مكتب التنظيم والرقابة لقطاع الكهرباء و المياه

RSB FOR ELECTRICITY & WATER

Independent Water and Power Producers' Code

Version 1.4 January 2020

Regulatory & Supervisory Bureau – Dubai, UAE

PO Box 121555, Dubai, U.A.E

Content

Preface

This Code (the IWPP Code) has been established and approved by the Regulatory & Supervisory Bureau for Water & Electricity (the RSB or Regulatory Authority) pursuant to Article 4(4) of Law Number 6 of 2011 Regulating the Participation of the Private Sector in Electricity and Water Production in the Emirate of Dubai.

Unless specifically stated otherwise, the IWPP Code applies to all Independent Power Producers, Independent Water Producers and Independent Power and Water Producers (Generators) that are connected to the Transmission System.

Terms and expressions used in the IWPP Code are defined either in the relevant section of the IWPP Code entitled "Glossary and Abbreviations for IPP Code" or, in some cases, in individual Code sections.

The IWPP Code contains the following constituent parts:

- General Conditions;
- Electrical Connection Conditions Code;
- Metering and Data Exchange Code;
- Operational Planning Code
- Scheduling and Dispatch Code 1
- Scheduling and Dispatch Code 2
- Water Connections Conditions Code;
- Ancillary Services Code; and
- Abbreviations and Definitions

The IWPP Code shall not constitute a contract between any of the parties to it. The IWPP Code shall contain an obligation for DEWA and the Generators to comply with the IWPP Code.

Nothing in this Code shall entitle any party to it or any other Person to any contractual or other general Law right or remedy of whatsoever kind and howsoever arising in respect of this IWPP Code.

However, nothing in this IWPP Code (including this paragraph) shall affect any legal right or remedy that may exist between any two parties to this IWPP Code under any such separate agreement.

Each party to this IWPP Code shall at all times deal with all other parties in good faith. All parties to the IWPP Code shall at all times perform all of their obligations in accordance with Good Industry Practice.

IWPP Code Index

The Electrical Connection Conditions code for the IWPP Code

Metering and Data Exchange Code for the IWPP code

Operational Planning Code for the IWPP Code

Scheduling and Dispatch Code SDC1 for the Scheduling of Power Units and RO Train for the IWPP Code

Scheduling and Dispatch Code SDC2 for the Generation and Desalination Dispatch for the IWPP Code

The Water Connection Conditions code for the IWPP Code

Ancillary Services Code for the IWPP Code

GC General Conditions

GC.1 Introduction

While each individual section of the IWPP Code contains the rules and provisions relating specifically to that section of the IWPP Code, there are provisions of a more general application, which need to be included in the IWPP Code to allow the various sections of the IWPP Code to work together. Such provisions are included in these General Conditions.

GC.2 Objective

The objectives of the General Conditions are as follows;

- to ensure, insofar as it is possible, that the various sections of the IWPP Code work together for the benefit of DEWA and all Generators; and
- to provide a set of principles governing the status and development of the IWPP Code and related issues as approved by the Regulatory Authority.

GC.3 Scope of IWPP Code and General Conditions

The General Conditions apply to DEWA and to all Generators.

GC.4 IWPP Code Review Panel

DEWA shall establish and maintain the IWPP Code Review Panel which shall be a standing body constituted to:

- generally review, discuss and develop the IWPP Code and its implementation;
- review and discuss suggestions for amendments to the IWPP Code which DEWA, the Regulatory Authority, or any Generator may wish to submit to DEWA for consideration by the IWPP Code Review Panel from time to time;
- discuss what changes are necessary to the IWPP Code arising out of any unforeseen circumstances referred to it by DEWA;
- publish recommendations and ensure that Generators consultation upon such recommendations has occurred through IWPP Code Review Panel members; and
- issue guidance in relation to the IWPP Code and its implementation, performance and interpretation when asked to by a Generator.

The IWPP Code Review Panel shall be governed by a constitution, (see Appendix A) which defines its scope, membership, duties, and rules of conduct, operation and further development of the IWPP Code as approved by the Regulatory Authority.

The IWPP Code Review Panel shall consist of:

- a Chairman and up to 2 members appointed by DEWA;
- a Person appointed by the Regulatory Authority; and
- up to 2 Persons representing Generators, with no more than 1 Person from an individual Generator.

GC.5 IWPP Code Revisions

All revisions to the IWPP Code must be reviewed by the IWPP Code Review Panel prior to application to the Regulatory Authority by the Chairman. All proposed revisions from Generators, the Regulatory

Authority or DEWA should be brought before the IWPP Code Review Panel by the Chairman for consideration. The Chairman will advise the IWPP Code Review Panel, all Generators, and the Regulatory Authority of all proposed revisions to the IWPP Code with notice of no less than 28 days in advance of the next scheduled meeting of the IWPP Code Review Panel.

Following review of a proposed revision by the IWPP Code Review Panel, the Chairman will apply to the Regulatory Authority for revision of the IWPP Code based on the IWPP Code Review Panel recommendation. The Chairman, in applying to the Regulatory Authority, shall also notify each Generator of the proposed revision and other views expressed by the IWPP Code Review Panel and Generators so that each Generator may consider making representations directly to the Regulatory Authority regarding the proposed revision.

The Regulatory Authority shall consider the proposed revision, other views, and any further representations and shall determine whether the proposed revision should be made and, if so, whether in the form proposed or in an amended form.

Having been so directed by the Regulatory Authority that the revision shall be made, the Chairman shall notify each Generator of the revision at least 10 Business Days prior to the revision taking effect, and the revision shall take effect (and this IWPP Code shall be deemed to be amended accordingly) from (and including) the date specified in such notification or other such date as directed by the Regulatory Authority.

GC.6 Derogations

If a Generator finds that it is, or will be, unable to comply with any provision of the IWPP Code, then it shall, without delay, report such non-compliance to DEWA and the Regulatory Authority and shall make such reasonable efforts as are required to remedy such non-compliance as soon as reasonably practicable. Non-compliance may result;

- with reference to plant and Apparatus connected to the Transmission System and is caused solely or mainly as a result of a revision to the IWPP Code; and
- with reference to plant and Apparatus which is connected, approved to connect or for which approval to connect to the Transmission System is being sought;

When a Generator believes either that it would be unreasonable (including cost and technical considerations) to require it to remedy such non-compliance or that it should be granted an extended period to remedy such non-compliance, it shall promptly submit to the Regulatory Authority a request for derogation from such provision and shall provide DEWA with a copy of such application.

If DEWA finds that it is, or will be, unable to comply with any provision of the IWPP Code at any time, then it shall make such reasonable efforts as are required to remedy such non-compliance as soon as reasonably practicable.

In the case where DEWA requests derogation, DEWA shall submit the information set out in this paragraph GC.6.1 to the Regulatory Authority.

GC.6.1 Request for Derogation

A request for derogation from any provision of the IWPP Code shall contain:

a. the issue number and the date of the IWPP Code provision against which the non-compliance or predicted non-compliance was identified;

b. identification of the plant and/or Apparatus in respect of which a derogation is sought and, if relevant, the nature and extent to which the non-compliance exists;
c. identification of the provision with which the Generator is, or will be, unable to comply;
d. the reason for the non-compliance; and
e. the date by which compliance will be achieved (if remedy of the non-compliance is possible).

On receipt of any request for derogation, the Regulatory Authority shall promptly consider such a request. Provided that the Regulatory Authority considers that the grounds for the derogation are reasonable, the Regulatory Authority shall grant such derogation unless the derogation would, or is likely to;

- have a material adverse impact on the security and/or stability of the Transmission System, or
- impose unreasonable costs on the operation of the Transmission System or on other Generators.

In its consideration of a derogation request by a Generator, the Regulatory Authority may contact the relevant Generator and/or DEWA to obtain clarification of the request or to discuss changes to the request.

Derogations from any provision of the IWPP Code shall contain:

a. the issue number and the date of the IWPP Code provision against which the derogation applies;
b. identification of the plant and/or Apparatus in respect of which a derogation applies and, if relevant, the nature and extent to which the derogation applies including alternate compliance provisions;
c. identification of the provision with which the derogation applies;
d. the reason for the non-compliance requiring derogation; and
e. the date by which the derogation ends if compliance will be achieved, or by which such derogation expires.

To the extent of any derogation granted in accordance with this paragraph GC.6.1, DEWA and/or the Generator (as the case may be) shall be relieved from its obligation to comply with the applicable provision of the IWPP Code and shall not be liable for failure to so comply but shall comply with any alternate provisions as set forth in the derogation.

DEWA shall:

a. keep a register of all derogations which have been granted, identifying the name of the Person and Generator in respect of whom the derogation has been granted, the relevant provision of the IWPP Code and the period of the derogation; and
b. on request from any Generator, provide a copy of such register of derogations to such Generator.

Where a material change in circumstance has occurred a review of any existing derogations, and any derogations under consideration, may be initiated by the Regulatory Authority at the request of the Regulatory Authority, DEWA or Generators.

GC.7 Unforeseen Circumstances

If circumstances arise which the provisions of the IWPP Code have not foreseen, DEWA shall to the extent reasonably practicable in the circumstances, consult all affected Generators in an effort to reach agreement as to what should be done and submit a proposal to the IWPP Code Review Panel for consideration.

Thereafter, DEWA shall refer the matter relating to the unforeseen circumstances and any such determinations to the IWPP Code Review Panel with a proposal for consideration.

GC.8 Hierarchy

In the event of any irreconcilable conflict between the provisions of the IWPP Code and any PPA, PWPA or WPA between DEWA and a Generator, then the IWPP Code shall prevail.

GC.9 Illegality and Partial Invalidity

If any provision of the IWPP Code should be found to be unlawful or wholly or partially invalid for any reason, the validity of all remaining provisions of the IWPP Code shall not be affected.

If part of a provision of the IWPP Code is found to be unlawful or invalid but the rest of such provision would remain valid if part of the wording were deleted, the provision shall apply with such minimum modification as may be:

a. necessary to make it valid and effective; and
b. most closely achieves the result of the original wording.

but without affecting the meaning or validity of any other provision of the IWPP Code. DEWA shall prepare a proposal to correct the default for consideration by the IWPP Code Review Panel.

GC.10 Time of Effectiveness

This IWPP Code comes into effect following its approval by the Regulatory Authority.

GC.11 Code Notices

Any notice to be given under the IWPP Code shall be in writing and shall be duly given if signed by or on behalf of an entity duly authorised to do so by the party giving the notice and delivered by hand at, or sent by post, or facsimile transmission or e-mail to the relevant address, facsimile number or e-mail address last established pursuant to these General Conditions.

DEWA shall maintain a list of contact details for itself and all Generators containing the telephone, facsimile, e-mail and postal addresses for all Generators. DEWA shall provide these details to any Generator in respect of any other Generator as soon as practicable after receiving a request.

Both DEWA and all Generators shall be entitled to amend in any respect their contact details previously supplied and DEWA shall keep the list up to date accordingly.

Any notice required to be given by this IWPP Code shall be deemed to have been given or received:

- if sent by hand, at the time of delivery;
- if sent by post, from and to any address within Dubai, 4 days after posting unless otherwise proven; and
- if sent by facsimile, subject to confirmation of uninterrupted transmission report, or by e-mail, one hour after being sent, provided that any transmission sent after 14:00 hrs on any day shall be deemed to have been received at 8:00 hrs on the following Business Day unless the contrary is shown to be the case.

GC.12 Code Disputes

If any dispute arises between DEWA and any Generator or between Generators in relation to this IWPP Code, either party may by notice to the other require to seek to resolve the dispute by negotiation in good faith.

If the parties fail to resolve any dispute by such negotiations within 14 days of the giving of a notice under the previous paragraph then:

a. either party shall be entitled by written notice to the other to require the dispute to be referred to a meeting of members of the boards of directors of the parties or, if no such directors are present in Dubai, the most senior executive of each party present in Dubai;
b. if either party exercises its right under the sub-clause 12(a), each party shall procure that the relevant senior executives consider the matter in dispute and meet with senior executives of the other party within 14 days of receipt of the written notice of referral to attempt to reach agreement on the matter in question; and
c. if the parties fail to resolve any dispute which has been referred to directors/senior executives under the sub-clause 12(a), either party may refer the matter to the Regulatory Authority for determination as the Regulatory Authority sees fit. All parties shall be bound by any decision of the Regulatory Authority. If it sees fit the Regulatory Authority may:
    i. determine the dispute itself; and
    ii. refer the dispute for determination by arbitration.

If the dispute is referred by the Regulatory Authority to arbitration, the Regulatory Authority shall serve a written notice on the parties to the dispute to that effect and the rules of arbitration of the Dubai International Arbitration Centre (the "DIAC Rules") shall govern such arbitration save to the extent that the same are inconsistent with the express provisions of the IWPP Code.

Any arbitration conducted in accordance with the preceding paragraph shall be conducted:

a. in Dubai;
b. in English; and
c. by a panel comprising an odd number of arbitrators provided that (i) there shall be not fewer than three arbitrators (ii) each of the parties to the dispute shall appoint an arbitrator and (iii) the Regulatory Authority shall appoint one arbitrator if there is an even number of parties to the dispute (in which case, the Regulatory Authority's appointee shall act as Chairman of the panel) or two arbitrators if there is an uneven number of parties to the dispute are (in which case the Regulatory Authority shall nominate one of its appointees to act as Chairman of the panel).

Where the IWPP Code provides that any dispute or difference of the parties in relation to a particular matter should be referred to an Expert for resolution, such difference or dispute may not be referred to arbitration unless and until such expert determination has been sought and obtained.

The Regulatory Authority shall have the right to require that all disputes which are referred to it in accordance with paragraph GC.12(c) above and are related, whether between the same parties or not, shall be consolidated and determined together either by the Regulatory Authority or by any arbitrator to which the Regulatory Authority has referred any dispute.

Any arbitral award shall be final and binding on the parties.

GC.13 Code Confidentiality

Several parts of the Code specify the extent of confidentiality which applies to data supplied by Generators to DEWA. Unless otherwise specifically stated in the Code, DEWA shall be at liberty to share all data with Generators likely to be affected by the matters concerned. In all cases, DEWA is at liberty to share the data with the Regulatory Authority.

GC.14 Interpretation

In this IWPP Code, unless the context otherwise requires:

- references to "this IWPP Code" or "the IWPP Code" are reference to the whole of the IWPP Code, including any schedules or other documents attached to any part of the IWPP Code;
- the singular includes the plural and vice versa;
- any one gender includes the others;
- references to Code sections, paragraphs, clauses or schedules are to Code sections, paragraphs, clauses or schedules of this IWPP Code;
- code, paragraph and schedule headings are for convenience of reference only and do not form part of and shall neither affect nor be used in the construction of this IWPP Code;
- reference to any law, regulation made under any law, standard, secondary legislation, contract, agreement or other legal document shall be to that item as amended, modified or replaced from time to time. In particular, any reference to any Licence shall be to that Licence as amended, modified or replaced from time to time and to any rule, document, decision or arrangement promulgated or established under that Licence;
- references to the consent or approval of the Regulatory Authority shall be references to the approval or consent of the Regulatory Authority in writing, which may be given subject to such conditions as may be determined by the Regulatory Authority, as that consent or approval may be amended, modified, supplemented or replaced from time to time and to any proper order, instruction or requirement or decision of the Regulatory Authority given, made or issued under it;
- all references to specific dates or periods of time shall be calculated according to the Gregorian Calendar and all references to specific dates shall be to the day commencing on such date at 00:00 hours;
- where a word or expression is defined in this IWPP Code, cognate words and expressions shall be construed accordingly;
- references to "Person" or "Persons" include individuals, firms, companies, government agencies, committees, departments, Ministries and other incorporate and unincorporated bodies as well as to individuals with a separate legal personality or not; and
- the words "include", "including" and "in particular" shall be construed as being by way of illustration or emphasis and shall not limit or prejudice the generality of any foregoing words.

GC.15 Cyber Security

Generators are required to comply with those Cyber Security requirements applicable by law, decree, directive or any other requirements set by:

a. The Information Security Regulations (ISR) of Dubai Electronic Security Center
b. The UAE National Electronic Security Authority (NESA) Regulations
c. Any other competent authority or body

and with any other requirements set out by DEWA in PPA, PWPA or WPA and/or written communications to Generators. Generators are required to make available to DEWA all data and access to information systems as required to enable monitoring, investigation and verification of compliance with these requirements.

For any changes in DEWA Cyber Security requirements, Generators are required to ensure compliance with such new requirements within the deadline set by DEWA, which will be, in general, no less than 6 months. In the event of any Cyber Security Incident where faster action is needed, DEWA may require Generators to implement or apply security measures in a shorter time period.

Appendix A. Constitution of the IWPP Code Review Panel

1. Definitions and Interpretation

1.1 The following words and expressions shall have the following meanings in this Constitution:-

"Chairman" means the Person appointed by DEWA under Clause 6 of this Constitution to act as the chairperson of the Panel.

"Constitution" means the constitution and rules of the Panel as set out herein and as may be amended from time to time with the approval of the Regulatory Authority.

"IWPP Code" means the code regulating the Generators connected to the Transmission System.

"Member" means a Person appointed to act as a representative of the Persons or groups referred to in Clause 3 on the Panel.

"Panel" means the IWPP Code Review Panel established by DEWA in accordance with the IWPP Code (section GC.4) and governed by this Constitution.

"Secretary" means the Person appointed by DEWA pursuant to Clause 7 and named as such.

"DEWA" means the Dubai Electricity and Water Authority.

1.2 Except as otherwise provided herein and unless the context otherwise admits, words and expressions used herein shall have the meanings given to them in the IWPP Code.

1.3 Words importing the singular only also include the plural and vice versa where the context requires. Words importing the masculine only also include the feminine.

1.4 Headings and titles shall not be taken into consideration in the interpretation or construction of the words and expressions used herein.

1.5 Unless otherwise stated, any reference to a Clause is a reference to a Clause of this Constitution.

2. Principal objects

2.1 The Panel has been established by DEWA to further the objectives set out below and such other objectives as the Regulatory Authority may stipulate from time to time:

a. to generally review, discuss and develop the IWPP Code and its implementation;
b. to review and discuss suggestions for amendments to the IWPP Code which DEWA, the Regulatory Authority or any Generator may wish to submit to DEWA for consideration from time to time;

c. to discuss what changes are necessary to the IWPP Code arising out of any unforeseen circumstances referred to it by DEWA;
d. to publish recommendations and ensure that Generator consultation upon such recommendations has occurred through Members; and
e. issue guidance in relation to the IWPP Code and its implementation, performance and interpretation when asked to by a Generator.

3. Membership and Appointment

3.1 The Panel shall comprise:
a. the Chairman and up to 2 Persons appointed by DEWA;
b. a person appointed by the Regulatory Authority; and
c. up to 2 Persons representing Generators, with no more than 1 Person from an individual Generator.

3.2 Each Person appointed as specified at Clause 3.1 shall be a Member of the Panel. If at any time any of the Persons or groups identified at Clauses 3.1 are unable to agree on a representative to act as their Member, the Chairman shall contact (insofar as he is reasonably able) the Person(s) or group(s) unable to agree and seek to encourage appointment or, as appropriate, unanimous agreement between relevant Persons as to their prospective Member. If no such agreement is reached at least 21 Business Days prior to the next meeting of the Panel (or the first meeting of the Panel, as the case may be) the Chairman shall request the Regulatory Authority to make such appointment and the Regulatory Authority shall have the right, until the relevant Person or group of Persons has decided upon an appointment and notified the Regulatory Authority and the Chairman accordingly, to appoint a Member or Members on behalf of that Person or group of Persons, and to remove (if appropriate) any Person so appointed by it.

3.3 No Person other than an individual shall be appointed a Member or his alternate.

3.4 After the Panel has been established for one year, each Member shall retire automatically at the beginning of the meeting of the Panel held on the first Business Day in the month of February each year (or if no meeting is held on such day, at the meeting which is held on the date falling closest after that day) but shall be eligible for re-appointment.

3.5 Each Person or group of Persons entitled to appoint a Member (or a Person within such group of Persons) may, by notice in writing to the Chairman, indicate its wish to re-appoint the retiring Member or to appoint a new Person as a Member in his place.

3.6 Such notifications for re-appointment or appointment must be delivered to the Chairman at least 21 Business Days in advance of the relevant meeting of the Panel by the relevant Person(s) or group(s) entitled to appoint a Member. A notification for re-appointment in respect of an existing Member shall be deemed to be given if no notification is delivered to the Chairman at least 21 Business Days in advance of the relevant meeting of the Panel.

3.7 If only one notification is received for the re-appointment of a Member or appointment of a new Person as a Member (or if all notifications received are unanimous), the Person named in the notifications(s) will become the Member with effect from the beginning of the relevant meeting of the Panel. If the notifications are not unanimous, the provisions of Clause 3.2(a) shall govern the appointment of the Member.

3.8 These provisions shall apply equally to Persons or groups of Persons entitled to appoint more than one Member, with any necessary changes to reflect that more than one Member is involved.

4. Alternates

4.1 Each Member (and the Chairman) shall have the power to appoint any individual to act as his alternate and remove (at his discretion) any alternate Member or Chairman (as the case may be) so appointed. Any appointment or removal of an alternate Member or Chairman shall be effected by notice in writing executed by the appointor and delivered to the Secretary or tendered at a meeting of the Panel.

4.2 If his appointor so requests, an alternate Member or Chairman (as the case may be) shall be entitled to receive notice of all meetings of the Panel or of sub-committees or working groups of which his appointor is a member. He shall also be entitled to attend and vote as a Member or Chairman (as the case may be) at any such meeting at which the Member or Chairman (as the case may be) appointing him is not personally present and at any such meeting to exercise and discharge all the functions, powers and duties of his appointor as a Member or Chairman (as the case may be) and for the purpose of the proceedings at the meeting the provisions of this Constitution shall apply as if he were a Member or Chairman (as the case may be).

4.3 Every Person acting as an alternate Member or Chairman (as the case may be) shall have one vote for each Member or Chairman (as the case may be) for whom he acts as alternate, in addition to his own vote if he is also a Member or Chairman (as the case may be). Execution by an alternate Member or Chairman (as the case may be) of any resolution in writing of the Panel shall, unless the notice of his appointment provides to the contrary, be as effective as execution by his appointor.

4.4 An alternate Member or Chairman (as the case may be) shall cease to be an alternate Member or Chairman (as the case may be) if his appointor ceases for any reason to be a Member or Chairman (as the case may be).

4.5 References in this Constitution to a Member or Chairman (as the case may be) shall, unless the context otherwise requires, include his duly appointed alternate.

5. Representation and voting

5.1 The Chairman and each other Member shall be entitled to attend and be heard at every meeting of the Panel. One adviser (or such greater number as the Chairman shall permit) shall be entitled to attend any meeting of the Panel with each Member and shall be entitled to speak at any meeting but shall not be entitled to vote on any issue.

5.2 Each Member (including the Chairman) shall be entitled to cast one vote. In the event of an equality of votes, the Chairman shall have a second or casting vote.

6. The Chairman

6.1 Upon retirement or removal by DEWA of the first and each successive Chairman, DEWA shall appoint a Person to act as Chairman.

6.2 DEWA may at any time remove the Chairman from office.

6.3 The Chairman shall preside at every meeting of the Panel at which he is present. If the Chairman is unable to be present at a meeting, he may appoint an alternate pursuant to Clause 4.1 to act as Chairman. If neither the Chairman nor any other Person appointed to act as Chairman is present within half an hour after the time appointed for holding the meeting, the Members present appointed by DEWA, may appoint one of their number to be Chairman of the meeting.

6.4 The Chairman, or the Person appointed to act as Chairman by the Chairman shall be entitled to cast one vote. Where a Member is acting in the capacity of both Member and Chairman, he shall be entitled to cast one vote as Chairman, in addition to his one vote as Member.

7. The Secretary

7.1 DEWA shall have power to appoint and dismiss a Secretary and such other staff for the Panel as it may deem necessary. The Secretary may, but need not be, a Member, but shall not be a Member by virtue only of being Secretary. The Secretary shall have the right to speak at, but, unless a Member, no right to cast a vote at any meeting.

7.2 The Secretary's duties shall be to attend to the day to day operation of the Panel and, in particular, to:

i. attend to the requisition of meetings and to serve all requisite notices;
ii. maintain a register of names and addresses of Members and the Chairman and such alternates as may be appointed from time to time;
iii. maintain a register of names and addresses of Persons in each of the groups of Persons described in sub-clauses 3.1(a) to (c); and
iv. keep minutes of all meetings.

7.3 The Secretary shall make available the registers of names and addresses referred to in sub-clauses 7.2(ii) and (iii) above, for inspection by any Generator and/or the Regulatory Authority. The Secretary shall provide any Generator and/or the Regulatory Authority with a copy of the said registers within three Business Days of being requested to do so.

7.4 If the office of a Member is vacated the Secretary shall notify (insofar as he is reasonably able) the group or Person whom the Member represented and they shall appoint a new Member as provided in Clause 3.

8. Meetings

8.1 Subject always to the direction of DEWA and the Regulatory Authority, the Panel meetings shall operate as follows:

a. the Panel shall meet on the first Business Day in the months of May and November and as necessary for the transaction of business whenever convened by the Chairman at such places and at such times as may be determined by the Regulatory Authority, and in any event shall meet not less than twice each year.
b. notwithstanding the right of the Chairman to call a meeting of the Panel whenever appropriate, the Chairman shall call a meeting when notified in writing to do so by the majority of Members;
c. unless agreed by all Members, not less than 14 Business Days prior written notice shall be given to all Members of all meetings of the Panel;
d. the quorum of Members required for the Panel meetings shall not be less than 4 of the Members;

e. if within one hour of the time appointed for a meeting of the Panel a quorum is not present, the meeting shall stand adjourned for at least 2 Business Days. The re-adjourned meeting shall be deemed quorate and its proceedings valid notwithstanding there being fewer than four Members present;
f. subject to sub-paragraphs (d) and (e) above the following circumstances shall not (of themselves) invalidate proceedings of the Panel:
   i. vacancies amongst the Panel;
   ii. any defects in the appointment of Members; or
   iii. the accidental omission to give notice of a Meeting to, or the non-receipt of notice of a meeting by a Person entitled to receive notice.

9. IWPP Code Revisions

9.1 All proposed revisions to the IWPP Code must be reviewed by the Panel prior to their implementation. All proposed revisions from Generators, the Regulatory Authority or DEWA should be brought before the Panel by the Chairman for consideration. The Chairman will advise the Panel, [all] Generators, and the Regulatory Authority of all proposed revisions to the IWPP Code with notice of no less than 20 Business Days in advance of the next scheduled meeting of the Panel.

9.2 Following review of a proposed revision by the Panel, the Chairman will, if appropriate, apply to the Regulatory Authority for revision of the IWPP Code based on the Panel recommendation. The Chairman, in applying to the Regulatory Authority, shall also notify each Generator of the proposed revision and other views expressed by the Panel and Generators so that each Generator may consider making representations directly to the Regulatory Authority regarding the proposed revision.

9.3 The Regulatory Authority shall consider the proposed revision, other views, and any further representations and shall determine whether the proposed revision should be made and, if so, whether in the form proposed or in an amended form.

9.4 If the Panel is directed by the Regulatory Authority that the revision shall be made, the Chairman shall notify each Generator of the revision at least 10 Business Days prior to the revision taking effect, and the revision shall take effect (and the IWPP Code shall be deemed to be amended accordingly) from (and including) the date specified in such notification or other such date as directed by the Regulatory Authority.

10. Resolutions

10.1 A resolution of the Panel shall be passed by a simple majority of votes cast.

10.2 A resolution in writing signed by all Members shall be as valid and effective as if it had been passed at a meeting of the Panel duly convened and held. Written resolutions may be produced in one or more counterparts.

10.3 A meeting of the Panel may consist of a conference between Members who are not all in one place but who are able (directly or by telephonic communication) to speak to each of the others and to be heard by each of the others simultaneously. The word "meeting" shall be construed accordingly.

11. Minutes

11.1 The Secretary shall circulate copies of the minutes of each meeting of the Panel to each Member as soon as practicable (and in any event within ten Business Days) after the relevant meeting has been held.

11.2 Each Member shall notify the Secretary of his approval or disapproval of the minutes of each meeting within 15 Business Days of receipt of the minutes. A Member who fails to do so will be deemed to have approved the minutes. The approval or disapproval of the minutes aforesaid will not affect the validity of decisions taken by the Panel at the meeting to which the minutes relate.

11.3 If the Secretary receives any comments on the minutes, the Secretary shall circulate revised minutes as soon as practicable following the expiry of the period referred to in Clause 11.2, incorporating those comments which are of a typographical nature and indicating, where necessary, that Members disagree with certain aspects of the minutes. The Secretary shall then incorporate those aspects of the minutes upon which there is disagreement, into the agenda for the next following meeting of the Panel, as the first item for discussion, and, if possible, resolution.

12. Guidance from the Panel

12.1 The Panel may at any time, and from time to time, issue guidance in relation to the IWPP Code and its implementation, performance and interpretation, and it may establish subcommittees and working groups to carry out such work.

13. Sub-committees and working groups

13.1 The Panel may establish such sub-committees from time to time consisting of such Persons as it considers desirable. Each sub-committee shall be subject to such written terms of reference and shall be subject to such procedures as the Panel may determine. The meetings of sub-committees shall so far as possible be arranged so that the minutes of such meetings can be presented to the members in sufficient time for consideration before the next following meeting of the Panel.

13.2 The Panel may also establish working groups to advise it on any matter from time to time. Such working groups may consist of Members and/or others as the Panel may determine for the purpose.

13.3 Resolutions of sub-committees and working groups shall not have binding effect unless approved by resolution of the Panel.

