



PUBLIC

WESM Manual

Management Procedure for Load Shedding Issue 0.0

Abstract	This document covers method and procedures in managing Load Shedding.
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1. INTRODUCTION

Load shedding, as defined in the WESM Rules, is reducing or disconnecting load from the system. This action is conducted by the System Operator in response to:

- a. An overall shortage of energy at a node or in a region specified in the market network model, or
- b. Other network conditions, as determined by the System Operator in accordance with the procedures established under the Grid Code and the Distribution Code.

Load shedding is also implemented by the System Operator upon advice from the Market Operator in the event that:

- a. day ahead projections performed using the market dispatch optimization model, or
- b. dispatch optimization performed prior to commencement of each trading interval,

indicate that nodal energy prices are expected to be equal to, or exceed nodal value of lost load (VoLL) at any customer nodes in the market network model.

In the Grid Code and Distribution Code, load shedding can either be automatic load dropping (ALD) or manual load dropping (MLD), or both. For clarity in the procedures to be followed by the System Operator, the terms automatic load dropping and manual load dropping shall be used. Also, the procedures were formulated separately as the two events have different courses of action to be undertaken by the System Operator.

For the System Operator, load shedding is instigated when the demand for electricity exceeds the supply capacity of the system and/or to prevent the overloading of line or equipment. It is resorted to when available options to address the supply-demand imbalance and/or line/equipment overloading have been exhausted.

This management procedure is based on the WESM Rules and is supplemented by the applicable provisions of the Grid Code and the Distribution Code.



2. DEFINITION OF TERMS

Automatic Load Dropping (ALD) is the process of automatically and deliberately removing pre-selected loads from a power system in response to an abnormal condition in order to maintain the integrity of the system

Cascading outage is the uncontrolled successive loss of system elements triggered by an incident at any location.

Contingency is the unexpected failure or outage of a system component, such as a generator, transmission line, power transformer, bus, circuit breaker, or other electrical element. A contingency may also include multiple components, which are related by situations leading to simultaneous component outages.

Contingency reserve is the generating capacity that is intended to take care of the loss of the largest synchronized generating unit or the power import from a single grid interconnection, whichever is larger. Contingency reserve include spinning reserve and backup reserve.

Demand Control the reduction in demand for the control of frequency when the grid is in an emergency state.

Demand Control Imminent Warning A warning from the System Operator, not preceded by any other warning, which is issued when demand reduction is expected within thirty (30) minutes

Disturbance is an unplanned event that produces an abnormal system condition.

Emergency is any abnormal system condition that requires automatic or immediate manual action to prevent or limit loss of transmission facilities or generation supply that could adversely affect the reliability of the electric system.

Extreme State of the Grid a condition when the corrective measures undertaken by the System Operator during an emergency state failed to maintain system security and resulted to cascading outages, islanding, and/or system voltage collapse.

Frequency control a strategy used by the System Operator to maintain the frequency of the grid within the limits prescribed by then Grid code by the timely use of frequency regulating reserve, contingency reserve and demand control.

Island grid is a portion of a power system or several power systems that is electrically separated from the interconnection due to the disconnection of transmission system elements.



Manual Load Dropping (MLD) is the process of manually and deliberately removing pre-selected loads from a power system in response to an abnormal condition in order to maintain the integrity of the system.

Multiple outage contingency is an event caused by the failure of two or more components of the grid including generating units, transmission lines, and transformers.

Normal state is the grid operating condition when the system frequency, voltage, and transmission line and equipment loading are within their normal operating limits, the operating margin is sufficient, and the grid configuration is such that any fault current can be interrupted and the faulted equipment isolated from the grid.

Operating margin is the margin of generation over the total demand plus losses that is necessary for ensuring power quality and the security of the grid. Operating margin is the sum of the load following and frequency regulating reserve and the contingency reserve.

