



PUBLIC

WESM Manual

Procedure on Start-up and Shutdown of a Generating Unit

Issue 1.0

Abstract	This document outlines the procedures to be implemented by the Market Operator in the start-up and shutdown of generating units.
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Related Document

Document ID	Document Title
	WESM Rules
WESM DP-000	WESM Dispatch Protocol
WESM SSRG-000	WESM System Security & Reliability Guidelines



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1. PURPOSE

This document provides the procedure to be undertaken during the start-up and shutdown of generating units.

The procedure will minimize the ex-post settlement imbalance and market intervention resulting from the start-up and shutdown of generating units.

2. SCOPE

This manual applies to the Market Operator (MO), the System Operator (SO), and the Trading Participants (TPs) of the Philippine Wholesale Electricity Spot Market (WESM).

3. PRINCIPLES

- 3.1. To prevent scheduling problems that may arise, it is important that the start-up and shutdown of a generating unit to/from the grid shall strictly comply with the outage schedule approved by the SO and forwarded to the MO.
- 3.2. Generating units shall follow the dispatch schedule generated by the MO. Any deviation from the schedule is deemed an imbalance in delivery and shall be subject to the ex-post settlement processes.
- 3.3. In general, the generating units scheduled to operate are always dispatched at their Pmin level regardless of the offered price. Above the Pmin (up to their Pmax), the incremental dispatch is based on the offered price.
- 3.4. During registration in the WESM, the generating units shall declare their absolute Pmin value. The registered Pmin shall correspond to the minimum loading that the generating unit can operate during start-up operations.
- 3.5. Generating units shall submit their respective start-up and shutdown profile to the SO for validation and reference. Any adjustments or modifications to the start-up and shut-down profiles shall be coordinated with the SO. SO shall notify the TPs of any adjustments or modifications made.
- 3.6. The Pmin of generating units during start-up and shutdown shall be adjusted by the SO based on the following considerations:
 - 3.6.1 Pmin values are adjusted to ensure that the dispatch schedule of the generating unit conforms to the start-up and shut-down profiles.
 - 3.6.2 The basis for the adjustment of Pmin shall be the validated start-up and shutdown profiles.
 - 3.6.3 The SO shall adjust the Pmin and Pmax values of generating units through the submission of security limits to the WESM Market Management System (MMS).



- 3.7. The general principles that will be observed in the start-up of a generating unit are as follows (see Appendix I):
 - 3.7.1. Off-line units will not be scheduled for start-up if they are included in the approved outage schedule submitted by the SO to the MO (through the MMS).
 - 3.7.2. The generating unit shall be synchronized to the grid prior to the execution of the hour-ahead (RTD) dispatch schedule consistent with the WESM timetable.
 - 3.7.3. The generating unit scheduled for start-up shall have valid energy offers for the next trading intervals consistent with the WESM timetable.
 - 3.7.4. Once synchronized to the grid, the generating unit shall ramp-up linearly to its Pmin in the next trading interval.
 - 3.7.5. From its synchronization to the start of the next trading interval, the generating unit shall be a “price taker”.
- 3.8. The general principles that will be observed in the shutdown of a generating unit are as follows (see Appendix II):
 - 3.8.1. Generating units scheduled for shutdown shall be included in the approved outage schedule submitted by the SO to the MO (through the MMS).
 - 3.8.2. The generating unit scheduled for shutdown shall withdraw its energy and operating reserve offers for the next trading interval consistent with the WESM timetable
 - 3.8.3. The generating unit shall ramp-down linearly while shutting down until it is finally disconnected from the grid.
 - 3.8.4. Generating units scheduled for shutdown shall be a “price taker” while ramping down from its current dispatch until it is finally disconnected from the grid.

4. DEFINITION OF TERMS

- 4.1. **Absolute Pmin** - the minimum loading that the generating unit can operate during start-up operations.
- 4.2. **Scheduled Generating Unit** - generating units registered as ‘scheduled’ and which are allowed to submit energy and operating reserve offers.
- 4.3. **Shutdown of a Generating Unit** - disconnection of a generating unit from the grid (opening of generator breakers).



