STATE OF VERMONT
PUBLIC SERVICE BOARD

Petition of Coolidge Solar I, LLC for a certificate of public good, pursuant to 30 V.S.A. § 248, authorizing the installation and operation of a 20 MW solar electric generation facility to be located in Coolidge and Cavendish, Vermont, to be known as the "Coolidge Solar Project"	)))))))	Docket No. _____

PREFILED TESTIMONY OF ADAM F. COHEN AND AARON B. SVEDLOW ON BEHALF OF PETITIONER

December 14, 2015

The testimony of Mr. Cohen and Mr. Svedlow: (1) provides an overview of the Project, including the Project description, construction sequence and schedule, and the status of the proposed PSB Rule 4.100 power purchase agreement with VEPP, Inc.; (2) explains how a 20 MW grid-scale solar Project is compatible with Vermont siting and energy needs; (3) describes the benefits of the Project to Vermont and the region; (4) introduces the other witnesses presenting testimony in support of the Project; and (5) addresses how the Project will satisfy certain criteria of 30 V.S.A. § 248, namely: orderly development of the region (30 V.S.A. § 248(b)(1)), need (30 V.S.A. § 248(b)(2)), system stability and reliability and impacts upon transmission infrastructure (30 V.S.A. §§ 248(b)(3) and (b)(10)), economic benefit (30 V.S.A. § 248(b)(4)), noise, greenhouse gas impacts, impacts upon historic sites, public health and safety, municipal and educational services, and public investments (30 V.S.A. § 248(b)(5)), and compliance with the Comprehensive Energy Plan (30 V.S.A. § 248(b)(7)).

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1. Introduction

Q1. Mr. Cohen, please state your name, occupation and qualifications.

A1. My name is Adam F. Cohen, and I am the President and founder of Ranger Solar LLC ("Ranger Solar" or "Ranger"). Ranger is a utility scale solar development company focused on the New England region. Ranger is led by an experienced team with an extensive track record developing renewable energy projects across the United States.

Prior to forming Ranger Solar, I was a founding team member of Pioneer Green Energy, which has almost 800 MW of new wind and 130 MW of new solar projects under construction or in operation in the U.S., representing over 2 billion dollars of installed new investment in American communities. There, I led renewable energy development activities in Pioneer Green Energy's Eastern U.S. Unit, which consisted of over 700 MW of solar and wind projects under development across six states. Prior to founding Pioneer Green Energy, I

successfully led the development of 400 MW of wind projects into commercial operation, including two of the first coastal wind sites in the United States. I am a graduate of Northwestern University in Evanston, Illinois. A copy of my resume is included as Exhibit Petitioner CS-1.

Q2. Mr. Svedlow, please state your name, occupation and qualifications.

A2. My name is Aaron B. Svedlow. I am the Director of Permitting for Ranger and am acting as the Project Manager for the Coolidge Solar Project (the "Project"), a 20 MW (AC) solar electric generation facility that Coolidge Solar I, LLC ("Coolidge Solar" or the "Petitioner") proposes to build in the Towns of Ludlow and Cavendish, Vermont. My business address is 40 Lafayette St., Yarmouth, Maine 04096.

I am an environmental scientist and wildlife biologist and have over 10 years of experience in the renewable energy sector. My expertise includes local, state, and federal permitting of renewable energy projects including solar, wind, and transmission power projects in New England. In addition to permitting, I have a background in wetland delineation, endangered species consultations, and wildlife assessments. I am a former president of the Maine Chapter of the Wildlife Society, where I used my skills as a biologist to take a scientific and fact-based approach to wildlife conservation. I also currently serve on the Conservation Commission for the Town of Falmouth, Maine and have professional affiliations

with The Wildlife Society, Maine Bat Working Group, Maine Lobstermen's Association, Northeast Migration Monitoring Network, Northeast Bat Working Group, ECO Canada, and E2Tech. I am a graduate of the University of New Hampshire in Durham, New Hampshire and a candidate for a Master's of Science from the University of Southern Maine. A copy of my resume is included as Exhibit Petitioner CS-2.

Q3. What is the purpose of your testimony?

A3. Our testimony: (1) provides an overview of the Project, including the Project description, construction sequence and schedule, and the status of the proposed Public Service Board ("PSB" or "Board") Rule 4.100 power purchase agreement with VEPP, Inc.; (2) explains how a 20 MW grid-scale solar Project is compatible with Vermont siting and energy needs; (3) describes the benefits of the Project to Vermont and the region; (4) introduces the other witnesses presenting testimony in support of the Project; and (5) addresses how the Project will satisfy certain criteria of 30 V.S.A. § 248, namely: orderly development of the region (30 V.S.A. § 248(b)(1)), need (30 V.S.A. § 248(b)(2)), system stability and reliability and impacts upon transmission infrastructure (30 V.S.A. §§ 248(b)(3) and (b)(10)), economic benefit (30 V.S.A. § 248(b)(4)), noise, greenhouse gas impacts, impacts upon historic sites, public health and safety, municipal and educational services, and public investments (30 V.S.A. § 248(b)(5)), and compliance with the Comprehensive Energy Plan (30 V.S.A. § 248(b)(7)).

Q4. Please provide a Project overview and summarize why the Project is being proposed.

A4. The Coolidge Solar Project is a 20 MW (AC) solar electric generation facility being developed by Coolidge Solar, an affiliate company of Ranger, that will generate approximately 33,000 megawatt hours (MWh) of electrical energy per year, enough to power over 5,000 homes. The Project will be located on approximately 88.5 acres of an undeveloped parcel of land located off of Barker Road in Ludlow, Vermont (the "Project Site"), adjacent to the existing Vermont Electric Power Company, Inc. ("VELCO") Coolidge substation. See the Project Site Plan, Exhibit Petitioner IAJ-2.

We formed Ranger Solar specifically to address the growing demand for utility scale solar energy in New England. Our collective experience working on renewable energy projects in the region, and elsewhere, led us to the conclusion that wind energy, and other types of renewables such as biomass and hydro, face significant challenges. These challenges have stemmed from an increased perception of undue adverse visual impacts, costs, and environmental impacts. Conversely, solar energy provides clean and economical energy, with less environmental and aesthetic impacts than other types of renewables. Coupled with the declining costs of solar photovoltaic ("PV") panels and increased production efficiency, we believe solar is a better fit for New England. This is not just an investment – Ranger's team has been working on renewable energy

development in New England collectively for over 20 years—we understand the region's needs, its culture, and will be pursuing the development of renewable projects in Vermont and elsewhere for years to come. This Project will generate a significant amount of energy and provide real and substantial economic value to the Towns of Ludlow and Cavendish, as well as to the state of Vermont and the New England region.

With the closure of multiple aging power plants in New England, the region faces a challenging time ahead as it seeks to maintain clean, reliable, and reasonably-priced electricity to its consumers. According to the *2015 Regional Energy Outlook* issued by the New England Independent System Operator ("ISO-NE"), the majority of electric generation resources on the New England power system today "are traditional, grid-connected generators fueled by imported fossil fuels." Exhibit Petitioner CS-7 at 13.

