

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA**

**IN THE MATTER OF THE APPLICATION OF
CROWNED RIDGE ENERGY STORAGE, LLC FOR A FACILITIES PERMIT TO
CONSTRUCT A 120-MEGAWATT BATTERY ENERGY STORAGE SYSTEM
FACILITY**

Docket No. EL26-

**DIRECT TESTIMONY AND EXHIBITS
OF JOSHUA DUDASH**

May 14, 2026

1 **I. INTRODUCTION AND QUALIFICATIONS**

2 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

3 A. My name is Joshua Dudash. My business address is 700 Universe Blvd., Juno Beach, FL
4 33408.

5
6 **Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

7 A. I am employed by a contractor Vitaver Staffing Solutions to NextEra Energy Resources,
8 LLC (“NextEra Energy Resources”), and I act as the Battery Energy Storage System (or
9 “BESS”) Principal Fire Safety Engineer in the Engineering & Construction department.

10
11 **Q. PLEASE DESCRIBE YOUR PROFESSIONAL BACKGROUND.**

12 A. I hold a Bachelor’s degree in Mechanical Engineering from the Pennsylvania State
13 University. After graduation I worked at UL, LLC (formerly Underwriters’ Laboratories)
14 (“UL”) as a test engineer from 2017 to 2019. I then transitioned to working for a battery
15 manufacturer (EnerSys) as a Systems Test Engineer and was responsible for managing
16 small teams of test engineers to evaluate lead acid and lithium-ion products to safety
17 standards including UL 1973, UL 9540, UL 583 and UL 2580. I joined the Canadian
18 Standards Association (CSA Group) in 2022 as an Energy Storage Specialist, overseeing
19 electrical and fire testing for certification per UL 1973, UL 9540, and UL 9540A. I
20 contributed to the writing of CSA C800, the first Large Scale Fire testing standard for
21 BESS. I joined the NextEra Energy Resources BESS fire safety team as a subject matter
22 expert in January 2026. A copy of my curriculum vitae is provided as Exhibit A to my
23 testimony.

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Q. WHAT IS YOUR ROLE WITH RESPECT TO THE CROWNED RIDGE ENERGY STORAGE PROJECT (THE “PROJECT”)?

A. In my capacity as Fire Safety Engineer, I am responsible for all matters related to BESS fire safety design, including codes, standards, and compliance from product to project. I am the fire and safety expert for battery energy storage for the Project. This includes advising on BESS design to ensure compliance with current fire safety codes and regulations and assisting with training local fire departments.

Q. HOW MANY ENERGY STORAGE PROJECTS DO NEXTERA ENERGY RESOURCES SUBSIDIARIES OWN AND OPERATE IN THE UNITED STATES?

A. NextEra Energy Resources subsidiaries currently own and operate over 50 BESS Projects in the United States.

Q. HAS THIS TESTIMONY BEEN PREPARED BY YOU OR UNDER YOUR DIRECT SUPERVISION?

A. Yes.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH DAKOTA?

A. No.

1 **II. PURPOSE OF TESTIMONY**

2 **Q. PLEASE DESCRIBE THE PURPOSE OF THE TESTIMONY.**

3 A. The purpose of my testimony is to: (1) provide an overview of the BESS equipment and
4 components to be used at the Project; and (2) describe the design considerations and safety
5 components of the BESS.
6

7 **Q. WHAT PORTIONS OF THE APPLICATION DO YOU SPONSOR?**

8 A. I sponsor or co-sponsor the following sections of the Application filed in this proceeding:
9 Sections 7 (portions), 20-27, and 30 (portions).
10

11 **PROJECT COMPONENTS AND SPECIFICATIONS**

12 **Q. PLEASE DESCRIBE HOW A BESS FACILITY OPERATES.**

13 A. Grid-scale energy storage functions as a “peak-shaving” system with energy being stored
14 in off-peak hours and discharging during peak demand hours. The systems are rated for a
15 4-hour rate, typically, meaning a 1MW site can provide 1MW of power for 4 hours.
16

17 **Q. PLEASE PROVIDE AN OVERVIEW OF THE BESS DESIGN FOR THE
18 PROJECT.**

19 A. The BESS is currently designed as a 120-MW, 4-hour battery system. The conceptual
20 layout for the BESS and anticipated storage capacity is based on a storage system capable
21 of a 4-hour discharge at 120 MW, totaling 480 MWh. The BESS will utilize lithium-ion
22 battery technology from a reputable battery manufacturer that follows all applicable codes
23 and standards. A more in-depth description of the BESS components is provided below.

