STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

IN RE: THE RHODE ISLAND DISTRIBUTED GENERATION BOARD'S REPORT AND RECOMMENDATIONS RELATING TO THE 2018 RENEWABLE ENERGY GROWTH CLASSES, CEILING PRICES, AND CAPACITY TARGETS	:	DOCKET NO. 4774

REPORT AND RECOMMENDATIONS OF THE RHODE ISLAND DISTRIBUTED GENERATION BOARD ON 2018 RENEWABLE ENERGY GROWTH CLASSES, CEILING PRICES, AND CAPACITY TARGETS

I. INTRODUCTION

The Distributed Generation Board ("Board") hereby submits its recommendations to the Public Utilities Commission ("Commission") regarding the 2018 ceiling prices and annual targets in accordance with R.I. Gen. Laws § 39-26.6-4(a)(1) and the applicable provisions of R.I. Gen. Laws § 39-26.2-4 and § 39-26.2-5. These recommendations were approved by the Board at its meeting on October 23, 2017 to approve the ceiling prices and megawatt allocation plan; the recommendations were also endorsed by the Office of Energy Resources ("OER") and are submitted as a package.

The Renewable Energy Growth ("REG") Program, R.I. Gen. Laws § 39-26.6-1 et seq., requires the Board to develop and recommend ceiling prices for tariffs under the REG Program to the Commission for review and approval. The Board had Sustainable Energy Advantage ("SEA") develop the recommended ceiling prices, which SEA has conducted for the Board for prior REG program year submittals to the Commission. The REG Program also requires the Board to develop and recommend to the Commission annual megawatt ("MW") targets for enrollments by specified renewable energy technology classes for the program year. This is the fourth year in which the Board has made submissions to the Commission under the REG Program.

This filing contains the Board's Report and Recommendations for the 2018 Renewable Energy Growth Program Classes, Ceiling Prices, and Targets (hereafter "Report"). The Board's 2018 REG Program recommendations are summarized in **Exhibit B**, attached hereto and explained further in the Report.

II. 2017 REG PROGRAM RESULTS

The Rhode Island renewable energy market continued its growth in 2017, as national, regional, and local renewable energy developers become more familiar with the REG Program. As of October 2017, over 2,000 small solar tariffs from the 2015 to 2017 REG Program years have been awarded to homeowners across the State. The larger-scale solar market was also very strong in 2017, with full subscriptions in the medium, commercial and large solar classes. The large wind class was also fully subscribed with multiple wind turbines scheduled to be installed in Johnston in the summer of 2018. There were no small-scale wind, small-scale hydropower or anaerobic digestion project submittals in 2017, but OER is aware of a few projects that are under development and anticipate a proposal being submitted during the 2018 program year.

Overall, both the Board and OER are pleased with the REG Program's progress over the past 3 program years and National Grid's implementation and administration of the program. It is also worth noting that the success of the state's renewable program has not been lost on Massachusetts, which appears to be utilizing elements of the REG Program in its design of the new Solar Massachusetts Renewable Target Program.

III. ENACTED 2017 LEGISLATION AND IMPACTS WITH THE 2018 REG PROGRAM

The Rhode Island General Assembly enacted legislation that created a Statewide Solar Permit Application that streamlines the building and electrical permits associated with solar projects. The current solar permitting process involved 39 separate building and electric permits with municipal building and electric officials. The new Statewide Solar Permit Application is being finalized by OER through Rules and Regulations as of this Report's filing and will be required to be used by all municipalities and solar companies for solar projects of all sizes beginning on January 1, 2018. It appears that Rhode Island will be the only state in the northeast that has a mandatory statewide solar permit application with municipalities and is another example of the state's efforts to reduce the "soft costs" of solar project development. This new law is estimated to enable reductions in permitting costs of 10% to 15%, which contributed to a ~1% decrease in ceiling prices for solar PV systems compared to the 2017 program.

IV. FEDERAL ACTIVITY – POTENTIAL TARIFFS/QUOTAS AND TAX REFORM LEGISLATION

As of this Report's filing there is uncertainty regarding two (2) federal policy dynamics that may have a direct impact on the recommended 2018 ceiling prices:

(1) Trade Remedies under Section 201 of the Trade Act of 1974 – On September 22, 2017, the U.S. International Trade Commission ("USITC") ruled that two U.S. solar manufacturers (Suniva and SolarWorld) were being harmed by low-cost imported solar panels from a variety of international producers. On October 31, 2017, members of the USITC proposed three different remedies. The proposed remedies include differing combinations of tariffs, quotas, and/or an import licensing fee, to begin in 2018. The USITC has until November 13, 2017 to provide more detailed recommendations to the Trump Administration. The Trade Act of 1974 requires President Trump to accept or alter the USITC recommendations by January 12, 2018.

(2) Federal Tax Reform Legislation – The U.S. Congress and Trump Administration are currently pursuing tax reform legislation and could possibly include provisions that change the economics of renewable energy development.

OER is currently tracking both issues in coordination with the RI Congressional Delegation.

If there is federal activity that requires an adjustment to the 2018 Ceiling Prices, SEA will make the necessary adjustments and the Board will file an amended Report with updated ceiling prices in either December or January. OER will keep the Commission fully informed and provide any updates on these matters.

V. THE BASIC REQUIREMENTS OF THE REG PROGRAM

The applicable provisions of the REG law pertaining to the development of ceiling prices are as follows:

R.I. Gen. Laws § 39-26.6-3*(2)*: *"Ceiling price" means the bidding price cap applicable to an enrollment for a given distributed-generation class that shall be approved annually for each renewable-energy class pursuant to the procedure established in this chapter. The ceiling price for each technology should be a price that would allow a private owner to invest in a given project at a reasonable rate of return, based on recently reported and forecast information on the cost of capital, and the cost of generation equipment. The calculation of the reasonable rate of return for a project shall include, where applicable, any state or federal incentives, including, but not limited to, tax incentives.*

R.I. Gen. Laws § 39-26.6-5*(d)*: *The board shall use the same standards for setting ceiling prices as set forth in § 39-1 26.2-5. In setting the ceiling prices, the board may specifically consider:*

(1) Transactions for newly developed renewable energy resources, by technology and size, in the ISO-NE control area and the northeast corridor;

(2) Pricing from bids received during the previous program year;

(3) Environmental benefits, including, but not limited to, reducing carbon emissions;

(4) System benefits; and

(5) Cost effectiveness.

In addition, the Board is expected by R.I. Gen. Laws § 42-6.2-8 to exercise its powers in manner that addresses purposes of the Resilient Rhode Island Act, R.I. Gen. Laws § 42-6.2-1 et seq.

VI. 2018 REG PROGRAM

a. Technology Classes and System Sizes

The anticipated outcomes for the 2018 REG Program are the following:

(1) A diversified renewable energy program, in accordance with the purposes of R.I. Gen. Laws § 39-26.6-1 et seq., with a portion of the MW capacity to support each sector.

(2) As appropriate, continued decreases in ceiling prices in each technology – signaling increased program cost effectiveness.

(3) Economic development with the State's renewable energy market.

(4) Maintaining a consistent and predictable REG Program and associated capacity targets from year-to-year for both residential and commercial associated renewable energy companies to operate, maintaining staffs and develop complex projects that have potential multiple year lead times before submitting a tariff proposal to National Grid.

The Board recommends the following classes and eligible system sizes for solar, wind, anaerobic digestion and small-scale hydropower. The 2018 REG Program includes the same technology and classes that were filed and approved by the Commission for the 2018 REG Program:

Table I

Technology Class	**Eligible System Sizes**
Small Solar I	1 to10 kW DC
Small Solar II	11 to 25 kW DC

Medium Solar	26 to 250 kW DC
Commercial Solar	251 to 999 kW DC
Large Solar	1 to 5 MW DC
Small Wind	10 to 999 kW DC
Large Wind	1.0 to 5.0 MW DC
Anaerobic Digestion	≤ 5 MW DC
Small Scale Hydropower II	≤ 5 MW DC
Community Remote – Commercial Solar	251 to 999 kW DC
Community Remote – Large Solar	1 to 5 MW DC
Community Remote – Large Wind	1.0 to 5.0 MW DC

b. <u>Recommended Ceiling Prices</u>

The Board, with SEA and OER, considered the following data when developing the ceiling prices recommendations:

(1) State or federal incentives including, but not limited to, tax incentives;

(2) Transactions for newly developed renewable energy resources, by technology and size, in the ISO-NE region and the northeast corridor;

(3) Pricing for DG Standard Contracts executed between 2011 and 2014 and first three years (2015, 2016, 2017) of the REG Program;

(4) 2016 State Law - Residential Renewable Energy Systems/Local Tax Exemption;

(5) 2016 State Law - Statewide Renewable Tangible Taxes State Law;

(6) 2017 State Law - Statewide Solar Permit (Building/Electric) Application;

(7) Rhode Island and Massachusetts Interconnection Costs;

(8) Cost effectiveness for the eligible technologies; and

(9) Public Comments and Data received from stakeholders, including estimates of the cost and performance of their projects currently under development.

The Board developed ceiling price recommendations for each technology and size class listed in Tables I above. The Board recommends that all of the solar ceiling prices include the benefit of the thirty percent (30%) federal investment tax credit (“ITC”), as the full value of this credit is available for projects achieving commercial operation by December 31, 2019. A prescribed phasedown of the ITC commences thereafter. While the Production Tax Credit (“PTC”) was also extended, the wind PTC (or ITC in lieu thereof) is subject to an earlier phasedown than the solar ITC. As a result, the Board recommends that the wind ceiling prices include a benefit equal to 60% of the (30%) full value of the ITC. The Board recommends ceiling prices for the anaerobic digestion and small-scale hydropower classes without the federal production tax credit (or ITC in lieu thereof) because this incentive is not currently available. Federal accelerated depreciation benefits – including a 30% bonus depreciation – are also assumed to be captured by eligible projects placed in service during calendar year 2019.

The Board is also recommending that the medium scale solar class and associated ceiling price be shifted from a set-fixed price submittal to a competitive bidding process for the capacity allocated to that program category in 2018.

2018 Ceiling Price Development - SEA has previously advised the development of the 2011, 2012, 2013 and 2014 DGSC and the 2015, 2016 and 2017 REG ceiling prices. SEA used the Cost of Renewable Energy Spreadsheet Tool (“CREST”) Model to evaluate potential 2018 ceiling prices. The CREST Model was published as a report of the National Renewable Energy Laboratory, a national laboratory of the U.S. Department of Energy, Office of Renewable Energy and Energy Efficiency.

To generate ceiling prices with the CREST Model, SEA collected data from renewable energy programs in Rhode Island, Massachusetts, Connecticut, Vermont, and New York. SEA also requested from National Grid the bid and cost data (including interconnection data) from the DGSC and REG applications submitted from 2011 to 2016, as well as the first two enrollment periods of 2017. SEA, on behalf of the Board, also issued a survey to stakeholders at the beginning of the 2018 ceiling price development process (June 2017). SEA further requested data and comments from stakeholders to inform the development of a first, second, and final draft of the ceiling prices. SEA staff was made available to OER, Board members, and stakeholders during the development of the ceiling prices. SEA attended and participated in three (3) public meetings to discuss the research conducted and data submitted, the analysis completed, and the ceiling prices recommended – the last of which occurred at the October 23rd DG Board meeting, where the 2018 REG Program Report was unanimously approved.

Tables II and III provide the Board's recommended 2018 ceiling prices:

Table II

Technology	**Ceiling Prices (¢/kWh)**
Small Solar I (15 Year Tariff)	31.25
Small Solar I (20 Year Tariff)	27.75
Small Solar II (11-25)	26.55
Medium Solar (26-250)	22.45
Commercial Solar	17.65
Large Solar	14.65
Small Wind	20.85
Large Wind	16.35
Anaerobic Digestion	19.75
Small Scale Hydropower	23.35

Table III – Community Remote Distributed Generation Classes

Technology	**Ceiling Prices (¢/kWh)**
Community Remote – Commercial Solar	20.30
Community Remote – Large Solar	16.85
Community Remote – Large Wind	18.05

Solar (Modeling Inputs Sources) - The CREST modeling relied upon information provided by stakeholders, as well as data from the Rhode Island Renewable Energy Fund, past DGSC and REG enrollments, National Grid, the Massachusetts Solar Renewable Energy Certificates ("SREC") Database, the Massachusetts Commonwealth Solar Program, New York State Energy Research and Development Authority ("NYSERDA", the New York Power Clerks Database), Lawrence Berkeley National Laboratories, and the Department of Energy to determine inputs used in modeling. Interconnection cost data were provided by National Grid and stakeholders. SEA also reviewed data from the Department of Energy's *Tracking the Sun* Program.

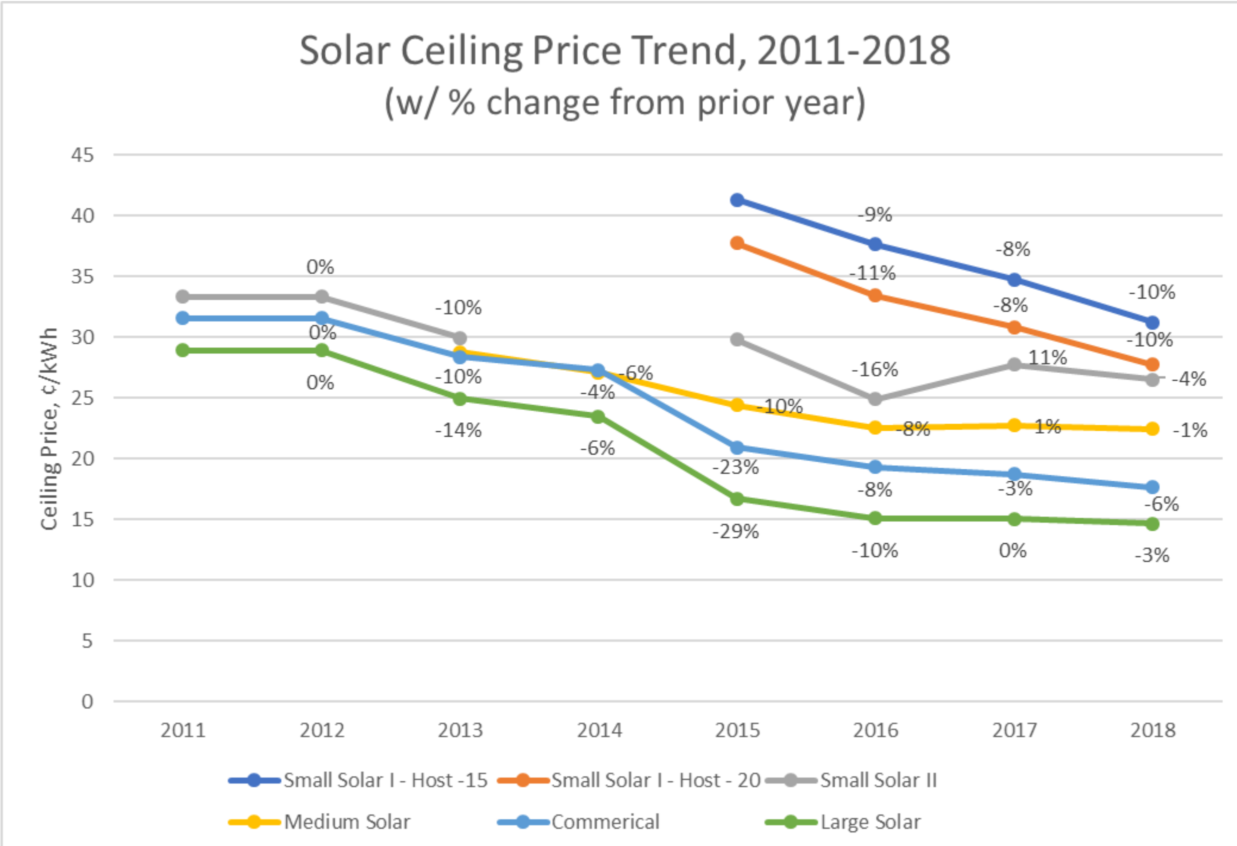
Solar (Comparison to 2017 REG Ceiling Prices):

Table IV

Solar Ceiling Price Category	**% Change between 2017 Actual and 2018 Proposed Ceiling Prices**
Small Solar I (20-year tariff)	-10%
Small Solar II	-4%
Medium Solar	-1%
Commercial Solar	-6%
Large Solar	-3%

The following Chart I summarizes the Ceiling Price trend for the Large Solar category from 2011 to 2018 (proposed), and includes the percentage change from year to year:

