SWIS LOCAL BLACK START PROCEDURE GUIDELINE

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APPROVED BY:	Martin Maticka
TITLE:	Group Manager – WA Operations

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1. INTRODUCTION

1.1. Purpose and scope

The Wholesale Electricity Market Rules (WEM Rules) require:

(a) that AEMO publish guidelines for the preparation of Local Black Start Procedures (LBSP) and may amend the guidelines from time to time [Clause 3.7.12];

(b) that each Scheduled Facility and Non-Scheduled Facility must develop Local Black Start Procedures in accordance with the guidelines published under clause 3.7.14 of the WEM Rules [Clause 3.7.13]; and

(c) this guideline is published under clause 3.7.12 of the WEM Rules.

1.2. Interpretation

The following principles of interpretation apply to this guideline unless otherwise expressly indicated:

(a) terms that are capitalised, but not defined in this guideline, have the meaning given in the WEM Rules;

(b) to the extent that this guideline is inconsistent with the WEM Rules or Market Procedures, the following order of precedence must be followed to the extent of the inconsistency:

(i) the WEM Rules; then

(ii) Market Procedures; then

(iii) this guideline;

(c) a reference to the WEM Rules or Market Procedures includes any associated forms required or contemplated by the WEM Rules or Market Procedures; and

(d) words expressed in the singular include the plural and vice versa.

1.3. Glossary

(a) Terms defined in the WEM Rules and Market Procedures have the same meanings in this guideline unless otherwise specified in this clause. The words, phrases and abbreviations in the table below have the meanings set out opposite them in the table when used in this guideline.

(b) In this document, capitalised words, phrases, and acronyms have their meaning set out in the Table 1.

Table 1 Definitions

Term	Meaning
Major supply disruption[1]	The unplanned absence of voltage on a part of the transmission system affecting one or more Facilities.
System shutdown or black system[1]	The absence of voltage on all or a significant part of the transmission system or within a region during a major supply disruption affecting a significant number of customers.

[1] While this term is not defined in the WEM Rules, similar terms are defined in the National Electricity Rules. Accordingly, these definitions have been adopted in the SWIS restart plan.

1.4. Related Policies and Procedures

Table 2 lists the documents, policies, and procedures that are relevant to the interpretation and execution of the SWIS restart plan made under clause 3.7.1 of the WEM Rules.

Table 2 Related Policies, Procedures, Instructions, and Forms

Title	Location
State Hazard Plan (Westplan) – Energy Supply Disruption	SEMC website[2]
System Restart Standard	AEMO website[3]

[2] SEMC. *State Hazard Plan - Energy Supply Disruption*. Available at: https://www.wa.gov.au/government/publications/state-hazard-plan-energy-supply-disruption

[3] AEMO. *System Restart Standard*. Available at: https://aemo.com.au/energy-systems/electricity/wholesale-electricity-market-wem/system-operations/essential-system-services/system-restart

2. LOCAL BLACK START PROCEDURES

LBSPs provide AEMO with information[4] to understand the likely condition and the capabilities of Scheduled Facilities and Non-Scheduled Facilities following a black system or major supply disruption. Provision of accurate information in LBSPs is necessary for AEMO to be fully informed of the technical requirements and limitations of Facilities and related network plant, and develop robust system restart plans accordingly.

In providing this information to AEMO, Market Participants may assume that their Facility is not likely to be damaged due to a black system or major supply disruption. However, AEMO considers that some of the information included in LBSPs may be best estimates by Market Participants, and Market Participants are encouraged to include additional scenarios to provide an indication as to the likely status and capabilities of their Facilities in the event of system black or major supply disruption.

2.1. Scheduled Facilities and Non-Scheduled Facilities

Market Participants must develop an LBSP for each of its Facilities, and provide these LBSPs to AEMO by email to wa.sm.planning@aemo.com.au. Appendix A of this guideline provides the template that Market Participants must use when developing an LBSP for a Scheduled Facility or Non-Scheduled Facility. However, Market Participants must provide any information to AEMO in addition to that specified in Appendix A should AEMO request further information.

At a high-level, Market Participants are required to provide the following information in LBSPs:

(a) General, operational and technical information pertaining to Facilities.

(b) Assessment of the emergency situation and safe shut down of generating units.

(c) The process for restart of Facilities and high-level strategies followed by their power stations in the event of a black system or major supply disruption.

(d) Specific information to be provided in respect to any embedded generation, solar generation and wind generation.

This information must be consistent with any relevant System Restart Service contract(s).

Market Participants must review and amend the LBSPs at AEMO's request or following significant changes to their Scheduled Facility or Non-Scheduled Facility.

Should a Market Participant require any additional time in providing any of the required information specified in Appendix A, the Market Participant must specify the date on which this particular information can be provided to AEMO in the relevant section in the template in Appendix A.

2.2. Review process

AEMO will review the adequacy of the information provided in LBSPs, and ensure that the information provided is consistent with the SWIS system restart plan.

Following its review, AEMO may require any Market Participant to submit its LBSPs to AEMO for review and to amend its LBSPs to take into account the results of the review [Clause 3.7.6].

[4] AEMO will treat all information in LBSPs as confidential unless it is required by law to disclose information.

APPENDIX A. INFORMATION TO BE INCLUDED IN FACILITY LBSPS

Note:

- LBSPs of embedded generation are required to complete only sections 1 and 5 of Appendix A.
- LBSPs of solar generation or wind generation are required to cover only the sections 1 and 6 of Appendix A.

