BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Refinements, and Establish Annual Local Procurement Obligations.	Rulemaking R.11-10-023 (Filed October 20, 2011)

COMMENTS OF MEGAWATT STORAGE FARMS, INC. ON THE January 24, 2014 WORKSHOP STAFF PROPOSALS

February 18, 2014

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INTRODUCTION

Thank you for this opportunity to provide comments on the January 27, 2014 workshop Staff Proposals.

MegaWatt Storage Farms, Inc. is focused on developing grid-scale storage, including storage-related consulting and analysis services.

MegaWatt Storage Farms, Inc. ("MegaWatt") submits these comments on the Resource Adequacy (RA) Staff Proposals workshop presentation on January 27, 2014.

COMMENTS

Specifically, our comments are focused on the staff proposals for Qualifying Capacity ("QC") and Effective Flexible Capacity ("EFC") for Energy Storage ("ES").

MegaWatt supports the staff proposal requirements (slide 50) for ES for 4-hour minimum duration at P_{max} for System and Local QC. MWSF also supports the requirements to operate for 4-hours over three consecutive days and the Must-Offer Obligation (MOO).

MegaWatt supports the recommended calculation (slide 53) of EFC: EFC ≤ Maximum(NQC, NQC – P_{min})

MegaWatt supports the requirement (slide 54) that the negative output (dispatchable charging/load) be sustainable for the full 3 hour ramp to set the P_{min} for DR and aggregations of DR and ES.

MegaWatt does <u>not</u> support (slide 54) the reduction from 3 hours to only 1.5 hours that a positive *and* negative operating range facility (storage) must operate at P_{min} for full EFC credit.

MegaWatt would support a requirement that the negative output of storage also meet the full 3 hour ramp to set the P_{min} for full EFC credit.

Three reasons for the above are set forth below:

Reason 1: 1.5 hours of storage dispatched as suggested does not reduce a 3 hour ramp

The staff proposal (slide 54) "Assumes a facility can operate (charge) at P_{min} for the first half of the three-hour ramp, and (discharge) at P_{max} for the second half."

Figure 1 below illustrates this staff proposal case. As shown at the bottom of the figure, a storage facility with 1000 MW P_{min} and 1000 MW P_{max} and 1.5 MWH of energy storage is first charged for 1.5 hours at P_{min} = and then discharged for 1.5 hours at P_{max}.

The figure also shows an illustrative net load of 20,000 MW before time 0 and a 10,000 MW up-ramp over 3 hours to a 30,000 MW net load. The figure also shows the net load adjusted for this storage dispatch.

