ELECTRICITY INDUSTRY ACT

ELECTRICITY INDUSTRY (WHOLESALE ELECTRICITY MARKET) REGULATIONS 2004

WHOLESALE ELECTRICITY MARKET RULES

Power System Operation Procedure:

Commissioning and testing

Version history	
21 September 2006	Power System Operation Procedure (Market Procedure) for Commissioning and Testing
17 July 2009	System Management amended changes to the procedure resulting from Procedure Change Report PPCL 0009
23 June 2011	System Management amended changes to the procedure resulting from Procedure Change Report PPCL 0016
20 January 2012	System Management amended changes to the procedure resulting from Procedure Change Report PPCL 0023

TABLE OF CONTENTS

Relationship with Market Rules 3

Related documents 3

Commencement 3

1 Scope 4

2 COMMISSIONING TESTS 4

2.1 Market Participant to submit Commissioning Test plan 4

2.2 Communication in relation to Commissioning Test plans 5

2.3 Assessment and Approval of Commissioning Test plans 5

2.4 Update of Commissioning Test plan 6

2.5 Conduct of Commissioning Tests 7

3 Reserve Capacity Tests 7

Appendix A Commissioning Test Plan Standard Form Template 9

Appendix B Preferred times for commissioning testing 12

Appendix C Guidelines for additional ancillary services during commissioning tests 16

RELATIONSHIP WITH MARKET RULES

1. This Procedure has been developed in accordance with, and should be read in conjunction with, the Wholesale Electricity Market Rules (Market Rules).
2. References to particular Market Rules within the Procedure in bold and square brackets **[MR XX]** are current as 5 December 2011. These references are included for convenience only, and are not part of this procedure.
3. This Power System Operating Procedure is subservient to the Market Rules. In the event of conflict between this Procedure and the Market Rules or any other document, the order of precedence is as set out in the Market Rules **[MR 1.5.2]**
4. This Power System Operating Procedure may include explanatory text, including quotations from the Market Rules. Such explanatory text is for information only, does not form part of the Procedure, and is italicised and contained in a rectangular box.

RELATED DOCUMENTS

1. This document is related to, and should be read in conjunction with, the following documents:
   a. Power System Operation Procedure – Dispatch
   b. Power System Operation Procedure – Facility outages

COMMENCEMENT

1. This market procedure replacement has effect from the date of commencement of Rules Change Proposal RC_2011_10.

1 SCOPE

1. The Power System Operation Procedure: Commissioning and Testing ('Procedure') details procedures that System Management and Market Participants must follow when planning and conducting tests on Generators, Demand Side Programs, Interruptible Loads and Dispatchable Loads.
2. The Commissioning and Testing Procedure covers the following processes:
    a. the planning and implementation of Commissioning Tests for particular generation systems that wish to verify their output capability, in accordance with the Market Rules **[MR 3.21A]**; and
    b. the planning and implementation of Reserve Capacity Tests in accordance with the Market Rules **[MR 4.25]**

Tests other than Commissioning Tests and Reserve Capacity Tests may be undertaken by way of balancing movements provided that the Facility conducting the tests follows its Dispatch Instructions and remains within its Tolerance Range at all times during the test. Such testing by Verve Energy may be undertaken by way of variation to the plant schedule ***[MR 7.6A.2(a)].***

2 COMMISSIONING TESTS

The Market Participant carrying out commissioning tests must cooperate with System Management and Western Power to develop a Commissioning Test Plan to ensure that the commissioning tests are carried out in a manner that:

- Does not adversely affect other Market Participants; and
- Does not affect power system security or reliability or quality of supply of the power system; and
- Minimises the threat of damage to any other Market Participants equipment.

2.1 Market Participant to submit Commissioning Test plan

Participants are advised to contact System Management to discuss possible network conditions that might influence the Commissioning Test plan prior to submitting a Commissioning Test plan. System Management will use reasonable endeavors to assist the Market Participant.

