

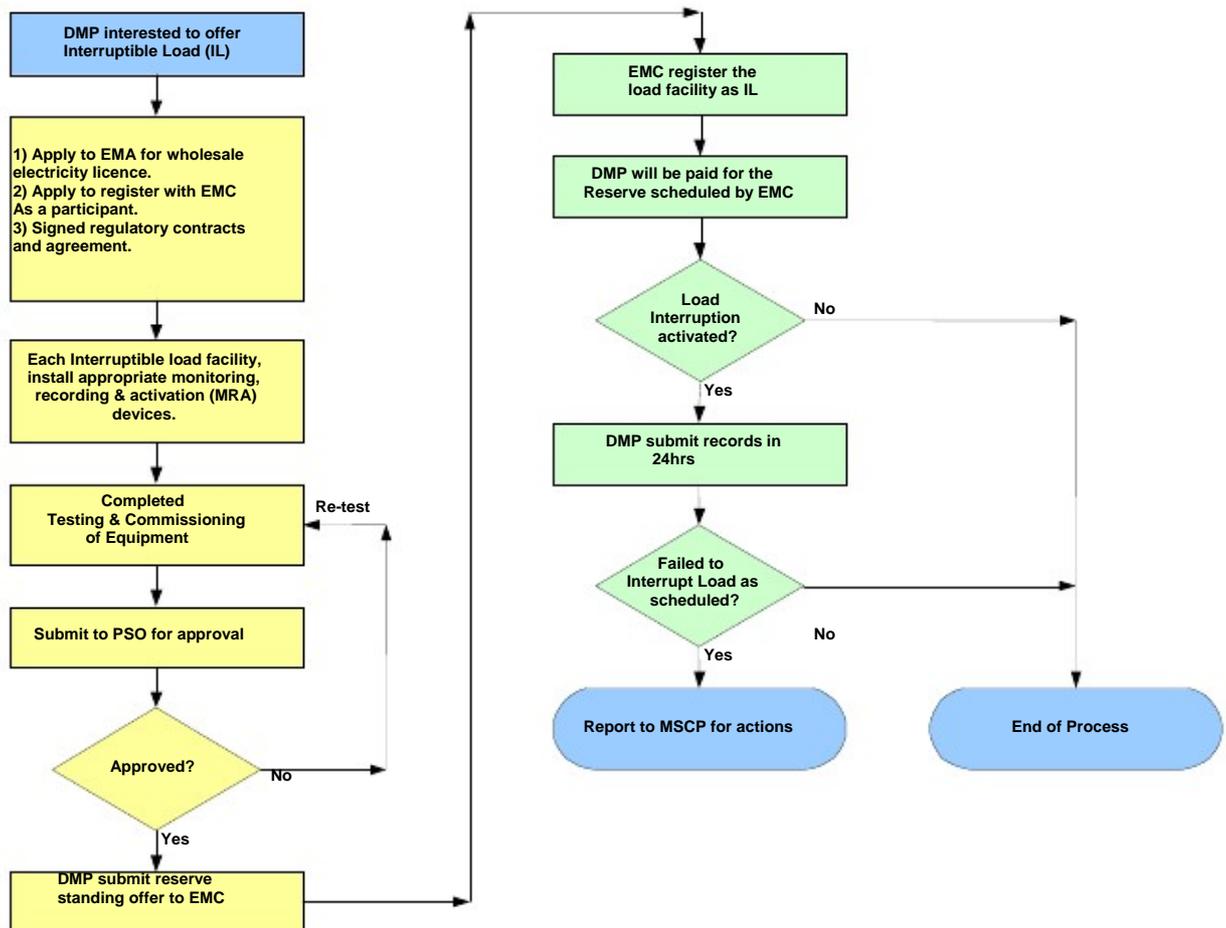
Frequently Asked Questions on **Interruptible Load Scheme**

Q1. How do I register as a reserve (interruptible load) provider?

A. The easiest way to provide reserve is to have your retailer register your load facility as a 'load registered facility' with the EMC after you have installed Monitoring-Recording-Activation (MRA) device . Your retailer will also submit reserve offers on your behalf, as well as receive dispatch schedules for your load facility from the EMC. To be able to affect this, you may need to negotiate a commercial arrangement with your retailer.