Intensifying these challenges, New England states have all set ambitious targets and adopted corresponding policies to increase renewable energy sources and decrease greenhouse gas emissions. Other energy trends also contribute to the rising demand for renewable energy resources including: the decline in coal and oil generation; the increased reliance on natural gas and the need to hedge

exposure to it; and the mass-based limits on carbon emissions contained in the Clean Power Plan[1] and the Regional Greenhouse Gas Initiative.

On a local level, utilities face similar challenges in ensuring that energy needs and capacity constraints are addressed reliably and in an environmentally responsible and cost-effective manner. Vermont currently ranks 50th in total net electrical energy generation by state, and as of the end of 2014, hosted less than 10% of the approximately 909 MW of New England installed solar capacity (the vast majority is sited in Massachusetts (666.8MW) and Connecticut (118.8 MW)). See Exhibits Petitioner CS-4 (U.S. Energy Information Administration ("EIA") Vermont State Profile and Energy Estimates), CS-5 (EIA Rankings: Total Net Energy Generation), and CS-6 (ISO-NE's 2015 Solar PV Forecast Details).

Fortunately, as these energy demands have intensified, the cost of solar has dropped by over 75% in the past few years, quickly becoming the leading choice for safe, efficient, and reliable energy. Solar PV offers on-peak power at a cost that is in line with traditional fossil fuels around the country. As noted in Vermont's recently released "Total Energy Study" ("TES"), "[i]n the near to mid-term, growth in renewable energy supply . . . can be secured at lower cost to the energy system through large scale/centralized resources," both in and out of Vermont, and that in the long term, "in-state renewables of all scales [will] play a

[1] See the Prefiled Testimony of Mr. Thomas Vitolo (Synapse Energy Economics, Inc.) submitted for Coolidge Solar in this proceeding. As he notes, while Vermont is exempt from the Clean Power Plan, the other states within ISO-NE are not.

more significant role as costs and risks" associated with in-state renewables to diminish over time. See Exhibit Petitioner CS-3 at 17 (Excerpts from the Vermont Total Energy Study (December 8, 2014)).

Out of this large demand in New England and around the country for on-peak clean energy and capacity, Ranger Solar was founded. Ranger believes that well-sited utility scale solar projects of 20 MW and above are the leading choice to meet these goals and mandates in a meaningful way. Ranger Solar is built on this commitment to provide clean, domestic, and locally based on-peak power at a cost effective price, while utilizing its company's vast experience in renewable energy siting, development, and finance to bring these mandates to a reality.

The Project Site is favorable for solar development in several ways. First, the Project Site is open and relatively flat, requiring limited clearing and grading. Second, the Project is located in Windsor County, a region of the state that is largely rural and agricultural; therefore, while the Project will require less than 90 acres, there are over 100,000 acres of farm land in Windsor County,[2] as well as over 1.2 million acres of land used for farming in Vermont,[3] meaning the Project

[2] Census of Agriculture (2012), http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Vermont/cp50027.pdf. As explained in the Prefiled Testimony of Mr. Ian Jewkes, the Project will disturb less than 8 acres of primary agricultural soils and these impacts will be temporary only, as the soils will be reclaimed and restored as part of the decommissioning plan.

[3] Census of Agriculture (2012), http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/Vermont/st50_1_008_008.pdf.

will temporally impact 0.0009 of the available farmland in Windsor County and 0.0075 of the available farmland in Vermont, respectively. Third, the Project Site has minimal aesthetic impacts (please refer to the Prefiled Testimony of Mr. Michael Buscher's and his aesthetics report, Exhibit Petitioner MJB-2). Additionally, the Project avoids significant environmental resource impacts (please refer to the Prefiled Testimony of Mr. Richard Jordan and his natural resources report, Exhibit Petitioner RJ-2). Lastly, the Project is co-located with the existing Vermont Electric Power Company, Inc.'s ("VELCO") 115 kV/345 kV Coolidge substation and its robust supporting transmission network infrastructure.

Q5. Please summarize the benefits that the Project is expected to provide to Vermont and the region.

A5. The Coolidge Solar Project will create significant environmental, social, and economic benefits, including the following:

- It will produce 245 job-years;[4]
- It will produce more than $15 million in labor income;
- It will produce more than $25 million in gross domestic product for the state;
- It will produce nearly $4 million in increased state and local tax revenue;

[4] A job-year is the equivalent of one job over one year. Impacts are presented in job-years in order to combine construction and operation activities that occur over different periods of time.

- It will produce an estimated $27.9 million social benefit in avoided CO_2 emissions;
- It will lower electricity costs to ratepayers by suppressing wholesale markets and placing downward pressure on other short-term power contracts;
- It will help alleviate a well-documented gap between needed and available capacity—primarily during the summertime peak—that the region will face in the forthcoming years due in part to substantial retirements of existing fossil and nuclear generating units;
- The Project will provide a substantial contribution towards meeting Vermont's and the region's renewable energy targets and greenhouse gas reduction goals;
- The Project's long-term, stably priced, contract at competitive rates will serve as a fuel hedge that will help protect Vermont ratepayers from short-term price increases that can result from summer heatwaves, winter cold snaps, or large generation or transmission outages;
- The Project is consistent with the 2011 Comprehensive Energy Plan ("CEP") and the Vermont TES, both of which emphasize the importance of centralized large scale renewable energy as a part of the Vermont energy mix; and
- The Project will be part of a diversified solution to the region's clean energy challenges as New England seeks to reduce its dependence on natural gas and other fossil fuel resources over time. In particular, it

would qualify as both a Tier 1 resource within Vermont and as a Class I Renewable Energy Credit resource throughout New England, thus addressing an ever-increasing demand for renewable energy resources to meet legislated targets.

2. Introduction of Other Witnesses

Q6. Please identify the other witnesses offering testimony in support of this filing.

A6. In addition to our testimony, the following witnesses are providing testimony in support of the Project:

Witness	Subject
Thomas Vitolo, PhD Synapse Energy	Demonstrates the Vermont and regional need for the Project and describes the Project's economic benefits to the state and its residents.
Richard Jordon, Project Manager, TRC Envtl. Corp.	Describes the Project's potential impacts upon the natural environment.
Ian Jewkes, President Krebbs and Lansing Engineers, Inc.	Describes the civil engineering details, and addresses water supply, water conservation, waste disposal, soil erosion prevention and sediment control, noise, and impacts upon primary agricultural soils.
Michael J. Buscher, President, T.J. Boyle Associates	Describes the Project's potential visual impacts.
Robert Bartone, Director, New England Archaeology	Describe the Project's potential impacts upon archeological resources.

3. Project Description & Schedule

Q7. Please describe the Project.

A7. The proposed Project Site is located on undeveloped, open fields, and managed forests north and south of Barker Road in Ludlow, Vermont. The Project site is on a single parcel owned by one landowner who has entered into a long-term lease agreement with Coolidge Solar.

The Project will consist of solar PV panels, centralized inverters and transformers, electrical lines, a step-up transformer ("Project Transformer" or "Step-Up Transformer"), a station controller, perimeter fence, access roads, and stormwater management features. The Project Site, defined as the area to be developed within the perimeter fence and access roads, will consist of approximately 88.5 acres of the 155.75 property. The entire property (155.75 acres) was evaluated for wetlands; waterbodies; streams; rare plants; rare, threatened or endangered animals; protected natural communities; geological conditions; and cultural resources. The Project Site allowed us to design the Project to avoid direct impacts to all of these resources. The Site Plan (Exhibit Petitioner IAJ-2), includes a Site Location Map and also shows the anticipated locations of the Project's components in geographic relation to the surrounding areas, including elevation cross sections.

