



November 9, 2010

Dear Market Participants

**Re: Request for Expressions of Interest ("EOI")
485 MW of Load Shedding Services for Imports ("LSSi")**

Invitation for Expressions of Interest

The Independent System Operator, operating as AESO (the "**AESO**"), has identified a need for up to 485 MW of LSSi. LSSi is an ancillary service procured to assist in restoring the available transfer capability (the "**ATC**") through the Alberta-BC interconnection. Through this EOI, the AESO invites expressions of interest from potential bidders for the provision of the LSSi (the "**LSSi Provider**").

Need for LSSi

The Alberta-BC interconnection is one of the two interconnections which Alberta has with other jurisdictions, which is subject to congestion that reduces the ATC. The Alberta-BC interconnection is rated at 1200 MW for imports and 1000 MW for exports but is restricted to 700 MW and 735 MW respectively for reliability reasons. Pursuant to Section 16 of the *Transmission Regulation* the AESO must restore the capability of this path and LSSi is one of the initiatives to this end.

There are operational drivers for the procurement of LSSi as the use of LSSi during high import conditions helps to maintain system reliability. Operating the Alberta-BC interconnection above certain import levels without LSSi would put the Alberta interconnected electric system (the "**AIES**") at risk of firm load shedding should the interconnection trip during these circumstances.

Requirements for LSSi

The requirements related to the provision of LSSi can be found in Schedule "A" attached to this EOI. Key points include:

- a) The load is disconnected from the AIES within 0.2 seconds (12 cycles) of the frequency reaching 59.50 Hz (+/- 0.02 Hz);
- b) Once the load is armed, the real power subject to tripping must be maintained for at least the duration of the scheduling hour;
- c) The LSSi Provider must be capable of communicating electronically via SCADA with the AESO in order to respond to dispatch instructions and provide status information to the AESO; and

- d) The LSSi Provider must comply with the provisions of [OPP 312](#) "Import Load Remedial Action Scheme (ILRAS) and Load Shed Service (LSS)", and the proposed ISO Rule 303.1 "Import Load Remedial Action Scheme Service and Load Shed Service" when it comes into effect.

Pricing Considerations

Pricing considerations related to the provision of LSSi can be found in Schedule "B" attached to this EOI.

Responses to Request for Expression of Interest

The AESO wishes to determine whether sufficient interest or capability exists in the province to merit launching a Request for Proposal (the "RFP") in respect of LSSi. If you are interested in responding to this EOI and in participating in an RFP for LSSi, then **no later than noon (MST) on November 30, 2010**, please respond in writing to the EOI project manager (contact information provided below) indicating:

- a) your legal name and address and a description of whether you are a corporation, partnership or otherwise, and a description of the eligibility of your organization to provide LSSi;
- b) your proposal of the volume (MW) that you would be willing to make available for LSSi;
- c) your preference on how the arming price will be calculated (fixed, indexed or either) and for each preference, an indication of the arming price for which you would be willing to provide LSSi;
- d) your proposal of the contract term for which you would be willing to provide LSSi to the AESO (with a minimum duration of one (1) year); and
- e) the name, title, address, telephone number, facsimile number and e-mail address of an individual authorized to represent your organization.

Additional Information

Please note the following:

- a) your response to this EOI shall be indicative only and shall not require you to participate in the RFP process;
- b) this EOI is not legally binding and, by issuing this EOI, the AESO has not committed to issuing an RFP in respect of LSSi;
- c) you will be responsible for all costs and expenses which you pay or incur as a result of responding to this EOI, whether or not the AESO issues an RFP;
- d) the AESO will follow its [ancillary services procurement process](#) to: (i) determine whether it shall issue an RFP or commence bi-lateral negotiations to procure LSSi; and (ii) implement the selected procurement alternative; and

- e) the AESO will treat as confidential all responses received to this EOI to preserve any competitive advantage.

Definitions

Capitalized terms not defined in this EOI and its Schedules shall have the meaning ascribed to them in the AESO's [Consolidated Authoritative Document Glossary](#).