1. Any Market Participant wishing to conduct a Commissioning Test **[MR 3.21A.3]** must provide System Management with a Commissioning Test plan that:
    a. includes, at a minimum, the information specified in Appendix A of this Procedure; and
    b. is transmitted in the form specified in Section 2.2 of this Procedure.
2. System Management may, at its discretion, vary the requirements set out in Appendix A for a particular Facility.

3. System Management may, at its discretion, consider Commissioning Test plans submitted after the timing requirement provided in the Market Rules **[MR 3.21A.4]**, but must notify the IMO of a breach of the timing requirement if it accepts such a Commissioning Test plan.
4. System Management must not approve Commissioning Test plans first submitted less than 2 days prior to the commencement of the first Trading Day covered by the Commissioning Test plan.

*Note the two day limitation does not apply to Commissioning Test plans re-submitted pursuant to Paragraph **2.4.1 below** or **2.4.2b below***

2.2 Communication in relation to Commissioning Test plans

1. System Management must advise Market Participants of contact details and modes of communication for the submission of Commissioning Test plans.
2. A Market Participant must comply with the communication requirements set by System Management pursuant to Paragraph **2.2.3 below** of this Procedure.
3. Market Participants must provide System Management with the communication details of the operating person(s) authorised to submit Commissioning Test plans for each of their facilities.
4. System Management and the Market Participant must prepare and agree a communication protocol to apply between System Management and a Market Participant concerning a commissioning test being carried out on the Trading Day.

2.3 Assessment and Approval of Commissioning Test plans

1. System Management may refuse to approve a Commissioning Test plan if it reasonably believes that the conditions stipulated in the Market Rules **[MR 3.21A.3]** have not been met.

***[MR 3.21A.3]** states that:*

"System Management may approve a Commissioning Test only for a new generating system that is yet to commence operation, or for an existing generating system that has undergone significant maintenance".

System Management will generally interpret "significant maintenance" to mean maintenance work following which the Facility cannot be reasonably assured of operating at a satisfactory level of reliability for its full output.

***[MR 3.21A.3]** states that:*

"System Management must accept a request for a Commissioning Test unless:

(a) in its opinion inadequate information is provided in the request; or

(b) in its opinion the conduct of the test at the proposed time would pose a threat to Power System Security or Power System Reliability; or

(c) in the case of a new generating system that is yet to commence operation, the proposed Commissioning Test Period is greater than four months".

System Management will generally endeavour to accommodate the requested Commissioning Test plan, including by scheduling any additional ancillary services required to maintain power system security, provided the Commissioning Test plan is broadly consistent with expected network conditions at the time of each proposed test.

2. Where System Management requires additional information to make an assessment of a draft Commissioning Test plan, System Management must request such information from the Market Participant, and the Market Participant must provide the information as soon as practicable.
3. System Management must consider the criteria set out in Appendix B in assessing the expected impact of the draft Commissioning Test plan on power system security and power system reliability.
4. If System Management approves the draft Commissioning Test plan, it may schedule additional ancillary services during the Commissioning Test Period consistent with its powers under the Market Rules.

Additional Ancillary Services requirements will generally be in accordance with the guidelines set out in Appendix C but System Management may vary the application of those guidelines if required to maintain power system security or power system reliability.

At the time of writing the Market Rules allow System Management some discretion in the quantity of Load Following Ancillary Service scheduled, but not in the quantities of Spinning Reserve or Load Rejection Reserve. System Management will consider plant movements reasonably expected as part of commissioning to be "uninstructed output movements from Scheduled Generators" in terms of ***[MR 3.10.1 (a) ii]****.*

5. Where a Commissioning Test plan has not been approved System Management must provide an explanation for its decision in accordance with the Market Rules **[MR 3.21A.10(a)].** The Market Participant may then submit a new Commissioning Test plan which should take into account the explanation provided by System Management.