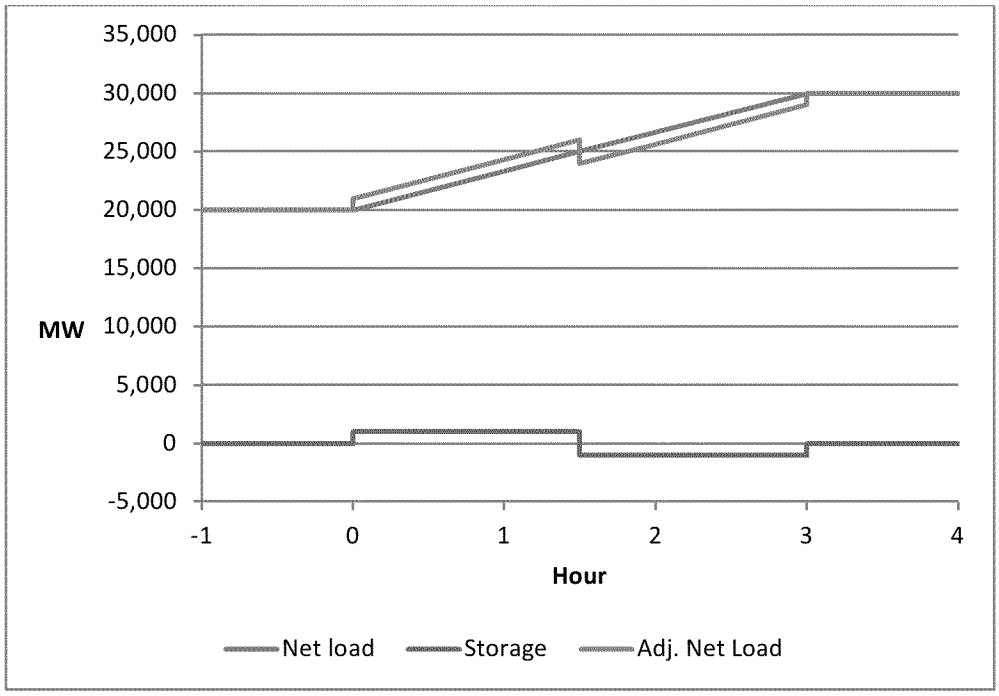

Figure 1: Impact of 1000 MW of 1.5 Hour Storage on 10,000 MW 3 Hour Net Load Ramp

The figure shows that 1.5 hours of storage dispatch has no net impact on the 3-hour ramp. Furthermore, the increased up-ramp in the first 1.5 hours is likely to complicate the dispatch of other resources to meet the overall ramp.

Reason 2: Potential for unbeneficial arbitrage and discrimination between negative output only and positive and negative output facilities

The staff proposal states that ES and DER programs may be aggregated to meet RA (QC and EFC) requirements (slide 51). Thus, the proposal permits aggregation of facilities into a virtual single facility to meet RA requirements. The P_{min} for a standalone negative output (charging/load) only facility is set by the largest magnitude of charging (or load) sustainable for the full 3 hour ramp.

For example, 100 MW of a positive output only facility (a generator with 3 hours or more of sustainable energy) can be combined with 100 MW of a negative output only facility (a dispatchable load) with 1.5 hours of sustained energy absorption. This will create a combined facility with both positive and negative operating ranges. Yet the negative output only facility (dispatchable load) standing alone would have to have 3 hours of dispatchable energy to qualify.

This is discriminatory treatment in favor of 1.5-hour charging storage and against demand response (dispatchable load), and against storage facilities with 3 hours of sustainable charging energy. Positive and Negative Output storage should be required to have 3 hours of sustained charging energy, the same as required for dispatchable load.

Reason 3: The 2020 CASIO "Duck Curve" illustrates that storage durations of 4 to 6 hours may be ideal for California.

Figure 2 shows the net load for the California Duck Curve for a day in 2020.