Contact Information

The contact information for the EOI project manager is as follows:

Independent System Operator, operating as AESO
2500 Calgary Place
330 - 5th Avenue S.W.
Calgary, AB T2P 0L4

Attention: Hameed Zaman
Senior Commercial Analyst, Commercial Services
Phone: 403-539-2667
Fax: 403-539-2509
E-mail: commercial.services@aeso.ca

Additionally, it is requested that you send electronic copies of your response in either Word or PDF format to the email address provided above **no later than noon (MST) on November 30, 2010.**

If you require clarification on any information presented in this EOI please send your questions to the project manager of this EOI at the email address above.

THIS IS SCHEDULE "A" TO THE LOAD SHEDDING SERVICES FOR IMPORTS REQUEST FOR EXPRESSIONS OF INTEREST

Schedule "A" outlines the eligibility criteria and requirements that an LSSi Provider needs to fulfill in order to provide LSSi.

1. Eligibility to Provide LSSi

- 1.1 The load offered for LSSi must be located within the Alberta Balancing Authority Area and be connected to the AIES.
- 1.2 The load must be able to provide a minimum of 1 MW of LSSi.
- 1.3 The load may be an aggregation of several individual loads from various facilities throughout the AIES irrespective of whether the individual loads are electrically separated from each other via transmission or not.
- 1.4 Loads that are part of the [Under Frequency Load Shedding \(UFLS\) program](#) are eligible to provide LSSi except for the time-delayed blocks D1, D2 and D3. The AESO may need to evaluate the total volume of loads participating in LSSi that are also part of the UFLS program. The LSSi Provider needs to inform the AESO whether the load offered for LSSi is connected to a UFLS relay and if so, what the UFLS relay setting is.
- 1.5 The AESO may need to evaluate the maximum amount of load offered for LSSi in any one geographical location or by any one LSSi provider if the trip of this amount of load causes a violation of reliability criteria.

2. Communication Requirements

- 2.1 The LSSi Provider must be able to receive and respond to SCADA signals received from the System Controller energy management system (EMS) as primary communication for the purpose of arming/disarming the LSSi scheme and for load restoration. The LSSi Provider must install and maintain reliable telemetry signals to the System Controller in accordance with the [AESO SCADA Standard](#). In particular, the requirements in Section 4.4 and Section 5.1 through to Section 5.5 of the AESO SCADA Standard must be met with regards to the integrity scan and analog telemetry. Both analog and status points shall have a latency of no more than 30 seconds.
 - a) The following analog SCADA data shall be provided:
 - i) From the LSSi Provider to the AESO:
 - A) The total amount of real power (MW) that is being consumed from the loads subject to LSSi (the "**Actual Volume**"); a measured quantity;
 - B) The offered amount of real power (MW) (the "**Offered Volume**"); an entered quantity;

- C) The dispatched amount of real power (MW) agreed to be armed for LSSi (the “**Armed Volume**”); an entered quantity;
 - ii) From the AESO to the LSSi provider:
 - A) The dispatched amount of real power (MW) to be armed for LSSi (the “**Dispatched Volume**”); an entered quantity;
 - b) The following status SCADA data shall be provided:
 - i) From the LSSi Provider to the AESO:
 - A) Armed or disarmed status of the service. This is a contact that is either open or closed, where open means “disarmed” and closed means “armed” (or a corresponding digital signal, or a word).
 - ii) From the AESO to the LSSi provider:
 - A) An arm or disarm dispatch signal; an entered quantity that can be either a digital value or a word.
- 2.2 The LSSi Provider must be able to receive and respond to voice communication from the System Controller as backup communication. Voice communication for normal telephone service shall be in accordance with the AESO [Operational Voice Communications Standard](#) as required under Table 4-1 for the category “All Participants who are required to receive ancillary service dispatches”. Note that access to the AESO Automated Dispatch and Messaging System (ADaMS) is not required for the provision of LSSi.

Refer to Section 1 of Attachment “1” for an illustration of the LSSi SCADA communications.