2.4 Update of Commissioning Test plan

1. If System Management delays or cancels a Commissioning Test **[MR 3.21A.11],** the affected Market Participant must submit a new Commissioning Test plan prior to undertaking any commissioning tests.
2. At any stage where a Market Participant becomes aware of conditions which may prevent the generating Facility from conforming to the approved Commissioning Test plan **[MR 3.21A.13]**, they must:
    a. if the Commissioning Test Period has commenced, immediately notify System Management; and

b. either withdraw the Commissioning Test plan or provide amended plans in accordance with this Procedure to System Management for approval as soon as practicable before commencement of the commissioning tests.

2.5 Conduct of Commissioning Tests

1. For each test or series of successive tests in the approved Commissioning Test plan for which similar system conditions and incremental ancillary services are required, System Management must define a Test Window, being the set of Trading Intervals during which the test or tests may be conducted and for which any additional ancillary services required pursuant to Paragraph **2.3.4 above** are scheduled.

The "Test Window" is intended to provide flexibility for Market Participants to make changes to the timing of their commissioning activities insofar as they may do so without threatening power system security.

2. System Management must issue an Operating Instruction for each Trading Day covered by the approved Commissioning Test plan, prior to the commencement of the Trading Day.
3. For each Test Window, System Management must pre-issue Dispatch Instructions to the Market Participant for all Trading Intervals in the Test Window prior to commencement of the Test Window.
4. The Market Participant must seek System Management's verbal approval to commence any test in the Commissioning Test plan. If the Market Participant's advice regarding the timing of the test is inconsistent with the current Dispatch Instruction(s) for the Trading Intervals affected, System Management must deem the Market Participant to have declined the Dispatch Instruction in accordance with Paragraph 88 of the Power System Operating Procedure "Dispatch".
5. If subsequent updates to the Balancing Merit Order render the Dispatch Instructions referred to in Paragraph 24 "out of merit", System Management must issue new Dispatch Instructions consistent with the Balancing Merit Order.

Note that System Management will not issue Dispatch Instructions to Commissioning Generators except in accordance with the Balancing Merit Order or Forecast Balancing Merit Order. Maintaining consistency between Balancing Submissions and physical operations remains the responsibility of the Market Participant at all times.

3 RESERVE CAPACITY TESTS

1. System Management must provide Market Participants nominated by the IMO to undertake a Reserve Capacity Test under the Market Rules **[MR 4.25.2 (a) ii.]** with an Operating Instruction directing them to undertake the test in accordance with the test parameters provided by the IMO to System Management under **[MR 4.25.7].**

2. In considering whether it is possible to conduct the test in accordance with **[MR 4.25.8]**, System Management must consider the applicable criteria set out in Appendix B.

APPENDIX A COMMISSIONING TEST PLAN STANDARD FORM TEMPLATE

COMMISSIONING TEST PROFORMA

Generator Details

Market Participant:	
Facility Designation:	

Contact Details:

	Operational	Commercial
Email		
Mobile		
Phone		
Fax		

Fuel Types:

Fuel "1"	Fuel "2"	Fuel "3"

Test Details

Test Period:

Start Time (dd/mm/yyyy HH:MM)	End Time (dd/mm/yyyy HH:MM)

Purpose of Test(s):	
System Under Test:	

Test Description	
Contingency Plan(s):	

Timelines

Day	Net Output		Fuel Mix	Trip Risk	Specific Tests			
(dd/mm/yyyy)	MW Active Power	MVAr Reactive Power	"1", "2", "3", "1&2", "1&3", "2&3", or All	Low , Medium, or High	Technical Rule, Table A11.1	Technical Rule, Table A11.2	(other specify)	(other specify)
8:00								
8:30								
9:00								
9:30								
10:00								
10:30								
11:00								
11:30								
12:00								
12:30								
13:00								
13:30								
14:00								
14:30								

	15:00								
	15:30								
	16:00								
	16:30								
	17:00								
	17:30								
	18:00								
	18:30								
	19:00								
	19:30								
	20:00								
	20:30								
	21:00								
	21:30								
	22:00								
	22:30								
	23:00								
	23:30								
	0:00								
	0:30								
	1:00								
	1:30								
	2:00								
	2:30								
	3:00								
	3:30								
	4:00								
	4:30								
	5:00								
	5:30								
	6:00								
	6:30								
	7:00								
	7:30								

APPENDIX B PREFERRED TIMES FOR COMMISSIONING TESTING

The commissioning of some new generators may take place so that the generator will be available for commercial load before the time of summer peak. Regardless of the time of year during which a generator is being commissioned it should be commissioned according to the following 'time of day' periods.