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Q. WHAT SAFETY STANDARDS WERE TAKEN INTO CONSIDERATION FOR THE DESIGN AND TESTING OF THE PROJECT?

A. The Project will ensure that the BESS is designed in compliance with the latest applicable safety codes—including the International Fire Code (“IFC”), NFPA Standard 855, the National Electric Code (“NFPA 70”), and UL safety standards. Those same standards and codes inform the procurement of BESS equipment and govern the operation of the BESS.

South Dakota has adopted the 2021 IFC. The Project will be designed to the most recent 2024 IFC, which is harmonized with the 2023 NFPA 855 standards for battery energy storage projects. As a requirement of the IFC and NFPA 855, energy storage system (“ESS”) facilities, unless exempted, must be listed to UL9540, a safety standard for ESSs, covering the design, performance and installation of the systems. As required by UL9540, the batteries must be tested and listed in accordance with UL 1973, which ensures the battery system is electrically and mechanically safe for integration into energy storage systems. BESS cabinets are required to be tested following UL 9540A, a test method that evaluates the fire and explosion hazards of an ESS by testing “thermal runaway” at the cell, module, rack, and cabinet level. Thermal runaway is a self-reinforcing cycle where an increase in temperature causes conditions that generate even more heat, which in turn raises temperature further — which can lead to fire or explosion. The purpose of this test is to prevent a fire from propagating outside of the facility or to adjacent equipment. Power conversion systems (“PCS”), such as inverters, converters, and controllers, must be listed to UL 1741. The Project will use BESS equipment that has met the aforementioned testing and certifications requirements.

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Q. PLEASE DESCRIBE THE PROJECT’S BATTERY MODULES.

A. As shown on Exhibit B, individual lithium-ion battery cells are proposed to form the core of the BESS. Battery cells are connected in series and parallel configurations and enclosed within sealed battery modules. Each battery module is equipped with a battery management system (“BMS”) that continuously monitors and regulates critical parameters, such as voltage, temperature, state of charge and state of health, to maintain operational integrity and safety. Battery modules are stacked and connected to form individual racks monitored by the BMS. Individual racks are then connected to deliver the BESS capacity rating per cabinet.

Q. DESCRIBE THE PROJECT’S BATTERY MANAGEMENT AND ENERGY MANAGEMENT SYSTEMS.

A. BESS cabinets, such as those that will be used for the Project, house the batteries and BMS. The BMS monitors and controls the safe and effective operation of the storage system. The BMS is used in conjunction with the site-wide energy management system (“EMS”) to monitor battery voltage, current, temperature, charge, discharge, thermal management, fault diagnosis, fire alarm monitoring, and more. Together, the BMS and the EMS form a multi-level control structure designed to provide controls for the battery cabinets and PCS up to the point of connection with the collection substation. The BMS and EMS both ensure that the BESS effectively responds to dispatch instructions, as well as provide a secondary safety system designed to safely shut down the BESS in the event of an emergency. As I mentioned, BESS projects are monitored 24 hours a day, 7 days a week, 365 days a year

1 by NextEra Energy Resources' Renewable Operations Control Center ("ROCC"). Each
2 BESS cabinet will be equipped with a thermal management system to maintain optimal
3 temperature for the batteries.