14. Removal of Members and Chairman and vacation of office

14.1 The office of a Member shall be vacated if:-

a. he resigns his office by notice delivered to the Secretary;
b. he becomes bankrupt or compounds with his creditors generally;
c. he becomes of unsound mind or a patient for any purpose of any statute relating to mental health; or
d. he or his alternate fails to attend more than three consecutive meetings of the Panel without submitting an explanation to the Chairman which is reasonably acceptable to the Chairman.

14.2 Further, any Person or Persons entitled to appoint a Member or the Chairman, as the case may be, pursuant to Clause 3 may at any time remove that Member or the Chairman, as the case may be, from office and appoint another Person to be a Member or the Chairman, as the case may be, in its place. A

Person or Persons will only have the right to remove from office the Member or the Chairman, as the case may be, that it or they have appointed, and will have no right to remove from office any Member or the Chairman, as the case may be, appointed by another Person. Whenever any individual Member or the Chairman changes, the Person or group of Persons entitled to appoint that Member or the Chairman shall notify the Secretary in writing within seven days of the change taking effect.

15. Members on the panel's responsibilities and protections

15.1 In the exercise of its powers and the performance of its duties and responsibilities, the Panel shall have due regard for the need to promote the attainment of the principal objects of the Panel set out in Clause 2.

15.2 In the exercise of its powers and the performance of its duties and responsibilities as a Member, a Member shall represent the interests of that Person or Persons by whom he is for the time being appointed pursuant to Clause 3, provided that such obligation of representation shall at all times be subordinate to the obligations of the Member as a member of the Panel set out in Clause 15.1.

15.3 The Panel, each Member and the Secretary:

i. shall be entitled to rely upon any communication or document reasonably believed by it or him to be genuine and correct and to have been communicated or signed by the Person by whom it purports to be communicated or signed.
ii. may in relation to any act, matter or thing contemplated by this Constitution act on the opinion or advice of, or any information from, any chartered engineer, lawyer, or expert in any other field, and shall not be liable for the consequences of so acting.

15.4 The Panel shall enjoy no status, immunity or privilege of the Emirate of Dubai. However, Members shall not be personally liable in respect of the performance of the functions of the IWPP Code Review Panel.

16. Group representatives' addresses

16.1 Each Member shall from time to time communicate his address to the Secretary and all notices sent to such address shall be considered as having been duly given to such Member.

17. Confidentiality

17.1 Each Member shall keep confidential all information which that Member might reasonably be expected to understand to be confidential.

Independent Water and Power Producers' Code

Electrical Connection Conditions

Content

Tables

ECC Electrical Connection Conditions code for the IWPP

ECC.1 Introduction

This Electrical Connection Conditions Code specifies the minimum technical, design and operational criteria that must be complied with by Generators seeking to be Connected to the Electricity Transmission System for the purpose of exporting electrical energy from their Production Facility to the Electricity Transmission System, and the minimum technical, design and operational criteria, which must be complied with by DEWA. These criteria are required for the Protection of the Electricity Transmission System and the Generators' Apparatus Connected to the Electricity Transmission System.

ECC.2 Objective

The objective of this Electrical Connection Conditions Code is to ensure that by specifying minimum technical, design and operational criteria the basic rules for Connection to the Electricity Transmission System and to a Generator's Apparatus are similar for all Generators.

ECC.3 Scope

This Electrical Connection Conditions Code applies to DEWA and to Generators connected to the Electricity Transmission System for the purpose of exporting electrical energy from their Production Facility to the Electricity Transmission System.

ECC.4 Procedure

The PPAs/PWPAs contain provisions relating to the procedure for Connection to the Electricity Transmission System.

ECC.5 Connection and Initial Synchronisation

ECC.5.1 Connection of Equipment

Prior to the Generator's Equipment being Connected to DEWA's Connection Equipment, the following information is to be submitted by the Generator:

a. Typical information to enable DEWA to prepare Electrical Connection Site Responsibility Schedules on the basis of the provisions set out in Appendix A. The final information will be agreed with DEWA;
b. Updated data with any estimated values assumed for planning purposes confirmed or, where practical, replaced by validated actual;
c. Details of the Main Protection and Back-up Protection arrangements and settings;
d. Copies of the Generators' Safety Rules which shall be used at the Electrical Connection Site;
e. An Operation Diagram for all Equipment on the Generator side of the Electrical Delivery Point;

f. A list of Safety Coordinators together with contact details;
g. A list of the telephone numbers for joint system incidents at which senior management representatives nominated for the purpose can be contacted and confirmation that they are fully authorised to make binding decisions on behalf of the Generator;
h. A list of managers who have been duly authorised to sign Electrical Connection Site Responsibility Schedules on behalf of the Generator together with contact details;
i. The Electrical Connection Site Common Drawings.
j. Meter Registration System data; and
k. Any other information required by DEWA relating to the Connection of Equipment to the Electricity Transmission System.

ECC.5.2 Initial Synchronisation

Prior to the initial synchronisation of a Power Unit, the Generator shall submit to DEWA copies of all test results relating to the testing of the generator and generator breaker.

ECC.6 Technical, Design and Operational Criteria

ECC.6.1 Electricity Transmission System Performance Characteristics

DEWA shall ensure that the Electricity Transmission System complies with the following technical, design and operational criteria in relation to the part of the Electricity Transmission System at the Electrical Connection Site with a Generator.

An Operation Diagram shall be prepared for each Electrical Connection Site at which an Electrical Delivery Point exists using, where appropriate, the graphical symbols shown in Appendix B and Appendix C.

ECC.6.1.1 Frequency Deviations

The system Frequency of the Electricity Transmission System shall be nominally 50.00 Hz with system Frequency set points between 49.950 Hz and 50.050 Hz and shall be controlled within the limits of 49.90 Hz and 50.10 Hz under normal conditions and following a contingency the steady state Frequency shall be within the limits 49.80 Hz and 50.20 Hz.

Under disturbance conditions the Power Units should remain synchronised in the range 52.50 Hz to 47.50 Hz.

ECC.6.1.2 Voltage Variations

During normal operating conditions, the nominal system voltage of the Electricity Transmission System at the Electrical Delivery Point shall be 400 kV or 132 kV and will be controlled normally between 415 kV and 380 kV or 138.6 kV and 125.4 kV respectively. During exceptional steady state conditions, the 400 kV part of the Electricity Transmission System could reach a minimum voltage of 360 kV and a maximum voltage of 420 kV, the 132 kV part could reach a minimum voltage of 118.8 kV and a maximum voltage of 147.8 kV. At 400 kV level, voltage variations between 415 kV and 420 kV and also between 380 kV and 360 kV can occur but will not last longer than 15 minutes unless abnormal conditions prevail. At 132 kV level, voltage variations between 138.6 kV and 147.8 kV and also between 125.4 kV and 118.8 kV can occur but will not last longer than 15 minutes unless abnormal conditions prevail.

ECC.6.1.3 Automatic Generation Control

Each Synchronously Connected Generating Unit shall be fitted with Automatic Generation Control (AGC) systems to enable the Transmission Control Centres to control Active Power from each Power Unit.

ECC.6.1.4 Automatic Voltage Regulation

Each Synchronously Connected Generating Unit shall be fitted with Automatic Voltage Regulation (AVR) systems with voltage / Reactive Power / power factor control options, so that set point may be adjusted by the Transmission Control Centres to control voltage / Reactive Power / power factor from each unit through the appropriate SCADA application. These control options from Transmission Control Centres shall be based on the requirements specified in the PPA/PWPA.

ECC.6.1.5 Voltage Waveform Quality

All plant and Apparatus Connected to the Electricity Transmission System, and that part of the Electricity Transmission System at each Electrical Connection Site, should be capable of withstanding the following distortions of the voltage waveform in respect of harmonic content and phase unbalance.

ECC.6.1.6 Harmonic Distortion

The maximum total levels of harmonic distortion of the voltage on the Electricity Transmission System at 400 kV, from all sources under both normal, Planned Outage and fault Outage conditions (unless abnormal conditions prevail) shall not exceed a total harmonic distortion of 1.5% with no individual harmonic greater than 1.0%.

The maximum total levels of harmonic distortion of the voltage on the Electricity Transmission System at 132 kV, from all sources under both normal, Planned Outage and fault Outage conditions (unless abnormal conditions prevail) shall not exceed a total harmonic distortion of 2.5% with no individual harmonic greater than 1.5%.

ECC.6.1.7 Phase Unbalance

Under Electricity Transmission System Planned Outage conditions, the maximum negative phase sequence component of the phase voltage on the Electricity Transmission System should remain below 1% unless abnormal conditions prevail.

ECC.6.1.8 Voltage Fluctuations

Voltage fluctuations shall not exceed 1% of the voltage level at 400 kV for step changes that may occur repetitively, and 2% at 132 kV. Any large voltage excursions other than step changes may be allowed up to a level of 3% at 400 kV and 5% at 132 kV, provided that this does not constitute a risk to the Electricity Transmission System.

ECC.6.2 Plant and Apparatus Relating To Electrical Connection Site

The following requirements apply to plant and Apparatus at Electrical Connection Sites. Each Generator must ensure that its plant and Apparatus comply with these conditions.

ECC.6.2.1 General Requirements

Under fault conditions the rated Frequency component of voltage could fall transiently to zero on one or more phases or rise to 140% phase-to-earth voltage. The voltage rise would last only for the time that the fault conditions exist. The fault conditions referred to here are those existing when the type of fault is single or two phase-to-earth.

All plant and Apparatus associated with the Connection to the Electricity Transmission System shall comply with the following standards, as applicable. (in the following order of precedence):

Safety Rules;
- DEWA Electrical Standards, which are such national standards as may be approved by and amended;
- the standards and recommendations of the International Standards Organisation and the International Electrotechnical Commission; and
- national standards and codes which are accepted internationally.

It is recommended that Generators take precautions against disturbances on the Electricity Transmission System including protection against:
a. Load unbalance (negative sequence) Protection;
b. over/under voltage;
c. over/under frequency;
d. any combination of (b) and (c) that may result in overfluxing; and
e. automatic reclosing (either single or three phase)

Generators shall consult DEWA with respect to Protection adequacy and ensure that the Protection requirements set by DEWA are met.

ECC.6.2.2 Power Producer/DEWA Electrical Delivery Points

Short Circuit Levels

Each Connection between a Power Unit and the Electricity Transmission System must be controlled by a circuit breaker capable of interrupting the maximum short circuit current at the point of Connection as determined by DEWA.

Power Unit and Production Facility Protection Arrangements

Protection of Power Units and their Connections to the Electricity Transmission System must meet the minimum requirements given below. These are necessary to reduce to a practical minimum the impact on the Electricity Transmission System of faults on circuits owned by Generators.

Fault Clearance Times

The fault clearance times for faults cleared by the Generators Protection system from fault inception to the circuit breaker arc extinction, shall not be longer than 100 milliseconds for Connections at the Electrical Delivery Point.

Generators shall provide Back-Up Protection to cover the possible failure of the Main Protection system. DEWA shall also provide Back-Up Protection system and this Back-Up Protection system shall be coordinated so as to provide discrimination and protect Equipment from damage.

Protection Requirements

Circuit-breaker fail Protection

When the Power Unit is Connected to the Electricity Transmission System and a circuit breaker is provided by the Generator or DEWA, circuit breaker fail Protection shall be provided by the Generator or DEWA on this circuit breaker. In the event, following operation of a Protection system, of a failure to interrupt fault current by these circuit-breakers within the fault current interruption time, the circuit breaker fail Protection is required to initiate tripping of all the necessary electrically adjacent circuit-breakers so as to interrupt the fault current within the next 200 ms.

Loss of Excitation

The Generators must provide Protection to detect loss of excitation on a Synchronously Connected Generating Unit and initiate a Power Unit trip.

Pole-Slipping Protection

Pole-slipping Protection shall be fitted on each Synchronously Connected Generating Unit.

Work on Protection Equipment

No busbar Protection, circuit-breaker fail Protection relays, AC or DC wiring may be worked upon or altered by Generators personnel without first a method statement approved by DEWA or in the absence of a representative of DEWA.

Relay Settings

Protection and relay settings shall be coordinated across the Electrical Delivery Point to ensure effective disconnection of faulty Apparatus. Generators shall undertake such studies and obtain agreement of DEWA as to the Protection settings.

ECC.6.3 Power Unit Requirements

This section sets out the technical and design criteria and performance requirements that each Generator must ensure are complied with in relation to its Power Units.

ECC.6.3.1 Plant Performance Requirements

ECC.6.3.2 Technical data for generator/transformer unit

All Power Units must be capable of contributing to Primary Response by supplying Active Power (MW) at any point between the limits 0.80 power factor lagging and 0.90 power factor leading at the Power Units' terminals. The short circuit ratio of a Synchronously Connected Generating Unit shall be not less than 0.5.

The Capacity of a Power Unit at site reference conditions shall not reduce in the Frequency range 50.00 Hz to 49.00 Hz and the maximum Capacity reduction at 47.50 Hz shall be 10%. For Frequencies between 49.00 Hz and 47.50 Hz the allowed Capacity reduction shall be assessed by linear interpolation of the correction curve for Frequency to be included in the PPA or PWPA. For ambient air temperatures in excess of the site reference ambient air temperature the reduction in Capacity shall be higher, however this shall not exceed that as detailed in the correction curve for Capacity reduction as a function of Frequency and ambient air temperature to be included in the PPA/PWPA. Power

Units must remain synchronised to the Electricity Transmission System at Electricity Transmission System Frequencies according to the following requirements:

- From 47.50 to 48.00 Hz Power Unit to remain synchronised for 10 minutes;
- From 48.00 Hz to 48.50 Hz Power Unit to remain synchronised for at least 20 minutes;
- From 48.50 Hz to 49.00 Hz Power Unit to remain synchronised for at least 1 hour;
- From 49.00 Hz to 50.50 Hz the Power Unit to remain synchronised permanently;
- From 50.50 to 52.50 Hz the Power Unit to remain synchronised for at least 1 hour.

The Active Power output under steady state conditions of any Power Unit Connected to the Electricity Transmission System should not be affected by voltage changes in the normal operating range. The Reactive Power output under steady state conditions should be fully available within the range of Electricity Transmission System voltages within the ranges specified in ECC.6.1.2.

ECC.6.3.3 Control Arrangements

Each Power Unit must be capable of contributing to Primary Response by supplying Active Power according to its Primary Response capabilities as set out in the PPA/PWPA.

The capability for contributing to Secondary Response shall be as set out in the PPA/PWPA. DEWA shall determine the Power Units that are required to provide this Secondary Response.

Each Power Unit must be capable of supporting voltage regulation at the Electrical Delivery Point by continuous modulation of Reactive Power supplied.

Generator voltage range requirements shall be +5% to -5% of the generator’s rated voltage.

On-load tap changing facilities are mandatory for power unit step-up transformers designed for Electricity Transmission System minimum and maximum voltage levels, in 400 kV-systems with steps no greater than 1.25% and in 132-kV-systems no greater than 1.5%.

For a Non-Synchronously Connected Generating Unit, in 132kV solidly grounded systems, the minimum impedance of a 132kV/33kV or 132kV/MV transformer at nominal tap position shall be 24.3% on a 100 MVA base.

For a Synchronously Connected Generating Unit with an Electrical Delivery Point in the 132kV system the resulting impedance of the transformer, sub transient reactance of generator and connection line shall be minimum 30% (MVA base is maximum power output at Electrical Delivery Point), without negative tolerance to limit the short circuit contribution to the 132 kV Electricity Transmission System.

For a Synchronously Connected Generating Unit with an Electrical Delivery Point in the 400kV system the resulting impedance of the transformer, sub transient reactance of generator and connection line shall be minimum 36.3% (MVA base is maximum power output at Electrical Delivery Point), without negative tolerance to limit the short circuit contribution to the 400 kV Electricity Transmission System.

Turbine Control System

Each Synchronously Connected Generating Unit must be fitted with a fast acting turbine controller. The turbine speed control principle shall be in such a way that the Synchronously Connected Generating Unit output shall vary with rotational speed according to a proportional droop characteristic.

The Turbine Speed Controller shall be sufficiently damped for both isolated and interconnected operation modes. Under all operation conditions, the damping coefficient of the Turbine Speed Control shall be above 0.25 for speed droop settings above 3% for gas turbines and 5% for steam turbines.

Under all system operation conditions, the Synchronously Connected Generating Unit speed shall not exceed 106%. For generator oscillations with Frequencies below 2 Hz, the Turbine Speed Controller shall have no negative effect on generator oscillation damping.

The Turbine Speed Controller and any other superimposed control loop (Load control, gas turbine temperature limiting control, etc.) shall contribute to the primary control as set out in the PPA/PWPA.

All steam turbine Synchronously Connected Generating Units must be fitted with a Turbine Speed Controller which is designed and operated to the requirements of IEC 45.

All gas turbine Synchronously Connected Generating Units must be fitted with a Turbine Speed Controller capable of a power related speed droop characteristic of between 3% and 5%.

Automatic Voltage Regulator

A continuous Automatic Voltage Regulator (AVR) acting on the excitation system is required to provide constant terminal voltage of the Power Unit without instability over the entire operating range of the Power Unit.

Control performance of the voltage control loop shall be such that under isolated operation conditions the damping coefficient shall be above 0.25 for the entire operating range.

The AVR shall have no negative impact on generator oscillation damping.

The specific requirements for automatic excitation control facilities, including power system stabilisers where these are necessary for system reasons, shall be specified in the PPA/PWPA. Operation of such control facilities shall be in accordance with the Scheduling and Dispatch Code, SDC2.

Dispatch Inaccuracies

A Dispatch Instruction for a Power Unit can either be by manual instruction or automatic control from DEWA’s Transmission Control Centres.

The standard deviation at steady state Active Power or Reactive Power over a sixty minute period must not exceed 2.5 percent of the Dispatch Instructions.

In the case of Power Units powered by intermittent sources, such as solar photovoltaic and wind, this provision applies as follows:

- At any point in time, the production should not exceed by more than 2.5 percent the Dispatch Instructions.
- If the Generator has reason to believe that production could fall below the limit indicated in the Dispatch Instructions, the Generator should promptly inform DEWA’s Transmission Control Centres and provide an updated forecast reflecting the expected production during the period to which the Dispatch Instruction relates.

ECC.6.3.4 Negative Phase Sequence Loadings

The maximum negative phase sequence component of the phase voltage on the Electricity Transmission System should remain below 1% unless normal conditions prevail.

Each Power Units shall be required to withstand, without tripping, the negative phase sequence loading incurred by clearance of a close-up phase-to-phase fault, by Back-Up Protection on the Electricity Transmission System.

ECC.6.3.5 Neutral Earthing

In the case of Synchronously Connected Generating Units consisting of one module, the windings of the step-up transformer on the Electricity Transmission System side (400 kV and 132 kV) must be star connected with the star point suitable for connection to earth. The earthing factor shall not be greater than 1.4.

In the case of Synchronously Connected Generating Units consisting of several power generating modules with individual step-up transformers the earthing shall be as agreed in the PPA.

ECC.6.3.6 Frequency Sensitive Relays

The system Frequency could rise to 52.50 Hz or fall to 47.50 Hz and Power Units must continue to operate within this Frequency range unless DEWA has agreed to any frequency-level relays and/or rate-of-change-of-frequency relays which shall trip such Power Units within this Frequency range.

Generators shall be responsible for protecting all their Power Units against damage should Frequency excursions outside the range 52.50 Hz to 47.50 Hz ever occur.

ECC.6.4 Communications Equipment

In order to ensure control of the Electricity Transmission System, telecommunications between Generators and DEWA must, be established in accordance with the requirements set down below.

The main network requirements for data exchanges and telephone communications between Production Facilities and TCC1 and TCC2 are as follows;

- Each DCS shall be connected through duplicated fibre optic links to the communication equipment at the Electricity Transmission System substation or switching station compatible with DEWA's communication network. The Generator shall provide and install all necessary devices to establish the DCS communication up to the communication equipment located in the Electricity Transmission System substation or switching station;
- The Electricity Metering System shall be connected through duplicated fibre optic links to the communication equipment at the Electricity Transmission System substation or switching station;
- All tele-protection communications shall be connected through duplicated direct fibre optic links between the Production Facilities and Electricity Transmission System substation or switching station. The Generators shall provide all necessary devices to establish the Protection communication between the Production facilities and the Electricity Transmission System substation or switching station;
- The Generators shall provide, install and commission two redundant fibre optic cables between the Production Facility and Electricity Transmission System substation or switching station to be used for all communications. These fibre optic links form the Production Facilities to the end devices shall be the responsibility of the Generator.

ECC.6.4.1 Control Telephony

Control telephony is the method by which a Generator operator and DEWA control engineers speak to one another for the purposes of control of the Electricity Transmission System in both normal and Emergency operating conditions including Dispatch Instruction and acknowledgement of Dispatch Instruction. Control telephony provides secure point-to-point telephony for routine control calls, priority control calls and Emergency control calls.

Details of and relating to the control telephony required are contained in the PPAs/PWPAs.

As required by SDC.2.4.2 all telephone conversations will be recorded by DEWA. Any conversation relating to Plant Capacity shall be followed up by written redeclaration as required by SDC.1.4.1. If there is a dispute between the Plant Capacity redeclaration recorded by telephone conversation and written communication, the recorded telephone conversation shall take precedence.

ECC.6.4.2 Operational Metering

DEWA shall provide supervisory control and data acquisition (SCADA) Outstation interface equipment at each Electrical Connection Site. The Generator shall provide such Voltage, Current, Frequency, Active Power and Reactive Power measurement outputs and plant status indications and alarms to DEWA's SCADA Outstation interface equipment as required by DEWA in accordance with the terms of the PPAs/PWPAs.

Active Power and Reactive Power measurements, circuit breaker and disconnector status indications from Power Units and generator transformer tap positions must each be provided to DEWA on an individual Power Unit basis. In addition, measured or derived Active Power (MW) output on each fuel, from Power Unit that can continuously fire on more than one fuel simultaneously must be provided.

The communication interface between DCS the Electricity Transmission System substation or switching station SCMS shall be consist of dual gateways on both sides, interconnected via duplicated fibre optic-based data communication links (A and B). The protocols shall be IEC 60870-5-101, IEC 60870-5-104. The data communication speed shall be a minimum of 64kbps. The Generator shall provide all necessary procedures, manuals, and drawings to DEWA of equipment which forms this interface.

The typical general requirements for connection of such signals to DEWA's SCADA system are set out in Appendix D. The final requirements will be agreed between DEWA and the Generator.

Metering System requirements shall be provided in accordance with the Metering Code.

ECC.6.4.3 Facsimile Machines

Each Generator shall provide a facsimile machine at its Production Facility.

Each Generator shall, prior to Connection to the Electricity Transmission System of the Generators plant notify DEWA of its telephone number, and shall notify DEWA of any changes.

DEWA shall provide facsimile machines at each of its Transmission Control Centres.

Prior to Connection to the Electricity Transmission System of the Generator's plant, DEWA shall notify the Generator of the telephone number of its facsimile machine and shall notify any changes.

ECC.6.4.4 Busbar Voltage

DEWA shall provide to each Generator at the Electrical Delivery Point with appropriate voltage signals to enable the Generator to obtain the necessary information to synchronise its Power Unit to the Electricity Transmission System and for Protection equipment.

ECC.6.5 System Monitoring

To allow the monitoring of individual Power Units, DEWA requires voltage and current signals from the secondary windings of Power Unit circuit current transformers and voltage transformers. They shall be provided by the Generator with the installation of the monitoring equipment being detailed within the PPA/PWPA.

By interactions between different grid elements e.g. torsional oscillations, sub synchronous or super synchronous resonances could occur. In case the Generator identifies such a phenomenon, it has to inform DEWA accordingly. DEWA will trigger an exchange process between the affected parties with the goal to develop common counter measures.

ECC.7 Electrical Connection Site Related Conditions

In the absence of agreement between the parties to the contrary, construction, commissioning, control, operation and maintenance responsibilities follow ownership.

ECC.7.1 Responsibilities for Safety

Any Generator entering and working on its plant and/or Apparatus on an Electrical Connection Site will work to the DEWA Safety Rules (and any future revisions of these rules) unless otherwise agreed in writing.

DEWA entering and working in a Generator’s plant shall work to the Generator’s Safety Rules. In the event that DEWA does not receive a copy of the Generators Safety, the DEWA Safety Rules will apply.

A Generator may apply to DEWA for permission to work according to that Generators own Safety Rules when working on its plant and/or Apparatus on DEWA sites. If DEWA is of the opinion that the Generator Safety Rules provide for a level of safety commensurate with that of DEWA’s Safety Rules, it shall notify the Generator, in writing, that the Generator may use its own Safety Rules.

DEWA may apply to a Generator for permission to work according to DEWA Safety Rules when entering and working in a Generator’s plant. If the Generator is of the opinion that DEWA Safety Rules provide for a level of safety commensurate with that of that Generator Safety Rules, it shall notify DEWA, in writing, that DEWA may use its own Safety Rules. Until receipt of such notice, the Generator Safety Rules will apply.

ECC.7.2 Electrical Connection Site Schedules

A set of Electrical Connection Site Schedules shall be prepared identifying the equipment and ownerships at the Electrical Connection Site, the Electrical Delivery Points and the responsibilities for safety, control and maintenance.

The responsibilities for safety, control and maintenance shall be included in an Electrical Connection Site Responsibility Schedule to inform site operational staff and DEWA engineers of agreed responsibilities for plant and/or Apparatus at the operational interface.

Appendix A sets down the requirements for Electrical Connection Site Schedules. The attachment to Appendix A provides a format to be used in the preparation of Electrical Connection Site Responsibility Schedules.

ECC.7.3 Operation and SF_6 Gas Zone Diagrams

ECC.7.3.1 Operation Diagrams

An Operation Diagram shall be prepared for each Electrical Connection Site at which an Electrical Delivery Point exists using, where appropriate, the graphical symbols shown in Appendix B. The Operation Diagram shall include all HV Apparatus. All SF6 gas-insulated HV Apparatus must be depicted within an area delineated by a chain dotted line which intersects SF6 gas-zone boundaries. The Operation Diagram (and the list of technical details) is intended to provide an accurate record of the layout and circuit interconnections, ratings and numbering and nomenclature of HV Apparatus and related plant.

ECC.7.3.2 SF_6 Gas Zone Diagrams

An SF6 Gas Zone Diagram shall be prepared for each Electrical Connection Site. They shall use, where appropriate, the graphical symbols shown in Appendix B. The nomenclature used shall conform to that used in the relevant Electrical Connection Site.

ECC.7.3.3 Preparation of Operation and SF_6 Gas Zone Diagrams

DEWA shall prepare and submit to the Generator all information for the Connected Equipment. The Generator shall then prepare, produce and distribute, using the information submitted on the Generator Operation Diagram, a composite Operation Diagram for the complete Electrical Connection Site.

Changes to Operation and SF_6 Gas Zone Diagrams

When DEWA has decided that it wishes to install new HV Apparatus or it wishes to change the existing numbering or nomenclature of its HV Apparatus at an Electrical Connection Site, DEWA shall one month prior to the installation or change, send to such Generator a revised of that Connection Equipment to enable the Generator to amend the Electrical Connection Site Common Drawings incorporating the new DEWA HV Apparatus to be installed and its numbering and nomenclature or the changes, as the case may be.

ECC.7.3.4 Validity

The composite Operation Diagram prepared by the Generator shall be the definitive Operation Diagram for all operational and planning activities associated with the Electrical Connection Site. If a dispute arises as to the accuracy of the composite Operation Diagram, a meeting shall be held at the Electrical Connection Site, as soon as reasonably practicable, between DEWA and the Generator, to endeavour to resolve the matters in dispute.

ECC.7.4 Electrical Connection Site Common Drawings

Electrical Connection Site Common Drawings shall be prepared for each Electrical Connection Site and shall include Electrical Connection Site layout drawings and electrical layout drawings and they will identify the responsibilities for common services drawings.

ECC.7.4.1 Preparation of Electrical Connection Site Common Drawings

DEWA shall provide to the Generator all information required for the Generator to prepare and submit the Electrical Connection Site Common Drawings for the substation or switching station.

The Generator shall then produce and distribute, using the information provided by DEWA, Electrical Connection Site Common Drawings for the complete Electrical Connection Site.

DEWA Changes to Electrical Connection Site Common Drawings

When DEWA becomes aware that it is necessary to change any aspect of the Electrical Connection Site Common Drawings at an Electrical Connection Site it shall provide the necessary information to the Generators to allow the Generators to prepare, produce and distribute revised Electrical Connection Site Common Drawings for the complete Electrical Connection Site.

If DEWA changes can be dealt with by it notifying the Generator in writing of the change then DEWA shall so notify and each Generator shall so amend.

ECC.7.4.2 Validity

The Electrical Connection Site Common Drawings for the complete Electrical Connection Site prepared by the Generator shall be the definitive Electrical Connection Site Common Drawings for all operational and planning activities associated with the Electrical Connection Site. If a dispute arises as to the accuracy of the Electrical Connection Site Common Drawings, a meeting shall be held at the site, as soon as reasonably practicable, between DEWA and the Generator, to endeavour to resolve the matters in dispute.

ECC.7.5 Access

The provisions relating to access to the Electrical Connection Site by the Generator, are set out in each PPA/PWPA.

ECC.7.6 Maintenance Standards

It is a requirement that all Generator Apparatus on DEWA sites is maintained adequately for the purpose for which it is intended and to ensure that it does not pose a threat to the safety of any of DEWA Apparatus or personnel on the Electrical Connection Site.

DEWA shall have the right to inspect the test results and maintenance records relating to such Apparatus at any time.

ECC.7.7 Site Operational Procedures

DEWA and the Generators must make available staff to take necessary Safety Precautions and carry out operational duties as may be required to enable work/testing to be carried out and for the operation of plant and Apparatus connected to the Electricity Transmission System.

Appendix A. Principles and Basic Procedure for Connection Site Schedules

A.1. Principles

At all Electrical Connection Sites, Connection Site Schedules shall be drawn up in accordance with the following requirements or with such variations as may be agreed between DEWA and the Generators.

