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March 23, 2021

Tanowa Troupe
Ohio Power Siting Board
Secretary, Administration/Docketing
180 E. Broad Street, 11th Floor
Columbus, OH 43215

Re: **In the Matter of the Application of Hecate Energy Highland 4, LLC's Application for a Certificate of Environmental Compatibility and Public Need to Construct a Solar-Powered Electric Generating Facility in Clay and Whiteoak Townships in Highland County, Ohio Case No. 20-1288-EL-BGN/Compliance with Condition #15 Regarding Updated Decommissioning Plan**

Dear Ms. Troupe:

On March 18, 2021, Hecate Energy Highland 4, LLC ("Hecate Energy") was issued a certificate of environmental compatibility and public need ("Certificate") by the Ohio Power Siting Board ("Board") to construct a 65 MW solar-powered electric generating facility in Clay and Whiteoak Township, Highland County, Ohio. The Certificate was issued subject to twenty three (23) conditions.

At this time, Hecate Energy is submitting an updated decommissioning plan for New Market Solar I as required by Condition #15. The updated decommissioning plan includes an updated engineering estimate for the decommissioning. This confirms that the financial assurance mechanism for decommissioning will be a performance bond where Hecate Energy is the principal, the insurance company is the surety, and the Ohio Power Siting Board is the obligee.

With this filing, Hecate Energy will have complied with Condition #15 of the Certificate. If you have questions or need additional information, please do not hesitate to call.

Very truly yours,

Karen A. Winters

cc: Patti Shorr, Hecate Energy LLC
Jared Wren, Hecate Energy LLC
Danelle Gagliardi, Squire Patton Boggs (US) LLP

Hecate Energy Highland 4, LLC

New Market Solar I Farm

Case No. 20-1288-EL-BGN

Site Restoration and Decommissioning

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SITE RESTORATION AND DECOMMISSIONING

Overview

New Market Solar I (the Project). will be located in Highland County, Ohio and is a 65 megawatt alternating current (“MWAC”) facility that will occupy approximately 602 acres (“New Market Solar I Proposed Project Footprint’).

1. Application Requirements

Applicant proposes this decommissioning plan which outlines the responsible parties, schedules, and projected costs for decommissioning the Projects and restoring the Project area to substantially its pre-construction condition (the Plan). The Plan will;

a.) provide for the safe removal and sale, re-deployment, recycling or proper disposal of all components of the Projects, including components containing rare or valuable materials.

b.) prioritize reuse and recycling over land disposal as waste.

c.) require that the contractor leading the decommissioning effort work closely with manufacturers, local subcontractors, and waste management firms to segregate - based on the prevailing standards and practices at the time - materials that can be reused and recycled from those that must be land-disposed as waste.

d.) require that the Project area be restored to use for cultivation, unless circumstances prevailing shortly in advance of the start of decommissioning indicate that another use is more appropriate or explicitly desired by the landowner. Restoration will include a return to the same or functionally similar pre- construction drainage patterns, including farm drainage tiles, decompaction of soil, and seeding with an appropriate, low-growing vegetative cover, to stabilize soil, enhance soil structure, and increase soil fertility.

e.) repair any damage to drain tile systems. Applicant will provide for financial security to ensure that funds are available for the removal of the Projects and restoration of the Project area.

Prior to the pre-construction meeting, the Applicant will provide to the OPSB, a stamped Plan which is stamped an independent and registered professional engineer who is licensed to practice in Ohio. The Plan, consist of:

a.) an estimate of the total cost of implementing the Plan, without regard to the salvage value of the components of the Projects, plus a 10% amount to cover contingencies; less

b.) an estimate of the salvage value of the components of the Projects, less a 10% amount to cover contingencies ("Net Decommissioning Cost"). The Professional Engineer (or an equally qualified one) will re-calculate the Net Decommissioning Costs approximately every five (5) years over the operating life of the projects. If and when the Net Decommissioning Cost is a positive number, Applicant will post and maintain a surety bond or similar financial assurance instrument in the amount of the Net Decommissioning Cost that may be drawn upon to implement the Plan. If and when a subsequent estimate of the Net Decommissioning Cost increases the New Decommissioning Cost, the financial assurance instrument will be increased to the higher amount.

Except as it may be drawn upon to implement the Plan, the amount of the financial assurance will not be decreased.

2. Safety and the Removal of Hazardous Conditions during Decommissioning

The Project is anticipated to have an operational lifespan of 35 years. At the end of the project lifespan, the Project components are expected to be decommissioned as described in Section 3.0. If Project economics and need remain viable at that time, the facilities could be "repowered" with new technology and continue operating for an extended period. This process may include the replacement and/or upgrading of Project components. However, specific details are unknown at this time, as technological improvements over the next 35 years are currently unknown. It is important to note that the landowner will be likely the certificate holder or an affiliate. The Project will be purchasing the land from the current landowners.