However, if you intend to participate directly in the wholesale electricity market, you need to

- Obtain a license from the EMA to trade in a wholesale electricity market.
 - Apply to register with the EMC as a Direct Market Participant (DMP)
 - Install & commission Monitoring-Recording-Activation (MRA) device
 - Register your load facility with the EMC as a "load registered facility" in accordance with the Market Rules and Market Manuals.
 - Put electronic communication systems in place for the purposes of placing reserve offers, receiving reserve schedules and market information from EMC.
- Please see flow chart below:



Q2. Is there minimum load reduction capability to be a reserve provider?

- A.** The minimum reserve offer that can be accepted is 0.1 MW. Therefore you must have a minimum load reduction capability before you can be a reserve provider. However, a retailer may have certain limits on handling communications with a large number of individual resources. As such, a retailer might set a higher minimum load reduction criterion.

Q3. How will I know when to interrupt my load connection to the Grid?

- A.** For those who provide primary reserve, the under-frequency relay, if armed, will automatically interrupt your designated load within 1 second when system frequency drops below 49.4 Hz.

For those who provide secondary reserve, the under-frequency relay, if armed, will automatically interrupt your load when frequency drops below 49.7 Hz and remain at or below that level for at least 30 seconds.

For those who provide contingency reserve, Power System Operator (PSO) would post the Activation Order on EMC's website for Advisory Notices. In addition, all Dispatch Coordinator¹ of Interruptible Load Provider² (ILP) should also receive message paging. Those ILP with contingency reserve scheduled must reduce their load to at least the level schedule in the relevant dispatch schedule within 10 minutes of activation.

Q4. How long will the interruption typically last, and how will I know when to restore my load to the grid?

- A.** There is no "typical" period of interruption. The maximum time is determined by the need of the power system. From our experience with major system disturbances, supply to interrupted load was restored approximately 30 minutes after interruption.

For Restoration of load, PSO would post the Restoration Order on EMC's website for Advisory Notices. In addition, all Interruptible Load Provider (ILP) Dispatch Coordinators should also receive message paging. ILPs can then restore load interrupted (be it for primary, secondary or contingency reserve) upon receipt of the Restoration Order.

¹This will typically be a 'role/person' within retailer or DMP who deals with real-time and dispatch communications with the EMC.

²ILP is a market participant who is willing to provide interruptible load. Such a market participant can be a retailer or a direct market participant.

Q5. How does PSO monitor the performances of my interruptible load?

- A.** An Interruptible Load Provider shall be responsible for the installation, testing, commissioning and subsequent maintenance of Measuring-Recording-Activation (MRA) device associated with its load facilities. The proper functioning of the MRA device including the associated monitoring and controlling wiring to the load facilities must be certified by a Licensed Electrical Worker. Any subsequent changes to the MRA device or its associated wiring shall be re-certified by a Licensed Electrical Worker.

The MRA device must have at least the following capability:

- i) For Primary & Secondary reserve, Frequency and Timer activated digital output contacts that can be pre-set at frequency of 48Hz to 52Hz in 0.05Hz steps and Timer of 0 second to 60 seconds in 0.5 second steps;
- ii) Continuous recording of analogue measurement and digital status for all signal channels even in the event of power disruption;
- iii) Non-volatile internal memory that can store signals of all channels for least 30 second (for primary & secondary reserve), or 10 minutes (for contingency reserve) before and 30 minutes after the start of each activation or restoration time (whichever is later);
- iv) Power and Frequency measurement shall have accuracy of at least 0.01MW and 0.05Hz respectively;
- v) Signals shall be sampled no slower than the rate of 1 second (for primary & secondary reserve) or 30 seconds (for contingency reserve) for each channel.

The MRA device must record measurements such as Power, Frequency, status of Designated Circuit Breakers, etc. before and after activation. MRA records in internal memory must then be transferred to portable data medium in ASCII/Excel format and submitted to the PSO within 24 hours of activation. These records must clearly indicate the MRA's identity and should be secured and tamper proof.

Q6. What level of compensation (dollars times kWh) makes it worthwhile or profitable for me to reduce the load?

- A.** This is the key business decision you must make internally. Only you know the financial impact of shutting off electricity to some or all of your operations, and the cost of restarting operations.

For those who offer reserve through your retailer, your retailer may offer variations of products. For example, you may receive a discount off your bill for giving your retailer the right to interrupt your load.

