC system or to effect changes in the way that generating stations are controlled. These are initiatives that can only be implemented by the SO and the owners of generating stations. The Commission is able to contribute to this project by:

- negotiating a contractual arrangement with the SO, for the development of an AGC system;
- facilitating agreement with the Grid Owner (GO) for the HVDC link to be used to transfer frequency regulation between islands;
- acting as an industry facilitator to co-ordinate projects undertaken by the SO and generator owners; and
- developing the rules to support market arrangements for a multi-provider frequency regulation ancillary service.

2.3 Problem definition

The problems to address are:

2.3.1 The lack of competition in the current frequency keeping service which is limited to a single provider in each trading period in each island. AGC is intended to provide the infrastructure to support multiple providers in a market arrangement similar to that used for the procurement of instantaneous reserves.

2.3.2 The expected increase in the quantity of frequency regulation required on the system to support a greater level of wind generation which is not able to be dispatched and does not support system frequency.

2.4 Project context

2.4.1 Paragraph 67 of the Government Policy Statement on Electricity Governance (May 2009) requires the Commission to promote and facilitate efficient and well-functioning markets and related arrangements for (inter alia) common quality and real-time security. Frequency is common to all users of the power systems and the quality of frequency within the normal band[1] is managed by the SO through the frequency keeping ancillary service.

2.4.2 The Commission Board agreed to initiate stage 1 of a frequency regulation market (as outlined paragraphs 2.2.1 (a), (b) and (c)) at its meeting of 17-18 February 2009.

3. Expected results—what will the project achieve?

3.1 Project objectives

The high-level objectives of this project are to:

3.1.1 facilitate the SO to develop an AGC system to manage system frequency in both islands;

3.1.2 enable the transfer of frequency regulation between islands on the HVDC link; and

[1] The SO manages frequency outside of the normal band through measures set out in the Policy Statement security policy.

3.1.3 develop rules to support market arrangements for a multi-provider frequency regulation ancillary service co-optimised with energy and IR.

3.2 How do we know this initiative will address the problem?

3.2.1 Investigations completed to date confirm that AGC is technically feasible in the New Zealand context and a straw man market arrangement has been tested to confirm that frequency regulation can be purchased in a multi-provider market and co-optimised with energy and reserves

3.2.2 The multiple frequency keepers project is an essential initiative to facilitate the industry to develop a central AGC system and the peripheral interfaces required in generating stations.

3.2.3 In addition, the project will oversee development of the market rules required to support multi-provider frequency regulation.

3.3 Contribution to principal objectives and specific outcomes

3.3.1 A specific outcome for the Commission under section 172N of the Electricity Act 1992 is to sustain downward pressure on delivered electricity costs and prices.

3.3.2 The purpose of this project is to improve the competitiveness of the market arrangement for the procurement of the frequency keeping service and in doing so, achieve a reduction in the cost of the service.

4. Scope and deliverables—what will the project do?

4.1 Project scope – Stage 1 (approved)

System Operator

4.1.1 Develop specifications for the modification of AREVA's baseline RTGEN (AGC) program and the SPD program to provide regulation signals automatically issued to a single frequency regulation provider in each island and to the HVDC. This arrangement will replace the SO selected frequency keeper in each island.

4.1.2 Obtain a price and implementation schedule from AREVA for RTGEN modifications.

4.1.3 License the AREVA RTGEN program for use on the EMS

4.1.4 Modify the RTGEN program design and build the RTGEN database with the required data.

4.1.5 Obtain a price and schedule from AREVA for RTGEN and SPD modifications to calculate and send the regulation signal to the HVDC control system.

4.1.6 Modify SPD program design and build the SPD database with the required data.

4.1.7 Modify the RTGEN and SPD programs to develop and send the generator AGC regulation signal HVDC transfer regulation signal

4.1.8 Develop custom interfaces to other market systems software and databases as needed.

4.1.9 Install, test, tune, and commission the modified RTGEN and SPD programs.

Grid Owner

4.1.10 Specify and install communications links to deliver regulation signals to the frequency keeper providers in each island. The existing communications link connecting NCC with the HVDC controller can be used to transmit the combined dispatch instruction and regulation signal.

