

## **DECOMMISSIONING PLAN**

ASD Cotuit MA Solar LLC

### **BACKGROUND**

ASD Cotuit MA Solar LLC has prepared this preliminary decommissioning plan and cost estimate for the prospective Cotuit Road solar facility at 180 Cotuit Road, Sandwich, MA. The purpose of this estimate is to provide the general scope of decommissioning work and the related material and labor costs. And while this estimate is prepared by the applicant directly, we have a large body of comparable decommissioning estimates and bonds to draw conclusions from. An engineer certified cost estimate for a similarly sized and sited, operational project (Westport, MA in 2019) is provided for comparison.

A higher-level estimate was previously provided for a generic project with the original application package, but did not include some of the regional (and more conservative) cost components used here. Given the now expected public ownership of the property and future conservation of the site, we consider it reasonable to make far more cautious assumptions for the purposes of the bonding amount.

Please keep in mind that our proposed decommissioning bond structure includes a mechanism to update its assumptions on a 5 year basis (in addition to the annual inflation rate). So should an assumed price/cost change, the bond changes. By way of example, should module recycling become mandatory by 2030 (and its costs outweigh salvage value), the Special Permit would require the decommissioning bond amount to be increased accordingly.

Besides simply being more granular, the estimate includes an updated metal salvage costs (with a lower inflation rate than the labor costs), not including any significant module recycling value above scrap value, assuming more robust restoration with new pollinator standards and property conservation expectations, using single axis tracking with pile foundations instead of fixed tilt table with screw foundations, adjusting for wooden vs chain link fencing costs, and assuming increased labor costs due to the density of the Cotuit Rd site compared to typical sites.

Because we do not yet have approval by the Cape Cod Commission and the Sandwich Planning Board, we can only provide a preliminary draft at this time. A fully engineered decommissioning plan is expected to be required by the Sandwich Planning Board as a condition of the Special Permit. The decommissioning cost (and subsequent bond) would be finalized with Sandwich once the design is set after a Special Permit award.

### **Facility Description**

The proposed facility is an approximately 4.5 MWdc ground mounted PV System. The project impacts approximately 10.85 acres of currently wooded upland. The project includes ground-mounted, solar panel arrays, equipment pads hosting battery storage and an inverter/transformer, utility poles, stormwater management feature, a wooden perimeter fence and a gravel driveway off Cotuit Road.

### **Decommissioning activities: Dismantlement, Demolition, and Disposal or Recycle**

A significant amount of the components of the photovoltaic system at the Facility will include recyclable or re-saleable components, including copper, aluminum, galvanized steel, and modules. Due to their resale monetary value, these components will be dismantled and disassembled rather than being demolished and disposed.

Following coordination with the local utility company regarding timing and required procedures for disconnecting the Facility from the private utility-Tie In Point, all electrical connections to the system will be disconnected and all connections

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will be tested locally to confirm that no electric current is running through them before proceeding. All electrical connections to the panels will be disconnected at the panel and then removed from their framework by cutting or dismantling the connections to the supports; then modules will be removed. According to the November 2003 EPRI report "Potential Health and Environmental Impacts Associated with the Manufacture and Use of Photovoltaic Cells" prepared for the California Energy Commission, "At sites with installed PV modules, release of trace metals from sealed modules is unlikely except due to explosion or fire." There should be an exceptionally low chance of hazardous releases based on demolition activities.

The photovoltaic mounting system framework will be dismantled and recycled. The metal piles will be removed from below ground level and then recycled.

Finally, we assume that all associated structures will be demolished and removed from the site within one hundred fifty (150) days for recycling or after the system is taken offline. This will include the site fence and gates, which will likely be reclaimed or recycled. The buried cables/underground conduits will be removed and salvaged. Concrete will be broken and will be crushed and disposed of off-site or recycled. Temporary sanitary facilities will be provided on-site for the workers conducting the decommissioning of the Facility. The actual time to decommission and remove the equipment will be less than the 150 days but this allows for delays to the process caused by the time of year the project is taken off line.

All above ground utility poles owned by Operator/Owner will be completely removed and disposed of offsite in accordance with utility best practices. Any overhead wires will be removed from the area of the solar modules and terminated at the utility-owned (Utility Company) structure and will be recycled.

A final site walkthrough will be conducted to remove debris and/or trash generated within the site during the decommissioning process and will include removal and proper disposal of any debris.

### **Site Stabilization:**

If any areas of the Facility are significantly disturbed during decommissioning, they can be re-graded (at the preference of the property owner) to reestablish the previous topography. And while hydroseeding is an option for re vegetating ground cover, the then current mix of species in the ground cover (and their ecological function/requirements) will be considered in any necessary revegetation effort.

### **Schedule:**

The decommissioning process is estimated to take approximately 6-8 weeks, but in no case will be longer than is consistent with the Town of Sandwich bylaws.

