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Via Electronic Mail (siting.council@ct.gov)

May 14, 2021

Melanie Bachman
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **PETITION NO. 1442 - SR Litchfield, LLC petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed construction, maintenance and operation of a 19.8-megawatt AC solar photovoltaic electric generating facility on 6 contiguous parcels located both east and west of Wilson Road south of the intersection with Litchfield Town Farm Road in Litchfield, Connecticut, and both east and west of Rossi Road, south of the intersection with Highland Avenue in Torrington, Connecticut, and associated electrical interconnection**

Dear Attorney Bachman:

SR Litchfield, LLC hereby submits its initial responses to the Connecticut Siting Council's (Council) Interrogatories 49, 50, 60, 61, 62, and 74, as well as Attachment 1 and Attachment 2, issued on March 12, 2021 in connection with the above-referenced Petition. The written responses and Attachment 1 and Attachment 2 are attached hereto. On April 19, 2021, the Council granted SR Litchfield an extension of time to submit responses to the above-referenced interrogatories until this date.

If you have any questions concerning this submittal, please contact me at your convenience.

Sincerely,

Jonathan H. Schaefer

22333724-v1

Enclosures (Responses to Interrogatories 49, 50, 60, 61, 62, and 74, as well as Attachment 1 and Attachment 2)

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
A PETITION FOR A DECLARATORY RULING, PURSUANT TO CONNECTICUT GENERAL STATUTES §4-176 AND §16-50K, FOR THE PROPOSED CONSTRUCTION, MAINTENANCE AND OPERATION OF A 19.8-MEGAWATT AC SOLAR PHOTOVOLTAIC ELECTRIC GENERATING FACILITY ON 6 CONTIGUOUS PARCELS LOCATED BOTH EAST AND WEST OF WILSON ROAD SOUTH OF THE INTERSECTION WITH LITCHFIELD TOWN FARM ROAD IN LITCHFIELD, CONNECTICUT, AND BOTH EAST AND WEST OF ROSSI ROAD, SOUTH OF THE INTERSECTION WITH HIGHLAND AVENUE IN TORRINGTON, CONNECTICUT, AND ASSOCIATED ELECTRICAL INTERCONNECTION.	:	PETITION NO. 1442
	:	
	:	MAY 14, 2021

RESPONSES OF SR LITCHFIELD, LLC
TO CONNECTICUT SITING COUNCIL INTERROGATORIES, SET ONE

On March 12, 2021, the Connecticut Siting Council ("Council") issued Interrogatories, Set One to SR Litchfield, LLC ("Petitioner"), relating to Petition No. 1442. The Petitioner submitted responses to Council Interrogatories 1-34, 36-39, 41, 42, 44-46, 48, 52-59, 63-73, and 75-80 on April 2, 2021. A supplemental response to Interrogatory 31 and the responses to Council Interrogatories 35, 40, 43, 47 and 51 were submitted on April 16, 2021. Supplemental responses to Interrogatories 10, 21, 25, 26, 34, 36, 37, 38, 40, 42, 43, 44, 45, 46, 47, 48, 53, 58, 59, 64, 65, 67, 68, 69, and 73 were submitted as of the same date in a separate document.

Responses to Council Interrogatories 49, 50, 60, 61, 62, and 74 are provided below. These responses reflect the Petitioner's redesign, which is further described in the Petitioner's letter submitted this same date.

Environmental

Question No. 49

The Site Plans show an intermittent watercourse northeast of Stormwater Pond 2 but this watercourse and/or supporting wetlands, was not described or shown on diagrams within the Petition Exhibit U, Wetlands and Habitat report. Please provide information regarding this watercourse.

Response

The intermittent watercourse shown on the Site Plans northeast of Stormwater Pond 2 was investigated by an All-Points Technology Corp., P.C. soil scientist on May 11, 2021. A first-order intermittent stream was identified, flagged, and surveyed in this location. Two small hillside wetland seeps were also identified in the lower reach of this intermittent stream along the western bank before it converges with Gulf Stream. The forested intermittent stream conveys very seasonal flows within an incised two (2) to three (3) foot wide stone and gravel channel with discontinuous shallow pools and flows observed at the time of inspection. The small bordering wetland areas to this stream consist of forested hillside seeps that seasonally exfiltrate shallow seasonal groundwater into the intermittent stream. The Site Plans have been updated to reflect the location of this feature. The project will not directly impact this intermittent watercourse/wetland feature and a fifty-foot (50') buffer has been provided from the Project, as redesigned.

Question No. 50

Referring to Petition Exhibit U, Wetlands and Habitat report p. 31, what is the basis of the statement that wood frog habitat can be conserved with wooded CTH that is 50% or greater of the total acreage?

Response

The Petitioner would like to clarify this statement to read that wood frog habitat can be conserved with wooded critical terrestrial habitat (CTH) that is not greater than fifty percent (50%) developed of the total CTH acreage in the proposed condition. Furthermore, the Petitioner would like to clarify this statement to include that of the fifty percent (50%) or less developed CTH, such development does not include major fragmentation elements such as high traffic roadways or significant impervious surfaces in order to "conserve" the wood frog breeding population. There is a general consensus in the wetland scientific community based on circumstantial field observations that wood frogs can have a greater tolerance of certain development activities within the CTH without significantly impacting their population. In fact, vernal pools have been identified throughout Connecticut that contain productive wood frog breeding populations where less than fifty percent (50%) of the CTH remains undeveloped. While circumstantial evidence may suggest that some wood frog vernal pools remain productive where the CTH development exceeds fifty percent (50%), there is no empirical data or long-term studies that quantify fluctuations of wood frog populations from CTH pre-development less than fifty percent (50%) developed condition to post-development exceeding fifty percent (50%) developed condition.