4.1.11 Confirm availability of HVDC pole 2 for transfer of frequency regulation between the North and South Islands.

Existing frequency keeper providers

4.1.12 Install, test, and commission changes to the generating company control system, plant control systems, and unit control systems to add the regulation signal to the energy dispatch instruction.

4.1.13 Install, test, and commission changes to the generating company control system, plant control system, and unit control system to telemeter the required data to the NCC EMS.

Electricity Commission

4.1.14 Complete the review of the normal frequency targets and dynamic procurement and implement rule changes as required.

4.1.15 Complete the review of the normal frequency cost allocation and implement rule changes as required.

4.2 Project Scope – Stage 2 (requires Board approval)

System Operator

4.2.1 Obtain a price and implementation schedule from AREVA for SPD modifications to support co-optimisation of energy, reserves and regulation offers.

4.2.2 Modify SPD to co-optimise energy, reserves and regulation offers.

4.2.3 Replace the Genco communication system with an updated system that supports automatic 5-minute dispatch signals and a higher periodicity (10 seconds or less) regulation signal.

System Operator and Electricity Commission

4.2.4 Fully develop the straw man proposal for a frequency regulation Market outlined in the “Frequency Regulation Market Development” discussion paper dated September 2008 (in particular refer to Table 2 of the paper).

4.2.5 Develop the form of ancillary services contracts for the purchase of frequency regulation services.

Electricity Commission

4.2.6 Modify part G rules and the procurement plan to specify the basis for participation in the frequency regulation market.

Generating Companies

4.2.7 Install, test, and commission changes to the generating company control system, plant control systems, and unit control systems to add the regulation signal to the energy dispatch instruction.

4.2.8 Install, test, and commission changes to the generating company control system, plant control system, and unit control system to telemeter the required data to the NCC EMS.

4.3 Exclusions from project scope

4.3.1 The following activities are excluded from the project scope:

- Replacement of the SO’s Genco system.

4.4 Scope changes

4.4.1 Scope changes will be managed through the change control process as set out in section 5.10 of this project plan.

4.5 Deliverables and milestones

Deliverables	Start Date	Completion Date
Investigation Phase - Feasibility and Alternatives – already completed 1. Multiple Frequency Keepers Investigations - Alternatives Report 2. Frequency regulation Market Development - Discussion Paper		March 2008 September 2008
Phase 1 – Planning and Project Establishment for Stage 1 1. Develop and sign off project plan. 2. Appointment of project resources, technical advisory group and project teams. 3. Agree terms for the AGC project under the umbrella SOSPA contract. 4. Establish an approved SO project for the development of AGC 5. Appoint a technical working group. 6. Establish the technical capability of pole 2 of the HVDC to transfer frequency regulation between islands.	June 2009	October 2009