Red Alert an alert issued by the System Operator when the grid contingency reserve is zero, a generation deficiency exists, or there is critical loading or imminent overloading of transmission lines or equipment.

Reliability is of performance of the elements of the bulk electric system that results in electricity being delivered to customers within accepted standards and in the amount desired. Reliability may be measured by the frequency, duration, and magnitude of adverse effects on the electric supply.

Security is the ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements.

Stability is the ability of the dynamic components to return to a normal or stable operating point after being subjected to some form of change or disturbance.

Voltage collapse is an event that occurs when an electric system does not have adequate reactive support to maintain voltage stability. Voltage collapse may result in outage of system elements and may include interruption in service to customers.

Voltage control is the control of transmission voltages through adjustments in generator reactive output and transformer taps and by switching capacitor and reactors on the transmission and distribution systems.



3. OBJECTIVE

This document is intended to establish the responsibilities of the WESM participants and provide work procedures to the System Operator in managing supply shortfall and/or line or equipment overloading. It also aims to provide a consistent and equitable approach that uses best endeavors to balance the need for continued power system security and reliability with the electricity needs of the customer. And finally, to ensure that no WESM participant is treated unreasonably in the application of load shedding.

4. SCOPE

This management procedure applies to all WESM participants and shall be implemented in the Luzon, Visayas and Mindanao power systems

5. RESPONSIBILITIES

5.1 System Operator

- a. Establish the demand requirement for load shedding in order to limit the consequences of a major loss of generation in the grid.
- b. Declare an emergency when it determines the existence of a situation which has an adverse material effect on electricity supply or which poses as a significant threat to system security.
- c. Issue a Red Alert Warning
- d. Intervene in the spot market if the grid is in extreme state condition as established in the Grid Code arising from: (a) an emergency, (b) a threat to system security, or (c) an event of force majeure.
- e. Prepare a load shedding schedule, implement and monitor its compliance
- f. Give directions and coordinate with the Market Operator and WESM Participants the actions to be taken in order to restore normal operation of the power system.
- g. Provide the necessary notifications in accordance with the WESM Rules under clause 6.5.1.2
- h. Establish a load shedding program based on agreed priorities and equitable load-sharing between the distribution utilities, direct connect customers and cooperatives as shown in attachment A.



- i. Annually review the load shedding program in coordination with the Market Operator, distribution utilities and generation companies subject to the approval of the PEM Board.

5.2 Market Operator

- a. Inform the System Operator of the likelihood of initiating load shedding under clause 3.9.2 of the WESM Rules
- b. Coordinate actions with the System Operator in restoring the power system and the spot market to normal operation