The Best Development Practices (Calhoun and Klemens, 2002) guidance relies on concentric circles as a management tool used to evaluate vernal pool impacts. It is not the only methodology recognized by regulatory agencies. The U.S. Army Corps of Engineers New England

District relies on an updated methodology developed by Calhoun titled *Vernal Pool Best Management Practices (BMPs)* (January 2015). These BMPs contain similar criteria as the 2002 guidance, but also allow a more flexible approach focusing on conserving more essential forested travel corridor habitat, known as "directional corridors," as opposed to the concentric circle approach used in the 2002 guidance. The directional corridor methodology focuses on conserving the network of connected habitat elements along these directional corridors that link habitats essential to vernal pool species (*i.e.*, breeding pools, forested wetlands, forested uplands). When evaluating a project's impact to the CTH, it is important to identify and assess impacts to these more essential herpetofauna directional corridors that exist between the breeding pool, the supporting wooded terrestrial habitat (considered optimal habitat for the primarily forest dwelling vernal pool indicator species) and any wetland habitat that could serve as staging habitat during migration.

With the Project's redesign, there will no longer be an encroachment in the Vernal Pool 1 Envelope ("VPE"; 0-100' from the vernal pool edge). Although there will be some development within the CTH of Vernal Pool 1, it would occur within existing cool season grass habitat that is actively managed as a hay field, which is considered suboptimal habitat for vernal pool indicator species. Directional corridors associated with Vernal Pool 1 would occur primarily to the north and west within those existing forested habitats, including a tributary stream and wetland system located to the west that flows south eventually feeding into Gulf Stream. The Project would be limited to the existing hay field and thus would not disrupt these directional corridors. Therefore, the Project, as redesigned, would not result in a likely adverse impact to Vernal Pool 1.

For Vernal Pool 2, the redesigned Project would also not encroach into the VPE and the majority of the proposed development would occur within the nearby hay field to the north and

west of this vernal pool, considered suboptimal terrestrial habitat for vernal pool species. There will be only ±1.2 acres of forest clearing within the CTH and that would occur at a fairly significant distance from Vernal Pool 2, located ±470 feet to the south. As a result of the Project redesign, the proposed forest clearing represents a reduction from the original design's ±1.49 acres of forest clearing within the CTH.

Evaluation of the Project's impacts from a directional corridor perspective reveals a relatively large wetland corridor is located off the Site near the end of Wimbledon Gate N approximately 500 feet to the southeast and within the CTH of Vernal Pool 2. That off-site wetland may also provide vernal pool breeding habitat, but at a minimum, wood frogs would use forested wetland habitat during the summer and the intervening habitat includes forested uplands that are suitable upland habitat for both migrations linking those habitats as well as hibernation. As a result, this represents a likely directional corridor for Vernal Pool 2. The nearest wetland habitat on the Site that contains intervening terrestrial forest habitat to Vernal Pool 2 is Wetland AA located approximately 850 feet away, beyond Vernal Pool 2's CTH. Thus, this is unlikely to represent a significant directional corridor. Therefore, considering that the Project's development in the CTH is primarily contained within suboptimal hay field habitat, results in limited forest clearing within the CTH that is buffered by a significant distance of approximately 470-foot, and does not impact the primary direction corridor off-site to the southeast, the Project, as redesigned, would not result in a likely adverse impact to Vernal Pool 2.

Question No. 60

What would be the minimum area of meadow required to support a successful breeding pair of bobolink and savannah sparrow?

Response

The minimum area of grassland habitat required to support bobolink (*Dolichonyx oryzivorus*) breeding is approximately five (5) to ten (10) acres, while savannah sparrow (*Passerculus sandwichensis*) typically requires twenty (20) to forty (40) acres (*Protecting Connecticut's Grassland Heritage, A Report of the Connecticut Grasslands Working Group*. Audubon Connecticut. April 2003).

Of the five (5) hay fields that will be developed as part of the redesigned Project, only the large central field (approximately 29.6 acres) located east of Rossi Road is large enough to support potential breeding by savannah sparrow; the intervening windrows of trees within this field may effectively reduce the size of this field from the perspective of savannah sparrows as they tend to avoid areas with extensive tree cover. Of the remaining four (4) fields, except the small field (approximately1.6 acres) just east of Rossi Road near the existing farm road crossing of Gulf Stream, are of sufficient size to support potential breeding by bobolink: field north of Litchfield Town Road (approximately 13.3 acres), field south of Litchfield Town Road (approximately 9.3 acres), and field south of Highland Avenue (approximately 11.7 acres).

Question No. 61

Referring to Petition Appendix U, p. 41 clarify the Conclusion statement *that it is unlikely that any of the species found in the May 2017 letter from DEEP's NDDB occur or breed at the subject site* if the preceding section states the red bat and hoary bat are likely to utilize the site?

Response

The preceding statement in Petition Appendix U at the top of page 41 that states "It is likely that both the hoary bat and the red bat utilize the site during the roosting season…" is an accurate statement. The statement provided in the Conclusion in Section 7.6 on pg. 41 reads "Based on the listed species surveys conducted by REMA during several growing seasons" (emphasis added), and as discussed above, it is unlikely that any of the species found in the May 2017 letter from DEEP's NDDB occur or breed on the Site. Petition Appendix U does not indicate that either of these bat species were surveyed for (as their presence was assumed) and potential impacts to these species, which would occur during the roosting period, would be avoided through a tree clearing time of year restriction avoiding tree clearing during June and July. However, the Petitioner would like to clarify the referenced portion of the first sentence in Petition Appendix U, § 7.6, as its structure may not communicate its intended message clearly: "… it is unlikely that any of the species found in the May 2017 letter from DEEP's NDDB, excluding **hoary and red bat** [bold text added], occur or breed on the subject site." (emphasis added)

Question No. 62

The Greenhouse Gas (GHG) Assessment in Appendix M of Council Petition No. 1352 compared the life cycle GHG emissions from a solar project to a scenario where the solar project is avoided and an equivalent amount of natural gas-fired electric generation operated for the estimated life of the solar facility. For the proposed project, how would the net GHG emissions (or reduction) over the life of the solar facility and carbon debt payback be affected under this natural gas-fired generation versus proposed solar generation scenario?

Response

The Petitioner's Carbon Debt Analysis is included in Attachment 1.