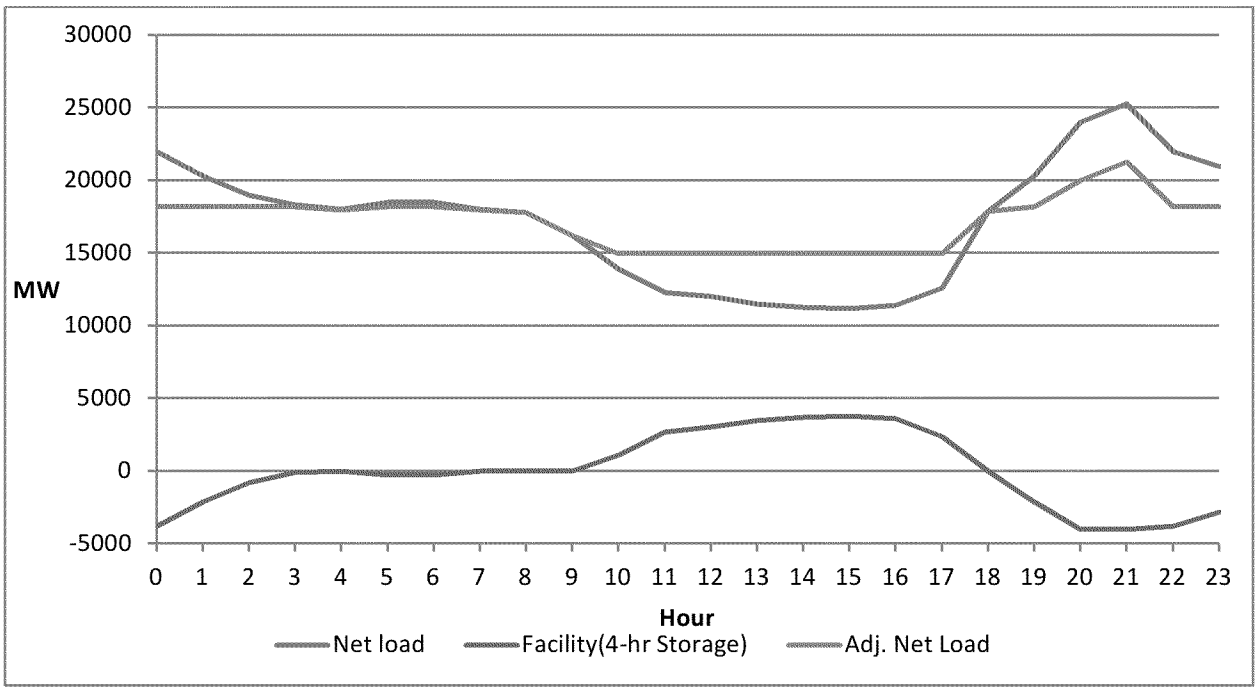

Figure 2: CAISO 2020 Net Load with 4 GW of 4- Hour Storage

Also shown on the figure is an illustrative dispatch of 4 GW of storage with 4 hours of energy[1]. The adjusted net load after application of the storage greatly reduces the net load ramp.

Figure 3 shows the same example with 1.5 hours of storage.

[1] This illustrative example uses storage with no loss and symmetric charge and discharge rates. Actual storage has loss and may have a higher charge rate than discharge rate.

