Texas Commission on Environmental Quality
New Technology Implementation Grant (NTIG) Program

Operation Phase Annual/Final Status Report

Contract Number: 582-15-53908-1471

Grantee: NRG Texas Power, LLC

Report for the Annual period: 2019 **Date Submitted:** 5/17/2020

Section I. Accomplishments

Provide a bulleted list of operations of the facility during the past year. Include exact numbers and/or estimates.

During 2019, the Elbow Creek Battery Storage (ECBS) project provided energy and frequency response by:

- Successfully executing over 13,000 deployments, an estimated 3.6 deployments per hour.
- Discharging over 279 MWhrs.
- Charging over 403 MWhrs, from renewable power.

Section II. Key Events and Issues

Report any key events that occurred during this reporting period. Please include any major project updates that impacted operations.

- In previous years during heavy use events with extremely high outdoor ambient temperatures, the cooling system has reached its thermal limits. Measures have been taken to address this which are further described below.
- Communication through Greensmith interface had periodic stability issues causing loss of visibility of the battery through one of the two communication channels. Measures were taken to improve reliability which are further described below.

Report any anticipated or unanticipated problem(s).

- Increased Cycling – The changes in the Fast Responding Regulation Service (FRRS) Parameters causes the ECBS to deploy sooner, longer, and at higher rate of deployment than initially designed. ECBS is able to comply and operate under the revised parameters.

- Cell Heating – The system continues to operate in the frequency market as anticipated; however, because of some changes to the frequency market structure, the battery is being exercised more than its design use-case resulting in unanticipated heating of the battery cells.
- Battery State of Charge Level Indication (SOC) – State of Charging level indication requires resetting periodically to allow for recalibration.
- Pro-Rated Regulation Down (RegDn) Awards – FRRS RegDn Day-Ahead Market (DAM) awards are now being awarded on a pro-rated basis due to an oversupply of market offers.

Proposed Solution(s): Report any possible solution(s) to the anticipated or unanticipated problem(s).

- Increased Cycling – Reduction of deployments within an available operating hour, under the current the Fast Responding Regulation Service (FRRS) parameters, is very unlikely. The only option within NRG's control to reduce increased cycling would be to adjust when EBCS is offered into the market. Due to the cell heating issue, scheduling optimization allows the ECBS batteries to cool, thereby offering some cycling relief for the interim period.
- Cell Heating – Scheduling optimization of ECBS allows the batteries to cool without impacting key hourly deployment periods within a day. It was determined the ambient temperature rating of the original chiller was exceeded during certain heat wave events. To address this issue, a second chiller rated for higher ambient conditions was installed and is now in service.
- Battery Charge Level – NRG operations periodically resets the batteries, thus allowing the SOC calculation to recalibrate. NRG and Toshiba are working on improving the algorithms that calculate SOC or possibly changing the charging criteria to be based on battery voltage. New algorithm is in in development.

Action(s) Conducted and Results: Describe the action(s) taken to resolve the anticipated or unanticipated problem(s). Were the actions successful in resolving the problem?

- Installed second chiller rated for site summer ambient conditions.
- Replaced communication equipment and installed antenna to improve communications and provide better reliability of the Greensmith interface.

Section III. Provide a summary of the overall state of the facility and grant funded equipment.

- ECBS is generally functioning as designed, with the few exceptions noted in this report.
- Cooling system has been enhanced to allow for operating during peak summer conditions.
- ECBS is responding to ERCOT's deployment signals within the prescribed time as required by ERCOT.

Section IV. Goals and Issues for Upcoming Period

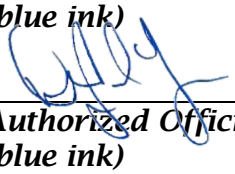
Provide a brief description of the project goal(s) you hope to realize during the next reporting period.

- Continue to collaborate with ERCOT to cross reference data telemetry to validate accuracy, discuss current and future protocols that impact ECBS' operation and compliance with ERCOT Protocols and Operating Guides.

- Implement control system modification to eliminate the need for manual reset to correct for state of changed indication.

Dudley D. Zahn, Vice President

Authorized Official/ Project Representative's Printed name (blue ink)



Date: May 15th, 2020

Authorized Official Signature/ Project Representative's name (blue ink)

NOTE: *Please attach any additional information that you feel should be a part of your report.*

This form may be submitted via e-mail to your Grant Coordinator or a paper copy may be sent to the following address:

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