# Demand Opportunity Service (DOS) Bid Examples

## Purpose

The purpose of this document is to build on the DOS modernization recommendation explanation of DOS load bidding in the energy market, provided during the Bulk and Regional Tariff Design Stakeholder Engagement Session 5B (DOS) hosted by the AESO on May 20, 2021. The examples are intended to provide an overview of how DOS load could bid in a simple manner, recognizing that more sophisticated bidding strategies could be developed.

The information contained in this document is provided to stakeholders in the Bulk and Regional Tariff Design engagement for information purposes only and to further stakeholder understanding of the information presented at Session 5B (DOS) on May 20, 2021. The information in this document is not intended to be used or relied upon for any other purpose.

## Bid submission and dispatch

Loads, using a dispatchable sink asset provided by the AESO, are able to bid into the energy market as a means of having their consumption dispatched in line with the price levels submitted through their bids. Bids are submitted with volume and price pairs like offers, where the bid indicates the volume of energy the sink will consume when price is below the bid price, and correspondingly indicating how much load will reduce should price exceed the bid price. Unlike offers, bids will not be paid for their response. Bid submission operates at the inverse to energy market offers.

Like energy market offers from a source asset, a participant may bid up to seven blocks of energy from a sink asset. Those seven blocks are then assigned to a dispatchable sink asset. For energy market offers, block zero is always the lowest priced block submitted. For bids, block zero is always the highest priced block submitted. Subsequent bid blocks are at least one cent lower in price than the previous block.

Bid blocks are “dispatched on”, meaning load is dispatched to consume, when the block price is above the system marginal price (SMP). Bid blocks are “dispatched off”, meaning load is dispatched to reduce, when the block price is at or below the SMP. When a bid block is “dispatched on” it means the energy in that block can be consumed as price has not yet reached the bid price, and the overall load should increase by the block size. When a bid block is “dispatched off” it means the energy in that block is to no longer be consumed as the price is above the bid price and the load should decrease by the size of the dispatched block.

Figure 1 below provides two different examples of bids for a 30 MW sink asset. The “in-merit” bid indicates the participant wants to be dispatched in much the same fashion as a “price-taker” offer by placing all the block MW at the energy market price cap. The “out-of-merit” bid indicates the participant does not want to be dispatched to consume by placing the bid block MW at the price floor.