Chart I

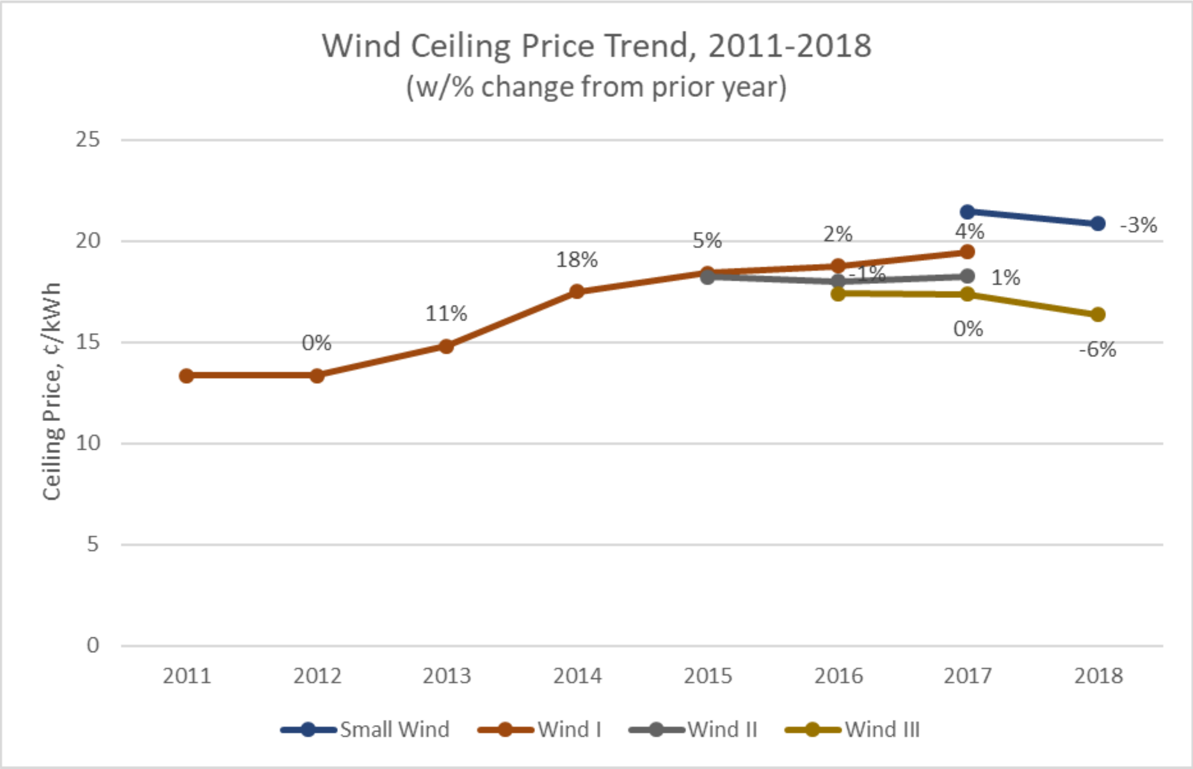


Changes in solar ceiling prices are based on updates to equipment (including interconnection), installation, and operating expenses, as well as tax and financing assumptions, where applicable.

Wind (Modeling Inputs Sources, and Comparison to Past DGSC Ceiling Prices) – The CREST modeling relied upon information provided by stakeholders, as well as data from the Massachusetts Clean Energy Center and the Lawrence Berkeley National Laboratory to determine inputs used in modeling. Historic interconnection cost data were provided by National Grid. The larger wind technology classes were consolidated from three size categories (Wind I, II, & III) to one (Large Wind) for 2018. The 2018 proposed ceiling prices would provide a 3 percent decrease for the Small Wind technology class compared to the 2017 ceiling price, and a 6 percent decrease for Large Wind compared to the 2017 Wind III ceiling price. The decrease in ceiling prices for the

Small and Large Wind technology classes is due to assumptions for decreased total project costs (for Large Wind) and a lower target after-tax IRR.

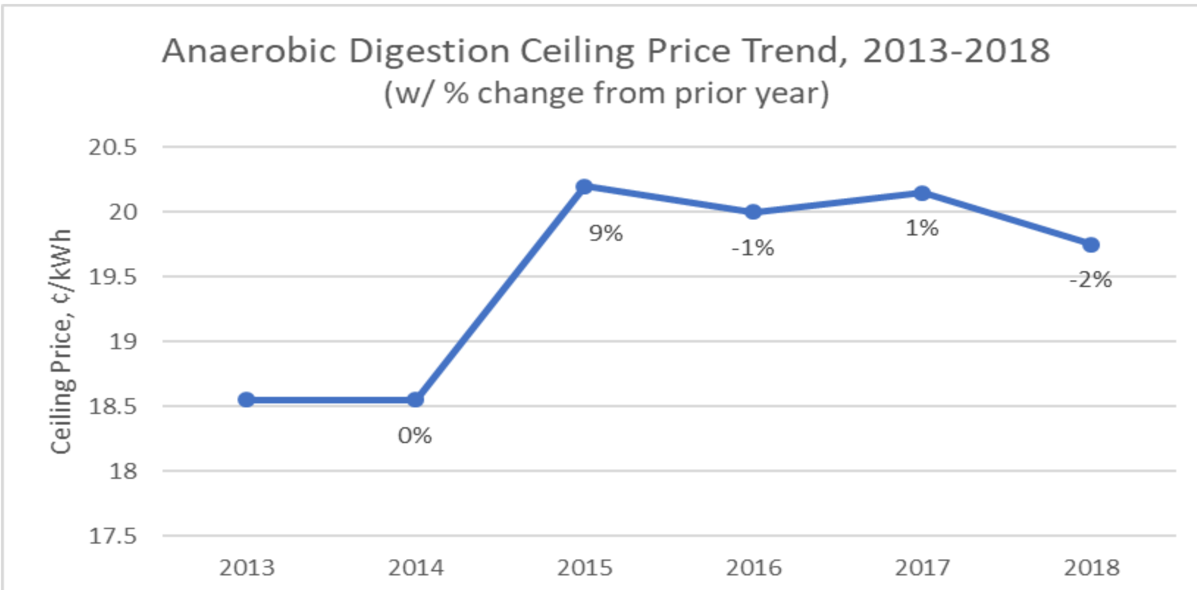
Chart II



The Board and SEA recommend these proposed ceiling prices as necessary to support wind development in Rhode Island, taking into account the difficulty of wind project siting and permitting, and the significant cost of developing, financing, constructing and operating wind projects that cannot benefit from the economies of scale that support the cost reduction trend demonstrated in other parts of the country. These high cost conditions are further exacerbated by the fact that on-shore wind development in Rhode Island will likely take place inland, as opposed to in coastal areas, where wind regimes are weaker. This leads to a lower production per MW of capacity, and a higher cost per MWh than would be expected for most well-sited wind turbines in other areas.

Anaerobic Digestion (Comparison to Past DGSC Ceiling Prices) – In 2014, there was only one Anaerobic Digestion technology class (50kW - 1.0MW), and in 2015-2017 there were two technology classes (I – 150-500 kW and II – >500kW – 1.0MW). For the 2018 REG Program, the technology classes have been combined into one (≤ 5 MW). The proposed ceiling price would provide a 2 percent decrease compared to 2017 (either AD technology class), due to assumptions for a lower target after-tax IRR.

Chart III



Small Scale Hydropower (Comparison to Past DGSC Ceiling Prices) - In 2014, there was only one Small Scale Hydropower technology class (50kW - 1.0MW), and in 2015-2017 there were two technology classes (I – 10-250 kW and II – >250kW – 1.0MW). For the 2018 REG Program, the technology classes have again been combined into one (≤ 5 MW). Hydroelectric development generally requires longer lead-times and is subject to more site-specific cost variation than other renewable energy technologies. As a mature technology, where available resources have largely been developed over the last 100+ years, there are limited opportunities for incremental hydro development. The recommended ceiling prices represent the acquisition of additional data about the costs to develop and operate those Rhode Island sites that may provide opportunity to install additional hydro capacity. The recommended 2018 Ceiling Price would result in a 4 percent increase from the 2017 Ceiling Prices for Hydro (Hydro I and II had the same ceiling price).

Chart IV

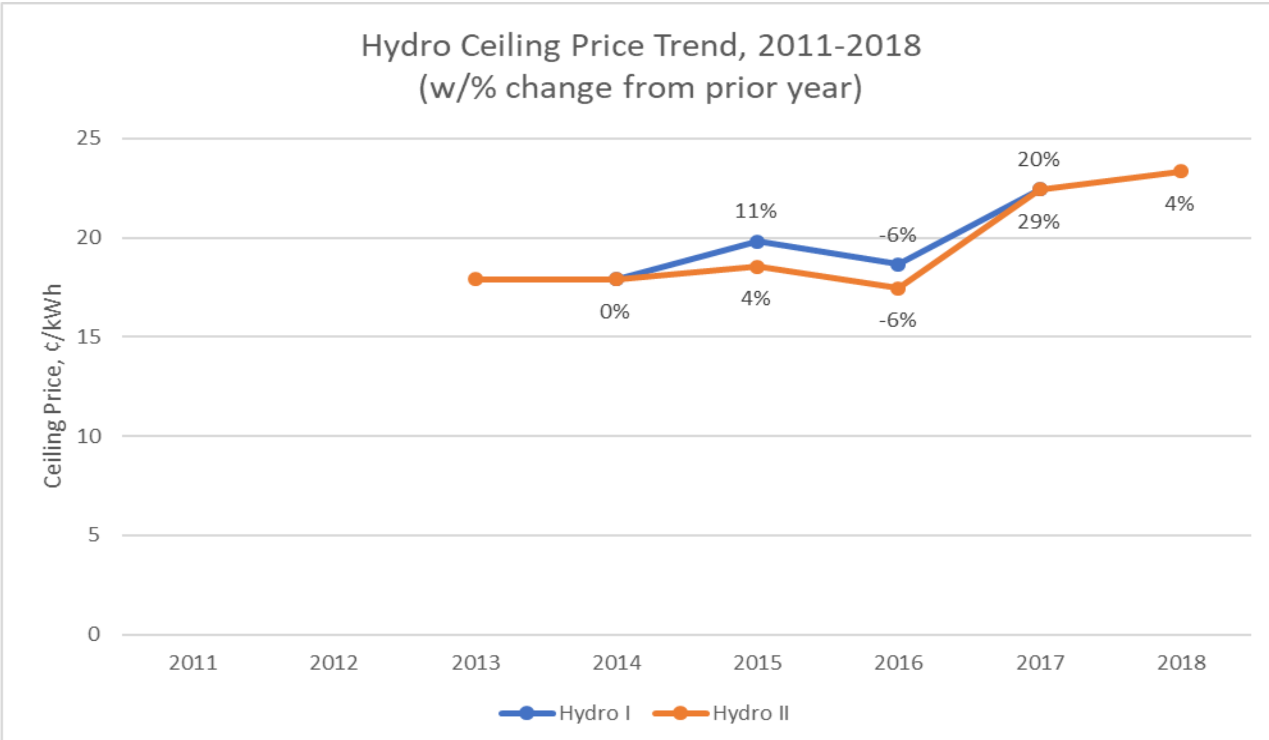


Table V provides a comparison of the proposed 2018 ceiling prices to those approved by the PUC for the 2017 REG Program:

[Table starts on next page]

Table V

2018 Renewable Energy Growth Program Recommended Ceiling Prices v. 2017 REG Approved Ceiling Prices (¢/kWh)				
2015 Technology Class	2017		2018	
	Size	Price (c/kWh)	Size	Price (c/kWh)
Small Solar I - 15 year tariff	1 - 10 kW	34.75	1 - 10 kW	31.25
Small Solar I - 20 year tariff	1 - 10 kW	30.85	1 - 10 kW	27.75
Small Solar II	10 - 25 kW	27.75	10-25 kW	26.55
Medium Solar	26 - 250 kW	22.75	26-250 kW	22.45
Commercial Solar	251 - 999 kW	18.75	251-999 kW	17.65
Large Solar	1 - 5 MW	15.05	1 – 5 MW	14.65
Small Wind	< 1 MW	21.45	< 1 MW	20.85
Large Wind	N/A	17.35	1- 5 MW	16.35
AD	501 - 1000 kW	20.15	≤ 5 MW	19.75
Hydro	250 - 1000 MW	22.45	≤ 5 MW	23.35

c. Recommended Allocation Plan

The 2018 REG Program will provide 40 MW of total nameplate capacity for fixed price and competitively bid projects. There will be 6.55 MW of capacity available for fixed priced projects with the small solar program and 33.45 MW available through a competitive bidding process. Overall, approximately 84% of the 2018 REG Program would be competitively bid. In 2017, it was approximately 76%. The increase in the percentage of capacity being competitively bid this upcoming year is due to the Board and OER recommending that the Medium Scale Solar Class be competitively bid during the commercial enrollment periods in 2018.

The Board recommends the following allocation plan for 2018, which is the same exact allocation plan that the Commission approved in 2017 and will continue one of the Board's primary objectives in having a consistent and predictable program for the renewable market and interested homeowners, businesses, municipalities, farmers and others to plan projects and participate in:

Table VI

Technology/Classes	**Megawatt/Kilowatt Allocation**
Small Solar I & II	6.55 MW DC
Medium Solar	3.0 MW DC
Commercial Solar	5.0 MW DC
Community Remote - Commercial Solar	3.0 MW DC
Large Solar	12.05 MW DC
Community Remote - Large Solar	3.0 MW DC
Small Wind	0.400 kW DC
Community Remote and Non-Community Remote Wind I, II and III	6.0 MW DC
Anaerobic Digestion I	1.0 MW DC
Anaerobic Digestion II	
Small Scale Hydropower I	
Small Scale Hydropower II	
Total	40 MW DC

d. <u>2018 REG Enrollment Plan Recommendations</u>

The Board recommends the following for the 2018 REG Small Solar and Commercial Renewable Programs:

(1) Allow the MW rollover rule for anaerobic digestion, small scale hydropower and wind technologies to occur during the first and second enrollments in 2018. If there are no projects submitted in the third enrollment to National Grid for these technologies or other eligible technologies, then the MW capacity can be redirected to where there is the greatest demand for the overall program. This process has been implemented by National Grid during past program years.

(2) Continuous open enrollment for the Small Solar Program that will open on April 1st.

This is how the 2015-2017 REG Program have operated and will allow homeowners, businesses, and solar companies the ability to submit their tariff applications on a rolling basis to National Grid and would allow small solar project customers to participate when they are ready.

First Enrollment – The Board recommends the following for the first commercial enrollment in April 2018:

Table VII

Technology/Classes	**Kilowatt Allocation**
Small Solar I & II	6.55 MW DC*
Medium Solar	3.0 MW DC
Commercial Solar	5.0 MW DC
Community Remote - Commercial Solar	3.0 MW DC
Large Solar	12.05 MW DC
Community Remote - Large Solar	3.0 MW DC
Small Wind	0.400 kW DC
Community Remote and Non-Community Remote Large Wind	6.0 MW DC
Anaerobic Digestion & Small Scale Hydropower	1.0 MW DC
Total	40 MW DC

*The continuous Small Solar Program is from April 2018 to March 31, 2019.

Second and Third Enrollments – The second (August) and third (October) enrollment quantities will be dependent on the results of the first enrollment.

VII. CONCLUSION

After an extensive and transparent development process, the Board voted at its October 23, 2017 to approve the recommendations made in this Report. The Board and OER respectfully request the Commission to approve the recommendations contained in this Report.

LIST OF EXHIBITS

Exhibit A - Distributed Generation Board Members

Exhibit B – Summary of 2018 REG Recommendations:

- Rhode Island Distributed Generation Board Recommended Target Classes, Ceiling Prices, and Targets for the 2018 Renewable Energy Growth Program;
- Rhode Island Distributed Generation Board Recommended 2018 Technology Classes and Allocation Targets; and
- Rhode Island Distributed Generation Board Recommended 2018 Ceiling Prices (¢/kWh), by Technology Class

Exhibit C - Sustainable Energy Advantage Documents:

- Rhode Island Renewable Energy Growth Program: Research, Analysis, & Discussion in Support of 2018 Ceiling Price Recommendations, August 24, 2017, Sustainable Energy Advantage, LLC; Mondre Energy, Inc.;
- Rhode Island Renewable Energy Growth Program: Analysis, & Discussion in Support of 2nd Draft 2018 Ceiling Price Recommendations, September 27, 2017, Sustainable Energy Advantage, LLC; Mondre Energy, Inc.;
- Rhode Island Renewable Energy Growth Program: 2018 Ceiling Price Recommendations to DG Board, October 23, 2017, Sustainable Energy Advantage, LLC; Mondre Energy, Inc.