1. Electrical Connection Site Details and Equipment, including;
   a. Electrical Connection Site location;
   b. Ownership of assets;
   c. Electrical Delivery Points
   d. Electrical Connection Site Responsibility Schedule;
   e. Operational Diagram.
2. Site Capacity and tariff Metering;
   a. Actual Metering Point
3. Site services;
   a. Site specific technical conditions, including;
   b. Special technical facilities;
   c. Protection requirements;
   d. Operational Metering;
   e. Control telephony;
   f. Special equipment requirements;
   g. System monitoring inputs;
   h. Other site services

Each set of Electrical Connection Site Schedules for an Electrical Connection Site shall be prepared by DEWA in consultation with other Generators and be agreed at least two (2) weeks prior to the Generator's plant being Connected to the Electricity Transmission System. Each Generator shall provide the necessary information to DEWA to enable it to prepare the Electrical Connection Site Responsibility Schedule not less than six (6) months prior the Generator's plant being Connected to the Electricity Transmission System.

Each set of Electrical Connection Site Schedules shall be subdivided to take account of any separate Electrical Connection Sites.

Each Electrical Connection Site Responsibility Schedule, (1, a-e) above, shall detail for each item of plant and Apparatus;

1. Plant/Apparatus ownership;
2. Safety (applicable Safety Rules and control Person or other responsible Person (Safety Coordinator), or such other Person who is responsible for safety);
3. Operations (applicable Operational Procedures and control engineer);
4. Site Manager (Controller);
5. Responsibility to undertake maintenance;
6. Responsibility for site security.

The Electrical Connection Site Responsibility Schedule shall be prepared in accordance with the attachment to this Appendix unless otherwise agreed in writing with DEWA and shall include, for each Electrical Connection Site, lines and cables emanating from the Electrical Connection Site.

Every page of each Electrical Connection Site Schedule shall bear the date of issue and the issue number.

Following preparation of a set of Electrical Connection Site Schedules, DEWA shall send it to the Generators involved for confirmation of its accuracy.

The Electrical Connection Site Schedules shall be signed on behalf of DEWA by the manager responsible for the area in which the Electrical Connection Site is situated and on behalf of each Generator involved by its responsible manager, by way of written confirmation of its accuracy. Once signed, DEWA shall distribute two copies, not less than two weeks prior to its implementation date, to the Generator that is a party on the Connection Site Schedule, accompanied by a note indicating the issue number and the date of implementation.

A.2. Alterations to Existing Electrical Connection Site Schedules

When a Generator identified on an Electrical Connection Site Schedule becomes aware that an alteration is necessary, it must inform DEWA immediately and in any event 12 weeks prior to any change taking effect.

Where a Generator has informed DEWA of a change, or DEWA proposes a change, DEWA shall prepare a revised Connection Site Schedule not less than 8 weeks prior to the change taking effect.

The revised Electrical Connection Site Schedule shall be signed and accompanied by a note indicating where the alteration(s) has/have been made, the new issue number and the date of implementation.

When a Generator on an Electrical Connection Site Schedule, or DEWA, as the case may be, becomes aware that an alteration to the Electrical Connection Site Schedule is required urgently to reflect an Emergency situation for example, the Generator shall notify DEWA, or DEWA shall notify the Generator, as the case may be, immediately and shall discuss:

1. what changes are necessary to the Electrical Connection Site Schedules;
2. whether the Electrical Connection Site Schedules are to be modified temporarily or permanently; and
3. the distribution of the revised Electrical Connection Site Schedules.

DEWA shall prepare the revised Electrical Connection Site Schedules as soon as possible and in any event within seven days of it being informed of or knowing the necessary required alteration. The Electrical Connection Site Schedules shall be confirmed by Generators and signed on behalf of DEWA and Generators as soon as possible after it has been prepared and sent to Generators for confirmation.

A.3. Responsible Managers

Each Generator shall, prior to the Generators plant being connected to the Electricity Transmission System under each PPA/PWPA, supply to DEWA a list of managers, together with contact details, who have been duly authorised to sign Electrical Connection Site Schedules on behalf of the Generator and DEWA shall supply to that Generator the name of the manager responsible for the area in which the Electrical Connection Site is situated.

Attachment to Appendix A

Table A.1: Proforma for Electrical Connection Site Responsibility Schedule

Generator:…….
Electrical Connection Site: ……
Company: ……

Item of Equipment	Equipment Owner	Safety Rules	Safety Co-ordinator	Operational Procedures	Control Responsibility	Party Responsible for Statutory Inspections, Maintenance and Fault Investigations	Security Responsibility	Access	Comments

Signed on behalf of the Generator Date

by way of written confirmation of its accuracy.

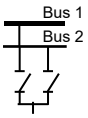
Appendix B. Symbols for Operation Diagrams


Circuit Breaker


Circuit Breaker


Isolator


Earth Switch



Double Busbar with Selection


2 Winding Transformer


Earthing Resistance


Surge Arrester


Capacitor


A. C. Generator

Motor


Fuse

Automatic Reclose Switch


Cable


Overhead Line


Current Transformer

Voltage Transformer

Appendix C. Apparatus to be Included on Operation Diagrams

C.1. Basic Principles

1. Where practicable, all the HV Apparatus on any Electrical Connection Site shall be shown on one Operation Diagram. Provided the clarity of the diagram is not impaired, the layout shall represent as closely as possible the geographical arrangement on the Electrical Connection Site.
2. Where more than one Operation Diagram is unavoidable, duplication of identical information on more than one Operation Diagram must be avoided.
3. The Operation Diagram must show accurately the current status of the Apparatus e.g. whether commissioned or decommissioned. Where decommissioned, the associated switchbay shall be labelled "spare bay".
4. Provision shall be made on the Operation Diagram for signifying approvals, together with provision for details of revisions and dates.
5. Operation Diagrams shall be prepared in A4 format or such other format as may be agreed with DEWA.
6. The Operation Diagram should normally be drawn single line. However, where appropriate, detail that applies to individual phases shall be shown. For example, some HV Apparatus is numbered individually per phase.

C.2. APPARATUS TO BE SHOWN ON OPERATION DIAGRAM

1. Busbars
2. Circuit breakers
3. Disconnectors (Isolators)
4. Switch disconnectors (Switching isolators)
5. Bypass facilities
6. Earthing switches
7. Maintenance earths
8. Overhead line entries
9. Overhead line traps
10. Cable and cable sealing ends
11. Capacitor voltage transformers (CVTs)
12. Power line carrier line matching units (LMUs)
13. Power Units
14. Power Unit step-up transformers
15. Production Facilities auxiliary transformers
16. Static VAr compensators
17. Series or shunt capacitors
18. Series or shunt reactors
19. System transformers including tertiary windings
20. Earthing and auxiliary transformers
21. Voltage transformers (VTs) and current transformers (CTs)
22. Surge arrestors/diverters
23. Neutral earthing arrangements on HV plant
24. Fault throwing devices
25. Phase shifting transformers (Quadrature boosters)
26. Arc suppression coils

27. Wall bushings
28. Shorting and discharge switches
29. SF_6 gas zones.

Appendix D. SCADA Outstation Interfacing

D.1. INTRODUCTION

This Appendix sets out the basic technical requirements for connections to the DEWA SCADA system Outstation.

D.2. GENERAL REQUIREMENTS

DEWA operates a SCADA system for management of power generation and transmission, the SCADA system interconnects and controls all Production Facilities and Electricity Transmission System substations or switching stations from both transmission control centres (TCC1) and (TCC2).

Status indications, alarms, circuit breaker and switch positions, measured values (voltage, current, Active and Reactive Power, Frequency, tap positions, etc.) are transmitted in real time from every Production Facility and Electricity Transmission System substation or switching station to the Transmission Control Centres for supervisory control and monitoring.

The signals shown in the table below, as a minimum, shall be made available to the DEWA SCADA system Outstation by means of a hardwired interface panel to be installed by DEWA at a location in the Electricity Transmission System substation or switching station.

Equipment	Description	Digital	Analogue
Gas Turbines (each)	Ready to start	x	
	Outage	x	
	Operating	x	
	Gas flow		x
	Oil flow		x
	Gas turbine trip	x	
Steam Turbines (each)	Ready to start	x	
	Outage	x	
	Operating	x	
	Steam turbine trip	x	
Generators	Generator connect/disconnect	x	
	Maximum possible output		x
	Minimum possible output		x
	Generator actual Active Power		x
	Generator actual reactive power		x
	Generator actual voltage		x
	Net generation and total aux. power MW/MVAR		x
	Load actual set point		
	Generator control local/remote		x
	Excitation control local/remote	x	

Equipment	Description	Digital	Analogue
	Generator trip	x	
	Excitation trip	x	
		x	
GCBs	Circuit breaker open/close	x	
	Disconnector open/close	x	
	Earth switch open/close	x	
	Control local/remote	x	
	GCB trip	x	
Gen. Transformers	Tap-changer control local/remote	x	
	Tap position	x	
	Tap changer fault	x	
	Winding temperature high	x	
Weather Station	Ambient air temperature		
	Ambient air pressure		
	Ambient air humidity		
	Wind velocity		

During execution a detailed list shall be developed and agreed between the Generator and DEWA.

Included in the signal exchange shall be sufficient signals for the operation of DEWA's SCADA/ energy management system (EMS) applications which include the following for each Power Unit:

a. AGC control (request for control for each generator).
b. Generator MW setpoint.
c. Generator MVAR setpoint.
d. Generator AVR setpoint.
e. Generator Power Factor setpoint.

The Production Facility DCS shall also be responsible for verifying the setpoint values it receives from the SCADA system whether they are within the operating limits before acting upon them (e.g. with alarm/acknowledgement sent to operator before execution).

For DEWA's EMS the following controls shall be made available by the Contractor via the SCADA Outstation interface:

a. Active Power
b. Reactive Power
c. Voltage

At the Production Facility DCS operator stations a dedicated screen graphic shall be allocated to the SCADA system communication. The screen shall allow checking of the communication channels and the signals being transmitted, operator inputs shall be available as required for adjustment of various parameters.

It is required to have two modes of controlling the Production Facility from the SCADA/EMS system at TCC1 and TCC2 as follows:

a. Manually by operators issuing SCADA setpoint controls.
b. Automatically through the EMS applications issuing the setpoint controls via SCADA.

Provision should be made to ensure that the transfer of control between the Transmission Control Centres and the Production facility DCS results in no sudden change in output of any online Power Unit.

D.3. Power Data Requirements for Applications Functions

In addition to the General Requirements detailed in section D.2, Generators shall also provide the Power Unit data required for DEWA's Spectrum Power 4 system. These data will be agreed with DEWA and shall be based on the requirements outlined in the PPA/PWPA.

D.4. SIGNAL REQURIEMENTS

In all cases the interface signals shall be arranged such that the level of electrical interference does not exceed those defined in IEC 60870-2-1: "Telecontrol Equipment and Systems - Operating Conditions Power Supply and Electromagnetic Compatibility" and IEC60870-3: "Telecontrol Equipment and Systems - Specification for Interfaces (Electrical Characteristics)".

D.4.1. Digital Inputs

Digital inputs cover both single and double points for connection to digital input modules on the DEWA Outstation equipment. The Production Facility contacts shall be free of potential, whereas the input circuitry of the Outstation is common to the negative 48 volt potential.

D.4.2. Single Points

Single point inputs must be used for alarms and where single contact indications are available. The off (contact open or 0) state is considered to be the normal state and the on (contact closed or 1) state the alarm condition.

D.4.3. Double Points

Double points are used to indicate primary plant states by the use of complementary inputs for each plant item. Only the "10" and "01" states are considered valid with the "00" and "11" states considered invalid. The "10" state is considered to be the normal or closed state.

D.4.4. Energy Meter Inputs

Meter input pulses for connection to pulse counting input modules on DEWA's Outstation equipment must operate for a minimum of 100ms to indicate a predetermined flow of MWh or MVArh. The contact must open again for a minimum of 100ms. The normal state of the input must be open.

D.4.5. Analogue Inputs

Analogue inputs for connection to analogue input modules on DEWA's Outstation equipment must all be electrically isolated with a two wire connection required. Signals shall be in the form of 4-20mA (or other range to be agreed between the Generator and DEWA) for both unidirectional and bi-directional measured values. Signal converters shall be provided as necessary to produce the correct input signals.

D.4.6. Command Outputs

All command outputs for connection to command output modules on DEWA's Outstation equipment switch both the 0 volts and -48 volts for a period of 2.5 seconds at a maximum current of 1 amp. All outputs shall electrically isolated with a two wire connection to control interposing relays on the plant to be operated.

Independent Water and Power Producers' Code

Metering and Data Exchange Code

Content

MDEC Metering and Data Exchange Code

MDEC.1 Introduction

All electricity and water exported and electricity imported from the Transmission System by a Production Facility, gas entering a Production Facility and back-up fuel entering a Production Facility must be metered. In order to achieve this, the following system shall be provided, as appropriate:

a. All electricity exiting Production Facility sites must be metered and recorded using a Electricity Metering System;
b. All water exiting Production Facility sites into the Water Transmission System must be metered and recorded using a Water Metering System;
c. All gas entering a Production Facility sites must be metered and recorded using a Gas Metering System; and
d. All back-up fuel entering a Production Facility sites must be metered and recorded using a Back-up Fuel Metering System.

MDEC.2 Objectives

The objectives of this Code are to establish:

a. The standards to be met in the provision, location, installation, operation and maintenance of Metering Systems;
b. The standards to be met by DEWA and the Generators in relation to all matters associated with Metering;
c. The responsibilities of DEWA and the Generators in relation to ownership and management of Metering Systems, Metering and the provision and use of Metering Data; and
d. The responsibilities of DEWA and the Generators in relation to the storage of Metering Data.

In particular in order that DEWA and Generators may prepare, calculate, assess and validate invoices between DEWA and the Generators with a view to their prompt settlement, having available to them all necessary Metering Data of reliable quality and accuracy for those purposes at the times at which they require the same.

MDEC.3 Scope

The Metering and Data Exchange Code applies to DEWA and to the Generators.

MDEC.4 General

The principal contractual and other arrangements and the invoices contemplated under them envisaged by this Code are listed below.

Metering Systems and Meters shall be established, Metering shall take place and Metering Data shall be recorded, checked and exchanged between DEWA, and the Generators and then stored, sufficient to ensure that DEWA and the Generators are able to prepare and calculate, assess and validate and, keep appropriate records concerning and where appropriate, challenge, invoices as listed below, on a prompt, comprehensive and accurate basis.

Metering Data shall be permanently recorded and stored for these purposes in accordance with other provisions of this Code.

At each Delivery Point, Meters and/or Metering Systems shall be installed, operated and maintained and Metering shall take place sufficient for all purposes of this Code.

Each Power Unit shall have an Electricity Metering System to measure electrical quantities and each Production Facility that produces water shall have a Water Metering System to measure the total water exiting the Production Facility.

Where required the Electricity Metering System shall meter supplies of electrical quantities provided to seawater intake facilities.

MDEC.4.1 Meter and Metering System Ownership

Meter ownership shall be determined as follow:

a. DEWA shall own all Electricity Metering System;
b. DEWA shall own all Water Metering Systems;
c. DEWA shall own all Gas Metering Systems; and
d. DEWA shall own all Back-up Fuel Metering Systems.

MDEC.4.2 Metering System Purchase, Maintenance, and Calibration

The following table sets down the responsibilities. The term Meter refers to the complete Metering System unless otherwise qualified.

Metering System	Functions	Responsibility
Electricity Metering System	Measurement transformers	These are an inherent part of the switchgear and will be owned, purchased and maintained by DEWA.
	Site cabling	This is an inherent part of the GIS switchgear and will be purchased, owned and maintained by DEWA
	Meters and associated transmitters	These will be located within the substation or switching station and will be owned, purchased and maintained by DEWA.
	Electricity Metering System Testing and Calibration	DEWA will be responsible for Electricity Metering System testing and Calibration but will consult with the Generator who may witness all tests.
Water Metering Systems	.	These will be located downstream of the pumping station forming part of the Production Facilities and be constructed by the Generators. They will be handed to DEWA upon completion of construction. DEWA will own, maintain, calibrate and test the Water Metering System.

Metering System	Functions	Responsibility
Gas Metering Systems	-	These will be located at the boundary of the Production Facilities and be constructed by the Generators. They will be handed to DEWA upon completion of construction. DEWA will own, maintain, calibrate and test the Gas Metering System.
Back-up Fuel Metering Systems	-	These will be located at the boundary of the Production Facilities and be constructed by the Generators. They will be handed to DEWA upon completion of construction. DEWA will own, maintain, calibrate and test the Back-up Fuel Metering System.

MDEC.5 Electricity Metering Systems

MDEC.5.1 General

All Electricity Metering Systems procured, installed, operated and maintained for the purposes of this Code shall be sufficient for all purposes of this Code such that the standards to be met in relation to those Electricity Metering Systems, Metering and the recording and exchange of Metering Data set out in this Metering and Data Exchange Code are met.

Each Electricity Metering System shall comply with the all provisions of this Code, including those as to the standards of accuracy and Calibration to be achieved in Metering.

All data communications equipment required for the purposes of this Code and forming part of or associated with any Electricity Metering System shall perform to the relevant International Telecommunications Union (ITU) standards and recommendations for data transmission over telecommunication systems.

The relevant PPA/PWPA may provide for site-specific isolation or other requirements in accordance with established Good Industry Practice and in particular, to comply with the requirements of any telecommunications service providers.

MDEC.5.2 Meter, CT and VT Requirements

MDEC.5.2.1 Equipment Required

Meters

Electricity Metering Systems shall include Main Electricity Metering System and a Check Electricity Metering System. Main Electricity Metering System and Check Electricity Metering System equipment shall at all relevant times have the same levels of accuracy and functionality. Both the Main Electricity Meters and Check Electricity Meters shall measure the quantities defined below.

Main Electricity Meters and Check Electricity Meters shall be installed, operated and maintained so as to comply at all relevant times with the standards and accuracy classes indicated in Appendix A.

For each separate Actual Metering Point, an Electricity Metering System shall be installed, operated and maintained to measure the following parameters:

a. Entry and exit Active Energy
b. Entry and exit Reactive Energy

DEWA shall configure Main Electricity Meters and Check Electricity Meters such Active Energy is measured with the number of measuring elements equal to or one less than the number of primary system conductors. These include the neutral and/or earth conductor where system configurations enable the flow of energy in such conductors.

All Main Electricity Meters and Check Electricity Meters shall be labelled by DEWA or otherwise be readily identifiable in accordance with Appendix B.

The Electricity Metering Systems shall meter the quantities on a continuous basis and the information shall be displayed on a non-volatile Meter Register. The Meter Registers shall not pass through zero to zero more than once within the normal meter reading cycle.

Electricity Metering Systems shall be provided by DEWA with Outstations that shall provide two outputs per measured quantity, one for the use of the Generator and one for the use of DEWA.

The Outstations shall enable Metering Data to be interrogated locally and at a later date for Metering Data to be provided remotely over communications channels.

Where Electricity Metering Systems provide Metering Data to Outstations external to the Electricity Metering System, the Outstations shall provide two outputs per measured quantity.

DEWA shall provide Test terminals for Main Electricity Meters and Check Electricity Meters to facilitate on-site tests. These terminals shall be in close proximity to the Main Electricity Meters and Check Electricity Meters and shall be capable of providing suitable means for accessing current and voltage signals, injecting test quantities, connecting test Meters, and replacing Main Electricity Meters and Check Electricity Meters without a circuit Outage.

Current Transformers

DEWA shall provide current transformers in accordance with the standards and accuracy classes indicated in Appendix A.

DEWA shall provide two of current transformers. The current transformers supplying electricity Main Electricity Meters, the current transformer windings and cables connecting such windings to electricity Main Electricity Meters shall be dedicated for such purposes and such cables and Connections shall be securely sealed.

The current transformers supplying electricity Check Electricity Meters shall be dedicated for such purposes and such cables and Connections shall be securely sealed

The total Burden on each current transformer shall not exceed the rated Burden of such current transformer. No other Burden shall be connected to these current transformers.

Current transformer test certificates showing errors at the overall working Burden or at Burdens which allow the error at working Burden to be calculated shall be made available by DEWA, wherever possible, for inspection by the relevant parties.

Voltage Transformers

DEWA shall provide voltage transformers in accordance with standards and accuracy classes indicated in Appendix A.

DEWA shall provide one voltage transformer with two or more secondary windings.

The voltage transformer winding supplying Main Electricity Meters shall be dedicated to that purpose and such windings and Connections shall be securely sealed.

The voltage transformer winding supplying Check Electricity Meters shall be dedicated to that purpose and such windings and Connections shall be securely sealed. No other Burden shall be connected to these voltage transformer secondary windings.

Separately fused voltage transformer supplies shall be provided by DEWA for the electricity Main Electricity Meter and the electricity Check Electricity Meter. The fuses shall be located as close to the voltage transformer as possible.

MDEC.5.2.2 Accuracy Requirements

Overall Accuracy

The accuracy of the various items of measuring equipment comprising the Electricity Metering Systems shall conform to the relevant IEC standards current at the time that the PPA/PWPA is signed. Standards relevant to this IWPP Code are listed in Appendix A.

Where relevant standards change from time to time, DEWA will review such changes and recommend to the Regulatory Authority the extent to which any such changes should be implemented.

Any errors arising from the Measurement Transformers and associated leads to the Main Electricity Meters and Check Electricity Meters that affect the overall accuracy shall be compensated such that the overall accuracy requirement is met. Values of the compensation factors and their justification including test certificates shall be established in accordance with Good Industry Practice and recorded and shall be available for inspection by the Generators. The compensation criteria and the justification shall be established in accordance with Good Industry Practice and recorded in the Meter Registration System.

MDEC.5.2.3 Meter Approval and Certification

Meters used in accordance with this Code shall be the electricity Meter types contained in DEWA’s list of approved Meters. The Generators shall have the right to approve the Electricity Metering Systems proposed by DEWA however the Meters shall be provided by DEWA from its list of approved Meters.

MDEC.5.2.4 Operation and Maintenance

Electricity Metering Systems shall be operated and maintained in accordance with the manufacturer's recommendations or as otherwise necessary for DEWA to comply with its obligations under this Code.

MDEC.5.3 Metering System Calibration and Testing

MDEC.5.3.1 Initial Calibration

All new Main Electricity Meters and Check Electricity Meters shall undergo relevant certification tests in accordance with Good Industry Practice.

All initial Calibration of Main Electricity Meters and Check Electricity Meters shall be performed on behalf of DEWA in a recognised test facility (including any Meter manufacturer's works). These tests shall be performed in accordance with the relevant IEC standards and shall confirm that Main Electricity Meter and Check Electricity Meter accuracy is within the limits stated in Appendix A. A uniquely identifiable Calibration record shall be provided by the recognised test facility before the Connection is made live.

DEWA will apply a certification seal following initial Calibration. DEWA must maintain this seal intact in order for the Main Electricity Meter and Check Electricity Meter to retain certified status. No Person shall break the seal unless properly authorised to do so. DEWA is responsible for ensuring that Main Electricity Meter and Check Electricity Meter certification is carried out for compliance with the provisions of this Code.

Main Electricity Meters and Check Electricity Meters removed from service must be re-certified before reconnection for use under this Code.

New voltage transformers and current transformers shall be calibrated prior to installation on any site. DEWA shall provide manufacturers' test certificates to show compliance with the accuracy classes.

MDEC.5.3.2 Commissioning

Commissioning tests shall be carried out on all new Electricity Metering Systems providing Metering Data before the Connection is made live and in accordance with Good Industry Practice. Commissioning tests shall also be carried out before reconnection where a replacement Electricity Metering System is fitted as part of existing Electricity Metering System. No Connection or reconnection shall be permitted unless the tests are passed.

Following commissioning, DEWA shall provide such evidence that may be required to confirm that Electricity Metering System meets the requirements of this Code.

Appendix C sets out the tests and checks that as a minimum shall be included in a commissioning programme.

All Main Electricity Meters, Check Electricity Meters, Measurement Transformers shall be tested by the respective DEWA for accuracy in accordance with Good Industry Practice at initial commissioning before the Connection is made live, as indicated in Appendix C.

MDEC.5.3.3 Periodic Calibration and testing

General

Periodic Calibration of Electricity Metering Systems shall be undertaken by DEWA to ensure that the requirements of this Code are met at all relevant times.

Periodic Calibration of Main Electricity Meters and Check Electricity Meters shall be performed in DEWA's in-house Meter Calibration facilities or in a recognised test facility (including any Meter manufacturer's works) or by competent Persons using standard Meters certified by a recognised authority. The tests shall be performed in accordance with the relevant IEC standards and shall confirm that Main Electricity Meter and Check Electricity Meter accuracy is within the limits stated in Appendix A. The Calibration record shall be uniquely identifiable, retained in a safe place and the significant details (Identification Number, date, names and status of authorised testing Persons and accuracy results) recorded in the Meter Registration System.

Meters shall also be tested outside of the prescribed intervals stated below if the Main Electricity Meter and Check Electricity Meter diverge by more than 1.5 times the prescribed limit of error associated with the accuracy classes given in Appendix A.

Complete and accurate records of tests, work carried out and pertinent data to confirm successful testing/Calibration in accordance with the requirements of this Code shall be kept by DEWA and promptly registered in the Meter Registration System where appropriate.

Frequency of testing

For the Main Electricity Meter and Check Electricity Meters on-site accuracy tests shall be performed at intervals of not less than 18 months and not exceeding 5 years.

Periodic testing of Measurement Transformers is not required.

Suspected Metering errors

If any item of an Electricity Metering System is suspected of performing incorrectly, the Generators may request DEWA to carry out a test in accordance with Good Industry Practice to confirm correct operation and accuracy. DEWA shall carry out any test so requested. The Generators shall be given 24 hours notice of such tests and be invited to witness the tests. Test results shall be made available promptly and in writing to the Generator.

Certified test equipment and reference standards (all traceable to recognised national or international standards) shall be used in such tests and if, by agreement, it is deemed necessary, an approved independent laboratory may be employed.

Where an accuracy test indicates that an error exceeds the limits of error associated with the accuracy classes given in Appendix A, the errors shall be recorded before promptly adjusting, repairing or renewing the Electricity Metering System (or part thereof) or replacing defective components. In such cases substitute Metering Data shall be provided in accordance with the PPA/PWPA.

The Electricity Metering System shall be restored to service and proved to be operating within the prescribed limits of accuracy as soon as is reasonably practicable. Upon the completion, examination, maintenance, repair, recalibration or replacement of any component in the Electricity Metering System, the Main Electricity Meter and Check Electricity Meter shall be sealed.

MDEC.5.4 Meter and Data Security and Registration

MDEC.5.4.1 Meter Access and Sealing

All Electricity Metering Systems and associated communications equipment shall be located in secure Metering cabinets located in an area that is readily accessible, free from obstructions and well lit by artificial light. The cabinets shall include as a minimum, effective protection from moisture and dust ingress and from physical damage, including vibration. Appropriate temperature controls shall be provided. The cabinets must be lockable and capable of being sealed to prevent unauthorised access.

DEWA and the Generators shall jointly seal the Main Electricity Meters and Check Electricity that shall include data collection equipment and associated modems and telephone links. Only DEWA’s personnel shall break such seals. The Generator shall be given at least forty-eight (48) hours' advance notice of the breaking of any seals. No such notice will be necessary when the breaking of a seal is necessitated by the occurrence of an Emergency.

Neither DEWA or the Generators shall tamper or otherwise interfere with any part of the Electricity Metering System in any way. Where it is established that the Electricity Metering System has been tampered or interfered with, then until such tampering or interference has been rectified either:

a. the quantity measured or recorded shall be that measured or recorded by any other relevant installed Metering, or
b. if there is no other relevant Metering or it is established to have been tampered or interfered with, the quantity shall be agreed by the parties, or, in the absence of such agreement, either DEWA and the Generator shall be entitled to refer the matter to an Expert for determination.

Where the Generator requires the right of access or to deal in some other way with a Meter or Electricity Metering System for the purposes of this Code, all such necessary rights shall be granted by DEWA. All such rights should be set down in the relevant PPA/PWPA.

The right of access provided for in this Code includes the right to bring onto DEWA’s property any vehicles, plant, machinery and maintenance or other materials as shall be reasonably necessary for the purposes of performance of obligations under this Code.

DEWA and the Generator shall ensure that all reasonable arrangements and provisions are made and/or revised from time to time as and when necessary or desirable in accordance with Good Industry Practice to facilitate the safe exercise of any right of access.

MDEC.5.4.2 Meter Records

DEWA shall label all Main Electricity Meters and Check Electricity Meters with a unique identification number from lists maintained by DEWA.

DEWA shall ensure that complete and accurate records are maintained of the Calibration and operation of the Electricity Metering System. These records shall include but not be limited to the dates and results of any tests, readings, adjustments or inspection carried out and the dates on which any seal was applied or broken. The reasons for any seal being broken and the Persons, and their affiliations, attending any such tests, readings, inspections or sealings shall be recorded.

DEWA shall ensure that the pertinent data (Appendix D) is promptly entered into the Meter Registration System. Such data shall be kept up to date. They shall also provide any other Electricity Metering System data requested by other involved parties.

MDEC.5.4.3 Meter Registration

Electricity Metering Systems shall be registered in a central database, the Meter Registration System, which is to be operated and maintained by DEWA in accordance with Good Industry Practice. The purpose of the Meter Registration System is to provide a complete, accurate and up to date central database of all Metering Data and to ensure an auditable trail to demonstrate compliance with this Code. The Meter Registration System shall contain, as a minimum, specific information at each Actual Metering Point as indicated in Appendix D.

DEWA is responsible for ensuring that data relating to all changes to DEWA's Electricity Metering System including any changes to the types of data set out in Appendix D are promptly reported in writing, to the Meter Registration System.

The Meter Registration System shall maintain the specified information for a minimum of seven years after the replacement or disconnection of a Meter.

