California ISO

Excess BTM Production

Issue Paper

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1. Executive Summary

The proliferation of distributed energy resources, particularly behind the meter (BTM) rooftop solar and other BTM resources, has been increasing rapidly throughout the ISO balancing area over the past decade. The ISO expects the continued expansion of BTM resources in the future. There are currently about 6,200 MW of non-utility BTM rooftop solar installed in the ISO balancing area, with over 2,500 MW installed since 2016.[1] Because of the recent and vigorous adoption of these resources, a number of potential issues related to their impact on various aspects of the ISO markets and operations have become more relevant and now require addressing. The primary issue the ISO is concerned with is related to "excess BTM production." Excess BTM production refers to energy generated by BTM resources above the host customer's load. This occurs during periods when a household or customer site with a BTM resource produces more energy than the household or customer site is consuming. Any excess BTM production is exported back onto the grid and consumed by other customers.

The frequency and magnitude of excess BTM energy production is increasing as more behind the meter resources are integrated into the system. The treatment of this excess energy impacts the calculation of Gross Load, and has other market, settlement, and operational impacts. During the ISO's recent transmission access charge (TAC) stakeholder initiative, the ISO observed some inconsistencies in how excess BTM production was reported to the ISO in the Gross Load data submittals. When utility distribution companies (UDCs) report excess BTM production differently, it can impact load-based settlement charges, including allocation of transmission access charges.

Through this initiative, the ISO intends to address the issues described above. The ISO will clarify the Tariff definition of Gross Load to indicate that excess BTM production shall not be netted from Gross Load data submittals, and will develop a reporting standard for how excess energy from BTM production is communicated to the ISO. This standard will be developed so it can be consistently applied across the ISO by UDCs. The ISO will also explore and establish a best practice for reflecting excess BTM production in ISO market processes to ensure consistent and appropriate settlement results, which will help the ISO optimize forecasts and ancillary services procurement.

[1] https://www.californiadgstats.ca.gov

2. Plan for Stakeholder Engagement

This stakeholder initiative is organized to allow time for the careful consideration of issues surrounding excess BTM production. The ISO intends to present its draft final proposal to its Board of Governors during Q1 2019. The currently planned schedule for this initiative is shown below.

Table 1 – Stakeholder initiative schedule

Milestone	Date
Post Issue Paper	6/28/2018
Stakeholder Call	7/10/2018
Stakeholder Written Comments Due	7/18/2018
Post Straw Proposal	10/2018
Stakeholder Call	10/2018
Stakeholder Written Comments Due	11/2018
Revised Straw Proposal Posted	12/2018
Draft Final Proposal Posted	TBD 2019
Stakeholder [Meeting or Call]	TBD 2019
Stakeholder Written Comments Due	TBD 2019
Board of Governors Meeting	Early 2019

3. Background

The ISO expects the continued expansion of BTM resources in the future. Excess BTM production refers to energy generated by BTM resources above the host customer's load. This is observed when the household or customer site is generating more energy from a BTM resource while consuming less load than is being produced. Any excess BTM production is *exported* back onto the grid and consumed by other customers. The primary focus of this initiative is to resolve inconsistencies in how excess BTM production is reported to the ISO and establish standard reporting practices to ensure Gross Load is reported consistently across UDCs.

The ISO provides the following example of excess BTM production to ensure a consistent understanding of the issue. This example assumes a snapshot in time to demonstrate periods that display occurrences of excess BTM production.

Table 2 - Excess BTM production example

Household with installed BTM resource with 2 MW production capacity		**Reported/observed value**
Load (amount of energy consumed on-site)	[A]	1 MW
BTM rooftop solar resource production (total production output)	[B]	2 MW
Excess BTM production (production greater than household load)	[C]	1 MW IF B > A; THEN B - A = C

4. Scope

The scope of this initiative has been carefully considered to address the issues outlined below, and does not include items addressed in other ongoing stakeholder initiatives (particularly the transmission access charge initiative) or ancillary topics.

Issues to be included in scope of this initiative:

The ISO proposes the scope of this initiative will include the following items:

1. Establish a standard reporting practice for excess BTM production to indicate that excess BTM production shall not be netted from Gross Load data submittals.
2. Determine appropriate practice for representation of excess BTM production in ISO market processes.
3. Explore potential impacts of the reporting of Gross Load and excess BTM production on Scheduling Coordinators that submit meter data to the ISO.

Issues not in scope of this initiative:

The ISO proposes that the scope of this initiative will not include the following items:

1. Issues related to telemetry and the transmission access charge will not be addressed in this initiative.
2. Only excess BTM production will be discussed in the initiative. Metering, settlement, and visibility of BTM generation that serves its own onsite load (such as rooftop solar serving

its host customer load) is not at issue in this initiative. Moreover, the ISO is examining only the effect from non-utility scale generation that is not participating in the ISO market.