Although the future land use of the Project Location cannot be known, it is most probable that after decommissioning, the Project Locations will be returned to their former agricultural land use. Therefore, this report has conservatively assumed that the future site uses will be agricultural. It should be noted that there is potential for the planned post-Project land use to change before actual decommissioning. The information in this report will be updated, if required, in advance of decommissioning to represent the applicable conditions and regulatory requirements in effect at that time.

Prior to the start of the decommissioning of the Project, the scope of work for the contractor performing the decommissioning will ensure that the entire plant will be completely de-energized before the commencement of decommissioning and that the solar panels will have their leads taped upon being cut.

3. Decommissioning

At the end of the Projects useful life, the Project components are expected to be decommissioned as described below. The decommissioning and restoration work will generally involve the following:

- Planning, permitting, and consultation;
- Disassemble and recycle PV panels;
- Remove and recycle inverter stations, combiner boxes, and switchboards;
- Remove transformers and transport to a licensed facility for draining, disassembly, and recycling;
- Remove circuit breakers and transport to a licensed facility for degassing, disassembly, and recycling.
- Disassemble and recycle tracker steel components;
- Disassemble and recycle substation steel and components;
- Remove and recycle tracker I-beam posts;
- Remove, crush and recycle concrete foundations (substation components and inverter skids);
- Remove and recycle selected stone roads;
- Remove and recycle perimeter fencing;
- Collect and dispose of non-recyclable materials (loose debris, road filter fabric, select substation components, above ground PVC conduits);
- Regrading and decompaction as needed; and
- Clean up and inspection.

The contractor will be required to properly track and manifest all material leaving the site and properly dispose to licensed recycling and disposal programs.

Decommissioning and removal of Facility components from the Facility Area is anticipated to occur within one year following discontinuation of operations on the Facility Area. The decommissioning is anticipated to be completed over a 6-9 -month period, most likely during a summer season that provides drier conditions.

3.1 Responsible Parties

The Certificate Holder once approved, will ensure that the decommissioning activities lead by the contractor are fulfilled and in compliance with the conditions set forth in this document and any Agreement, law or regulation mentioned herein.

The general contractor will lead the decommissioning efforts by working closely with manufacturers, local subcontractors, and waste management firms to segregate – based on the prevailing standards and practices at the time – materials can be reused and recycled from those that must be land-disposed as waste. The general contractor will be responsible for preparing the construction (decommissioning) management plans, Rehabilitation Plan, obtaining construction permits/approvals, and executing the decommissioning plan and associated decommissioning works.

3.2 Decommissioning During Construction (Abandonment of Projects)

In the unlikely event that construction cannot be completed and decommissioning of the Projects are initiated during the construction phase, restoration of lands to pre-construction conditions will follow the same procedure as for the decommissioning at the end of Project life, as described in the sections below.

In the event that the sites have been cleared and/or excavated in preparation for installation of Project infrastructure, appropriate environmental protection measures would be implemented to prevent topsoil erosion. The extent of environmental protection measures required would be dependent on the progress made at the time of Projects abandonment and would be determined through site inspections by qualified specialists. Possible measures would include, as appropriate, erosion and sediment control fencing, filling excavated areas, replacement of topsoil, and/or revegetation.

3.3 Decommissioning After Ceasing Operation

It is anticipated that the Projects would have an operational lifespan of 35 years. The Project life could be further extended with proper maintenance, component replacement and repowering.

3.3.1 General Environmental Protection During Decommissioning

During all decommissioning and restoration activities, general environmental protection and mitigation measures would be implemented. Many activities during decommissioning would be comparable to the construction phase. As such, general mitigation measures and management practices that would be used, as appropriate, including erosion and sediment control, Storm Water Pollution Prevention Plan (SWPPP), air quality and noise mitigation, and contingency plans for unexpected finds and spills, are provided in the construction management plans.

All decommissioning and restoration activities will be performed as per the requirements of relevant governing agencies and will be in accordance with all relevant statutes in effect at the time of decommissioning.

3.3.2 Pre-Dismantling Activities

At the end of the Projects useful life, they will first be de-energized and isolated from all external electrical lines. Prior to any dismantling or removal of equipment, staging areas would be delineated at appropriate locations within the Project Locations, including near the project substation and inverter locations.

Temporary erosion and sedimentation control measures and SWPPP controls will be implemented during the decommissioning phase of the Projects. These measures will be enacted with consideration of industry-standard practices.

Review the surrounding area for local disposal company as described below.

- Steel https://www.877ironmike.com/metal-prices
- Clean aluminum https://www.877ironmike.com/metal-prices
- Dirty aluminum https://www.877ironmike.com/metal-prices
- Copper https://www.877ironmike.com/metal-prices
- Glass https://www.recyclingtoday.com/article/rt1114-recycled-glass-commodity/
- Electronic disposal waste http://greencitizen.com/the-real-cost-of-electronics-recycling/

3.2.3 Equipment Dismantling and Removal

The following sections describe the process that will be undertaken to remove the various components associated with the Projects.