4
5 **Q. PLEASE DESCRIBE THE PROJECT'S ENERGY STORAGE SYSTEM**
6 **CABINETS.**

7 A. Every BESS cabinet has a system cabinet that houses the control, communication,
8 protection, and auxiliary equipment needed to operate the battery system, such as the BMS,
9 fire alarm control panel, thermal management system, controllers, breakers, and power
10 distribution components. System cabinets are located in separate compartments or sections
11 of the cabinet, allowing technicians to access controls, breakers, and communication
12 equipment without being exposed to the battery modules themselves.

13
14 **Q. PLEASE DESCRIBE THE PROJECT'S PCS.**

15 A. The Power Conversion Systems ("PCS") located in the BESS facility will consist of an
16 inverter, protection equipment, direct current ("DC") and alternating current ("AC") circuit
17 breakers, filter equipment, equipment terminals, and a connection cabling system. During
18 battery charging, the PCS converts electric energy from AC to DC when energy is
19 transferred from the grid to the battery. During a battery discharging event, the PCS
20 converts electric energy from DC to AC when energy is transferred from the battery to the
21 grid.

22 Additionally, the BESS facility will also include a transformer that converts the
23 low-voltage AC side output of the inverter to medium AC voltage, facilitating

1 interconnection and improving overall BESS efficiency. The transformer and associated
2 protection equipment also safeguard the PCS in the event of system electrical faults.

3
4 **CONSTRUCTION AND SAFETY**

5 **Q. ONCE THE FACILITY IS CONSTRUCTED, PLEASE DESCRIBE THE**
6 **PROJECT'S GENERAL SITE LAYOUT.**

7 A. The total project boundary is approximately 7.8 acres in addition to the existing 1.4-acre
8 substation. The BESS equipment is located inside security fencing. Setbacks for the Project
9 include: 10 feet from the nearest equipment to the BESS yard fencing; and 100 feet from
10 the nearest BESS equipment to the Project boundary. At the beginning of the life of the
11 Project, Crowned Ridge Energy Storage anticipates approximately 126 battery energy
12 storage cabinets and 46 PCSs will be installed. Please see the photos in section 7.1 of the
13 Application for reference. Additional augmentation equipment will be installed throughout
14 the life of the Project with approximately 24 additional BESS cabinets and four PCSs. The
15 final numbers may change depending on final design and technology changes at the time
16 of augmentation. To maintain the Project's required energy capacity over its operational
17 life, periodic battery augmentation will be planned to offset the gradual capacity reduction
18 in the original battery systems.

19
20 **Q. PLEASE EXPLAIN WHAT YOU MEAN BY THE TERM AUGMENTATION.**

21 A. Battery systems are initially sized to meet the full nameplate energy requirement from the
22 start of operations, accounting for auxiliary loads and other energy losses. However, as
23 battery capacity diminishes over time, new battery cabinets will be integrated within the

1 existing footprint to uphold the contracted energy levels, which is called “augmentation.”
2 The nameplate capacity will not be increased by augmentation but will remain the same.
3 The facility’s design accounts for planned augmentation.
4

5 **Q. PLEASE PROVIDE AN OVERVIEW OF THE SAFETY PRECAUTIONS**
6 **INCORPORATED INTO THE DESIGN OF THE BESS.**

7 A. There are four layers of safety protection built into the Project’s design:

- 8 1. Physical thermal barriers are installed between the cells within a module to prevent
9 cell to cell thermal runaway propagation with additional thermal barriers designed
10 between modules, racks, and at the cabinet level to prevent fire propagation within
11 the system components.
- 12 2. The BMS monitors cell voltage, temperature, current, ambient conditions, and fire
13 alarm signals of each battery storage cabinet for abnormal conditions.
- 14 3. A fire alarm control panel monitors and alarms when smoke or gas is detected for
15 any cabinet.
- 16 4. The NextEra Energy Resources ROCC monitors the BESS facility 24 hours a day,
17 7 days a week, 365 days a year for alarms and abnormal conditions. If an alarm or
18 abnormal condition is detected that indicates an emergency condition, the
19 individual equipment or project can be shut down remotely from the ROCC.