3. Operational Requirements

- 3.1 An LSSi Provider may not arm an LSSi scheme without receiving a dispatch from the System Controller to do so.
- 3.2 Once the LSSi scheme has been armed it may not be disarmed until a dispatch to that effect is received from the System Controller.
- 3.3 The LSSi Provider must arm or disarm the LSSi scheme within fifteen (15) minutes in response to a SCADA dispatch from the System Controller. The dispatch may be verbal under emergency conditions or if the telemetry / SCADA system has failed.
- 3.4 The LSSi Provider must ensure that their SCADA point for the Actual Volume is current and accurate at all times with the amount of LSSi load available from the facility and/or facilities.
- 3.5 Once the LSSi Provider has received a SCADA dispatch to arm the LSSi, the System Controller will interpret the telemetered real power consumed by the LSSi load as the Armed Volume.

- 3.6 Once a load volume has been armed, the LSSi Provider must maintain the Armed Volume within the tolerances, described in Section 4.5 below, for at least the duration of the scheduling hour¹. If the LSSi Provider desires to change the Offered Volume, the change will be dispatched by the System Controller no later than the next scheduling hour.
- 3.7 An LSSi Provider dispatched at thirty five minutes after any hour (“XX:35”) must provide service at the Armed Volume within fifteen (15) minutes for the scheduling hour that starts at XX:50. Hence, a dispatch at 12:35 creates a firm commitment to provide service at the Armed Volume until as late as 2:10.
- 3.8 After a trip event, when the LSSi scheme has operated and the load has been shed, the LSSi Provider can restore the load only when directed by the System Controller, or after a minimum of sixty (60) minutes have elapsed from the trip event instant.
- 3.9 The LSSi Provider is not obligated to restore a load subject to a trip event. However the LSSi Provider must ensure that the Offered Volume telemetered to the AESO via SCADA is accurate and reflects the LSSi provider’s capability.
- 3.10 The LSSi Provider must comply with the provisions of [OPP 312](#) “Import Load Remedial Action Scheme (ILRAS) and Load Shed Service (LSS)”, and the proposed ISO Rule 303.1 “Import Load Remedial Action Scheme Service and Load Shed Service” when it comes into effect.

4. Technical Requirements

- 4.1 LSSi requires that the committed amount of load is disconnected from the AIES within 0.2 seconds (12 cycles) of the frequency reaching 59.50 Hz (+/- 0.02 Hz). The 0.2 seconds is the sum of the frequency measurement time plus any time required to trip the load. See Section 2 of Attachment 1 for further information.
- 4.2 The LSSi scheme shall be developed using digital devices, with the possible exception of the circuit breaker that trips a load. Each device to be tripped shall be hard-wired to the under-frequency relay measuring frequency and no communications shall be used between a “central” measurement point and the device that is to trip.
- 4.3 A relay used in the UFLS program must not be used for LSSi.
- 4.4 The LSSi Provider must be able to arm and disarm the LSSi scheme. “**Arming**” means enabling the LSSi scheme’s functionality such that it is continuously measuring system frequency and operates when the target frequency is reached. “**Disarming**” means disabling the LSSi scheme’s functionality such that no load shedding happens as a result of a frequency deviation.
- 4.5 Once the LSSi scheme is armed, the Actual Volume that will be tripped by the LSSi scheme must remain within ninety five percent (95%) to one hundred and twenty percent (120%) of the Dispatched Volume.

¹ A scheduling hour has duration of 80 minutes: it begins 10 minutes before the hour, includes the 60 minutes of the hour and includes 10 minutes of the following hour.

- 4.6 Any load that is tripped must not be restored automatically or taken over by another feeder at any other point within the AIES and shall remain off the grid until the System Controller has directed the LSSi Provider that it is safe to restore their load or after a minimum of sixty (60) minutes have elapsed from the time of the event that caused the LSSi load to trip.
- 4.7 Any load participating in LSSi must be able to remain off the grid for up to sixty (60) minutes.
- 4.8 The LSSi Provider must be capable of recording the time and real power (MW) for the trip event. Trip event records shall be digital records with a sampling interval of the reported data of at most twenty (20) ms. The record shall consist of a minimum of sixty (60) seconds of data prior to the trip event, the trip event and sixty (60) seconds following the trip event. The recorded data shall include the value of the measured frequency (Hz) and the value of the real power (MW) of the armed load, as a minimum.
- 4.9 The above record shall be retained by the LSSi Provider for a minimum of one (1) year after any trip event.
- 4.10 The LSSi Provider must be capable of providing the trip event record in digital form, preferably in "csv" format to the AESO upon request. The record shall show the actual volume for sixty (60) seconds prior to the trip event, during the trip event and for sixty (60) seconds after the event.