The testing of ramp up capability between load points could occur when there is an increase in system loads in the periods leading up to morning and evening peaks. The preferred time however to do these tests is during the middle of the day when the load profile is relatively flat and plant movements minimal. This allows for easier configuration of load following and spinning reserve. The generator output should be held at a steady value during evening peaks. Ramp down and de-commitment should take place after evening peak, or before evening peak period begins.

A general principle to be observed is that commissioning should only take place when there is sufficient plant on the system to maintain system security. This would tend to rule out commissioning during periods of low over night system load.

Load rejection or trip tests should be done during times of flat load profile, and with maximum spinning reserve.

Requirements for specific tests are shown below.

C tests (Note that these tests are compulsory)

C2A Step changes to AVR voltage reference with PSS out of service.	
Generator Output and Test Sequence	System Conditions
(i) 50% rated MW	System base load OR typical conditions and typical connection at Generator
(ii) 100% rated MW	System base load OR typical conditions and typical connection at Generator

C2B Step changes to AVR voltage reference with PSS in service.	
Generator Output and Test Sequence	System Conditions
(i) 50% rated MW	System base load OR typical conditions and connection at Generator
(ii) 100% rated MW	System base load OR typical conditions and connection at Generator

C3A Step changes to AVR voltage reference with PSS out of service.	
Generator Output	System Conditions
100% rated MW	(i) System minimum load with no other generation on the same bus OR relatively weak connection to Network
100% rated MW	(ii) System maximum load with maximum generation on the same

	bus OR relatively strong connection to Network

C3B Step changes to AVR voltage reference with PSS in service.	
Generator Output	System Conditions
100% rated MW	(i) System minimum load with no other generation on the same bus OR relatively weak connection to Network
100% rated MW	(ii) System maximum load with maximum generation on the same bus OR relatively strong connection to Network

C4 Step change of MVA on the transmission system.	
Generator Output and Test Sequence	System Conditions
(i) 50% rated MW with PSS out of service	System base load OR typical conditions and connection at Generator
(ii) 50% rated MW with PSS in service	System base load OR typical conditions and connection at Generator

C5 Real power load rejection (generator trip test)	
Generator Output and Test Sequence	System Conditions
(i) 25% rated MW	To be done at time of flat system load profile
(ii) 50% rated MW	To be done at time of flat system load profile
(iii) 100% rated MW	To be done at time of flat system load profile

C6 Steady state over-excitation limiter (OEL) operation	
Generator Output and Test Sequence	System Conditions
(i) 100% rated MW	After peak or during decommitment
(ii) 75% rated MW	After peak or during decommitment
(iii) 50% rated MW	After peak or during decommitment
(iv) 25% rated MW	After peak or during decommitment
(v) min MW output	After peak or during decommitment

C7 Steady state under-excitation limiter (UEL) operation	
Generator Output and Test Sequence	System Conditions
(i) 100% rated MW	After peak or during decommitment

(ii) 75% rated MW	After peak or during decommitment
(iii) 50% rated MW	After peak or during decommitment
(iv) 25% rated MW	After peak or during decommitment
(v) min MW output	After peak or during decommitment

C9 MVAR capability at full MW output	
Generator Output	System Conditions
MW and MVAR output levels set to 100% of rated values and maintained for one hour.	System Maximum load and maximum generation in high ambient temperature.