Any data held in the Meter Registration System (a) shall be the intellectual property of DEWA and (b) may be viewed by the Generator.

MDEC.6 Water Metering Systems

MDEC.6.1 General

All Water Metering Systems procured, installed, operated and maintained for the purposes of this Code shall be sufficient for all purposes of this Code such that the standards to be met in relation to those Water Metering Systems, Metering and the recording and exchange of Metering Data set out in this Code are met.

Each Water Metering System shall comply with the all provisions of this Code, including those as to the standards of accuracy and Calibration to be achieved in Metering.

All data communications equipment required for the purposes of this Code and forming part of or associated with any Water Metering System shall perform to the relevant International Telecommunications Union (ITU) standards and recommendations for data transmission over telecommunication systems.

The relevant PWPA or WPA may provide for site-specific isolation or other requirements in accordance with established Good Industry Practice and in particular, to comply with the requirements of any telecommunications service providers.

MDEC.6.2 Water Meter Requirements

Water Metering Systems shall include a Main Water Metering System and Check Water Metering System in series with a means of removing each Meter without affecting the operation of the other. Both the Main Water Meter and Check Water Meter shall have at all relevant times the same levels of accuracy and functionality.

Main Water Meters and Check Water Meters shall include a pulsed output providing instantaneous and integrated flow readings, interface over serial communication protocols such as MODBUS/PROFIUS, or similar acceptable to DEWA, and shall be equipped with battery back-up power supplies for 24 hours operation.

All Water Metering Systems shall comply with the technical requirements specified in Appendix A.

Water Metering Systems shall meter the quantities on a continuous basis and the information shall be displayed on a non-volatile Meter Register. The Meter Registers shall not pass through to zero more than once within the normal reading cycle.

The Generators shall provide Water Metering Systems with Outstations that shall provide two outputs per measured quantity one for the use of the Generator and one for the use of DEWA.

The Outstations shall enable water Metering Data to be interrogated locally and at a later date for water Metering Data to be provided remotely over communications channels.

MDEC.6.2.1 Accuracy Requirements

The system accuracy over the normal operating range shall not be more than ±0.20% of full-scale reading.

MDEC.6.2.2 Meter Approval and Certification

Main Water Meters and Check Water Meters used in accordance with this Code shall be approved Meter types. DEWA shall have the right to approve the Water Metering Systems proposed by the Generators.

MDEC.6.2.3 Operation and Maintenance

Water Metering Systems shall be operated and maintained in accordance with the manufacturer’s recommendations or as otherwise necessary for DEWA to comply with its obligations under this Code.

MDEC.6.3 Water Metering System Calibration and Testing

MDEC.6.3.1 Initial Calibration

The Generator will apply a certification seal following initial Calibration. The Generator must maintain this seal intact in order for the Main Water Meter and Check Water Meter to retain certified status. No Person shall break the seal unless properly authorised to do so. The Generators is responsible for ensuring that Meter certification is carried out for compliance with the provisions of this Code.

All new Water Metering Systems shall undergo relevant certification tests in accordance with Good Industry Practice.

All initial Calibration of Main Water Meters and Check Water Meters shall be performed on behalf of the Generator in a recognised test facility (including any Meter manufacturer's works). These tests shall be performed in accordance with the relevant IEC standards. A uniquely identifiable Calibration record shall be provided by the recognised test facility before the Meter enters service.

Main Water Meters and Check Water Meters removed from service must be re-certified before reconnection for use under this Code.

MDEC.6.3.2 Commissioning

Commissioning tests shall be carried out on all new Water Metering Systems providing Metering Data before the Connection is placed into service and in accordance with Good Industry Practice. Commissioning tests shall also be carried out before reconnection where replacement Water Metering System is fitted as part of an existing Water Metering System. No Connection or reconnection shall be permitted unless the tests are passed.

Following commissioning, the Generator shall provide such evidence that DEWA may require to confirm that the Water Metering System meets the requirements of this Code.

MDEC.6.3.3 Periodic Calibration and testing

General

Periodic Calibration of the Main Water Meters and Check Water Meters shall be undertaken by DEWA to ensure that the requirements of this Code are met at all relevant times. Periodic Calibration of Main Water Meters and Check Water Meters shall be performed in DEWA's in-house meter Calibration facilities or in a recognised test facility (including any Meter manufacturer's works) or by competent Persons using standard Meters certified by a recognised authority. The tests shall be performed in accordance with the relevant ISO standards and shall confirm that Main Water Meter and Check Water Meter accuracy is within the limits stated in MDEC.6.2.1. The Calibration record shall be uniquely identifiable, retained in a safe place and the significant details (identification number, date, names and status of authorised testing Persons and accuracy results) recorded in the Meter Registration System.

The Main Water Meter and Check Water Meter shall be tested by DEWA for accuracy in accordance with Good Industry Practice at specified intervals thereafter to verify that operation is within the prescribed limits of error associated with the accuracy given in MDEC.6.2.1.

The Main Water Meter and Check Water Meter shall also be tested by DEWA in accordance with Good Industry Practice outside of the prescribed intervals stated below if the Main Water Meter and Check Water Meter in a Water Metering System diverge by more than 1.5 times the prescribed limit of error associated with the accuracy given in MDEC.6.2.1.

Complete and accurate records of tests, work carried out and pertinent data to confirm successful testing/Calibration in accordance with the requirements of this Code shall be kept by DEWA and promptly registered in the Meter Registration System where appropriate in accordance with Good Industry Practice.

Timing of Water Meter Tests

The Main Water Meter and Check Water Meter shall be re-calibrated at intervals of not less than one year but not exceeding 2 years.

Suspected Metering errors

If any item of a Water Metering System is suspected of performing incorrectly, the Generator may request DEWA to carry out a test in accordance with Good Industry Practice to confirm correct operation and accuracy. DEWA shall carry out any test so requested. The Generators shall be given 24 hours notice of such tests and be invited to witness the tests. Test results shall be made available promptly and in writing to the affected parties.

Certified test equipment and reference standards (all traceable to recognised national or international standards) shall be used in such tests and if, by agreement, it is deemed necessary, an approved independent laboratory may be employed.

Where a test indicates that an error exceeds the limits of error associated with the accuracy given in this Code, then these errors shall be recorded before promptly adjusting, repairing or renewing the Water Metering System (or part thereof) or replacing defective components. In such cases substitute Metering Data shall be provided in accordance with relevant PWPA or WPA.

The Water Metering System shall be restored to service and proved to be operating within the prescribed limits of accuracy as soon as is reasonably practicable. Upon the completion, examination, maintenance, repair, recalibration or replacement of any component in the Water Metering System in accordance with Good Industry Practice, the Water Metering System shall be sealed.

MDEC.6.4 Water Meter and Data Security and Registration

MDEC.6.4.1 Water Meter Access and Sealing

All Water Metering Systems and associated communications equipment shall be located in a secure Metering cabinet located in an area that is readily accessible, free from obstructions, well lit by artificial light. The cabinets shall include as a minimum, effective protection from sunlight, effective protection from moisture and dust ingress and from physical damage, including vibration. Appropriate temperature and humidity controls shall be provided. The cabinets must be lockable and capable of being sealed to prevent unauthorised access.

The Generators and DEWA shall jointly seal the Main Water Meter and Check Water Meter including data collection equipment and associated modems and telephone links. Only DEWA’s personnel shall break such seals. Generators shall be given at least forty-eight (48) hours' advance notice of the breaking of seals. No such notice will be necessary when the breaking of a seal is necessitated by the occurrence of an Emergency.

Neither DEWA nor the Generator shall tamper or otherwise interfere with any part of the Water Metering System in any way. Where it is established that the Water Metering System has been tampered or interfered with, then until such tampering or interference has been rectified either:

- the quantity measured or recorded shall be that measured or recorded by any other relevant installed Water Metering System; or
- if there is no other relevant Metering or it is established to have been tampered or interfered with, the quantity shall be agreed by the parties, or, in the absence of such agreement, either DEWA or the Generator shall be entitled to refer the matter to an Expert for determination.

Where Generators require the right of access or to deal in some other way with a Main Water Meter or Check Water Meter or Water Metering System for the purposes of this Code, all such necessary rights shall be granted by DEWA. All such rights should be set down in the relevant PWPA or WPA.

The right of access provided for in this Code includes the right to bring onto the DEWA's property any vehicles, plant, machinery and maintenance or other materials as shall be reasonably necessary for the purposes of performance of obligations under this Code.

DEWA and the Generator shall ensure that all reasonable arrangements and provisions are made and/or revised from time to time as and when necessary or desirable in accordance with Good Industry Practice to facilitate the safe exercise of any right of access.

MDEC.6.4.2 Water Meter Records

The Generators shall label all Main Water Meters and Check Water with a unique identification number from lists maintained by DEWA.

DEWA shall ensure that complete and accurate records are maintained of the Calibration and operation of Water Metering System. These records shall include but not be limited to the dates and results of any tests, readings, adjustments or inspection carried out and the dates on which any seal was applied or broken. The reasons for any seal being broken and the Persons, and their affiliations, attending any such tests, readings, inspections or sealings shall be recorded.

Generators shall ensure that the pertinent data (Appendix D) is provided promptly to DEWA for entry into the Meter Registration System. Such data shall be kept up to date. They shall also provide any other Water Metering System data requested by DEWA.

MDEC.6.4.3 Water Meter Registration

Water Metering Systems shall be registered in a central database, the water Meter Registration System, which is to be operated and maintained by DEWA in accordance with Good Industry Practice. The purpose of the water Meter Registration System is to provide a complete accurate and up to date central database of all Metering Data and to ensure an auditable trail to demonstrate compliance with this Code. The Meter Registration System shall contain, as a minimum, specific information at each Desalinated Water Delivery Point as indicated in Appendix D.

DEWA is responsible for ensuring that data relating to all changes to a Water Meter System including any changes to the types of data set out in Appendix D. Any other information regarding each Desalinated Water Delivery Point as may be reasonably required by DEWA shall be recorded in the Meter Registration System.

The Meter Registration System shall maintain the specified information for a minimum of seven years after the replacement or disconnection of a Main Water Meter and Check Water Meter.

Any data held in the Meter Registration System (a) shall be the intellectual property of DEWA and (b) may be freely accessed by the Generator.

MDEC.7 Gas Metering Systems

MDEC.7.1 General

All Gas Metering Systems procured, installed, operated and maintained for the purposes of this Code shall be sufficient for all purposes of this Code such that the standards to be met in relation to those Gas Metering Systems, Metering and the recording and exchange of Metering Data set out in this Code are met.

Each Gas Metering System shall comply with the all provisions of this IWPP Code, including those as to the standards of accuracy and Calibration to be achieved in Metering.

All data communications equipment required for the purposes of this Code and forming part of or associated with any Gas Metering System shall perform to the relevant International Telecommunications Union (ITU) standards and recommendations for data transmission over telecommunication systems.

The relevant PPA/PWPA may provide for site-specific isolation or other requirements in accordance with established Good Industry Practice and in particular, to comply with the requirements of any telecommunications service providers.

MDEC.7.2 Gas Metering System Requirements

Gas Metering Systems shall include Main Gas Meters and Check Gas Meters in series with a means of removing each meter without affecting the operation of the other. Both the Main Gas Meter and Check Gas Meter shall have at all relevant times the same levels of accuracy and functionality.

The Gas Metering System shall adopt a “Z” valving arrangement to enable validation testing of the Main Gas Metering System and Check Gas Metering System.

The Main Gas Meter and Check Gas Meter shall include a pulsed output providing instantaneous and integrated flow readings and shall be equipped with uninterruptible power supplies for not less than 24 hours operation.

All Gas Metering Systems shall comply with the technical requirements specified in Appendix A.

Gas Metering Systems shall meter the quantities on a continuous basis and the information shall be displayed on a non-volatile Meter Register. The Meter Registers shall not pass through to zero more than once within the normal reading cycle.

The gas chromatographs forming part of the Gas Metering System shall have two helium gas bottles capable of automatic changeover in the event that one becomes empty.

The Gas Metering System flow computers shall have a proving facility to allow the Main Gas Meter System flow computer and Check Gas Metering System flow computer to check the accuracy or each other.

The Gas Metering System flow computers shall be provided with diagnostic software.

The Generators shall provide Gas Metering Systems with Outstations that shall provide three outputs, one for the use of the Generator and two for the use of DEWA. The Outstation remote terminal unit protocol shall be Modbus RTU protocol over an RS-485 serial Connection.

The Outstations shall enable gas Metering Data to be interrogated locally and at a later date for gas Metering Data to be provided remotely over communications channels.

The following measurements are required in order to obtain the Standard Gas Volume and to compute the heat values (all values to be expressed in appropriate SI Units):

a. Gas quantity in m^3 under line conditions;
b. Gas Temperature in degrees Celsius;
c. Gas Pressure in Bar;
d. Gas compressibility/or Gas Specific Gravity; and
e. Specific Heat Values – (Lower and Higher Specific Heat Values)

MDEC.7.3 Gas Analysis and Properties

The required thermal values of the gas shall be derived based on the Standard Gas Volume and the Heat Value of the Gas. The Standard Gas Volume will be computed at ST&P. For the purpose of this Code:

a. Standard Pressure is 1.015598 bar (A); and
b. Standard Temperature is 60.0 degrees Fahrenheit

The equipment shall be capable of using other base conditions as required under the PWPA between DEWA and the Generator.

The gas composition data to arrive at the gas compressibility shall be inferred through an on-line device such as a gas chromatograph within in the Gas Metering System.

Calculation of the net calorific value of gas shall be by way of GPA 2172.

MDEC.7.3.1 Accuracy Requirements

The Gas Metering Systems shall be accurate on a volumetric basis to within plus or minus zero point five zero percent (±0.50%) or better and on a net calorific basis to within plus or minus zero point seven point zero percent (±0.70%).

To achieve the overall accuracy requirements it may be necessary to compensate Meters for the errors of the measuring elements. Values of the compensation shall be recorded and evidence to justify the compensation criteria, including wherever possible test certificates, shall be available for inspection by DEWA.

MDEC.7.3.2 Meter Approval and Certification

The Main Gas Meters and Check Gas Meters used in accordance with this Code shall be approved Meter types. DEWA shall have the right to approve the Gas Metering Systems proposed by the Generators.

MDEC.7.3.3 Operation and Maintenance

Gas Metering Systems shall be operated and maintained in accordance with the manufacturer's recommendations or as otherwise necessary for DEWA to comply with its obligations under this Code.

MDEC.7.4 Gas Metering System Calibration and Testing

MDEC.7.4.1 Initial Calibration

All new Gas Metering Systems shall undergo relevant certification tests in accordance with Good Industry Practice.

All initial Calibration of Main Gas Meters and Check Gas Meters shall be performed on behalf of the Generator in a recognised high pressure test facility (including any Meter manufacturer's or third party works). These tests shall be performed in accordance with the relevant IEC standards. A uniquely identifiable Calibration record shall be provided by the recognised test facility before the Meter enters service.

The Generator will apply a certification seal following initial Calibration. DEWA must maintain this seal intact in order for the Main Gas Meters, Check Gas Meters, pressure transmitters and temperature transmitters to retain certified status. No Person shall break the seal unless properly authorised to do so. The Generator is responsible for ensuring that Meter certification is carried out for compliance with the provisions of this Code.

Meters removed from service must be re-certified before reconnection for use under this Code.

MDEC.7.4.2 Commissioning

Commissioning tests shall be carried out on all new Gas Metering Systems providing Metering Data before the Connection is placed into service and in accordance with Good Industry Practice. Commissioning tests shall also be carried out before reconnection where replacement Gas Metering System is fitted as part of an existing Gas Metering System. No Connection or reconnection shall be permitted unless the tests are passed.

Following commissioning, the Generator shall provide such evidence that DEWA may require to confirm that the Gas Metering System meets the requirements of this Code.

MDEC.7.4.3 Periodic Calibration and testing

General

Periodic Calibration of all Main Gas Meters and Check Gas Meters shall be undertaken by DEWA to ensure that the requirements of this Code are met at all relevant times. The Calibration of Main Gas Meters

and Check Gas Meters shall be performed on behalf of DEWA in a recognised test facility (including any Meter manufacturer's works). The tests shall be performed in accordance with the relevant ISO standards and shall confirm that Main Gas Meter and Check Gas Meter accuracy is within the limits stated in MDEC.7.3.1. The Calibration record shall be uniquely identifiable, retained in a safe place and the significant details (identification number, date, names and status of authorised testing Persons and accuracy results) recorded in the Meter Registration System.

All Main Gas Meters and Check Gas Meters shall be tested by DEWA for accuracy in accordance with Good Industry Practice at specified intervals thereafter to verify that operation is within the prescribed limits of error associated with the accuracy given in MDEC.7.3.1.

Gas Meters shall also be tested in accordance with Good Industry Practice outside of the prescribed intervals stated below if the Main Gas Meter and Check Gas Meter in a Gas Metering System diverge by more than 1.5 times the prescribed limit of error associated with the accuracy given in MDEC.7.3.1.

Complete and accurate records of tests, work carried out and pertinent data to confirm successful testing/Calibration in accordance with the requirements of this Code shall be kept by DEWA and promptly registered in the Meter Registration System where appropriate in accordance with Good Industry Practice.

Timing of Gas Meter Tests

A Gas Metering System validation test by way of the Main Gas Metering System flow computer and Check Gas Metering System flow computer proving facilities shall be carried out by DEWA at intervals of not less than one year but not exceeding two years.

All Main Gas Meters and Check Gas Meters shall be re-calibrated at third party high pressure test facilities at intervals of not less than five years but not exceeding six years.

Suspected Metering errors

If any item of a Gas Metering System is suspected of performing incorrectly, the Generator may request DEWA to carry out a test in accordance with Good Industry Practice to confirm correct operation and accuracy. DEWA shall carry out any test so requested. The Generator shall be given 24 hours notice of such tests and be invited to witness the tests. Test results shall be made available promptly and in writing to the affected parties.

Certified test equipment and reference standards (all traceable to recognised national or international standards) shall be used in such tests and if, by agreement, it is deemed necessary, an approved independent laboratory may be employed.

Where a test indicates that an error exceeds the limits of error associated with the accuracy given in this Code, then these errors shall be recorded before promptly adjusting, repairing or renewing the Gas Metering System (or part thereof) or replacing defective components. In such cases substitute Metering Data shall be provided in accordance with relevant PPA/PWPA.

The Gas Metering System shall be restored to service and proved to be operating within the prescribed limits of accuracy as soon as is reasonably practicable. Upon the completion, examination, maintenance,

repair, recalibration or replacement of any component in the Gas Metering System in accordance with Good Industry Practice, the Gas Metering System shall be sealed.

MDEC.7.5 Gas Meter and Data Security and Registration

MDEC.7.5.1 Gas Metering System Access and Sealing

All Gas Metering Systems and associated communications equipment shall be located in a secure Metering cabinet located in an area that is readily accessible, free from obstructions, well lit by artificial light. The cabinets shall include as a minimum, effective protection from sunlight, effective protection from moisture and dust ingress and from physical damage, including vibration. Appropriate temperature and humidity controls shall be provided. The cabinets must be lockable and capable of being sealed to prevent unauthorised access.

The Generators and DEWA shall jointly seal the Main Gas Meter and Check Gas Meter including data collection equipment and associated modems and telephone links. Only DEWA’s personnel shall break such seals. The Generator shall be given at least forty-eight (48) hours' advance notice of the breaking of seals. No such notice will be necessary when the breaking of a seal is necessitated by the occurrence of an Emergency.

Neither DEWA nor the Generator shall tamper or otherwise interfere with any part of the Gas Metering System in any way. Where it is established that the Gas Metering System has been tampered or interfered with, then until such tampering or interference has been rectified either:

- the quantity measured or recorded shall be that measured or recorded by any other relevant installed Metering system, or
- if there is no other relevant Main Gas Meter or Check Gas Meter or it is established to have been tampered or interfered with, the quantity shall be agreed by the parties, or, in the absence of such agreement, either DEWA or the Generator shall be entitled to refer the matter to an Expert for determination.

Where the Generator requires the right of access or to deal in some other way with a Gas Metering System for the purposes of this Code, all such necessary rights shall be granted by DEWA. All such rights should be set down in the relevant PPA/PWPA where this is practicable.

The right of access provided for in this Code includes the right to bring onto DEWA’s property any vehicles, plant, machinery and maintenance or other materials as shall be reasonably necessary for the purposes of performance of obligations under this Code.

DEWA and the Generator shall ensure that all reasonable arrangements and provisions are made and/or revised from time to time as and when necessary or desirable in accordance with Good Industry Practice to facilitate the safe exercise of any right of access.

MDEC.7.5.2 Gas Meter Records

The Generators shall label all Main Gas Meters and Check Gas Meter with a unique identification number from lists maintained by DEWA.

DEWA shall ensure that complete and accurate records are maintained of the Calibration and operation of Gas Metering Systems. These records shall include but not be limited to the dates and results of any tests, readings, adjustments or inspection carried out and the dates on which any seal was applied or broken. The reasons for any seal being broken and the Persons, and their affiliations, attending any such tests, readings, inspections or sealings shall be recorded.

DEWA shall ensure that the pertinent data (Appendix D) is entered into the Meter Registration System. Such data shall be kept up to date.

MDEC.7.5.3 Gas Meter Registration

Gas Metering Systems shall be registered in a central database, the Meter Registration System, which is to be operated and maintained by DEWA in accordance with Good Industry Practice. The purpose of the gas Meter Registration System is to provide a complete accurate and up to date central database of all gas Metering Data and to ensure an auditable trail to demonstrate compliance with this Code. The Meter Registration System shall contain, as a minimum, specific information at each Gas Delivery Point as indicated in Appendix D.

DEWA is responsible for ensuring that data relating to all changes to a gas Meter System including any changes to the types of data set out in Appendix D. Any other information regarding each Gas Delivery Point as may be reasonably required by DEWA shall be recorded in the Meter Registration System.

The Meter Registration System shall maintain the specified information for a minimum of seven years after the replacement or disconnection of a gas Meter.

Any data held in the gas Meter Registration System (a) shall be the intellectual property of DEWA and (b) may be freely accessed by the Generator.

MDEC.8 Back-up Fuel Metering Systems

MDEC.8.1 General

All Back-up Fuel Metering Systems procured, installed, operated and maintained for the purposes of this Code shall be sufficient for all purposes of this Code such that the standards to be met in relation to those Main Back-up Fuel Meters and Back-up Fuel Metering Systems, Metering and the recording and exchange of Metering Data set out in this Code are met.

Each Back-up Fuel Meter and Back-up Fuel Metering System shall comply with the all provisions of this Code, including those as to the standards of accuracy and Calibration to be achieved in Metering.

All data communications equipment required for the purposes of this Code and forming part of or associated with any Back-up Fuel Metering System shall perform to the relevant International Telecommunications Union (ITU) standards and recommendations for data transmission over telecommunication systems.

The relevant PPA/PWPA may provide for site-specific isolation or other requirements in accordance with established Good Industry Practice and in particular, to comply with the requirements of any telecommunications service providers.

MDEC.8.2 Back-up Fuel Metering System Requirements

Back-up Fuel Metering Systems shall include Main Back-up fuel Meters and Check Back-up fuel Meters in series with a means of removing each Meter without affecting the operation of the other. Both Meters shall have at all relevant times the same levels of accuracy and functionality.

The Back-up Fuel Metering System shall adopt a “Z” valving arrangement to enable validation testing of the Main Back-up Fuel Metering System and Check Back-up Fuel Metering System.

Main Back-up Fuel Meters and Check Back-up Fuel Meters shall include a pulsed output providing instantaneous and integrated flow readings and shall be equipped with battery back-up power supplies for 24 hours operation.

All Back-up Fuel Metering Systems shall comply with the technical requirements specified in Appendix A.

Back-up fuel Metering Systems shall meter the quantities on a continuous basis and the information shall be displayed on a non-volatile Meter Register. The Meter Registers shall not pass through to zero more than once within the normal reading cycle.

The Generators shall provide Back-up Fuel Metering Systems with Outstations that shall provide two outputs per measured quantity one for the use of the Generator and one for the use of DEWA.

The Outstations shall enable Metering Data to be interrogated locally and at a later date for Metering Data to be provided remotely over communications channels.

For each separate DMP the following measurements are required for Settlement purposes in order to obtain the back-up fuel flow converted to ST conditions:

a. Back-up fuel quantity in m^3 under actual line conditions;
b. Back-up fuel quantity in imperial gallons corrected to ST;
c. Back-up fuel temperature in degrees Celsius; and
d. Back-up fuel pressure in Bar Gauge

MDEC.8.2.1 Accuracy Requirements

The Back-up Fuel Metering System shall include turbine flow meters. The required accuracy of turbine meters is +/- 0.15%. The accuracies of pressure transmitter and temperature elements used in the flow compensation are +/-0.075% and +/-0.5% respectively.

MDEC.8.2.2 Meter Approval and Certification

Fuel Meters used in accordance with this Code shall be approved Meter types. DEWA shall have the right to approve the Back-up Fuel Metering Systems proposed by the Generators.

MDEC.8.2.3 Operation and Maintenance

Back-up Fuel Metering Systems shall be operated and maintained in accordance with the manufacturer’s recommendations or as otherwise necessary for the Generators to comply with its obligations under this Code.

MDEC.8.3 Back-up Fuel Metering System Calibration and Testing

MDEC.8.3.1 Initial Calibration

The Generator will apply a certification seal following initial Calibration. The Generator must maintain this seal intact in order for the Main Back-up Fuel Meters and Check Back-up Fuel Meters to retain certified status. No Person shall break the seal unless properly authorised to do so. The Generator is responsible for ensuring that Meter certification is carried out for compliance with the provisions of this Code.

All new Back-up Fuel Metering Systems shall undergo relevant certification tests in accordance with Good Industry Practice.

All initial Calibration of Main Back-up Fuel Meters and Check Back-up Fuel Meters shall be performed on behalf of the Generator in a recognised test facility (including any Meter manufacturer's works). These tests shall be performed in accordance with the relevant IEC standards. A uniquely identifiable Calibration record shall be provided by the recognised test facility before the Meter enters service.

Meters removed from service must be re-certified before reconnection for use under this Code.

MDEC.8.3.2 Commissioning

Commissioning tests shall be carried out on all new Back-up fuel Metering Systems providing Metering Data before the Connection is placed into service and in accordance with Good Industry Practice. Commissioning tests shall also be carried out before reconnection where replacement Back-up Fuel Metering System is fitted as part of an existing Back-up Fuel Metering System. No Connection or reconnection shall be permitted unless the tests are passed.

Following commissioning, the Generator shall provide such evidence that DEWA may require to confirm that the Back-up Fuel Metering System meets the requirements of this Code.

MDEC.8.3.3 Periodic Calibration and testing

General

Periodic Calibration of all Main Back-up Fuel Meters and Check Back-up Fuel Meters shall be undertaken by DEWA to ensure that the requirements of this Code are met at all relevant times. The Calibration of Main Back-up Fuel Meters and Check Back-up Fuel Meters shall be performed in a recognised test facility (including any Meter manufacturer's works). The tests shall be performed in accordance with the relevant ISO standards and shall confirm that Main Back-up Fuel Meter and Check Back-up Fuel Meter accuracy is within the limits stated in MDEC.8.2.1. The Calibration record shall be uniquely identifiable, retained in a safe place and the significant details (identification number, date, names and status of authorised testing Persons and accuracy results) recorded in the Meter Registration System.

All Main Back-up Fuel Meters and Check Back-Up Fuel Meters shall be tested by DEWA for accuracy in accordance with Good Industry Practice at specified intervals thereafter to verify that operation is within the prescribed limits of error associated with the accuracy given in MDEC.8.2.1.

Main Back-up Fuel Meters and Check Back-up Fuel Meters shall also be tested in accordance with Good Industry Practice outside of the prescribed intervals stated below if the Main Back-up Fuel Meter and Check Back-up Fuel Meter in a Back-up Fuel Metering System diverges by more than 1.5 times the prescribed limit of error associated with the accuracy given in MDEC.8.2.1.

Complete and accurate records of tests, work carried out and pertinent data to confirm successful testing/Calibration in accordance with the requirements of this Code shall be kept by DEWA and promptly registered in the Meter Registration System where appropriate in accordance with Good Industry Practice.

Timing of Back-up Fuel Meter Tests

All Main Back-up Fuel Meters and Check Back-up Fuel Meters shall be re-calibrated at intervals of not less than one year but not exceeding 2 years.

Suspected Metering errors

If any item of a Back-up Fuel Metering System is suspected of performing incorrectly, the Generator may request DEWA to carry out a test in accordance with Good Industry Practice to confirm correct operation and accuracy. DEWA shall carry out any test so requested. The Generator shall be given 24 hours notice of such tests and be invited to witness the tests. Test results shall be made available promptly and in writing to the affected parties.

Certified test equipment and reference standards (all traceable to recognised national or international standards) shall be used in such tests and if, by agreement, it is deemed necessary, an approved independent laboratory may be employed.

Where a test indicates that an error exceeds the limits of error associated with the accuracy given in this Code, then these errors shall be recorded before promptly adjusting, repairing or renewing the Back-up Fuel Metering System (or part thereof) or replacing defective components. In such cases substitute Metering Data shall be provided in accordance with relevant PPA/PWPA.

The Back-up Fuel Metering System shall be restored to service and proved to be operating within the prescribed limits of accuracy as soon as is reasonably practicable. Upon the completion, examination, maintenance, repair, recalibration or replacement of any component in the Back-up Fuel Metering System in accordance with Good Industry Practice, the Back-up Fuel Metering System shall be sealed.

MDEC.8.4 Back-up Fuel Metering System and Data Security and Registration

MDEC.8.4.1 Back-up Fuel Meter Access and Sealing

All Back-up Fuel Metering Systems and associated communications equipment shall be located in a secure Metering cabinet located in an area that is readily accessible, free from obstructions, well lit by artificial light. The cabinets shall include as a minimum, effective protection from sunlight, effective protection from moisture and dust ingress and from physical damage, including vibration. Appropriate temperature and humidity controls shall be provided. The cabinets must be lockable and capable of being sealed to prevent unauthorised access.