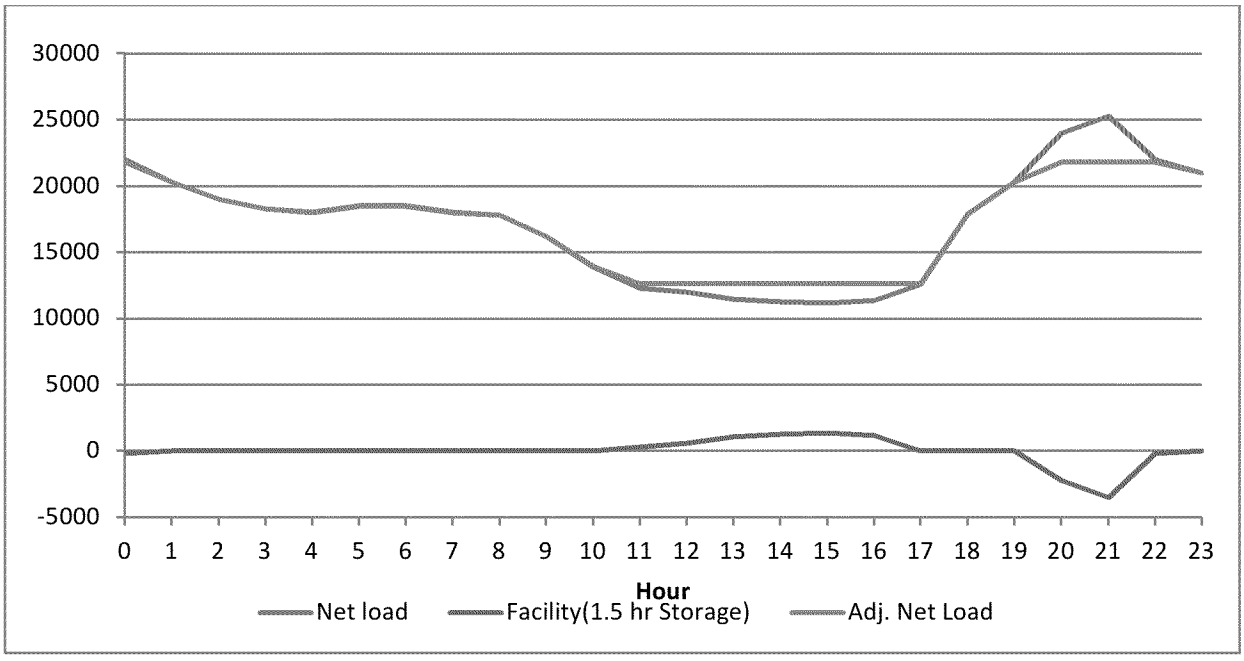

Figure 3: CAISO 2020 Net Load with 4 GW of 1.5- Hour Storage

Figure 4 shows the example with 6 hours of storage.

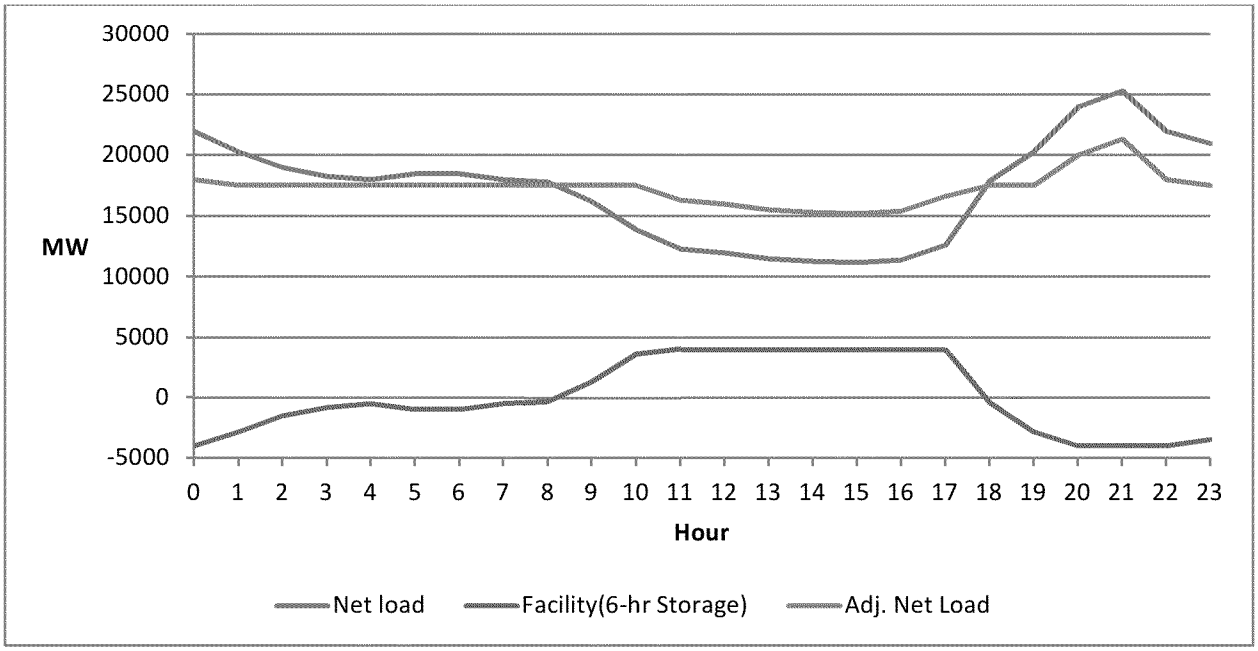

Figure 4: CAISO 2020 Net Load with 4 GW of 6- Hour Storage

The graphs show that 1.5 hours of storage has smaller impact on the net load ramp and potential over generation at the base of the "Duck" relative to 4 and 6 hours of storage. Hence, from a longer-term perspective, QC and EFC requirements that favor short duration 1.5-hour storage will support much less renewables integration than storage facilities that are required to have 3 to 4 hours or more of storage.