5. Monitoring

- 5.1 The AESO will monitor the response of load assets to trip events through the normal telemetry (SCADA) system. However, because the SCADA system does not provide sufficient detail for any given event, the AESO may request the LSSi Provider to provide a copy of the electronic record referred to in 4.8 through 4.10 above following every trip event.

6. Testing

- 6.1 The LSSi Provider must provide the AESO with a report certified by a Professional Engineer registered with The Association of Professional Engineers, Geologists, and Geophysicists of Alberta (APEGGA) of a test confirming that the load will disconnect from the AIES within 0.2 seconds following an event wherein the system frequency reaches 59.5 Hz.
- 6.2 The AESO also requires a report demonstrating the data collection and retention ability of the LSSi scheme that meets the requirements described in section 4.8 through 4.10.
- 6.3 The above certified test needs to be repeated any time there is a material change to the equipment providing the LSSi and the report of the new test must be submitted to the AESO.
- 6.4 The functional test described above needs to be repeated after five (5) years of a previous test and the certified report submitted to the AESO even if there has been no change to the equipment.

- 6.5 Any time there has been a failure of the LSSi scheme to comply with any of the foregoing requirements above, the AESO may require the performance of a test after corrective action has been taken in order to confirm the capability of the LSSi scheme.
- 6.6 The AESO does not require that the test of the LSSi scheme actually trip the load.

See Section 3 of Attachment "1" for an illustration of two loads being armed, tripped and restored.

**THIS IS SCHEDULE "B" TO THE LOAD SHEDDING SERVICES FOR IMPORTS REQUEST
FOR EXPRESSIONS OF INTEREST**

Schedule "B" provides details on how an LSSi Provider will receive payment for services.

The LSSi Provider will be paid a monthly payment for providing LSSi that is comprised of the sum of:

1. Availability Payment;
2. Arming Payment; and
3. Tripping Payment.

Availability Payment

The Availability Payment is paid to make volume available to the System Controller for arming and is the sum of the Hourly Availability Payments for the month calculated as follows:

Hourly Availability Payments = Availability Volume X Availability Price, where:

Availability Volume = the lesser of the:

- (i) minimum Actual Volume in the hour; and
- (ii) minimum Offered Volume in the hour

Availability Price = \$5/MW

Arming Payment

The Arming Payment is paid to allow the automatic trip for the volume that is made available to the System Controller. It is paid for each hour or portion of an hour the service is dispatched in the armed state. Payment begins when a provider responds to an arm dispatch (arms the load to automatically trip) and stops with the disarm dispatch (no payment for staying armed past the disarm dispatch). The Arming Payment is the sum of the Hourly Arming Payments for the month calculated as follows:

Hourly Arming Payments = [Arming Volume X Arming Price] X Hourly Arming Duration / 60, where:

Arming Volume = the lesser of the:

- (i) minimum of Actual Volume in the hour; and
- (ii) Armed Volume

Arming Price = (Hourly Pool Price +/- \$ _____/MW), if indexed arming price selected,

OR

\$ _____/MW, if fixed arming price selected.

Hourly Arming Duration = number of minutes in the hour that the load was armed

Tripping Payment

A Tripping Payment is made whenever a load is armed and the load actually trips in accordance with the requirements and is the sum of the Hourly Tripping Payments calculated as follows:

Hourly Tripping Payments = Tripping Volume X Tripping Price, where:

Tripping Volume = the lesser of the:

- (i) Actual Volume when tripped and
- (ii) Armed Volume

Tripping Price = \$1000/MW

THIS IS ATTACHMENT "1" TO SCHEDULE "A" TO THE LOAD SHEDDING SERVICES FOR IMPORTS REQUEST FOR EXPRESSIONS OF INTEREST

Attachment "1" is provided for guidance and information purposes only.