A more detailed description of the Project elements is as follows:

Panel Arrays

The PV panels will be installed in linear arrays oriented in a generally east-west direction across the Project Site. Arrays will face south and be tilted to a maximum of 45-degrees above horizontal. Each array will consist of panels mounted on fixed vertical post foundations driven into the ground; in some areas screws or pins may be used in lieu of or in addition to the posts. There will be approximately 82,080 solar PV panels (approximately 320 watts each). There will be 4,560 strings with 18 modules per string. The vertical height of the arrays will start at approximately four (4) feet above the ground on the southern side of the array, and extending to a maximum height of approximately twelve (12) feet above the ground on the northern side of the array. Electricity from the panel arrays will be transmitted to the centralized inverter locations via underground collector lines.

Centralized Inverter/Transformer Stations

There will be 13 centralized inverters in 13 locations within the Project Site. There will be eleven (11) TMEIC (or similar) 1666 kW inverters, and two (2) TMEIC (or similar) 833 kW inverters. The centralized inverters invert the direct current ("DC") produced by the panels to alternating current ("AC") for interconnection with the existing utility grid. Each inverter also has a medium voltage AC transformer. There will be eleven (11) two-winding 1,850 kVA

34.5kV transformers, one each paired to the 1666 kW inverters, and two (2) two-winding 1,000 kVA 34.5 kV transformers paired with the 833 kW inverters. Inverters and transformers will be skid mounted.

Each inverter/transformer (collectively referred to as the "Centralized Inverter Stations") will have secondary oil containment systems capable of holding 150% of the volume of the transformer. Mr. Jewkes describes the oil containment in his prefiled testimony and the secondary oil containment plans are depicted in Exhibit Petitioner IAJ-2.

Electrical Lines and Interconnection Facilities

The Project will require both AC and DC electrical lines, including the aforementioned collector lines, medium voltage AC lines (34.5 kV), and the Project Export Line (a 115 kV transmission line from the Project Transformer to the point of interconnection ("POI") with the existing VELCO Coolidge substation). There will be approximately 24,300 linear feet ("LF") of electrical line, including 11,200 LF of AC electrical lines, and 13,100 LF of DC electrical lines. Overall, about 98 percent (approximately 23,850 LF) of the Project's electrical lines will be installed below ground. All DC lines will be installed underground.

There will be three sections of overhead AC electrical lines. There will be a 100 foot section of 34.5 kV AC electrical line crossing overhead perpendicular to Barker Road from the array areas north of Barker Road to the Project Transformer (See Exhibit Petitioner IAJ-2). Additionally, a portion of the Project Export Line, including a 250 LF section of 115 kV AC electrical line from the Project Transformer to a riser structure east of the Project Transformer, and a 100 foot section from a riser structure near the existing VELCO Coolidge substation fence to the point of interconnection with the existing substation, will be overhead. As noted in the Natural Resources Assessment Report, Exhibit Petitioner RJ-2, spanning the overhead line in this area will minimize impacts to a small stream in the area.

Project Step-Up Transformer and Interconnection Facilities

The Centralized Inverter Stations will be connected to the Project Step-Up Transformer via underground and overhead AC electrical lines. The Step-Up Project Transformer will convert the AC electricity voltage from 34.5 kV to 115 kV. The Step-Up Transformer will be located at the northeastern edge of the Project area close to the existing VELCO Coolidge substation. The Project Transformer will be located on a concrete pad approximately 100 feet by 18 feet within a fenced in area of approximately 100 feet by 155 feet, as shown on Exhibit Petitioner IAJ-2, Sheet C-103.

Power from the Project Transformer to the point of Interconnection ("POI") with the VELCO Coolidge substation will be transmitted via a 115 kV AC transmission line (Project Export Line). There is an open 115 kV breaker at the Coolidge substation POI which will accommodate the Project's energy. Power from the Project Step-Up Transformer to the VELCO POI will be managed by a "Station Controller" (TMEIC Solar Ware MSC EX or similar) to limit the output of electricity from the Project inverters and Step-Up Transformer to the grid at a fixed maximum of 20 MW AC.

The Project Export Line is a combination of overhead and below ground installation of the 115 kV line. See Exhibit Petitioner IAJ-2. The route avoids all direct impacts to wetlands and streams, and will result in the least amount of wetland clearing and management. The Project Export Line route includes a 234-foot overhead section between the Project Transformer and a transfer pole located east of the unnamed stream, and in an existing ROW managed by VELCO, see Exhibit Petitioner IAJ-2, Sheet C-103. At the transfer pole, the Project Export Line will transition underground, and be trenched across Quent Phelan Road and below the existing VELCO 345 kV lines, to a previously developed area just outside the Coolidge Substation fence. At this point the Project Export Line will transition to another transfer pole which will bring the Project Export Line back above ground where it will go overhead for approximately 100 feet into the existing Coolidge substation.

There will be three pole structures for the Project Export Line. From west to east, the first will be within the Project Transformer area fence entirely within uplands and outside of the 50-foot buffer of the unnamed jurisdictional stream; the second will be an overhead / subgrade transfer pole east of the unnamed jurisdictional stream and in an upland area outside the stream's 50-foot buffer and within an existing maintained ROW; and the third pole will transfer the line from subgrade to overhead near the Coolidge substation fence. No poles or other structures are proposed in wetlands, streams, or the 50-foot buffers adjacent to wetlands and streams.

The Project Export Line will require limited tree clearing within a 75-foot wide section perpendicular to the unnamed jurisdictional stream and within the stream's 50-foot buffer. See Exhibit Petitioner IAJ-2, Sheet C-103. A section of woody vegetation in the wire zone within the 50-foot buffer of the unnamed jurisdictional stream will need to be maintained to a maximum height of 12 feet. The wire zone will consist of an area of approximately 35 feet outside of the lines on each side, and directly underneath the lines, as shown on Exhibit Petitioner IAJ-2, Sheet C-103. We estimate vegetation will need to be maintained to heights less than 12 feet within an area of approximately 3,750 square feet.

Access Roads and Laydown Areas

Primary gravel access roads will be constructed to provide access to the arrays and Project Transformer from Barker Road, and secondary access roads will be constructed to provide access to the Centralized Inverter Stations. Primary access roads will be approximately 20 feet wide during construction, and restored to 10 feet wide post-construction. Secondary access roads will be approximately 10 eet wide during construction and operation. The access roads will intersect with Barker Road at three locations, as shown on Exhibit Petitioner IAJ-2.

In addition, temporary designated lay-down areas will be located within the Project's boundaries as shown on Exhibit Petitioner IAJ-2. These areas will be used during construction with appropriate erosion controls, and then re-graded and restored with conservation mix seed with erosion control measures kept in place. The Prefiled Testimony of Mr. Jewkes describes the access roads and temporary laydown areas in more detail.

Clearing and Fencing

The panel arrays will be enclosed by a 7 to 8 foot tall, 6"x 6" perimeter wildlife fence. The fence will be approximately 19,200 feet in length, with separate enclosed sections south and north of Barker Road. The Project Transformer will be enclosed by a 7-foot chain link fence with 1-foot of barbed wire along the top.