The Generators and DEWA shall jointly seal the Main Back-up Fuel Meter and Check Back-up Fuel Meter including data collection equipment and associated modems and telephone links. Only DEWA's personnel shall break such seals. The Generators shall be given at least forty-eight (48) hours' advance notice of the breaking of seals. No such notice will be necessary when the breaking of a seal is necessitated by the occurrence of an Emergency.

Neither DEWA nor the Generator shall tamper or otherwise interfere with any part of the Back-up Fuel Metering System in any way. Where it is established that the Back-up Fuel Metering System has been tampered or interfered with, then until such tampering or interference has been rectified either:

- the quantity measured or recorded shall be that measured or recorded by any other relevant installed Back-up Fuel Metering System; or
- if there is no other relevant Back-up Fuel Metering System or it is established to have been tampered or interfered with, the quantity shall be agreed by the parties, or, in the absence of such agreement, either DEWA or the Generator shall be entitled to refer the matter to an Expert for determination.

Where The Generator requires the right of access or to deal in some other way with a Back-up Fuel Meter or Back-up Fuel Metering System for the purposes of this Code, all such necessary rights shall be granted by DEWA. All such rights should be set down in the relevant PPA/PWPA where this is practicable.

The right of access provided for in this Code includes the right to bring onto the Generator's property any vehicles, plant, machinery and maintenance or other materials as shall be reasonably necessary for the purposes of performance of obligations under this Code.

DEWA and the Generator shall ensure that all reasonable arrangements and provisions are made and/or revised from time to time as and when necessary or desirable in accordance with Good Industry Practice to facilitate the safe exercise of any right of access.

MDEC.8.4.2 Back-up Fuel Meter Records

DEWA shall label all Main Back-up Fuel Meters and Check Back-up Fuel Meters with a unique identification number from lists maintained by DEWA.

DEWA shall ensure that complete and accurate records are maintained of the Calibration and operation of Back-up Fuel Metering Systems. These records shall include but not be limited to the dates and results of any tests, readings, adjustments or inspection carried out and the dates on which any seal was applied or broken. The reasons for any seal being broken and the Persons, and their affiliations, attending any such tests, readings, inspections or sealings shall be recorded.

DEWA shall ensure that the pertinent data (Appendix D) is entered into the Meter Registration System. Such data shall be kept up to date.

MDEC.8.4.3 Back-up fuel Meter Registration

Back-up Fuel Metering Systems shall be registered in a central database, the Meter Registration System, which is to be operated and maintained by DEWA in accordance with Good Industry Practice. The purpose of the Meter Registration System is to provide a complete accurate and up to date central database of all Metering Data and to ensure an auditable trail to demonstrate compliance with this Code. The Meter

Registration System shall contain, as a minimum, specific information at each Back-up Fuel Delivery Point as indicated in Appendix D.

DEWA is responsible for ensuring that data relating to all changes to a Back-up Fuel Meter System including any changes to the types of data set out in Appendix D. Any other information regarding each Back-up Fuel Delivery Point as may be reasonably required by DEWA shall be recorded in the Meter Registration System.

The Meter Registration System shall maintain the specified information for a minimum of seven years after the replacement or disconnection of a Meter.

Any data held in the Meter Registration System (a) shall be the intellectual property of DEWA and (b) may be freely accessed by the Generator.

MDEC.8.5 Back-up Fuel Metering Tank Dipping Process

Following each delivery of Back-up Fuel to the Generator and at the end of each calendar month, DEWA and the Generator shall jointly determine the quantity of Back-up Fuel delivered by dipping the Back-up Fuel storage tanks.

The Back-up Fuel storage tanks shall be dipped in accordance with the latest version of procedures ASTM D1250 – Standards for Petroleum Measurements.

The results of the dipping test shall be made available to DEWA by the Generator within five (5) working days.

MDEC.9 Data Exchange

MDEC.9.1 General

Meters must be installed at each Delivery Point.

At each Delivery Point, Meters and/or Metering Systems shall be installed, operated and maintained and Metering shall take place sufficient for all purposes of this Code. The Delivery Points shall be at the ownership boundary and shall be set out in each PPA, PWPA or WPA, as applicable.

Metering Data needs to, and is required by this part of the Code, to flow to and from DEWA to inform the process of preparation and calculation of invoices and the assessment, verification and where appropriate, challenging of these invoice, as well as for accounting and record keeping purposes.

The data requirements can be considered in two parts,

a. Metered Data that measures Output; and
b. Availability Notices and the corresponding supporting data.

DEWA and the Generators in respect of each Meter shall in good faith, and in accordance with Good Industry Practice conduct such Metering operations as may be necessary to produce and record complete and accurate Metering Data.

Where this Code requires Data to be exchanged between the Generator and DEWA or invoices to pass between them supported by Metering Data, DEWA and the Generator shall undertake Meter reading at the times required by this Code. If no time is specified for Meter reading to take place, Meter reading shall take place as close in time as possible to the time required in relation to the relevant invoice or Metering Data flow specified in this Code. All Metering Data shall include the time or times at which Meter reading took place.

The Metering Data shall be provided by making accurate readings of the relevant Meter or Meters, accurately recording the Metering Data arising from those readings and supplying that Metering Data in accordance with the terms of this Code.

DEWA and the Generators shall carry out Metering Data quality checks in accordance with MDEC.5.3, MDEC.6.3, MEDC.7.4 and MDEC.8.3. Where Metering Data is supplied by one Person to another pursuant to this Code, the Person supplying the Metering Data shall declare in writing to the Person to whom the Metering Data is supplied any lack of completeness or accuracy in such Metering Data of which the Person supplying it is aware. This requirement applies both at the time at which the Metering Data is supplied and also requires written notification of inaccuracy or incompleteness to be provided as soon as possible after it is discovered, if the Metering Data concerned has already been supplied.

MDEC.9.2 Data Requirements and Flows

The specific items of data that must between the various entities to satisfy the conditions of the relevant contracts are shown in Appendix E, Table 5.

Each table shows for a specific contract:

a. In column A - The data item
b. For each item of data
c. In column B - The Person who is obliged to conduct Metering as the producer of the data;
d. In column C - The entity who is obliged to send the data to the recipient of the data;
e. In column D - The recipient of the data;

f. In column E - The purpose of the data flow;
- The frequency of
  - Metering the data (specified in Column F) required to comply with this Code
  - Sending the data (specified in Column G) required to comply with this Code
- The format of
  - Data collection (specified in Column H) required to comply with this Code
  - Data transmission (specified in Column I) required to comply with this Code

MDEC.9.3 Metering Data Validation and Quality checks

Metering Data relating to quantities of Active Energy, Reactive Energy and Desalinated water entering or exiting each system shall be collected, validated and aggregated as required for the proper functioning of invoicing in accordance with the relevant parties.

In cases where Metering Data is not available due to a failure of the Main Meter or its associated equipment such as CT, VT, cabling or Protection devices, or in cases where the Main Meter has been proven to have operated outside the prescribed limits of error, the Metering Data obtained from the Check Meter shall be admissible.

In cases where estimated or substitute Metering Data will be used, this will be governed by the rules and procedures set out, between DEWA and the Generator, in the PPA/PWPA/WPA, as applicable.

MDEC.9.4 Metering Data Communications System

The remote communications provided in connection with any Metering System should conform to the requirements of this section, MDEC.9.4.

Meters shall be provided with either integral or separate Local Outstations. Any Local Outstations must be capable of being connected to and interrogated by future Remote Instations within DEWA. The Remote Instations would read the Metering Data at the specified time and frequency.

Any Metering communications system would be independent from the operational SCADA data systems in order to avoid potential conflicts of interfacing and protocol.

The Metering communication system would be a duplex system, wherever possible, i.e., each Remote Instation shall be able to interrogate both the Meter Outstations over either of two communication routes.

MDEC.9.4.1 Local Outstations

Any local Outstation that is installed (whether internal or external) should have facilities to enable Metering Data to be interrogated locally and for the required Metering Data to be provided to Remote Instations. Separate ports shall be used for local and remote interrogations wherever possible.

The interrogation ports shall be opto-coupler ports with a serial protocol such as DLMS protocol for Metering. The local interrogation port shall be capable of use for commissioning, maintenance and fault finding, time setting, in addition to the transfer of Metering Data and alarms. A series of security levels and coding facilities shall be provided to limit access to data and other features to authorised Persons only.

Local Outstations shall perform processing of Data.

The local Outstation data should conform to a format and protocol specified by relevant parties.

Facilities shall be provided to select a relevant Demand period from one of the following values - 60, 30, 15 and 10 minutes with, in each case, one Demand period ending on the hour.

A secure power supply shall be provided to each Local Outstation system with separate fusing for each local Outstation.

Where a local Outstation system uses a separate modem the modem shall be provided with a secure supply, separately fused. Alternatively, line or battery powered modem types may be used.

The local Outstations shall provide an alarm output signal at a manned point in the event of a supply failure.

Metering Data together with alarm indications, and local Outstation time and date shall be capable of being transferred on request during the interrogation process.

In the event of a local Outstation failure, any partial Demand values, Data associated with a local Outstation supply failure and/or restoration, and zero Demand values associated with a local Outstation supply failure, shall be marked so that a future interrogation can identify them.

Local Interrogation Units may be used to interrogate the local Outstations for the purposes of commissioning, maintenance/fault finding and when necessary the retrieval of stored Metering Data.

MDEC.9.4.2 Remote Instations

Remote Instations would be computer-based systems that collect or receive Metering Data on a routine basis from local Outstations.

The broad specification for the Remote Instations would be similar to those for local Outstations outlined above. The Remote Instations would be fitted with separate ports for local and remote interrogations. The local interrogation port would be capable of use for commissioning, maintenance and fault finding, time setting. A series of security levels and coding facilities will be provided to limit access to data and other features to authorised Persons only.

Remote Instations would be capable of collecting all Metering Data by daily interrogation or other time interval to be specified. It should however, be possible to repeat collections of Metering Data at any time throughout the local Outstation data storage period.

MDEC.9.4.3 Communications

All data communications equipment shall conform to the relevant International Telecommunications Union (ITU) standards and recommendations for data transmission over telecommunications systems.

Interrogation of local Outstations shall be possible using any of the following media, as specified by relevant Persons:

a. public switched telephone networks;
b. radio data networks;
c. DEWA private network;
d. mains signalling / power line carrier channels/fibre optic channels; and
e. low power radio.

In addition the relevant parties may specify other media and the format and protocol of any Metering Data.

Error checking facilities should be included in all communication facilities between local Outstations and Remote Instations.

MDEC.9.5 Data Display and Storage

MDEC.9.5.1 Registers

The Metering Systems shall Meter the quantities on a continuous 24 hour basis and the Data shall be displayed on a non-volatile Meter Register. The language of displays shall be English.

Where Meters provide Metering Data to local Outstations external to the Meter, the local Outstations should provide two outputs per measured quantity.

Where a separate local Outstation is used, cumulative register values should be provided in the local Outstation that can be set to match and increment with the Meter Registers.

MDEC.9.5.2 Storage

Any local Outstations provided should have the capability to store all Metering Data collected by the respective Meters including alarms and other functions for relevant parties for two (2)] complete calender months.

DEWA and the Generators shall store Metering Data in accordance with this Code and shall retain a copy of the data in electronic format in accordance with Table 6.1. shall include the following essential parameters; time period, Meter identifiation number, Meter readings.

DEWA shall maintain a log in the form of electronic storage of digital data of all data from all Metering Systems and local Outstations and the associated data received from the Generators for at least ten (10) complete operational years.

DEWA and the Generators shall ensure that back-up copies of data in electronic format are made in accordance with Table 6.1. All back up copies shall be made promptly at the end of the period or immediately following completion of the data set.

Table 1: Data Storage by DEWA and the Generators

Data	Frequency of back up	Place of storage	Retained for	Comment
Current day's working data (1)	End of each working day	On site	One complete week	Each day's back up stored separately
Current week's	Each Thursday at	One copy at	One complete	Each week's back

Data	Frequency of back up	Place of storage	Retained for	Comment
working data (1)	the end of working day	Generator's; One copy at DEWA	month	up stored separately
Current month's working data (1)	Each month at the end of the last working day	One copy at the Generator site; One copy at DEWA	One complete year	
Each month of finalised data	First working day of following month	One copy at the Generator site; One copy at DEWA	Five Financial Years	Finalised means all settlements agreed.
One Financial Year's set of finalised data		One copy at DEWA; One copy at another site	Ten Financial Years	

Notes:
(1) The period of a day, a week or a month will be defined in the PPA/PWPAs
(2) Current period, i.e., day, etc, means all work undertaken in that period including new data and changes to existing data.

Appendix A. Accuracy of Electricity Metering System

A.1. Electricity Meter Standards

A.1.1. Standards

The following standards are among those related to this Code:

IEC Standard 60687 – Alternating current static watt-hour meters for active energy (classes 0.2 S and 0.5 S)

IEC Standard 61036 - Alternating current static watt-hour meters for active energy (classes 1 and 2)

IEC Standard 60521 – Alternating current watt-hour meters (classes 0.5, 1 and 2)

IEC Standard 61268 – Alternating current static var-hour meters for reactive energy (classes 2 and 3)

IEC Standard 60044 Part 1 – Current transformers

IEC Standard 60044 Part 2 – Voltage transformers

IEC Standard 60044 Part 3 – Combined transformers

IEC Standard 61107 – Data exchange for meter reading – direct local data exchange.

All electricity Metering Systems and electricity Meters shall comply with the relevant standards current at the time that the PPA/PWPA is signed.

A.1.2. Overall Accuracy Requirements

For the measurement and Metering of Active Energy, Reactive Energy, Active Power, Metering System shall be tested and calibrated to operate within the overall limits of error set out in Table A -1, after taking due account of CT and VT errors and the resistance of cabling or circuit protection. Calibration equipment shall be traceable to a recognised national or international standard.

Table 2: Overall Accuracy of an Electricity Metering System

Condition		Limits of Error at Stated Power Factor for Active Power and Energy Measurement
Current Expressed as a Percentage of Rated Measuring Current	Power Factor	Limits of Error for Connections
120% to 10% inclusive	1	±0.5%
Below 10% to 5%	1	±0.7%
Below 5% to 1%	1	±1.5%
120% to 10% inclusive	0.5 lag	±1.0%

Condition		Limits of Error at Stated Power Factor for Active Power and Energy Measurement
120% to 10% inclusive	0.8 lead	±1.0%

Condition		Limits of Error for Reactive Power and Energy at Stated Power Factor
Current Expressed as a Percentage of Rated Measuring. Current	Power Factor	Limits of Error for Connections
{120%} to 10% inclusive	0	±4.0%
{120%} to 20% inclusive	0.866 lag	±5.0%
{120%} to 20% inclusive	0.866 lead	±5.0%

A.1.3. Metering System Accuracy Classes

The accuracy class or equivalent shall as a minimum be as follows:

Table 3: Equipment Accuracy Classes

Equipment Type	Equipment Accuracy Class
Current Transformers (Note 1)	0.2S
Voltage Transformers	0.2
Active Energy and Power Meters (Note 2)	0.2S
Reactive Energy and Power Meters	2

Note 1: Current transformers shall meet the class accuracy requirements irrespective of CT secondary ratings.

Note 2: A Meter accuracy class of 0.5 may be used where energy transfers to be measured by the entry/exit Meter during normal operating conditions is such that the metered current will be above 5% of the rated measuring current for periods equivalent to 10% or greater per annum (excluding periods of zero current).

A.2. Water Metering System Standards

The following standards are among those related to this Code:

International Standards

ISO 4064: Measurement of Water Flows in Closed Conduits – Meters for Cold Potable Water (Parts 1, 2 and 3)

OIML R 49 – Water Meters Intended for the Metering of Cold Potable Water

ISO 7066-1:1997 - Measurement of Liquid Flow – Assessment Of Uncertainty In The Calibration And Use Of Flow Measurement Devices.

BS EN 14154-1:2005 - Water meters. General requirements

A.3. Gas Metering System Standards

The recommendations of the following standards shall be complied with as part of this IWPP Code:

International Standards

BS EN 12261:2002 Gas Meters - Gas Turbine Meters

ISO 9951:1993 Measurement of gas flow in closed conduits – Turbine Meters

AGA Report No. 7, Measurement of Gas by Turbine Meter (2006)

AGA Report No. 8, Compressibility factor of Gas and Related Hydrocarbon Gases (Detailed methodology only)

AGA Report No. 9, Measurement of Gas by Multipath Ultrasonic Flowmeters (2007)

AGA Report No. 10, Speed of Sound in Natural Gas and other Related Hydrocarbon Gases, (2003)

A.4. Back-up Fuel Metering System Standards

The following standards are among those related to this Code:

International Standards

API Manual of Petroleum Measurement Standards

BS 7405:1991 – Guide to Selection and Application of Flow meters

OIML R117 Measuring systems for liquids other than water

Appendix B. Labelling of Meters

B.1. General

Each Meter shall be allocated a unique Meter identification number that will be given by DEWA and recorded in the Meter Registration System.

The number shall be marked permanently on the Meter in a position that is clearly visible under all normal viewing of the Meter.

The number will be quoted on all records arising from and related to the Meter including Meter readings.

Test blocks and other related Metering equipment should be clearly identified with the Metering System with which they are associated.

B.2. Entry and exit labelling

The following standard method of labelling Meters, test blocks, etc; based on the definitions for entry and exit shall be incorporated. The required labelling shall be as follows.

Active Energy

Meters or Meter Registers shall be labelled
- "Entry" for all Active Energy flows normally entering the Transmission System, and
- "Exit" for all Active Energy flows normally leaving or exiting the Transmission System,

Reactive Energy

Within the context of this Code the relationship between Active Energy and Reactive Energy can be best established by means of the power factor. The following table gives the relationship:

Table 4: Reactive Energy entry/exit Convention

Flow of Active Energy	Power Factor	Flow of Reactive Energy
Entry	Lagging	Entry
Entry	Leading	Exit
Entry	Unity	zero
Exit	Lagging	Exit
Exit	Leading	Entry
Exit	Unity	zero

Meters or Meter Registers for registering entry Reactive Energy should be labelled "Entry" and those for registering exit Reactive Energy should be labelled "Exit".

Appendix C. Commissioning Tests

This Appendix sets out the tests and checks that shall be included in the Metering Systems commissioning programme. Metering System shall in addition have basic tests carried out on earthing, insulation, together with all other tests that would normally be conducted in accordance with Good Industry Practice.

C.1. Measurement Transformers

For all installations with new/replaced Measurement Transformers DEWA shall ensure that from site tests and inspections the following are confirmed and recorded:

1. Details of the installed units, including serial numbers, rating, accuracy classes, ratio(s);
2. CT ratio and polarity for selected tap; and
3. VT ratio and phasing for each winding.

For installations with existing Measurement Transformers the Meter Owner shall ensure that, wherever practically possible, 1, 2 and 3 above are implemented, but as a minimum must confirm and record VT and CT ratios. If it is not possible to confirm the CT ratio on site, the reason must be recorded on the commissioning record and details must be obtained from any relevant Person.

C.2. Measurement Transformer Leads and Burdens

For all installations the Meter Owner shall wherever practically possible:

1. Confirm that the VT and CT Connections are correct;
2. Confirm that the VT and CT Burden ratings are not exceeded; and
3. Determine and record the value of any Burdens (including any Burdens not associated with Metering Systems or Meters) necessary to provide evidence of the overall Metering accuracy.

C.3. Metering

C.3.1. General Tests and Checks

The following may be performed on-site or elsewhere (e.g. factory, Meter test station, laboratory, etc):

1. Record the Metering System details required by the Meter Registration System;
2. Confirm that the VT/CT ratios applied to the Meter(s) agree with the site Measurement Transformer ratios;
3. Confirm correct operation of Meter test terminal blocks where these are fitted (e.g. CT/VT operated Metering);
4. Check that all cabling and wiring of the new or modified installation is correct;
5. Confirm that Meter registers advance (and that output pulses are produced for Meters which are linked to separate Outstations) for entry and where appropriate exit flow directions. Confirm Meter operation separately for each phase current and for normal polyphase current operation;
6. Where separate Outstations are used confirm the Meter to Outstation channel allocations and that the Meter units per pulse values or equivalent data are correct; and
7. Confirm that the local interrogation facility (Meter or Outstation) and local display etc operate correctly.

C.3.2. Site Tests

The following tests shall be performed on site:

1. Check any site cabling, wiring, Connections not previously checked under clauses D.1, D.2 and D.3.1 above;
2. Confirm that Meter/Outstation is set to UTC (Dubai time) within +/- 5 seconds;
3. Check that the voltage and the phase rotation of the measurement supply at the Meter terminals are correct;
4. Record Meter start readings (including date and time of readings);
5. Wherever practically possible, a primary prevailing load test (or where necessary a Primary injection test) shall be performed which confirms that the Meter(s) is registering the correct primary energy values and that the overall installation and operation of the Metering installation are correct;
6. Where for practical or safety reasons (5) is not possible then the reason shall be recorded on the commissioning record and a secondary prevailing load or injection test shall be performed to confirm that the Meter registration is correct including, where applicable, any Meter VT/CT ratios. In such cases the VT/CT ratios shall have been determined separately as detailed under D.1: Measurement Transformers, above;
7. Record values of the Meter(s)/Outstation(s) displayed or stored Metering Data (at a minimum one complete half-hour value with the associated date and time of the reading) on the commissioning record;
8. Confirm the operation of Metering System alarms (not data alarm or flags in the transmitted data); and
9. Confirm from Meter owner that accuracy certificates exist for the Meters.

Appendix D. Meter Registration Data

The Meter Registration System forms the Metering database and holds Metering Data relating to Metering.

Data in the Meter Register shall be treated as confidential and only relevant Metering Data should be released to the Generator.

Metering Data to be contained in the Meter Register should include, but is not limited to the following:

- A unique Meter identification number;
- Connection and the Actual Metering Point data, including:
  - location and reference details (i.e. drawing numbers)
  - participant details at the Electrical Delivery Point
  - site identification nomenclature
  - Meter owner
- Meter installation details, including;
  - serial numbers
  - Metering installation identification name
  - Meter types and models
  - instrument transformer ratios (available and connected)
  - test and Calibration programme details: test results and reference test certificates for Meters and Measurement Transformers
  - asset management plan and testing schedule
  - Calibration tables, where applied to achieve Meter installation accuracy
- any Meter summation scheme values and multipliers;
- data register coding details;
- Data communication details (when communication systems are used);
- telephone number for access to data;
- communication equipment type and serial numbers;
- communication protocol details or references;
- data conversion details; and
- Generator identifications and access rights.

Appendix E. Data Requirements

All data requirements are for the purposes of invoicing; DEWA receives data for confirmation and conformance checking purposes only.

Table 5: Data Requirements

Data Item				Data		Frequency of		Format of	Comments
	Producer	Sender	Receiver	Purpose	Measurement	Sending	Data collection	Data transmission	
A	B	C	D	E	F	G	H	I	J
MW	DEWA	DEWA	Generator	Invoice	Hourly	Hourly	Electronic and paper	Electronic	Metered data
MWh	DEWA	DEWA	Generator	Invoice	Hourly	Hourly	Electronic and paper	Electronic	Metered data
Water Production	Generator	Generator	DEWA	Invoice	Hourly	Hourly	Electronic and paper	Electronic	Metered data
Notified Data									
Day –1 Declarations	Generator	Generator	DEWA	Invoice	N/A	Daily	Paper	Electronic	
Re-declaration	Generator	Generator	DEWA	Invoice	N/A	Daily As required	Paper	Electronic	
Outage notification	Generator	Generator	DEWA	Invoice	N/A	Daily As required	Paper	Electronic	
Generation exceptions report	Generator	Generator	DEWA	Invoice	N/A	Weekly	Paper	Electronic	
System Frequency	Generator	Generator	DEWA	Invoice	Hourly	Monthly	Electronic and paper	Electronic	Sent data is average of start & end data
Unit Power Factor	Generator	Generator	DEWA	Invoice	Hourly	Monthly	Electronic and paper	Electronic	Sent data is average of start & end data

Data Item				Data		Frequency of		Format of	Comments
	Producer	Sender	Receiver	Purpose	Measurement	Sending	Data collection	Data transmission	
A	B	C	D	E	F	G	H	I	J
No. of Cold starts	Generator	Generator	DEWA	Invoice	N/A	Monthly	Electronic and paper	Electronic	
No. of Warm starts	Generator	Generator	DEWA	Invoice	N/A	Monthly	Electronic and paper	Electronic	
No. of Hot starts	Generator	Generator	DEWA	Invoice	N/A	Monthly	Electronic and paper	Electronic	
No. of Water Starts	Generator	Generator	DEWA	Invoice	N/A	Monthly	Electronic and paper	Electronic	
Ambient air temperature	Generator	Generator	DEWA	Invoice	Hourly	Monthly	Electronic and paper	Electronic	Hourly spot readings
Ambient air pressure	Generator	Generator	DEWA	Invoice	Hourly	Monthly	Electronic and paper	Electronic	Hourly spot readings
Relative Humidity	Generator	Generator	DEWA	Invoice	Hourly	Monthly	Electronic and paper	Electronic	Hourly spot readings
Seawater temperature	Generator	Generator	DEWA	Invoice	Hourly	Monthly	Electronic and paper	Electronic	Hourly spot readings
Water delivered Temperature	Generator	Generator	DEWA	Conformance to delivery specification	Hourly	-	Electronic and paper	Electronic	Continuous readings
Water delivered turbidity	Generator	Generator	DEWA	Conformance to delivery specification	Hourly	-	Electronic and paper	Electronic	Continuous readings
Water delivered conductivity	Generator	Generator	DEWA	Conformance to delivery specification	Hourly	-	Electronic and paper	Electronic	Continuous readings

Data Item				Data		Frequency of		Format of	Comments
	Producer	Sender	Receiver	Purpose	Measurement	Sending	Data collection	Data transmission	
A	B	C	D	E	F	G	H	I	J
Water delivered hydrogen ion (ph)	Generator	Generator	DEWA	Conformance to delivery specification	Hourly	-	Electronic and paper	Electronic	Continuous readings
Water delivered total organic carbons	Generator	Generator	DEWA	Conformance to delivery specification	Hourly	-	Electronic and paper	Electronic	Continuous readings
Water delivered residual chlorine	Generator	Generator	DEWA	Conformance to delivery specification	Hourly	-	Electronic and paper	Electronic	Continuous readings
Water delivered Langelier saturation index total calcium hardness	Generator	Generator	DEWA	Conformance to delivery specification	Hourly	-	Electronic and paper	Electronic	Continuous readings
Water delivered total alkalinity	Generator	Generator	DEWA	Conformance to delivery specification	Hourly	-	Electronic and paper	Electronic	Continuous readings
Gas Metering System Information	Generator	Generator	DEWA	Invoice	Hourly	Hourly-	Electronic and paper	Electronic	Continuous readings
Back-up Fuel Metering System Information	Generator	Generator	DEWA	Invoice	Hourly	Hourly-	Electronic and paper	Electronic	Continuous readings
Back-up Fuel Tank Dip Information	Generator	Generator	DEWA	Invoice	-	Monthly-	Electronic and paper	Electronic	Monthly

Independent Water and Power Producers' Code

Operational Planning Code

Content

OC Operating Code – Operational Planning

OC.1 Introduction

This Operational Planning Code is concerned with the:

- provision of data by Generators to DEWA for operational planning purposes
- procedures relating to the coordination of Outages for construction, repair and maintenance of Apparatus and plant on the Transmission System.

This Code covers planning procedures through various timescales for matching Production Capacity with forecast Demand plus Operating Margin and water production on the Transmission System. The procedures coordinate Outages of Power Units and RO Trains and Outages of and constraints on parts of the Transmission System to achieve, so far as possible, DEWA's security standards.

The Code sets out the data required by DEWA from Generators in order to conduct the operational planning process, and the procedures to be adopted by DEWA in the planning and coordination of Outages of Power Units and of the Transmission System.

OC.2 Objective

The objective of this code is to ensure, as far as possible, that DEWA co-ordinates and approves Outages of Power Units, taking into account Demand forecasts, Desalination requirements and Transmission System Outages in order to ensure that forecast Demand plus the Operating Margin is met in accordance with DEWA's security standards.

OC.3 Scope

In addition to DEWA this Code applies to Generators.

OC.4 Procedures

The procedures in this code cover details of the data required and the time at which the data needs to be provided to DEWA to allow co-ordination of Outages.

OC.5 Planning of Outages

The procedure set out below is to be followed in each Operational Year.

DEWA will indicate to each Production Facility criteria on which the Proposed Station Outage Schedules should be submitted. The format of the submission is detailed in Appendix A/A1.

OC.5.1 Planning for the following Operational Year

OC.5.1.1 By the end of March

Each Generator will provide to DEWA a Proposed Station Outage Schedule for the following October to April inclusive in writing no later than 31 March. The Proposed Station Outage Schedule shall contain the following information in relation to each proposed Planned Outage:

1. identity of the Power Unit and/or RO Train concerned;
2. MW and/or m³/h concerned i.e. MW and/or m³/h which will not be available as a result of the Outage and that which will, not withstanding the Outage, still be available;
3. required duration of Outage, including cool down time, turning gear operation and pre-synchronisation warm up requirements;
4. preferred start date and start time or range of start dates and start times;
5. whether the Outage is a Flexible Outage or an Inflexible Outage, provided that the Generator must not declare an Outage to be an Inflexible Outage unless prudent operating practice would not permit the Outage to be declared as a Flexible Outage; and
6. If it is a Flexible Outage:
    i. the period for which the Outage could be deferred at the request of DEWA, which period shall not be more than 30 days in length;
    ii. the period for which the Outage could be advanced at the request of DEWA, which period shall be not more than 10 days in length.