3.3.4 Solar Panels

Each solar panel will be mounted on a galvanized steel and aluminum rack system that is positioned approximately 1 to 4 ft above finished grade with a +/- 60-degree range of motion (single-axis tracking).

During decommissioning, each panel will be disconnected from the electrical system and unfastened from the mounting rack. After removal of the panel from the rack, it will be placed in a vehicle or container for transportation off-site for recycling or disposal.

The tracker that supports the solar panels will be disassembled and removed from the site. The metal racking components may be reused or recycled for future use.

All surface components and subsurface components, including those related to foundations will be removed off-site and properly recycled.

3.3.5 Electrical Equipment and Collector System

Inverters and inverter step-up transformer skids, including associated piling, will be removed and will be shipped off-site for eventual recycled or disposal. The piles and associated foundations will be removed from the site and disposed or recycled.

Underground collector cables will be removed, and all work to decommission underground connection lines would be conducted within the boundaries of the Projects and municipal road easements.

3.3.6 Project Substation

All the above-ground structures and electrical equipment, including circuit breakers, main transformer, chain link fencing, control building and grounding grid would be removed, and any concrete foundations would be removed. All granular and geotextile materials would be removed from the Project Locations by a dump truck or placed in a designated on-site area for use by the landowner. All electrical system components will be taken off-site for reuse or disposal.

3.3.6 Access Roads

All-access roads (constructed of aggregate material or covered in grass – not paved) will be removed; this includes any geotextile material beneath the roads and granular material. All granular and geotextile materials would be removed from the site by a dump truck.

Where any access roads will be removed within areas that were previously used for agricultural purposes, topsoil will be redistributed to provide similar ground cover as was present within the areas prior to site disturbance.

3.3.7 Storage Infrastructure and Perimeter Fence

Storage and operation infrastructure and any associated temporary decommissioning improvements (e.g., temporary construction trailer) used during the decommissioning phase will be removed from the site by truck. Any foundations associated with these facilities would be removed.

Perimeter fencing would be removed and recycled or re-used. Where the landowner prefers to retain the fencing, these portions of the fence would be left in place.

3.4 Site Rehabilitation and Restoration

At the time of decommissioning a Rehabilitation Plan will be developed to restore agricultural lands and wildlife habitat in areas affected by the Projects to the same or functionally similar pre- construction state, unless circumstances prevailing shortly in advance of the start of decommissioning indicate that another use is more appropriately or explicitly desired by the landowner. It is important to note here that the landowner and the certificate holder will be one and the same, meaning the underlying property will be owned by either the Project or a Project affiliate, so unlike many Projects, the land will not be being returned to the current landowner.

The Rehabilitation Plan will include, but not be limited to the following:

- Agricultural areas, which comprise the pre-developed Project Locations, will be restored by redistributing topsoil to provide substantially similar ground cover as was present within the areas prior to site disturbance to accommodate the return of active agricultural operation of the site. The agricultural areas will be revegetated using the same types of grasses or crops found on adjacent tracks if the landowner reasonably requests such reseeding.
- Natural areas will be revegetated using native plant material and seeds appropriate for the Project Locations or allowed to revegetate naturally. In the event the land is intended to be placed into agricultural production, the re-seeding of the land will be done using the same types of grasses or crops found on adjacent tracks if the landowner reasonably requests such reseeding.
- Access roads and other areas which may have become compacted during operation or decommissioning will be de-compacted to pre-existing conditions.
-

Where Project infrastructure has been removed, disturbed areas will be seeded with quick-growing native species to prevent topsoil erosion, unless seeding is immediately applied by the landowner. The seed mixture will be determined at that time in consultation with the Highland County Officials and the OPSB. Erosion and sediment control measures and SWPPP protection will be installed at ditches and will be left in place until the ground cover is fully established.

3.4.1 Watercourses

Any proposed decommissioning works within or near watercourses will be discussed with the U.S. Army Corp. of Engineers, County, Ohio Department of Natural Resources, Ohio Environmental Protection Agency and OPSB, to determine any applicable guidelines, permitting, site-specific mitigation and/or remediation plans, if any. Similar mitigation and monitoring measures implemented during construction will be used during the decommissioning of the Projects. These mitigation measures are described in the Construction Management Plans, and site-specific requirements determined during the detailed design and permitting process. Measures are anticipated to include standard construction practices at the time of decommissioning, including erosion and sediment control during removal of the structures.

3.4.2 Agricultural Lands

Agricultural lands that have become compacted due to facility operation or decommissioning activities, such as access roads, would be de-compacted using chisel ploughing and/or subsoiling, as determined by an environmental advisor. Topsoil would be re-graded or added to a similar depth as the condition it was before construction. All areas would be graded to pre-construction conditions and restored appropriately, if required by the Project landowner.