Maintenance/Decommissioning

Question No. 74

Provide a post-construction Operations and Maintenance Plan that includes provisions for vegetation management within and outside the array areas that incorporates mowing/vegetation management restrictions related to listed-species, and inspection/corrective action protocols for site equipment, stormwater features, and landscaping.

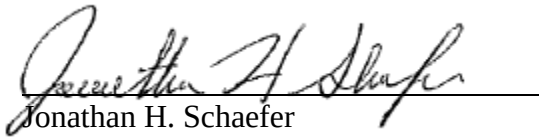
Response

A post-construction Operations and Maintenance Plan is included in Attachment 2.

CERTIFICATE OF SERVICE

I hereby certify that on the 14th day of May 2021, a copy of the foregoing was sent, via electronic mail, to:

Dominick J. Thomas, Esq.
Cohen and Thomas
315 Main Street
Derby, CT 06418
Phone: (203) 735-9521
djt@cohen-thomas.com



Jonathan H. Schaefer

Carbon Debt Analysis

HDR completed a carbon debt analysis for the Litchfield, Connecticut solar project (Project). This analysis compares the anticipated reduction in greenhouse gas (GHG) emissions from an activity compared to an associated temporary or permanent increase in GHG emissions (referred to as carbon debt). For this analysis, it was assumed the Project will reduce GHG emissions by displacing electricity produced by natural gas-powered generation facilities with electricity produced by the photovoltaic system. Construction of the Project will require clearing 15acres of forested land, thereby releasing stored carbon from the five carbon stocks of an established forest (aboveground biomass, belowground biomass, dead wood, litter and soil organic carbon) as well as preventing these trees from storing carbon over the life of the Project. The purpose of this analysis is to determine the net impact of adding solar electricity to the power grid and clearing a forested area from the Project area.

Avoided Emissions

Greenhouse gas (GHG) emissions displaced by the Project are calculated by using output emission rates for natural gas for the state of Connecticut. The output emission rates are obtained from the USEPA's Emissions and Generation Resource Integrated Database (eGRID) 2019 data[1]. The output emission rate for natural gas is not specific to peak load output; however, it is considered representative because it is anticipated that the operation of the photovoltaic system will displace the production of electricity using natural gas facilities. Total GHG emissions are expressed as carbon dioxide equivalent (CO_2e), which represents the cumulative impact of multiple greenhouse gases taking into account varying global warming potential, expressed as the amount of CO_2 that would create the same amount of warming. This analysis is not a lifecycle GHG emissions analysis and does not consider all upstream, operational and downstream effects of the Project or existing power generation resources on the regional grid.

Based on these estimations, the Project will displace 11,735 metric tons of direct CO_2e emissions in the first year of operation. Over the 40-year expected life of the Project approximately 426,391 metric tons of direct CO_2e emissions will be avoided.

Loss of Carbon Sequestration

Land use changes associated with the project, specifically the clearing of 15 acres of forested land, will cause an initial release of stored carbon at the time the forest is cleared. Clearing the forests releases the carbon that has already been stored by the forest system in the form of biomass (in four different stocks) and soil organic carbon. When the forest is cleared, the stored carbon is released. This value was calculated using a United States Environmental Protection Agency (USEPA) conversion factor of 126.57 metric tons CO_2 per acre of forest cleared.[2] Using

[1] Emissions & Generation Resource Integrated Database (eGRID). (2021, February 23). Retrieved from https://www.epa.gov/egrid/data-explorer.

[2] "Greenhouse Gases Equivalencies Calculator - Calculations and References." EPA, Environmental Protection Agency, 18 Dec. 2018, www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references.

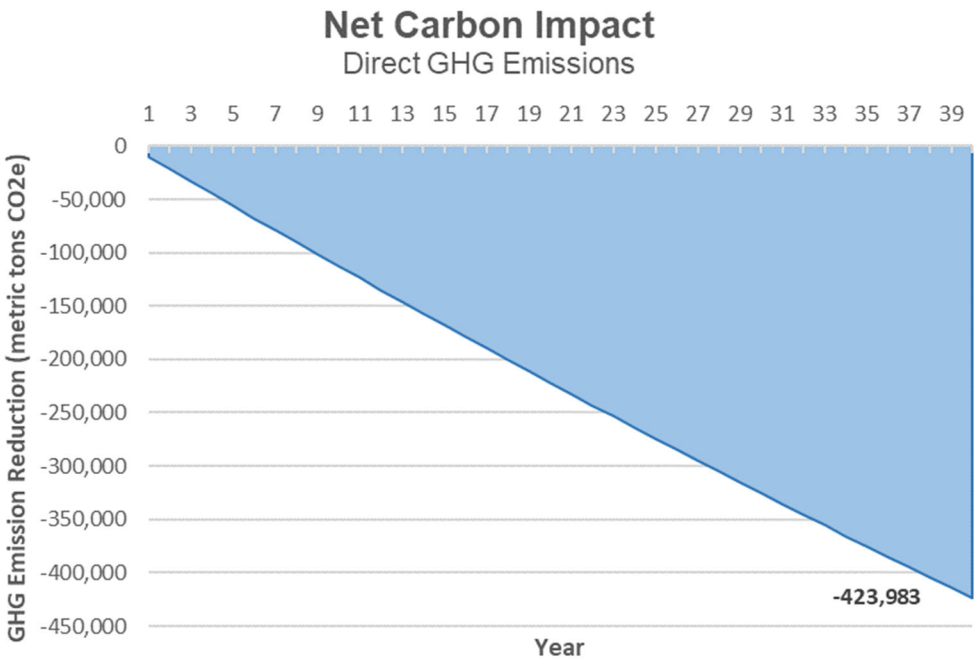
this emission factor assumes that all of the carbon stored by the forest is released and no carbon is stored by re-vegetation of the Project area. This loss occurs only once and is accounted for in the first year of the Project's life. Due to the clearing of this forested area, the Project will cause 5,063 metric tons of CO_2 to be released.