In relation to sub-paragraph (e) above, the Generator must provide DEWA with such evidence as it may reasonably require in order to substantiate the declaration as an Inflexible Outage and, if the Generator fails to establish to DEWA’s reasonable satisfaction that the Outage is required to be an Inflexible Outage, the Outage shall be deemed to have been submitted as a Flexible Outage with an attendant Flexible Outage Period of 10 days for advancement and 30 days for deferral.

For a Planned Outage in excess of 12 weeks, operational planning of each of these will be addressed in the relevant PPA/PWPA/WPA.

OC.5.1.2 By the end of August

For each week of the following October to April inclusive, DEWA will forecast the maximum Capacity that may be required from each Production Facility no later than 31 August. This forecast will be solely based on the maximum Capacity available as specified in the PWPA, WPA or PPA. Under normal circumstances this forecast will not be made available to the Generators however in the event this forecast is provided to Generators, this will be at the discretion of DEWA.

During the Period 31 March to 31 August DEWA may, as appropriate, contact each Generator which has supplied information to seek clarification of information received or such additional relevant information as is reasonable.

DEWA will on the basis of (i) the maximum Capacity required each week (ii) the Proposed Station Outage Schedules and (iii) the total available Capacity develop a Final Station Outage Schedule.

The Final Station Outage Schedule will contain the following information in relation to each proposed Planned Outage:

Identity of the Power Units and/or RO Trains concerned;
1. MW and/or m³/h concerned (i.e. MW and/or m³/h which will not be available as a result of the Outage and that which will, not withstanding the Outage, still be available);
2. whether the Outage is a Flexible Outage or an Inflexible Outage;
3. start date and start time;
4. if it is a Flexible Outage:
5. the period for which the Outage could be deferred at the request of DEWA, which period shall be not more than 30 days in length
6. the period for which the Outage could be advanced at the request of DEWA, which period shall be not more than 10 days in length.

OC.5.2 Flexible Outage Movements

In the case of a Flexible Outage, DEWA may, upon giving a Generator written notice of not less than 7 days require the start date or start time of the Flexible Outage to be advanced or deferred within the Flexible Outage Period, the Generator will take that Outage in accordance with the revised timing set out in that notice.

OC.5.3 Amendments to Planned Outages

In the cases of:
- a Flexible Outage which DEWA would like to move outside the Flexible Outage Period
- a Flexible Outage which DEWA would like to move within the Flexible Outage Period at less than seven days notice
- an Inflexible Outage which DEWA would like to move.

DEWA may, upon giving a Generator written notice, request that the start date or start time of a Planned Outage be advanced or deferred.

If the Generator agrees to such advancement or deferral, or DEWA and the Generator agrees to some other advancement or deferral, the Generator will take the Outage in accordance with DEWA’s requirements.

If there is no agreement, then the Outage will not be taken by the Generator.

OC.5.4 Power Unit and/or RO Train Substitution

A Generator may, on reasonable grounds, by notice submitted to DEWA in writing at any time during the period October to April inclusive, request that a Power Unit and/or RO Train for which there is a Flexible Outage, as specified in the Final Station Outage Schedule, remain in service and that one of the other Power Units and/or RO Trains at the same Production Facility (having substantially the same Capacity and Operating Parameters) be permitted to be taken out of service during the period for which such Flexible Outage has been Planned. DEWA shall not unreasonably withhold its consent to such substitution and, if DEWA does consent, the Final Station Outage Schedule shall be amended and the Generator shall be entitled to take the Outage accordingly.

OC.5.5 Short Notice Outages

At any time a Generator may request from DEWA a Short Notice Outage. The request notice must contain the following information:

- identity of the Power Unit(s) and/or RO Train(s) concerned;
- the reasons why the Short Notice Outage is being requested and the effect of the Short Notice Outage on the Operating Parameters and the equipment which is affected;
- the expected date and start time of the Short Notice Outage;
- the estimated date and time on which the Power Unit and/or RO Train and/or the plant is expected to return to commercial operation; and
- full details of any restrictions or Risk of Trip of a Power Unit and/or the RO Train and/or the plant caused by the problem associated with the Short Notice Outage.

On receipt of a request notice for a Short Notice Outage, DEWA shall consider the request and shall, having discussed the position with the Generator, reply in writing indicating:

- acceptance of the request, confirming the requested start time and duration of the Short Notice Outage; or
- proposals for the advancement or deferment of the Short Notice Outage if taken, indicating alternative start time and duration; or
- rejection of the request.

If DEWA has accepted the request, the Short Notice Outage, if taken, must be taken by the Generator in accordance with DEWA’s requirements.

If DEWA has indicated an alternative start time and/or duration, DEWA and the Generator must discuss the alternative and any other options which may arise during the discussions. If agreement is reached, then the Short Notice Outage, if taken, must be taken by the Generator in accordance with DEWA’s requirements.

If DEWA refuses the request or if agreement is not reached then the Short Notice Outage may not be taken by the Generator.

If, in respect of a particular Power Unit or RO Train, DEWA has rejected requests on two successive occasions, which were not more than 7 days apart, DEWA may not reject a third request. However, DEWA may require that such Outage, if it is to be during the Summer Period, be deferred if, in DEWA’s reasonable opinion, were the Short Notice Outage not to be deferred:

- the Transmission System security standards might not be met; or
- there would otherwise be insufficient generating Capacity to meet forecast Demand and the Operating Margin.

Any such deferral shall be for so long as the above circumstances exist, but shall not be beyond the end of the month following the end of the Summer Period.

In the event that a Short Notice Outage is scheduled pursuant to this subsection, DEWA shall by notice in writing to confirm the details thereof within one day after the details of the Short Notice Outage have been settled. Such notice shall contain the following information:

- the identity and Capacity of the Power Unit(s) and/or RO Train(s) concerned;
- full details of the problem;
- maximum allowed duration of the Outage; and
- the start date and start time.

OC.5.6 Forced Outages

In the event that a Power Unit and/or RO Train suffers a Forced Outage, the relevant Generators shall immediately inform DEWA by written notice and giving the Generator's best estimate of the date and time by which the Power Unit and/or RO Train is likely to have been repaired and restored to its full level of Availability.

A Generator shall, following a Forced Outage, provide DEWA with written notification as soon as possible, but no later than 24hours from the commencement of the Outage and shall thereafter provide updates, as DEWA may reasonable require in respect of such Forced Outage, every 24 hours. The Generator shall use all reasonable endeavours to ensure that the Power Unit and/or RO Train is repaired and restored to its full level of Availability as soon as possible and in accordance with Good Industry Practice.

OC.5.7 Release of Power Units and RO Trains

Generators may only undertake Planned Outages with DEWA agreement in accordance with Outage programmes produced pursuant to this Operational Planning Code.

Power Units or RO Trains must not be withdrawn for a Planned Outage or a Short Notice Outage without DEWA's formal permission for such release according to the procedures set out below.

DEWA's formal permission shall specify:
- the identity of the Power Unit and/or RO Train and Capacity concerned (i.e. Capacity which will not be available as a result of the Outage and that which will, notwithstanding the Outage, still be available, if any);
- the duration of the Outage; and
- the start date and start time.

DEWA may withhold its permission for the release of a Power Unit and/or RO Train for a Planned Outage or a Short Notice Outage where such Outage has previously been planned in accordance with this Operational Planning Code where, in DEWA's reasonable opinion (were such Outage not to be deferred):
- the Transmission System security standards could not be met; or
- there would be insufficient Capacity to meet forecast Demand and the Operating Margin.

DEWA may require the Generator to continue to defer such Outage for so long as the above circumstances exist.

OC.5.8 Return to Service and Overruns

Where a Power Unit is not expected to be fully available upon its return to service, the Generator shall state the Active Power level at which the Power Unit is expected to be available. In the case of a Power Unit that is capable of generating from more than one primary resource of energy, the Availability must be stated for each resource. When a RO Train is not expected to be fully available upon its return to service the Generator should state the capacity at which the RO Train is expected to be available.

In the case of a return from a Planned Outage earlier than expected, notice of return to service must be given as far as possible in advance of return but in any event not later than 7

days before the expiry of the Planned Outage period. It shall be at DEWA's sole discretion to accept whether the Planned Outage has ended.

In the case of a return from a Planned Outage later than expected, notice of return to service must be given not later than 2 days before the expiry of the Planned Outage period and shall state the reason for the delay in the return of the Power Unit and/or RO Train to service and the Generator's best estimate of the date and time at which the Power Unit and/or RO Train will return to service.

During the period of delay in returning the Power Unit and/or RO Train to service the applicable penalty factor as specified in the PPA, PWPA or WPA shall be applied to the deduction for unavailability.

When a Planned Outage takes longer than expected, any subsequent Planned Outage which was to commence during the delay period shall not be taken unless agreed with DEWA.

A Generator must use all reasonable endeavours to ensure that, in respect of each Planned Outage, the Planned Outage as included in the Final Station Outage Schedule (or as moved in accordance with this Operational Planning Code) is carried out.

Before returning from any Outage other than a Planned Outage, a Generator must inform DEWA, as far in advance as reasonably possible that its Power Unit and/or RO Train is returning to service. The Generator must, in addition, provide an Availability Notice in accordance with the Scheduling and Dispatch Code on the day prior to the Schedule Day on which the Power Unit and/or RO Train is to return to service.

If at any time during an Outage the Generator becomes aware that its Power Unit and/or RO Train will not be Available by the expiry of the period specified for the duration of the Outage in the Final Station Outage Schedule or as otherwise notified in the case of Outages other than Planned Outages, the Generator shall notify DEWA immediately in writing stating the reason for the delay and the Generator's best estimate of the date and time by which the Power Unit and/or RO Train will actually have been maintained, repaired or restored to be Available in accordance with the Scheduling and Dispatch Code.

OC.6 Data Requirements

Each Generator shall submit in writing to DEWA prior to the end of each Operational Year the following data for the next Operational Year in respect of each Power Unit:

- the Generator Performance Chart; and
- the Operating Parameters to be applied from the beginning of the next Operational Year.

The submissions shall be in the format indicated in Appendix B and Appendix C. The data shall be reconfirmed annually even where it has already been provided or specified under a PPA or PWPA.

DEWA shall use the Operating Parameters for Operational Planning purposes only and not for Scheduling and Dispatch. These data will however, form the basis for Operating Parameters that the Generators will submit/update within the Scheduling and Dispatch Codes.

In the case of a Power Unit which is capable of generating from different primary resources of energy, the Generator shall submit to DEWA, the Operating Parameters in respect of each resource, each clearly marked to indicate for which resource it applies.

The Generator Performance Charts must be submitted for each Power Unit separately showing output at the generator terminals under reference conditions. They shall include the details shown in Appendix C.

The Generator Performance Chart shall be supported by correction curves or formulas to enable DEWA to assess the variation in performance over expected ambient temperatures and for other parameters that could affect the output of the Power Unit from reference conditions.

For each Production Facility with both RO Trains and Power Units, Generators shall submit in writing to DEWA the combination of RO Trains and Power Units that could be running for any given combination of Capacity and Desalinated water outputs.

Each Generator shall provide details of the automatic generation control capability for each Power Unit.

Appendix A. Format for Submission of Proposed Station Outage Schedules from Generators

A.1: Format for Submission of Proposed Station Outage Schedules from Generators

To Production Planning (Gen)/ Transmission Operations Department			**Fax No:**
FROM:	PRODUCTION FACILITY		
PROPOSED STATION OUTAGE SCHEDULE FOR		YEAR	Date sent:

Power Unit No	**Registered Capacity MW**	**Unavailable Capacity MW**	**Outage duration**	**Preferred start date or range of start dates**	**Flexible Outage or not**	**If Outage flexible. Period Outage could be deferred**	**advanced**
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Appendix A1. Format for Submission of Proposed Outage Schedules for RO Trains

To Production Planning Operations Department		Fax No:	
FROM:	WATER PRODUCTION FACILITY		
PROPOSED OUTAGE SCHEDULE FOR RO TRAIN		YEAR	Date sent:

Desalination Plant name/Train No.	Registered Capacity (m^3/h)	Unavailable Capacity (m^3/h)	Outage duration	Preferred start date or range of start dates	Flexible Outage or not	If Outage flexible. Period Outage could be	
						deferred	advanced

Appendix B. Operating Parameters for Power Units

The following parameters are required for each Power Unit

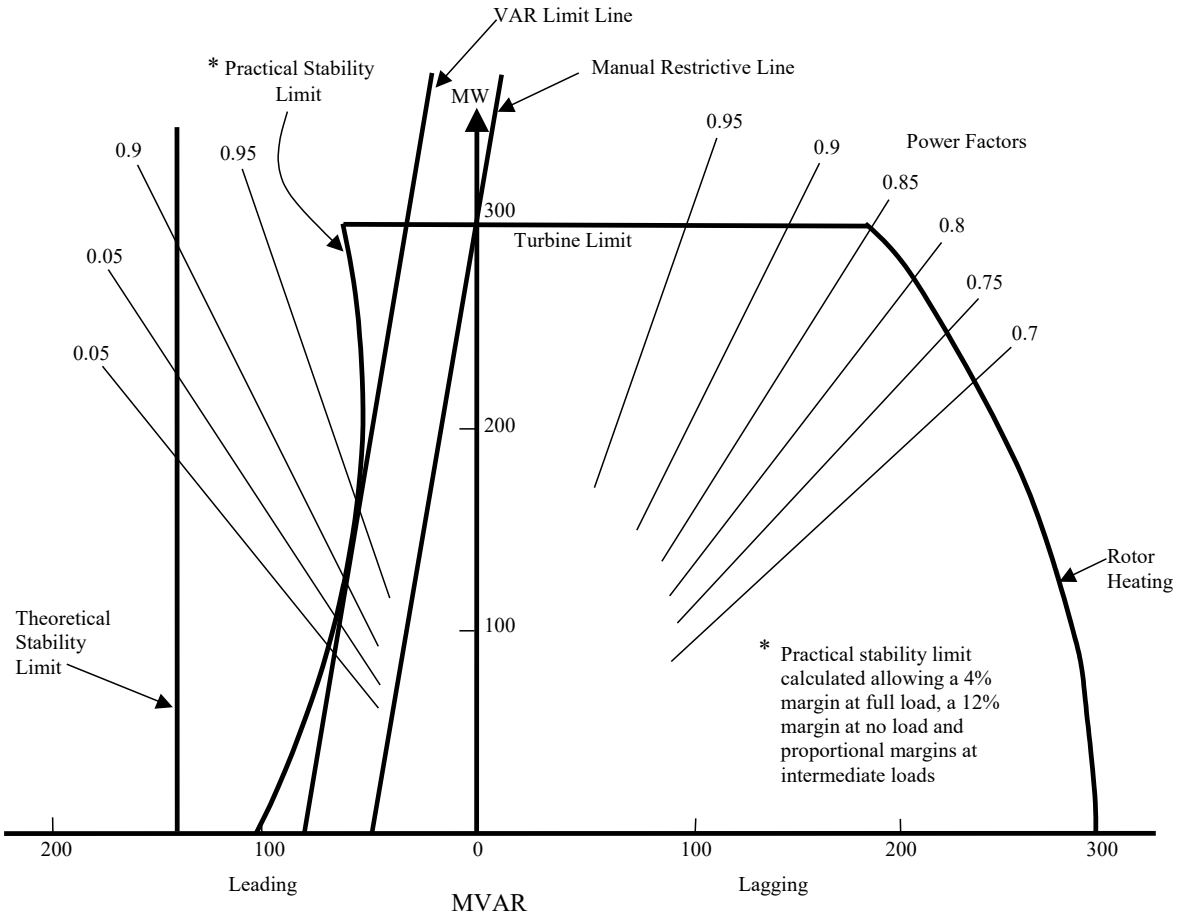
Registered Capacity under reference conditions supported by curves showing changes in output for significant variables such as temperature.

For each Power Unit:

a. the minimum notice required to synchronise the Power Unit or a CCGT Module from a condition of de-synchronisation
b. the minimum time between synchronising different Power Units or CCGT Modules in a Production Facility
c. the minimum Power Unit Active Power requirements on synchronising, expressed as a block Load in the case of a power generating facility (with more than one Power Unit) e.g. gas turbine generating set and a steam turbine generating set
d. maximum Power Unit, or CCGT Module, loading rates from synchronisation for the following conditions:
    i. Hot
    ii. Warm
    iii. Cold
e. minimum time off load
f. maximum Power Unit, or in the case of a CCGT Module, deloading rates for the following conditions:
    i. Hot
    ii. Warm
    iii. Cold

Appendix C. Typical Generator Performance Chart

C.1: Typical Generator Performance Chart



Independent Water and Power Producers' Code

Scheduling and Dispatch Code 1

Content

SDC1 Scheduling and Dispatch Code SC1 - Generation and Desalination Scheduling

SDC1.1 Introduction

The scheduling of Power Units and/or Water Production Facility depends on the pattern of Demand on the Transmission System, the running cost of each Production Facility, Desalination requirements of DEWA, and the flexibility of operation of Power Units.

SC1 sets out the following procedures to facilitate production of a Generation Schedule and Desalination Schedule.

- the submission of a Daily Status Form (and revisions) by Generators to DEWA for the Power Units and RO Trains including the mode of operation for each Power Unit; and
- the issue by DEWA of a Generation Schedule and Desalination Schedule on the day before the next Schedule Day as a statement of which Power Units and capacity of the Water Production Facility may be required.

SDC1.2 Objective

The objectives of SC.1 are as follows:

- To specify the data to be provided by Generators to enable DEWA to prepare the Generation Schedule and Desalination Schedule; and
- To specify the timetable for the preparation and issue of the Generation Schedule and Desalination Schedule.

SDC1.3 Scope

The Scheduling Code SC1 applies to DEWA and to the Generators.

SDC1.4 Procedures

The timetable for main actions within this Code is given in Appendix A.

Where information is requested in writing throughout this Code, facsimile transmission or other electronic means as agreed with DEWA in writing may be used. All correspondence shall be in the English language.

SDC1.4.1 Data Provided to DEWA by the Generators

1. Availability Notice

By 10:00 hours each day, each Generator shall notify DEWA in writing of the Availability of each of its Power Units and RO Trains by means of an Availability Notice in the Daily Status Form set out in Appendix B to this SDC1. The Availability Notice shall state the Availability of each Power Unit or RO Train to apply for the following Schedule Day.

Such Availability Notice will replace any previously submitted Availability Notice.

Where the following Schedule Day is a Friday, the Generator shall notify DEWA of the Availability of its Power Units and RO Trains for the Friday, Saturday and Sunday. Where the following Scheduled Day is a public holiday the Generator shall notify DEWA of the Availability of its Power Units and RO Trains for all days up to and including the next working day. If the public holiday falls on a Sunday, then the Generator shall notify DEWA of the Availability of its Power Units and RO Trains for the Friday, Saturday, Sunday and Monday.

2. Operating Parameters

By 10:00 hours each day, each Generator shall notify DEWA in writing of any revisions to the Operating Parameters of each of its Power Units to those submitted under a previous declaration. The data shall be submitted in the Daily Status Form set out in Appendix B to this SDC1.

The Operating Parameters shall reasonably reflect the operating characteristics expected on the Schedule Day, including the mode of operation for each Power Unit. In so far as not revised, the previously submitted Operating Parameters will apply.

3. Other Relevant Scheduling and Dispatch Data

By 10:00 hours each day, each Generator in respect of each of its Power Units and RO Trains declared available shall notify DEWA in writing of the following:

- details of any special factors which may have a material effect on the likely output of such Power Unit and/or RO Train;
- any temporary changes and their possible duration, to the Operating Parameters of each of its Power Units; and
- the data to be provided in SDC1.4.1 1, 2 and 3 shall form the Daily Status Form.

4. Redeclarations

If at any time after the submission of the Daily Status Form the Generator becomes aware of any change to any of the values in its Availability Notice or Operating Parameters that shall apply to any Operating Parameters before the end of the relevant Schedule Day, it shall promptly notify DEWA in writing by submitting a Daily Status Form showing the changed data only and the time submitted.

5. Failure to submit

Failure to submit a Daily Status Form in accordance with SC1.4.1 shall result in the following:

- DEWA shall endeavour to contact the Generator to see if a Daily Status Form was sent and not received. If this is the case the Daily Status Form shall be resent immediately;
- If no Daily Status Form is received by 12:00 hours DEWA shall, for the purposes of Scheduling and Dispatch, use the data provided in the previous day's Daily Status Form received from that Generator; and
- For the purposes of payment under the PPA/PWPA, the Power Unit's Availability will be deemed to be the level of Active Power dispatched by DEWA.
- For the purposes of payment under the WPA/PWPA, the Water Production Facility's Availability will be deemed to be the Capacity dispatched by DEWA.

SDC1.4.2 Compilation of the Generation Schedule and Desalination Schedule

1. Production of Schedules

For the following Schedule Day, DEWA shall produce the Generation Schedule and Desalination Schedules by 15:00 each day, taking due consideration of the following factors:

a. forecast Demand and geographical demand distribution;
b. declared Power Unit Active Power capabilities;
c. declared Power Unit Ancillary Service capabilities;
d. declared Operating Parameters;
e. declared Power Unit inflexibilities;
f. declared RO Train capabilities;
g. system Operating Reserve requirements;
h. Transmission System stability issues;
i. system Frequency control;
j. Operating Margin;
k. forecast demand for Desalinated water;
l. Transmission System constraints together with relevant standards and other constraints;
m. Transmission System losses;
n. Interconnector information;
o. Ancillary Service requirements; and
p. other factors as may be reasonably considered by DEWA to be relevant.

DEWA shall issue provisional running orders based upon the Generation Schedule and Desalination Schedule for each hour of the Schedule Day to each Generator for each of its Power Units and the Water Production Facility by 16:00 hrs on the day preceding the relevant Schedule Day.

The Provisional Running Orders issued to each Generator by DEWA shall contain information relating to the Power Unit(s) of that Generator only and shall indicate, for each of its Power Units, the planned loading pattern for the Schedule Day.

Appendix A. Timescale Diagram For Main Actions From Scheduling & Dispatch Code 1

(Note that following are summaries only and reference should be made to Scheduling & Dispatch Codes for full details.)

Table A.1: Appendix A. Timescale Diagram For Main Actions From Scheduling & Dispatch Code 1

	Operating day 1 Data to be provided for Operating day 0		
	By 10:00 hrs	By 12:00 hrs	By 16:00 hrs
All Generators notify DEWA in writing			
	Availability Notice (SDC1 Appendix A, Table 1)		
	Any revisions to Scheduling & Dispatch parameters (SDC1 Appendix A, Table 1)		
	Details of any special factors likely to affect output of Power Units (SDC1 Appendix A, Table 2)		
	Any temporary changes and duration to registered data (SDC1 Appendix A, Table 2)		
	Voltage & MVAr reserve requirements (SDC1 Appendix B, Table 1)		
	Any temporary changes to registered Demand management data		
	Constraints on its system that DEWA may need to consider		
	Requirements for voltage control and Mvar reserves (SDC1 Appendix B, Table 2)		
	Any other information agreed with DEWA		
DEWA actions			
		If any party does not submit data, DEWA will use the latest data submitted.	

Operating day 1 Data to be provided for Operating day 0		
By 10:00 hrs	By 12:00 hrs	By 16:00 hrs
DEWA produces the Generation Schedule & Desalination Schedule for SD1 after considering -		Forecast demand and geographic demand distribution
		Declared Power Unit MW capabilities
		Declared Water Production Facility capabilities
		Declared Power Unit Ancillary service capabilities
		Declared Operating Characteristics
		Other relevant data
DEWA issues provisional running orders for each Power Units & the Water Production Facility ()		
		Information only provided to relevant Generators.

Notes

1 Provisional running orders are indicative only and are not Dispatch Instructions.

Appendix B. Daily Status Form

(SEE NOTES ON SHEET 5)

Sheet 1 of 4

To Production Planning (Gen)/Transmission Operations Department	**Fax No:** **Fax No**
FROM: Production Facility	
Date-Schedule Day:	
Today's date: Time sent:	

Table B.1: Power Units

Temperature basis of Availability declaration	0C

Power Unit No	Registered Capacity MW	Availability Notice MW	Changes to Operating Parameters (Use code from sheet 4 followed by new value)	
			Code	Revised Value
1				
2				
3				
4				
5				
6				
7				
8				
9				

Sheet 2 of 4

Table B.2: Detail any Special Factors or Temporary Changes that may affect Power Units or RO Train outputs.

Date-Schedule Day:				
Power Units/ RO Train no.	Description of Special Factor/Temporary Change	Expected Start Time	Expected End time	Expected Duration Hrs/Mins

Sheet 3 of 4

Table B.3: Generating Plant Performance Data Codes

Item	Performance item	Units	Code
1	Minimum Generation	MW	MG
	At full load		
2	Maximum lagging Mvar	Mvar	Flvarlag
3	Maximum leading Mvar	Mvar	Flvarlead
	At minimum load		
4	Maximum lagging Mvar	Mvar	Mlvarlag
5	Maximum leading Mvar	Mvar	Mlvarlead
6	Maximum emergency generation	MW	MEG
7	Minimum generation time	Hrs/mins	Min on
8	Minimum off-time	Hrs/mins	Min off
9	Notice to synchronise/start up	Hrs/mins	NSS
10	Synchronising block load	MW	SBL
11	Time between starting/ synchronising Gensets	Hrs/mins	TbeSynch
12	Time between stopping/ desynchronising Gensets	Hrs/mins	TbeStop
13	Maximum water production	Cu mtr/hr	Max Prod
14	Minimum water production	Cu mtr/hr	MinProd
15	Change to Ancillary Service Capability	■	ASC
16	Governor not in frequency mode	■	NFM
17	Change to Primary Response characteristics	■	PrimResp
18	Change to Secondary Response characteristics	■	SecResp
19	Change to Tertiary Reserve characteristics	■	TertResp
20	Abnormal loading rate	■	ALR
21	Special factor	■	SF
22	Temporary change	■	TC
23	Risk of Trip	■	RoT
24	Restriction of fuel supplies, i.e. Gas, Coal	■	SupRes

Note

1. These data should be entered in sheet 1 but detailed in sheet 2
2. All other data should be entered and data given in sheet 1

Sheet 4 of 4

GENERAL NOTES

Generators when making the daily submissions of Availability to DEWA will address the following factors. Most regular issues will be covered by responses in Table 1 using heading codes from Table 3. All other issues will be tabulated on a Power Unit/ RO Train basis in Table 2.

1. Power Unit basic data;
2. Minimum Generation;
3. Maximum Generation and/or RO Train increase in output above declared Availability;
4. Power Unit minimum on time;
5. Minimum shutdown time;
6. Power Unit and/or RO Train inflexibility (inflexibility description, start date and time, end date and time, MW, m^3/h);
7. Power Unit Synchronising intervals (hot time interval, off-load time interval).
8. Power Unit Synchronising generation output MW;
9. RO Train startup intervals (hot time interval, off load time interval).
10. Station Power Unit Desynchronising intervals;
11. Station RO Train shut-down intervals;
12. RO Train basic data;
13. Minimum water production;
14. Maximum water production;
15. Constraints on Power Unit output for range of associated RO Train outputs;
16. Power Unit two shifting limitation;
17. Power Unit Synchronising groups;
18. Power Unit run up rates with MW breakpoints;
19. Power Unit run-down rates with MW breakpoints;
20. Power Unit loading rates covering the range from Minimum Generation to declared power Capacity; and
21. Power Unit de-loading rates covering the range from declared power Capacity to Minimum Generation.

Independent Water and Power Producers' Code

Scheduling and Dispatch Code 2

Content

SDC2 Scheduling and Dispatch Code 2

SDC2.1 Introduction

SDC2 sets out the procedures for the issue of Dispatch Instructions by the Transmission Control Centres.

In the order to meet Demand at minimum cost and with an appropriate margin of reserve, whilst maintaining the security and quality of electricity supply and provision of Desalinated water and taking account of operational constraints, DEWA needs to:

- re-optimise Generation Schedule and Desalination Schedule as required; and
- issue Dispatch Instructions to Power Unit and the Water Production Facility.

SDC2.2 Objective

This code covers the procedures for the issue of Dispatch Instructions by DEWA to meet Demand and Desalinated water requirements at minimum cost, taking account of operational constraints whilst maintaining the integrity of Transmission System security and the quality of electricity and/or desalinated water supply.

SDC2.3 Scope

This Schedule and Dispatch Code SDC2 applies to DEWA and to the Generators.

SDC2.4 Procedures

Where information is requested in writing throughout this Code, facsimile transmission or other electronic means as agreed with DEWA in writing may be used. All correspondence shall be in the English language.

SDC2.4.1 Data

The information that DEWA shall use in preparing Dispatch Instructions, will be:

- the Generation Schedule and Desalination Schedule;
- the declared Availability (Daily Status Form); and
- other relevant data in respect of that Power Unit / Water Production Facilities, as determined by DEWA.

The Operating Parameters to be used in the Dispatch phase to assess which Power Units to Dispatch will be those used by DEWA to compile the Generation Schedule and Desalination Schedule as described in SDC1.4.

SDC2.4.2 Dispatch Instructions to Generators

Dispatch Instructions relating to the Schedule Day will normally be issued during the Schedule Day however Dispatch Instructions can also be issued at any time during the period beginning immediately after the issue of the Generation Schedule and Desalination Schedule in respect of that Schedule Day.

A Dispatch Instruction given by DEWA for a Power Unit may involve a change in output of Active Power, a change in Reactive Power, a change to the mode of operation or a Dispatch Instruction to provide an Ancillary Service by a specific Power Unit

A Dispatch Instruction for the Water Production Facility may involve a change in output or a change in the range for chlorine dioxide range (mg/l C1O2) provided such range remains within the range required under the WPA or PWPA.

A Dispatch Instruction given by DEWA to a Generator will be given orally by telephone and all telephone conversations between the Transmission Control Centres and the Generators will be recorded by DEWA.