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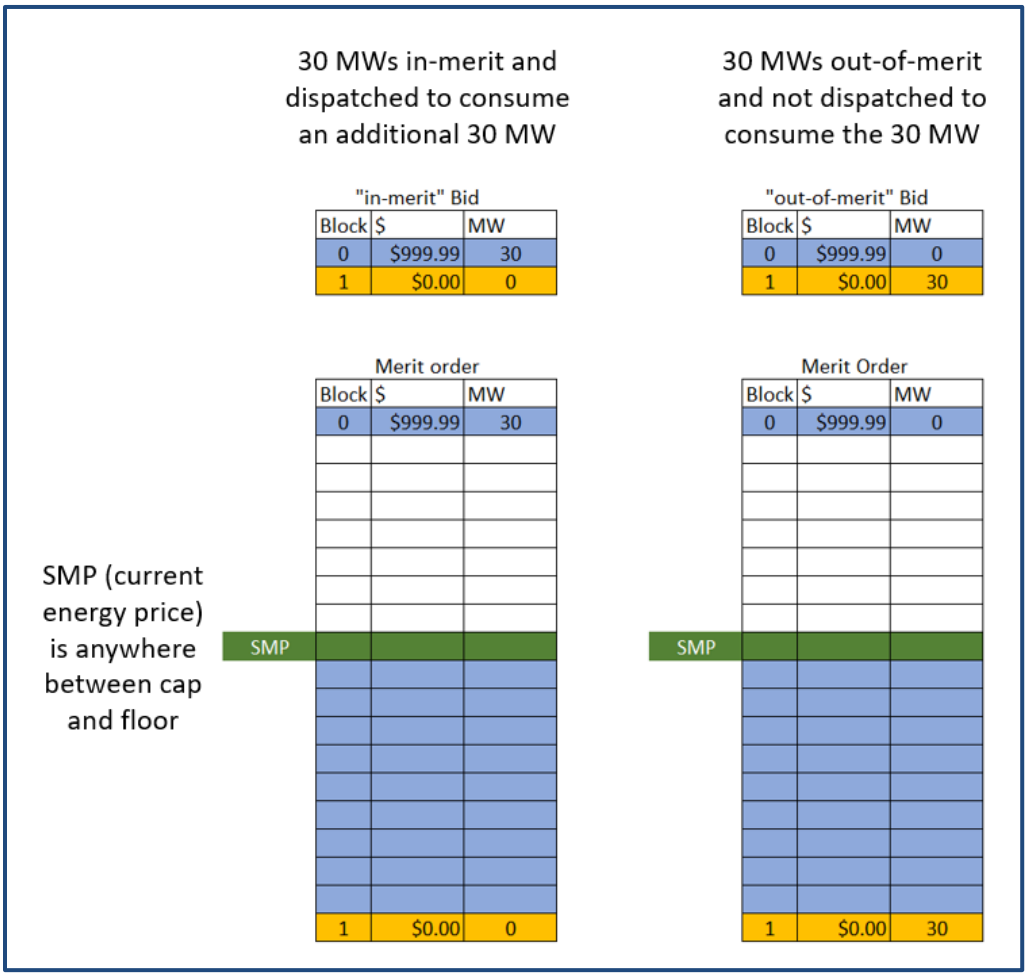
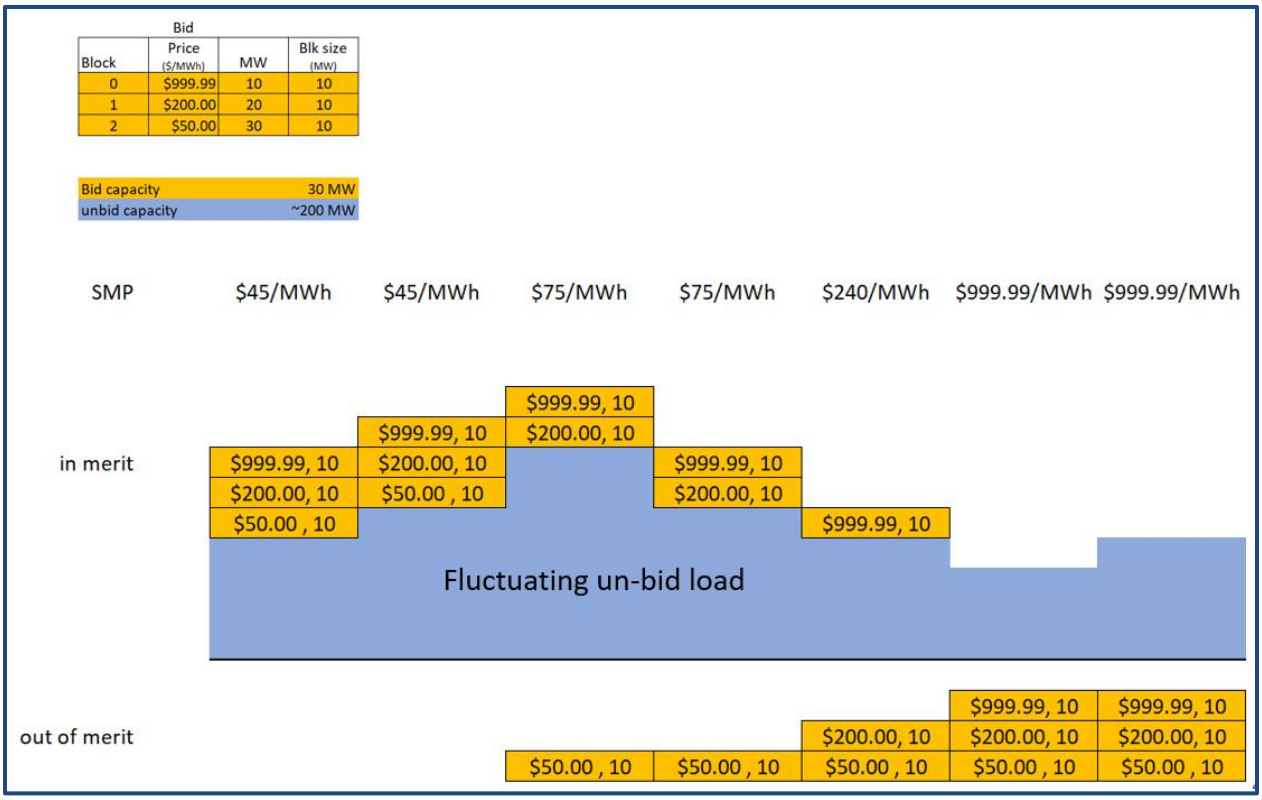
**Figure 1: Bid prices and dispatch**




