BEFORE THE PUBLIC UTILITIES COMMISSION

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	Rulemaking 12-11-005

COMMENTS OF OUTBACK POWER TECHNOLOGIES ON THE ASSIGNED COMMISSIONER RULING REGARDING THE INTERCONNECTION OF ENERGY STORAGE SYSTEMS PAIRED WITH RENEWABLE GENERATORS ELIGIBLE FOR NET ENERGY METERING

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Harvey Wilkinson
General Manager
OutBack Power Technologies
17825 59th Ave NE, Suite B
Arlington, WA 98223
Phone: 360.435.6030
email: hwilkinson@outbackpower.com

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OutBack Power Technologies (OutBack Power) is honored to have the opportunity to provide comments regarding the Assigned Commissioner Ruling Regarding The Interconnection Of Energy Storage Systems Paired With Renewable Generators Eligible For Net Energy Metering. OutBack Power very much appreciates the California Public Utilities Commission (CPUC) issuing clear and direct guidance to the industry on the proper treatment of storage devices under the NEM tariff, and we believe this ruling will assist the industry in meeting the overall Decision Adopting Energy Storage Procurement Framework And Design Program goal of installing 200 MW of energy storage behind the meter by 2020.

I. DESCRIPTION OF PARTY

OutBack Power is a privately held company headquartered in Arlington, WA, and is a leading designer and manufacturer of advanced power electronics for renewable energy, backup power, marine and mobile applications incorporating solar, wind, micro-hydro and battery based energy storage systems. Businesses within the State of California represent nearly forty percent of OutBack Power's solar business, with over 4.7 MW of inverters sold

yearly within the State of California. The company is also a member of The Alpha Group -- a global alliance of independent companies that share a common philosophy: create world-class powering solutions for communication, commercial, industrial and renewable energy markets.

II. Suggestion on Clarification of Text

It should be clarified on page 3 of the ruling that "For battery-based integrated storage, the Guidebook further elaborates that 'the storage device must only be capable of storing energy from the renewable generator' to be considered 'integrated'" to clearly indicate that this limitation on source applies to integrated storage and does not apply to all battery-based storage, as well as to correct a grammatical error.

III. Batteries are Buckets, Not Balloons

Presently, electric utilities such as Southern California Edison require that storage devices paired with NEM-eligible facilities interconnect under the Multiple Tariff Facilities provision of their NEM tariffs[1]. The utilities have stated their position that if the battery is ever charged under any conditions from the grid, then they consider it now a non-NEM eligible generator – in essence, that the battery must be acting like a balloon, that every electron that flows into will someday come rushing back out, and therefore any intermingling of "green" and "brown" electrons will contaminate the purity of the battery. This position is flawed and misrepresents the fundamental operation of energy storage devices.

The majority of battery-based systems on the market today are designed to export excess renewable energy that attempts to drive the battery voltage up, with the inverter "harvesting" excess RE and exporting it to loads and to the grid. In these systems the battery operates analogous to a bucket, rather than to a balloon – energy must overflow the bucket in order to be made available for export, and as energy ceases to overflow the bucket (ie, at sunset) the water level in the bucket quickly falls to a resting level and the overflow (export) stops. The system may charge the battery with energy from multiple sources in order to ensure optimal battery health, for instance in recovery from being discharged during a utility outage.

[1] Southern California Edison's External Memorandum on Battery-Backed Storage System and Net Energy Metering Eligibility, dated July 22, 2013

We would suggest if the applicant can show that the system exports energy while in a charging state, then the resulting percentage of renewable fuel used to generate electricity to be applied to the generation output of the facility would therefore be 100%. Under a Multiple Energy Resources calculation, the only energy input resulting in generation to be considered in the fuel measurement methodology would be the renewable input of the PV. Applying a Multiple Tariff structure to a single fuel source is not reasonable or prudent, as it only adds cost and complexity without benefit.

Even for those applications where energy storage is being utilized for benefits beyond backup power, such as leveling, ancillary services, peak shaving or other use-case scenarios, the battery still operates like a bucket, not a balloon. There are some times when the battery may be discharged to the load (empty the bucket) and other times when the battery will be charged (refill the bucket), yet these applications would be severely negatively impacted by SCE's unsupported requirement of battery "purity." Ensuring NEM Integrity can be achieved by simple accounting. An account with no energy storage but with a Renewable Generator exports power when the system is producing more than the local load and then imports energy when the Renewable Generator is not, and under NEM the account is settled at the end of a period. This same technique should apply to those accounts with storage.

IV. Batteries are Not Generators

There is a misunderstanding promoted by the utilities regarding the function of energy storage that has the potential to severely impact and hinder the industry and the adoption of energy storage, and should be addressed by the Commission. Storage is not generation. There are many benefits for energy storage, and multiple use-case scenarios that will come to market as this industry matures and develops. However, while storage may have many performance attributes similar to generation, the actual generation of electricity is not within the capabilities of energy storage. By correctly recognizing energy storage as a new category we can avoid the trap of trying to classify it as generation, and thereby avoiding the pretzel logic of having to characterize it as either NEM or Non-NEM Generation. One of the concerns raised by the commission is the potential to "buy low, sell high" by using storage devices to store off-peak

grid energy and generate credits during high-value time periods. It should be noted that one of the challenges facing the California grid is an excess of energy production during certain times and a substantial demand at others. Such challenges have prompted Time-Of-Use rate schedules, congestion pricing, and numerous other policies intended to help shape the use and generation of energy. Storage has the distinction of allow a planned shaping to accomplish these goals. While there have been many arguments about the cost-effectiveness of this approach given the multiple other possible use-case scenarios for energy storage with far more beneficial economics, it would seem to be reasonable to use market forces and valuation of time-varying rates to reduce the delta between the so-called belly and the head of the duck exhibited in projected utility load profiles by incenting energy storage to be used in exactly this manner. By recognizing the value of energy storage as separate from generation by eliminating any characterization of Non-NEM Generation, the commission would leave open the door for the utilities and industry to develop such a market-based solution.