The removal of trees also results in a loss of future carbon sequestration because if the forest was not cleared, the trees would have continued to store additional carbon in the forest carbon stocks as they grew each year, in addition to the carbon the forest has already stored at the time of clearing. This value was calculated using a USEPA conversion factor of 0.85 metric tons CO_2/acre/year.[2] This emission factor is based on the average amount of carbon sequestered by U.S. forests in 2016. This loss will occur annually and is estimated to be approximately 12.75 metric tons of CO_2 per year. Over the 40-year life of the Project, 510 metric tons of CO_2 will not be sequestered.

Net Carbon Impact

Over its operational life, the Project will displace 426,391 metric tons of CO_2e and result in the loss of 2,409 metric tons of carbon sequestered. Therefore, the Project has a positive impact through a net reduction of 423,983 metric tons of CO_2e (Figure 1). It will take approximately 83 days for the Project to offset its carbon debt from the operational phase of the Project.

Figure 1 – Direct Emissions, Net Carbon Impact (Solar vs Natural Gas Output)



Lifecycle Analysis Discussion

The National Renewable Energy Laboratory (NREL) recently published a harmonization of life cycle assessments (LCAs) of electricity generation technologies, including solar and natural gas[3]. NREL reviewed more than 2,100 published LCA studies on utility-scale electricity generation. The studies were screened by multiple experts using strict criteria of quality, relevance, and transparency. As a result, less than 15% of the 2,100 studies were included in the harmonization effort. The harmonization effort adjusted the estimates from published peer-reviewed literature to a consistent set of methods and assumptions specific to each technology. Harmonization did not significantly change the median value of the published data but did reduce the variability of GHG emissions estimates.

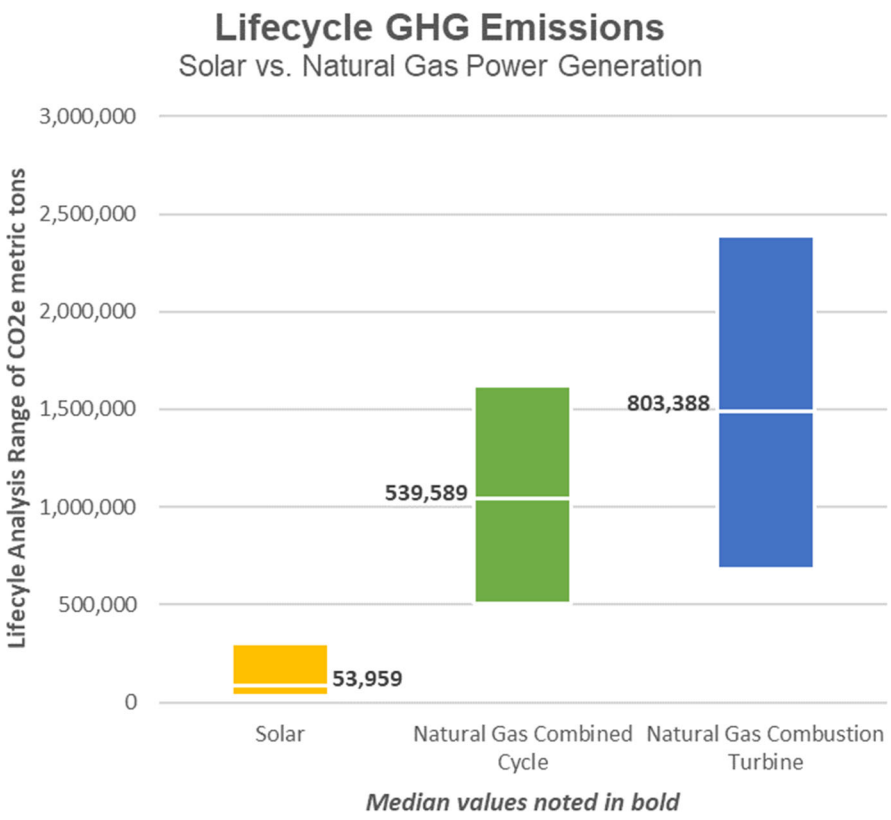
The harmonized studies employed a 'cradle-to-grave' approach to the LCA of crystalline silicon utility-scale solar panel arrays and electricity produced from conventionally produced natural gas. The LCAs included GHGs directly emitted during electricity generation, as well as indirect emissions from upstream processes such as material extraction, transportation, and plant construction, and from downstream processes such as plant decommissioning, recycling of materials, and waste disposal. The LCAs did not consider the removal of trees from a project site, as that is a site-specific factor.

The harmonized lifecycle greenhouse gas emission value of crystalline silicon solar panels ranged from 26 grams CO_2e per kWh (g CO_2e/kWh) to 183 g CO_2e/kWh with a median value of 45 g CO_2e/kWh. The Project is anticipated to produce 1,109,301 MWh of power over its 40-year life. Therefore, based on the NREL harmonization median value, the Project will result in 49,918,545 kilograms (kg) CO_2e over its lifetime. The harmonized lifecycle greenhouse gas emission value of electricity produced from conventionally produced natural gas ranged from 310 g CO_2e/kWh to 990 g CO_2e/kWh with a median value of 450 g CO_2e/kWh and 670 g CO_2e/kWh for combined cycle plants and combustion turbine plants, respectively. It is assumed for comparison purposes that a natural gas plant would produce an equivalent amount of power over a 40-year operational life as the Project. Based on the median value, a combined cycle natural gas plant would result in 499,185,452 kg CO_2e over its lifetime, and a combustion turbine plant would result in 743,231,673 kg CO_2e over its lifetime.

The lowest estimated lifecycle value for electricity produced from conventionally produced natural gas is higher (310 g CO_2e/kWh) than the highest estimated lifecycle value for electricity produced from crystalline silicon solar panels (183 g CO_2e/kWh). From an LCA perspective based on NREL harmonized numbers, the solar panel array would result in 90% fewer CO_2e emissions compared to a combined cycle natural gas plant and 93% fewer CO_2e emissions than a combustion turbine natural gas plant, as shown in Figure 2.

[3] "Lifecycle Assessment Harmonization." NREL, National Renewable Energy Laboratory, https://www.nrel.gov/analysis/life-cycle-assessment.html.