A Dispatch Instruction must be either formally acknowledged immediately by the Generator in respect of that Power Unit and/or the Water Production Facility by telephone, or a reason given immediately for non-acceptance. The reason for non-acceptance may only be on safety grounds (relating to personnel or Production Facility) or because the Dispatch Instruction is not in accordance with Power Units Operating Parameter, Availability of Power Units and RO Trains forming part of the Water Production Facility as declared in the Daily Status Form relevant to the period to which the Dispatch Instruction relates.

For a Dispatch Instruction to be valid, it must observe the limits of Availability, Ancillary Service capability and Operating Parameters as properly declared to DEWA in accordance with SDC1.

In the event that an unforeseen problem arises in carrying out the Dispatch Instruction, DEWA must be notified without delay by telephone.

SDC2.4.3 Generation Synchronising and Desynchronising Times

DEWA will determine the required timing of Synchronising and Desynchronising of Power Units.

If the Generator is unable to meet the Synchronising time, it must inform DEWA immediately. If the estimate of the Synchronising time is later than the instructed time by more than 10 (ten) minutes, this will constitute a redeclaration of Availability by the Power Unit as defined in SDC1.4.1. If the Synchronising time is early by more than one minute, DEWA shall keep a record.

When DEWA issues a Dispatch Instruction for a Power Unit and/or a Water Production Facility to a Generator not in accordance with the data submitted on Daily Status Form, the Generator must immediately contact DEWA to indicate the error. DEWA will take immediate steps to amend the Dispatch Instruction.

SDC2.4.4 Additional Instructions to Power Units

Additional Instructions to Power Units may include the following:
1. Reactive Power

To ensure that a satisfactory system voltage profile and that sufficient Reactive Power reserves are maintained, Dispatch Instructions may include, in relation to Reactive Power:

a. **Reactive Power output**. The Reactive Power output from the individual Power Unit onto the Transmission System at the Power Unit's Electrical Delivery Point. Where a Power Unit is instructed to a specific Reactive Power output, the Generator must achieve that output within a tolerance of ± 5 Mvar (or such other figure as may be agreed with DEWA) by either:
   i. on load tap changing on the Power Unit step-up transformer; or
   ii. adjusting the Power Unit terminal voltage.

Once this has been achieved, the Generator will not tap change again or adjust terminal voltage again without prior consultation with and the agreement of DEWA, on the basis that Reactive Power output will be allowed to vary with Transmission System conditions.

b. **Target Voltage Levels**. Target voltage levels to be achieved by the Power Unit on the Transmission System at the Power Unit's Electrical Delivery Point. Where a Power Unit is instructed to a specific target voltage, the Generator must achieve that target within a tolerance of ± 0.5 kV (or such other figure as may be agreed with DEWA) by either:
   i. on load tap changing on the generator step-up transformer; or
   ii. adjusting the Power Unit terminal voltage.

   Under normal operating conditions, once this target voltage level has been achieved the Generator will not tap change again or adjust terminal voltage again without prior consultation with, and with the agreement of, DEWA.
   However, under certain circumstances the Generator may be instructed to maintain a target voltage until otherwise instructed and this will be achieved by on load tap changing on the Power Unit step-up transformer or adjusting Power Unit stator terminal voltage. In such circumstances the Generator shall decide how best to achieve the target voltage instructed by DEWA.
   Voltages on the Transmission System at each Electrical Delivery Point will normally remain within the limits 415 kV to 380 kV for the 400 kV level and 138.6 kV and 125.4 kV for the 132 kV level, unless abnormal conditions prevail. Under fault conditions, voltage may collapse transiently to zero at the point of fault until the fault is cleared

c. **Maximum Reactive Power output ("maximum excitation")** Under certain conditions, such as low system voltage, a Dispatch Instruction to maximum Reactive Power output at instructed Active Power output ("maximum excitation") may be given, and a Generator should take appropriate actions to maximise Reactive Power generation unless constrained by plant operational limits or safety grounds (relating to personnel or plant).

d. **Maximum Reactive Power Absorption ("minimum excitation")** Under certain conditions, such as high system voltage, a Dispatch Instruction to maximum Reactive Power absorption at instructed Active Power output ("minimum excitation") may be given, and a Generator should take appropriate actions to maximise Reactive Power absorption unless constrained by plant operational limits or safety grounds (relating to personnel or plant).

In addition:

   i. DEWA may issue Dispatch Instructions for Active Power and Reactive Power at any point on or within boundaries of the Generator Performance Chart as modified by any temporary changes submitted in the Daily Status Form. Any failure of a Generator to achieve these potential Instructions within the agreed times shall be recorded as a Forced Outage by DEWA;
   ii. The issue of Dispatch Instructions for Active Power at the Power Unit’s Electrical Delivery Point will be made with due regard to any resulting change in Reactive Power capability and may include a Dispatch Instruction for reduction in Active Power generation to enable an increase in Reactive Power capability;
   iii. The excitation system, unless otherwise agreed with DEWA, must be operated only in its constant terminal voltage mode of operation with Var limiters in service. Any constant Reactive Power output control mode or constant power factor output control mode must always be disabled, unless agreed otherwise with DEWA. In the event of any change in the system voltage, a Generator must not take any action to override automatic Reactive Power response that is produced as a result of constant terminal voltage mode of operation unless instructed otherwise by DEWA or unless immediate action is necessary to comply with stability limits or unless constrained by plant operational limits or safety grounds (relating to personnel or plant);
   iv. A Dispatch Instruction relating to Reactive Power will be implemented without delay and shall be achieved not later than 2 minutes after the Dispatch Instruction time, or such longer period as DEWA may instruct;

v. On receiving a new Dispatch Instruction for Active Power, no tap changing or generator terminal voltage adjustment shall be carried out to change the Reactive Power output unless there is a new Dispatch Instruction for Reactive Power;
vi. Where a Dispatch Instruction to synchronise is given, or where a Power Unit is synchronised and a Dispatch Instruction for Active Power is given, a Dispatch Instruction for Reactive Power consistent with the Power Unit relevant Operating Parameters may be given. In the absence of a Dispatch Instruction for Reactive Power with a Dispatch Instruction to synchronise, the Reactive Power output shall be 0 Mvar; and
vii. Where a Dispatch Instruction to desynchronise is given, a Dispatch Instruction for Reactive Power, compatible with shutdown, may be given prior to Desynchronisation being achieved. In the absence of a separate Dispatch Instruction for Reactive Power, it is implicit in the Dispatch Instruction to desynchronise that Reactive Power output shall be reduced to 0 Mvar by the time of desynchronisation.

2. Frequency Sensitive Mode
DEWA may instruct a change to or from the Frequency Sensitive Mode for each Power Unit.

3. Tests
A Dispatch Instruction may be issued to carry out tests.

SDC2.5 Action required from the Generator

Each Generator will comply with all Dispatch Instructions correctly given by DEWA unless the Generator has given notice to DEWA under the provisions of the Scheduling and Dispatch Code regarding non-acceptance of Dispatch Instructions.

Each Generator must utilise the relevant run-up or run-down rate and loading or deloading rate in accordance with the Operating Parameters.

To preserve Transmission System integrity under Emergency Conditions DEWA may issue Emergency Instructions. Such Emergency Instructions will be issued by DEWA direct to the Generator and may require an action or response that is outside Operating Parameters. The Generator will use reasonable endeavours to achieve these Emergency Instructions without prejudice to the safety of the plant or personnel.

SDC2.6 Synchronisation/Desynchronisation

Generators will only synchronise or desynchronise Power Units in response to the Dispatch Instructions from DEWA. Desynchronisation may take place without DEWA's prior agreement if it occurs automatically as a result of Power Unit or Transmission Protection operations or it is done purely on immediate safety grounds.

SDC2.7 Instructions Following Parameter Changes

If DEWA fails to issue a new Dispatch Instruction within 15 (fifteen) minutes of being notified of an Operating Parameter change then the relevant Generator shall be entitled to change the operation of such Power Unit to bring its operation within the applicable Availability and/or Operating Parameters until DEWA issues a new Dispatch Instruction within the applicable Availability and/or Operating Parameters. Prior to making such a change in operation, the Generator will use reasonable endeavours to advise DEWA (by telephone and then confirmed in writing) of its intended action and timing.

SDC2.8 Request for Operation Under Risk

A Generator may request DEWA agreement for one of the Power Units and/or the Water Production Facility to be operated under Risk of Trip. DEWA's agreement will be dependent on the evaluation by DEWA of the risk to the Transmission System arising from the potential trip of the Power Unit and/or the Water Production Facility.

Appendix A. Dispatch Instructions

A.1. Form of Dispatch Instruction

DEWA will give Dispatch Instructions to Generators by telephone.

The Dispatch Instructions will normally follow the form:

a. an exchange of operator names;
b. the specific Power Unit and/or Water Production Facility to which the Instruction applies;
c. the output to which it is instructed;
d. if the start time is different from the time the Instruction is issued, the start time will be included;
e. where specific Power Unit run-up/Power Unit run-down rates or Power Unit Loading/ Power Unit de-loading rates are concerned, a specific target time;
f. the issue time of the Instruction.

All Power Unit run-up/ Power Unit run-down rates and Power Unit loading/ Power Unit deloading rates will be assumed to be constant and in accordance with Operating Parameters.

Unless a loading programme is also given at the same time it will be assumed that the Power Units are to be brought to minimum generation and 0 Mvar output.

DEWA will issue a further Dispatch Instruction when the Generator reports that the Power Unit has synchronised.

Unless a separate Reactive Power Dispatch Instruction is given, the Power Unit will be brought to 0 Mvar (at the point of synchronism) prior to desynchronisation.

A.2. Voltage Control Instruction

To ensure adequate system voltage profiles and Reactive Power reserves are maintained under normal and fault conditions a range of voltage control Instructions will be utilised. These include;

a. increase/decrease Reactive Power to specified Mvar export or import levels;
b. Maximum Mvar output (or "maximum excitation");
c. Maximum Reactive Power absorption (or "minimum excitation");
d. Increase Power Unit step-up transformer tap position by one tap or go to a specified tap position;
e. Achieve a target voltage and then allow the voltage vary with system conditions;
f. Maintain a target voltage until otherwise instructed. Tap change (or adjust generator terminal voltage) as necessary.

A.3. Frequency Control

All Dispatch Instructions will be deemed to refer to target output at the instructed Target Frequency when the Power Unit is in the Frequency Sensitive Mode.

Power Units are required to operate in Frequency Sensitive Mode in the configurations set out in the relevant PPA/PWPA.

Frequency control Dispatch Instructions may be issued in conjunction with or separate from Dispatch Instruction for Active Power output.

A.4. Tertiary Reserve

Tertiary Reserve will be specifically instructed as required and will normally be given with the Dispatch Instruction as an additional item.

A.5. Black Start

In the event that a Black Start is required the Dispatch Instruction will confirm that the Generator should undertake a Black Start and the time at which the Black Start should commence.

A.6. Emergency Instruction

In the event that an Emergency Instruction is given the instruction will include that the Dispatch Instruction is being given under Transmission System Emergency Conditions.

Independent Water and Power Producers' Code

Water Connection Conditions Code

Content

Tables

WCC Water Connection Conditions for the IWPP Code

WCC.1 Introduction

The Water Connection Conditions Code specifies the minimum technical, design and operational criteria that must be complied with by Generators Connected or seeking to be Connected to the Water Transmission System for the purpose of exporting Desalinated water from their Water Production Facility to the Water Transmission System, and the minimum technical, design and operational criteria, which must be complied with by DEWA. These criteria are required for the Protection of the Water Transmission System and the Generators' Apparatus Connected to the Water Transmission System.

Each Generator will have a PWPA or WPA with DEWA that is specific to that Generator's Connection to the Water Transmission System. Where there is any possible conflict, this Water Connection Conditions Code takes precedence.

WCC.2 Objective

The objective of this Water Connection Conditions Code is to ensure that by specifying minimum technical, design and operational criteria the basic rules for Connection to the Water Transmission System and to a Generator's Apparatus are similar for all Generators.

WCC.3 Scope

This Water Connection Conditions Code applies to DEWA and to Generators that have entered into a PWPA or WPA with DEWA.

WCC.4 Procedure

The WPA/PWPA contains provisions relating to the procedure for Connection to the Water Transmission System.

WCC.5 Connection

Prior to the Generators' Water Equipment being connected to DEWA's Water Connection Equipment, the following information is to be submitted by the Generator:

a. Updated data with any estimated values assumed for planning purposes confirmed or, where practical, replaced by validated actual;
b. All studies shall have been completed and the Protection measures for the plant and Water Transmission System agreed with DEWA;
c. Typical information to enable Generators to prepare Water Connection Site Responsibility Schedules on the basis of the provisions set out in Appendix A. The final information will be agreed with DEWA;
d. A Water Operation Diagram for all Apparatus relating to the delivery of water on the Generator side of the Desalinated Water Delivery Point;
e. A list of Safety Coordinators together with contact details;

f. A list of the telephone numbers for joint system incidents at which senior management representatives nominated for the purpose can be contacted and confirmation that they are fully authorised to make binding decisions on behalf of the Generator;
g. A list of managers who have been duly authorised to sign Site Responsibility Schedules on behalf of the Generator together with contact details;
h. The Water Connection Site Common Drawings.
i. Meter Registration System data;
j. The Generator shall provide to DEWA as built drawings and all technical details of the SCADA equipment for DEWA to reflect the same at the Water Control Centre; and
k. Any other information required by DEWA relating to the Connection of Water Equipment to the Water Transmission System.

WCC.6 Technical, Design and Operational Criteria

WCC.6.1 General Requirements

All plant and Apparatus associated with the water Connection to the Water Transmission System shall comply with the following standards, as applicable, in the following order of precedence:

- Safety Rules;
- DEWA Standards, which are such national standards as may be approved by and amended;
- national standards and codes which are accepted internationally.

It is recommended that Generators take precautions against disturbances on the Water Transmission System.

Generators shall consult DEWA with respect to Protection adequacy and ensure that the Protection requirements set by DEWA are met.

WCC.6.2 Water Delivery Requirements

The water delivery requirements including flow rates, delivery pressure, delivery temperature, reservoir levels, reservoir capacity, pump status, valve status, pipeline flow and water quality shall be detailed in the PWPA or WPA.

Without prejudice to any higher standards set out in the PWPA or WPA, the Generator shall comply with the Water Quality Regulations.

WCC.6.3 Dispatch Inaccuracies

A Dispatch Instruction for the Water Production Facility can either be by manual instruction or automatic control from Water Control Centre.

The standard deviation at steady state over a sixty minute period must not exceed 2.5 percent of the Dispatch Instructions.

WCC.6.4 Communications Equipment

In order to ensure control of the Water Transmission System, telecommunications between Generators and DEWA must be established in accordance with the requirements set down below.

WCC.6.4.1 Control Telephony

Control telephony is the method by which a Generator operator and DEWA control engineers speak to one another for the purposes of control of the Water Transmission System in both normal and Emergency operating conditions. Control telephony provides secure point-to-point telephony for routine control calls, priority control calls and Emergency control calls.

Details of and relating to the control telephony required are contained in the PWPA or WPA.

As required by SDC.2.4.2 all telephone conversations will be recorded by DEWA. Any conversation relating to plant Capacity shall be followed up by written redeclaration as required by SDC.1.4.1. If there is a dispute between the plant Capacity redeclaration recorded by telephone conversation and written communication, the recorded telephone conversation shall take precedence.

WCC.6.4.2 Operational Metering

DEWA shall provide supervisory control and data acquisition (SCADA) Outstation interface equipment at each Water Connection Site. The Generator shall provide such measurement outputs and plant status indications and alarms to DEWA's SCADA Outstation interface equipment as required by DEWA in accordance with the terms of the PWPA or WPA.

The typical general requirements for connection of such signals to DEWA's SCADA system will be agreed between DEWA and the Generator.

Metering System requirements shall be provided in accordance with the Metering and Data Exchange Code and in compliance with DEWA's standards and specifications.

The Generator shall provide all SCADA related data within the Water Production Facility and Water Connection Site to the SCADA outstation interface. The Generator shall notify DEWA for SCADA changes to be applied on the Production Facility in order for DEWA to implement the same at the Water Control Centers to keep consistency between the DEWA SCADA system and the Generator SCADA system. SCADA point to point testing shall be conducted together with DEWA and the Generator.

WCC.6.4.3 Facsimile Machines

Each Generator shall provide a facsimile machine at its Production Facility.

Each Generator shall, prior to Connection to the Water Transmission System notify DEWA of its telephone number, and shall notify DEWA of any changes.

DEWA shall provide a facsimile machine at its Water Transmission Control Centres.

Prior to Connection to the Water Transmission System, DEWA shall notify the Generator of the telephone number of its facsimile machine and shall notify any changes.

WCC.6.5 System Monitoring

To allow the monitoring of individual RO Trains, DEWA requires output signals from the monitoring equipment associated with each RO Train.

WCC.7 Site Related Conditions

In the absence of agreement between the parties to the contrary, construction, commissioning, control, operation and maintenance responsibilities follow ownership.

WCC.7.1 Responsibilities for Safety

Any Generator personnel entering and working on its plant and/or Apparatus on a Water Connection Site will work to the DEWA's Safety Rules (and any future revisions of these rules) unless otherwise agreed in writing. In the event that the Generator does not receive a copy of DEWA's Safety Rules the Generator's Safety Rules will apply

A Generator may apply to DEWA for permission to work according to that Generators own Safety Rules when working on its plant and/or Apparatus on DEWA sites. If DEWA is of the opinion that the Generator Safety Rules provide for a level of safety commensurate with that of DEWA's Safety Rules, it shall notify the Generator, in writing, that the Generator may use its own Safety Rules.

DEWA may apply to a Generator for permission to work according to DEWA Safety Rules when entering and working in a Generator's Production Facility. If the Generator is of the opinion that DEWA Safety Rules provide for a level of safety commensurate with that of that Generator Safety Rules, it shall notify DEWA, in writing, that DEWA may use its own Safety Rules. Until receipt of such notice, the Generator Safety Rules will apply.

WCC.7.2 Water Connection Site Schedules

A set of Water Connection Site schedules shall be prepared the Generators identifying the equipment and ownerships at the Water Connection Site, the Desalinated Water Delivery Point and the responsibilities for safety, control and maintenance.

The responsibilities for safety, control and maintenance shall be included in a Site Responsibility Schedule to inform site operational staff, safety manager and DEWA engineers of agreed responsibilities for plant and/or Apparatus at the operational interface.

Appendix A sets down the requirements for Water Connection Site Schedules. The attachment to Appendix A provides a format to be used in the preparation of Water Site Responsibility Schedules.

WCC.7.3 Water Connection Site Common Drawings

Water Connection Site Common Drawings shall be prepared by the Generators for each Water Connection Site and shall include Water Connection Site layout drawings and process and instrumentation drawings and they will identify the responsibilities for common services drawings.

WCC.7.3.1 Preparation of Water Connection Site Common Drawings

DEWA shall prepare and submit to the Generator information required for the Water Connection Site Common Drawings for DEWA's side of the Desalinated Water Delivery Point.

The Generator shall then prepare, produce and distribute, using the information submitted by DEWA the Water Connection Site Common Drawings for the complete Water Connection Site.

WCC.7.3.2 Generator Changes to Water Connection Site Common Drawings

When the Generator becomes aware that it is necessary to change any aspect of the Water Connection Site Common Drawings at a Water Connection Site it shall prepare, produce and distribute revised Water Connection Site Common Drawings for the complete Water Connection Site.

If the Generator change can be dealt with by it notifying DEWA in writing of the change and for each party to amend its copy of the Water Connection Site Common Drawings then the Generator shall so notify and seek confirmation from DEWA and each party shall so amend following confirmation.

WCC.7.3.3 Validity

The Water Connection Site Common Drawings for the complete Water Connection Site prepared by the Generator shall be the definitive Water Connection Site Common Drawings for all operational and planning activities associated with the Water Connection Site. If a dispute arises as to the accuracy of the Water Connection Site Common Drawings, a meeting shall be held at the site, as soon as reasonably practicable, between DEWA and the Generator, to endeavour to resolve the matters in dispute.

WCC.7.4 Access

The provisions relating to access to the Water Connection Site by DEWA, are set out in each PWPA or WPA.

WCC.7.5 Maintenance Standards

It is a requirement that all Generator Apparatus on the Water Connection Site is maintained adequately for the purpose for which it is intended and to ensure that it does not pose a threat to the safety of any of DEWA Apparatus or personnel on the Water Connection Site.

DEWA shall have the right to inspect the test results and maintenance records relating to such Apparatus on the Water Connection Site at any time.

WCC.7.6 Water Connection Site Operational Procedures

DEWA and the Generators must make available staff to take necessary Water Safety Precautions and carry out operational duties as may be required to enable work/testing to be carried out and for the operation of plant and Apparatus connected to the Water Transmission System.

Appendix A. Principles and Basic Procedure for Preparation of Water Connection Site

A.1. Principles

At all Water Connection Sites, Water Connection Site Schedules shall be drawn up in accordance with the following requirements or with such variations as may be agreed between DEWA and the Generators.

1. Water Connection Site Details and Equipment, including:
   a. Water Connection Site location;
   b. Ownership of assets;
   c. Desalinated Water Delivery Points;
   d. Site Responsibility Schedule;
   e. Operational Diagram.
2. Site Capacity and tariff Metering:
   a. Actual Metering Point
3. Site services:
   a. Site specific technical conditions, including;
   b. Special technical facilities;
   c. Protection requirements;
   d. Operational Metering;
   e. Control telephony;
   f. Special equipment requirements;
   g. System monitoring inputs;
   h. Other site services

Each set of Water Connection Site Schedules for a Water Connection Site shall be prepared by the Generator in consultation with DEWA and be agreed at least 2 weeks prior to the Generator's plant being Connected to the Water Transmission System.

Each set of Water Connection Site Schedules shall be subdivided to take account of any separate Water Connection Sites.

Each Site Responsibility Schedule, (1-a-e) above, shall detail for each item of plant and Apparatus:

1. Plant/Apparatus ownership;
2. Safety (applicable Safety Rules and control Person or other responsible Person (Safety Coordinator), or such other Person who is responsible for safety);
3. Operations (applicable Operational Procedures and control engineer);
4. Site Manager (Controller);
5. Responsibility to undertake maintenance;
6. Responsibility for site security.

The Water Site Responsibility Schedule shall be prepared in accordance with the attachment to this Appendix unless otherwise agreed in writing with DEWA and shall include, for each Water Connection Site, lines and cables emanating from the Water Connection Site.

Every page of each Water Connection Site Schedule shall bear the date of issue and the issue number.

Following preparation of a set of Water Connection Site Schedules, the Generator shall send it to DEWA for confirmation of its accuracy.

The Water Connection Site Schedules shall be signed on behalf of DEWA by the manager responsible for the area in which the Water Connection Site is situated and on behalf of each Generator involved by its responsible manager, by way of written confirmation of its accuracy. Once signed, the Generator shall distribute two copies, not less than two weeks prior to its implementation date, to DEWA, accompanied by a note indicating the issue number and the date of implementation.

The SCADA system shall be up to date prior to the Generator's Production Facility being connected to the Water Transmission System and the Generator shall provide, at the minimum, at the SCADA outstation interface point, the SCADA signal list set out at Attachment B to this Appendix A.

A.2. Alterations to Existing Site Responsibility Schedules

When a Generator identified on a Water Connection Site Schedule becomes aware that an alteration is necessary, it must inform DEWA immediately and in any event 12 weeks prior to any change taking effect.

Where a Generator has informed DEWA of a change, or DEWA proposes a change, DEWA shall prepare a revised Water Connection Site Schedule not less than 8 weeks prior to the change taking effect.

The revised Water Connection Site Schedule shall be signed and accompanied by a note indicating where the alteration(s) has/have been made, the new issue number and the date of implementation.

When a Generator on a Water Connection Site Schedule, or DEWA, as the case may be, becomes aware that an alteration to the Water Connection Site Schedule is required urgently to reflect an Emergency situation for example, the Generator shall notify DEWA, or DEWA shall notify the Generator, as the case may be, immediately and shall discuss:

1. what changes are necessary to the Water Connection Site Schedules;
2. whether the Water Connection Site Schedules are to be modified temporarily or permanently;
3. the distribution of the revised Water Connection Site Schedules.

The Generator shall prepare the revised Water Connection Site Schedules as soon as possible and in any event within seven days of it being informed of or knowing the necessary required alteration. The Water Connection Site Schedules shall be confirmed by Generators and signed on behalf of DEWA and Generators as soon as possible after it has been prepared and sent to Generators for confirmation.

A.3. Responsible Managers

Each Generator shall, prior to the Generators plant being connected to the Water Transmission System supply to DEWA a list of managers, together with contact details, who have been duly authorised to sign Water Connection Site Schedules on behalf of the Generator and DEWA shall supply to that Generator the name of the manager responsible for the area in which the Water Connection Site is situated.

Attachment A to Appendix A

Table A.1: Proforma for Water Site Responsibility Schedule for the Delivery Point

Generator:…….
Water Connection Site:.
……
Company: ……

Item of Equipment	Equipment Owner	Safety Rules	Safety Co-ordinator	Operational Procedures	Control Responsibility	Party Responsible for Statutory Inspections, Maintenance and Fault Investigations

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Signed on behalf of the Generator Date

by way of written confirmation of its accuracy.

Attachment B to Appendix A

DEWA Water SCADA Signal List		
Signal Description	**Signal Type**	**Meter/Equipment Type**
PRESS.OUT OF RANGE	Indication (Signal)	**Pressure Transmitters)**
PRESS.RATE OF CHANGE	Indication (Signal)	
PRESSURE Value	Measured value	
VALVE STATUS	Indication (Signal)	**Motorized Valves**
VALVE OPERATING MODE	Indication (Signal)	
VALVE OPERAT.ALARM	Indication (Signal)	
VALVE COMM.ALARM	Indication (Signal)	
VALVE POSITION	Measured value	
VALVE SETPOINT FEEDBACK	Measured value	
VALVE MODE SELECTION	Command	
VALVE SETPOINT	Set Point	
VALVE SEL.COMMAND	Set Point	
FLOW RATE OF CHANGE	Indication (Signal)	**Flow Transmitters**
FLOW OUT OF RANGE	Indication (Signal)	
FLOW DIRECTION	Indication (Signal)	
EMPTY PIPE ALARM	Indication (Signal)	
FLOW RATE	Measured value	
FWD FLOW TOTALIZER	Counter value	
REV FLOW TOTALIZER	Counter value	
LEVEL OUT OF RANGE	Indication (Signal)	**Reservoir Level Transmitters**
LEVEL RATE OF CHANGE	Indication (Signal)	
LEVEL Value	Measured value	
PUMP OPERATING MODE	Indication (Signal)	**Pumps**
PUMP OPERAT.ALARM	Indication (Signal)	
PUMP STATUS	Indication (Signal)	
PUMP READY TO START	Indication (Signal)	
VFD SPEED IN RPM	Measured value	

VFD SPEED SETPOINT AV	Measured value	
Pump Running Hours	Counter value	
Pump Running Hours SO	Counter value	
PUMP DEACT.COMMAND	Command	
PUMP EXEC.COMMAND	Command	
PUMP SEL.COMMAND	Command	
PUMP FAULT RESET	Command	
PUMP MODE SELECTION	Command	
VFD PUMP SETPOINT	Set Point	
VFD PUMP SEL.COMMAND	Set Point	
PUMP STATUS	Indication (Signal)	
PUMP POWER FAILURE	Indication (Signal)	
pH/CL SENSOR	Indication (Signal)	**Water Quality Analyzer Transmitters**
CONDUCTIVITY/TEMP.SENSOR	Indication (Signal)	
pH RATE OF CHANGE	Indication (Signal)	
pH OUT OF RANGE	Indication (Signal)	
CONDUCTIVITY.OUT OF RANGE	Indication (Signal)	
CONDUCTIVITY.RATE OF CHANGE	Indication (Signal)	
CHLORINE RATE OF CHANGE	Indication (Signal)	
CHLORINE OUT OF RANGE	Indication (Signal)	
TEMP OUT OF RANGE	Indication (Signal)	
TEMP RATE OF CHANGE	Indication (Signal)	
pH INDICATION	Measured value	
CONDUCTIVITY	Measured value	
CHLORINE INDICATION	Measured value	
TEMP INDICATION	Measured value	
ANALYZER FAULT	Signal	
ORP INDICATION	Measurement	
TURBIDITY INDICATION	Measurement	
RAW WATER LEVEL	Measurement	
BACK WASH LEVEL	Measurement	
AIR COMP FEEDBACK	Indication (Signal)	**Surge Vessels**
AIR COMP STATUS	Indication (Signal)	
GEBNERAL WARNING	Indication (Signal)	

GENERAL SHUTDOWN WARN	Indication (Signal)	
GENERAL SHUTDOWN	Indication (Signal)	
GENERAL SERVICE	Indication (Signal)	
GENERAL START FAILURE	Indication (Signal)	
EMERGENCY STOP	Indication (Signal)	
MODE SELECTION	Indication (Signal)	
OPERATING MODE	Indication (Signal)	
NOT READY TO START	Indication (Signal)	
COMMUNICATION ERROR	Indication (Signal)	
OUTGOING FEEDER TO AC1 Breaker	Indication (Signal)	
OUTLET PRESSURE	Measured value	
RUNNING HOURS	Measured value	
MMF AIR COMP COMMAND	Command	
MMF AIR MODE	Indication (Signal)	
MMF WASH MODE	Indication (Signal)	
MMF FILTER AUT AVAILABLE	Indication (Signal)	
MMF FILTRATION MODE	Indication (Signal)	
MMF FILTER NOT READY	Indication (Signal)	
MMF RINSE MODE	Indication (Signal)	
PRS PLANT STATUS	Indication (Signal)	
RO Section Running in	Indication (Signal)	
RO Status	Indication (Signal)	
SCF STREAM STATUS	Indication (Signal)	
CF CARTRIDGE FILTER	Indication (Signal)	
RAW WATER LEVEL	Measured value	
BACK WASH LEVEL	Measured value	
SOLENOID VALVE	Signal	
OPERATIONAL ALARM	Signal	

Independent Water and Power Producers' Code

Ancillary Services Code

Content

ASC Ancillary Services Code

ASC.1 Introduction

Ancillary Services are services ancillary to the transmission of electricity that DEWA requires to operate the Electricity Transmission System.

