



<i>Project:</i>	<i>Greycourt</i>	<i>Engineer:</i>	<i>J. Farrell</i>
<i>Client:</i>	<i>Lightstar</i>	<i>Issue Date:</i>	<i>5/4/22</i>
<i>Location:</i>	<i>Chester, NY</i>	<i>Revision:</i>	<i>3</i>

OPINION OF PROBABLE COST - PV PLANT DECOMMISSIONING - SAT - 4.1 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.

After the PV plant can longer be used, it shall be removed by the permit applicant or any subsequent owner. 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 union labor rates.

This opinion of cost has been split between plant disassembly and site restoration which reflects the overall decommissioning process - estimated to occur for approximately 2.5 months. 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 be removed by hand, the racks, buried cables, and concrete can be removed by machine to increase efficiency. It is assumed that concrete, gravel, and fiber optic cable will be disposed off site.

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. The revegetated site will be monitored for two (2) years to confirm plant establishment - costs associated with this monitoring have not been included in this opinion of probable costs.

It is assumed that re-grading of the site is not required. However, erosion and sediment control best management practices (BMPs) outlined in the project's Stormwater Pollution Prevention Plan (SWPPP) will be implemented during decommissioning of the project. Appropriate BMPs will be installed, as needed, to control soil erosion and sedimentation while re-establishing vegetation in seeded areas. Upon completion of restoration and reclamation activities, any temporary structures, silt fences or barriers used as erosion and sediment controls during decommissioning, restoration and reseeding activities will be removed when they are no longer needed.

Inflation in this estimate has been projected at 2% over the 20-year lifespan of the project. Detailed assumptions and the total opinion of cost for decommissioning is provided on the next sheets.

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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. 1200 modules/day, 6-person crews
Inverters	Removal by crane and transport via flat-bed to staging location. Assume no disassembly.
Transformers	Removal by crane and transport via flat-bed to staging location. Assume no disassembly. Oil removal performed by scrap facility.
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.
Racking Posts	Remove via post-puller and transport via dump truck to staging location.
Racking Wiring	Disconnect PV connectors, cut cable ties, and remove wires from cable tray. Transport via dump truck to staging area.
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.
Fence	Machine roll fence fabric. Remove posts via post-puller and transport via dump truck to staging location.
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.



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OPINION OF PROBABLE COST - PV PLANT DECOMMISSIONING - 4.1 MW - ANNUAL INFLATION=2% - END OF LIFE: YEAR 20				
DISASSEMBLY & DISPOSAL				
ITEM	DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL
1.0	PV Modules (450 W)	11,336	\$ 3.11	\$ 35,254.96
2.0	PV Inverter(s) (2.05 MVA)	2	\$ 1,892	\$ 3,784.00
3.0	PV Transformer(s) (2.05 MVA)	2	\$ 946	\$ 1,892.00
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)	140	\$ 232	\$ 32,480.00
8.0	Racking Posts	1,820	\$ 27	\$ 49,140.00
9.0	Tracker Motors	140	\$ 31	\$ 4,340.00
10.0	Racking Wiring	122,615 LF	\$ 0.13	\$ 15,939.95
11.0	Underground Cable (LV, MV, Comm)	6,731 LF	\$ 1.13	\$ 7,606.03
12.0	PV Plant Fence	5,744 LF	\$ 3.91	\$ 22,459.04
13.0	Interconnection Facilities	1 LS	\$ 7,450.00	\$ 7,450.00
14.0	Concrete	7 CY	\$ 156	\$ 1,092.00
15.0	Gravel	138 CY	\$ 58	\$ 8,004.00
16.0	Offsite Disposal by Volume	146 CY	\$ 45	\$ 6,570.00
17.0	Offsite Disposal by Weight	7.01 TON	\$ 95	\$ 665.95
18.0	General Conditions	4 MW	\$ 4,438	\$ 18,195.80
			SUBTOTAL	\$ 214,873.73
SITE RESTORATION				
ITEM	DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL
19.0	Re-Seeding	20 ACRES	\$ 167	\$ 3,340.00
20.0	Re-Grading	0 CY	\$ 39	-
21.0	Erosion and Sediment Control	1 LS	\$ 22,046	\$ 22,046.00
			SUBTOTAL	\$ 25,386.00
TOTAL DISASSEMBLY, DISPOSAL, & SITE RESTORATION COST				\$ 240,259.73

Mott MacDonald

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 5/4/2022
 Date