EXHIBIT A

Distributed Generation Board Members

Name	Representing	Voting or Non-Voting Member
Carol Grant	Office of Energy Resources	Non-Voting
Ian Springsteel	National Grid	Non-Voting
Kenneth Payne (Chair)	Energy Regulation and Law	Voting
Vacant	Construction of Renewable Generation	Voting
William Ferguson	Large Commercial/Industrial Users	Voting
Sam Bradner	Small Commercial/Industrial Users	Voting
Kari Lang	Residential Users	Voting
Vacant	Low Income Users	Voting
Sheila Dormody	Environmental Issues Pertaining to Energy	Voting

EXHIBIT B

Rhode Island Distributed Generation Board
Recommended Target Classes, Ceiling Prices, and Targets for the
2018 Renewable Energy Growth Program

The Board recommends that National Grid conduct three open enrollments and the continuous small solar program in 2018, with the goal of 40 MW of projects being awarded tariffs.

Rhode Island Distributed Generation Board
Recommended 2018 Technology Classes and Allocation Targets

Technology/Classes	**Megawatt/Kilowatt Allocation**
Small Solar I & II	6.55 MW DC
Medium Solar	3.0 MW DC
Commercial Solar	5.0 MW DC
Community Remote - Commercial Solar	3.0 MW DC
Large Solar	12.05 MW DC
Community Remote - Large Solar	3.0 MW DC
Small Wind	0.400 kW DC
Community Remote and Non-Community Remote Large Wind	6.0 MW DC
Anaerobic Digestion & Small-Scale Hydropower	1.0 MW DC
Total	40 MW DC

Rhode Island Distributed Generation Board
Recommended 2018 Ceiling Prices (¢/kWh), by Technology Class

Technology and Eligible Class	**Ceiling Price**
Small Solar I (15 Year Tariff)	31.25
Small Solar I (20 Year Tariff)	27.75
Small Solar II	26.55
Medium Solar	22.45
Commercial Solar	17.65
Community Remote – Commercial Solar	20.30
Large Solar	14.65
Community Remote – Large Solar	16.85
Small Wind	20.85
Large Wind	16.35
Community Remote – Large Wind	18.05
Anaerobic Digestion	19.75
Small-Scale Hydropower	23.35

EXHIBIT C

Sustainable Energy Advantage Documents

Rhode Island
Renewable Energy Growth Program:

Research, Analysis, & Discussion in Support of 2018 Ceiling Price Recommendations

August 24, 2017

Sustainable Energy Advantage, LLC
Mondre Energy, Inc.

Sustainable Energy Advantage, LLC

Purpose

- To present stakeholder data responses, survey results, and supplemental research,
- To *begin* the discussion that supports the development of Ceiling Price inputs and recommendations for the 2018 Renewable Energy Growth (REG) Program.
- To develop Ceiling Price recommendations through an iterative, public process.

Overview: Ceiling Price Categories

2018 REG Program: Proposed Technology, Size & Tariff Length Parameters			
The DG Board and OER seek comment on the following Ceiling Price technology, system size and tariff length parameters.			
Eligible Technology	**System Size for CP Development**	**Eligible System Size Range**	**Tariff Length**
Small Solar I	5 kW	≤ 10 kW	15 and 20 Years Options
Small Solar II	25 kW	11 to 25 kW	20 Years
Medium Solar	140 kW*	26 to 250 kW	20 Years
Carport I	250 kW	≤ 500 kW	20 Years
Commercial Solar	500 kW	251 to 999 kW	20 Years
Commercial Solar - CRDG	500 kW	251 to 999 kW	20 Years
Carport II	1,000 kW	500 kW to 5 MW	20 Years
Large Solar	2,000 kW	1 to 5 MW	20 Years
Large Solar - CRDG	2,000 kW	1 to 5 MW	20 Years
Small Wind	100 kW	≤ 999 kW	20 Years
Large Wind	3,000 kW	1.0 to 5.0 MW	20 Years
Anaerobic Digestion	750 kW	≤ 5 MW	20 Years
Hydropower	500 kW	≤ 5 MW	20 Years

** Of the seven medium solar projects awarded in the First 2017 Open Enrollment, one was 228 kW and the remainder were either 249 or 250 kW. As a result, we have modeled the Medium Solar Ceiling Price at an assumed project size of 250 kW.*

New Category

- Carports and Solar Canopies
  - *Sample definition: A solar photovoltaic system installed on top of a parking surface or above a pedestrian walkway, which preserves the function of the space.*

- Carport I: systems ≤ 500 kW DC
  - Modeled Project Size: 250 kW

- Carport II: systems 500kW to 5 MW DC
  - Modeled Project Size: 1,000 kW

Overview of Research to Inform CP Inputs

- Direct stakeholder input
  - Through *Data Request <u>and</u> Survey*
- Supplemental research
  - Interviews
  - Program data (bids, executed contracts)
  - Additional data from National Grid (Actual interconnection costs)
  - Northeast regional cost databases
  - Northeast data from national reports (LBNL *Tracking the Sun*)
  - Technology-specific, competitively bid long-term contract pricing data (VT)
- DG Standard Contracts bid data (2011 – 2014)
- REG bid data (2015, 2016, & Round 1 2017)

Summary of Data/Survey Response

Ceiling Price Category	# of Data Points Received (Data Request or Survey)
Small Solar I/II	1
Medium Solar	0
Commercial Solar	1
Commercial Solar - CRDG	0
Carport I	0
Large Solar	1
Large Solar - CRDG	0
Carport II	0
Small Wind	0
Large Wind	2
Large Wind - CRDG	0
Anaerobic Digestion	1
Hydro	2
TOTAL	**7**

Detailed data provided in Appendix.

Small Solar I, Installed Costs

	2016			2017		
Dataset	Average ($/kW)	25th Percentile ($/kW)	75th Percentile ($/kW)	Average ($/kW)	25th Percentile ($/kW)	75th Percentile ($/kW)
NY - NYSERDA Solar Electric Programs	$3,916	$3,316	$4,432	$4,171	$3,549	$4,795
MA RPS Solar Carve Out I+II	$3,993	$3,424	$4,470	$3,827	$3,270	$4,349
MA Peformance Tracking System	$4,031	$3,430	$4,535	$3,910	$3,350	$4,448
CT - Residential Solar Investment Program	$3,489	$3,043	$3,908	$3,433	$3,029	$3,686
Tracking the Sun - CT	$3,388	$2,966	$3,753	Not Available		
Tracking the Sun - DE	$4,995	$3,547	$5,023			
Tracking the Sun - MA	$4,011	$3,435	$4,483			
Tracking the Sun - MD	$4,302	$3,281	$4,888			
Tracking the Sun - NH	$3,659	$3,221	$4,009			
Tracking the Sun - NJ	$3,446	$3,021	$3,734			
Tracking the Sun - NY	$3,901	$3,313	$4,428			
Tracking the Sun - RI	$4,163	$3,602	$4,367			
Tracking the Sun - VT	$2,984	$2,893	$3,132			

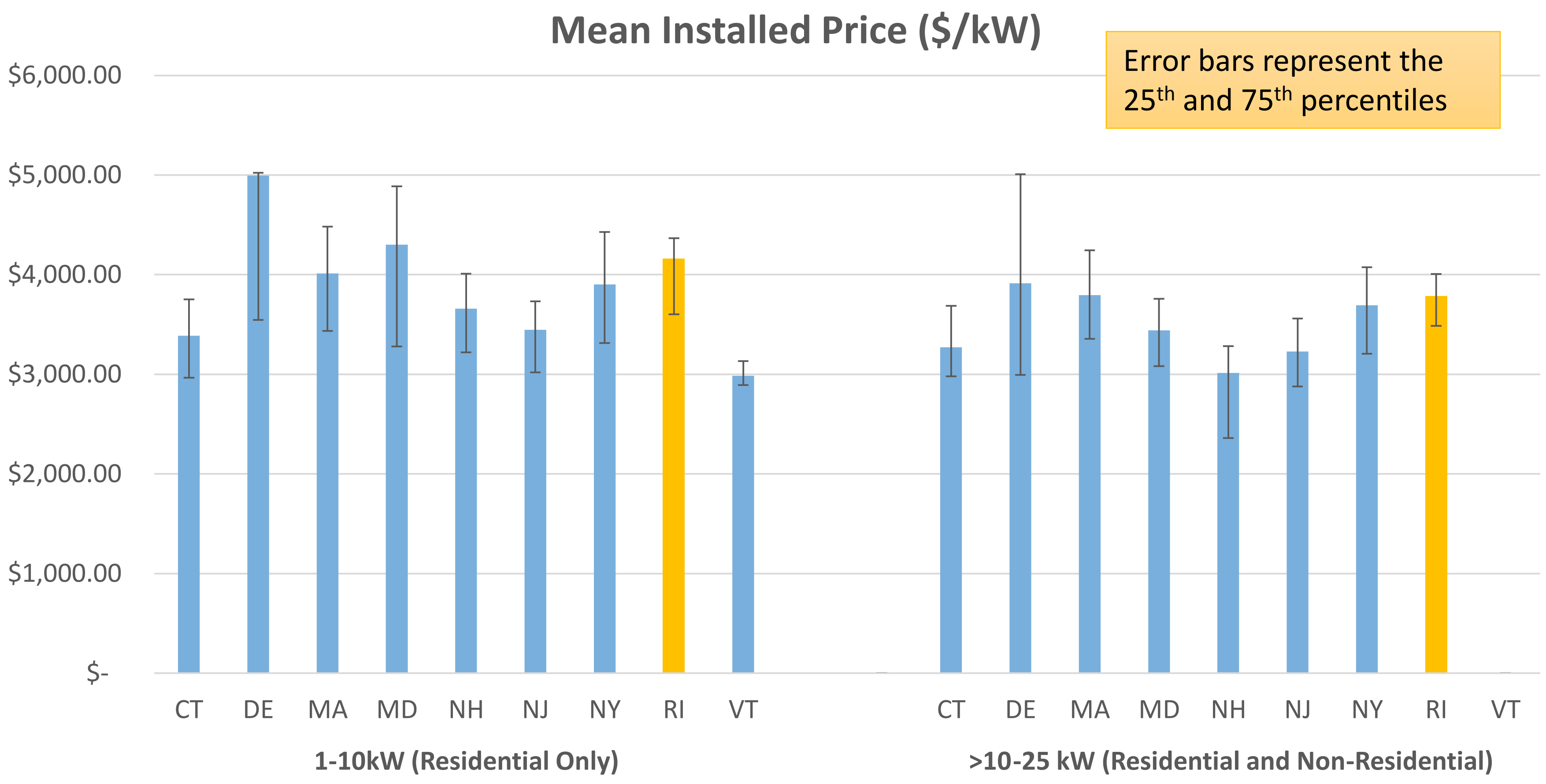
Datasets: MA SREC, MA PTS, NY (NYSERDA Solar Programs), CT (Residential Solar Investment Program), LBNL Tracking The Sun. Includes residential data only.

Small Solar II, Installed Costs

	2016			2017		
Dataset	Average ($/kW)	25th Percentile ($/kW)	75th Percentile ($/kW)	Average ($/kW)	25th Percentile ($/kW)	75th Percentile ($/kW)
NY - NYSERDA Solar Electric Programs	$3,696	$3,205	$4,048	$3,671	$3,111	$4,153
MA RPS Solar Carve Out I+II	$3,794	$3,371	$4,186	$3,698	$3,227	$4,114
MA Peformance Tracking System	$3,831	$3,398	$4,221	$3,773	$3,290	$4,203
CT - Residential Solar Investment Program	$3,398	$3,211	$3,720	$3,300	$3,008	$3,560
Tracking the Sun - CT	$3,271	$2,980	$3,687	Not Available		
Tracking the Sun - DE	$3,913	$2,995	$5,009			
Tracking the Sun - MA	$3,795	$3,355	$4,246			
Tracking the Sun - MD	$3,441	$3,082	$3,758			
Tracking the Sun - NH	$3,014	$2,361	$3,282			
Tracking the Sun - NJ	$3,228	$2,878	$3,559			
Tracking the Sun - NY	$3,692	$3,206	$4,074			
Tracking the Sun - RI	$3,782	$3,487	$4,006			
Tracking the Sun - VT	No data	No data	No data			

Datasets: MA SREC, MA PTS, NY (NYSERDA Solar Programs), CT (Residential Solar Investment Program), LBNL Tracking The Sun. Includes residential and non-residential data.

Small Solar I+II Cost Comparison



* Figures drawn from LBNL's 2016 Tracking the Sun Data. VT had no installations in the >10-25 kW size class in 2016.

Medium Solar Installed Costs

	2016			2017		
Dataset	**Average ($/kW)**	**25th Percentile ($/kW)**	**75th Percentile ($/kW)**	**Average ($/kW)**	**25th Percentile ($/kW)**	**75th Percentile ($/kW)**
NY - NYSERDA Solar Electric Programs	$3,471	$2,816	$3,939	$3,302	$2,552	$3,796
MA RPS Solar Carve Out I+II	$3,265	$2,671	$3,766	$3,154	$2,592	$3,494
MA Peformance Tracking System	$3,301	$2,673	$4,221	$3,773	$2,582	$3,432
CT - Residential Solar Investment Program	$4,238	$3,506	$4,891	No data	No data	No data
Tracking the Sun - CT	$3,208	$2,913	$3,320	Not available		
Tracking the Sun - DE	$3,563	$2,879	$3,884			
Tracking the Sun - MA	$3,283	$2,692	$3,742			
Tracking the Sun - MD	$3,143	$2,867	$3,353			
Tracking the Sun - NH	$3,063	$2,832	$3,314			
Tracking the Sun - NJ	$3,130	$2,520	$3,488			
Tracking the Sun - NY	$3,479	$2,773	$3,891			
Tracking the Sun - RI	$3,359	$2,738	$3,984			
Tracking the Sun - VT	No data	No data	No data			

Datasets: MA SREC, MA PTS, NY (NYSERDA Solar Programs), CT (Residential Solar Investment Program), LBNL Tracking The Sun. Includes residential and non-residential data.

Commercial Solar Installed Costs

Dataset	2016 Average ($/kW)	2016 25th Percentile ($/kW)	2016 75th Percentile ($/kW)	2017 Average ($/kW)	2017 25th Percentile ($/kW)	2017 75th Percentile ($/kW)
NY - NYSERDA Solar Electric Programs	$2,630	$1,721	$3,085	$2,202	$1,624	$2,332
MA RPS Solar Carve Out I+II	$2,662	$2,217	$3,048	$2,699	$2,246	$2,852
MA Peformance Tracking System	$2,722	$2,217	$3,049	$2,650	$2,291	$2,836
Tracking the Sun - CT	$2,936	$2,523	$2,948	Not available		
Tracking the Sun - DE	No data	No data	No data			
Tracking the Sun - MA	$2,742	$2,224	$3,045			
Tracking the Sun - MD	No data	No data	No data			
Tracking the Sun - NH	$2,062	$2,019	$2,105			
Tracking the Sun - NJ	$2,828	$2,151	$3,263			
Tracking the Sun - NY	$2,630	$1,767	$3,029			
Tracking the Sun - RI	$2,183	$2,183	$2,183			
Tracking the Sun - VT	No data	No data	No data			

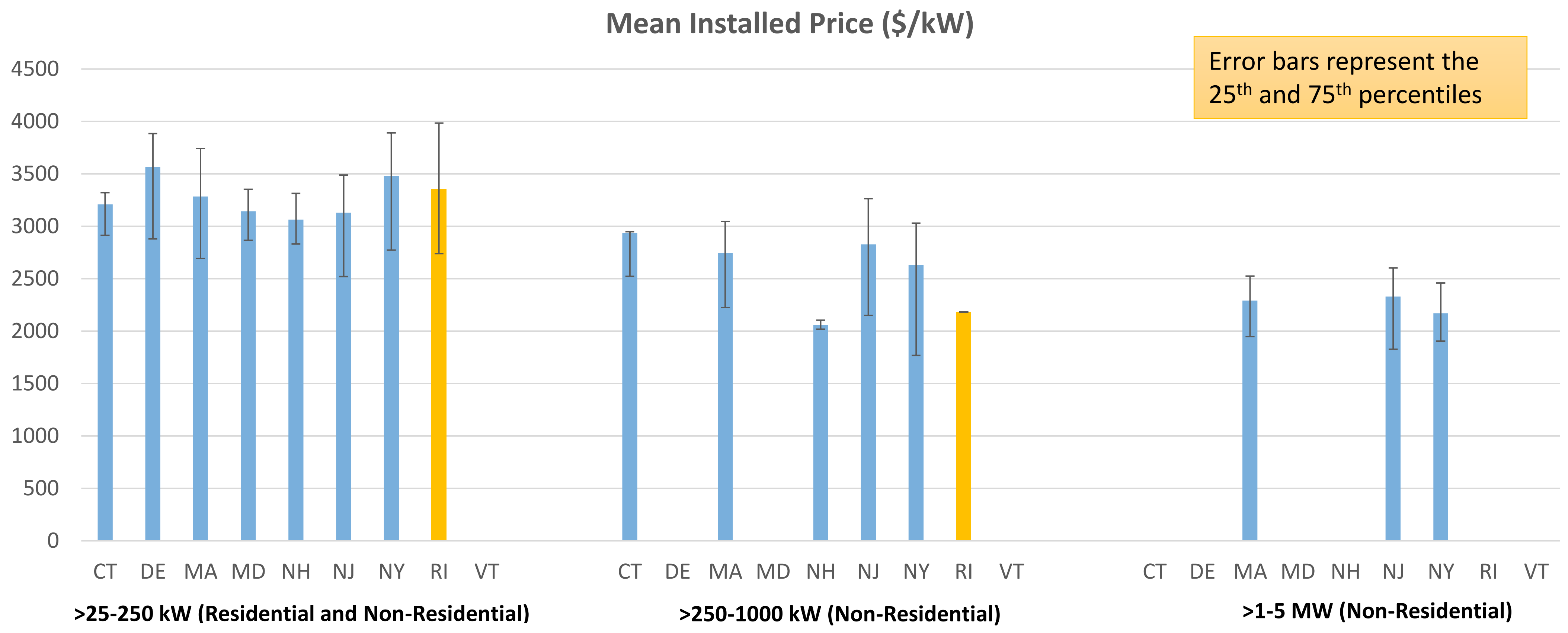
Datasets: MA SREC, MA PTS, NY (NYSERDA Solar Programs), LBNL Tracking The Sun.