Q7. Under what circumstances would I get paid without having to actually interrupt my load?

- A.** How much you would get for your reserve offered depend on the market reserve price determined by EMC, the payment is based on your amount of reserve being scheduled, NOT the actual amount of load interrupted. If your offer is at the right price then you will be scheduled and be paid for how much is scheduled at the market reserve price even if you are never interrupted.

Q8. What happens if I can't deliver the full load reduction I contracted for?

- A.** Currently, under the Market Rules, the minimum contracted load reduction is 0.1MW. A load facility is deemed unable to provide adequate Reserve (i.e. non-compliance with PSO's direction or dispatch instruction) as scheduled/instructed, if the load facility
- i) fails to deliver its scheduled reserve within the required time frame after a contingency event;
 - ii) restore its interrupted load before PSO gives clearance.

The PSO will refer the non-compliance to the market assessment unit of the EMC and the Market Surveillance and Compliance Panel (MSCP), which may impose fine or penalty on the ILP.

For example, if you provide reserve through your retailer, (the entity that actually interfaces with the Wholesale Electricity Market) your performance can affect your retailer's ability to meet its scheduling obligations. Hence, if you under-deliver a load reduction, it could result in your retailer having to pay a fine or penalty to the Market. (Depending on the commercial arrangement with your retailer, the retailer may charge you additional monies for this) So, you should be prepared to inform your retailer to submit an Offer variation at short notice if you are not able to deliver as per the latest offer submitted to the market.

Q9. Do I receive extra payments if I deliver more reserve (i.e. load reduction) than what I was scheduled for?

- A.** No. Payment for reserve is based on scheduled quantity, not on actual quantity delivered.

Q10. Can I use my standby generators to keep my plant running during a Load curtailment?

- A. Unless you have prior permission from the Grid owner, if you are going to use standby generator that was originally offline, you must first isolate your installation from the Grid before connecting to your standby generators.
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Q11. How do I determine what value my “interruptibility” has in this new market?

- A. The value of an energy consumer’s “interruptibility” depends on at least three factors:
- How quickly you can respond to an interruption request (this determines which reserve class you can provide);
 - The price at which you are willing to interrupt your load; and
 - The market prices and availability (of your competitors) for that particular reserve class.
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Q12. I want to make sure I’m getting the best value for my load interruption. How will I know in advance, which of the various schemes will be paid the best price?

- A. EMC web site provides a daily trading report as well as historical reserve prices. In addition, an ILP will have access to hours-ahead, day-ahead and week-ahead prices forecasted by the EMC. Having access to such information will assist you in evaluating various schemes.

Keeping in mind that the flexibility of your load facility dictates which of the reserve class you can offer into, you can offer simultaneously to provide all three classes of reserve. The MCE will choose from your offers, the reserve class and quantum that is most valuable to the Market.

Q13. Is there a limit on the total MW amount of Primary, Secondary, or Contingency Reserve that load can provide in to the market in any 30-minute Settlement Period?

- A. For system security reasons, the amount of Reserve provision from Interruptible Load that can be scheduled by the MCE would be capped at 20%, 20% & 30% of total reserve required for Primary, Secondary & Contingency reserve class respectively when the system is interconnected. When the system is not interconnected, the limit would be 10% , 20% and 30% for Primary, Secondary & Contingency reserve class respectively.

In addition to the class limits, there are also Zonal limits ranging from 28% to 100% of total estimated load in a zone (this translates to at least 114 MW in any particular zone) to ensure voltage stability even after interruption of loads.

These limits will be reviewed at least annually taking into account records of non-performing Interruptible load, etc.

Q14. Consider the case where: (a) the load facility has a standing offer to supply primary reserve say for the period noon to 5pm, (b) at 2pm the load facility is called upon to provide the Primary Reserve and ten minutes later told it can return to service, and (c) because of the nature of its load it took say 3 hours to return the load facility to full power consumption. Would the load facility be liable for any sort of penalty for the three-hour period it took to return to full load during which it is unavailable to provide the full amount of Primary Reserve committed to in the standing offer for this period?

- A.** In the above case, its Dispatch Coordinator should submit offer variation with Zero reserve quantity offered until the time it can again provide the reserve to the Market. If not, it is a breach of the Market Rules and would be referred to the MSCP for follow-up action, which may include award of penalty.