1. Illustration of LSSi SCADA Communications

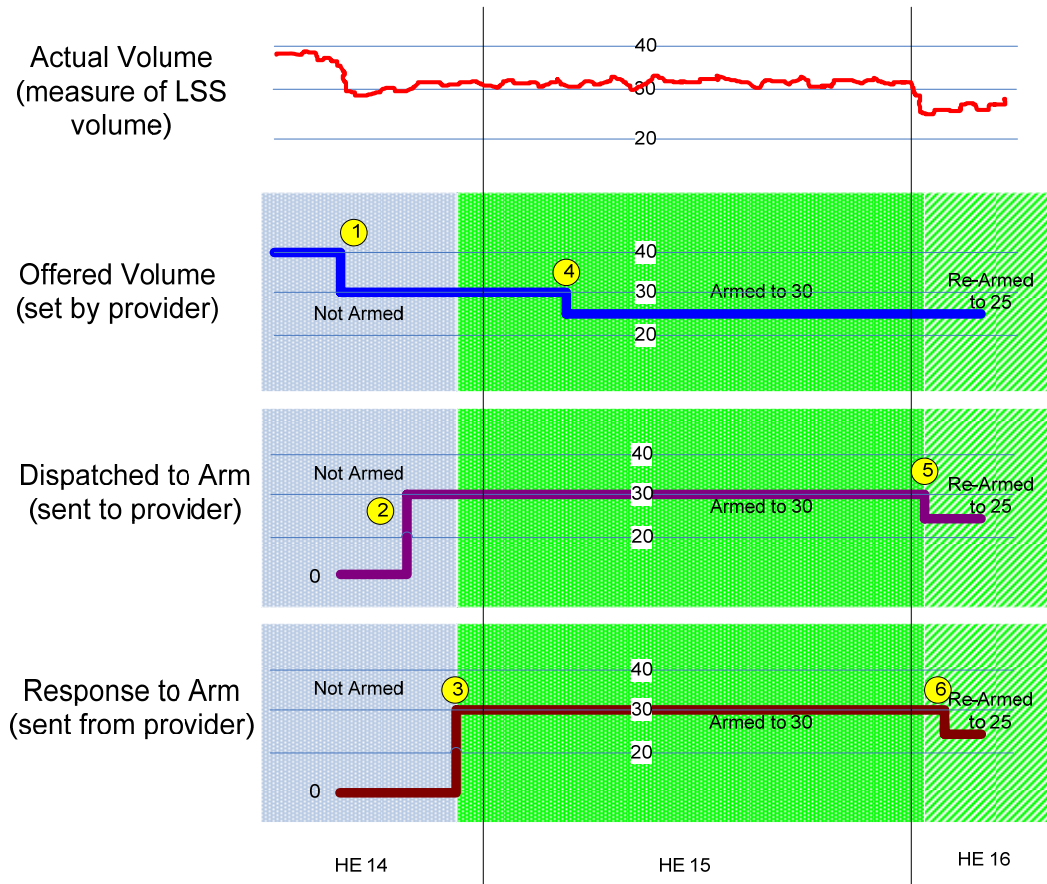


Figure 1 – Graphical Illustration of the LSSi SCADA Communication

The highlighted events above correspond to the following actions:

- 1) At 13:23 the LSSi Provider changes their Offered Volume from 40 MW to 30 MW. The change is transmitted via SCADA to the System Controller indicating that the LSSi Provider can only offer 30 MW of LSSi from this point forward. At this point the LSSi Provider is not armed and does not have any volume obligations.
- 2) At 13:45 the System Controller determines that 30 MW of LSSi are required from the LSSi Provider based on net import schedule and a merit order of service provider offers. The Dispatched Volume is transmitted by SCADA to the LSSi Provider, indicating that the System Controller will require the 30 MW of offered LSSi to be armed. The System Controller expects the LSSi Provider to comply with the dispatch within 15 minutes of the dispatch.