The Project fencing complies with the National Electric Safety Code ("NESC") and the National Electric Code ("NEC").

Coolidge Solar has leased a tract of up to 155.75 acres, which is nearly twice the size of what is required for the Project, so as to have sufficient useable space for the Project as needed to avoid natural resources and provide appropriate screening. No clearing will occur in Type I, II, or III wetlands. The areas to be cleared are designated on the Site Plan (Exhibit Petitioner IAJ-2). Construction fencing will be installed along the 50' wetland/stream buffers where Project infrastructure and/or construction activities are within 15 feet of the buffers.

Approximately 43.5 acres of vegetation will be cleared for the Project, which represents only approximately 48% of the Project site. Of the approximately 43.5 acres to be cleared, 32.5 acres will be within the perimeter fence and will be cleared, stumped, grubbed, and graded. The remaining cleared areas (approximately 11 acres) outside of the perimeter fence will be selectively cut; trees which would shade or otherwise be a potential hazard to the panel arrays will be flush with existing grade, and stumps will be left in place.

Appropriate erosion prevention and sediment control measures will be implemented according to the Erosion Prevention and Sediment Control ("EPSC") plan, discussed in more detail by Mr. Jewkes and provided as Exhibit

Petitioner IAJ-3. Additionally, Coolidge Solar voluntarily completed rare bat surveys using standard U.S. Fish and Wildlife Service (USFWS) methods for determining presence/absence of listed species in areas proposed for clearing at the Project site. No protected bat species were documented on site; please see Mr. Jordan's prefiled testimony for additional information and Exhibit Petitioner RJ-2.

Q8. Will lighting be installed?

A8. Lighting for the proposed Project will be installed along the fence of the Project Transformer, and at each Centralized Inverter Station to provide visibility for personnel access at night. Night access is a rare event, and the lights will be manually switched on only when necessary. Lighting will consist of two 70-watt metal halide outdoor floodlights at each Centralized Inverter Station, on the Project Step-Up Transformer fence, and in the Project Step-Up Transformer yard. The fence lights will be directed into the substation yard, and oriented downward to avoid light pollution.

Q9. Please describe operations and maintenance activities.

A9. The Project will be inspected by qualified electrical engineers before it is energized, and upon commissioning. Because of the passive nature of solar, operations activities at the site will be minimal. The Project and associated electrical equipment will be operated with remote monitoring (SCADA)

equipment, and the equipment will undergo routine maintenance as needed. The Project Site will be mowed at regular intervals during the growing season. In addition, during the winter months the area will be plowed as necessary for snow removal.

Q10. Will the Project be decommissioned?

A10. Yes. Per Board Rule 5.402(C)(2), only non-utility projects greater than 1 MW must include a "plan for decommissioning the project at the end of its useful life." Significantly, this means that the numerous 500 kW net metered projects in Vermont are not required to be decommissioned, nor are utility solar projects of any size required to be decommissioned under Board Rule 5.402(C)(2). Because Coolidge Solar will be fully decommissioned at the end of its useful life and the site fully restored to its pre-construction conditions, it will have a truly temporary impact on the landscape and preserve the area's current agricultural character.

A copy of the Project's Decommissioning Plan, including the plan for funding decommissioning in accordance with PSB requirements, and to preserve and reclaim impacted primary agricultural soils, is included as Exhibit Petitioner CS-11. Mr. Jewkes address the reclamation plan in more detail in his prefiled testimony.

Q11. Please describe the proposed construction sequence.

A11. The basic construction sequence will be as follows:

1) Pre-constriction Meeting: Prior to any work on the Project, a meeting will be held with representatives of the Developer, Contractor, Engineer, State of Vermont Department of Environmental Conservation, local officials from Ludlow and Cavendish, VELCO, and any other parties that would be involved in the construction of the Project. This meeting will cover the following topics:

a) Review applicable permits under which the permit is being constructed.

b) Establish a general site work schedule and check for conflicts with meeting participants.

c) Establish a clear line of communications between the Contractor, Developer, and the meeting participants.

2) Pre-constriction EPSC Meeting and Installation of Initial EPSC Measures: Prior to any earthwork on the Project or any material deliveries, a meeting will be held with representatives from the Stormwater Division of the State of Vermont Agency of Natural Resources. This meeting shall review the erosion and sediment control measures for the initial staging area, to be located just south of Barker Road, and all four stabilized construction entrances to be used for the Project. The following EPSC measures will be installed: silt fence, erosion control berm mix, and construction limit barrier fence around the perimeter of the Project.

3) Site Clearing: Prior to commencing site clearing, an additional construction staging area will be constructed north of Barker Road. Please see Exhibit Petitioner IAJ-3. All clearing operations north of Barker Road will access the site at this location.

4) Site Grading: The portion of the site that has been cleared will be stumped, grubbed, seeded and stabilized in five area units. No more than five areas of the Project will have open soils at any one time. Portions of the cleared areas will be re-shaped at this time. Please see Exhibit Petitioner IAJ-3 for the areas to be graded and the erosion and sediment control measures to be employed during construction.

5) Site Access Drive Construction: The 20 foot wide gravel main access drives will be constructed prior to installation of solar module support racking. The permanent stormwater controls, ditching and stormwater ponds will be installed at the same time.

6) Solar PV Module Racking: The solar PV module racking will be installed in 13 sections corresponding to the 13 Centralized Inverter Station locations in the Project.

7) Trenching for New Electric Conduit: In pace with the solar PV module racking, the DC conduit connecting solar PV modules to the inverters will be installed. This excavation will be seeded and stabilized in accordance with the EPSC Plan (Exhibit Petitioner IAJ-3).

8) Installation of Solar PV Modules: The solar PV modules will be mounted as the racking system is assembled. The wire connecting the solar PV modules and the inverters will be pulled at the same time.

9) Centralized Inverter Station Construction: The 13 Centralized Inverter Stations will be installed in the same order as the solar PV module racking is installed. The inverters and their corresponding transformer will be delivered to the site on a pre-manufactured skid. These skids will be installed over their secondary transformer oil containment systems. See Exhibit Petitioner IAJ-2, Sheet C-102 entitled "Substation, Inverter Skids and Secondary Oil Containment."

10) AC electric collector lines: The 13 Centralized Inverter Stations will be connected to the Project's 115kV Step-Up Transformer via new underground AC electric lines. These lines will be installed at the same time as the inverter skids. The conduit may be placed at an earlier time. Please note that these is one portion of this line that is overhead, the crossing of Barker Road on the northeast side of the Project area.

11) New Project 115kV Step-Up Transformer and Interconnection: The new 115kV Step-Up Transformer, controls, substation yard, fence, and the new 115kV electric lines connecting to the VELCO Coolidge substation will be constructed in close coordination with VELCO. The objective being to have the interconnection to the VELCO substation ready when the remainder of the Project is complete.

12) Project Commissioning: All electrical components of the Project will be commissioned and the Project will start supplying power to the grid.

13) Post Commissioning Work: Once the construction traffic has ceased, the main access road widths will be reduced to 10 feet from 20 feet. The freshly placed topsoil will be seeded and mulched and stabilized. Final landscaping and fencing adjustments will be made and the final construction site staging areas will be removed.