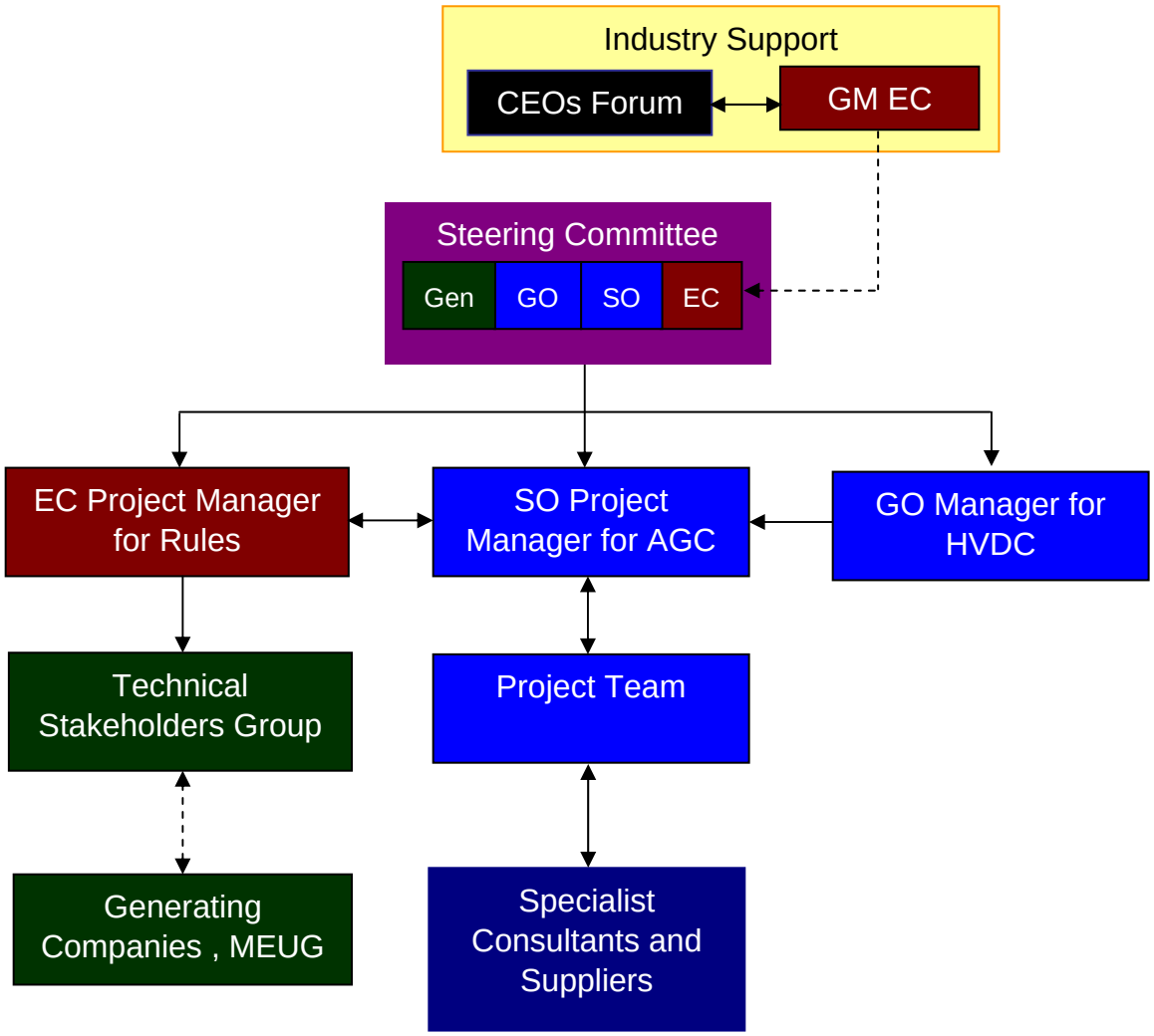
Deliverables	Start Date	Completion Date
Phase 2 – Development and Implementation of AGC 1. Develop a detailed specification for AGC and its interfaces to other software and databases. 2. Licence RTGEN and complete required modifications to RTGEN and SPD. 3. Complete changes to control systems at existing frequency keeper stations to accept AGC control signals. 4. Review and update normal frequency Rules.	TBA	TBA
Phase 3 – Planning and Project Establishment for Stage 2 1. Develop and sign off project plan. 2. Appointment of project resources, technical advisory group and project teams. 3. Agree terms for the changes to market systems to support a frequency regulation market 4. Establish an approved SO project to complete changes to the market systems software. 5. Appoint a technical working group, if required.	TBA	TBA
Phase 4 – Development and Implementation of a full market for frequency regulation 1. Develop a detailed specification of the required market system changes. 2. Modify SPD for frequency regulation market offers and co-optimisation changes. 3. Initiate a project to replace GENCO (not in the scope of this project) 4. Complete changes to control systems at stations participating in a frequency regulation market. 5. Commission new market systems.	TBA	TBA

Deliverables	Start Date	Completion Date
Stage 5 Project Closure 1. Project closure report	TBA	TBA

5. Method—how will the project be carried out?

5.1 Project structure

5.1.1 The project structure is outlined below:



5.2 Roles and responsibilities

5.2.1 The following table provides a brief overview of the various roles. Roles may change from time to time during the project as the needs change or as more information comes to light.