DEWA is required to ensure sufficient Ancillary Services will be available on the day ahead when preparing the Dispatch Schedule (see SDC1); and

This Ancillary Services Code (ASC) lists the Ancillary Services required by DEWA, the contractual arrangements governing the provision of such services, and details of the Ancillary Services to be provided by Generators. The IWPP Code also sets down the form of instruction that will be used by DEWA to implement the requirements for Ancillary Services.

ASC.2 Objectives

The objectives of the ASC are as follows:
- to list the Ancillary Services that DEWA requires to operate the Transmission System; and
- to clarify the process for Scheduling and instructing the requirements for the use of Ancillary Services.

ASC.3 Scope

In addition to DEWA, this Ancillary Services Code applies to Generators.

ASC.4 Requirement for Ancillary Services

The requirements for Ancillary Services can be categorised as follows:
- Regulation of System Frequency
- Reactive Power and Voltage Control
- Black Start capability for Transmission System restoration

ASC.4.1 Regulation of System Frequency

DEWA is required to maintain Frequency within the following limits.

The system Frequency of the Transmission System shall be nominally 50.00 Hz with system Frequency set points between 49.950 Hz and 50.050 Hz and shall be controlled within the limits of 49.90 Hz and 50.10 Hz under normal conditions and following a contingency the steady state Frequency shall be within the limits 49.80 Hz and 50.20 Hz. Under disturbance conditions the Power Units should remain synchronised in the range 52.50 Hz to 47.50 Hz.[1]

[1] These requirements are specified in the Electricity Connection Code of the IWPP Code

The Frequency of the Total System is responsive to changes in the balance between Demand and total Available generation. DEWA will therefore ensure that that there is sufficient generation Capacity to meet the Demand.

The IWPP Code requires all Power Units to have the capability to contribute to Frequency control. Synchronously Connected Generating Units can provide continuous Frequency control through their automatic governing systems. Frequency control will also be assisted by Synchronously Connected Generating Units through changes in output in response to Dispatch Instructions issued by DEWA.

ASC.4.2 Reactive Power and Voltage Control

DEWA is required to maintain voltage control within certain limits. At 400 kV level, the voltage on the Transmission System within the limits of a minimum voltage of 360 kV and a maximum voltage of 420 kV. At 132 kV level, the voltage on the Transmission System within the limits of a minimum voltage of 118.8 kV and a maximum voltage of 147.8 kV.[2]

During some system disturbances such as where short circuits occur, the voltage may collapse transiently to zero at the point of fault until the fault is cleared.

Voltage regulation requires both Active and Reactive Power flows across the Transmission System to be carefully controlled. The physical characteristics of the Apparatus and plant of the Transmission System also give rise to the generation and absorption of Reactive Power. Reactive Power flowing across the system can give rise to substantial voltage differences and it is therefore necessary to maintain Reactive Power balances between sources of generation Capacity and Demand.

The management of Voltage requires control of Reactive Power and this can be provided by Power Units or by means of synchronous or static compensators/reactors.

ASC.4.3 Transmission System Restoration

Black Start is an Ancillary Service required to restore the Transmission System following a Partial System Shutdown or Total System Shutdown of the Transmission System.

Black Start capability should normally be available as required from certain Generators in accordance with the terms of a PPA/PWPA. Power Units powered by intermittent sources, such as solar energy and wind energy, are not typically expected to have Black Start capability, unless explicitly established in the PPA/PWPA.

ASC.5 Ancillary Services provided by Generators

DEWA is responsible for identifying the Ancillary Services requirements when preparing the day ahead Schedule.

[2] These requirements are specified in the Electricity Connection Code of the IWPP Code.

The PPA/PWPA shall require the provision on Ancillary Services.

All Ancillary Services whether provided through a PPA or PWPA shall be provided in accordance with Dispatch Instructions and the requirements of the IWPP Code.

The PPA or PWPA for each Generator shall state the Active Power and Reactive Power ranges for each Power Unit. It also shall state that each Power Unit must be capable of contributing to Frequency and voltage control by continuous modulation of Active Power and Reactive Power supplied to the Transmission System. These services cover the requirements for Primary Response, Secondary Response and Tertiary Reserve and the provision of Reactive Power response from Generators.

The speed governor of a Synchronously Connected Generating Unit in co-ordination with other control devices must control the Active Power output with stability over the entire operating range of the Synchronously Connected Generating Unit. The speed governor shall be capable of being set so that it operates with an overall speed droop of between 3% and 5%.

DEWA may instruct a Power Unit to operate anywhere within the operating envelop defined in its Generator Performance Chart. This envelope is contained between declared Active Power capability and registered Minimum Generation and between the practical stability limit line (leading Reactive Power) and the lagging Reactive Power line determined by the rotor-heating limit. The Reactive Power limits are shown by way of illustration in Appendix C of Operational Planning Code.

Each Power Unit should be capable of providing constant voltage control at its terminals over the entire operating range without instability. This shall be by a continuously acting Automatic Voltage Regulation system which should be in service at all times when the Power Unit is synchronised unless otherwise instructed by DEWA.

Black Start capability will be provided in accordance with a PPA/PWPA. Non-availability of this capability must be declared in the Daily Status Form.

Independent Water and Power Producers' Code

Abbreviations and Definitions

Content

Abbreviations and Definitions for the IWPP Code

Abbreviations

A	Ampere
AGC	Automatic Generation Control
AVR	Automatic Voltage Regulation
BS	Black Start
CCGT	Combined Cycle Gas Turbine
CT	Current Transformer
DEWA	Dubai Electricity and Water Authority
DCS	Distributed Control System of a Production Facility
G	Giga or 10^9
GWh	Giga Watt Hour
HP	High Pressure
HV	High Voltage
Hz	Hertz
IEC	International Electro-technical Commission
ITU	International Telecommunications Union
K	Kilo or 10^3
kV	Kilo-Volt
LV	Low Voltage
M	Mega or 10^6
M^3	Cubic Meter
M^3h	Cubic Meter per hour

MDEC	Metering and Data Exchange Code of the IWPP Code
MVA	Mega-Volt-Ampere
Mvar	Mega-Volt-Ampere Reactive / Mega-var (Reactive Power)
Mvarh	Mega-var- hour (Reactive Energy)
MW	Mega-Watt (Active Power)
MWh	Mega-Watt-hour (Active Energy)
OC	Operating Code of the IWPP Code
PPA	Power Purchase Agreement
PSS	Power System Stabiliser
PWPA	Power and Water Purchase Agreement
SCADA	Supervisory Control and Data Acquisition
SCMS	Substation or switching station Control and Management System
SD1	Schedule Day 1
SDC1	Scheduling and Dispatch Code One of the IWPP Code
SDC2	Scheduling and Dispatch Code Two of the IWPP Code
ST&P	Standard Temperature and Pressure (15 degrees Celsius and 1.01324 bar)
VA	Volt-Ampere
VT	Voltage Transformer
W	Watt
WCC	Water Conditions Code of the IWPP Code
WPA	Water Purchase Agreement

Definitions

The following definitions identify the meanings of words used in the IWPP Code. Plurals of the words and variations of tense are deemed to have similar meanings;

Active Energy means the integral with respect to Active Power, measured in units of voltampere active hours (Wh) and standard multiples thereof;

Active Power means the product of voltage and the in-phase component of alternating current measured in units of watts or multiples thereof. When the term “Power” is used without any modifier, this will have the same meaning;

Actual Metering Point means the physical point at which electricity and/or Desalinated water is metered;

Ancillary Services means the services which Generators may be required to provide from time to time in connection with the security and stability of such Electricity Transmission System or the Total System;

Apparatus means all equipment used for the Generation, Transmission, and Dispatch of electricity or water as applicable;

Automatic Voltage Regulation means a continuously acting automatic excitation system to control a Power Unit terminal voltage;

Availability means the MW Capacity together with the associated Ancillary Services and AGC of a Power Unit and/or m^3/Hour Desalination capacity declared available to DEWA by the Generator and Available shall be construed accordingly;

Availability Notice means notice issued by a Generator, stating the Availability of a Power Unit and/or RO Train to apply for the following Schedule Day;

Back-up Fuel Delivery Point means the point at which back-up fuel is delivered in accordance with PPAs and PWPAs and by reference to which back-up fuel is measured**;**

Back-up Fuel Metering System means the Main Back-up Fuel Metering System and Check Back-up Fuel Metering System;

Back up Protection means protection equipment or system that is intended to operate when a system fault is not cleared because of a failure of the Main Protection to operate;

Black Start means the procedure necessary for the recovery from a Partial System Shutdown or a Total System Shutdown;

Burden means the electrical Load, measured in VA, connected to current and/or voltage transformers for the purposes of metering, protection or measurement;

Calibration means the procedure whereby the relevant percentage errors of any item of Metering Systems are determined and, where appropriate, modified;

Capacity means the capacity of any Apparatus to (i) produce, deliver or receive electricity, as the case may be, stated in MW at an assumed or agreed power factor or in MVA, or (ii)

produce, deliver or receive Desalinated water, as the case may be, stated in M^3 at an assumed or agreed flow factor at M^3/h.

Chairman means the person appointed by DEWA under Clause 6 of Appendix A (Constitution of the IWPP Code Review Panel) of the General Conditions Code of the IWPP Code.

Check Back-up Fuel Meter means a device where required, that duplicates and provides back up to the Main Back-up Fuel Meter for measuring and recording of back-up fuel quantities;

Check Back-up Fuel Metering System means the group of equipment including Check Back-up Fuel Meters, time switches, metering protection and isolation equipment including alarms, circuitry, associated data storage and data communications equipment that are back-up fuel measuring equipment at or relating to an Electrical Connection Site.

Check Gas Meter means a device where required, that duplicates and provides back up to the Main Gas Meter for measuring and recording of gas quantities;

Check Gas Metering System means the group of equipment including Check Gas Meters, time switches, metering protection and isolation equipment including alarms, circuitry, associated data storage and data communications equipment that are gas measuring equipment at or relating to an Electrical Connection Site.

Check Electricity Meter means a device where required, that duplicates and provides back up to the Main Electricity Meter for measuring and recording of Active Power, Active Energy, Reactive Power or Reactive Energy quantities;

Check Electricity Metering System means the group of equipment including Check Electricity Meters, time switches, measurement transformers, metering protection and isolation equipment including alarms, circuitry, associated data storage and data communications equipment that are the electricity (Active Energy, Reactive Energy) measuring equipment at or relating to an Electrical Connection Site.

Check Water Meter means a device where required, that duplicates and provides back up to the Main Water Meter for measuring and recording of water quantities;

Check Water Metering System means the group of equipment including Check Water Meters, time switches, metering protection and isolation equipment including alarms, circuitry, associated data storage and data communications equipment that are water measuring equipment at or relating to a Water Connection Site.

Connection means in relation to any Generator, the presence of a physical connection between the Generators plant and the Transmission System and Connect and Connected shall be construed accordingly;

Connection Point means the point at which a Power Unit and/or the Water Production Facility is connected to DEWA's Transmission System as agreed with DEWA (e. g. by PPA, PWPA or WPA);

Connection Equipment means plant and equipment owned by DEWA necessary to connect the Equipment to the Electricity Transmission System at the Electrical Delivery Point comprising the metering current transformers, the Protection current transformers, the voltage

transformers and the circuit breaker controlled by DEWA and associated cables and instrumentation;

Contingency Reserve means the margin of Available generation Capacity over forecast Demand that is required in the period from 24 hours ahead down to real time to cover against uncertainties in Power Unit and/or RO Train Availability and against Demand forecast errors;

Cyber Assets means connected computing devices, personnel, infrastructure, applications, services, telecommunications systems, and information, either transmitted and/or stored;

Cyber Security means the collection of controls, tools, personnel, policies, security concepts, security safeguards, guidelines, risk management approaches, actions, training, best practices, assurance strategy and methodologies and other technologies that can be used to protect the organization, its users and its Cyber Assets;

Cyber Security Incident means one or more unwanted or unexpected Cyber Security events that have either compromised or could potentially compromise the security of information the security of the organization, its users or its assets;

Daily Status Form means the form used by Generators for submission of data to DEWA under SDC1;

Delivery Point means one or more of the following (as the case may be):
- Electrical Delivery Point;
- Desalinated Water Delivery Point;
- Gas Delivery Point;
- Back-up Fuel Delivery Point.

Demand means the demand, as applicable, for Active Power or Reactive Power or Desalinated water;

Desalinated Water Delivery Point means the point at the exit of the Water Metering System at which Desalinated water is delivered in accordance with PWPAs or WPAs and by reference to which Desalinated water flow is measured;

Desalination means the production of demineralised or potable water by desalination, and **Desalinated** shall be construed accordingly;

Desalination Schedule means a statement prepared by DEWA of the capacity of the Water Production Facilities that may be required to meet the demand at all times, and ensure (as far as possible) the integrity of the Water Transmission System and the security and quality of supply, with an appropriate margin of reserve;

;

Dispatch means the general process by which instructions are determined and the issuing of those instructions

Dispatch Instructions means instructions to Generators as to the operation or cessation of operation of their Production Facilities;

Electrical Connection Site means the physical site belonging to DEWA where an Electrical Delivery Point is located;

Electrical Connection Site Common Drawings means drawings that incorporate connection site layout drawings, electrical layout drawings, common protection/control drawings and common services drawings prepared for each Connection Site;

Electrical Connection Site Responsibility Schedule means a schedule containing the information and prepared in accordance with the Attachment of Appendix A of the Electrical Connection Conditions Code;

Electrical Connection Site Schedules means the schedules detailed in Appendix A of the Electrical Connection Conditions Code;

Electrical Delivery Point means the point at which electrical energy is delivered in accordance with PPAs and PWPAs and by reference to which electrical energy is measured;

Electricity Metering System means the Main Electricity Metering System and Check Electricity Metering System;

Electricity Transmission System means the 400 kV and 132 kV system for the transport of electricity, which system consists (wholly or mainly) of high voltage electric lines and electric plant (namely, electric lines and electric plant with a nominal voltage equal to 400 kV and 132 kV) owned and operated by DEWA (in its capacity as transmission operator) and which is used for the transmission of electricity from a Production Facility to a sub-station, from one generating station to another, from one sub-station to another and any electric plant used for the purposes of Dispatch;

Electricity Transmission Control Centres means both transmission control centres (TCC1) and (TCC2) owned and operated by DEWA for the co-ordination and issuing of direct instructions for dispatch of available Power Units (including by way of an energy management system);

Emergency means a condition or situation which, in the sole, but reasonable, opinion of the Meter owner materially and adversely affects, or is likely materially and adversely to affect the ability of the Meter owner to maintain safe, adequate and continuous operations or presents or is likely to present a physical threat to persons or property;

Emergency Conditions means abnormal Transmission System conditions that require automatic or rapid manual action to prevent or limit loss of transmission facilities or generation Capacity that could adversely affect the reliability of the Transmission System;

Emergency Instructions means a Dispatch Instruction issued by DEWA that may require an action or response that is outside the limits implied by a Daily Status Form submitted by a Generator instructions issued by DEWA to prevent or limit abnormal Transmission System conditions;

Equipment means the electrical apparatus owned by the Generator up to the Electrical Delivery Point;

Expert means a Person with appropriate educational and practical experience to provide relevant advice to the subject in question and who should have no direct involvement with any of the parties;

Final Station Outage Schedule means the station outages developed by DEWA and described in the Operational Planning Code.

Flexible Outage means a Planned Outage that, at the request of DEWA, can be deferred or advanced with a Flexible Outage Period;

Flexible Outage Period means the period within which a Planned Outage can be moved at the request of DEWA, can be deferred or advanced by a period;

Forced Outage means an Outage for which no notice can be provided by the Generator to DEWA;

Frequency means the number of alternating current cycles per second expressed in Hertz (Hz) at which the Transmission System is running;

Frequency Sensitive Mode means the operation of a Power Units (which can be part of a CCGT Module) that will result in Active Power output changing automatically in response to changes in Transmission System Frequency;

Gas Delivery Point means the point at which gas is delivered in accordance with PPAs and PWPAs and by reference to which gas is measured;

Gas Metering System means the Main Gas Metering System and Check Gas Metering System;

Gas Turbine Power Unit means Power Unit with a gas turbine as its prime mover;

Gas (SF6) Zone Diagram means a single line diagram showing boundaries of, and interfaces between, SF6 gas-insulated HV Apparatus modules which comprise part, or the whole, of a substation or switching station at an Electrical Connection Site, together with the associated stop valves and SF6 gas monitors required for the safe operation of the Transmission System or the Generators system;

Generator(s) means any entity authorised by the Regulatory Authority to produce electricity and/or Desalinated water in the Emirate and is connected to the Transmission System;

Generation Schedule means a statement prepared by DEWA of the Power Units that may be required to meet the Total System demand at all times, and ensure (as far as possible) the integrity of the Electrical Transmission System and the security and quality of supply, with an appropriate margin of reserve;

Generator Performance Chart means a diagram which shows the MW and Mvar capability limits within which a Power Units will be expected to operate under steady state conditions;

Good Industry Practice means acting in good faith to perform obligations in accordance with the requirements of the law and international good practice in the electricity and desalination industries;

Inflexible Outage means a Planned Outage that cannot be deferred or advanced by a period at the request of DEWA, under the Operational Planning Code;

Instation means equipment located within DEWA premises that receives and stores Metering Data from Outstations;

IWPP Code Review Panel means the panel established by DEWA in accordance with the General Conditions of this IWPP Code.

Licence means the licence granted to the Generator by the Regulatory Authority for the generation of electricity and/or production of water.

Load means the Active or Reactive Power, as the context requires, generated or transmitted;

Local Interrogation Unit means portable or fixed equipment capable of interrogating, updating and/or programming an Outstation;

Main Back-up Fuel Meter means the primary Meter for measuring and recording back-up fuel quantities;

Main Back-up Fuel Metering System means the group of equipment including Main Back-up Fuel Meters, time switches, metering protection and isolation equipment including alarms, circuitry, associated data storage and data communications equipment that are back-up fuel measuring equipment at or relating to an Electrical Connection Site.

Main Gas Meter means the primary Meter for measuring and recording of gas quantities;

Main Gas Metering System means the group of equipment including Main Gas Meters, time switches, metering protection and isolation equipment including alarms, circuitry, associated data storage and data communications equipment that are gas measuring equipment at or relating to an Electrical Connection Site.

Main Electricity Meter means the primary Meter for measuring and recording of Active Power, Active Energy, Reactive Power or Reactive Energy quantities;

Main Electricity Metering System means the group of equipment including Main Electricity Meters, time switches, measurement transformers, metering protection and isolation equipment including alarms, circuitry, associated data storage and data communications equipment that are the electricity (Active Energy, Reactive Energy) measuring equipment at or relating to an Electrical Connection Site.

Main Protection means protection equipment or system expected to have priority in initiating fault clearance or an action to alleviate an abnormal condition;

Main Water Meter means the primary Meter for measuring and recording water quantities;

Main Water Metering System means the group of equipment including Main Water Meters, time switches, metering protection and isolation equipment including alarms, circuitry, associated data storage and data communications equipment that are water measuring equipment at or relating to a Water Connection Site.

Maximum Power Export Capacity means the maximum agreed capacity (measured in MW) of the Electrical Delivery Point;

Measurement Transformers means voltage and/or current transformers or combinations thereof used in Electricity Metering Systems;

Meter means a device for measuring and recording units of Active Power, Active Energy, Reactive Power or Reactive Energy, Desalinated water, gas or back-up fuel.

Meter Register means a device associated with a Meter, from which it is possible to obtain a visual reading of the quantity of electricity that has been supplied;

Meter Registration System means a system that uniquely identifies the Meter and contains pertinent data relating to the Meter as required by the Meter and Data Exchange Code;

Metering means the activity of measuring and recording units of electricity (Active Power, Active Energy, Reactive Power or Reactive Energy), Desalinated water, gas or back-up fuel using a Electricity Metering System, Water Metering System, Gas Metering System or Back-up Fuel Metering System respectively;

Metering Data means the data produced by a Metering System for the purpose of invoice settlement.

Metering Systems means the Electricity Metering System, Water Metering System, Gas Metering System and Back-up Fuel Metering System, as appropriate.

Metering Communication System means the system and Apparatus of communications between Meters, Local Outstations and Remote Instations;

Non-Synchronously Connected Generating Unit is a set of installations having a single Connection Point or operated as if they have a single Connection Point, which can generate electrical energy and is non-synchronously connected to the network through power electronics. Installations that are fully connected to the network through power electronic converters fall in this category.

Operation Diagram means a diagram that is a schematic representation of the 400 kV Equipment and Connected Equipment at an Electrical Connection Site, incorporating its numbering, nomenclature and labelling;

Operating Margin means the combination of Contingency Reserve and Operating Reserve

Operating Parameters means the technical capabilities, flexibilities and limitations of a Power Unit, taking into account changes due to site rating and notified under the Scheduling and Dispatch Code 2 forming part of this IWPP Code through the Daily Status Form, as amended in accordance with these codes;

Operating Reserve means the additional output from Power Units that can be realised in real time operation to contribute to containing or correcting a Transmission System Frequency deviation to an acceptable level following a sudden change in Demand or generation.

Operational Year means from the period commencing 00:00 on 1 October in a Gregorian Calendar Year and ending at 24:00 on 30 September in the following Gregorian Calendar Year.

Outage means in relation to a Power Unit or RO Train, an event, which affects Availability;

Outstation means on-site equipment which receives data from local equipment and may perform some processing of data before transmitting the data to an Instation or SCADA system or downloading to a Local Interrogation Unit on request. When used with Metering Systems the Outstation will store data from a Meter(s);

Partial System Shutdown means as a Total System Shutdown except that all generation has ceased in a part of the Electricity Transmission System that has become detached from other parts of the Electricity Transmission System and there is no power supply from other

parts of the Electricity Transmission System, so it is necessary for DEWA to invoke Black Start procedures to re-establish its function;

Person means an individual, partnership, company, firm, trust, body corporate, government, government body, authority, emanation, agency, instrumentality, unincorporated body or an association;

Planned Outage means an Outage planned at least seven days in advance of the event;

Primary Response means the automatic increase in Active Power output of a Power Unit in response to a fall in the Frequency of the Transmission System. The response will be fully available within 30 seconds or less from the time of the Frequency fall;

Power Purchase Agreement (PPA) means an agreement entered into by DEWA and a Generator pursuant to which DEWA agrees, amongst other things, to purchase the electricity Production Capacity and output associated with the relevant Production Facilities;

Power and Water Purchase Agreement (PWPA) means an agreement entered into by DEWA and a Generator pursuant to which DEWA agrees, amongst other things, to purchase the electricity and water Production Capacity and output associated with the relevant Production Facilities;

Power Unit means either a Synchronously Connected Generating Unit or a Non-Synchronously Connected Generating Unit;

Production Capacity means the electricity generation capacity and/or the water Desalination capacity of a Production Facility, as the context so requires;

Production Facility means plant which is used for the generation of electricity and/or Desalination of water and includes, as applicable, all associated electric lines, electric plant and water equipment and includes a Water Production Facility;

Proposed Station Outage Schedules means those schedules detailed in Appendix A of the Operation Planning Code forming part of this IWPP Code.

Protection means the provision for the detection of fault conditions and the automatic or manual initiation of fault clearance action, including audible and visual alarms, indications and data logging;

Reactive Energy means the integral with respect to Reactive Power, measured in units of voltampere reactive hours (Varh) and standard multiples thereof;

Reactive Power means the product of alternating voltage and current and the sine of the phase angle between them measured in units of voltamperes reactive (vars) and standard multiples thereof. Reactive Power generation or output is an export onto the Transmission System and is referred to as "lagging Reactive Power or lagging Mvar", and Reactive Power absorption is an import from the System and is referred to as "leading Reactive Power or leading Mvar";

Regulatory Authority means the Regulatory and Supervisory Bureau (RSB) for the Electricity and Water Sector in the Emirate of Dubai;

Remote Instations means computer-based systems operated by DEWA that collect or receive metering data on a routine basis from Outstations;

Risk of Trip means the operation of a Power Unit and/or Water Production Facility when the failure of any single piece of auxiliary equipment could result in the loss of the Power Unit's Active Power and/or Reactive Power output and/or the Water Production Facility's Desalinated water output, or the Power Unit and/or Water Production Facility is undertaking a test as defined in a PPA, PWPA or WPA;

RO Train means a group of reverse osmosis pressure vessels fitted with their own reverse osmosis membrane elements including energy recovery device, support racks, pipe works and fed by high pressure pump(s), together with their ancillary equipment;

Safety Coordinator means a person nominated by a Generator to be responsible for the coordination of Safety Precautions at an Electrical Delivery Point when work which includes testing is to be carried out on a system which necessitates the provision of Safety Precautions on 400 kV equipment;

Safety Precautions means the isolation and or earthing of 400 kV equipment, posting of safety tags, use of safety equipment and other measures to ensure safety;

Safety Rules means DEWA or the Generators' rules that detail the procedures and practices for the safe operation of the Transmission System and Production Facilities as applicable.

SCADA/Energy Management System (EMS) Applications: The system of computer-aided tools used by DEWA as part of the TCC to monitor, control, and optimize the performance of the generation and/or transmission system and include applications for automatic generation control, state estimation, load flow, optimal power flow, contingency analysis, fault calculation, voltage stability, etc…;

Secondary Response means the automatic increase in Active Power output of a Power Unit in response to a fall in the Frequency of the Total System. The response will be fully available from 30 seconds from the time of the Frequency fall and shall be fully provided for not less than 30 minutes. After 30 seconds, any additional Active Power should be made available by operation in Frequency Sensitive Mode;

Scheduling means the preparation of the Generation Schedule and Desalination Schedule for the following Schedule Day as detailed in the Scheduling and Dispatch Code, SDC1.

Schedule Day means the 24 hour period starting at 00:00 hrs (midnight) of the Schedule Day concerned. Schedule Days are designated SD0, SD1, SD2 etc, where SD0 is today in real time.

Short Notice Outage means an Outage for maintenance performed at no less than 48 hours and not more than 7 days notice to DEWA, the approval of which will be at the sole discretion of DEWA;

Summer Period means the period commencing 00:00 on 1 May in a Gregorian Calendar Year and ending at 24:00 on 30 September in the same Gregorian Calendar Year.

Synchronously Connected Generating Unit is an indivisible set of installations which can generate electrical energy such that the frequency of the generated Voltage, the generator speed and the frequency of network Voltage are in a constant ratio and thus in synchronism.

Partially or fully directly-connected synchronous generators and induction generators fall in this category.

Target Frequency means that Frequency determined by DEWA as the desired operating Frequency of the Total System. This will normally be 50.00 Hz plus or minus 0.05Hz except in exceptional circumstances determined by DEWA.

Tertiary Reserve means the component of the Operating Reserve that would be available as a result of Emergency Instructions to Synchronise and Dispatch other Power Units.

Total System means the entire Electricity Transmission System and the Equipment, as the same may be developed or modified from time to time;

Total System Shutdown means the situation when all generation has ceased and there is no electricity supply on the Electricity Transmission System;

;**Transmission System** means, as applicable, the Electricity Transmission System and/or the Water Transmission System;

Turbine Speed Controller means any control device that is provided to govern the turbine output according to set values (speed control, power control, extraction flow control, temperature limitation control, etc.);

Water Connection Equipment means plant and equipment owned by DEWA necessary to connect the Water Equipment to the Transmission System at the Desalinated Water Delivery Point;

Water Connection Site means the physical site belonging to the Generator where a Desalinated Water Delivery Point is located;

Water Connection Site Common Drawings means drawings that incorporate connection site layout drawings, process and instrumentation diagrams, common protection/control drawings and common services drawings prepared for each Water Connection Site;

Water Connection Site Responsibility Schedule means a schedule containing the information and prepared in accordance with the Attachment of Appendix A of the Water Connection Conditions Code forming part of this IWPP Code;

Water Connection Site Schedules means the schedules detailed in Appendix A of the Water Connection Conditions Code forming part of this IWPP Code.

Water Control Centres means both water control centres (WCC) and (WEC) owned and operated by DEWA for the co-ordination and issuing of direct instructions for dispatch of available Water Production Facilities (including by way of an energy management system);

Water Equipment means the apparatus owned by the Generator up to the Desalinated Water Delivery Point;

Water Operation Diagram means a diagram that is a schematic representation of the equipment, process and instrumentation diagrams and the connections at the Water Connection Site, incorporating its numbering, nomenclature and labelling**;**

Water Metering System means the Main Water Metering System and Check Water Metering System;

Water Production Facility means the RO Trains and related process equipment, which is capable of producing Desalinated water at the Desalinated Water Delivery Point;

Water Purchase Agreement (WPA) means an agreement entered into by DEWA and a Generator pursuant to which DEWA agrees, amongst other things, to purchase the water Production Capacity and output associated with the relevant Production Facilities;

Water Quality Regulations means the water quality regulations as issued by the Regulatory Authority from time to time.

Water Safety Precautions means the isolation equipment, posting of safety tags, use of safety equipment and other measures to ensure safety;

Water Site Responsibility Schedule means a schedule containing the information and prepared in accordance with this IWPP Code;

Water Transmission System means the water transmission system consisting (wholly or mainly) of water pipelines and storage facilities owned or operated by DEWA (in its capacity as transmission operator) and which is used for the transmission of water from a Production Facility to a pumping station or storage facility or between pumping stations used for the purpose of Dispatch.