- 4.4. **Start-up of a Generating Unit** - synchronization of a generating unit to the grid from its outage state (closing of generator breakers).
- 4.5. **RTD** - hour-ahead real time dispatch scheduling process. RTD determines ex-ante dispatch schedules.
- 4.6. **RTX** - real time ex-post scheduling process.

5. RESPONSIBILITIES

5.1. The MO shall -

- 5.1.1. Receive and process bids and offers for energy and operating reserves from TPs.
- 5.1.2. Issue a market advisory to the SO and the concerned TP.
- 5.1.3. Execute pre-dispatch (WAP/DAP) and real-time (RTD/RTX) dispatch scheduling processes.
- 5.1.4. Perform energy accounting and settlement processes for the WESM.

5.2. The SO shall -

- 5.2.1. Submit to the MO (through the MMS) the approved Outage Schedule pursuant to the outage schedule procedure provided in the WESM Dispatch Protocol.
- 5.2.2. Monitor the compliance of generating units to dispatch / outage schedules.
- 5.2.3. Continuously provide real-time data of generating unit, load, and breaker status to the MO (through the MMS).
- 5.2.4. Continuously provide security limits of generating units and transmission lines to the MO (through the MMS). If necessary, the SO shall adjust the Pmin of generating units consistent with the start-up/ shutdown profiles and normal operating procedure.
- 5.2.5. Notify MO on the start-up and shutdown of generating units including their deferment or cancellation.
- 5.2.6. Issue clearance to the TPs for the start-up and shutdown of generating units to and from the grid.