Figure 2 – Lifecycle Assessment of Natural Gas vs. Solar Electricity Production



The NREL harmonization studies did not include the loss of carbon sequestration due to land use changes. It is conservatively assumed that the construction of a natural gas power plant would result in no land use changes. If the land use change impacts associated with the Project (described above in the Loss of Carbon Sequestration section) are added to the NREL LCA number for the Project, then the Project would result in 52,327,145 kg CO_2e over its lifetime. This value is 90% lower than the NREL LCA number for a combined cycle natural gas plant and 93% lower than the NREL LCA number for a combustion turbine natural gas plant.

HDR **CARBON DEBT ANALYSIS** CALCULATIONS

Client: Silicon Ranch
Project Name: Litchfield Solar Project
Date: 05.14.2021

Loss of Carbon Sequestration - Annual

Forested Project Area (acres)	Carbon Sequestered by US Forest [1] (metric tons CO_2/acre forest/year)	Loss of Carbon Sequestration (metric tons CO_2/year)
15	0.85	12.75

[1] Source: "Greenhouse Gases Equivalencies Calculator - Calculations and References." EPA, Environmental Protection Agency, 18 Dec. 2018, www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references. This factor represents an average for U.S. forests in 2016 and may change in the future if the carbon stock significantly changes.

Avoided Emissions - Annual

Annual Production (MWh/year)	State	Output Emission Rate [1] (lb/MWh)	Avoided Emissions (metric tons CO_2e/year)
33,000	Connecticut	783.96	11,734.68

[1] The output emission rate reflects the average emission rate from natural gas electricity production in Connecticut, as calculated by the EPA's Emissions and Generation Resource Integrated Database (eGRID) for the year 2019.

Net Avoided Emissions - Annual

Avoided Emissions (metric tons CO_2e/year)	Loss of Carbon Sequestration (metric tons CO_2/year)	Net Avoided Emissions[1] (metric tons CO_2e/year)
11,734.68	12.75	11,721.93

[1] Net Avoided Emissions represents the difference between Avoided Emissions and Total Loss of Carbon Sequestration. A positive number indicates a net reduction; a negative number indicates a net increase.

Loss of Sequestered Carbon - Land Clearing

Forested Project Area (acres)	Carbon Sequestration Lost Due to Conversion of Forest to Clearing [1] (metric tons CO_2/acre)	Carbon Sequestration Lost Due to Converting Land Use from Forested to Project Use (metric tons CO_2e)
15	126.57	1,898.60

[1] Source: "Greenhouse Gases Equivalencies Calculator - Calculations and References." EPA, Environmental Protection Agency, 18 Dec. 2018, www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references. This factor represents the one-time loss of sequestered carbon in aboveground, belowground, dead wood, and litter biomass, as well as mineral soils. The factor assumes no carbon is sequestered by vegetation on cleared land (such as grass).

Avoided Emissions - Project Lifetime

Project Lifetime Production (MWh)	State	Output Emission Rate [1] (lb/MWh)	Avoided Emissions (metric tons CO_2e/Project Life)
1,199,087	Connecticut	783.96	426,391.13

[1] The output emission rate reflects the average emission rate from natural gas electricity production in Connecticut, as calculated by the EPA's Emissions and Generation Resource Integrated Database (eGRID) for the year 2019.

Net Avoided Emissions - Lifetime

Project Lifespan (years)	Avoided Emissions (metric tons CO_2e/Project Life)	Total Loss of Carbon Sequestration[1] (metric tons CO_2/Project Life)	Net Avoided Emissions[2] (metric tons CO_2e/Project Life)
40	426,391.13	2,408.60	423,982.53

[1] The Total Loss of Carbon Sequestration represents but the one time carbon loss resulting from land clearning and the annual loss from incremental forest sequestration.

[2] Net Avoided Emissions represents the difference between Avoided Emissions and Total Loss of Carbon Sequestration. A positive number indicates a net reduction; a negative number indicates a net increase.

HDR **CARBON DEBT ANALYSIS** DATA INPUTS

Client: Silicon Ranch
Project Name: Litchfield Solar Project
Date: 05.14.2021

Project Information

Project City	State	Zip Code
Litchfield	CT	06750

Energy Output in Year 1 of Operation
33,000 MWh

Energy Output in Project Lifetime
1,199,087 MWh

Expected Useful Life
40 years

Acres of Forested Land Removed due to Project Construction
15 acres

Notes:
Lifetime project output assumes 0.5 percent loss annually.

HDR **CARBON DEBT ANALYSIS** CALCULATIONS

Client: Silicon Ranch
Project Name: Litchfield Solar Project
Date: 05.14.2021

LCA GHG Emissions - Crystalline Silicon Solar Panels

LCA Value	Grams CO2e per kWh	Lifecycle 'Cradle to Grave' Emissions (metric tons CO_2/year)
Low	26	31,176
Median	45	53,959
High	183	219,433

[1] Source: Lifecycle Assessment Harmonization." NREL, National Renewable Energy Laboratory, https://www.nrel.gov/analysis/life-cycle-

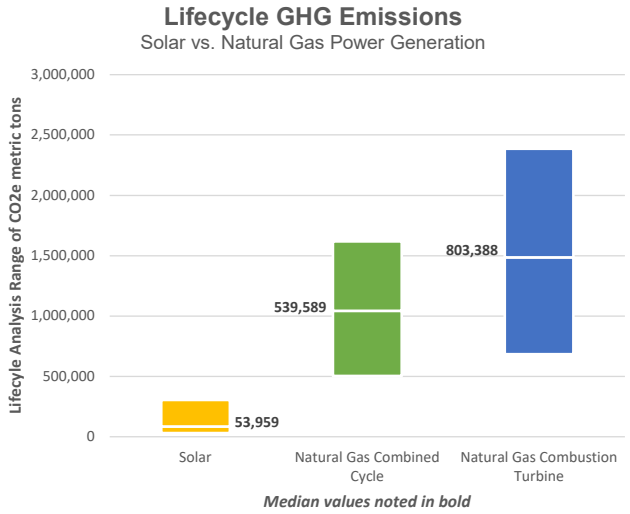
LCA GHG Emissions - Combined Cycle Natural Gas