S TESTS (these tests, though not compulsory, may be included in a commissioning programme)

S1 (a) and **S2** (a) and **S1** (b) Load rejection (reactive power)	
Generator reactive power output	Generator real power output
(a) -30% rated MVAR	0 or Min MW output
(b) +25% rated MVAR	0 or Min MW output

S5 AVR / OEL changeover	
Generator Output	System Conditions
100% rated MW output.	To be done at time of flat system load profile

S6 AVR / UEL changeover	
Generator Output	System Conditions
100% rated MW output	To be done at time of flat system load profile

S8 Tripping of an adjacent generating unit.	
Generator Output	System Conditions
At a level sufficiently below its rated output so that in combination with LF and SR generators it would assist with maintaining system frequency	To be done at time of flat system load profile

S10 Step changes added to and subtracted from governor / load reference (Note this test is not a ramp rate test.)

Generator Output	System Conditions
Output at 50-85% rated MW (a) 2.5% step increase in MW demand signal (b) 2.5% step decrease in MW demand signal (c) Equivalent of 0.05 HZ subtracted from governor speed reference (d) Equivalent of 0.1 HZ added to governor speed reference	To be done at time of flat system load profile

OTHER TESTS (these tests although not compulsory are commonly included in commissioning programmes for new plant)

Maximum Ramp Rate	
Generator Output	System Conditions
0 to Maximum output at maximum ramp rate	To be done at flat system load profile and sufficient balancing plant on the system (ie during the middle of the day) or during time of rising load.
Maximum Output to 0MW at maximum output	To be done at flat system load profile and sufficient balancing plant on the system (ie during the middle of the day) or during time of falling load.

APPENDIX C GUIDELINES FOR ADDITIONAL ANCILLARY SERVICES DURING COMMISSIONING TESTS

C tests (note that these tests are compulsory):

C2A Step changes to AVR voltage reference with PSS out of service.		
Generator Output and Test Sequence	Additional load following and/or spinning reserve	Indicative Balancing Market submission
(i) 50% rated MW	100%	Bid 50% at floor and 50% at cap
(ii) 100% rated MW	100%	Bid 100% at floor and 0% at cap

C2B Step changes to AVR voltage reference with PSS in service.		
Generator Output and Test Sequence	Additional load following and/or spinning reserve	Indicative Balancing Market submission
(i) 50% rated MW	100%	Bid 50% at floor and 50% at cap
(ii) 100% rated MW	100%	Bid 100% at floor and 0% at cap

C3A Step changes to AVR voltage reference with PSS out of service.		
Generator Output	Additional load following and/or spinning reserve	Indicative Balancing Market submission
100% rated MW	100%	Bid 100% at floor and 0% at cap
100% rated MW	100%	Bid 100% at floor and 0% at cap

C3B Step changes to AVR voltage reference with PSS in service.		
Generator Output	Additional load following and/or spinning reserve	Indicative Balancing Market submission
100% rated MW	100%	Bid 100% at floor and 0% at cap
100% rated MW	100%	Bid 100% at floor and 0% at cap

C4 Step change of MVA on the transmission system.		
Generator Output and Test Sequence	Additional load following and/or spinning reserve	Indicative Balancing Market submission
(i) 50% rated MW with PSS out of service	100%	Bid 50% at floor and 50% at cap
(ii) 50% rated MW	100%	Bid 50% at floor and 50% at cap

with PSS in service		

C5 Real power load rejection (generator trip test)		
Generator Output and Test Sequence	Additional load following and/or spinning reserve	Indicative Balancing Market submission
(i) 25% rated MW	100% + load rejection amount	Bid 12.5% at floor and 87.5% at cap for trip interval
(ii) 50% rated MW	100% + load rejection amount	Bid 25% at floor and 75% at cap for trip interval
(iii) 100% rated MW	100% + load rejection amount	Bid 50% at floor and 50% at cap for trip interval

C6 Steady state over-excitation limiter (OEL) operation		
Generator Output and Test Sequence	Additional load following and/or spinning reserve	Indicative Balancing Market submission
(i) 100% rated MW	100%	Bid 100% at floor and 0% at cap
(ii) 75% rated MW	100%	Bid 75% at floor and 25% at cap
(iii) 50% rated MW	100%	Bid 50% at floor and 50% at cap
(iv) 25% rated MW	100%	Bid 25% at floor and 75% at cap
(v) min MW output	100%	Bid min at floor and remainder at cap