Large Solar Installed Costs

	2016			2017		
Dataset	Average ($/kW)	25th Percentile ($/kW)	75th Percentile ($/kW)	Average ($/kW)	25th Percentile ($/kW)	75th Percentile ($/kW)
NY - NYSERDA Solar Electric Programs	$2,178	$1,926	$2,504	$2,266	$2,104	$2,416
MA RPS Solar Carve Out I+II	$2,386	$2,034	$2,786	$2,452	$1,966	$2,827
MA Peformance Tracking System	$2,386	$2,034	$2,786	$2,315	$1,756	$2,574
Tracking the Sun - CT	No data	No data	No data	Not available		
Tracking the Sun - DE	No data	No data	No data			
Tracking the Sun - MA	$2,290	$1,947	$2,525			
Tracking the Sun - MD	No data	No data	No data			
Tracking the Sun - NH	No data	No data	No data			
Tracking the Sun - NJ	$2,329	$1,826	$2,602			
Tracking the Sun - NY	$2,170	$1,904	$2,458			
Tracking the Sun - RI	No data	No data	No data			
Tracking the Sun - VT	No data	No data	No data			

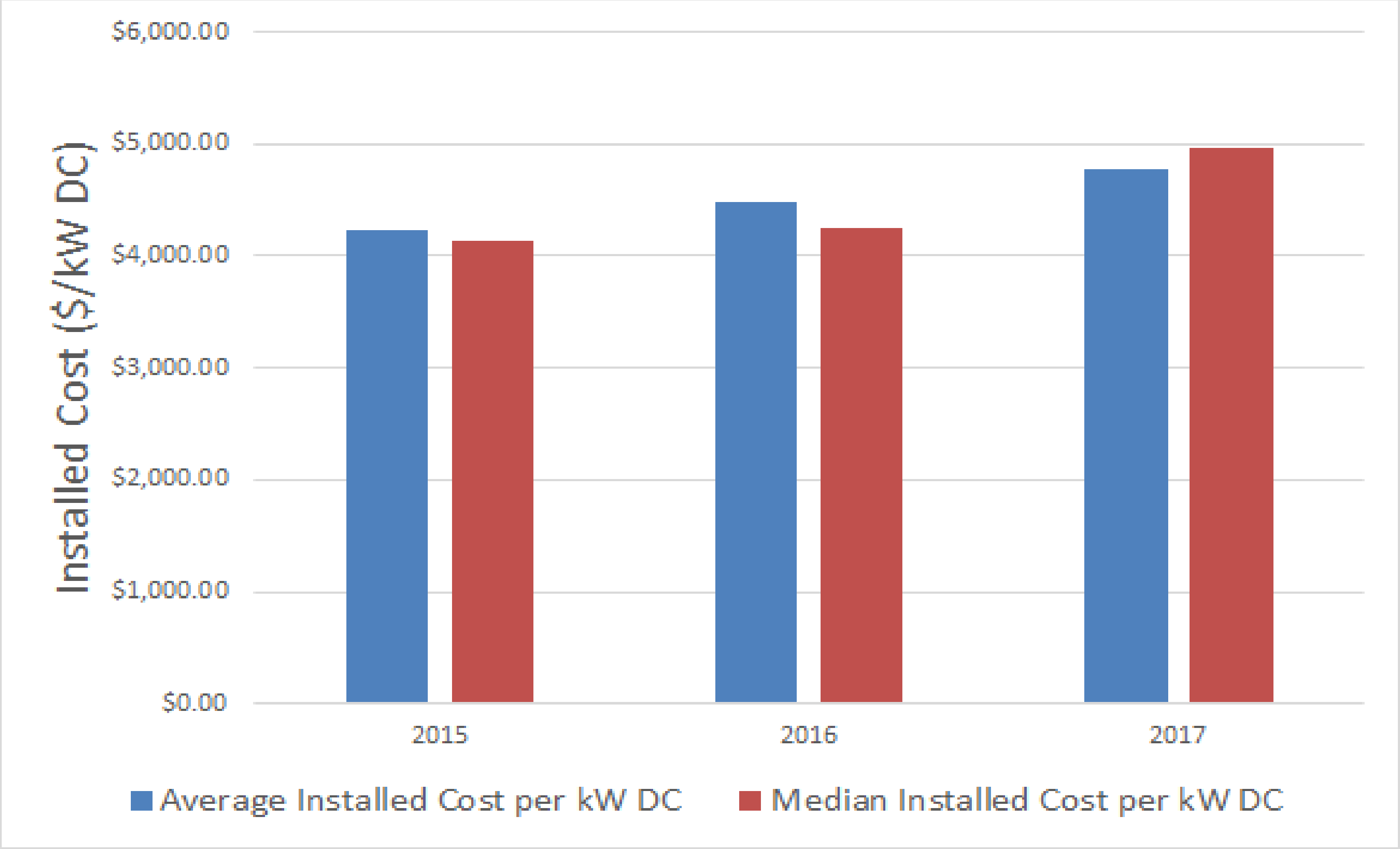
Datasets: MA SREC, MA PTS, NY (NYSERDA Solar Programs), LBNL Tracking The Sun.

Installed Cost Trends – Larger Size Categories*



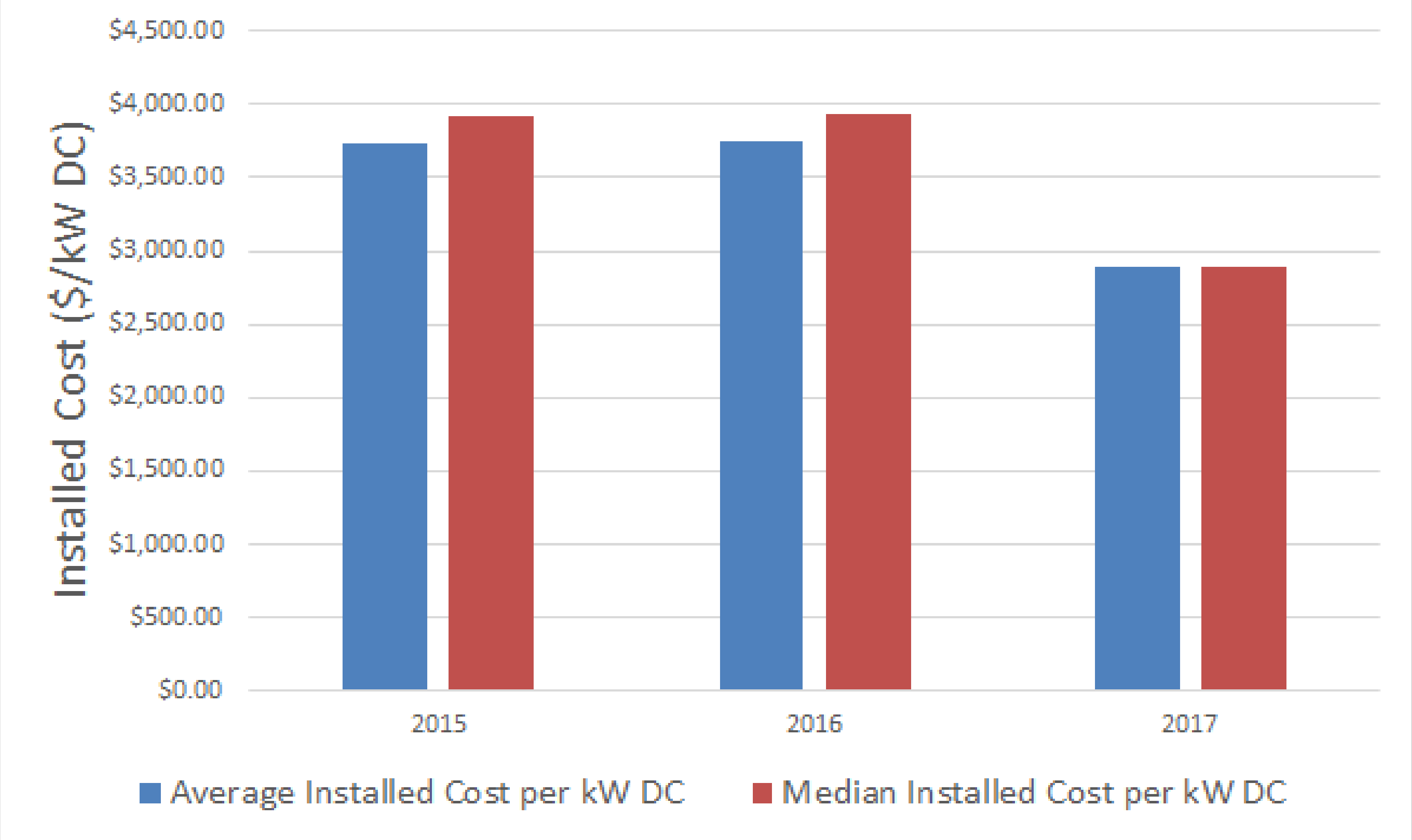
*Figures drawn from LBNL's 2016 Tracking the Sun Data. Include Interconnection Costs. States with no data in a particular size category had no installations in the size class in 2016. The RI data for the >250-1000 kW includes only one project.

REG Bid Data – Average & Median Installed Cost for Small Solar I Under Different Tariff Years



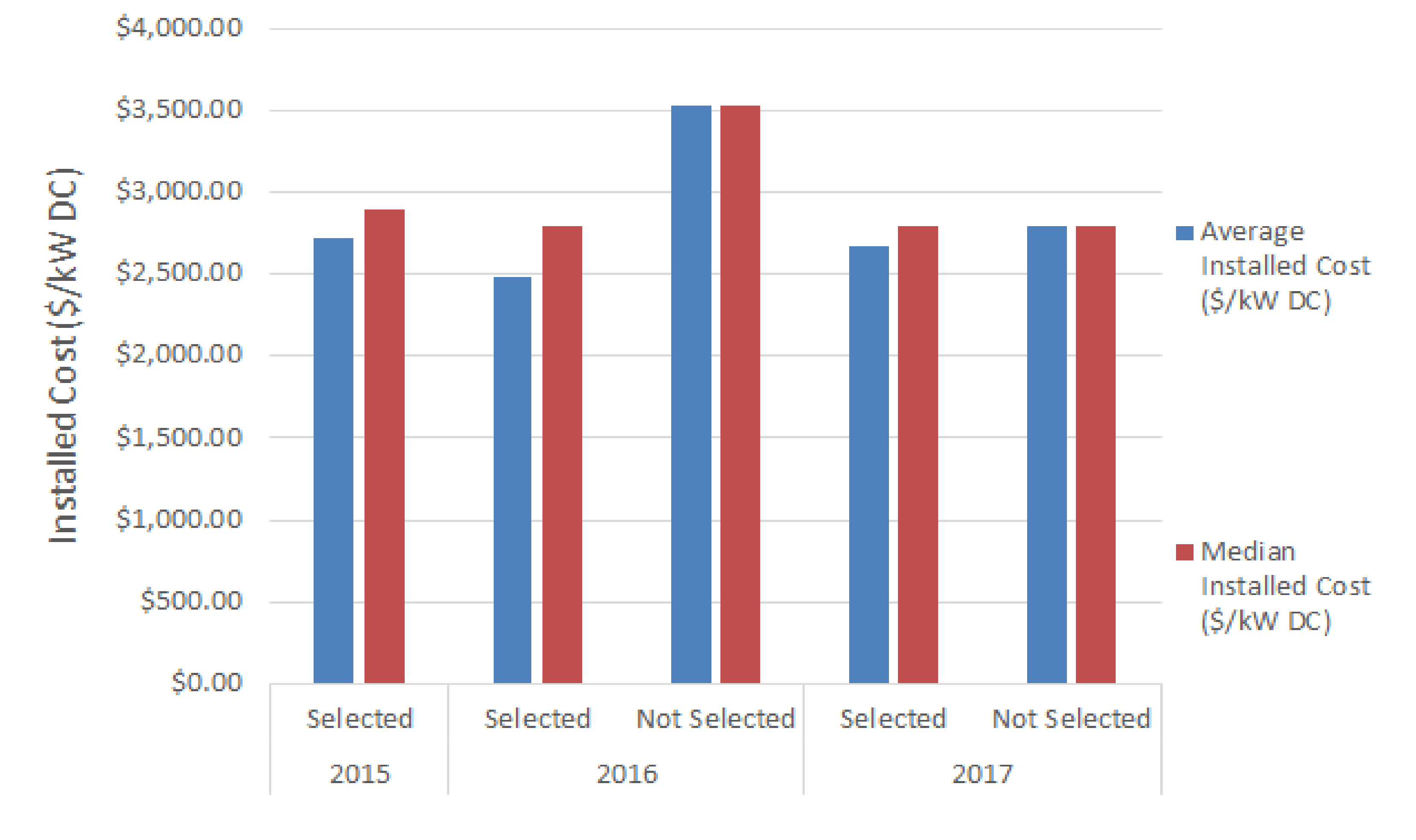
Note: Data includes 339 projects with contracts under the 2015 tariff, 921 under the 2016 tariff, and 104 thus far under the 2017 tariff.

REG Bid Data – Average & Median Installed Cost for Small Solar II Under Different Tariff Years



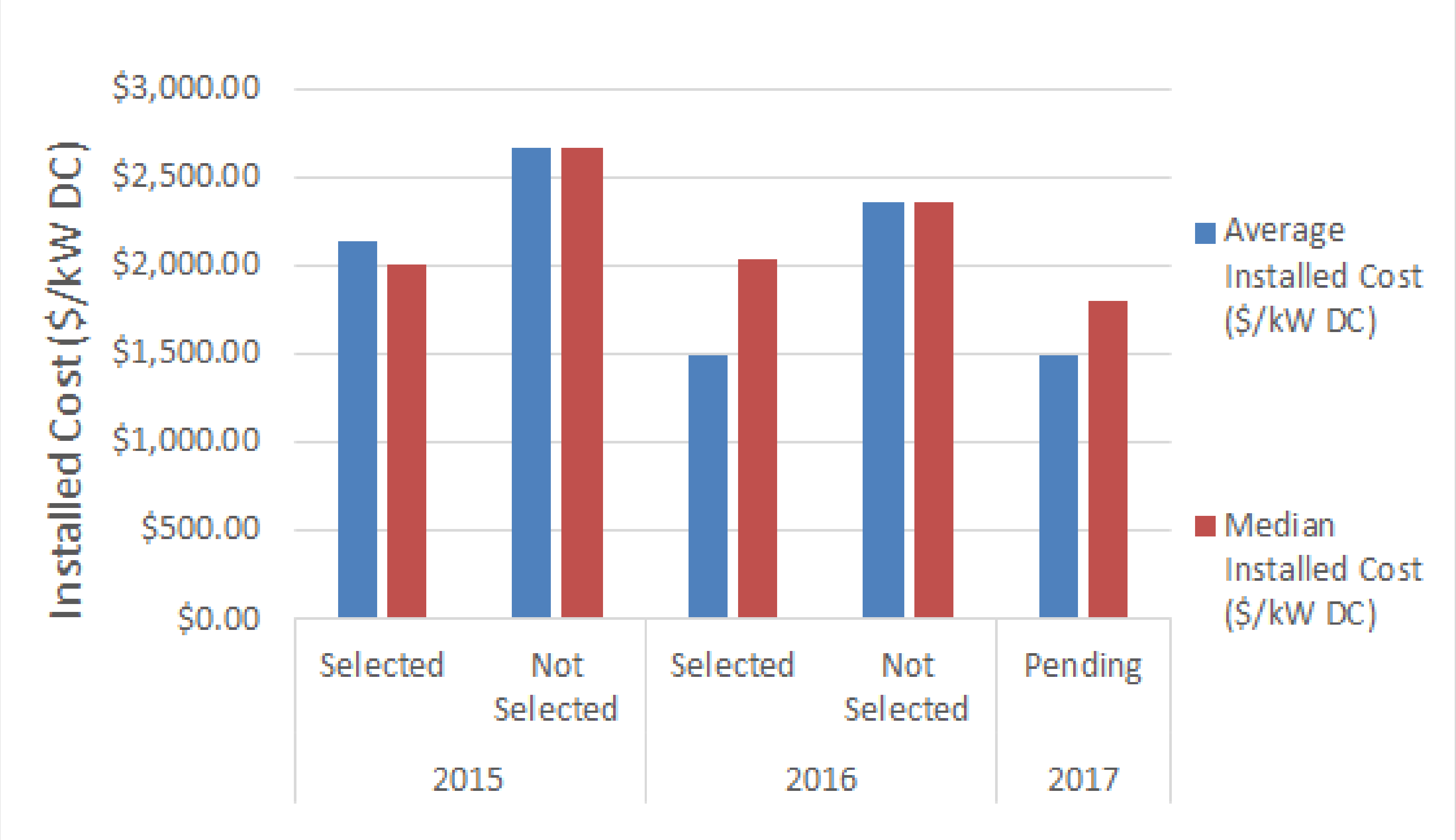
Note: Data includes 10 projects with contracts under the 2015 tariff, 20 under the 2016 tariff, and only 1 thus far under the 2017 tariff.