LCA Value	Grams CO2e per kWh	Lifecycle 'Cradle to Grave' Emissions (metric tons CO_2/year)
Low	420	503,617
Median	450	539,589
High	480	575,562

LCA GHG Emissions - Combustion Turbine Natural Gas

LCA Value	Grams CO2e per kWh	Lifecycle 'Cradle to Grave' Emissions (metric tons CO_2/year)
Low	570	683,480
Median	670	803,388
High	750	899,315

LCA Value	Solar	Natural Gas Combined Cycle	Natural Gas Combustion Turbine	% Reduction
Low	31,176	503,617	683,480	-93.8%
Median	53,959	539,589	803,388	-90.0%
High	219,433	575,562	899,315	-61.9%



HDR **CARBON DEBT ANALYSIS** CALCULATIONS

Client: Silicon Ranch
Project Name: Litchfield Solar Project
Date: 05.14.2021

Year	Annual Output (MWh)	Avoided Emissions	Land Use Impact	Net Annual Impact	Net Cumulative Impact
1	33,000	-11,735	1,911.35	-9,823	-9,823
2	32,835	-11,676	12.75	-11,663	-21,487
3	32,671	-11,618	12.75	-11,605	-33,091
4	32,507	-11,560	12.75	-11,547	-44,638
5	32,345	-11,502	12.75	-11,489	-56,127
6	32,183	-11,444	12.75	-11,431	-67,559
7	32,022	-11,387	12.75	-11,374	-78,933
8	31,862	-11,330	12.75	-11,317	-90,250
9	31,703	-11,273	12.75	-11,261	-101,511
10	31,544	-11,217	12.75	-11,204	-112,715
11	31,387	-11,161	12.75	-11,148	-123,864
12	31,230	-11,105	12.75	-11,092	-134,956
13	31,074	-11,050	12.75	-11,037	-145,993
14	30,918	-10,994	12.75	-10,982	-156,975
15	30,764	-10,939	12.75	-10,927	-167,901
16	30,610	-10,885	12.75	-10,872	-178,773
17	30,457	-10,830	12.75	-10,818	-189,591
18	30,304	-10,776	12.75	-10,763	-200,354
19	30,153	-10,722	12.75	-10,710	-211,064
20	30,002	-10,669	12.75	-10,656	-221,720
21	29,852	-10,615	12.75	-10,603	-232,322
22	29,703	-10,562	12.75	-10,549	-242,872
23	29,554	-10,509	12.75	-10,497	-253,368
24	29,407	-10,457	12.75	-10,444	-263,812
25	29,260	-10,405	12.75	-10,392	-274,204
26	29,113	-10,353	12.75	-10,340	-284,544
27	28,968	-10,301	12.75	-10,288	-294,832
28	28,823	-10,249	12.75	-10,237	-305,069
29	28,679	-10,198	12.75	-10,185	-315,254
30	28,535	-10,147	12.75	-10,134	-325,388
31	28,393	-10,096	12.75	-10,084	-335,472
32	28,251	-10,046	12.75	-10,033	-345,505
33	28,109	-9,996	12.75	-9,983	-355,488
34	27,969	-9,946	12.75	-9,933	-365,421
35	27,829	-9,896	12.75	-9,883	-375,304
36	27,690	-9,846	12.75	-9,834	-385,138
37	27,551	-9,797	12.75	-9,784	-394,922
38	27,414	-9,748	12.75	-9,735	-404,658
39	27,277	-9,699	12.75	-9,687	-414,344
40	27,140	-9,651	12.75	-9,638	-423,983
Lifetime Output:	**1,199,087**	**-426,391**	**2,409**	**-423,983**	

OPERATIONS & MAINTENANCE PLAN
SR Litchfield, LLC

Operator agrees to provide the following Standard Services at the Site, pursuant to the terms and conditions in this Agreement.

1. Overview

The purpose of this Agreement is to maximize energy production of the plant, maximize reliability and Availability (but at all times meet or exceed the Guaranteed Availability), ensure safe working conditions on the Site, maintain the System in good working order in accordance with manufacturer maintenance and code requirements, and protect the state of the environment at and adjacent to the site.

2. Emergency Response

Operator shall provide a procedure or plans for emergency response (an "Emergency Response Procedure") to ensure proper response to all Force Majeure Events. This shall include emergency response plans for network or regional wide Force Majeure Events such as large storms and collaboration with emergency response personnel. Immediate response to any event threatening the safety of staff or adjacent property or Site access violations shall be to call 911.

Except as otherwise provided in this Agreement, Operator shall provide all necessary services including staff, equipment, tools and consumables to repair, replace or maintain the affected parts or system causing the emergency response.

3. Contacts

Operator shall provide contact information to Owner ("Notices and Contact Information"). The Contact Information shall include an emergency contact for Operator and a support line with prompt response capability to the Site. The Notices and Contact Information shall include a single point of contact and a general use phone number for all inquiries relating to the System or this Agreement to operations staff and must be available during business hours in the time zone of the System. Information on the Notices and Contact Information may be amended from time to time by written Notice to Owner.

4. Staffing

Operator shall employ qualified staff or subcontractors for the purpose of electrical system repair who are based within the region where the Site is located to ensure a timely response to all unplanned repairs.

5. Staffing Qualifications

Operator staff or subcontractors working with electrical components on Site shall meet at least one of the following requirements.

5.1. Bonded Journeyman or Master Electrician with current license where the System is located.

5.2. Apprentice Electrician with current apprenticeship where the System is located, with supervision.

5.3. Technician with maintenance training certification from component manufacture in need of repair.

5.4. Technician sent by component manufacturer expressly for the repair of a component.

6. System Monitoring

Operator shall maintain the monitoring system set forth in the Technical Specification and leverage it to monitor system performance alerts and troubleshoot problems using a SCADA system or equivalent application. System performance and alerts shall be monitored by qualified technicians during sunlight hours in the time zone where the plant is located. Operator shall agree with Owner on an alarm notification procedure. This procedure shall identify alarm levels and Owner alarm means of communications.