Q12. What is the schedule for construction and commencement of operation?

A12. We plan to complete permitting for the Project in the Spring of 2016 and complete construction and commence commercial operations by October, 2016. There are two collateral environmental permits needed in addition to the Section 248 Certificate of Public Good ("CPG") requested in this proceeding – a Vermont Agency of Natural Resources ("ANR") operational phase stormwater permit and an ANR construction stormwater permit. Mr. Jewkes describes the stormwater permits in his prefiled testimony. We are preparing these permit applications now and expect to file the applications in the next several weeks. In addition, the Project will require a sign off letter from the Vermont Division of Historic Preservation ("DHP"). As described in the Prefiled Testimony of Mr. Bartone, site review supports a determination of no undue adverse impacts to historic sites; we therefore expect to receive that concurrence from DHP.

Construction, including initial site preparation, is expected to last about 6 months. Following site preparation, the supporting structures will be delivered, offloaded, assembled, and then placed in accordance with a construction schedule. The panels will be first offloaded at the lay-down yard and, depending on the timing of deliveries, panels will either remain in the lay-down yard or be placed on pallets in proximity of the designated constructed rows. It is estimated that during this period of time the Project will employ 80 people. Four, full-time permanent positions are expected thereafter.

Like many other renewable energy projects currently before the Board, we have structured financing to take advantage of the federal Investment Tax Credit ("ITC") of up to 30% of the total Project cost. Since this ITC benefit is scheduled to expire after December 31, 2016, it is imperative that the Project achieve commercial operation before the end of calendar year 2016, and to that end, that we receive all permits, including the CPG, as early in 2016 as achievable, and no later than May 1, 2016.

4. <u>Orderly Development & Public Outreach [30 V.S.A. § 248(b)(1)]</u>

Q13. Will the Project unduly interfere with orderly development of the region, considering the recommendations of the municipal and regional planning commissions, the recommendations of municipal legislative bodies, and the land conservation measures contained in the plan of any affected municipality?

A13. No. The Project was sited with due consideration to the area land uses, compatibility with the other utility infrastructure in the area, namely the VELCO Coolidge substation and related infrastructure, environmental resources, and aesthetics. At 20 MW, the Project is comparable to the capacity output of 40 separate 500 kW net meter solar projects. Yet, as a single facility, the Project arrays and associated electrical upgrades and road improvements will be consolidated in a single location, rather than being scattered at 40 locations throughout Vermont. In addition, as noted previously, because the Project will be decommissioned at the end of its useful life, its impacts on the regional landscape are temporary.

The Project is efficiently sited from a land-use planning perspective in a manner that:

1) optimizes proximity to and co-location with electrical grid infrastructure;
2) is compatible with the character of its surroundings and will not result in an unduly adverse aesthetic impact;
3) will provide the landowner with stable payments, thereby diversifying the landowners income and helping to resist subdivision and cluster development; and
4) avoids impacts to wetlands, RTE, floodways, streams (with the exception of clearing impacts at one location for an overhead

transmission line crossing over an unnamed stream), necessary wildlife habitat, and will not adversely impact natural plant communities.

Further, as discussed in the Prefiled Testimony of Michael J. Buscher, the Project Site is not within a land conservation area. Mr. Buscher's testimony also confirms that the Project is consistent with relevant provisions of the town and regional plans.

During the development review of the site, Coolidge Solar consulted with regulators and prepared the Project layout to avoid wetland buffers and stream buffer, establish 100 foot setbacks from roads and 50 foot setbacks from property boundaries, and avoid and minimize impacts to cultural resources and agricultural soils. Consultations included meetings with ANR staff on September 1, 2015, a site visit with an ANR wetland scientist on September 14, 2015, discussions with ANR Director of Permitting on October 23, 2015, review of the draft Wetlands and Waterbodies Memorandum submitted to ANR on October 2, 2015, and a revised Wetlands and Waterbodies Memorandum submitted to ANR on October 1, 2015.

Consultations also included discussions and meetings with the Vermont Division for Historic Preservation staff, including a meeting on September 15, 2015, a site

visit on September 25, 2015, review and approval of an archaeological survey scope of work on October 8, 2015, and provision of a revised scope of work on November 13, 2015.

Q14. Did Coolidge Solar provide 45 day advance notice to the local and regional planning commissions and to the town selectboards?

A14. The 45-Day Notice was sent on September 14, 2015.

Q15. Please describe the stakeholder outreach conducted for the Project.

A15. We have conducted extensive stakeholder outreach with regulators as well as the local community as part of our planning of this Project. We met with and received feedback about the Project from the Town of Ludlow, the Town of Cavendish, and the Southern Windsor County Regional Planning Commission ("SWCRPC"). Coolidge Solar met with the Ludlow Select Board on September 7, 2015, the town manager of Ludlow on October 26, 2015, the chair of the Ludlow Select Board on November 24, 2015, and with the full Select Board again on December 7, 2015. Additionally, Coolidge Solar held a public hearing in Ludlow to answer questions about the Project on November 16, 2015. Coolidge Solar also met with the town manager of Cavendish on September 15, 2015 to introduce and discuss the Project. Coolidge Solar met with the SWCRPC Board on September 22, 2015. Coolidge Solar is continuing to work with the Town of Ludlow to assure that the Project does not have an undue adverse effect

on the town; and to assure the town is able to benefit from the proposed development.

5. Need for Present and Future Demand for Services [30 V.S.A. § 248(b)(2)]

Q16. Is the Project needed for present and future demand for service which could not otherwise be provided in a more cost-effective manner through energy conservation programs and measures and energy efficiency load management measures?

A16. Yes. Synapse Energy has prepared a report that addresses both the need for the Project under Section 248(b)(2) and the economic benefits of the Project to Vermont under Section 248(b)(4). Please refer to the report, Exhibit Petitioner TV-2. As clearly demonstrated by the Synapse Report, Vermont and the region need a significant amount of new electric generation from renewable energy resources like the Coolidge Solar Project.

In 2005, the Vermont General Assembly set aggressive greenhouse gas reduction goals for the state: reducing emissions of greenhouse gases from 1990 levels by 50 percent by 2028 and 75 percent by 2050.[5]

In 2007, the Vermont General Assembly issued legislative findings (Act 92) concluding among other things that: "[g]lobal climate change, which is

[5] 10 V.S.A. § 578(a).

threatening our environment and perhaps ultimately our existence, has been caused in part by an energy policy that is largely dependent upon the burning of fossil fuels."[6]

Vermont is currently operating under the 2011 Comprehensive Energy Plan ("2011 CEP"). The 2011 CEP established the ambitious goal to obtain 90% of Vermont's energy from renewable sources by 2050. The 2011 CEP also emphasizes the magnitude of the need for more clean power:

> Over the last decade, Vermont ratepayers have used electricity from resources with relatively stable prices and relatively low emissions. Going forward, we will face many challenges if we are to continue to deliver electricity "in a manner that is adequate, reliable, secure and sustainable; that assures affordability and encourages the state's economic vitality … that is environmentally sound."

Exhibit Petitioner CS-8 (2011 CEP Vol. 2 at 64 (citing 30 V.S.A. 202a)). The CEP lays out a mix of resources for achieving the 90%-by-2050 goal, including in-state power plants of various sizes (utility, community, and residential) utilizing solar. Exhibit Petitioner CS-8 (2011 CEP Vol. 2 at 107-114).