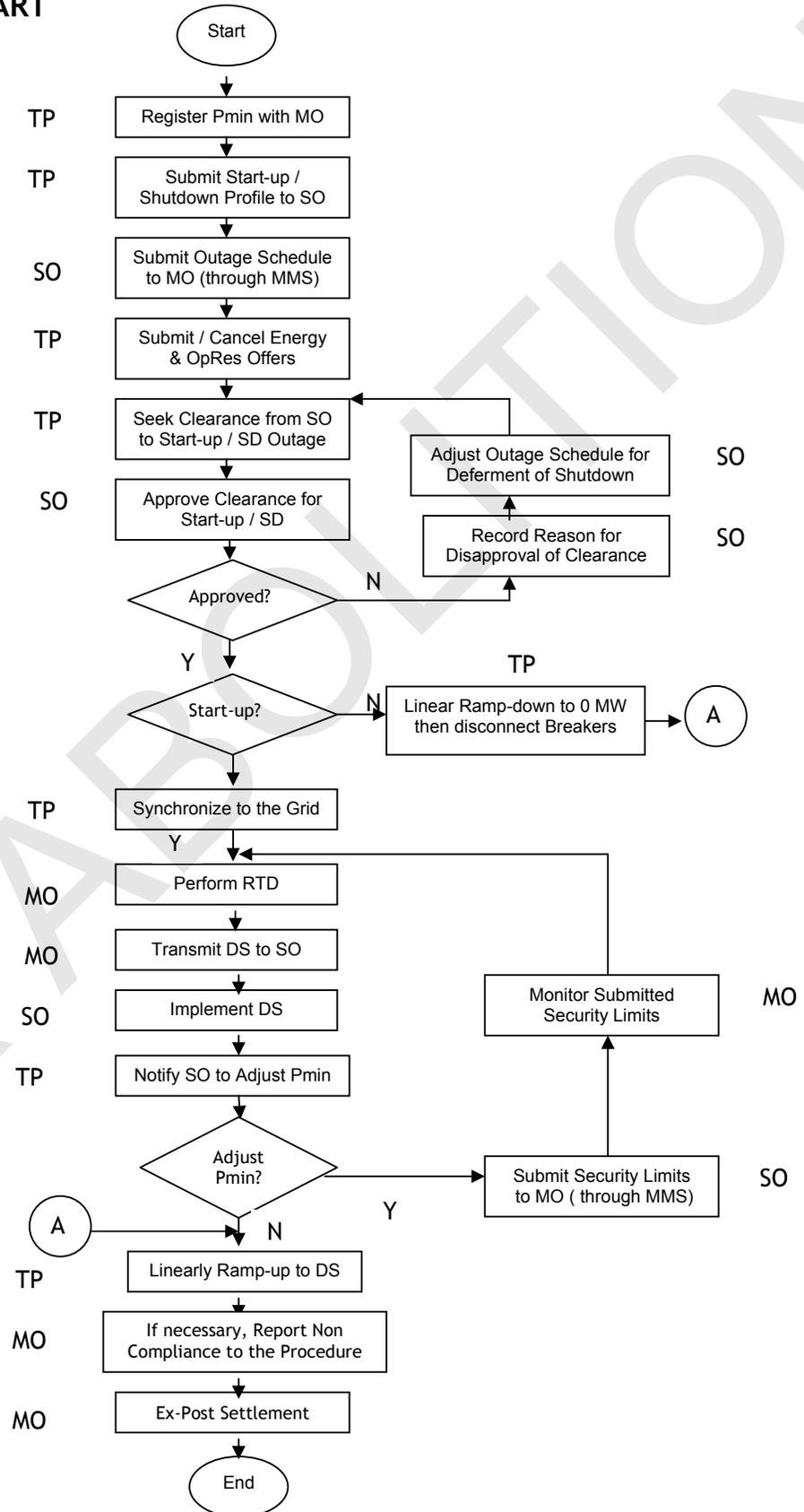
5.3. The TPs shall -



- 5.3.1. Register to the WESM the absolute Pmin values of their generating units.
- 5.3.2. Submit to the SO start-up and shutdown profile of their generating units.
- 5.3.3. Submit or cancel energy and operating reserve offers consistent with the WESM timetable.
- 5.3.4. Strictly comply with the outage and dispatch schedules.
- 5.3.5. Seek clearance from the SO prior to the start-up or shutdown of a generating unit.
- 5.3.6. Notify SO to adjust Pmin of their generating units consistent with the start-up / shutdown profiles.
- 5.3.7. As an alternative strategy to Section 5.3.6, submit an adjusted energy offer configured in such a manner where the second block quantity corresponds to the adjusted Pmin paired with very low price offer (almost zero price to indicate as price-taker while at the same time maintaining monotonic prices) for the next trading interval consistent with the start-up profiles.