REG Bid Data – Average & Median Installed Cost for Medium Solar Under Different Tariff Years

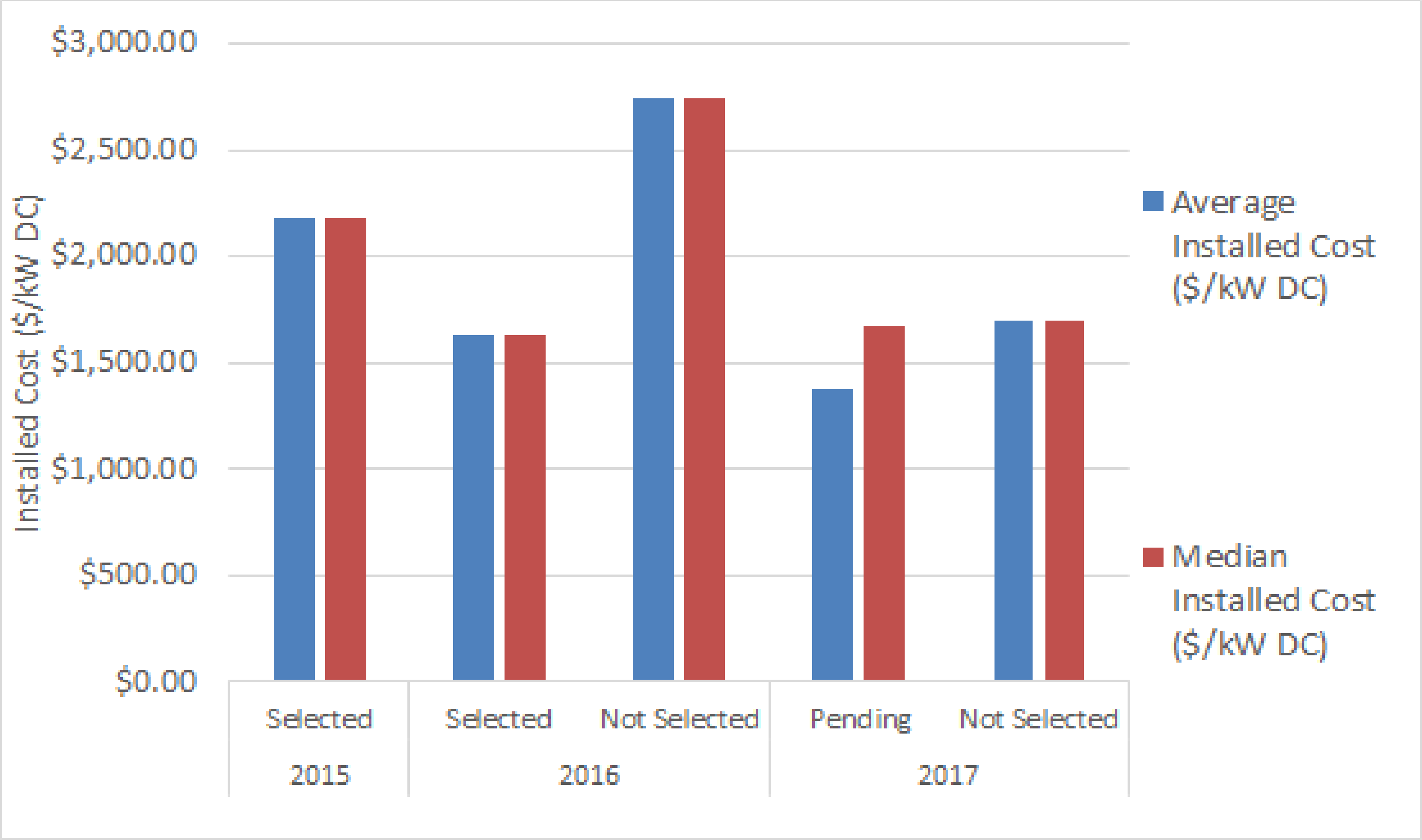


Note: Only 1 project was not selected under the 2016 tariff and thus far under the 2017 tariff.

REG Bid Data – Average & Median Installed Cost for Commercial Solar Under Different Tariff Years

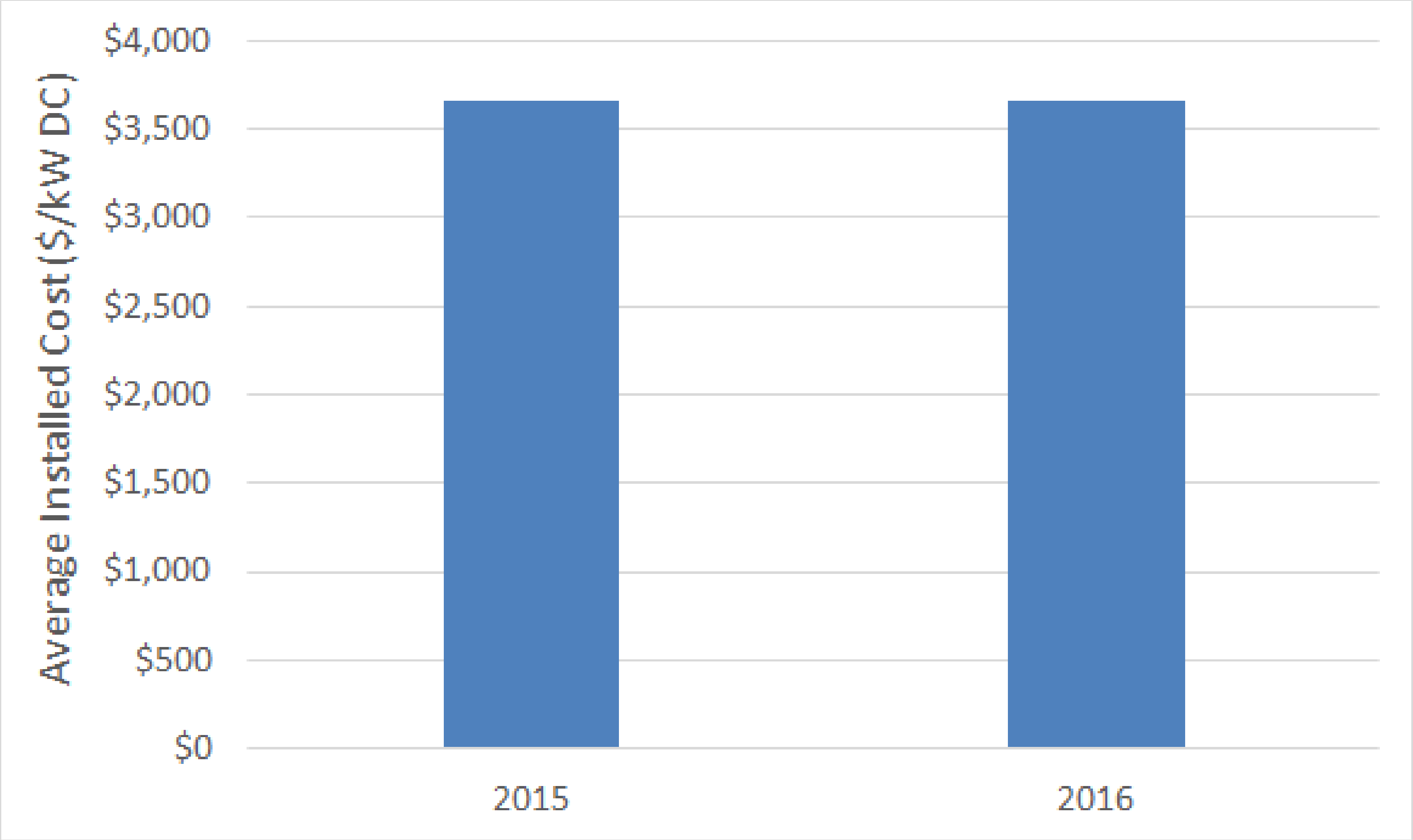


REG Bid Data – Average & Median Installed Cost for Large Solar Under Different Tariff Years



Note: Only one cost one data point was available for projects selected under the 2016 tariff.

REG Bid Data – Average Installed Costs for Large Wind Under Different Tariff Years



Note: Only 2 projects were bid in each tariff year (all 4 were accepted). Each bid featured the same average costs per kW DC

Interconnection Cost Analysis: MA & RI

	Massachusetts & Rhode Island		Rhode Island only	
	Number of Projects	Wtd. Average Cost ($/kW DC)	Number of Projects	Wtd. Average Cost ($/kW DC)
Small Solar I (<=10 kW)	N/A	N/A	N/A	N/A
Small Solar II (11-25 kW)	N/A	N/A	N/A	N/A
Medium Solar (26-250 kW)	319	$15.10	27	$41.92
Commercial Solar (251-999 kW)	253	$102.29	18	$85.82
Large Solar (1000-5000 kW)	170	$151.83	9	$144.23
Small Wind (<=999 kW)	4	$112.89	2	$65.74
Large Wind (1000-5000 kW)	14	$156.31	9	$191.28
Anaerobic Digestion (<=5000 kW)	1	$16.98	1	$16.98
Hydro	1	$19.20	1	$19.20

**Based on National Grid Data, excludes projects assumed to require safety equipment related to islanding (i.e. DTT, 3Vo, etc.)*

Regional benchmarking & DG SC Bid Data

Sustainable Energy Advantage, LLC

VT Standard Offer 2017 Bid Prices: SOLAR

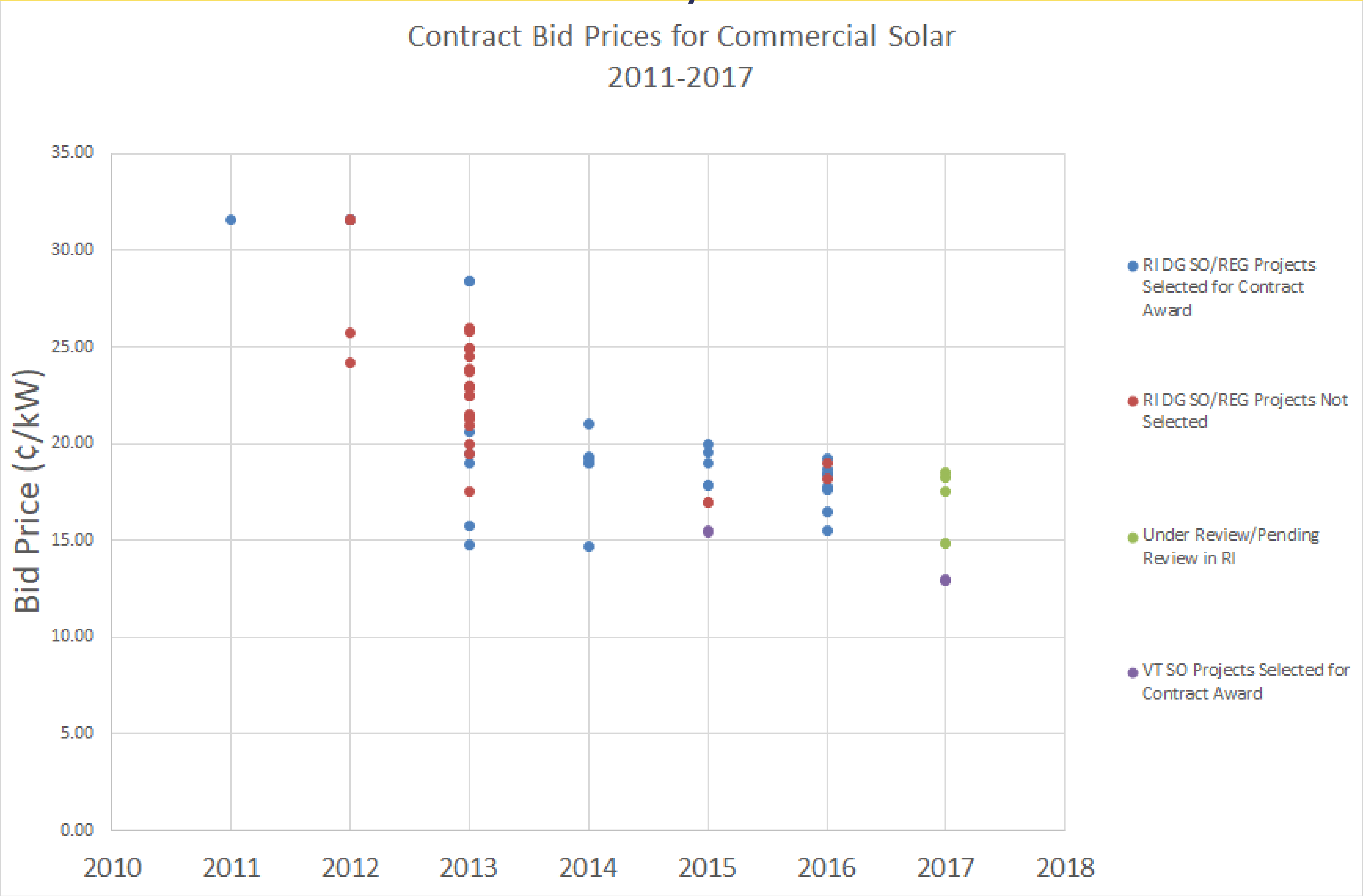
Project Name	Project Size (kW)	Bid Price* ($/kWh)
Trombley Hill Solar	855	$0.1290
Blackberry Solar 1	860	$0.1295
Eitri Foundry, LLC	1,200	$0.1396
VT Fresh Energy	1,200	$0.0899
Windsor Tech Park Solar	1,222	$0.1089
Hess Auto Solar	1,200	$0.1120
Battle Creek Solar 3	1,000	$0.1189
Richville Road Solar	1,222	$0.1213
Pig Pen Solar	1,050	$0.1246
Golden Solar	2,200	$0.0889
Babcock Solar	2,200	$0.0904
Wallingford Solar	2,200	$0.0946
Otter Creek 2 Solar	2,200	$0.1020
Blackberry Solar 2	2,150	$0.1037
IP Solar	2,000	$0.1038
Sunderland Solar	2,200	$0.1045
Missisquoi Valley Solar	2,200	$0.1117

* Note that the VT SO Program offers 25-year fixed price contracts, compared to 20 years in RI.