Yet, as clearly demonstrated by the Synapse Report and in our earlier testimony, the region continues to be dependent upon fossil fuels for the vast majority of the electric generation in the regional power mix. Both the 2011 CEP and the recently published Vermont Total Energy Study recognize that centralized, large, utility scale solar is needed as part of the Vermont power mix to meet Vermont's

[6] 2007 Vt. Acts & Resolves Act No. 92.

clean power needs. The Total Energy Study emphasizes that "[i]n the near to mid-term, growth in renewable energy supply . . . can be secured at lower cost to the energy system through large scale/centralized resources," both in and out of Vermont, and that in the long term, "in-state renewables of all scales [will] play a more significant role as costs and risks" associated with in-state renewables to diminish over time. See Exhibit Petitioner CS-3 at 17 (Excerpts from the TES). The 2011 CEP similarly points out that "[w]ith economies of scale, utility-scale systems are the most cost effective way to install PV." See Exhibit Petitioner CS-8 (2011 CEP Vol. 2 at 114).

More recently, in a 2015 report presented by Asa Hopkins, Vermont Department of Public Service ("DPS") Director of Energy Policy and Planning to the Vermont Solar Siting Task Force, the DPS emphasized that the Comprehensive Energy Plan's 90 percent renewable goal reflects Vermont's "[s]trong desire to become energy secure, ensure stable prices *and as much as possible to rely on resources indigenous to Vermont.*" See Exhibit Petitioner CS-10. We discuss the Project's conformance with the need for clean energy and other policies outlined in the 2011 CEP in more detail in our testimony below regarding compliance with the state energy plan.

The Project will also meet a need in accordance with Section 248(b)(2) because, as Mr. Vitolo discusses in his testimony and the Synapse Report, Exhibit

Petitioner TV-2, the power sold from the Project will be under a long-term and stably priced power purchase agreement ("PPA") in accordance with state policy under 30 V.S.A. § 8001(a)(3), which provides in pertinent part:

> The General Assembly finds it in the interest of the people of the State to promote the State energy policy established in section 202a of this title by: . . . Providing an incentive for the State's retail electricity providers to enter into affordable, long-term, stably priced renewable energy contracts that mitigate market price fluctuation for Vermonters.

Q17. Does Coolidge Solar have a power purchase agreement ("PPA") for the sale of the output of the Project?

A17. Yes. Coolidge Solar is developing the Project as a qualifying small power production facility ("Qualifying Facility" or "QF") under the Public Utilities Regulatory Policy Act of 1978 ("PURPA"), as implemented in Vermont through 30 V.S.A. § 209(a)(8) and Public Service Board Rule 4.100. Coolidge Solar is a self-certified PURPA qualifying small power production facility pursuant to 18 C.F.R. § 292.207(a). Coolidge Solar has negotiated PPA terms with VEPP, Inc. (Vermont's Rule 4.100 "Purchasing Agent" under PURPA) and offered to sell the Project's output to Vermont utilities at the firm levelized rates for a term of 20 years pursuant to rate schedules approved by the Board in Docket No. 8010 on February 9, 2015. See Exhibit Petitioner CS-12 (the Coolidge Solar PPA). Coolidge Solar submitted a petition for 4.100 approval of the PPA with the Board on August 19, 2015 in Docket No. 8586.

Importantly, as explained in the Synapse Report, "Vermont's method for determining prices paid to this type of Project, known as avoided cost rates, ensures that the rates are equivalent to wholesale market rates after adjusting for line losses. Rather than be exposed to rapid or long-term price swings, consumers will reap the hedging benefits of an affordable, long term, stably priced purchase agreement." See Synapse Report, Exhibit Petitioner TV-2 at 1.

6. System Stability and Reliability [30 V.S.A. § 248(b)(3)] and Transmission System Impacts [30 V.S.A. § 248(b)(10)]

Q18. Will the Project adversely affect system stability and reliability?

A18. No, the Project will not adversely affect system stability and reliability. Coolidge Solar submitted an interconnection application on August 17, 2015 to ISO New England ("ISO-NE") to interconnect with the VELCO Coolidge substation on Quent Phelan Road in Cavendish, Vermont. The application was deemed completed on August 25, 2015. Coolidge Solar entered into a System Impact Study ("SIS") agreement with ISO-NE on September 25, 2015. See Exhibit Petitioner CS-13.

Q19. Please describe the Project's proposed interconnection.

A19. As noted in our discussion of the Project description above, the Project's proposed interconnection will occur at VELCO's Coolidge substation. In selecting Coolidge Solar's interconnection point, our team analyzed the electrical capacity to inject the Project's energy onto the grid at this location. The Coolidge

substation is located within a corridor in Vermont that has historically been used for transmitting energy from Vermont Yankee to areas across the state, and serves as the first high voltage substation for energy moving north from the former nuclear plant. After the closing of this large generating facility, the transmission system is expected to have significantly increased capacity for new generation.

Our discussions with VELCO and ISO-NE, as well as the ISO-NE project scoping meeting required for the interconnection request, have reinforced that the Coolidge substation is a favorable place to interconnect from a system stability perspective. See Exhibit Petitioner CS-14 (ISO-NE Scoping Meeting Minutes). As noted in the initial scoping meeting minutes, ISO-NE reported that it did not anticipate any significant transmission system issues for this Project.

Q20. What is the status of the SIS?

A20. Coolidge Solar was assigned a "queue number" of 565. Under the SIS Agreement, the SIS will consist of short circuit analysis, a stability analysis, a power flow analysis, voltage drop and flicker studies, protection and set point coordination studies, and ground reviews, as necessary. The SIS, when complete, will provide a list of facilities that are required as a result of Coolidge Solar's interconnection request, as well as costs and time to construct. The full cost of this study is born by Coolidge Solar. In addition, under the SIS agreement, Coolidge Solar will be fully responsible for all costs associated with

interconnection facilities required by the SIS. ISO-NE has informed Coolidge Solar that it expects to have the SIS completed by the first quarter of 2016. We will submit these results to the Board and parties once they are provided.

7. Economic Benefit [30 V.S.A. § 248(b)(4)]

Q21. Will the Project result in economic benefits to the state and its residents?

A21. Yes, as set forth in the Synapse Report, Exhibit Petitioner TV-2, the Project will result in substantial economic benefit for Vermont and its residents, including:

- 245 job-years;
- More than $15 million in labor income;
- More than $25 million in gross domestic product for the state; and
- Approximately $27,974,369 in value due to the decrease of regional greenhouse gas emissions.

The Synapse Report demonstrates that the Project will provide other key benefits to ratepayers in Vermont. It will act as a hedge against wholesale market volatility by including a long-term, stably priced contract over a multi-year timeframe. As noted above under Section 248(b)(2), long-term stably priced renewable energy contracts that mitigate market price fluctuations have been found by the Vermont Legislature to be in the best interests of Vermont under 30 V.S.A. § 8001(a)(3).

Q22. How do the Project PPA rates compare to other recently executed PPAs for solar power?