- 3) At 13:54 the LSSi Provider arms the LSSi scheme and ensures that the load armed to trip reflects the Offered Volume. The state of the LSSi scheme (armed or not armed) and a confirmation of the 30 MW Armed Volume are sent back to the System Controller indicating the site is armed for 30 MW, as dispatched.
- 4) At 14:16 the LSSi Provider determines they only wish to provide 25 MW of LSSi from this point forward and changes their Offered Volume to 25 MW. However, because the LSSi Provider was already armed for 30 MW they are committed to provide that 30 MW unless dispatched otherwise by the System Controller. The System Controller will dispatch the provider for the new Offered Volume at 15:10, i.e. the volume is firm for the scheduling hour.
- 5) At 15:10 the System Controller dispatches the LSSi from 30 MW to the new Offered Volume of 25 MW. The System Controller may not always need the LSSi Provider to maintain the originally Armed Volume of 30 MW until 15:10 due to a change in the intertie schedule, for example, but the provider must be capable of maintaining the load until 15:10 unless dispatched otherwise by the System Controller. This new dispatch is transmitted by SCADA to the LSSi Provider indicating that the System Controller will require the 25 MW of offered LSSi to be armed. The System Controller expects compliance to the dispatch volume within 15 minutes of the dispatch instruction.
- 6) The LSSi Provider ensures that the Actual Volume reflects the Armed Volume. The state of the LSSi scheme (armed or not armed) and a confirmation of the 25 MW Armed Volume are sent back to the System Controller indicating that the site is armed for 25 MW, as requested.

2. Guide to Meeting the LSSi Trip Requirement

The requirement to provide LSSi is that the committed real power (MW) amount is disconnected from the AIES within 0.2 seconds of the system frequency reaching 59.5 Hz. It can be met by employing an under-frequency relay set to 59.5 Hz and installing a fast breaker such that the total time used for measurement and breaker operation is 0.2 seconds or less. See Figure 2 below.