3. This initiative will not examine generation or load involving distributed energy resources aggregations, demand response resources, or other participating resources already accounted for in the ISO markets.
4. This initiative will not examine issues related to how excess energy production impacts ISO short-term load forecasting processes or setting operating reserve requirements. The ISO notes that these processes and requirements utilize real-time data. Metering and settlements data is not utilized for the development of short term load forecasts or operating reserve requirements. However, pending the developments under this initiative, these processes may be informed by some of the resulting market changes and settlements data – *i.e.*, could be used to improve some aspects of load forecasting and setting reserve requirements.

5. Clarification of Gross Load Tariff definition

A key issue central to a number of items addressed in this initiative is the inconsistent interpretation of the Gross Load definition. As noted above, the ISO became aware of some inconsistencies in how excess BTM production was being reported to the ISO in UDC's Gross Load data submittals during the ISO's recent transmission access charge stakeholder initiative.

The ISO will clarify the Tariff definition of Gross Load through this initiative. The clarification will provide a statement to indicate that any excess BTM production shall not be netted from Gross Load data submittals. The ISO provides its reasoning for this clarification in section 5.1 below. In addition, to effectuate the intended results of this clarification the ISO also will develop a reporting standard for how excess energy from BTM production is communicated to the ISO through Gross Load data submissions. This issue of establishing a standard reporting practice for excess BTM production is described in further detail in section 6.2 below.

5.1. Proposed clarification to Gross Load definition

The ISO proposes that the definition of Gross Load should expressly convey that excess BTM production shall not be netted from Gross Load. In other words, the definition must state that Gross Load does not allow for the netting of excess BTM production. The ISO believes that this is the correct interpretation of the current definition, and the clarification under this aspect of the ISO proposal will establish this requirement more expressly.

In addition to the settlement issues described above, the ISO believes this is the correct approach because the transmission system provides numerous benefits to customers related to the reliability support and capacity services required to meet the Gross Load. This means that it is not appropriate to net excess BTM production from Gross Load because such treatment would ignore a portion of the customer's consumption that benefits from having access to, and use of, the transmission system. The ISO has consistently advocated against netting distributed

energy resources (DER) energy production from the transmission access charge allocation because the transmission system provides reliability and capacity services to all loads in addition to serving energy needs.

6. Issue Paper

6.1. Excess BTM production reporting impacts

The treatment of Gross Load data reported to the ISO impacts a number of areas. Different reporting practices of excess BTM production (netting v. not netting) among UDCs has implications for the transmission access charge, unaccounted for energy (UFE), and uninstructed imbalance energy (UIE), as well as other settlement charges. The treatment of excess BTM generation also has impacts on ISO market outcomes and short-term load forecasting related activities, including procurement of ancillary service products such as operating reserves.

The ISO provides the following example to help demonstrate the impacts of the Gross Load reporting approaches that are currently applied inconsistently across the ISO Balancing Area. Consider the following simple example where one household (household 1) has a host load of 1 MW and rooftop solar generation of 2 MW, and another household (household 2) has a host load of 5 MW without any rooftop generation. In this case the total net-load that would be observed is 4 MW. In contrast, the Gross Load figures may be reported differently by UDCs depending on if the excess BTM production (Rooftop Solar in the example below) is “netted” or “non-netted.”

Table 3 – Gross Load reporting approach impacts example inputs

		Reported/observed value (MWs)	
		Household 1	**Household 2**
Load	[A]	1 MW	5 MW
Rooftop Solar Output	[B]	2 MW	0 MW
Instantaneous Meter Read Load Channel	[C]	0 MW	5 MW
Instantaneous Meter Read Export Channel	[D]	1 MW	0 MW

Table 4 - Gross Load reporting approach example settlement impacts outputs

		Reported/observed value (MWs)
Σ Load	[A1 + A2]	1 MW + 5 MW = 6 MW
Metered Load (Σ load channels)	[C1 + C2]	0 MW + 5 MW = 5 MW
Σ of Load - Σ of Rooftop Solar Output	[(A1 + A2) - (B1 + B2)]	6 MW – 2 MW = 4 MW
Gross Load with "netting excess BTM production"	[(A1 + A2) – (B1 + B2)]	6 MW – 2 MW = 4MW
Gross Load with "non-netting of excess BTM production"	[C1 + C2]	5 MW + 0 MW = 5 MW
Unaccounted for Energy with "non-netting excess BTM production"	[(C1 + C2) – (A1 + A2)]	5 MW – 6 MW = -1 MW

The example described in the tables above is intended to provide stakeholders with a simplified description of how the various potential reporting practices cause various impacts to the ISO market processes. For additional detail, the ISO describes the impacts provided in the above example further below.