V. Ensuring NEM Integrity

We agree with the commission that protecting the integrity of NEM is essential to ensuring the long standing goals of the program. However, for most applications this goal can be met without adding burdensome additional metering requirements and costs. For customers who are not on time-varying rates the value of the renewable generation is like baked goods – the energy is best the moment it is generated, and any attempt to package or preserve it only reduces its value. As there is no financial benefit to delaying export of energy for NEM credit under non-varying rates, there is no benefit to burdening these applicants with increased costs and complexities of multiple meters required for NGOM. For customers on other rate plans, simple basic calculations indicate even with the largest pricing delta possible under current tariffs the cost effectiveness of installing storage for the intent of NEM manipulation is marginal and would require a 10 year or longer payback window in the best of cases. Given that the same energy storage product could be used for other use-case scenarios with far better economic returns, the question must be asked, what are we trying to protect

against? Does the grid truly need to be protected against an onslaught of customers making bad business decisions in jumping over dollars to save dimes?

The RPS Guidebook does provide the option for the applicant to treat only the energy leaving the facility, including the renewable generator and storage device, in excess of the imported grid electricity as RPS eligible, if it can be shown that this approach will underestimate the renewable portion of the stored and exported electricity in all possible cases. This option provides a simple, low cost alternative for the customer to provide RPS eligible production using a single net meter, while providing NEM integrity. As an example, in a typical grid-tie with battery backup (GTBB) application the customer will have essential loads connected downstream of the inverter, to be served by the system in case of an emergency. These loads are typically modest in relation to the size of the PV array, and consist of key items to be protected during a power outage such as lights, water, communication and refrigeration. As they are downstream of the inverter they will always increment the single net meter upwards, as will any energy imported for battery charging and maintenance. Energy produced by the RE generator will decrement the single meter downwards, as is typical with any RE installation. If the output of the PV array is 4kW and the protected loads are consuming 400 Watts and maintaining the battery takes 100 Watts, the net export will be 3.5kW. The single meter will always underestimate the RE portion under every condition of consumption, charging and generation. As this is the case and will provide a sufficient proof of RPS energy generated this option for the applicant to meter only export minus import should be addressed in the guidance given to the industry as a cost-effective tool for achieving the goal at hand.

VI. Impracticality of Non-Export Relay

The provision for a non-export relay on the system is not functionally achievable with technology available today, and it should not be mandated or required. In a Directly Connected energy storage system, the RE generator, energy storage device and inverter are typically directly connected on a common DC bus, and the intent of the system is to export renewable energy. It is impossible for any device such as a non-export relay to distinguish which electrons have been pressed into action by photons striking a PV module from electrons excited by any

other source. Fortunately, if the applicant can show that the system exports energy while in a charging state then there is no need for a non-export relay as the only energy that can be exported is from the renewable generator.

VII. Storage System Sizing Limit Considerations

Energy storage is an emerging market that has the opportunity of fulfilling a wide range of key needs; these needs will require systems in a broad range of sizes and capacity, and for optimal performance these systems may require a range of ratio between energy storage, inverter and charging capacity. For instance in a GTBB application, unlike a grid-dependent PV system, the inverter is sized first to power the protected loads, and second to convert RE to AC. As such, the inverter may need to be sized larger than the connected RE source in order to power key critical loads such as a submersible well pump, which has a starting surge many times its running consumption. Similarly, the battery may be sized to power these loads through an extended outage, with provisions for reduced RE input due to inclement weather or smoke from a wild fire, for example. While the SGIP system sizing requirements do allow provisions for sizing the system up to the current or forecasted load, the advanced energy storage (AES) limitation to the CEC-AC output of the PV system has the potential to cause conflict in meeting this requirement.

It is typically most efficient to "trickle charge" a storage system (i.e., charge at some low percentage of the system maximum power) as it is much better for the lifespan of the battery and more efficient in the delivery of usable energy into the battery itself. As the storage can be then discharged at a higher rate than it was charged to serve the benefit of load reduction (as called for in SGIP for example) this inherently means that the sizing restriction on storage to match the maximum power of the renewable generator/PV is inappropriate and contrary to good engineering design and the desired impacts of storage uses.

We therefore recommend that the sizing cap be a ratio of not more than 12:1 in terms of max discharge power to max renewable generator power. This ratio is sufficient to allow the generator to produce enough energy in a single day to match the typical needs for energy and round trip efficiency losses while also meeting the instantaneous power needs of the local loads

being leveled or reduced. Alternately, extending the SGIP exemption to systems that are rated at 10kW or less from these sizing requirements would allow the inverter to be sized to serve most key critical loads such as submersible well pumps or similar loads, without forcing the customer to increase the connected RE unnecessarily.

VIII. Conclusion

OutBack Power thanks the Commission for the opportunity to submit these Opening Comments, and urges the Commission to expeditiously issue a final decision based on the proposal set forth in the ACR.

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Respectfully submitted,

Harvey Wilkinson
General Manager
OutBack Power Technologies
17825 59th Ave NE, Suite B
Arlington, WA 98223
Phone: 360.435.6030
email: hwilkinson@outbackpower.com