A22. They are favorable and very competitive. As set forth in the Synapse Report, the levelized cost of the Project is significantly less expensive than the proposed 5 MW GMPSolar Williston project, which GMP asserted to be "competitive with the very lowest-priced solar options presently available to GMP."[7] The 20-year levelized energy and capacity payments for the Project are $78.18 per MWh, while the 25-year levelized cost of the GMPSolar Williston without the inclusion of RECs is priced at $85 MWh. Over the course of 20 years, the Project's output would result in $4.5 million in savings compared to a same-sized project with the GMPSolar Williston's levelized cost.

Based upon agency records, in addition to the Williston GMPSolar project, in July and August of 2015, GMP asked the Board to approve two other new utility scale GMP solar projects with long term levelized power contracts at prices that exceed the Docket No. 8010 rates included in the Coolidge Solar PPA:

- In a petition submitted 7/20/15, GMP provided evidence concerning a new 2.0 MW solar project with a 25-year, 12.9 cent levelized PPA (the "GMPSolar Richmond Project");[8] and

[7] Docket No. 8562, D. Smith 7/15/15 pf. at 5.

[8] *Petition of GMPSolar – Richmod, LLC,* Docket No. 8564, submitted 7/20/2015; Smith 7/20/2015 pf. at 16.

- In a petition submitted 8/17/15, GMP provided evidence concerning a new 4.99 MW solar project with a 25-year, 12.8 cent levelized PPA (the "GMPSolar Hartford Project").[9]

Additionally, pursuant to 5.200 notices recorded at the Board and submitted by GMP for PPAs in 2015, GMP entered into several additional Vermont solar project 25-year PPAs – one with a fixed levelized rate of 13.12 cents per kWh for a 2.2 MW Vermont solar project, and another with a fixed levelized cost of 10.84 cents per kWh for a 4.9 MW solar project.[10] In May 2015, Vermont Electric Cooperative received a CPG for a 1 MW solar project in which the estimated levelized cost of power will be between 11 to 13 cents per kWh.[11]

8. <u>Greenhouse Gases [30 V.S.A. § 248(b)(5)]</u>

Q23. In 2011, the Vermont General Assembly modified Section 248(b)(5) to add that the Board must give due consideration to a project's impacts on GHG emissions. Please describe the Project's impacts upon greenhouse gases.

A23. Because the Project will generate electricity by photovoltaic generation, it will produce significantly lower GHG emissions per kWh than conventional electric generation, such as natural gas fired generation. Synapse estimates that the Project will provide $27.9 million in social benefit in avoided CO_2 emissions.

[9] *Petition of GMPSolar – Hartford, LLC,* Docket No. 8580, submitted 8/17/2015; Shields 8/17/15 pf. at 2.

[10] The 5.200 notice for the 2.2 MW solar project was submitted on May 7, 2015 and the 5.200 notice for the 4.9 MW solar project was submitted on June 11, 2015.

[11] *Petition of Vt. Elec. Coop.*, Docket No. 8439, Order of 5/22/2015 at 6.

From a lifecycle perspective, the Project will produce significantly lower GHG emissions per kWh than conventional electricity generation. See TRC Report, Exhibit Petitioner RJ-2. By reducing GHGs, the Project will promote air quality in the state by displacing fossil fuels, which are known to discharge pollutants, and will therefore contribute to reductions in global climate change. These are explicit objectives of Vermont state energy policy. See 10 V.S.A. § 578; 30 V.S.A. §§ 8001(a)(5) and 8001(a)(6).

9. Noise, Public Health and Safety [30 V.S.A. § 248(b)(5)]

Q24. Has Petitioner evaluated the potential Project noise?

A24. Yes. Noise generated by the Project construction will be of limited duration (up to approximately 6 months) and will be no louder than the noise generated by light construction equipment. Construction of the Project will occur between approximately 7:00 A.M. and 7:00 P.M. Monday through Friday and on Saturdays, as needed, between 8:00 A.M. and 5:00 P.M.

Mr. Jewkes performed an acoustic analysis that demonstrates that during plant operations, the Project will not produce undue noise. Please refer to Mr. Jewkes' prefiled testimony and Exhibit Petitioner IAJ-4 (Acoustic Analysis), which includes noise modelling results for the Project.

Q25. Will the Project equipment be locked?

A25. Yes. The gate to the Project Site will be locked, and locks will also be placed on the inverters and Project Transformer fence. As noted earlier in the Project description, the Project will conform to the NESC and NEC and all applicable electrical and fire codes.

10. <u>Above-Ground Historic Sites [30 V.S.A. § 248(b)(5)]</u>

Q26. Will the Project result in an undue adverse impact upon above-ground historic sites?

A26. No, the Project will not have an undue adverse impact upon above-ground historic sites. While there are historic properties located somewhat nearby the proposed Project on Bixby Road, North Hill Cross Road, North Hill Road, and 20 Mile Stream Road, the Project will not be visible from these historic properties. The Project is located on property directly associated with the State Registered-listed historic resource known as the Barker Farm (SR #1410-77); this is the only historic property that will potentially be directly or indirectly affected by the Project.

The Barker Farm, listed on the Vermont State Register as having the original formal name of "Granville Whitney Farm," is located along the north side of Barker Road, just over a half mile east of Barker Road's intersection with Commonwealth Avenue, Bixby Road, and North Hill Cross Road. The Barker

Farm was added to the State Register in 1993 (VDHP1993). The Barker Farm is not listed on the National Register.

Coolidge Solar completed a site visit on November 24, 2015 with Jamie Duggan of the DHP, to review the Project's potential impacts upon the Barker Farm. During the site visit, several measures to mitigate the potential impacts of the proposed Project on the Barker Farm were discussed and agreed upon. Coolidge Solar followed up with a memorandum to Jamie Duggan on December 1, 2015 outlining the specific mitigation measures discussed during the site visit. The visibility of the Project from the Barker Farm will be minimized through mitigation measures, which include the following:

- The farmstead, including the primary residence, adjacent outbuilding and the barn will have a 25 foot naturally vegetated buffer around them. The purpose of the buffer will be to retain the general "feel" and "setting" of the Barker Farm at eye level. This natural buffer will consist of trees left in place during construction. A few larger "hazard" trees, i.e., large white pines, may be removed to prevent damage to the proposed solar arrays, but the removal of hazard trees will not alter the purpose of the 25 foot buffer.
- The aesthetic assessment landscaping plan, which was prepared by T.J. Boyle, was designed to reduce potential visual impacts from the Project on Barker Farm and from Barker Road. The proposed landscaping plan

for the Project is shown as Exhibit Petitioner MJB-2. Coolidge Solar is committed to implementing this landscaping plan.

- Coolidge Solar will avoid and minimize impacts to stonewalls during construction and operation of the Project. The majority of stonewalls on the Barker Farm property will be unaffected by the Project, some minor sections of existing stonewalls along the south side of Barker Road may need to be temporarily altered during construction to accommodate installation of below ground electrical lines. Stones from any walls temporarily impacted during construction will be stored nearby and replaced following construction in a manner that preserves, or improves upon, the structure of the wall or wall section.
- Existing trees immediately adjacent to Barker Road will be left in place where practicable.
- Coolidge Solar will commission a "Barn Assessment" study within 2-years of the completion of the Project, to assess the existing barn, and to identify measure to stabilize and preserve the structure.
- Coolidge Solar will commit up to $10,000 to the stabilization of the outbuilding/shed attached to the primary residence at Barker Farm within 2-years of the completion of the Project. All stabilization measures will use construction techniques that will preserve the historical character of the existing structures.