The “must offer” requirement that applies for energy market offers, which requires all available capacity to be offered into the market does not directly apply for energy market bids. For sink assets in the energy market, bids may be submitted for all or part of the load attributed to the participant. Because of this bid feature the concept of “must bid the entire load” does not apply like “must offer” does for generators. However, the requirement to comply (i.e., “must comply to the dispatch instruction”) applies to both bids and offers.

The compliance requirements for bids are less stringent than those for offers. This is because the nature of bid load is dependent on the underlying base “un-bid” load. It is not possible to measurably distinguish un-bid load from the bid-in load because the load measurement only captures the total load at the dispatch point. This is illustrated in the following example shown in Figure 2.

**Figure 2: Bid dispatch and effect of underlying un-bid load on total load level**




Dispatched bid load floats on top of the un-bid load. The metered demand represents the sum of the un-bid and bid load. For example, the AESO may dispatch on the bid load while at the same time the un-bid load is dropping. If this occurs it appears as if the participant did not adequately respond to the dispatch on instruction. Conversely, if the un-bid load is increasing at the same time as the bid load is dispatched on it appears as if the load increased to a level much greater than the dispatch. Because of the unpredictable nature of the un-bid load, the rules are relatively silent on what constitutes bid compliance.

For example, in Figure 2 when the system marginal price (SMP) increases from $45/MWh to $75/MWh, block two (the 10 MW block priced at $50.00/MWh) is dispatched off and the load would be expected to decrease by 10 MW, but according to the real-time measurements the load increased by 10 MW. The price then jumps from $75/MWh to $240/MWh and the load would be expected to decrease another 10 MW following the dispatch instruction to do so. The price continues to climb to the price cap at $999.99 at which point the remaining 10 MW in block zero is dispatched off and the load would be expected to decrease another 10 MW. Meanwhile, fluctuations in the un-bid load occur.

## Treatment of DTS and DOS capacity within a bid

The AESO's DOS modernization recommendation uses the bid as the means to replace the transaction request where the bid acts as an on/off switch for intent to use DOS capacity. The "dispatch on" would represent the start of the DOS transaction and the "dispatch off" would represent the end of the same transaction.