As shown in the example, in instances where loads are reported by the UDC to the ISO and excess BTM production has been netted, the ISO does not receive any data about the amount of BTM energy production. In the example above, if loads were reported to the ISO net of BTM production, the ISO would receive load values of 4 MW, or the sum of all load less BTM production, without insight into the magnitude of the latter component.

If instead, loads were reported to the ISO without netting excess BTM production, the load values received would be 5 MW, and 1 MW would be captured as unaccounted for energy. In actual market scenarios, these unaccounted for energy values would be indistinguishable from other unaccounted for energy, and offer little insight into the actual amount of excess BTM production. Finally, if both Gross Load (with or without netting determined by convention) and excess BTM production are reported to the ISO, both 4 MW of net load and 1 MW of excess BTM production would be reported, and both numbers would provide a more accurate and complete picture of this example.

In addition to visibility issues, when certain UDCs report loads that are "net" of excess BTM production, additional settlement issues arise when other UDCs report load without netting. Again, referencing the example above, suppose that 2 UDCs report load, the first reporting load "net" of BTM production, and the second reporting load "non- netting" of BTM production. The first would report a total load of 4 MW, with no unaccounted for energy, while the second would report a total of 5 MW, with unaccounted for energy of -1 MW. In this simple example, charges, such as the transmission access charge would be disproportionately allocated to load between the two UDCs, while actual system conditions would be identical. Additionally, the second UDC would also incur additional charges and credits related to unaccounted for energy, where the first UDC would not.

These impacts related to the reporting of Gross Load data demonstrate the need to clarify the definition of Gross Load and support the need to provide a clear and standardized approach for reporting Gross Load data to the ISO.

6.2. Develop standard reporting practice for excess BTM production

As demonstrated by the potential impacts described above, a critical goal for this initiative is to establish a clear and concise standard for reporting the excess BTM production quantities so that all UDCs can follow the same reporting practice going forward. The tariff definition for Gross Load will be updated as proposed in section 5.1 above. The ISO believes that the Tariff may also need to be revised to include more specific details on how UDCs should treat excess BTM production reflecting the proposed Gross Load clarification, and how that data should be reported to the ISO. The ISO seeks stakeholder feedback on this issue, with a focus on any considerations that may need to be made when developing a standard reporting practice for excess BTM production.

6.3. Determine appropriate market mechanism to account for excess BTM production

Two potential solutions for market mechanisms to account for excess BTM production may include:

1. Treatment of excess BTM production as supply, and model as a pseudo-generation aggregate resource.
2. Treatment of excess BTM production as demand, and model as "negative load."

The ISO believes that excess BTM production data is important and increasingly valuable. Having consistent reporting of excess energy values will provide greater insight into the impact excess BTM production has on the ISO system, which will also help improve forecasting and system operations. This data can provide the ISO and stakeholders with useful information for forecasting and for overall energy accounting. To realize these potential benefits, the ISO

believes it would also be necessary for excess BTM production to be captured by UDCs and reported to the ISO.

While these values could potentially be treated similar to how traditional generation is currently handled, it may be appropriate to treat them as load. Both solutions would require that Resource IDs with a specific location be created to model the energy, at an aggregated level (likely at the DLAP level). Treating the excess BTM production as generation would require energy values to be submitted at a 5-minute level, while treating these as load would require that hourly profiles are provided. Transmission access charge and uplift settlement are assessed based on Gross Load, which would be calculated differently depending on the treatment of this data. Including excess BTM production as load would result in a lower value for Gross Load for these charges, compared to treatment as generation.

System changes (and related modifications) may be necessary if it is determined that excess BTM production needs to be treated in a similar fashion as generation. To account for this energy it may be necessary to create a mechanism to track and settle this energy (*e.g.*, similar to distributed energy resource aggregation (DERA) or physical scheduling plant (PSP) approaches).

The ISO provides the following table to lay out the pros and cons of the two potential market mechanism approaches for addressing the excess BTM production issue in the ISO market processes.

Table 5 - Potential market mechanism approach considerations

	Pros	Cons
1. Treatment as generation	• Would be possible to model at 5-minute level in the future	• Data granularity beyond 5-minute market may not be available • Gross load values may be inflated because of accounting approach • Additional market changes may need to be implemented to account for this approach
2. Treatment as negative load	• Gross loads would be accurately reported • Minimizes impacts to settlements • Generation could be modelled on an hourly basis	

The ISO presents these options and the issues described above for stakeholder review. The ISO seeks feedback on these potential solutions to accounting for excess BTM production in the ISO's market processes.

7. Next Steps

The ISO will discuss this issue paper with stakeholders during a call on July 10, 2018. Stakeholders are asked to submit written comments by July 18, 2018 to initiativecomments@caiso.com.