Rhode Island Renewable Energy Growth Program:

Research, Analysis, & Discussion in Support of Incentive-Rate Adder Recommendations and discussion of AC vs. DC capacity eligibility considerations

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Sustainable Energy Advantage, LLC
Mondre Energy, Inc.

Incentive-rate adder considerations

Sustainable Energy Advantage, LLC

Incentive-Rate Adder Eligibility (1)

- **2023-S 684/2023-H 5853 – An Act Related to Public Utilities and Carriers – Net Metering** Allows OER and the Board to consider the **development of adders** for projects sited on parcels "requiring remediation"
  - The statute does not define "requiring remediation"
- In SEA's first and second draft of incentive-rate adders, SEA assumed that brownfields and landfills were the primary land types which could be eligible ➔ modeling focused on adder calculations for brownfields and landfills
- Following the release of second draft prices, SEA met with the RI Department of Environmental Management (DEM) to verify its understanding of expected adder eligibility
  - DEM validated SEA's expectation that brownfields, superfund sites, and landfills are likely to be the primary land types eligible for an adder
- In its comments on second draft prices, RIE voiced support for including super fund sites but noted that it was unclear if costs associated with development on superfund sites would be comparable to brownfields
  - Consultation with DEM suggestion superfund sites are generally more expensive to remediate ➔ **SEA believes it is appropriate to apply brownfield adder for superfund projects given limited potential to over-compensate**

Incentive-Rate Adder Eligibility (2)

- DEM noted that current practice for validating a project is located on a brownfield (in the context of REF brownfield incentive eligibility) is to validate that the site in question appears on DEM's existing brownfield database
  - ➔ expectation is that, for REG eligibility, DEM will utilize its Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database
    - Consistent with DEM's approach for validating brownfield siting for the purposes of REF incentives
  - Sites listed as Active (Status "A") are requiring remediation
  - Current list includes 6.3k acres of sites ➔ ~1.6 GW of solar potential (assuming 3.8 acres/MW)
    - 1.9k acres represent remediation projects logged since 2010
    - 71 active sites list acreage sufficient to support a project over 5 MW

Incentive-Rate Adder Eligibility (3)

- In first- and second-draft adder calculations, SEA **did not assume that remediation would include the initial capping of landfills**, as such activity is a cost the landfill owner would inevitably incur in the regular course of business
- However, DEM's preliminary interpretation of "requiring remediation" would **exclude landfills that have already been capped**, reasoning that the capping of a landfill is the primary remediation activity required for such sites
  - **M.I., Add costs associated with the capping of landfills to adder calc (as described later)**

Incremental Landfill Cost Assumptions

- A literature review of the cost of capping landfills reveals a range of values
  - EPA: Capital costs for installation of a cap can run between $80k/acre and $500k/acre (Source)
  - Federal Remediation Technologies Roundtable: Rough industry cost are $175k/acre (Source)
  - Maryland Department of the Environment: typical cost for Maryland sanitary landfill $150k/acre (Source)
  - New Jersey DEP: $95-370k/acre
  - MA Department of Environmental Protection: approximately $200,000 per acre (Source)
- **M.I., Adopt assumed cost of $150k/acre → additional $570/kW (assuming 3.8 Acre/MW)**
  - **Although 150k/acre is on the low side of publicly available estimates, it was selected in order to reduce the ratepayer impact of a resulting adder (if ultimately adopted) and to reflect the likelihood that some portion of landfill capping costs may still be covered by municipalities who would want to attract solar development to fund a significant portion of costs**

Other Incremental Cost Assumptions

- In SEA's second draft presentation, we noted that the DPUC suggested that SEA consider a negative cost delta for projects sited on land requiring remediation (e.g., lower costs), arguing that greenfield land lease costs may exceed preferred site costs
- SEA noted it would conduct additional research to better understand how land lease costs may vary for parcels requiring remediation
- **M.I.: No change. SEA has reviewed data provided by stakeholders in this proceeding and others relating to the incremental costs of preferred siting and has not found instances in which a negative land lease cost delta is assumed.**

Adopted Incremental Cost Assumptions

Input	Unit	Landfill				Brownfield			
		Initial Input	1st Draft	2nd Draft	3rd Draft	Adopted Input	1st Draft	2nd Draft	3rd Draft
Upfront Capital Cost	Inc. $/kW vs. Greenfield	$350*	$392*	$391*	$961	$330	$365	$372	$372
Upfront Permitting Costs (incremental to above $/kW input)	Inc. $ vs. Greenfield	$175,000	$230,000	$216,071	$216,071	$0	$240,000	$190,833	$190,833
Year 1 DC CF	% Change vs. Greenfield	-5.0%	-5.0%	-5.0%	-5.0%	0%	-2.5%	-2.5%	-2.5%
O&M	"	15%	15%	15%	15%	16%	16%	16%	16%
Project Mgmt.	"	10%	10%	10%	10%	7%	7%	7%	7%
Insurance	"	10%	10%	10%	10%	15%	15%	15%	15%
Land/Site Lease	"	0%	0%	0%	0%	0%	0%	0%	0%