Section 1: General information on the power station

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
1A	Name of Market Participant.	
1B	Name of the Facility.	
1C	Address of the Facility.	
1D	Primary and back up contact for matters relating to LBSPs.	
1E	Provide the specific location of the Network Operator's substation where the Facility/ies connect to the power system.	
1F	Generating unit type.	*(leave the correct type, strikethrough or delete others)* Coal Gas CCGT Diesel Solar Wind ESR Biogas if other, please indicate:
1G	Number of generating units and MW capacity of each unit.	
1H	Number of generating units that can be returned to service without external supply.	
1J	Is the Facility staffed under normal operation conditions?	
1K	Number of generating units capable of a trip to house load (TTHL).	

Section 2: Assessment of the situation and safe shut down of generating units

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
2A	Who would the Facility staff contact to get an assessment of the situation and the estimated time to receive external power? How would the Facility staff contact this person/organisation?	

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
2B	What organisation is responsible for restoring the power system in the vicinity of the Facility? How would Facility staff contact this organisation?	
2C	Do staff need to be called out to manage the situation at the Facility? If yes, how long will it take to get on-call/standby/other staff to the Facility site?	
2D	Is external supply required to safely shut down the generating units?	
2E	Are emergency diesel/gas turbines installed at the Facility sufficient to safely shut down the generating units?	
2F	How long will it take to safely shut down, secure and make ready to restart the generating units?	
2G	Can the generating units that are in a shutdown sequence, be restored to service as soon as external supply becomes available or does the shutdown sequence need to be completed first?	
2H	Indicate how the time without external supply following a supply disruption affects the time to restart generating units. The required information may be provided in the following format. If external supply is made available within X hours, the Facility can start in Y hours. If the external supply is not made available within P hours, it will take Q days to start the Facility.	
2J	How much time will be required for any offline units (at the time of black system event) to be available to participate in system restart process?	
2K	How long can a generating unit be without external supply and still maintain the capability to restart when external supply is made available?	

Section 3: Restarting the generating units

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
3A	Are there any unique/complex switching requirements to receive station auxiliary supply from the power system?	
3B	Where does the Facility receive its external start up supply from?	
3C	Can generating units be connected to a de-energised bus? Can generating units operate supplying an isolated load and then synchronise to the rest of the system?	
3D	Provide a summary of the restart plan of the Facility. Include: - Facility specific information (at high level), AEMO should be aware of, in developing system restart plans; and - the order of unit restarts and estimates of time required to prepare units to synchronise.	
3E	What is the fuel supply arrangement (coal, gas etc.) to start up and continue to run generating units?	
3F	What is the arrangement for the supply of other station essential services such as demineralised water?	
3G	What nominal capacity steps (quantity of increase in capacity for each step) are available as each unit is progressively brought back on-line? What ramp rates for loading and unloading are available? Provide a generating unit MW loading capability curve, showing the size of load block as a function of the unit MW output., i.e. load block = f (unit active energy output). Is there a requirement for the load block to be a discrete value or is there a tolerance range? What are the main factors that dictate these increments?	

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
3H	If the MVAr capability of generating units during restart is different to the capability under normal operation, provide the restart MVAr capability as a function of MW output. i.e. unit MVar capability = f (unit active energy output). Include transformer energisation current capability. Indicate whether generator excitation can be controlled to minimise transformer magnetising current.	
3J	Provide the estimated electrical power requirements during various stages of the unit restart? (provide a breakdown for individual units, an aggregate, and house load)	
3K	What is the minimum load requirement for stable operation of each generating unit?	
3L	What are the upper and lower values of the normal operating frequency band for each unit over which full rated output is available? What are the extreme frequency bands for each unit where partial output is available?	
3M	Are there any special procedures to be followed in energising the transformers, any interlocks that must be by-passed etc.?	

Section 4: Use of TTHL capable generating units

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
4A	The duration of time the Facility is capable of stable operation on house load?	
4B	If there is a time limit for stable operation following TTHL, what factors determine this time limit?	
4C	What load blocks are required? (include details of timeframes)	

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
4D	Are there any other requirements for stable operation supplying house load, until the required load blocks are provided?	

Section 5: Restarting embedded generators

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
5A	Does the embedded generator have capability to restart and form an island supplying local load?	
5B	If an island can be formed, are there facilities for the island to be synchronised to the transmission network at a later stage?	
5C	Do you have any operational arrangements [as detailed in the Electricity Transfer Access Contract (ETAC) or in any other agreement] with the Network Operator regarding the starting and operation of embedded generation in a black system condition or major supply disruption? If yes, please include relevant details.	

Section 6: Restarting solar and wind Facilities

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
6A	How are the solar and/or wind generating units started and connected to the power system under normal operating conditions?	
6B	Do you have any operational arrangements [as detailed in the ETAC or in any other agreement] with the Network Operator regarding the starting and operation of solar and/or wind generation in a black system condition or major supply disruption? If yes, please include relevant details.	

Section 7: Technical details associated with the Facility

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
7A	Do generating units have under-frequency trip setting/s? If so, provide details of these settings.	
7B	Do generating units have over-frequency (and/or over-speed) trip settings? If so, provide details of these settings.	

Section 8: Technical details associated with TTHL capable generating units

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
8A	What are the triggering mechanisms of the TTHL capable generating units? (include details of the levels, durations, and rates of change of frequency and voltage, and power swings)	
8B	Are the TTHL units fully or partially automated? Is any form of manual intervention required for the generating unit to TTHL?	
8C	Are there any likely conditions that trip generating units prior to tripping to house load?	
8D	If there are multiple generating units with TTHL capability, how many generating units are normally enabled for TTHL? What strategy is used in selecting the number of generating units for TTHL?	

Section 9: Communication facilities

Item	Information required	Include the information in this column (If the required information is not readily available, include the likely date that this information will be provided)
9A	What communication facilities do you have to communicate with your on-call, standby and other staff?	
9B	What communication facilities do you have to communicate with AEMO and the Network Operator?	