



**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: 2020 **Date Submitted:** 5/14/2021

Section I. Accomplishments

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

During 2020, the Elbow Creek Battery Storage (ECBS) project provided energy and frequency response by:

- Successfully executing over 15,000 deployments, an estimated 3.9 deployments per hour.
- Discharging over 339 MWhrs.
- Charging over 483 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.

- As compared to 2019, unit availability significantly improved in 2020. The primary drivers for the improvement in performance were 1) fewer communications system faults and 2) improved chiller reliability.
- The primary driver for unit unavailability in 2020 was due to the installation and configuration of a new system that interfaces between the battery and ERCOT deployment signals. Once the new system was set up, the unit performed well for the remainder of the year.

Report any anticipated or unanticipated problem(s).

- Increased Cycling – Changes to the Electric Reliability Council of Texas' Fast Responding Regulation Service (FRRS) parameters cause 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 but more frequent utilization of the battery will reduce the life expectancy.

- 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 modeled design indicated 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.
- Over Supply of FRRS Regulation Down (RegDn) – Providers of FRRS RegDn Day-Ahead Market (DAM) awards are now receiving pro-rated awards due to an oversupply of offers from market participants.

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

- Increased Cycling – Under the current Fast Responding Regulation Service (FRRS) ERCOT Protocols, is very unlikely we will see a reduction of deployments within a given operating hour. The only option within NRG’s control to reduce cycling would be to limit when ECBS is offered into the market to a shorter window of time throughout a given day. Scheduling optimization gives the ECBS batteries time to cool, thereby offering some thermal relief due to cycling for the short term. However, the improved cooling system has allowed for more hours of operation and frequency of deployments while at the same time maintaining temperatures within the design limits.
- 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.
- Battery Charge Level – NRG operations periodically has to manually reset the battery control system, thus allowing the SOC calculation to recalibrate. The manufacturer has been unable to resolve the issue. NRG is working with a third party to automate this activity as a corrective measure. This issue does not cause any reliability concerns.

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?

- A second chiller rated for higher ambient conditions has successfully mitigated our temperature issues. The second chiller allows for two separate setpoints for the air conditioning and the cooling system on the inverters. This is important as higher cooling water temperatures are required for inverter cooling due to the potential for condensation to build up inside the inverters causing electrical faults. The addition of a second chiller has allowed for increased hours of battery operations without cell overheating.
- Communication equipment at the site was replaced and an antenna was installed to improve communications and provide better reliability of the third-party control system 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.
- The cooling system has been enhanced to allow for improved performance and reliability during peak summer conditions.
- In 2020, ECBS responded to ERCOT’s deployment signals as expected and within the prescribed time as required by ERCOT.

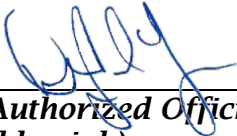
Section IV. Goals and Issues for Upcoming Period

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’s operation and compliance with ERCOT Protocols and Operating Guides.
- Implement control system modification to eliminate the need for manual reset to correct for SOC indication.

Dudley D. Zahn

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



Date: 05.14.2021

**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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