*Does not assume the cost of capping a landfill

Summary of Resulting Adder Values

- A summary of the resulting adders, by resource class and parcel type, is provided below
  - **Results are in line with adders in Massachusetts for brownfields, which are approximately 3-4 cents/kWh**

Resource Class	Landfill Adder (¢/kWh)			Brownfield/Superfund Adder (¢/kWh)		
Draft	*1st Draft*	*2nd Draft*	*3rd Draft*	*1st Draft*	*2nd Draft*	*3rd Draft*
Non-Large Solar (<1 MW)	4.20	4.30	**8.00**	3.50	3.60	**3.60**
Large Solar (1-<5 MW)	4.20	4.30	**8.00**	3.50	3.60	**3.60**
Large Solar II (5-<10 MW)	3.80	3.60	**7.80**	3.20	2.90	**2.90**
Large Solar III (10-<15 MW)	3.70	3.40	**7.50**	3.10	2.80	**2.80**
Large Solar IV (15-<39 MW)	3.60	3.30	**7.40**	3.00	2.70	**2.70**

SEA proposes to set the adder value for resources under 1 MW equal to the Large Solar Adder Value.

Note: Above values would apply for the duration of the two- to three-year period under consideration

AC vs DC Capacity for REG Eligibility

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Context: Capacity denomination for program eligibility

- Solar incentive programs provide eligibility requirements related to capacity in both AC and DC demonization
- In recent years there has been a trend among regional state solar incentive programs to express capacity criteria in AC, examples include:
  - MA SMART/Net Metering Program
  - ME Net Energy Billing Program
  - Vermont Standard Offer Program
- Denoting program capacity sizing in AC aligns program cutoffs with interconnection guidelines

Modeling AC-denominated CPs

- A review of all commercial and large scale projects selected through open enrollments from 2020-2023 reveals that the average DC:AC ratio is 1.30
  - AC capacity is not reported for medium-scale projects, but an analysis of medium solar capacity sizing in MA (not paired with solar) also yields an average ratio of 1.3
- To model appropriate ceiling prices for AC-denominated size bins SEA increased the proxy project size by a factor of 1.3 ➔ captures cost savings available to economies of scale
- AC-Denominated ceiling prices are generally lower than DC-denominated prices
  - Small solar is assumed to have no fixed costs ➔ no benefits from scale

Resource Class	% Change in 2024 CP from DC ➔ AC
Small Solar I	0%
Small Solar II	0%
Medium Solar	-8%
Commercial Solar I	-7%
Commercial Solar I CRDG	-7%
Commercial Solar II	-6%
Commercial Solar II CRDG	-5%
Large Solar	-4%
Large Solar CRDG	-4%
Large Solar II	-4%
Large Solar III	-4%
Large Solar IV	-4%

AC vs DC Denominated CPs

					DC-Denominated CPs			AC-Denominated CPs			% Change in from DC → AC		
Technology	**Tariff Term**	**Size Range kW**	**Modeled kW_{DC} assuming DC bins**	**Modeled kW_{DC} assuming AC bins**	**2024 CP**	**2025 CP**	**2026 CP**	**2024 CP**	**2025 CP**	**2026 CP**	**2024 CP**	**2025 CP**	**2026 CP**
Small Solar I	15	0-15	5.8	N/A*	36.45	34.65	33.95	36.45	34.65	33.95	0%	0%	0%
Small Solar II	20	>15-25	25	N/A*	33.15	31.95	31.35	33.15	31.95	31.35	0%	0%	0%
Medium Solar	20	>25-250	250	325	34.35	33.45	33.25	31.65	30.75	30.55	-8%	-8%	-8%
Commercial I	20	>250-500	500	650	29.35	28.55	28.35	27.25	26.45	26.25	-7%	-7%	-7%
Commercial I CRDG	20	>250-500	500	650	32.25	31.45	31.25	30.15	29.35	29.15	-7%	-7%	-7%
Commercial II	20	>500-1,000	1000	1300	24.45	23.75	23.55	23.05	22.35	22.15	-6%	-6%	-6%
Commercial II CRDG	20	>500-1,000	1000	1300	27.35	26.65	26.35	25.95	25.25	24.95	-5%	-5%	-5%
Large Solar	20	>1,000-5,000	5000	6500	18.65	18.05	17.85	17.85	17.15	16.95	-4%	-5%	-5%
Large Solar-CRDG	20	>1,000-5,000	5000	6500	21.45	20.75	20.53	20.53	19.72	19.49	-4%	-5%	-5%
Large Solar II	20	5,000-<10,000	9999	12998	18.05	17.45	17.25	17.35	16.75	16.55	-4%	-4%	-4%
Large Solar III	20	10,000-<15,000	14999	19498	18.45	17.85	17.75	17.75	17.15	17.05	-4%	-4%	-4%
Large Solar IV	20	15,000-<39,000	20000	26000	18.15	17.55	17.45	17.45	16.85	16.75	-4%	-4%	-4%

*Small Solar sizing must be in DC per IC Tariff

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DEM Discussion of Core Forest Guidance

Materials and Contact Information

- Draft Core Forest Guidance Document
  - Comments will be accepted through November 17 and can be filed here
- Core Forest GIS Map
- Contact DEM: Ryan.Mulcahey@dem.ri.gov

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