20 Every BESS cabinet is equipped with smoke and fire detection, in accordance with
21 NFPA 855 and the IFC. Additionally, the BMSs installed in the BESS are powered by
22 auxiliary transformers with a battery backup system to safely shut down and isolate the
23 BESS in the case of grid power loss. The BMS monitors and controls the safe and effective

1 operation of the storage system. Key metrics such as voltage, temperature, current, and
2 state of charge are continuously tracked to optimize the performance of the battery and
3 ensure it operates within the normal range. The BMS monitors the batteries to detect any
4 changes in normal battery behavior and operates as a thermal runaway prevention device,
5 containing automated protocols that will shut down and isolate that portion of the system
6 if any thermal runaway precursors are detected. If an anomaly is identified, an alarm or
7 notice is issued through the BMS. The NextEra Energy Resources ROCC would
8 immediately investigate to determine if further action is warranted, such as isolating or de-
9 energizing the system, deploying field personnel to investigate and repair, or dispatching
10 the local fire department.

11
12 **Q. PLEASE EXPLAIN WHAT IS MEANT BY THE TERM “THERMAL**
13 **RUNAWAY.”**

14 A. As described above, thermal runaway is a self-sustaining internal chemical reaction within
15 an individual battery cell in which it generates more heat than it can dissipate. The heat
16 that is generated can trigger the same chemical reactions in other battery cells, known as
17 propagation. Additional layers of mitigation, including physical barriers and separation,
18 are in place to prevent propagation in the very rare scenario of a thermal runaway event.

19
20 **Q. HOW IS THE PROJECT DESIGNED TO PROTECT AGAINST THERMAL**
21 **RUNAWAY EVENTS?**

22 A. The Project will utilize a system of separate cabinets that was designed and tested to
23 provide protection from thermal runaway events. The BMS is tested and certified by a

1 Nationally Recognized Testing Laboratory as a thermal runaway prevention device,
2 identifying the precursors to thermal runaway, de-energizing, and isolating the system
3 preemptively. The cabinet-based system includes thermal barriers between battery cells
4 within a module. Then the modules are isolated from other modules in the same rack, and
5 the racks are mounted with physical barriers separating them. Finally, the racks are placed
6 into a cabinet with exterior steel walls. Each of these layers of separation and containment
7 between cells, modules, and racks is designed to prevent the spread of a fire that occurs in
8 one battery cell and significantly reduce the risk of a thermal runaway event propagating.
9

10 **Q. EXPLAIN WHAT MONITORING AND MAINTENANCE WILL OCCUR FOR**
11 **THE PROJECT.**

12 A. The Project will operate 365 days per year and be monitored remotely through a
13 supervisory control and data acquisition (“SCADA”) system. The SCADA and fire alarm
14 control panel (“FACP”) send separate discreet signals to the ROCC so they have visibility
15 into exactly what is happening within a container at any given time. As I discussed
16 previously, NextEra Energy Resources’ ROCC monitors the readiness of its subsidiaries’
17 energy storage facilities nationwide around the clock. If an issue is detected at a BESS
18 location, the system can be shut down remotely, and a local technician in the Project Area
19 can be deployed to resolve the issue. One major maintenance inspection of the BESS will
20 occur annually. During normal operation and maintenance, Crowned Ridge Energy Storage
21 anticipates one to two workers will inspect the site approximately one to two times per
22 week. Additionally, on-site maintenance is expected following commissioning, including
23 replacement of inverter power modules and filters, and miscellaneous electrical repairs on

1 an as-needed basis. Inspection scheduling and monitoring will be supported by the control
2 center's SCADA system, which tracks system performance and flags any irregularities for
3 prompt on-site evaluation.