Highlighted Blue= Projects awarded a contract (recommended)

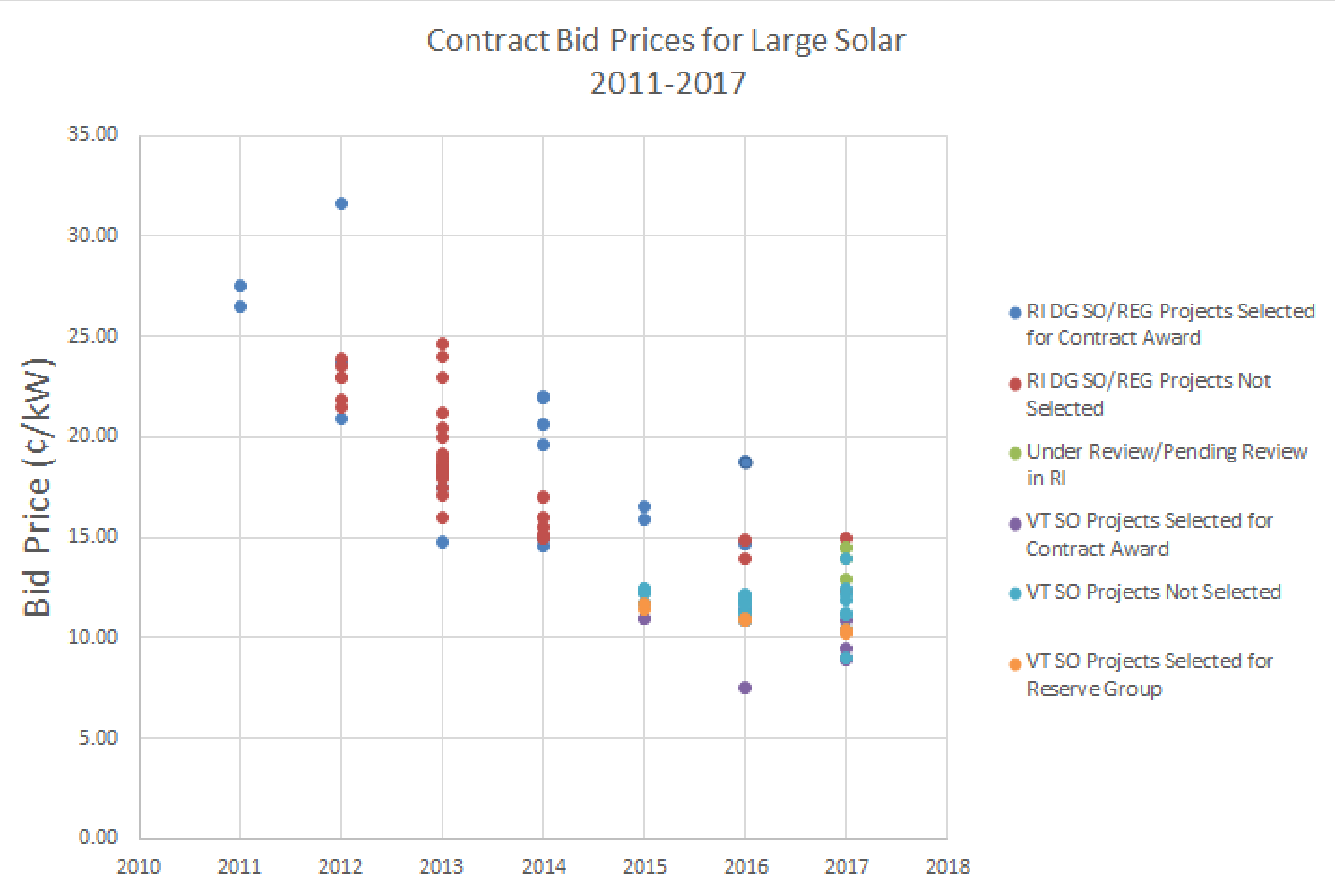
Highlighted Green = Projects selected for "Reserve Group" – these projects will be contracted if a project in the "Award Group" is withdrawn following selection (recommended)

Comparison of RI DG Standard Contract/REG & VT Standard Offer Bid Price History: Commercial Solar



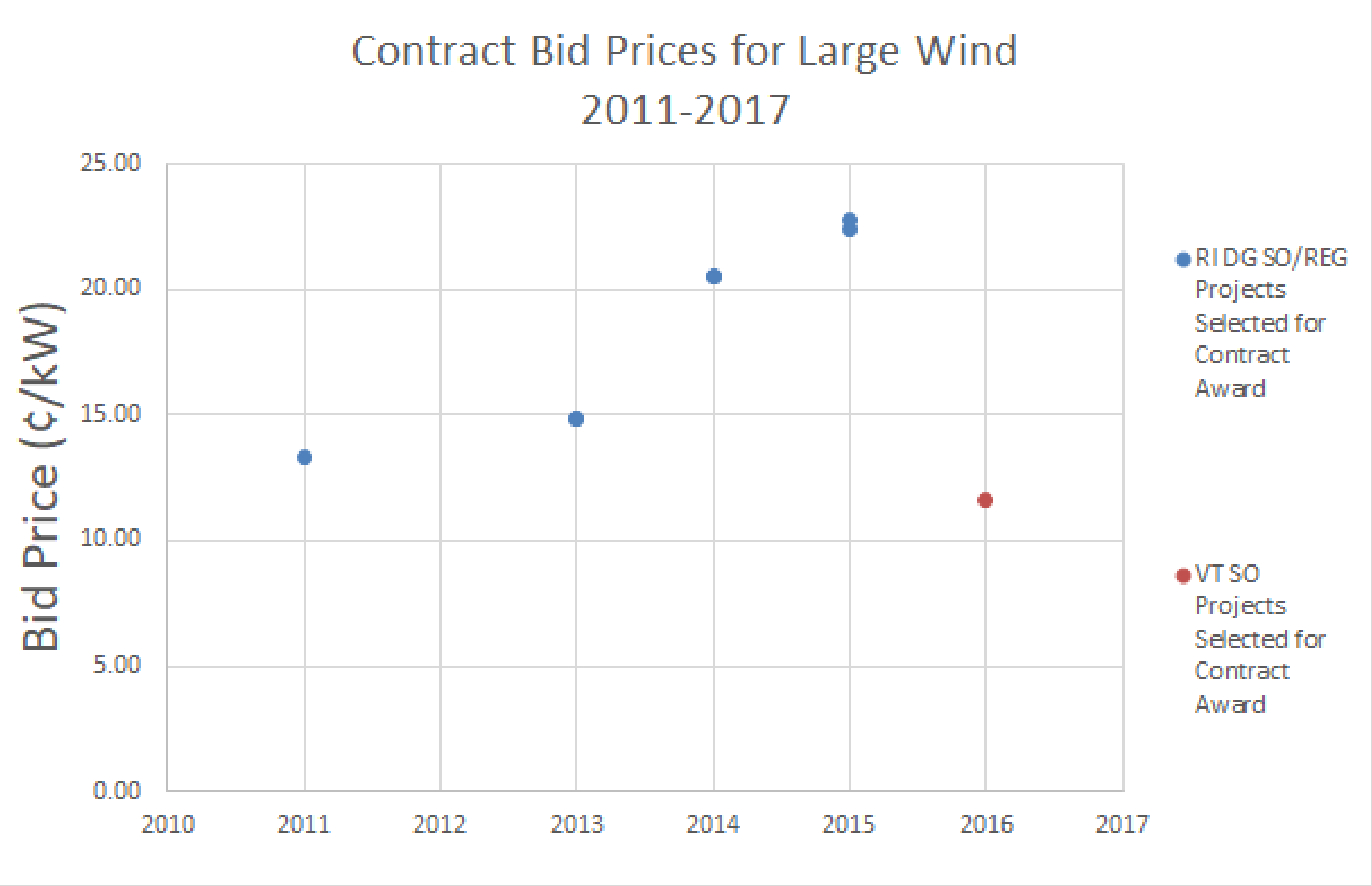
* Note that the VT SO Program offers 25-year fixed price contracts, compared to 20 years in RI.

Comparison of RI DG Standard Contract/REG & VT Standard Offer Bid Price History: Large Solar



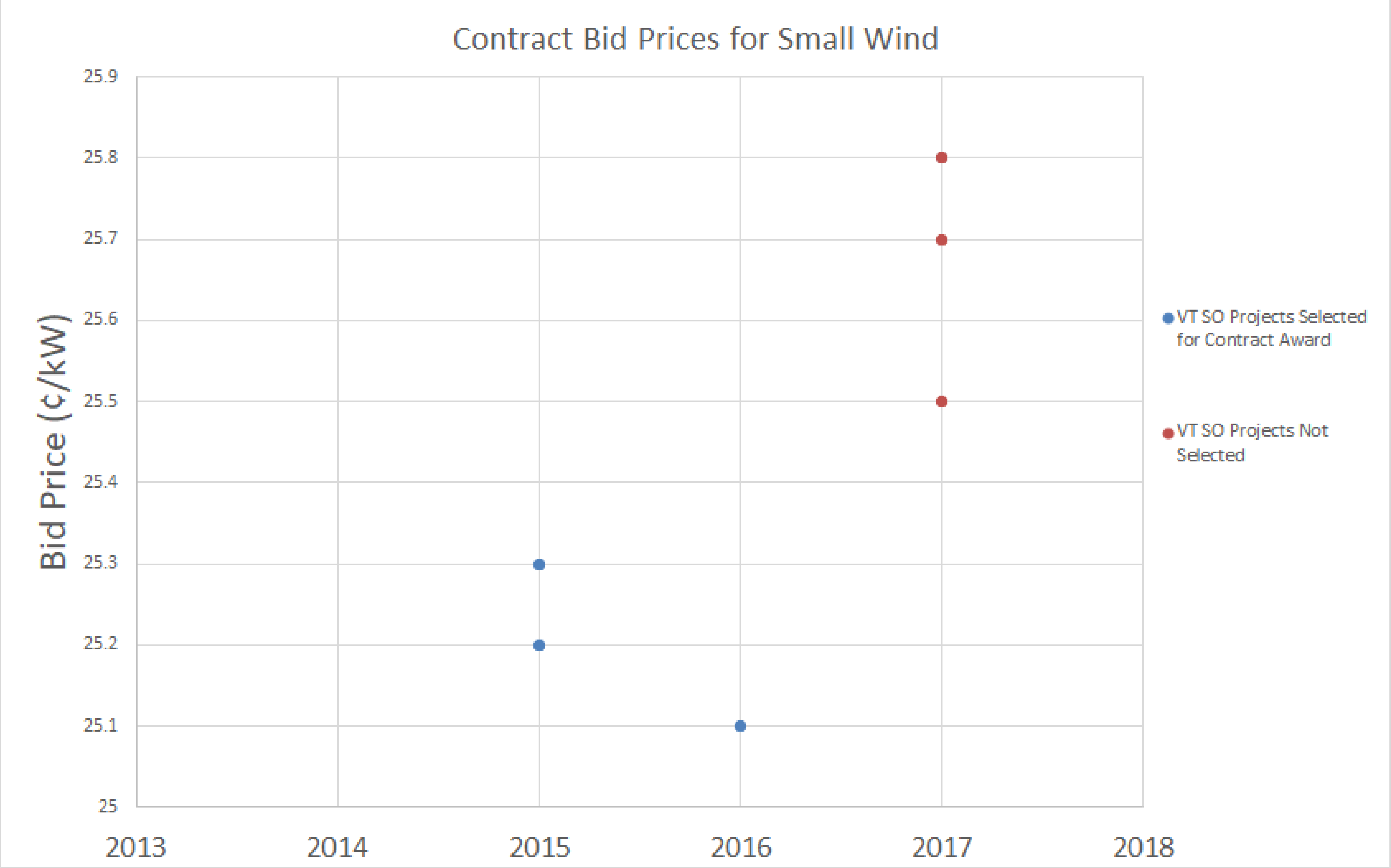
** Note that the VT SO Program offers 25-year fixed price contracts, compared to 20 years in RI.*

Comparison of RI DG Standard Contract/REG & VT Standard Offer Bid Price History: Large Wind



** Note that the VT SO Program offers 25-year fixed price contracts, compared to 20 years in RI.*

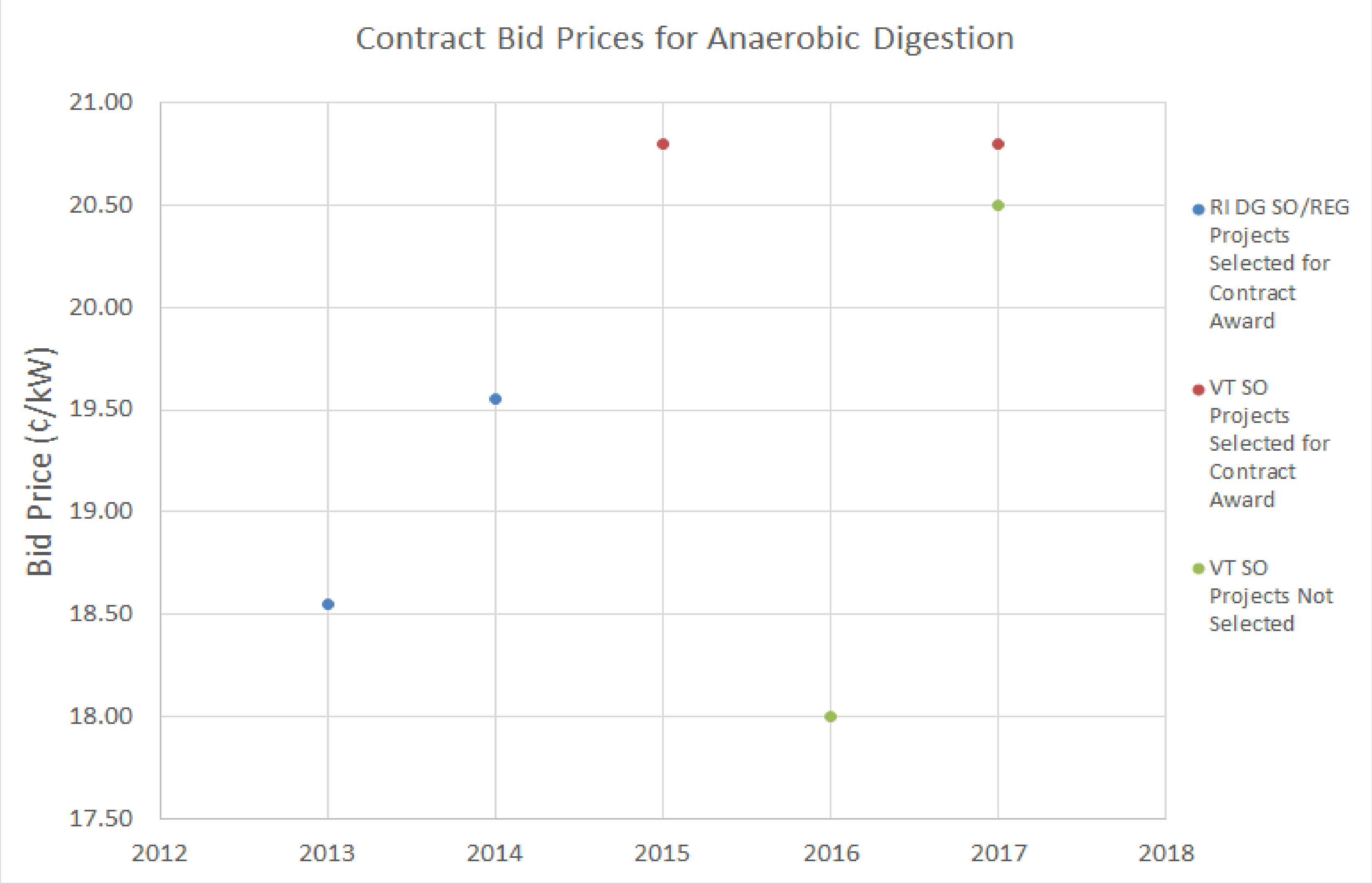
Comparison of RI DG Standard Contract/REG & VT Standard Offer Bid Price History: Small Wind



** Note that the VT SO Program offers 25-year fixed price contracts, compared to 20 years in RI.*

** Note that there were multiple projects bid in at each price point in the graph above*

Comparison of RI DG Standard Contract/REG & VT Standard Offer Bid Price History: AD