Role	Who	Responsibilities
Industry Support	CEOs/EC GM	The role of the industry support group is to agree on priority for the project across organisations that are required to have an input.
Steering Committee	Doug Goodwin Darryl Renner David Reeve Bob Simpson	The Steering Committee is responsible for overall project governance and resourcing decisions essential to delivery of project outputs and the attainment of project outcomes. It is also responsible and for ensuring appropriate management of the project components outlined in the project plan, including ultimate accountability for ensuring appropriate risk management processes are applied. The Steering Committee consists of a group of senior staff/managers, and includes the Project Sponsor. The Steering Committee will: • Sign off the project plan, and agreed to any amendments to the plan through the change request process. • Provide high level oversight of the project. • Resolve major issues raised by the Project Sponsor. • Provide active senior management support, including ensuring appropriate resourcing and removing barriers to project success. • Ensure that the project closure report is completed.
Project Sponsor	Darryl Renner	The Project Sponsor is responsible for the budget and has ultimate accountability and responsibility for the project and is a member of the Steering Committee. The Project Sponsor oversees the business management and project management issues that arise outside the formal business of the Steering Committee. The Project Sponsor also lends support by advocacy at a senior level. In addition, the Project Sponsor will: • Manage stakeholder expectations • Escalate issues if they cannot be resolved by the Steering Committee.

Role	Who	Responsibilities
		• Appoint members of the technical stakeholders group.
EC Project Manager	Mike Collis	The role of the EC Project Manager is to deliver the defined project outputs. He is responsible for managing the day-to-day aspects of the project, developing the project plan, resolving planning and implementation issues, and monitoring progress and budget. The EC Project Manager will: • Develop and maintain the project plan. • Manage and monitor project activity and progress against objectives, deliverables, and resources. • Report to the Steering Committee at regular intervals. • Identify and manage project issues and risks. • Escalate issues to the Steering Committee if they cannot be resolved. • Coordinate formal project communications • Prepare and submit project change requests • Coordinate all internal and external project resources • Manage project administration. • Ensure project closure actions are completed.
SO Project Manager	SO Project Manager	The role of the SO Project Manager is to deliver the defined scope of work associated with the implementation of AGC. He is responsible for managing the day-to-day aspects of the sub-project, developing a sub-project plan, obtaining business approval, resolving planning and implementation issues, and monitoring progress and budget. The SO Project Manager will: • Develop and maintain the sub-project plan. • Manage and monitor project activity and progress against objectives, deliverables, and resources. • Report to the Steering Committee at regular intervals. • Identify and manage project issues and risks. • Escalate issues to the Steering Committee if they cannot be resolved.

Role	Who	Responsibilities
		• Prepare and submit project change requests • Coordinate provision of services from specialist consultants and suppliers • Manage project administration. Ensure project closure actions are completed.
Project Team Members		A project team member undertakes all tasks necessary to design, develop, test and implement AGC. The primary responsibilities of a team member are to: • Undertake all tasks allocated by the SO project Manager • Track task progress • Maintain project records • Escalate issues , risks and changes to the SO Project Manager for resolution.
GO Manager for HVDC Investigations	GO Rep	The role of the GO manager of HVDC investigation is to complete investigations of the impact (if any) of transferring frequency regulation across the HVDC link on pole 2 (refer to EC scope of work included in EC letter to GO dated 15 June 2009).
Specialist Consultants and Suppliers		These parties are responsible for providing and configuring specialist software required to implement AGC.
Technical Stakeholders Group	Boyd Brinsdson Murray Wall Ashley Wall Richard Spearman Greg Salmon Terrence Currie	Refer to Appendix 1 for the groups terms of reference.

5.3 Project approach and timeline

5.3.1 Refer to the Gantt chart provided in Appendix 1.

5.4 Linkages and dependencies

Link:	Description:	Who (project)	Who (contact)
Market Design Programme	The Market Development Programme is a series of projects intended to improve the performance of the electricity market. The Multiple Frequency Keepers Project is included within the umbrella of the Market Development Programme (ref. MDP 8).		Tim Street
First Principles Dispatch Review	First Principles Dispatch Review is a project to review the role that dispatch plays in managing short-term system co-ordination.		Tim Street
Genco Replacement	The Genco Replacement is a SO project to replace the existing manual dispatch system with automated generation dispatch.		SO