3.4.3 Spills

Although strict spill prevention and spill response procedures will be in place during operation, there is the potential for small spills to occur during routine operation, maintenance, and decommissioning. It is not expected that the decommissioning of the Projects will entail the need to conduct any soil or groundwater remediation. The operation of the Projects will not produce any hazardous waste or wastewater. Provided the Projects are operated and maintained in accordance with industry best practices there should be no significant environmental liabilities associated with cleanup or remediation.

3.5 Managing Excess Materials and Waste

Before decommissioning the Projects, a complete waste audit and waste reduction work plan will be completed in accordance with any applicable guidance or requirements of the OPSB or relevant regulations in effect at the time of decommissioning.

Typical waste materials and modes of disposal, recycling or reuse are presented in Table 1.

Major pieces of equipment may be recyclable or reusable. The galvanized-steel and aluminum racks may be sold for scrap or recycled. Electrical equipment could either be salvaged for reuse or recycled. Components such as the cabling would have a high resale value due to copper and aluminum content. Concrete from footings could be crushed and recycled as granular fill material. Spent oils, if any, could be recovered for recycling through existing oil reprocessing companies.

As much of the facility would consist of reusable or recyclable materials, there would be a minimal residual waste for disposal as a result of decommissioning the facility. Small amounts of registerable waste materials would be managed in accordance with OPSB requirements or subsequent applicable legislation. Residual non-hazardous wastes would be disposed of at a licensed landfill in operation at the time of decommissioning.

4. Salvage and Recycling

Most of the Facility systems and components are recyclable. Publicly available data shows a market price for scrap materials, indicating these can be profitably recycled by the Applicants or the decommissioning contractor. The major components and their expected scrap codes are outlined in Table 1.

Table 1. Major Components and Scrap Codes

Facility Component	Scrap Code
Inverter	Computer / Server (Complete)
Transformer	Sealed Unit
Racking Frame (Single Axis)	Structural Steel
Racking Posts	Structural Steel
Tracker Motors	Scrap Electric Motors
LV Wiring - #10	#1 Insulated Copper Wire 85 percent (%) Recovery
LV Wiring - 2/0	#1 Insulated Copper Wire 85% Recovery
LV Wiring - #2 Bare	#1 Insulated Copper Wire 85% Recovery
LV Wiring - 500MCM	#1 Insulated Copper Wire 85% Recovery
MV Wiring - 2/0 Bare	#2 Insulated Copper Wire 50% Recovery
MV Wiring - 500MCM	#2 Insulated Copper Wire 50% Recovery
Chain Link Fence Fabric	Structural Steel
Chain Link Fence Top Post	Structural Steel
Chain Link Fence Line Post	Structural Steel
Chain Link Fence Corner Post	Structural Steel
Main Power Transformer	Sealed UnitStructural Steel*
Disconnect Switches	Aluminum Extrusions 6061
Primary Conductor	Aluminum Extrusions 6061
Electronic Controls	Low Grade Board
Control Panels	Structural Steel
Building	Structural Steel

The photovoltaic (PV) solar modules also are of recyclable material (silicon, metal). PV manufacturers are establishing programs to receive recycled PV modules.

The following general statements can be made about the present state of the salvage market with regards to crystalline silicon PV modules:

- The United States has a robust market for the salvage, recycling, and re-sale of industrial materials including the aluminum frame, glass fronts, and silicon which comprise the majority of a PV module.
- A number of websites post publicly available data on the scrap values of industrial materials in different regions of the United States. Example websites for pricing include: scrapmonster.com, rockawayrecycling.com, and recycleinme.com.

- Decommissioned PV modules from the Facility can be resold as industrial materials in the national salvage market. Possible salvage operations include: Cleanlites, ECS, Metal & Catalyst Resources, and Morgen Industries.
- PV modules also may be resold as functional modules for power production. PV Modules will continue to operate after years of use, though producing less power than their initial ratings. The industry has observed a degradation rate of 0.2–1% per year, with 0.7% used as an industry-wide assumption in the United States. Based on a 0.7% degradation rate, a 400-watt (W) PV module would be rated at 335-W after 25 years of operation. The module would need to be tested prior to re-sale to verify the new ratings.
- PV power plants may be re-powered at "end-of-life" with new inverter systems or may be decommissioned with PV modules re-sold for use at another plant.

PV modules are expected to be priced at $0.05–$0.1 per watt at the time of Facility decommissioning, significantly less than the price for new modules projected by the National Renewable Energy Laboratory.

5. Emergency Response and Communications Plan

The following programs, plans, and procedures will be carried forward during the decommissioning of the Projects.

5.1 Environmental Procedures

Spills and releases: identify the procedures for the prevention, response, and notification of spills. In addition, establish the general procedures for spill clean-up, personnel training, and material handling and storage to prevent spills.

Non-hazardous waste management: establish alternative procedures for the management and disposal of used lubricants, used drums, and general waste.