5.3 WESM Participants

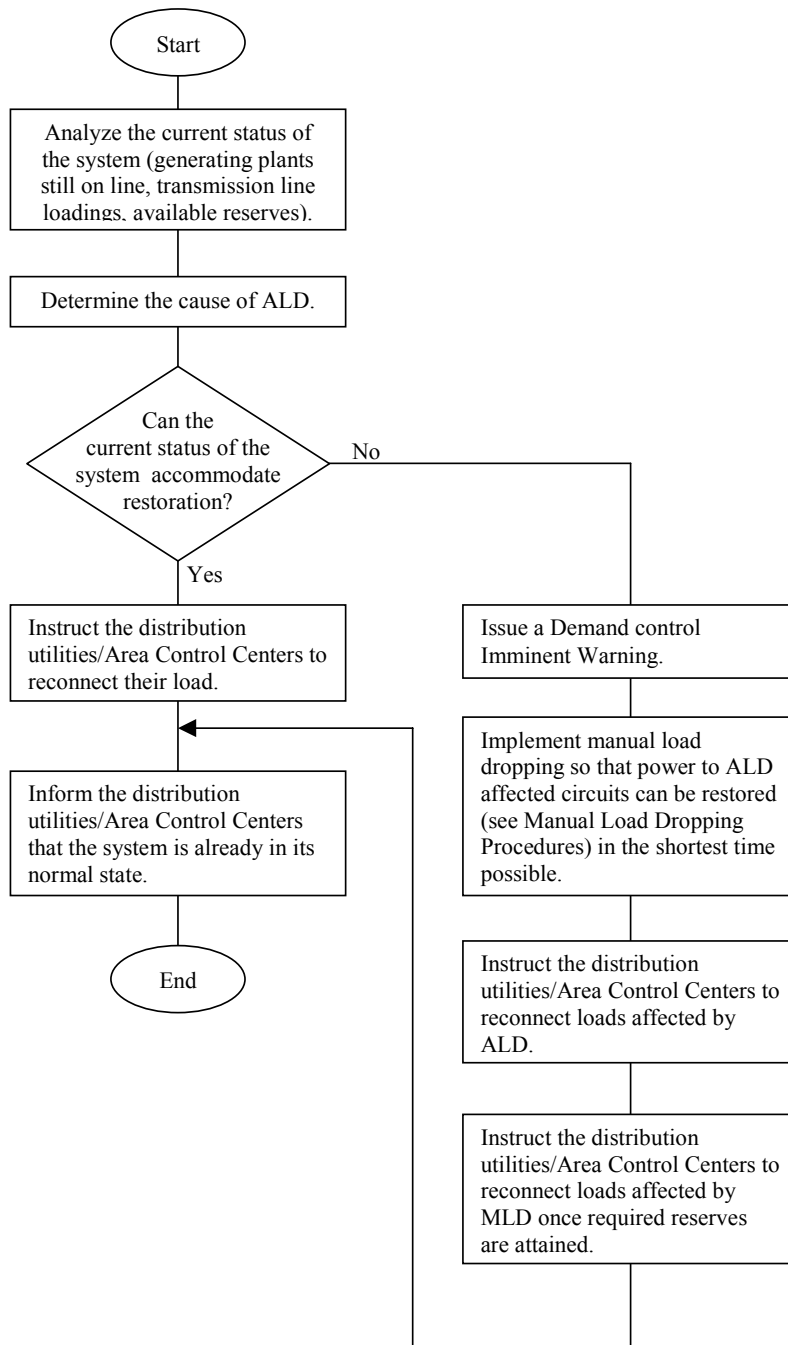
- a. All participants shall comply with the emergency direction/s given by the System Operator, unless it reasonably believes that an emergency direction poses a real and substantial risk of damage to its equipment, to the safety of its employees or the public, or if undue injury to the environment.
- b. All participants shall provide information required by the System Operator in order to address the emergency condition.
- c. The Network Service Provider shall have a load shedding program prepared in consultation with the System Operator with established priority and based on equitable load allocation.
- d. The Generator shall see to it that its units remain in synchronism for operating conditions specified under the Grid Code.

6. PRECONDITIONS / PRE-REQUIREMENTS

- a. The nodal prices are expected to equal to or exceed the VoLL based on the day ahead projections or dispatch optimization performed prior to commencement of each trading interval.
- b. During a trading interval, a power supply shortfall in the electric system, a region, or a node unexpectedly happened.
- c. The grid is in a state of extreme condition.
- d. The grid or part of the grid is under Red Alert.
- e. There is a threat to system security.