5.5 Communication plan

5.5.1 The key stakeholders for this project are:

Stakeholder/ Audience	Communication activities	Person responsible	Timeframe
Generators	Release of project plan Membership of the Technical Stakeholders Group	EC Project Manager	Dec-09 – Mar-10
MEUG and other non-generator Purchasers	Membership of the Technical Stakeholders Group	SO project Manager	Ad hoc
Project Team	Regular meetings held on an as needed basis.	SO Project Manager	As needed

Stakeholder/ Audience	Communication activities	Person responsible	Timeframe
EC Board	Board papers seeking approval at key milestone points. Board papers seeking agreement on recommended rule changes or substantial pieces of external work.	EC Project Manager	TBA
Transpower Board		SO Project Manager	TBA

5.6 Critical success factors

5.6.1 The following factors are considered critical to ensuring project success:

- the ability to integrate AGC with the SO's market systems software;
- adequate resourcing from the GO to investigate the capability of the HVDC link to transfer frequency regulation between the North and South Islands;
- adequate project resourcing for the deliverables and timeline;
- strong executive sponsorship and management support of the project scope and Project Team by the Steering Committee;
- a committed and well-informed Project Manager and Project Team having a thorough understanding of the project scope, goals and milestones;
- clear roles and responsibilities defined for the project in order to assure accountability, ownership, and quality;
- a comprehensive project plan;
- demonstrated discipline to maintain communication and project decisions;
- a thorough understanding of known project risks and assumptions; and
- timely execution of the project plan.

5.7 Quality management

Quality Assurance

5.7.1 Quality assurance for the project will be carried out by the Steering Committee which will monitor the outputs produced and as and when necessary, appoint appropriate parties to peer review work produced.

5.8 Risk management

5.8.1 Project risks will be identified during the early stages of the project initiation and planning and recorded in the project risk register. Any new risks identified during the project will be analysed and added to the risk register.

5.8.2 For each risk, the likelihood of it occurring, the impact or severity on the project if it did occur is assessed on a scale of low, medium and high.

5.8.3 The register will be used to record and manage risks at all stages of the project and will be reviewed by the Steering Committee at each meeting.

5.9 Issues management

5.9.1 Project issues will likely occur throughout the life of the project. These will be recorded in the project issues register, and as with risks will be actively managed at all stages of the project and will be reviewed by the Steering Committee at each meeting.

5.10 Change management

5.10.1 Once this plan is approved any changes (eg to scope, deliverables, milestones, budget) will be documented in a Change Request form and be signed off by the Project Sponsor.

6. Resources—what does the project need?

6.1 People

Role	Source	Time Required	Dates Required	Total Cost
Steering Committee	EC, SO and Generators	Meeting every three months		
Project Sponsor	EC	0.05 FTE		
EC Project Manager	EC	0.75 FTE		
SO Project Manager	SO	0.5 FTE		
Project Team Members	SO	2.0 FTE		
GO Manager for HVDC Investigations	GO	To be determined		
Specialist Consultants and Suppliers	External resource	To be determined		
Technical Stakeholders Group	External resource	To be determined		

6.2 Budget

6.2.1 To be determined.

Electricity Commission operating expenditure

CoA#	Expense category (operating)	2009/10 Year (GST excl.)	2010/11 Year (GST excl.)	2011/12 Year (GST excl.)	Total Budget (GST excl.)
	Frequency related project	$110,000	$80,000	$80,000	
	System operator variable budget	$120,000	$20,000	$20,000	
	TOTAL	$230,000	$100,000	$100,000	

System Operator capital expenditure

CoA#	Expense category (capital)	2009/10 Year (GST excl.)	2010/11 Year (GST excl.)	2011/12 Year (GST excl.)	Total Budget (GST excl.)
	TOTAL	$1,610,000[2]	TBA		

Contingency assessment and rationale

6.2.2 To be determined.

7. Reporting on the project

7.1 Reporting within project timeframe

7.1.1 This section should set out the reporting framework that the project will follow.

To	From	Frequency	Due Date	Purpose / Comments
EC Board	Project Sponsor	As required	As required	Provide project status to the EC Board. Highlight any issues that need their resolution. Reporting to the EC Board will be based on a no surprises philosophy.

[2] As advised by the System Operator.