** Note that the VT SO Program offers 25-year fixed price contracts, compared to 20 years in RI.*

VT Standard Offer 2017 Bid Prices: NON-SOLAR

Food Waste

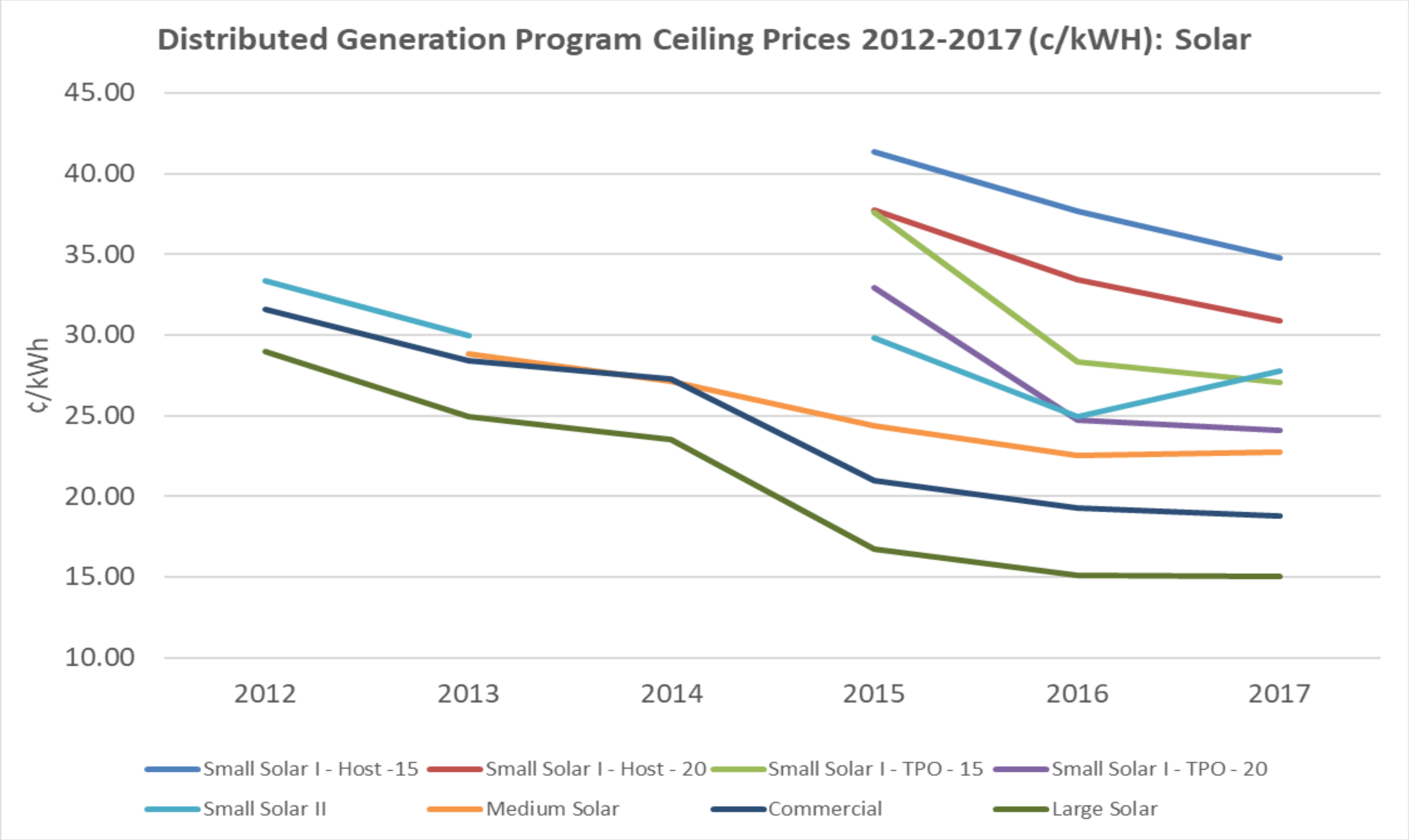
Project Name	Project Size (kW)	Bid Price (/kWh)
Middlebury Resource Recovery	1,104	$0.2050
Brattleboro Organic Energy	300	$0.2080

Highlighted Blue= Projects awarded a contract (recommended)

Wind

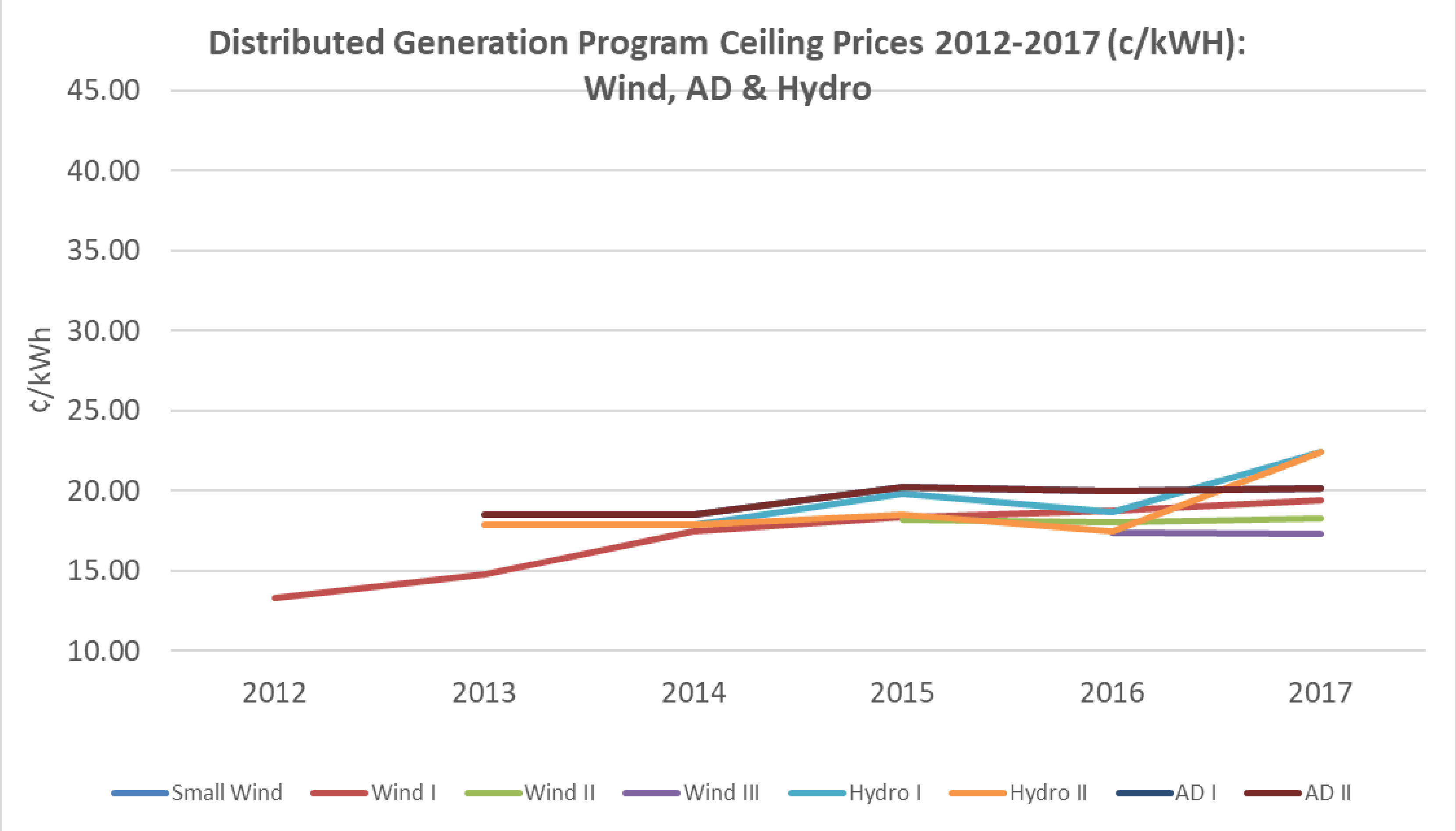
Project Name	Project Size (kW)	Bid Price (/kWh)
Forgues Dairy	50	$0.2520
Addie Wind 1	90	$0.2550
Haydale Wind A	90	$0.2550
Middle Wind A	90	$0.2550
Addie Wind 2	90	$0.2570
Alburgh North Wind B	90	$0.2570
Alburgh North Wind C	90	$0.2570
Haydale Wind B	90	$0.2570
Missile Wind Base	60	$0.2580
Alburgh North Wind A	90	$0.2580
Haydale Wind C	90	$0.2580
Middle Wind B	90	$0.2580
Middle Wind C	90	$0.2580

Summary of Ceiling Prices: 2012 – 2017 (Solar)



Graph for Demonstration Purposes only. Ceiling Price Classes have changed over time, making cross-comparison across enrollments tenuous. Commercial - CRDG and Large CRDG not shown because 2017 is the first progarm year in which they have tariffs.

Summary of Ceiling Prices: 2012 – 2017 (Non-Solar)



Graph for Demonstration Purposes only. Ceiling Price Classes have changed over time, making cross-comparison across enrollments tenuous.

Draft 2018 Ceiling Prices

Sustainable
Energy
Advantage, LLC

Summary Results (1): Solar, (cents/kWh)

Technology	Size Range kW (Modeled Size kW)	2017 Approved CP 15 year Tariff Duration	2018 *Proposed* CP 15 year Tariff Duration	2017 Approved CP 20 year Tariff Duration	2018 *Proposed* CP 20 year Tariff Duration
Small Solar I	1-10 (5)	34.75	33.65 / (-3%)	30.85	30.05 / (-3%)
Small Solar II	11-25 (25)	Not Applicable	Not Applicable	27.75	26.85 / (-3%)
Medium Solar	26-250 (250*)			22.75	21.85 / (-4%)
Carport I	1-500 (250)			Not Applicable	24.55
Commercial Solar	251-999 (500)			18.75	17.85 / (-5%)
Comm. Solar-CRDG	251-999 (500)			20.65	20.50** / (-1%)
Carport II	500-5,000 (1,000)			Not Applicable	23.85
Large Solar	1,000-5,000 (2,000)			15.05	14.05 / (-7%)
Large Solar-CRDG	1,000-5,000 (2,000)			16.85	16.20** / (-4%)

Adjusted from 140 kW based on composition of 2017 Medium Solar award group.

*** This is the maximum CRDG Ceiling Price allowed by law. The calculated values are 20.65 for Commercial and 16.55 for Large. Note, however, that this CP would allow cost-competitive projects (bidding below the CP) access to > a 15% premium compared to actual project costs.*

Summary Results (2): Wind, Hydro & AD

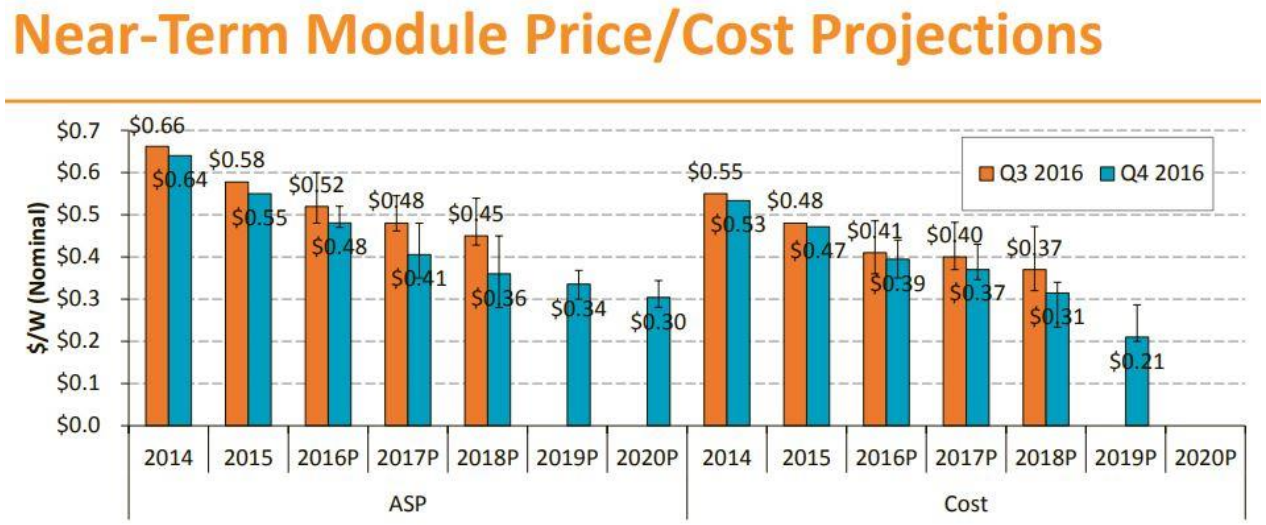
Technology	**Size Range kW** (Modeled Size kW)	**2017 Approved CP** 20 year Tariff Duration	**2018** ***Proposed*** **CP** 20 year Tariff Duration
Small Wind	1-999 (100)	21.45	20.15 / (-6%)
Large Wind	1,000-5,000 (3,000)	17.35	16.25 / (-6%)
Large Wind - CRDG	1,000-5,000 (3,000)	18.55	17.95 / (-3%)
Hydroelectric	1-5,000 (500)	22.45	22.25 / (-1%)
Anaerobic Digestion	1-5,000 (750)	20.15	18.95 / (-6%)

Suniva/SolarWorld Section 201 Case

- Vast majority of Tier 1 crystalline silicon (c-Si) solar modules (the main module type used in U.S. solar installations) are imported into the U.S. (typically from Asia)
- Suniva and SolarWorld (a U.S. solar module manufacturer) has petitioned the U.S. International Trade Commission (USITC) for a Section 201 "safeguard" action establishing a minimum module price (MMP) for imported modules, which includes:
  - (For Year 1) A MMP of 78 cents/W_{DC} (\$780/kW_{DC})
  - (For Year 2) A MMP of 72 cents/W_{DC} (\$720/kW_{DC})
  - (For Year 3) A MMP of 69 cents/W_{DC} (\$690/kW_{DC})
  - (For Year 4) A MMP of 68 cents/W_{DC} (\$680/kW_{DC})
- Final remedy decision expected by November 2017 – (approximately) the same time the DG Board is expected to file 2018 Ceiling Price recommendations to the PUC
- If approved on above schedule, Year 1 and Year 2 values overlapping with the 2018 Program Year
- Potential Impact
  - Based on its own internal estimates, SEA estimates the impact of a MMP on 2018 levelized system costs for solar PV systems is, as proposed likely to be <u>at least +10%-15%</u> and would likely go beyond observed installed cost values obtained by SEA for systems in the Northeast and New England (the area of focus for determining ceiling prices required by RI Gen. Laws §39-26.6-5(d)(1))
  - However, since historical/contemporaneous installed costs do not incorporating these transactional impacts, estimation of a potential impact is required for 2018 Ceiling Prices

Proposed Estimation Approach

- Key to determining impact:
  - Establishing change/”delta” between what module prices would have been without a MMP (“counterfactual”), and what they would be with an approved MMP
- SEA proposed approach: If an MMP is adopted, establish a <u>weighted counterfactual module price</u> for 2018 program year (April 2018-March 2019) utilizing pre-April 2017 estimates of future module prices (such as the Average Selling Prices (ASPs) seen in the below) and subtract it from either:
  - An estimated MMP determined prior to filing (and left unchanged after a final determination)
  - The actual MMP as determined by the U.S. Department of Commerce/POTUS (who is empowered to personally make the final decision under Section 201)



Source: *Q3/Q4 Solar Industry Update (NREL/DOE for SunShot)*

Modeling Parameters

Sustainable Energy Advantage, LLC

Summary: Cost & Production Assumptions

	Small I	Small II	Medium	Carport I	Commercial	Commercial CRDG	Carport II	Large	Large CRDG
Nameplate Capacity (kW)	5	25	250	250	500	500	1,000	2,000	2,000
Capacity Factor	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%	15.30%	15.30%
Annual Degradation	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Total Cost ($/kW)	$3,835	$3,610	$2,932	$3,488	$2,376	$2,576*	$3,839	$2,046	$2,246*
Fixed O&M ($/kW-yr)	$50	$35	$35	$35	$21	$36**	$21	$15	$30**
O&M Inflation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Insurance (% of Cost)	0.0%	0.0%	0.27%	0.27%	0.45%	0.45%	0.45%	0.45%	0.45%
Project Management ($/yr)	$0	$0	$750	$750	$3,000	$3,000	$3,000	$12,000	$12,000
Land Lease ($/yr)	$0	$0	$6,250	$6,250	$12,500	$12,500	$12,500	$50,000	$50,000

** Reflects installed cost of non-CRDG project from same category, plus estimated cost of customer acquisition.*
*** Reflects O&M cost of non-CRDG project from same category, plus estimated cost of customer care and replacement.*

Summary: Financing Assumptions

	Small I	Small II	Medium	Carport I	Commercial	Commercial CRDG	Carport II	Large	Large CRDG
% Debt	0%	0%	50%	50%	50%	50%	50%	55%	55%
Debt Term (years)	N/A	N/A	12	12	12	12	12	10	10
Interest Rate on Term Debt	N/A	N/A	6.50%	6.50%	6.00%	6.00%	6.00%	6.00%	6.00%
Lender's Fee (% of total borrowing)	N/A	N/A	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Target Pre-Tax Equity IRR	8.0%	8.0%	12.0%	12.0%	12.0%	12.0%	12.0%	11.0%	11.0%
Target After-Tax Equity IRR	5.9%	5.9%	7.1%	7.1%	7.1%	7.1%	7.1%	6.5%	6.5%

Summary: Cost & Production Assumptions

	Small Wind	Large Wind	Large Wind - CRDG	Hydroelectric	Anaerobic Digestion
Nameplate Capacity (kW)	100	3,000	3,000	500	725
Capacity Factor	21.00%	21.00%	21.00%	55.00%	92%[1]
Annual Degradation	0.5%	0.5%	0.5%	0.0%	0.0%
Total Cost ($/kW)	$3,500	$2,820	$3,020[2]	$8,750	$10,150[3]
Fixed O&M ($/kW-yr)	$30.00	$26.50	$41.50[4]	$2.00	$600
O&M Inflation	2.0%	2.0%	2.0%	1.0%	2.0%
Insurance (% of Cost)	0.3%	0.2%	0.2%	2.0%	1.0%
Project Management ($/yr)	$750	$18,000	$18,000	$3,000	$75,000
Land Lease ($/yr)	$5,000	$162,000	$162,000	$8,750	$35,000

1. *Note: For Anaerobic Digestion we use an Availability Factor*
2. *Reflects installed cost of non-CRDG project from same category, plus estimated cost of customer acquisition.*
3. *Note: Includes $150 per kW for interconnection costs*
4. *Reflects O&M cost of non-CRDG project from same category, plus estimated cost of customer care and replacement.*

Summary: Financing Assumptions

	Small Wind	Large Wind	Large Wind - CRDG	Hydroelectric	Anaerobic Digestion
% Debt	45%	65%	65%	68%	60%
Debt Term (years)	15	15	15	18	15
Interest Rate on Term Debt	6.0%	6.0%	6.0%	6.5%	6.0%
Lender's Fee (% of total borrowing)	2.0%	1.0%	1.0%	2.0%	2.0%
Target Pre-Tax Equity IRR	12.0%	12.0%	12.0%	12.0%	12.0%
Target After-Tax Equity IRR	7.1%	7.1%	7.1%	7.1%	7.1%

Additional Assumptions

Sustainable Energy Advantage, LLC

Tax Credits

- Solar:
  - All projects selected in 2018 solicitations are assumed able to qualify for a 30% ITC by 12/31/2019.
  - No monetization "haircut" assumed.