Dispatch Coordinator of Load facilities must also report promptly and directly to the PSO significant change in its load facility's reserve capability, including unavailability of any load facilities that have been scheduled to provide reserve. (See Market Rules, Chapter 6, Section 4.3.6.)

Q15. Can a load facility bid into only one reserve class at a time, or whether it can bid into several simultaneously?

- A.** As long as a load facility is setup and proven to meet the criteria of the UFR/Monitoring, Recording & Activation (MRA) devices for each reserve classes. It may then start to offer according to the specific reserve class/classes that the load facility has been registered to. A load facility can offer into all reserve markets simultaneously if it meets the criteria of the respective reserve class.
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Q16. If a load facility can offer into say Primary and Secondary Reserve at the same time, can it be scheduled to provide both Primary and Secondary Reserve simultaneously? To be scheduled, do you need two different UFRs?

- A.** If a load facility offers simultaneously to provide both Primary & Secondary reserve, the MCE will choose from the offer, the reserve class and quantum that is most valuable to the Market i.e the load facility may be scheduled to provide both Primary & Secondary Reserve simultaneously in the same dispatch period. The way this can be achieved depends on your MRA/UFR device; there are devices available with two separate settings.

Q17. If the load facility that has been scheduled to provide both primary and secondary reserve is called upon to provide secondary reserve, it will be potentially unavailable to provide primary reserve for a period of time. Would that lead to any penalties for the temporary unavailability of primary reserve while the load responds and subsequently returns to service?

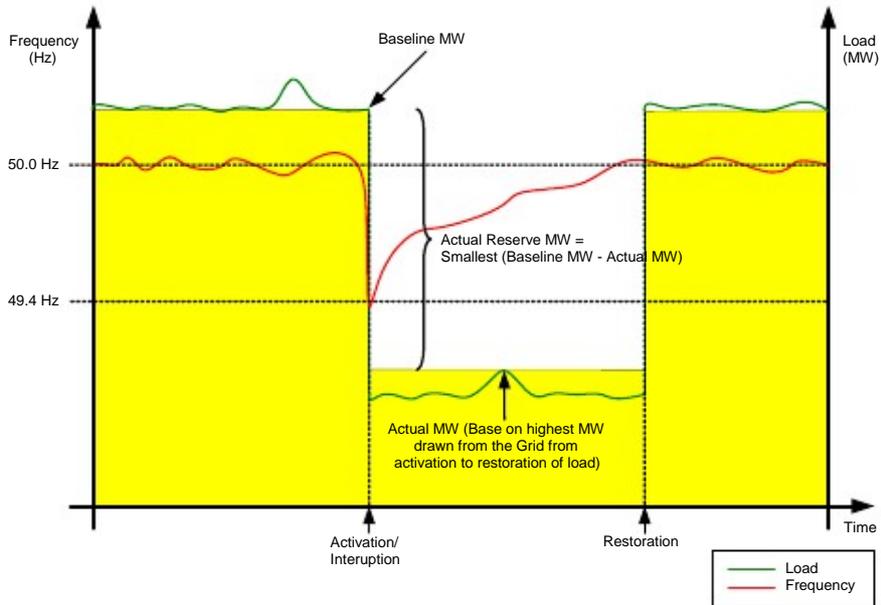
- A.** Unlike Generators, which can provide further output after responding to primary reserve, load facility, once interrupted, normally can't provide any further load reduction as reserve. Hence, for the same dispatch period, if a load facility already provided reserve from any class, it can be regarded as providing reserve from all classes of reserve that it has been scheduled as long as it doesn't restore the load prior to clearance from the PSO.

However, it must submit offer variations for the subsequent dispatch periods that reflect its reserve availability, which should be ZERO until its load is restored.

Q18. I'm interested in providing Interruptible Load (as reserve). How is the "baseline" set? That is, how will PSO measure the amount of my demand reduction (or reserve provided)?

- A.** Reserve provided is simply based on the difference between actual and baseline MW as recorded by the MRA device. The baseline MW use is based on the load level that is recorded prior to the activation. Reserve provided shall deem to be ZERO MW if MRA record has not been submitted by the ILP.

Measurement of Primary Reserve Quantum



Measurement of Secondary Reserve Quantum