5.2 Occupational Health and Safety Procedures

The general contractor retained to undertake decommissioning will be responsible for employee health and safety and will implement the following safety procedures and protocols, as appropriate, to maintain employee safety throughout decommissioning activities:

- Personal protective equipment (PPE), including non-slip footwear, eye protection, clothing, and hardhats, will be worn by personnel when on duty.
- Elevated platforms, walkways, and ladders will be equipped with handrails, toeboards, and non-slip surfaces.
- Electrical equipment will be insulated and grounded in compliance with the appropriate electrical code.

As appropriate, the general contractor retained to undertake decommissioning will develop or have an existing training program that can be implemented to appropriately train personnel on decommissioning programs, environmental, health, and safety procedures, and the Emergency Response Plan.

5.3 Health and Safety Plan

The general contractor will prepare a Health and Safety Plan considering both public and occupational health and safety issues. This may include protecting the public from equipment and construction areas by posting warning signs, use of PPE, accident reporting, equipment operation

5.4 Emergency Response and Communications Plan

The Emergency Response and Communications Plan will be developed and utilized during the decommissioning of the Projects, along with the Complaint Response Protocol. This includes informing the public about activities occurring at the Project sites (including emergencies), means for contacting the Owner or the general contractor responsible for decommissioning, recording follow up on complaints expressed during the decommissioning phase, and reporting spills to the Owner and OEPA, as required.

6. Decommissioning Notification

Advance notification of decommissioning will be provided to the stakeholders and other interested agencies prior to decommissioning works commencing. Notification may be in the form of letters, newspaper notices, and updates on the Projects or Certificate holder website or direct communications.

7. Schedule Decommission

The decommissioning and restoration of the projects, following the project termination, is expected to be from six (6) to nine (9) months. A phasing plan (order of construction activities) will be developed and will include phasing, material staging locations, truck routes, and information regarding recycling and disposal activities. Before any construction activities can begin a pre-construction, management plan must be developed and submitted thirty to sixty day(s) before decommissioning for County approval.

8. Project Decommissioning and Site Restoration Cost Estimate

Certificate holder will provide for financial security to ensure that funds are available for the removal of the Project and restoration of the Project Area.

If and when the Net Decommissioning Cost becomes a positive number, Certificate holder will post and maintain a surety bond or similar other financial assurance instrument, such as a Letter of Credit with accompanying draw down instructions, in the amount of the Net Decommissioning Cost that may be drawn upon to implement the Decommissioning Plan. If and when a subsequent estimate of the Net Decommissioning Cost increases the New Decommissioning Cost, the financial assurance instrument or letter of credit will be increased to the higher amount. Except as it may be drawn upon to implement the Decommissioning Plan, the amount of the financial assurance instrument will not be decreased. Exhibit A demonstrates an estimate of the total decommissioning and site restoration costs to be confirmed by the independent engineer:

Appendix A: Site Restoration and Decommissioning Cost Estimate

New Market Solar I OPINION OF PROBABLE COST - PV PLANT DECOMISSIONING - 65 MW		
ANNUAL INFLATION=1.36% - END OF LIFE: YEAR 35		
DISASSEMBLY & DISPOSAL		
ITEM	DESCRIPTION	TOTAL
1.0	PV Modules (400 W)	$ 451,754.58
2.0	PV Inverter(s) (2.5 MVA)	$ 29,906.50
3.0	PV Transformer(s) (2.5 MVA)	$ 14,953.25
4.0	ESS Inverter(s) (2MVA)	$ -
5.0	ESS Container(s)	$ -
6.0	ESS Transformer(s) (2MVA)	$ -
7.0	Racking Frame (Single Axis)	$ 447,850.65
8.0	Racking Posts	$ 571,490.40
9.0	Tracker Motors	$ 60,446.10
10.0	Racking Wiring	$ 102,525.99
11.0	Underground Cable (LV, MV, Comm)	$ 245,138.32
12.0	PV Plant Fence	$ 42,835.65
13.0	Interconnection Facilities	$ 105,632.49
14.0	Concrete	$ 7,098.00
15.0	Gravel	$ 115,096.80
16.0	Offsite Disposal by Volume	$ 170,937.00
17.0	Offsite Disposal by Weight	$ -
18.0	General Conditions	$ 236,275.00
SUBTOTAL		$ 2,601,940.73
SITE RESTORATION		
ITEM	DESCRIPTION	TOTAL
19.0	Re-Seeding	$ 73,912.80
20.0	Re-Grading	$ -
21.0	Erosion and Sediment Control	$ 46,673.90
SUBTOTAL		$ 120,586.70
SALVAGE		
ITEM	DESCRIPTION	TOTAL
22.0	PV Modules (400 W)	$ 2,959,775.00
23.0	PV Inverter(s) (2.5 MVA)	$ 83,794.10
24.0	PV Transformer(s) (2.5 MVA)	$ 71,999.20
25.0	ESS Inverter(s) (2MVA)	$ -
26.0	ESS Container(s)	$ -
27.0	ESS Transformer(s) (2MVA)	$ -
28.0	Racking Frame (Single Axis)	$ 955,970.18
29.0	Racking Posts	$ 707,219.37
30.0	Tracker Motors	$ 38,575.60
31.0	Interconnection Steel Structures	$ 2,472.13
32.0	Interconnection Power & Instrument Transformers	$ 11,243.00
33.0	Interconnection Disconnect Switches (1 & 3-Phase)	$ 1,059.76
34.0	Interconnection Primary Conductor	$ 874.90
35.0	Interconnection Pre-Fab Steel Buildings	$ 2,691.00
36.0	Control Panels	$ 62.40
37.0	Electronic Controls	$ 41.44
38.0	LV Wiring (PV Plant & Interconnection)	$ 257,825.16
39.0	MV Wiring	$ 268,989.70
40.0	Chain Link Fence (PV Plant & Interconnection)	$ 28,561.96
SUBTOTAL		$ 5,391,154.91
	TOTAL DISASSEMBLY, DISPOSAL, & SITE RESTORATION COST	*$ 2,722,527.43*
	TOTAL SALVAGE VALUE	*$ 5,391,154.91*
	NET DECOMISSIONING COST	*$ (2,668,627.47)*