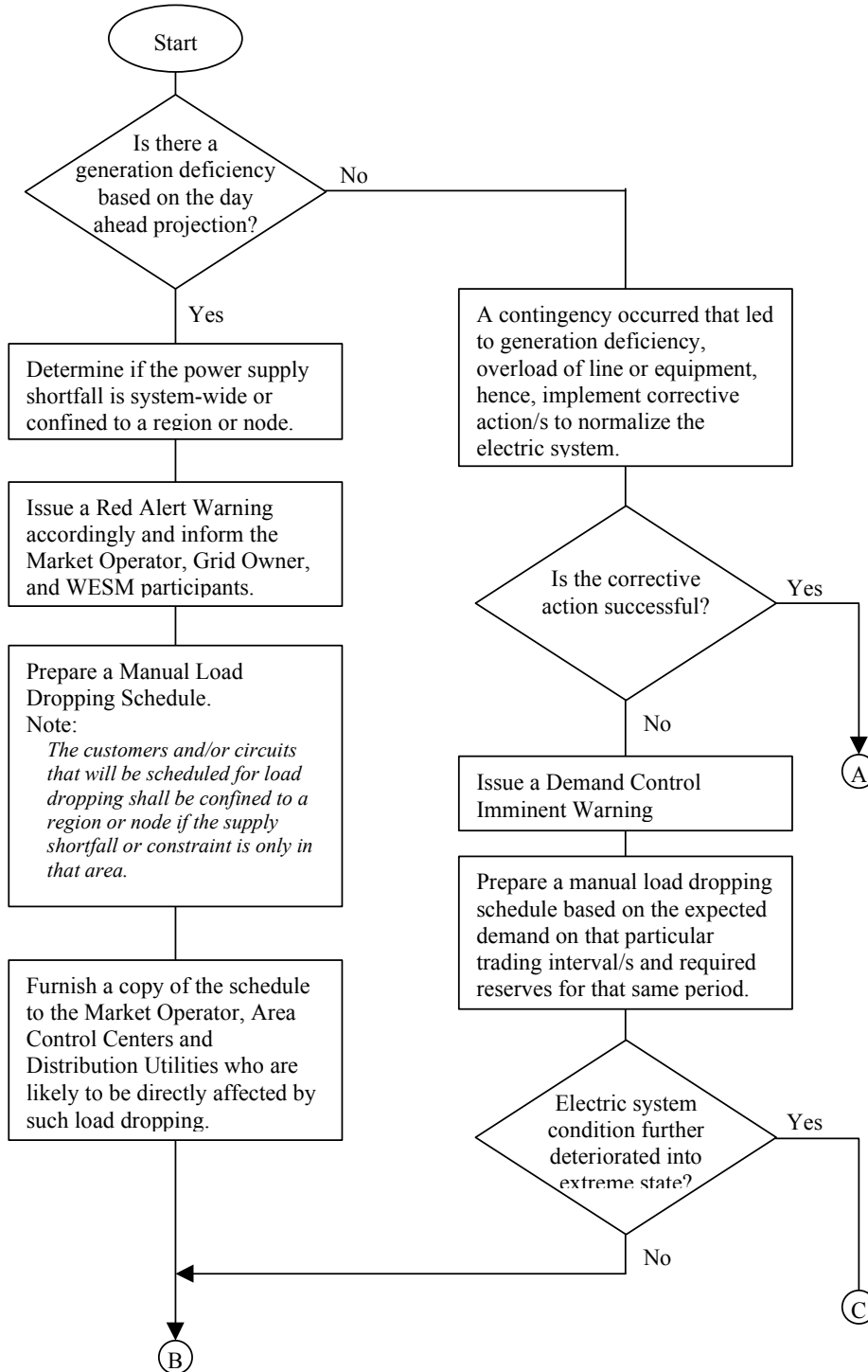


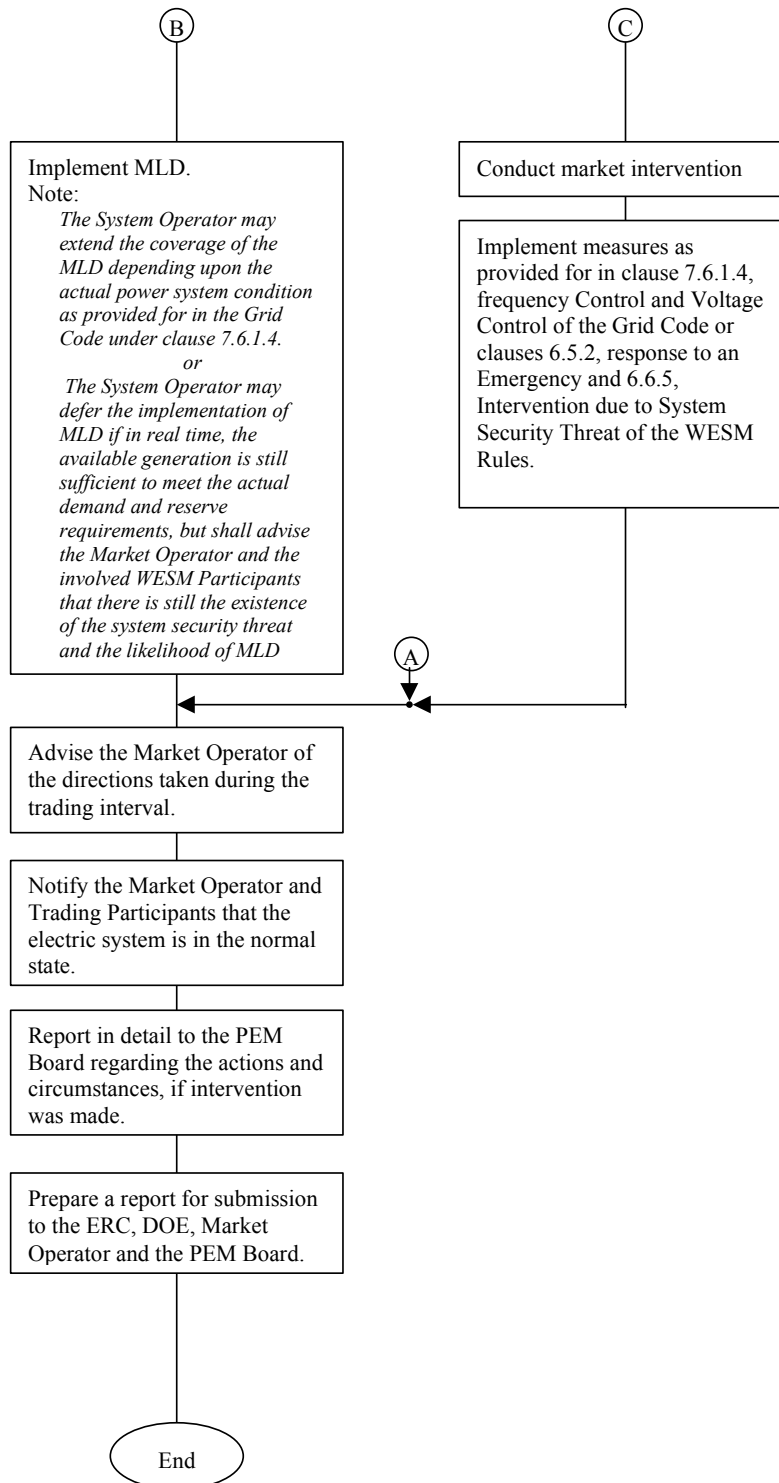
7. ALD PROCEDURE





8. MLD PROCEDURE







Attachment A

LOAD SHEDDING ALLOCATION PROGRAM

A. LUZON GRID

The Manual Load Shedding, if needed, shall be implemented on the following customers with the given order of priority below:

8:00AM – 5:00PM	5:01PM – 7:59AM the following day
Residential	VLC (voluntary load curtailment)
Commercial	Residential
Industrial	Commercial
	Industrial

The Load Shedding requirement (kWh) shall be distributed among Distribution Utilities in direct proportion to their respective actual demand on an hourly basis.

B. VISAYAS AND MINDANAO

The Manual Load Shedding, if needed, shall be implemented on the following customers with the given order of priority below:

1. Residential
2. Commercial
3. Industrial

The Load Shedding requirement (kWh) shall be distributed among Distribution Utilities in direct proportion to their respective actual demand on an hourly basis.