1 Overview

Daggett Solar Power, LLC
~~NRG Renewables Coolwater Solar 1 LLC~~, a subsidiary of NRG Renew, LLC, (Applicant) is proposing to develop the Coolwater Solar Project in San Bernardino County, east of Daggett (Figure 1). The proposed project consists of constructing and operating a utility-scale, solar photovoltaic (PV), electricity generation and energy storage facility that would produce up to 650 megawatts (MW) of power and include up to 450 MW of battery storage capacity on approximately 3,500 acres of land (Figure 2 and Figure 3). The project would utilize existing electrical transmission infrastructure adjacent to the existing Coolwater Generating Station, a recently retired natural gas-fired power plant, to deliver renewable energy to the electric grid.

The project site is flat and is generally bounded by the town of Daggett approximately 0.5 mile to the west; the Mojave River, Yermo, and Interstate 15 to the north; Barstow-Daggett Airport, Route 66, and Interstate 40 to the south; and Newberry Springs and Mojave Valley to the east. County zoning for the project site allows for development of renewable energy generation facilities with a Conditional Use Permit (CUP). The project is anticipated to be constructed in three phases and is seeking thirteen separate CUPs to facilitate project phasing and financing. The phases would share certain facilities, such as the on-site project substations and generation tie (gen-tie) line. Development would occur on privately-owned land.

The Applicant selected the project site based on proximity to existing electrical transmission infrastructure in order to repurpose former fossil fuel-based electricity generation capacity with renewable energy. The project is being designed in accordance with the County's Solar Ordinance (an ordinance amending Chapter 84.29, Renewable Energy Generation Facilities) and the recently adopted General Plan's Renewable Energy and Conservation Element (August 8, 2017), which strives to preserve the character of the project area and surrounding communities. The project area is in close proximity to existing high voltage electrical infrastructure, existing energy generation facilities, and other industrial uses. These include the existing non-operating Coolwater Generating Station, a 626-MW natural gas-fired power plant, the 44-MW photovoltaic Sunray Solar Project, the Los Angeles Department of Water and Power (LADWP) high-voltage transmission corridor of approximately 1,000 feet in width, several high-voltage substations and transmission lines owned by Southern California Edison (SCE), major highway and railroad infrastructure, and the Barstow-Daggett Airport.

8 Detailed Project Description

8.1 Facilities and Design

8.1.1 Overview of the Solar Facility

The proposed project consists of PV solar panels, mounted on a single axis tracking system that tracks the sun. The tracking system is supported by steel piles and the panels are arranged into long narrow rows, which are grouped into regions, informally referred to as solar arrays or blocks. The proposed design also includes inverters and transformers mounted on small concrete pads and distributed across the site. Electricity produced by the arrays would be collected and routed to an on-site substation where it would be stepped up in voltage. Each phase would have its own on-site substation, which is also expected to include a battery storage system. From the on-site substations, each phase would include a segment of the overhead gen-tie line, which would connect the project to the existing SCE-owned 115- and 230-kV Coolwater substations, which are adjacent to the Coolwater Generating Station. The project would also include security fencing for all phases and an O&M building to be constructed with the first phase. A preliminary layout of the proposed facility is shown in Figure 6.

Major project features are described below.

8.1.2 Solar Array

Solar panels would be mounted on a racking system which would be supported, when practical, by driven piers (piles) directly embedded into the ground. Panels would be organized in rows in a uniform grid pattern, with each row separated by approximately 10-20 feet (from post to post). A fixed tilt racking system, which does not track the sun, may also be used if deemed suitable. Panels are proposed to be a maximum of 20 feet in height. Typical solar array and tracker panel layouts are provided in Figure 7 and Figure 8, respectively.

The specific equipment chosen for the proposed project would be determined prior to construction. However, at this time, the solar panels are expected to be either crystalline silicon modules, or cadmium telluride modules (also known as panels; see Figure 8).

8.1.3 Inverters and Switchgear

Individual PV panels would be connected together in series to create a "string" to carry direct current (DC) electricity. Strings of DC electricity would be routed to inverters, which would take the DC output and convert it to alternating current (AC) electricity.

The system may utilize either centralized or string inverters. Centralized inverters and transformers would be supported on small concrete or steel equipment pads, on a foundation of either a concrete footing approximately 10 feet by 50 feet in size, or foundational piers. Small string inverters would be mounted throughout the solar array, as frequently as attached to each of the tracker rows. The power from inverters in each phase would be collected and transported to a new project substation. Power from new project substations would be transported via a new gen-tie line to the two existing SCE-owned Coolwater substations, where power would then flow into the utility-owned electric system. The battery system would be either AC- or DC-coupled, meaning the battery would be electrically connected either between the DC panels and the inverter input (in the case of a DC-coupled system) or further downstream, after the output of the inverters (in the case of an AC-coupled system).