MOTT MACDONALD

Project:	*New Market Solar I*	Engineer:	*J.Berkow*
Client:	*Hecate Energy*	Issue Date:	*3/4/20*
Location:	*Highland County, OH*	Revision:	*1*

OPINION OF PROBABLE COST - PV PLANT DECOMISSIONING - SAT - 100 Mwac

This opinion of probable costs is based on the engineer's experience in the design and construction of energy facilities and are subject to final engineering. This opinion is also based on our experience supervising the construction of PV plants and supervising the demolition of other non-PV facilities. The engineer accepts no liability for errors, omissions, or the accuracy and adequacy of this opinion. It is a violation of state law for any person, unless they are acting under direction of a licensed professional engineer to alter this document in any way. The engineer is unaware of a significant body of decommissioning PV plants with which to benchmark its opinion of cost. With the exception of the PV modules and inter-module wiring, none of the activities undertaken to disassemble a PV plant are unique to PV plants. Disassembly costs can be estimated similar to other types of facilities. While 3rd party software such as RS Means do contain data on PV plant disassembly, we have found that the data is not applicable to large ground-mounted systems.

This opinion assumes a third-party contractor, experienced in the construction and decommissioning of PV facilities will lead the effort. The reported costs include labor, materials, taxes, insurance, transport costs, equipment rental, contractor's overhead, and contractor's profit. Labor costs have been estimated using regional labor rates and labor efficiencies from the Bureau of Labor Statistics. This opinion assumes open-shop labor rates.

This opinion of cost has been split between plant disassembly, site restoration, and salvage which reflects the overall decommissioning process. The PV plant will first be disassembled, with all above and below grade components removed to a depth of 3 feet. This includes all buried cables, conduits, and foundations. Costs for disassembly are overall less than those for original assembly of the facility. While PV modules will need to be removed by hand to retain their salvage value, the racks, buried cables, and concrete can be removed by machine to increase efficiency. It is assumed that concrete, gravel, and fiber optic cable do not have salvage value and will be disposed off site. Other materials are assumed to have salvage value and can be sold at market prices.

It is expected that the entire site will be re-seeded with native grasses and vegetation. Planting of trees, shrubs, and other woody vegetation (re-forestation) or other beautification is not included in the costs. It is assumed that mulching and stabilization of seeded areas will only be required where gravel roads or concrete foundations were removed. As all cables will be direct buried, excavation to remove the cables will not be required, and the disturbance to those areas will be minimal. The remainder of site will already be vegetated and disassembly activities will not significantly disturb the vegetation. Seeding in those areas is included as a precautionary measure.

It is assumed that re-grading of the site to remove diversion dikes and retention ponds is not required. The earth-moving required to remove these features would likely trigger a NPDES (or state/local equivalent) permit, which would in turn require those same features to be installed to control stormwater on the site. In addition, it is assumed no new erosion and sediment control measure will be required for disassembly. These would have been put in place during the original construction, and would be required to remain in place and properly maintained for the project life.

Salvage values, if included, have been estimated using publicly available data from http://www.scrapmonster.com. Inverters were priced at the rate for Complete Computers, which is lower than what could be attained if they were disassembled on site. Transformers were priced at 80% of the market rate for Sealed Unit Transformers. PV modules may have residual value as functioning units, but were instead assumed to be priced a Low Grade Boards.

Inflation, if included in this estimate has been projected based on the Producer Price Indices for Final Demand Construction. PPI is a more appropriate measure than CPI as it is targeted to the specific commodity. Detailed assumptions and the total opinion of cost for decommissioning is provided on the next sheets. Inflation has not been assumed for salvage values.