The Project is also located adjacent to VELCO's Coolidge Substation, one 115 kV transmission line, and two 345 kV transmission lines; the 345 kV transmission lines are visible from multiple locations on the Barker Farm property. Further, the Project will be relatively temporary and will be fully decommissioned after its useful life. Therefore, any visual impacts will not be lasting and there will be no irreversible impacts or permanent change in the historic resource.[12]

11. <u>Transportation Systems/Traffic [10 V.S.A. § 6086(a)(5)]</u>

Q27. Please describe the potential Project impacts with respect to use of public roads.

A27. The Project will not cause unreasonable congestion or unsafe conditions with respect to transportation impacts. During construction, the Project components, including the panels, centralized inverters, Project Transformer, electrical lines, and ancillary construction equipment will be transported to the site using standard trucking methods. Coolidge Solar will coordinate with the Ludlow and Cavendish public works department, the Vermont Agency of Transportation, and local public safety officials, as appropriate, to assure construction traffic does not place any undue burdens on the community.

Both Barker Road and Quent Phelan Road have received in the past similar activity from construction and maintenance equipment associated with

[12] *See Petition of Rutland Renewable Energy, LLC,* Docket No. 8188, Order of 3/11/2015 at 56-57.

improvements and upgrades to the VELCO Coolidge substation and transmission lines.

Additionally, Coolidge Solar will stagger the trips of the construction trucks over time in order to keep traffic light and avoid congestion. The solar panels, mounting system, conduits, and inverter are all of appropriate size, shape, and weight to be transported to the site on Barker Road and other state or local roads using standard road delivery methods. We do not expect to need any oversize/overweight loads that require special permits for transportation. In the event the Project does require a transportation permit, Coolidge Solar will obtain any necessary permits prior to performing that portion of the Project that would require the permit. There will be no long-term traffic impacts from the Project.

12. <u>Municipal & Educational Services [10 V.S.A. § 6086(a)(6)&(7)]</u>

Q28. What impact will the Project have on municipal and educational services?

A28. The Project will not place an unreasonable burden on the ability of the Towns of Ludlow and Cavendish to provide municipal or educational services. Because it will not have potable water or sanitary facilities on site, the Project will not require any municipal water or sewer, or any unique fire, police or rescue services. In fact, the Project will add significant new revenues to the towns' tax bases without needing any of these services—thereby allowing the towns to invest

in its road, bridges and infrastructure as a direct result of our Project being located there.

The Project will be installed to conform to all applicable electrical and fire codes and will not require any unique fire, police, or rescue services. Access keys for the inverter buildings will be provided to the local fire and emergency services. In addition, lockable disconnect switches will be installed on the exterior of the buildings to allow emergency disconnection of the inverter buildings and solar arrays from the electrical supply in the event of an emergency. Additionally, the Project is not expected to generate additional students to the community and will have no impact on the ability to provide educational services. Coolidge Solar has committed to setting up a renewable education fund with the town of Ludlow to fund educational programs at the Ludlow elementary school.

13. Development Affecting Public Investments [10 V.S.A. § 6086(a)(9)(K)]

Q29. Will the Project unnecessarily or unreasonably endanger any public or quasi-public investment in any facility, service or lands, and it will not materially jeopardize or interfere with the function, efficiency or safety of, or the public's use or enjoyment of or access to, any facility, service or lands?

A29. No. The only public investments in the vicinity of the Project are Barker Road and Quent Phelan Road. The Project Site is setback a maximum of approximately 350 feet from Barker Road on the north side, approximately 100 feet from Barker

Road on the south side, and approximately 350 feet from Quent Phelan Road. As explained above, the Project will not create any adverse burdens on these public roads.

14. <u>Compliance with Comprehensive Energy Plan [30 V.S.A. § 248(b)(7)]</u>

Q30. Is the Project in compliance with the electric energy plan approved under 30 V.S.A. § 202?

A30. Yes. As explained in the 2011 CEP, solar energy is Vermont's most abundant energy resource and Vermont can accommodate large, centralized solar from a land use perspective. In fact, the 2011 CEP posits a scenario with PV installations potentially meeting 100% of Vermont's electricity needs:

> Contrary to public perception formed by Vermont's long winters, sunlight is Vermont's most abundant renewable energy resource. . . . Vermont's solar resource could generate 100% of the state's annual electricity consumption (5.5 billion kWh) with a solar array of 23 square miles (~ 0.25% of the state's total land area) using today's PV technology.

Exhibit Petitioner CS-8 (2011 CEP Vol. 2 at 107-108). The 2011 CEP also confirms that "[w]ith the economies of scale, utility-scale systems are the most cost effective way to install PV." Exhibit Petitioner CS-8 (2011 CEP Vol. 2 at 114).

Solar is recognized in the 2011 CEP as having other important advantages that make it a power source that the state should continue to support: solar power "is

generated without noise, requires low levels of maintenance, emits no pollution, and is extremely distributable." Exhibit Petitioner CS-8 (2011 CEP Vol. 2 at 110). Importantly, the CEP also explains that solar "is largely a peak electric load-following resource, meaning that during peak summer loads, the PV systems are at their highest production, resulting in peak shaving and grid reliability benefits." Exhibit Petitioner CS-8 (2011 CEP Vol. 2 at 110).

The Department is currently in the process of updating the 2011 CEP. The 2015 Draft CEP, issued on September 22, 2015, reiterates the goal of meeting 90% of the state's energy from renewable resources by 2050. See Exhibit Petitioner CS-9 (2015 Draft CEP at 1). The 2015 Draft CEP also recognizes that the efficiency of solar is increasing, which allows solar photovoltaics to "produce more power per square foot than ever before." Exhibit Petitioner CS-9 at 259. In addition, as noted in the 2011 CEP, the 2015 Draft CEP also recognizes that solar PV "provides a disproportionately large benefit to the state's electric utilities due to solar PV's characteristics" by providing power locally during peak demand times when demand and price are high for electricity. Exhibit Petitioner CS-9 at 263.

The 2015 Draft CEP also identifies many of the benefits of solar, including:

- It is a non-emitting power generation resources and can be located in close proximity to humans without concerns of hazardous pollutants;
- It provides reliability and cost savings benefits to the electric system based upon the time and location of its power production;

- Solar electricity is generated without a significant amount of noise and requires very little maintenance; and
- It provides utilities with increase diversity and grid resiliency.

See Exhibit Petitioner CS-9 at 267.

Additionally, as noted in both the 2011 CEP and the Department's 2014 TES, centralized, large, utility scale solar is needed to meet Vermont's clean power needs. The TES emphasizes that "[i]n the near to mid-term, growth in renewable energy supply . . . can be secured at lower cost to the energy system through large scale/centralized resources," both in and out of Vermont, and that in the long term, "in-state renewables of all scales [will] play a more significant role as costs and risks" associated with in-state renewables to diminish over time. See Exhibit Petitioner CS-3 at 17 (Excerpts from the TES). The 2011 CEP states that "[w]ith economies of scale, utility-scale systems are the most cost effective way to install PV." See Exhibit Petitioner CS-8 at 114.

15. Conclusion

Q31. Does this conclude your testimony?

A31. Yes.