Operator shall retrieve and store in archive for five (5) years the key performance parameters from the plant system control and data acquisition system (DAS/SCADA).

Operator shall monitor all equipment capable of providing status information, as installed under the EPC Agreement, including, but not limited to:

6.1. Meteorological stations

6.2. Inverters

6.3. Modules

6.4. Trackers (if applicable)

6.5. Transformers

6.6. DC sub-system (e.g., combiner boxes or re-combiner boxes)

6.7. AC systems

6.8. Interconnection metering and relaying equipment

6.9. Protection equipment, relays, and switchgear

6.10. Monitoring system and/or DAS/SCADA systems

7. Performance Engineering Services

Qualified technicians shall monitor performance of the plant. This shall include output degradation using the measured versus expected performance ratio and equipment alerts generated by the DAS/SCADA system. If performance degradation greater than 10% is sensed during times of Plane of Array (POA) irradiance greater than 600 W/m^2 for over four (4) hours or equipment alerts designate clearly defined failures, Operator shall act to identify and remediate the problem remotely or dispatch maintenance staff, as approved by Owner. All power generation problems must be rectified as agreed to by Owner.

8. Preventative and Scheduled Maintenance

8.1. Maintenance Checklist. Operator shall provide Owner with a template of the checklist for all scheduled maintenance activities, which shall be completed as maintenance activity proceeds, archived digitally and made available to Owner and Owner representatives.

8.2. Inverter Maintenance and Replacement. Operator shall perform inverter maintenance consistent with manufacturer requirements noted in the Manuals, at least once per year. In addition, once per year Operator shall perform infrared inspections and provide Owner reports of such investigations. Operator shall monitor remotely internal temperature of inverters along with other pertinent parameters and shall take reasonable action to rectify problems if parameters measured are beyond normal operating range, as defined per manufacturer specifications.

8.3. Transformer Maintenance. Transformer maintenance procedure as prescribed in the Manuals shall be completed by a qualified technician of Operator no less than once per year, which shall include, an oil sample and testing during the first year of operation and every three (3) years thereafter. Operator shall monitor remotely the internal temperature, oil level and other pertinent parameters and shall take action to rectify problems if transformer parameters measured are beyond normal operating range.

8.4. Combiner Boxes, Cabling and Wiring. Operator shall only open and perform visual checks of combiner boxes during failure or suspected performance events. Operator shall visually inspect ten percent (10%) of the accessible cabling, wiring and connections at least once per year and shall physically check any suspect connection for connectivity.

8.5. Module Maintenance and Replacement. When required, Operator shall undertake module maintenance and replacement as prescribed by the module manufacturer using module manufacturer procedures.

8.6. Tracker Maintenance (if applicable). Operator shall maintain the tracking system according to manufacturer requirements specified in the Manuals. In addition, at least once per year, Operator shall maintain a preventative maintenance plan for all motors, gear boxes, spot-

checking torque settings of bolted connections, non-destructive coating integrity inspection, grounding connections, etc.

8.7. Other maintenance procedures. Operator shall check all other plant components such as the combiner box, switchgear, DAS/SCADA system, grounding system, and meteorological station according to manufacturer recommendations and in accordance with industry standard practices, as well as initiating a periodic inspection program no later than 10 years after the piles are placed into service to assess the need for a passive cathodic protection system to reduce corrosion of the steel piles.

8.8. Governing Authority Maintenance and Inspections. Operator shall perform the maintenance and inspections set forth in this scope of work in accordance with Applicable Laws. Maintenance and inspections required to meet Governmental Authority requirements above and beyond the scope of this Agreement, if any, shall be performed as Additional Services under a predefined price schedule, upon Owner's and Operator's prior written approval.

8.9. Vegetation Abatement Procedures. Vegetation and maintenance shall be performed by Operator substantially in accordance with Exhibit A attached hereto (as may be updated from time to time by Operator in its reasonable discretion with prior written notice to Owner).

9. Procedure for Notifying Owner of Performance Problems and Emergencies

Operator shall notify Owner at the end of each calendar week if the System performance ratio deviates by more than fifteen percent (15%). Owner shall be notified immediately via email of plant-level failure (unless caused by grid/interconnection downtime), inverter-level failures, or emergencies requiring dispatch of emergency response personnel.

10. Asset Tracking and Ticketing System

Operator shall maintain and use an enterprise-level asset management and ticketing system to track all systems components, maintenance activities and provide read access to asset database, tickets and summary reports to Owner and Owner's Representative.

11. Training

Operator shall demonstrate a documented and phased training program for technicians such as NJATC, NABCEP or an equivalent program.

12. Procedure for interconnection control requirements

Operator shall comply with all interconnection requirements and inverter control settings required by the Transmission Provider such as, but not limited to, maximum power injection, emergency power ramping, power factor/VAR control, reactive supply and absorption.

This provision assumes that no on-site personnel are required for active grid control of the System. Included in the Standard Services is the ability to receive daily, day-ahead voltage schedules from the Transmission Provider and manually select the appropriate voltage schedule in the local plant controller to ensure the plant meets the operating requirements of the utility.

Operational control and grid coordination services to meet the Transmission Provider's requirements above and beyond the scope of this Agreement will be performed as Additional Services under a predefined price schedule and with Owner's prior written approval.

13. Water Use

All use of water shall be reasonable under the circumstances and comply, in all material respects, with local water use/drainage regulations.

14. Toxic Substances

Use, storage and application of toxic substances, if any, shall comply with hazardous substance laws and regulations, any other Applicable Laws, and Site use permits.

15. Snow Removal Plan

No snow removal plan is anticipated.

16. Site Access

Consistent with Prudent Solar Industry Practices, Operator shall use reasonable efforts to ensure that site access gates are locked, safe and secure when accessing and departing the System. Operator shall restrict Site access to qualified personnel in coordination with Owner requirements. Visitors must receive permission from Owner prior to entry on site.