To	From	Frequency	Due Date	Purpose / Comments
Steering Committee	EC and SO Project Managers	As required	3-4 days before actual meeting takes place	Provide an overview of the project progress. The report will include: • the status of key stages and milestones/ deliverables • activities performed in the reporting period • any change requests for approval • any problem encountered which may adversely affect the supply of the services and deliverables, including any remedial action taken or planned which will recover the position stipulated in the project plan • an updated risks and issues register • activities to be performed in the next reporting period • an update on budget vs. actual to date and for the year • any other matters requiring attention/action

To	From	Frequency	Due Date	Purpose / Comments
SO Project Manager	Project Team	Monthly		Each month, the Project Team will report in writing on its progress with the deliverables. The reports must include: • the status of each workstream against target • any issues or risk identified • any items to be parked / captured for the implementation stage • any problem encountered which may adversely affect the deliverables, including any remedial action taken or planned which will recover the position stipulated in the project plan • activities to be performed in the next reporting period • any other matter or issues as appropriate • any other matters as requested by the Steering Committee

7.2 Project closure report

7.2.1 On completion of the project a formal closure report will be produced by the EC Project Manager. This report will confirm if the project objectives have been achieved and provide for an overall assessment of the project itself for use in future projects undertaken by the EC.

7.2.2 The project closure report will be submitted to the Project Sponsor.

Appendix 1 Technical Stakeholders Group Terms of Reference

Terms of Reference for the Technical Stakeholder Group (TSG)

Background

The TSG will be established to advise and assist the EC and the wider project team (refer to the project structure in Figure 1 below) with tasks relating to the Multiple Frequency Keepers Project.

Terms of Reference

The initial Terms of Reference for the TSG are to provide technical advice and industry expertise as requested by the EC.

Membership

The TSG consists of up to six members appointed by the EC from nominees from participants and other parties. The TSG will appoint a Chair for the group.

Members are selected for their particular expertise, and accordingly:

- members are to act in the national interest,
- members have a duty to prepare for meetings,
- members do not represent their own organisations (although the range of commercial and technical experience inevitably adds diversity to the group's capabilities),
- any views expressed by members are not to be taken as being those of their employer or their organisation.

The members of the TSG will be appointed for a period of one year. Members may be re-appointed for a subsequent term at the discretion of the EC.

Roles and Responsibilities

The EC Project Manager will:

- coordinate communications between the TSG and the wider project team,
- report the activities of the TSG to the EC in accordance with arrangements agreed with the EC,
- arrange administrative support.

The EC will be accountable for the following:

- the resourcing, support and output of the TSG

- conveying the relevant EC policies to the TSG
- provision of alternative recommendations to the EC as well as those recommended by the TSG, where there are material differences of view.

Remuneration

Members' organisations shall meet the costs of members' travel and time spent preparing for meetings and attending meetings. The EC may elect, at its discretion, to reimburse part of the expenses incurred by members not remunerated for their involvement in the TSG. Remuneration and reimbursement of expenses incurred will be on a basis that is consistent with other similar roles in the public sector.

Transparency

In general, the operation of the TSG, including agenda, minutes and papers, will be transparent, in accordance with the EC's normal policies. However, TSG activities may touch on sensitive matters (matters of commercial confidence and market impacts), and unless specifically agreed otherwise:

- papers are to be circulated in advance of meetings amongst TSG members only
- minutes are to be published once confirmed at the subsequent meeting
- papers will be published at the EC's discretion.

Meetings

Reasonable notice of meetings must be given to every member, including details of the time and venue. Notice may be given by electronic or other means.

A meeting of the TSG may be held by a number of the members of the Technical Stakeholder Group who constitute a quorum, being at the date and time appointed for the meeting. As a general rule, meetings must be held in person.

A quorum for TSG meetings will be four or more members (excluding the Chair and Project Manager) of the group. No business may be transacted at a meeting of the TSG while a quorum is not present.

Members of the TSG are not entitled to send an alternate in their place if they cannot attend a meeting.

Any member of the TSG who, without leave of the TSG, misses two consecutive TSG meetings will be deemed to be removed from the TSG, except where leave is given by the Chair or the EC's Senior Advisor.

The Chair must ensure that minutes are kept of all proceedings at meetings of the TSG.

Appendix 2 Project Timeline

An indicative project timeline is attached. It will need to be updated when the System Operator provides a timeline for its sub-project to implement central AGC.