6. FLOWCHART





7. PROCEDURES

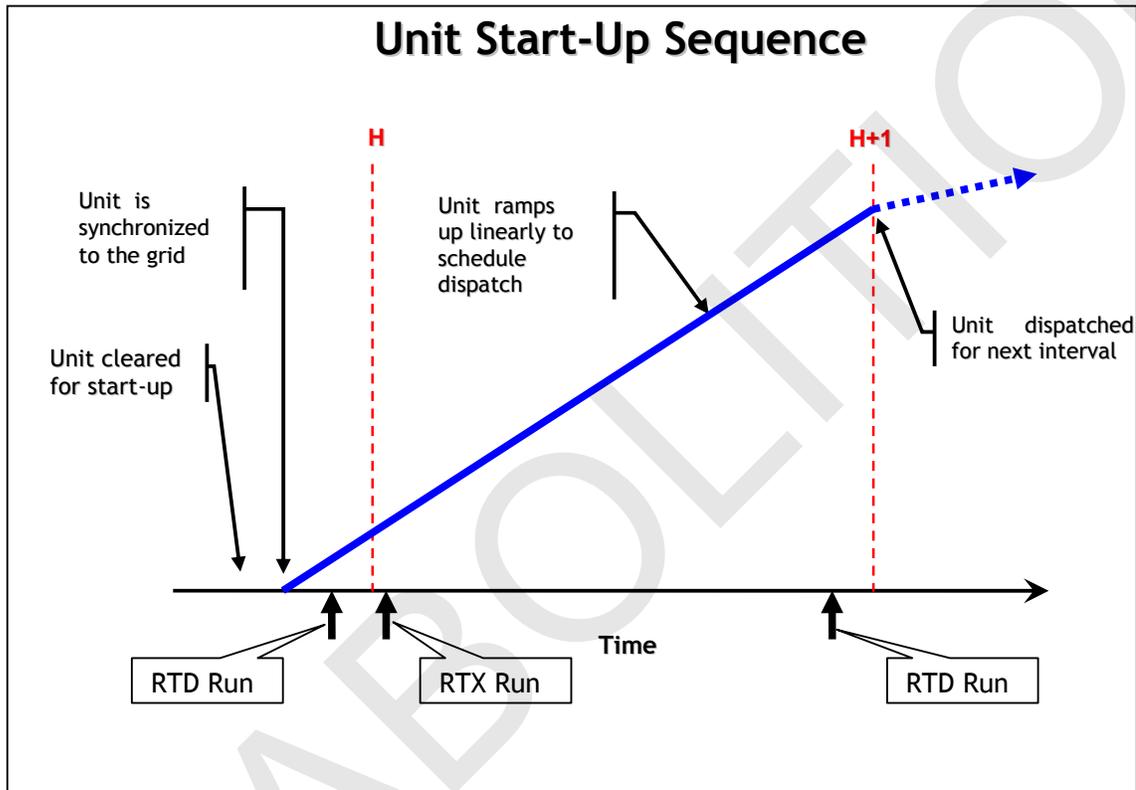
- 7.1. During the WESM registration the TP shall submit with the MO the Absolute Pmin of their generating units.
- 7.2. The TPs shall submit to SO the start-up/shutdown profiles of their generating units. They shall submit adjustment in the start-up/shutdown profiles, if necessary. The SO shall validate the submitted start-up / shutdown profiles and notify the TPs of any adjustments or modifications made.
- 7.3. The SO shall submit outage schedule to the MO (through the MMS).
- 7.4. Consistent with the WESM timetable, the TPs shall submit or cancel energy and operating reserve offers.
- 7.5. The TPs shall seek clearance from SO to start-up or shutdown.
- 7.6. The SO shall approve the clearance to start-up or shutdown the generating unit consistent with the provisions of the System Security & Reliability Guidelines.
- 7.7. The following actions shall be undertaken by the TP:
 - 7.7.1. Approved Start-up of a Generating Unit: The generating unit shall be synchronized to the grid at least ten (10) minutes prior to the execution of the RTD. After the generating unit has been synchronized to the grid, it is expected to ramp-up linearly to Pmin in the next trading interval.
 - 7.7.2. Approved Shutdown of a Generating Unit: The generating unit shall ramp-down linearly to zero (0) MW and then disconnect its breakers from the grid.
 - 7.7.3. Disapproved Start-up / Shutdown of a Generating Unit: SO notifies TP of the reason for the disapproval. SO shall record details of disapproval. In case of deferment in the Shutdown of a Generating Unit the SO shall adjust the start-up or shut-down outage schedule.
- 7.8. Consistent with the WESM timetable, the MO shall execute the RTD dispatch schedule.
- 7.9. The MO shall transmit the hourly dispatch schedule to SO.
- 7.10. The SO shall review and implement the hourly dispatch schedule.
- 7.11. Consistent with the submitted start-up profile of the generating unit, the TP shall notify SO for the need to adjust the Pmin, if necessary.



- 7.11.1. If necessary, the SO shall adjust the Pmin of generating units through the submission of security limit to MO (through the MMS). An alternative strategy is to submit an adjusted energy offer as specified in Section 5.3.7.
- 7.12. For generating unit with complex start-up profile, it shall ramp-up linearly to its next target dispatch schedule.
- 7.13. The MO shall monitor the adjustment in the Pmin of a generating unit.
- 7.14. If MO determines that the TP did not comply with the start-up or shutdown procedures, the MO shall issue a market advisory to the TP and the SO regarding the violation and prepare a report on the said incident.
- 7.15. The MO shall subject the generating units on start-up and shut-down to ex-post settlement process.



Appendix I - Generating Unit On Start-up Sequence





Appendix II - Generating Unit On Shutdown Sequence