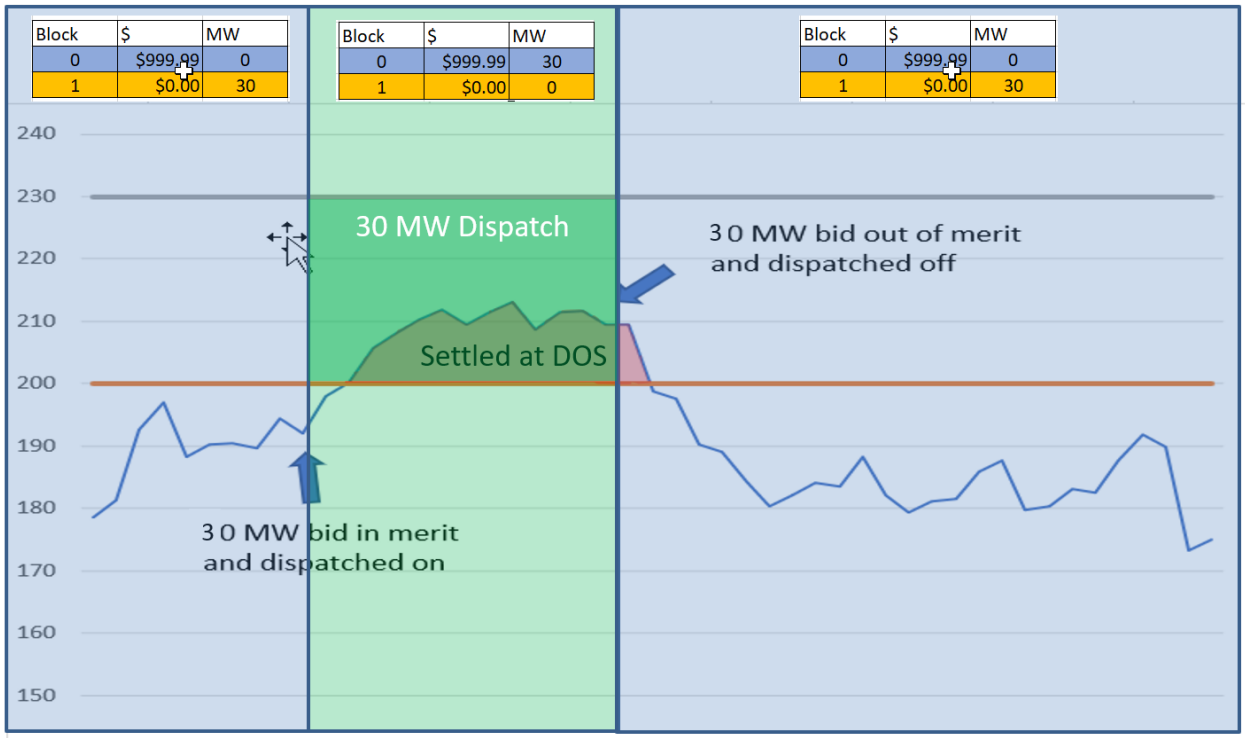
The AESO will assign the DOS participant with a sink asset whose capacity is equal to the volume of DOS contract capacity with which to submit a bid. The simplest way to approach bidding for the purposes of indicating the use of DOS capacity is for the participant to submit a bid with two blocks. Block zero is priced at $999.99/MWh and block one is priced at $0.00/MWh.

- If the participant is not planning to take DOS capacity in an hour the $0.00/MWh block will hold the DOS capacity and the $999.99/MWh block will have a block MW equal to zero. This effectively sets the DOS transaction switch in the off position.
- If the participant wishes to utilize the DOS capacity, the participant will move all, or the portion of the DOS capacity that the load wishes to consume, from the $0.00/MWh block to the $999.99/MWh block. This effectively sets the DOS transaction switch in the on position, for the amount of DOS capacity the participant wishes to use.

Toggling the energy between the two blocks will indicate to the system controller when the participant is taking or planning to take DOS energy and how much volume.

In the example shown in Figure 3, the participant starts off taking only DTS capacity by placing the 30 MW of DOS capacity in block one at $0.00/MWh. As per Section 203.3 of the ISO rules, *Energy Restatements*, at least two hours in advance of the hour the participant intends to use the DOS capacity, the bid for that hour is modified so the 30 MW of DOS capacity is priced at $999.99/MWh. At the top of the hour the bid will be in-merit and the system controller will issue a dispatch to the participant. This is equivalent to the start-time within the current DOS transaction request. The participant can leave the capacity in block zero for as many hours as the participant intends to use the DOS capacity.