MOTT MACDONALD

Project:	*New Market Solar I*	Engineer:	*J.Berkow*
Client:	*Hecate Energy*	Issue Date:	*3/4/20*
Location:	*Highland County, OH*	Revision:	*1*

PV PLANT ANTICIPATED DISASSEMBLY METHODS	
ITEM	DISASSEMBLY METHOD
PV Modules	Hand Removal. Place modules face down on pallets, tape wire ends, tied down and transport via skid-steer to staging location. Assumed 5% breakage, salvage value for crystalline, no salvage for thin-film. 1200 modules/day, 6-person crews
Inverters	Removal by crane and transport via flat-bed to staging location. Assume no disassembly. Assumed salvage value.
Transformers	Removal by crane and transport via flat-bed to staging location. Assume no disassembly. Oil removal performed by scrap facility. Assumed salvage value.
Racking Frame	Stabilize w/ machine. Cut legs and lower to ground level. Cut cross beams to appropriate size and transport via dump truck to staging location. Assumed salvage value.
Racking Posts	Remove via post-puller and transport via dump truck to staging location. Assumed salvage value.
Racking Wiring	Disconnect PV connectors, cut cable ties, and remove wires from cable tray. Transport via dump truck to staging area. Assumed salvage value.
Underground Cable	Excavate to cable depth at one end of trench. Use tractor or backhoe pull out all cables in common trench. Cables are direct buried so complete excavation of trenches is not required. Transport via dump truck to staging area. Assumed salvage value.
Fence	Machine roll fence fabric. Remove posts via post-puller and transport via dump truck to staging location. Assumed salvage value.
Concrete	Remove with excavator and jack hammer. Backfill and compact as needed. Transport via dump truck to staging area. Assumed offsite disposal.
Gravel	Remove with skid steer with sweeper. Transport via dump truck to staging area. Assumed offsite disposal.
Offsite Disposal	Assumed disposal at $95/ton or $45/CY including tipping fee.
Re-Seeding	Re-seed using an ATV-pulled drill seeder, at 5lbs bulk seed per acre of native grasses. Stabilize and mulch on areas where concrete or gravel was removed only.
Re-Grading	No bulk re-grading is included as this would alter site hydrology.
Erosion & Sediment Control	Install silt fence around project perimeter. Install tracking control at site entrance and replace once during disassembly. Remove at end of disassembly. We anticipate net soil disturbance is < 1 acre.
Energy Storage System	Assumes a containerized solution w/ up to 5MWh per container. Container has assumed salvage value. Batteries and racks have offsite disposal. Other components addressed as above.

MOTT MACDONALD

Project:	*New Market Solar I*	Engineer:	*J.Berkow*
Client:	*Hecate Energy*	Issue Date:	*3/4/20*
Location:	*Highland County, OH*	Revision:	*1*

GENERATION SUBSTATION ANTICIPATED DISASSEMBLY METHODS	
ITEM	DISASSEMBLY METHOD
Steel Structures	Disassembled, lowered by crane, and transported via flat-bed to staging location. Assumed salvage value.
Circuit Breakers	Removed from pads and transported via flat-bed to staging location. Assumed no salvage value, and no difference in recycling vs. disposal cost.
Power & Instrument Transformers	Removal by crane and transport via flat-bed to staging location. Assume no disassembly or oil removal of small units, oil drained from main power transformer prior to transport. Assumed salvage value.
Disconnect Switches	Removal by crane, disassemble, and transport via flat-bed to staging location. Assumed salvage value for metal components. Insulators assumed no value.
Insulators and Arresters	Removal from supports. Assumed no salvage value.
Primary Conductor	Cut cable and bus pipe at ends and transport to staging location. Assumed salvage value.
Underground Cable	Excavate to cable depth at one end of trench. Use tractor or backhoe remove all cables and conduits in common trench. Transport via dump truck to staging area. Assumed salvage value.
Pre-Fab Steel Buildings	Rough disassembly on site. Assumed salvage value.
Control Panels	Removal of electronic components. Rough disassembly. Assumed salvage value for electronic and metal components.
Fence	Machine roll fence fabric. Remove posts via post-puller and transport via dump truck to staging location. Assumed salvage value.
Concrete	Remove with excavator and jack hammer. Transport via dump truck to staging area. Assumed offsite disposal.
Gravel	Remove with skid steer with sweeper. Transport via dump truck to staging area. Assumed offsite disposal.
Offsite Disposal	Assumed disposal at $95/ton or $45/CY including tipping fee.
Re-Seeding & Re-Grading	Re-seed using an ATV-pulled drill seeder, at 3.2lbs per acre of native grasses. Use rough grading machine to lower substation pad to native elevation.