4
5 **Q. WILL CROWNED RIDGE ENERGY STORAGE HAVE AN EMERGENCY**
6 **RESPONSE PLAN FOR THE BESS SITE?**

7 A. Yes. Crowned Ridge Energy Storage will create an emergency response plan ("ERP") and
8 share this plan with local first responders, the site personnel assigned to manage
9 emergencies, and local emergency managers for Codington County to help them respond
10 to an event, should one occur at the site. A draft ERP is included in the Application as
11 Appendix G. The ERP will be finalized after construction is complete but prior to
12 commissioning, as completion of the ERP requires the as-built site dimensions and
13 features. Prior to commencing operations, Crowned Ridge Energy Storage will invite local
14 first responders to the site for training on the ERP and to familiarize them with the layout
15 of the facility and relevant personnel. Crowned Ridge Energy Storage will provide
16 refresher training at the request of the local fire department or anytime there is an alteration
17 to the procedures in the ERP. Any necessary notification to the public, or means thereof,
18 would typically be handled by the responding fire department.

19
20 **Q. IN DESIGNING THE PROJECT, HAS CROWNED RIDGE ENERGY STORAGE**
21 **CONSIDERED WEATHER CONDITIONS EXPERIENCED IN SOUTH**
22 **DAKOTA?**

1 A. Yes. The Project is designed for temperatures between -40 to 50 degrees Celsius (-40 to
2 122 degrees Fahrenheit). The Project takes into consideration lightning, high winds, and
3 severe storms that occur in South Dakota. The design includes incorporating short circuit
4 protection and ground protection for any lightning strikes or water infiltration, and the
5 foundations will be designed to accommodate axial and lateral loads associated with high
6 wind events.

7
8 **Q. WHAT SITE-SPECIFIC SECURITY MEASURES WILL THE PROJECT**
9 **IMPLEMENT?**

10 A. Security measures will be taken during the construction and operation of the Project,
11 including temporary and permanent safety fencing, warning signs, and locks on equipment.
12 The safety of the operations and maintenance staff, neighbors, and the public is the highest
13 priority.

14
15 **Q. BASED ON YOUR EXPERIENCE, ARE THERE COMMENTS OR QUESTIONS**
16 **YOU FIND THAT MEMBERS OF THE PUBLIC COMMONLY HAVE**
17 **REGARDING BESS FACILITIES?**

18 A. Yes, during permitting proceedings, it is not uncommon for the public to pose questions
19 regarding health risks associated with BESS, concerns around fires, and safety precautions
20 taken when designing the BESS.

21
22 **Q. WHAT IS YOUR RESPONSE TO COMMENTS ABOUT POTENTIAL HEALTH**
23 **RISKS ASSOCIATED WITH THE BESS?**

1 A. Battery cells are completely sealed and are designed not to leak or to produce any
2 emissions. In the very rare scenario of a thermal runaway event, continuous monitoring
3 and post-event testing of incidents at other companies' BESS facilities have revealed no
4 air, soil, ground water or surface water contamination. Moreover, a recent report prepared
5 for the American Clean Power Association ("ACP") by Fire & Risk Alliance, LLC
6 ("FRA"), a well-known and respected fire protection engineering firm, assessed historical
7 BESS fires over a 12-year period, and concluded that battery storage systems pose low
8 environmental and health risks, stating: "In none of the reviewed cases of environmental
9 sampling related to the BESS fire events were contaminant concentrations found that
10 would pose a public health concern or necessitate further remediation." A copy of this
11 report is provided in Exhibit C.

12
13 **Q. WHAT IS YOUR RESPONSE TO CONCERNS ABOUT THE RISK FROM**
14 **POTENTIAL FIRES?**

15 A. To protect the health and safety of the community, the BESS is designed and rigorously
16 tested to significantly reduce the risk of fires. Additionally, the Project will maintain an
17 ERP and continue to coordinate with local emergency responders to prioritize the safety of
18 the community and the responders. According to the Electrical Power Research Institute,
19 deployment of BESS has increased from about 3 GW to over 48 GW from 2018 to 2023.
20 In that same time, the failure rate per deployed GWh of BESS has decreased by
21 approximately 97%.

22

1 **Q. IN YOUR OPINION, HAS THE PROJECT BEEN SITED AND DESIGNED TO**
2 **MINIMIZE ADVERSE IMPACTS?**

3 A. Yes.

4

5 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**


6 A. Yes.

7

8 Dated this 14th day of May, 2026.

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Joshua Dudash