8.1.4 Substations

One new substation would be constructed as a part of each of the three project phases. The substations would occupy an area of approximately 300 feet by 300 feet each and would be protected and isolated with security fences. From the new project substations, a gen-tie line would be constructed to connect the solar facility to its point of interconnection, which are the two existing substations (115- and 230-kV) owned and operated by SCE and adjacent to the retired Coolwater Generating Station. The work SCE will perform to connect the gen-tie will occur primarily inside the existing substations and, therefore, no expansion of the existing substations is anticipated. Figure 6 shows preliminary locations for the project substations, however, the locations may be changed to optimize overall facility design.

SCE would conduct limited work within and surrounding the existing Coolwater substations to facilitate connection of the solar project to their system.

8.1.5 Battery Storage

The project is anticipated to include up to 450 MW of battery storage to be constructed in three phases corresponding to the phased construction of the solar arrays. The battery storage system is expected to be located either adjacent to each of the substations or distributed throughout the solar array at the inverter equipment pads or tracker rows. Up to 16 acres of battery storage would be located throughout the project site.

If batteries were located adjacent to the substations, they would be contained either within steel enclosures similar to a shipping container or a freestanding building. Each of these battery storage facilities would occupy up to approximately 1 acre of land. The anticipated locations of the battery storage facilities adjacent to project substations can be seen in Figure 6. If distributed throughout the solar array, the battery system would likely be contained within metal housings and electrically connected to the inverters located at each of the equipment pads shown in Figure 6 Figure 6 shows preferred locations for the battery storage facilities, however, the locations may be changed to optimize overall facility design.

The battery storage system would likely use one of several available lithium ion (Li-ion) technologies, though alternatives may be considered (such as flow batteries) given continuing rapid technological change in the battery industry. In general, a Li-ion battery is a rechargeable type of battery consisting of three major functional components: a positive electrode made from metal oxide, a negative electrode made from carbon, and an electrolyte made from lithium salt. Lithium ions move from negative to positive electrodes during discharging and in the opposite direction when charging. There are five major Li-ion battery sub chemistries that are commercially available. They are:

1. Lithium Nickel Cobalt aluminum (NCA)
2. Lithium Nickel Manganese cobalt (NMC)
3. Lithium Manganese oxide (LMO)
4. Lithium Titanate Oxide (LTO)
5. Lithium-iron phosphate (LFP)

Selection of the Li-ion sub chemistry for the project would take into consideration various technical factors, including safety, life span, energy performance, and cost.

The proposed battery storage system would be designed, constructed, operated, and maintained in accordance with applicable industry best practices and regulatory requirements, including fire safety standards. Current best practices for fire safety, as of this submission, utilize chemical agent suppressant-based systems to detect and suppress fires. If smoke or heat were detected, or if the system were manually triggered, an alarm would sound, horn-strobes would flash, and the system would release suppressant, typically FM-200, NOVEC 1230, or similar, from pressurized storage cylinders. However, final fire safety design would follow applicable standards and would be specific to the battery technology chosen.

8.1.6 Gen-Tie Lines

The project is expected to be constructed in three phases. Each phase would include a new substation and segment of above ground gen-tie line. From each substation, a segment of gen-tie would be constructed in order to connect the solar facility's output to the electrical grid at the existing SCE-owned 115- and 230-kV substations, located adjacent to the Coolwater Generating Station. The gen-tie poles are expected to be up to 120 feet in height and would be capable of accommodating both 115- and 230-kV electrical circuits. Each phase and its associated CUPs would share the substations and gen-tie facilities. The first segment of gen-tie would be constructed with Phase 1. The second segment of gen-tie would be constructed with Phase 2, connecting it to Phase 1. The third segment would be constructed with Phase 3, connecting it to Phase 2 such that at full build the gen-tie would be one line that serves all phases of the project.

Four primary alternative routes are being considered for the project gen-tie lines. The four primary alternatives are shown in Figure 6. These routes traverse the project site from east to west and would be primarily along Silver Valley Road. The alternative routes deviate from Silver Valley Road at various points as described below, and are *not* in order of preference. Portions of some alternatives may be under ground, particularly in the area of the LADWP right-of-way. The gen-tie line would be capable of accommodating both 115- and 230-KV electrical circuits. The gen-tie would be built out in sequences to match the phases of the solar project.

- Due north of the Barstow Daggett Airport, Option 1 turns north to Valley Center Road, where it turns west for approximately 2 miles. The route then turns south toward the northern edge of the existing Sunray Solar Project, and continues west, crossing SCE-owned land to the existing SCE Coolwater substations.
- At Powerline Road, two alternative routes (Option 2 and 3, as shown in Figure 6) would head south for a distance, before turning east toward the existing SCE Coolwater substations.
- At Powerline Road, Option 4 would head directly west, veering north around the border of the existing Sunray Solar Project and meeting the route outlined for Option 1.