17. Lockout/Tagout Procedures

Operator shall follow Lockout/Tagout procedures for all energized equipment. Operator shall conform to the standards established by the Transmission Provider for Lockout/Tagout of interconnection related equipment.

18. Covered Equipment

The following equipment is included under the scope of the O&M Agreement:

18.1. DC Array, including PV modules, combiner boxes, cabling, single- axis tracking system, disconnects and switches

18.2. Inverter and inverter subsystems

18.3. AC collection system, including medium voltage transformers, breakers, switchgear, conductors, and protective systems.

18.4. Monitoring and metering systems, including SCADA, metering, metrological systems, UPS, and battery.

Exhibit A

Vegetation Abatement Procedures

[see attached]

INTEGRATED VEGETATION MANAGEMENT PLAN

SR Litchfield, LLC

September 30, 2020
Amended: April 27, 2021

Silicon Ranch Corporation
222 Second Ave. S. Suite 1900
Nashville, TN 37201

Produced by:

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1.0 Introduction

Silicon Ranch Corporation (SRC) develops Vegetation Management Plans (VMP) for projects based on accepted solar industry vegetation management standards and practices. SRC takes an integrated approach to vegetation management, using a combination of mechanical, chemical, and biological controls to meet performance specifications and regulatory requirements.

2.0 Project Description

The SR Litchfield property consists of approximately 216.43 acres consisting of wooded land in its northern and southern portions, and agricultural fields in its central and northeastern portions. A Connecticut Light and Power Company (CL&PC) easement resides in a portion of the property, with the surrounding area consisting residential and agricultural uses. Post construction, disturbed areas will be vegetated using warm and cool season perennials in order to optimize soil stabilization throughout the year, increase water infiltration, and increase biodiversity of both flora and fauna on the project. Silicon Ranch takes an integrated management strategy through its Regenerative Energy program by integrating regenerative agricultural practices into the long-term land and vegetation management strategy. This consists of biological control methods (Adaptive Multi-Paddock sheep grazing), mechanical, and chemical control measures as needed, and described in section 3.0. An ecological health monitoring program will be applied annually to monitor the ecological impact and trends, keeping managers most informed as to the outcomes of their management decisions.

3.0 Vegetation Management Objectives – Inside Array Fencing

- **3.1** Vegetation Establishment
  - **3.1.1** Perennial vegetation will be established throughout Project Area providing adequate ground cover in order to reduce occurrence of erosion
  - **3.1.2** A mix of cool and warm season species is desired
  - **3.1.3** Diversity within the species composition is desired, with a healthy mix of perennial grasses, forbs, and sedges desired based on local growing conditions
- **3.2** Weed Prevention and Detection
  - **3.2.1** Existing vegetative species composition will be inventoried, monitored, and controlled during construction, production, and reclamation
  - **3.2.2** Weed inventories will allow for early detection and proper identification of a new weed infestation
  - **3.2.3** New infestations of noxious weeds in and around Project Area will be prevented using an integrated approach as described below
- **3.3** Integrated Management Plan Implementation
  - **3.3.1** Vegetation will be monitored and controlled throughout production term in order to provide adequate vegetative cover and reduce erosion
    - **3.3.1.1** Control methods include mechanical and biological vegetation removal as well as appropriate use of herbicide for noxious/invasive weed control
  - **3.3.2** Vegetation will not be allowed to grow more than 24”, and controlled no lower than 3” during any control operation
  - **3.3.3** Typical control prescription is as follows:
    - **3.3.3.1** Vegetation removal operations to occur at a frequency of 3 to 5 per year as needed during growing season
      - **3.3.3.1.1** Typically to occur in June, July, Aug, Sept as needed and based on local weather and climatic conditions
      - **3.3.3.1.2** Vegetation in areas not directly under modules or around electrical equipment will be allowed to grow to maturity to provide nesting habitat
    - **3.3.3.2** Appropriate herbicide to be used only as needed for control of noxious/invasive weed populations per local and state regulations

4.0 Vegetation Management Objectives – Outside Array Fencing

4.1 Shading Buffer Habitat Management

4.1.1 Vegetation Establishment

4.1.1.1 Perennial vegetation will be established throughout disturbed areas within Shading Buffers providing adequate ground cover in order to reduce occurrence of erosion

4.1.1.2 A mix of cool and warm season species is desired

4.1.1.3 Diversity within the species composition is desired, with a healthy mix of perennial grasses, forbs, and sedges desired based on local growing conditions

4.1.2 Shading Buffer Integrated Management Plan Implementation

4.1.2.1.1 Vegetation within Shading Buffers will be allowed to grow to maturity to provide ground-nesting bird habitat

4.1.2.1.2 Mowing to occur at least one time a year to prevent woody species from establishing, typically occurring in July to allow ground nesting birds enough time for successful production of at least one brood of young.

4.2 Forest Habitat Management

4.2.1 Forest outside not disturbed by construction will remain conserved during the useful life the project

4.3 Riparian Habitat Management

4.3.1 Riparian Habitat not disturbed by construction will remain conserved during the useful life of the project

4.3.2 A minimum of 100 feet buffer strip of natural vegetation will be maintained along streams to provide habitat to Threatened and Endangered Species and to improve water quality of the stream system

5.0 Threatened and Endangered Species

5.1 Vesper Sparrow

5.1.1 Within array fencing, vegetation directly under modules, within aisles, and around electrical equipment will be managed per above specifications; vegetation outside of these areas will be allowed to grow to maturity to provide ground nesting bird habitat and will be mowed one time a year at minimum, typically in July, to prevent woody species from establishing and to allow ground nesting birds enough time for successful production of at least one brood of young.

5.2 Red Bat, Hoary Bat

5.2.1 Forest habitat not disturbed by construction will remain conserved during the useful life of the project, providing suitable habitat for various species of bat

5.3 Wood Turtle

5.3.1 A minimum of 100 feet buffer strip of natural vegetation will be maintained along streams to provide and to improve water quality of the stream system

5.4 Pale Green Orchid

5.4.1 Forest outside not disturbed by construction, including wet woods where Pale Green Orchid is common, will remain conserved during the useful life the project