MOTT MACDONALD

Project:	*New Market Solar I*	Engineer:	*J.Berkow*
Client:	*Hecate Energy*	Issue Date:	*3/4/20*
Location:	*Highland County, OH*	Revision:	*1*

OPINION OF PROBABLE COST - PV PLANT DECOMISSIONING - 65 MW - ANNUAL INFLATION=1.36% - END OF LIFE: YEAR 35

DISASSEMBLY & DISPOSAL

ITEM	DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL
1.0	PV Modules (455 W)	177,653	$ 2.03	$ 360,635.59
2.0	PV Inverter(s) (2.56 MVA)	26	$ 1,070	$ 27,820.00
3.0	PV Transformer(s) (2.56 MVA)	26	$ 535	$ 13,910.00
4.0	ESS Inverter(s) (2MVA)	0	-	-
5.0	ESS Container(s)	0	-	-
6.0	ESS Transformer(s) (2MVA)	0	-	-
7.0	Racking Frame (Single Axis)	2,278	$ 145	$ 330,310.00
8.0	Racking Posts	25,054	$ 16	$ 400,864.00
9.0	Tracker Motors	2,278	$ 22	$ 50,116.00
10.0	Racking Wiring	2,495,827 LF	$ 0.09	$ 224,624.43
11.0	Underground Cable (LV, MV, Comm)	119,737 LF	$ 0.94	$ 112,552.78
12.0	PV Plant Fence	37,492 LF	$ 2.75	$ 103,103.00
13.0	Interconnection Facilities (Pro-Rata Split w/ NMSII)	1 LS	$ 105,632.49	$ 105,632.49
14.0	Concrete	78 CY	$ 84	$ 6,552.00
15.0	Gravel	4,936 CY	$ 31	$ 153,016.00
16.0	Offsite Disposal by Volume	5,015 CY	$ 45	$ 225,675.00
17.0	Offsite Disposal by Weight	0.00 TON	$ 95	$ -
18.0	General Conditions	65 MW	$ 2,112	$ 137,280.00
			SUBTOTAL	$ 2,252,091.29

SITE RESTORATION

ITEM	DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL
19.0	Re-Seeding	361 ACRES	$ 138	$ 49,818.00
20.0	Re-Grading	0 CY	$ 21	$ -
21.0	Erosion and Sediment Control	1 LS	$ 110,588	$ 110,588.00
			SUBTOTAL	$ 160,406.00

SALVAGE

ITEM	DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL
22.0	PV Modules (455 W)	168,770	$ 14	$ 2,362,780.00
23.0	PV Inverter(s) (2.56 MVA)	26	$ 2,998	$ 77,948.00
24.0	PV Transformer(s) (2.56 MVA)	26	$ 2,576	$ 66,976.00
25.0	ESS Inverter(s) (2MVA)	0	$ 2,998	$ -
26.0	ESS Container(s)	0 LBS	$ 0.12	$ -
27.0	ESS Transformer(s) (2MVA)	0	$ 2,576	$ -
28.0	Racking Frame (Single Axis)	6,359,231 LBS	$ 0.12	$ 763,107.72
29.0	Racking Posts	4,133,844 LBS	$ 0.12	$ 496,061.28
30.0	Tracker Motors	122,991 LBS	$ 0.26	$ 31,977.66
31.0	Interconnection Steel Structures	20,602 LBS	$ 0.12	$ 2,472.24
32.0	Interconnection Power & Instrument Transformers	93,692 LBS	$ 0.12	$ 11,243.04
33.0	Interconnection Disconnect Switches (1 & 3-Phase)	2,650 LBS	$ 0.40	$ 1,060.00
34.0	Interconnection Primary Conductor	2,188 LBS	$ 0.40	$ 875.20
35.0	Interconnection Pre-Fab Steel Buildings	22,425 LBS	$ 0.12	$ 2,691.00
36.0	Control Panels	520 LBS	$ 0.12	$ 62.40
37.0	Electronic Controls	166 LBS	$ 0.25	$ 41.50
38.0	LV Wiring (PV Plant & Interconnection)	147,124 LBS	$ 1.61	$ 236,869.64
39.0	MV Wiring	198,304 LBS	$ 1.03	$ 204,253.12
40.0	Chain Link Fence (PV Plant & Interconnection)	572,661 LBS	$ 0.12	$ 68,719.32
			SUBTOTAL	$ 4,327,138.12

TOTAL DISASSEMBLY, DISPOSAL, & SITE RESTORATION COST	*$*	*2,412,497.29*
TOTAL SALVAGE VALUE	*$*	*4,327,138.12*
NET DECOMISSIONING COST	*$*	*(1,914,640.83)*

Mott MacDonald

3/4/2020

Date

Stuart Akers, PE
Principal Engineer
(512) 777-3078

Summary: Notification Compliance with Condition No. 15 (Updated Decommissioning Plan) electronically filed by Ms. Karen A. Winters on behalf of Hecate Energy Highland 4 LLC