### **Decommissioning Cost Estimate:**

By a wide margin, the two biggest factors driving the bond amount is the cost or value of disposing or recycling the solar module and the market price of scrap steel and copper. In the initial years, there is a near certainty the modules would have significant salvage value as functional solar modules (with value far outweighing the other decommissioning costs). In later years (15-40+), a small salvage value can be assumed for the metal components of the modules. At present, recycling most of the module is likely: The aluminum and glass are the majority of the module by weight and volume, are easy recoverable, and are relatively valuable.

Assuming minor positive recycle value for PV module:

DECOMMISSIONING COST ANALYSIS							
	DESCRIPTION OF ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST (2020)	TOTAL COST (25 YEARS)	LOGIC
<b>I. DISASSEMBLY &amp; DISPOSAL</b>			<b>EA</b>				
0	Disconnect of Electrical System	1	EA	\$ 800.00	\$ 800.00	\$ 1,483.12	* Assumes one 10 hr day for 1 qualified lineman,
1	PV Modules	11500	EA	\$ 4.89	\$ 56,235.00	\$ 104,254.07	* Use Crew A-5 (2 Laborers; .25 Truck Driver; .25 Flatbed Truck) = \$1,222/day. Assume crews can remove ~250 panels/day.
2	Inverter(s), Converter(s)	2	EA	\$ 1,500.00	\$ 3,000.00	\$ 5,561.70	
3	Transformer(s)	1	EA	\$ 305.50	\$ 305.50	\$ 566.37	
4	Battery Containers	2	EA	\$ 1,500.00	\$ 3,000.00	\$ 5,561.70	
5	Racking Frame (Single Axis)	425	EA	\$ 7.64	\$ 3,247.00	\$ 6,019.61	* Use Crew A-5 (2 Laborers; .25 Truck Driver; .25 Flatbed Truck) = \$1,222/day. Assume crews can remove 80/day.
6	Racking Posts	1150	EA	\$ 7.64	\$ 8,786.00	\$ 16,288.37	* Use Crew A-5 (2 Laborers; .25 Truck Driver; .25 Flatbed Truck) = \$1,222/day. Assume crews can remove 80/day.
7	DC Wiring	20000	LF	\$ 1.17	\$ 23,400.00	\$ 43,381.26	* Use Crew A-5 (2 Laborers; .25 Truck Driver; .25 Flatbed Truck) = \$1,222/day. Assume 2 removal days.
8	AC Wiring(Conduits)	39000	LF	\$ 1.04	\$ 40,560.00	\$ 75,194.18	* Use Crew A-5 (2 Laborers; .25 Truck Driver; .25 Flatbed Truck) = \$1,222/day. Assume 6 removal days.
9	AC Wiring Overhead	1	LS	\$ 1,222.00	\$ 1,222.00	\$ 2,265.47	* Use Crew A-5 (2 Laborers; .25 Truck Driver; .25 Flatbed Truck) = \$1,222/day. Assume 1 removal days.
10	Wooden Fence	3360	LF	\$ 3.45	\$ 11,592.00	\$ 21,490.41	* Use Crew A-5 (2 Laborers; .25 Truck Driver; .25 Flatbed Truck) = \$1,222/day. Assume crews can remove 500 LF/day.
11	Concrete	15	CY	\$ 22.09	\$ 331.35	\$ 614.29	* Use Crew B-3B (2 Laborers; 1 Equip Oper; 1 Truck Driver; 1 Backhoe; 1 Dump Trk) = \$3,534/day. Assume crews can remove 160 CY/day.
12	Concrete disposal	15	CY	\$ 7.00	\$ 105.00	\$ 194.66	* Assumed \$7 ton per Concrete Recycling Inc. crushing and recycle costs. One CY = 2.03 tons
13	Gravel (Access Road)	800	CY	\$ 22.09	\$ 17,672.00	\$ 32,762.12	* Use Crew B-3B (2 Laborers; 1 Equip Oper; 1 Truck Driver; 1 Backhoe; 1 Dump Trk) = \$3,534/day. Assume crews can remove 160 CY/day.
14	Gravel Disposal	800	CY	\$ 5.50	\$ 4,400.00	\$ 8,157.16	* Assumed \$5.5 ton per Concrete Recycling Inc.. One CY = 1.4 tons (2800 lbs per Cyd)
15	General Conditions	1	LS	\$ 2,000.00	\$ 2,000.00	\$ 3,707.80	* Use Crew B-3B (2 Laborers) Assumes can complete in one days
16	Removal of utility poles	5	EA	\$ 1,100.00	\$ 5,500.00	\$ 10,196.45	Estimate include labor and all required tools and vehicles.
17	Utility Pole Disposal	1	LS	\$ 1,290.00	\$ 1,290.00	\$ 2,391.53	720 lbs per Pole. Commercial land fill cost per ton \$50. Transportation cost assumed to be \$1200 for rental and mileage fee
18	Landscaping Removal	1	LS	\$ 4,000.00	\$ 4,000.00	\$ 7,415.60	Estimate includes (2 Laborers) 2 days with required equipment for removal
				<b>SUBTOTAL</b>	<b>\$ (187,445.85)</b>	<b>\$ (347,505.86)</b>	
<b>II. SITE RESTORATION</b>							
19	Re-Seeding (includes seed )	10	Ac	\$ 1,200.00	\$ 11,400.00	\$ 21,134.46	* Cost includes: (Seed: 4-7 species (native types) Also with estimate is labor Spraying; Disking; Planting; Mulch; One man & machine)
20	Re-Grading / Stormwater System	1050	CY	\$ 11.00	\$ 11,550.00	\$ 21,412.55	* (2 Laborers; 1 Equip Oper; 1 Truck Driver; 1 Backhoe; 1 Dump Trk) = \$3,448/day. Assume crews can grade 300 CY/day.
				<b>SUBTOTAL</b>	<b>\$ (22,950.00)</b>	<b>\$ (42,547.01)</b>	
<b>III. SALVAGE</b>							
21	PV Modules	11500	EA	\$ 5.00	\$ 57,500.00	\$ 72,013.00	Assumes minimal material recycling value and no ability to sell resell modules for operational use
22	Inverter(s)	1	EA	\$ 400.00	\$ 400.00	\$ 500.96	Battery removal at end of life included in battery purchase
23	Transformer(s)	1	EA	\$ 1,700.00	\$ 1,700.00	\$ 2,129.08	
24	Racking Frame (Single Axis	580000	LBS	\$ 0.12	\$ 69,600.00	\$ 87,167.04	
25	Racking Posts	87000	LBS	\$ 0.12	\$ 10,440.00	\$ 13,075.06	
26	Tracker Motors	150	EA	\$ 5.75	\$ 862.50	\$ 1,080.20	
27	AC Wiring	39000	LBS	\$ 0.75	\$ 29,250.00	\$ 36,632.70	
				<b>SUBTOTAL</b>	<b>\$ 169,752.50</b>	<b>\$ 212,598.03</b>	
Cost Inflation Rate							Legend:
2.5%		DEMOLITION AMOUNT			<b>\$ (210,395.85)</b>	<b>\$ (390,052.87)</b>	* = Costs derived from RS Means Heavy Site estimating manual (assume 10 hr shift)
Year 1 to Year 25 Cost Ratio		SALVAGE VALUE CREDIT			<b>\$ 169,752.50</b>	<b>\$ 212,598.03</b>	** = Assumes 2.5% annual increase in labor costs and 1.0% annual increase in salvage value
1.8539		<b>NET DEMOLITION COSTS</b>			<b>\$ (40,643.35)</b>	<b>\$ (177,454.84)</b>	
	Assumed MWdc Size		4.5				
Salvage Value inflation Rate		DEMOLITION AMOUNT PER MWdc			<b>\$ (46,754.63)</b>	<b>\$ (86,678.41)</b>	
1%		SALVAGE VALUE PER MWdc			<b>\$ 37,722.78</b>	<b>\$ 47,244.01</b>	
Year 1 to Year 25 Cost Ratio							
1.2524		<b>NET DEMOLITION PER MWdc</b>			<b>\$ (9,031.86)</b>	<b>\$ (39,434.41)</b>	