**Figure 3: Bid dispatch activates and deactivates the DOS transaction**



If the participant no longer wants to use the DOS capacity, the participant will move the energy from block zero ($999.99/MWh) into block one ($0.00/MWh) at least two hours in advance, as described in Section 203.3 of the ISO rules, *Energy Restatements*. At the top of the hour the system controller would dispatch the $999.99/MWh block off signaling to the participant that the DOS transaction has ended.

In the above example (Figure 3) it would appear the participant did not comply with the 30 MW dispatch instruction. Even though the bid was dispatched on for 30 MW, a maximum of 12 MW of DOS capacity was taken over the period. As explained in the example shown in Figure 2, the bid capacity was dispatched on but the underlying un-bid load was dropping off resulting in a net change of only 12 MW.

In the event the participant can no longer take DOS capacity due to an acceptable operating reason and wants to end the DOS transaction prematurely, the participant can, at any time, restate the volumes in the block and the system controller will dispatch the load off.

## Settlement considerations of dispatch

If the DOS capacity was dispatched for any part of the hour, the hourly metered volume at or below the 200 MW DTS contract capacity will be settled in accordance with the DTS rate and the meter volume above the DTS contract capacity will be settled in accordance with the DOS rate.

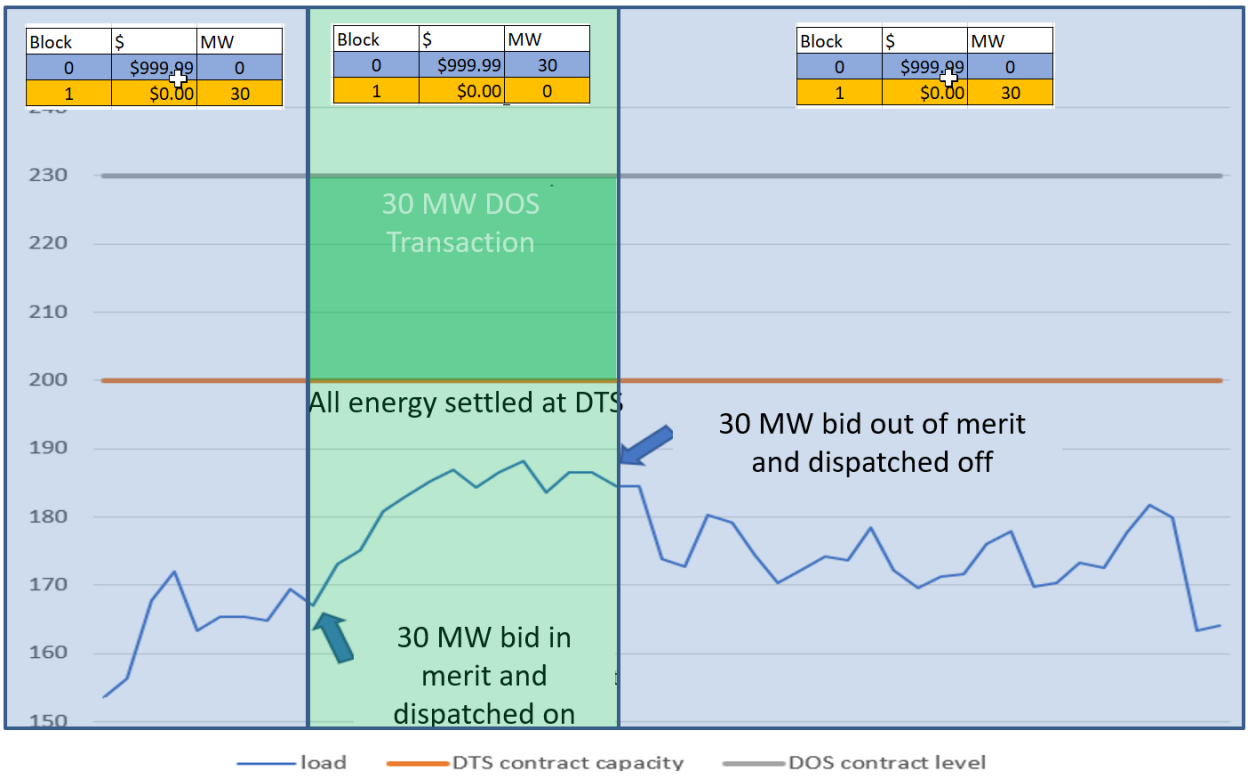
Tariff settlement does not consider dispatch compliance, but DOS settlement is determined based on whether or not the DOS capacity was dispatched on.