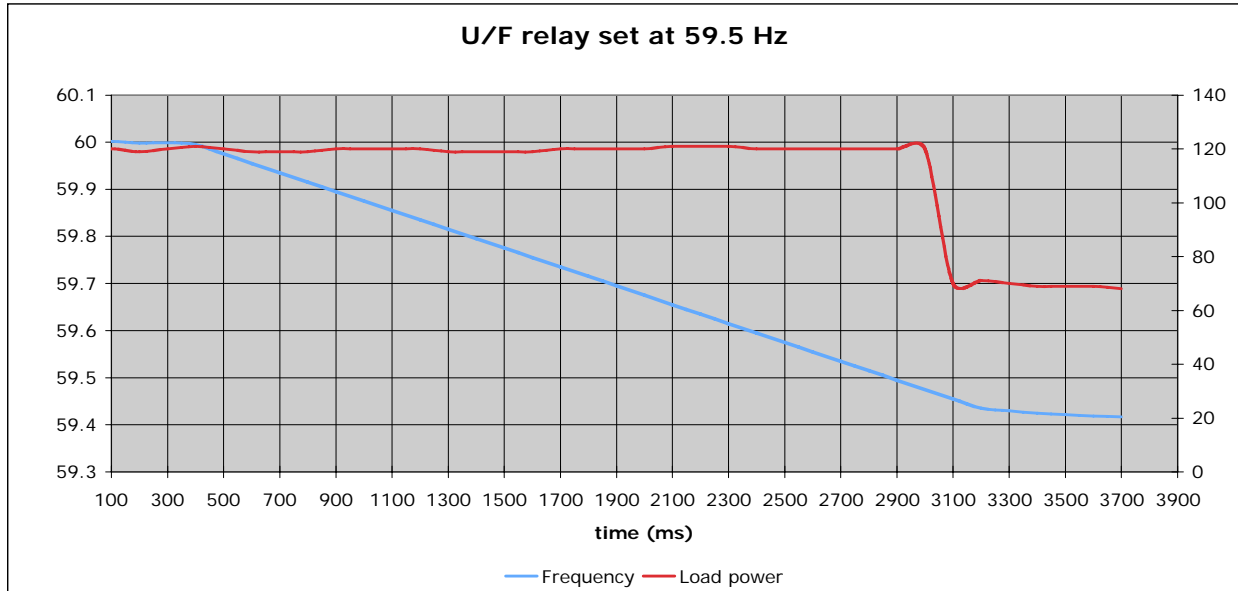


Figure 2 - Shows a load disconnecting from the AIES 0.2 seconds after the system frequency reaches 59.5 Hz when the under-frequency relay is set at 59.5 Hz. The amount of load shed is 50 MW as indicated by the right hand scale.

3. LSSi Arming, Tripping and Restoration Sequence

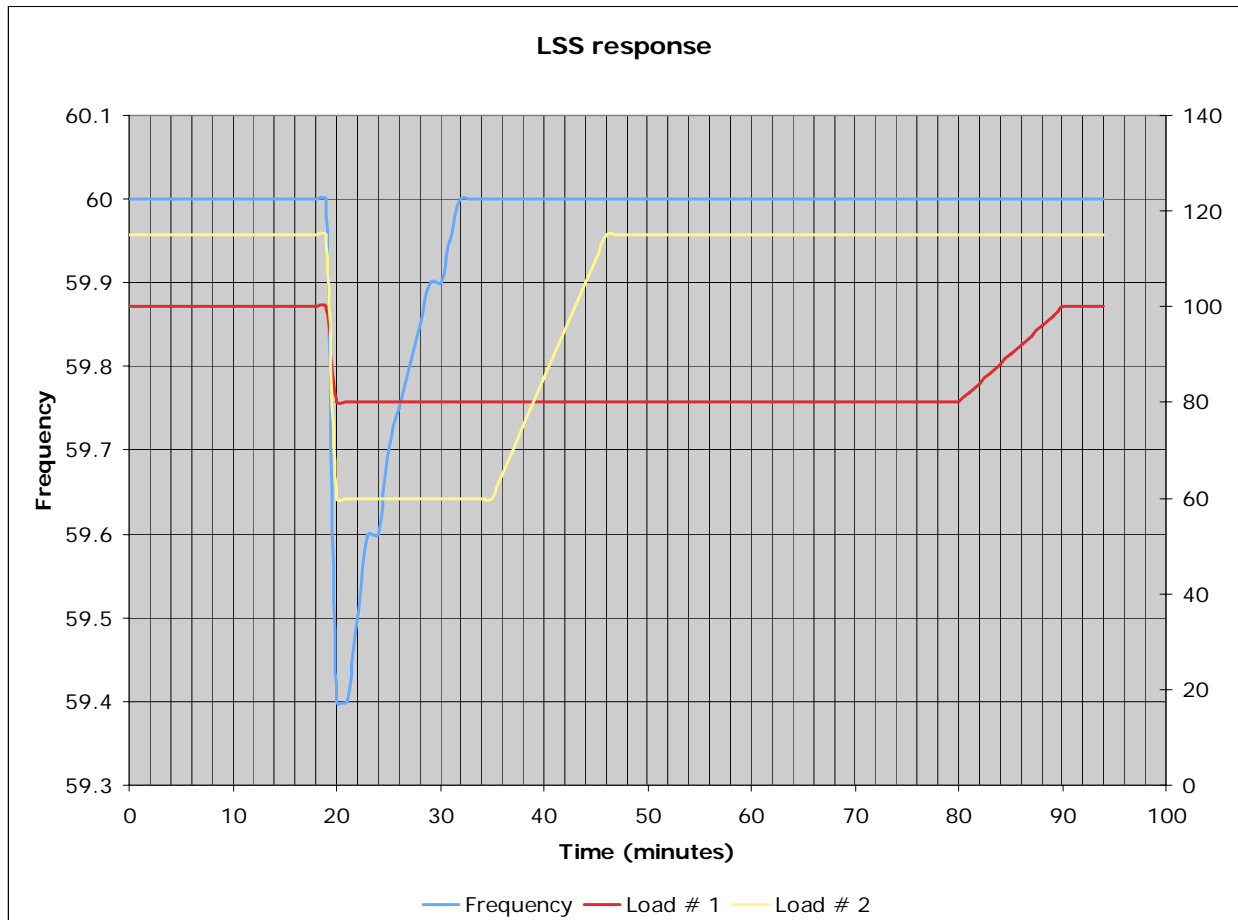


Figure 3 – Example of two LSSi loads being armed, tripped and restored as follows (load MW shown in the right hand scale):