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				<b>SUBTOTAL</b>	<b>\$ 54,752.50</b>	<b>\$ 68,572.03</b>	
	Cost Inflation Rate						Legend:
	2.5%			DEMOLITION AMOUNT	<b>\$ (210,395.85)</b>	<b>\$ (390,052.87)</b>	* = Costs derived from RS Means Heavy Site estimating manual (assume 10 hr shift)
	Year 1 to Year 25 Cost Ratio			SALVAGE VALUE CREDIT	<b>\$ 54,752.50</b>	<b>\$ 68,572.03</b>	** = Assumes 2.5% annual increase in labor costs and 1.0% annual increase in salvage value
	1.8539			<b>NET DEMOLITION COSTS</b>	<b>\$ (155,643.35)</b>	<b>\$ (321,480.84)</b>	
		Assumed MWdc Size	4.5				
	Salvage Value inflation Rate			DEMOLITION AMOUNT PER MWdc	<b>\$ (46,754.63)</b>	<b>\$ (86,678.41)</b>	
	1%			SALVAGE VALUE PER MWdc	<b>\$ 12,167.22</b>	<b>\$ 15,238.23</b>	
	Year 1 to Year 25 Cost Ratio						
	1.2524			<b>NET DEMOLITION PER MWdc</b>	<b>\$ (34,587.41)</b>	<b>\$ (71,440.19)</b>	