## Dispatch without using the DOS capacity

Like in the previous example, in Figure 4 below, the participant submits a bid with two blocks. Block zero priced at $999.99/MWh and block one priced at $0.00/MWh. If the participant is not looking to take DOS capacity in the hour the $0.00/MWh block will hold the DOS capacity. If the participant wants to utilize the DOS capacity, the participant will move all or a portion of the DOS capacity from the $0.00/MWh block to the $999.99/MWh block.

The participant starts off taking only DTS capacity by placing the 30 MW of DOS capacity in block one at $0.00/MWh. As per Section 203.3 of the ISO rules, *Energy Restatements,* at least two hours in advance of the hour the participant intends to use the DOS capacity, modifies the bid so that the 30 MW of DOS capacity is priced at $999.99/MWh. At the top of the hour the bid will be in-merit, and the system controller will issue a “dispatch on” to the participant and acts as the start-time of the current DOS transaction request. The participant can leave the capacity in block zero for as many hours as the participant intends to use the DOS capacity. However, in this example the participant’s load never exceeded the DTS contract levels the entire time block zero was in-merit and the 30 MW of load dispatched on. In accordance with the proposed DOS modernization rate design, the hours where the capacity in block zero was in-merit will all be settled at Rate DTS as no DOS capacity was actually utilized.

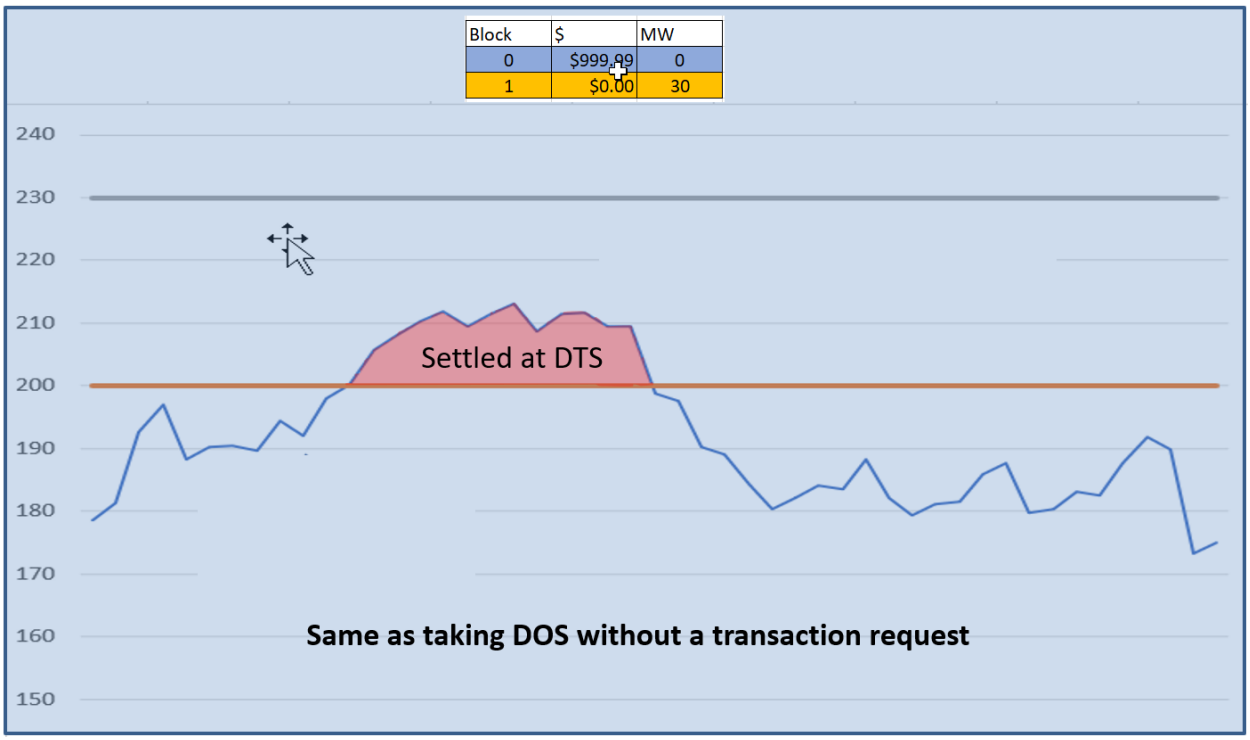
**Figure 4:DOS energy is energy consumed above DTS levels**