- 1) at time $t = 0$ Load # 1 is armed for 20 MW and Load # 2 is armed for 55 MW;
- 2) at time $t = 19$ minutes, a system event takes place and the frequency drops to 59.4 Hz and Load # 1 sheds 20 MW and Load # 2 sheds 55 MW;
- 3) at time $t = 32$ minutes the frequency is restored to normal;
- 4) at time $t = 35$ minutes the SC releases the trip directive for Load # 2 and allows it to restore. However, the directive for Load # 1 is not released so it remains at the reduced level;
- 5) at time $t = 80$ minutes (60 minutes after it tripped) Load # 1 begins to self-restore even though the trip directive has not been released by the SC.

4. Under-Frequency Events from 2005 to 2010

The chart below is provided as information only and shows the number of under-frequency events experienced by the AIES at different frequency levels during the 2005 to 2010 period.

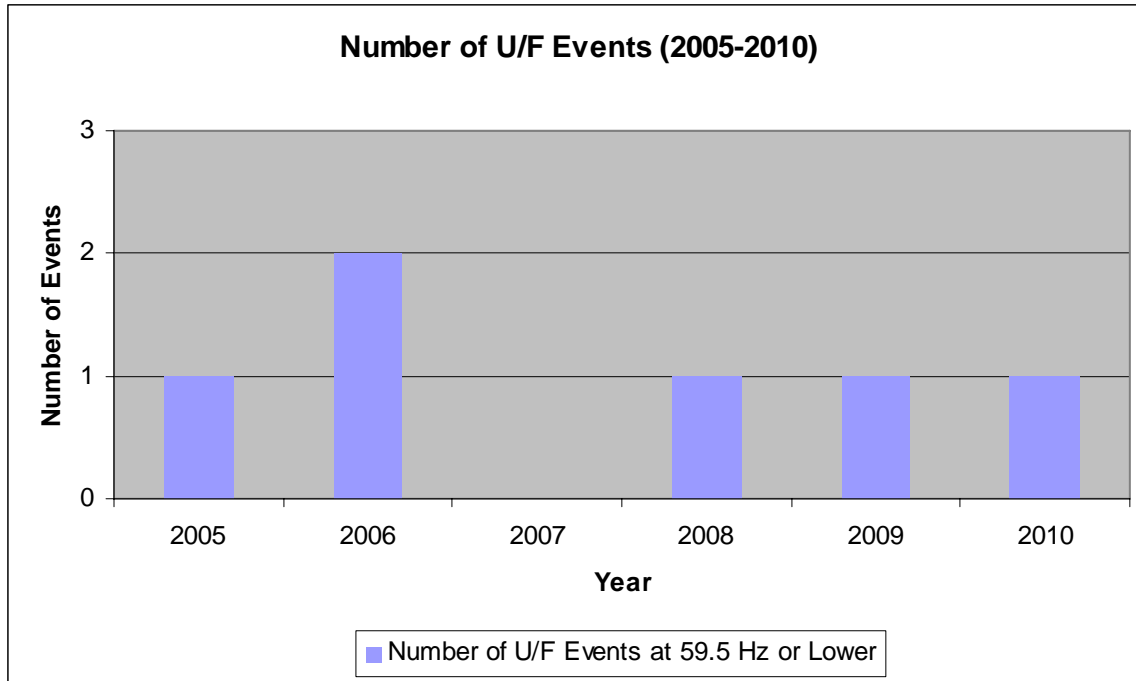


Figure 4 – Number of Under-Frequency Events at 59.5 Hz or lower for the years 2005 to 2010