C7 Steady state under-excitation limiter (UEL) operation		
Generator Output and Test Sequence	Additional load following and/or spinning reserve	Indicative Balancing Market submission
(i) 100% rated MW	100%	Bid 100% at floor and 0% at cap
(ii) 75% rated MW	100%	Bid 75% at floor and 25% at cap
(iii) 50% rated MW	100%	Bid 50% at floor and 50% at cap
(iv) 25% rated MW	100%	Bid 25% at floor and 75% at cap
(v) min MW output	100%	Bid min MW output at floor and remainder at cap

C9 MVAR capability at full MW output

Generator Output	Additional load following and/or spinning reserve	Indicative Balancing Market submission
MW and MVAR output levels set to 100% of rated values and maintained for one hour.	100%	Bid 100% at floor and 0% at cap

S TESTS (these tests, though not compulsory, may be included in a commissioning programme).

S1 (a) and **S2** (a) and **S1** (b) Load rejection (reactive power)		
Generator reactive power output	Additional load following and/or spinning reserve	Indicative Balancing Market submission
(a) -30% rated MVAR	70%	Bid min MW output at floor and remainder at cap
(b) +25% rated MVAR	70%	Bid min MW output at floor and remainder at cap

S5 AVR / OEL changeover		
Generator Output	Additional load following and/or spinning reserve	Indicative Balancing Market submission
100% rated MW output.	100%	Bid 100% at floor and 0% at cap

S6 AVR / UEL changeover		
Generator Output	Additional load following and/or spinning reserve	Indicative Balancing Market submission
100% rated MW output	100%	Bid 100% at floor and 0% at cap

S8 Tripping of an adjacent generating unit.		
Generator Output	Additional load following and/or spinning reserve	Indicative Balancing Market submission
At a level sufficiently below its rated output so that in combination	100% + amount supplied by generator to be tripped	Bid initial amount at floor and remainder at cap. For adjacent generator bid MW to be tripped

with LF and SR generators it would assist with maintaining system frequency		at floor and remainder at cap, and then for the interval of tripping 0% at floor and 0% at cap

S10 Step changes added to and subtracted from governor / load reference (Note this test is not a ramp rate test.)		
Generator Output	Additional load following and/or spinning reserve	Indicative Balancing Market submission
Output at 50-85% rated MW (a) 2.5% step increase in MW demand signal (b) 2.5% step decrease in MW demand signal (c) Equivalent of 0.05 HZ subtracted from governor speed reference (d) Equivalent of 0.1 HZ added to governor speed reference	100%	Bid 50-85% at floor and 50-15% at cap (a) Bid (50-85%) + 2.5% at floor and (50-15%) – 2.5% at cap (b) Bid (50-85%) - 2.5% at floor and (50-15%) + 2.5% at cap (c) Bid (50-85%) - MW equivalent of 0.05 HZ for the generator at floor and (50-15%) + MW equivalent of 0.05 HZ for the generator at cap (d) Bid (50-85%) + MW equivalent of 0.1 HZ for the generator at floor and (50-15%) – MW equivalent of 0.1 HZ for the generator at cap

OTHER TESTS (these tests although not compulsory are commonly included in commissioning programmes for new plant)

Maximum Ramp Rate		
Generator Output	Additional load following and/or spinning reserve	Indicative Balancing Market submission
0 to Maximum output at maximum ramp rate	100% for test window.	Bid initial amount at floor and remainder at cap for intervals prior to test. Bid full capacity at cap. If generator to stay at maximum output after this test bid these intervals at the floor.
0 to Maximum output	100% for test window.	Bid initial amount at cap if

at maximum ramp rate		previously bid this full capacity otherwise at the floor if an extension of ramp up test. If generator to stay at 0MW output after this test bid these intervals at thecap.