## Using DOS capacity without a dispatch

In the proposed DOS modernization rate design, using DOS capacity without a corresponding dispatch is the same as using DOS capacity without submitting a transaction request under the current DOS rate. In both cases, all energy consumed above the DTS contract capacity will be allocated to DTS rather than DOS. For example, as shown in Figure 5 below, if the participant bids all MWs in block one, those MW remain out-of-merit and would not receive a dispatch on, assuming the price remains higher than $0.00/MWh. All energy consumed in this example would be assessed to Rate DTS.

**Figure 5: Using DOS capacity without a bid dispatch**




## Recalling DOS energy for constraint

If the participant has energy in the $999/MWh block and there is a need to recall the DOS capacity, the system controller would direct all or a portion of the $999/MWh block off by reducing the size of the block. The participant would receive a signal from the AESO's dispatch system (ADAMS) indicating the reduction in the available DOS capacity and a directive to only consume the remaining capacity, if any. When the capacity is restored the system controller will restore the volume in the energy merit order bid and the participant will be re-dispatched according to merit order.

The recall instruction is an instruction to not consume DOS capacity. It is not necessarily an instruction to reduce load. The participant load may already be below the DTS contract levels and there is no need to reduce load further. It will be the participant's responsibility to ensure the load is reduced to the appropriate level and sustained there. For example, if the directive was to no longer consume the entire 30 MW of DOS contract capacity the participant would need to ensure the total site load did not exceed DTS contract levels until dispatched to do so.

## Recalling DOS energy for an EEA 1 alert

If the bid volume is priced at the top of the energy market merit order ($999.99/MWh) these are the last blocks dispatched before taking out of market actions to maintain system reliability during a supply shortfall. The instruction during an Energy Emergency Alert (EEA) 1 alert will be a dispatch off, to stop consuming energy in the $999.99/MWh block. Like the constraint recall example above, it will be the

participant's responsibility to know whether they are consuming DOS energy at the time of the dispatch or not. The instruction is an instruction to stop consuming DOS energy and continue to not consume any DOS capacity until dispatched on (price drops below $999.99), which may or may not require a physical load reduction.

## Failing to comply to DOS recalls

Failure to comply to an ISO directive to curtail DOS could result in suspension of DOS participation and a recalculation of the DTS contract capacity, administrative penalties, and the recovery of DTS revenue charged while under DOS.

## Market terminology

Market terminology used in this document is defined in the *Consolidated Authoritative Document Glossary* located on the AESO website here:

https://www.aeso.ca/rules-standards-and-tariff/consolidated-authoritative-document-glossary/