- Wind
  - All projects selected in 2018 solicitations are assumed to qualify for ITC in lieu of PTC
  - ITC value modeled reflects a reduction of 40% to face value.
  - No monetization "haircut" assumed.

- AD & Hydro
  - No PTC (or ITC in lieu thereof) for facilities commencing construction after 12/31/2016.

Depreciation Benefits

- MACRS depreciation creates deduction benefit by reducing taxable income.
- Where depreciation expense is > operating income, the project will experience a net operating loss (NOL) for the specified year.
- This NOL is passed through to the facility owner, creating a benefit by reducing that entity's eligible taxable income.
- NOL benefits are assumed to be applied "as generated" to both state and federal tax liabilities

- Bonus Depreciation:
  - Based on year of commercial operation
  - Majority of projects selected under 2018 enrollments assumed to come on-line in 2019
  - Therefore, 30% bonus depreciation assumed in Ceiling Price calculation
    - Exception: Hydro assumed to come on-line in 2020 or later. Therefore, no bonus depreciation is applied.

Post-Tariff Market Value of Production

- Applied after tariff expires, for remainder of modeled useful life, if applicable.
  - Solar (years 21 through 25)
  - Hydro (years 21 through 30)
  - Does not apply to wind and AD, modeled as 20-year useful life
- Purpose = to take full useful life and market revenues into account when recommending ceiling price
- Methodology
  - Wholesale energy revenue +
    - Production-weighted for solar
    - All-hours for hydro
  - (Nominal) REC revenue ($5)

Post-Tariff Market Value of Production

Project Year	Calendar Year	Market Value of Production (incl. energy & RECs) (cents/kWh)	
		Solar	Hydroelectric
16	2033	8.79	
17	2034	8.94	
18	2035	9.19	
19	2036	9.65	
20	2037	10.10	
21	2038	10.51	10.10
22	2039	10.87	10.45
23	2040	11.16	10.72
24	2041	11.46	11.01
25	2042	11.83	11.36
26	2043	12.21	11.73
27	2044	12.60	12.10
28	2045	13.01	12.49
29	2046	13.43	12.90
30	2047	13.86	13.31

Stakeholder Feedback: Solar

- Solar
  - “Current interconnection costs and system modifications are exponentially more expensive than they have been in the past.”
  - “Interconnection is a material cost of the project, typically in the 10-15% total cost range.”
  - “Financing assumptions are same as last year”
  - “The project financing market for domestic solar PV projects is quite efficient and deep at this point in time.”
  - “The long-term capital for projects is readily available.”
  - “Financing of RE facilities in R.I. is generally similar to financing of other Northeast markets.”
  - Most small solar owners select the 15-year tariff. If minimal effort is required to maintain the 20-year option, it may nonetheless make sense to keep it.
    - Given the Power Sector Transformation effort, “exploring even shorter terms might be interesting.”
  - “We are concerned that adding additional carve-out classes without increasing the overall number of MW’s solicited in REGrowth will negatively impact the rate of development through the REGrowth program.”
  - “XXX has been unable to make the numbers work for the community remote DG projects in the 2017 REG program. We are interested in the Rhode Island market and continue to evaluate opportunities, particularly under the community remote net metering program.”
  - “We are having trouble getting firm panel pricing due to tariff concerns.”
  - “Weight should also be given to the uncertainty in the panel price environment due to the lingering Suniva trade case.”

Stakeholder Feedback: Non-Solar

- Wind
  - “With longer blades, small sites in New England are approaching 40% capacity factor.”
  - “Est. $2.2MM per MW; approx. $1M/MW for turbines”
- Hydro
  - “Regional and local banks and investors generally have knowledge of the solar and wind industries but little knowledge or experience of developing hydropower projects hence we have to bear a real risk premium.”
  - “There are slim to no opportunities for the traditional tax equity investors for small scale hydro projects.”
  - “There is scant if any public information on small scale hydropower investments.”
  - “There are also annual FERC Compliance Costs…dependent on the Hazard Classification of the dam, Low, Medium or High Hazard. This does not reflect the condition of the dam more the risk of loss of human life or property downstream should the dam fail.”
- Anaerobic Digestion
  - AD risk is a 3-legged stool
    - PPA w/ creditworthy offtaker
    - Feedstock contract
      - Industry standard is 3-5 year contracts
      - Assume a tipping fee thereafter; must be < landfill fee to attract supply, and b/c needs to be separated
    - Digestate management – projects need a solution for waste
  - All three must be addressed for a successful project.

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Rhode Island
Renewable Energy Growth Program:

Analysis & Discussion in Support of
2^{nd} Draft 2018 Ceiling Price Recommendations

September 27, 2017
Sustainable Energy Advantage, LLC
Mondre Energy, Inc.

Stakeholder Comments

Sustainable Energy Advantage, LLC

Stakeholder Feedback on Ceiling Price Modeling

- After-tax internal rate of return (IRR)
  - *Assumed equity returns produce thin margins (particularly for Medium Solar projects)*
  - *~10% IRR likely to be more representative of financier needs*
  - *Concern that assumed returns are not comparable to National Grid regulated return on equity*
  - Modeling Implications: (M.I.)
    - Sponsor Equity = 10% AT IRR on 15% of total equity contributions;
    - Tax Equity = 8% AT IRR on 85% of total equity contributions;
    - AD/Hydro = blended 8% AT IRR on all equity contributions.
- ITC monetization assumptions
  - *Assume ITC haircut; investors won't contribute $1 of capital for $1 of return.*
  - M.I.: Equity returns are realized through IRR. Monetization represents assumption that project owner has enough taxable income to use tax incentives as generated.
- Post-contract REC price assumptions
  - *$5/MWh too high; seem aggressive, as market values are $1 to $2/MWh now.*
  - M.I.: Commenter units are incorrect. Market values are $10 to $20/MWh now; $5 assumption is conservative.
- Bill crediting assumptions
  - *Concern that selected approach leads to under-estimation of taxes*
  - M.I.: Tax impact adjusted to include all observed tax impacts
- Other assumed project costs or cost reductions
  - *General support for current estimates of CRDG incremental costs (given 15% statutory limit)*
  - *Evaluate inclusion of decommissioning reserve* M.I.: Cost of surety bond added for decommissioning cost
  - *Land lease: mixed comments received* M.I.: no change
  - *Consider including impact of reduced permitting costs due to statewide permit* M.I.: data not yet available

Stakeholder Feedback on Program/Policy Issues (1)

- Carports
  - *Concern that creating Carport I and Carport II allocations would detract from allocations for more mature/cost-effective sectors*
  - *Some support for considering a Carport "adder" (akin to what is proposed in MA SMART program)*
- Consider specific efforts to increase program participation
  - *Compare 40 MW annual totals (and annual per-category allocations) w/total bid MW to determine which sectors may be over- or under-performing* [see later slides]
  - *Consider increasing ceiling prices to ensure 40 MW is hit*
- Coordination between REGrowth and RIPUC Docket 4600/Power Sector Transformation processes
  - *Consider moving to a "value of solar" instead of cost of solar approach (thus eliminating Ceiling Prices)*
  - *OER should coordinate Ceiling Price process more closely with PUC business model and rate transformation processes*
- Suniva/SolarWorld Section 201 investigation
  - *Support expressed for proposed approach of revising Ceiling Prices to incorporate weighted average module price impact once trade decision is made*
  - *Concern that "Suniva effect" (of higher pre-tariff module prices driven by developer action to hoard modules ahead of a negative decision) already being felt by RI developers*

Stakeholder Feedback on Program/Policy Issues (2)

- Use/emailing of W9s to National Grid
  - *Concern that National Grid requirement that W9s be emailed to the company creates a security risk for participating customers*
  - *Recommend using a more secure customer-facing portal (stakeholder suggested use of Clean Power Research's PowerClerk platform) that would increase consumer confidence, reduce installation time and non-hardware "soft" costs*
- National Grid notarized affidavit requirements
  - *Requiring a "wet" (non-digital) signature adds time and cost for installers*
  - *Consider use of DocuSign or similar approach to avoid customer dissatisfaction or project cancellations*
- National Grid 3-year customer usage requirements
  - *Requiring customers to provide 3-year usage values adds time and costs installers must bear (but acknowledges statutory requirement)*
- DC vs. AC requirements
  - *Net metering program and REGrowth use of differing measurements of nameplate capacity creates confusion*
- Onerous hydro permitting process creates disproportionate pre-contract risk
  - *Selection for REG contract prior to FERC permitting process would create a more balanced risk/reward profile. Current framework puts all development expense at risk, with full exposure to regulatory risk (od program changes)*

Historic Bid Data

Sustainable Energy Advantage, LLC

Large Solar

Tariff Year	Total MWs bid	Total MWs selected (or pending)	MW Allocation	MWs bid as a % of MW Allocation	MWs selected as a % of MW Allocation
2015	6.644	6.644	6	111%	111%
2016	10.849	4.999	9	121%	56%
2017	18.213	9.736	12.05	151%	81%

All 2017 values reflect YTD progress (1st enrollment only)

Notes:
1. The DG Board is empowered to alter the MW allocation after enrollments to better reflect anticipated growth of different sub-categories. This explains how the Board approved more MWs in 2015 than was initially approved by the Public Utilities Commission.
2. Stakeholder feedback from Meeting #1 highlighted 3 MWs of missing wind projects in 2016. The 3 MWs were misclassified as Large Solar projects, which is why the 2016 figures are 3 MWs lower here.
3. Large Solar projects under the first enrollment of 2017 were either rejected or are pending – all MW shown in "selected" are pending.

Commercial Solar

Tariff Year	Total MWs bid	Total MWs selected (or pending)	MW Allocation	MWs bid as a % of MW Allocation	MWs selected as a % of MW Allocation
2015	5.799	4.147	5.5	105%	75%
2016	8.553	7.559	8	107%	94%
2017	3.398	3.398	5	68%	68%

All 2017 values reflect YTD progress (1st enrollment only)

Notes:

1. *All projects bid under the first enrollment of 2017 are still pending review.*
2. *All 2017 values reflect YTD progress (1st enrollment only)*

Medium Solar

Tariff Year	Total MWs bid	Total MWs selected	MW Allocation	MWs bid as a % of MW Allocation	MWs selected as a % of MW Allocation
2015	2.705	2.705	4	68%	68%
2016	4.694	4.496	5	94%	90%
2017	1.976	1.726	3	66%	58%

All 2017 values reflect YTD progress (1st enrollment only)

Notes:

1. *All projects bid under the first enrollment of 2017 are still pending review.*
2. *All 2017 values reflect YTD progress (1st enrollment only)*

Wind I, II

Tariff Year	Total MWs bid	Total MWs selected	MW Allocation	MWs bid as a % of MW Allocation	MWs selected as a % of MW Allocation
2015	6	6	5	120%	120%
2016	3	3	9	33%	33%
2017	0	0	6	0%	0%

Notes:

1. No Wind III projects bid into the program during 2015 or 2016.

2. The DG Board is empowered to alter the MW allocation after enrollments to better reflect anticipated growth of different sub-categories. This explains how the Board approved more MWs in 2015 than was initially approved by the Public Utilities Commission.

3. MW Allocation plans for 2015, 2016, and 2017 rolled Wind I, II, and III (where applicable) into the same MW allocation bucket. Thus, it is accurate for our purposes to roll them up here.

4. Stakeholder feedback from Meeting #1 highlighted 3 MWs of missing Large Wind projects in 2016. The 3 MWs were misclassified as Large Solar projects, which is why the 2016 figures are 3 MWs higher here. In the 2016 program year, wind facilities sized between 1.5-3 MWs were classified as Wind I. For the 2017 program year, wind facilities sized between 1-5 MWs are classified as Large Wind.

Small Solar I + II

Tariff Year	Total MWs Bid	MW Allocation	MWs bid as a % of MW allocation
2015	3.067	3	102%
2016	7.172	5.5	130%
2017	0.684	6.55	10%

All 2017 values reflect YTD progress (1st enrollment only)

Notes:

1. *Small Solar I and II comprised the same MW allocation block for program years 2015, 2016, and 2017. Thus, we have rolled them up as one here.*
2. *All 2017 values reflect YTD progress (1st enrollment only)*

2nd Draft 2018 Ceiling Prices

Sustainable Energy Advantage, LLC

Summary Results (1): Solar, *(cents/kWh)*

Technology	**Size Range kW** (Modeled Size kW)	**2017 Approved CP** 15 year Tariff Duration	**2018 1st Draft CP** 15 year Tariff Duration	**2018 2nd Draft CP** 15 year Tariff Duration	**2017 Approved CP** 20 year Tariff Duration	**2018 1st Draft CP** 20 year Tariff Duration	**2018 2nd Draft CP 20 year Tariff Duration**
Small Solar I	1-10 (5)	34.75	33.65 / (-3%)	33.85 (-3%)	30.85	30.05 / (-3%)	30.25 (-2%)
Small Solar II	11-25 (25)	Not Applicable	Not Applicable		27.75	26.85 / (-3%)	27.35 (-1%)
Medium Solar	26-250 (250*)				22.75	21.85 / (-4%)	22.55 (-1%)
Carport I	1-500 (250)				N/A	24.55	25.35
Commercial Solar	251-999 (500)				18.75	17.85 / (-5%)	18.45 (-2%)
Comm. Solar-CRDG	251-999 (500)				20.65	20.50** / (-1%)	21.15 (2%)
Carport II	500-5,000 (1,000)				N/A	23.85	24.75
Large Solar	1,000-5,000 (2,000)				15.05	14.05 / (-7%)	14.75 (-2%)
Large Solar-CRDG	1,000-5,000 (2,000)				16.85	16.20** / (-4%)	16.96 (1%)

**Adjusted from 140 kW based on composition of 2017 Medium Solar award group.*

*** This is the maximum CRDG Ceiling Price allowed by law. The 1st draft calculated values were 20.65 for Commercial and 16.55 for Large. The 2nd draft calculated values were 21.15 for Commercial and 17.25 for Large. Rounding in the 1st draft erroneously allowed the proposed ceiling prices to exceed the 115% cap and was adjusted in the 2nd draft. Note, however, that this CP would allow cost-competitive projects (bidding below the CP) access to > a 15% premium compared to actual project costs.*

Summary Results (2): Wind, Hydro & AD

Technology	Size Range kW (Modeled Size kW)	2017 Approved CP 20 year Tariff Duration	2018 1st Draft CP 20 year Tariff Duration	2018 2nd Draft CP 20 year Tariff Duration
Small Wind	1-999 (100)	21.45	20.15 / (-6%)	20.85 / (-3%)
Large Wind	1,000-5,000 (3,000)	17.35	16.25 / (-6%)	16.35 / (-6%)
Large Wind - CRDG	1,000-5,000 (3,000)	18.55	17.95 / (-3%)	18.05 / (-3%)
Hydroelectric	1-5,000 (500)	22.45	22.25 / (-1%)	23.35 (4%)*
Anaerobic Digestion	1-5,000 (750)	20.15	18.95 / (-6%)	19.75 (-2%)

**Change between 1st Draft CP and 2nd Draft CP is driven by adjustments to assumptions installed cost including interconnection, and on bonus depreciation. As projects must be placed in service by the end of 2019 to qualify for bonus depreciation, the 2nd Draft CPs assume hydro projects will not qualify.*

Preliminary Estimate Suniva/SolarWorld Impact

Sustainable Energy Advantage, LLC

Suniva/SolarWorld Section 201 action: Implications on CPs (if approved as proposed)

- On September 22, 2017, the USITC found that c-Si imports from a variety of nations constituted a "serious injury" to American solar manufacturers
- Next steps: USITC expected to propose a remedy no later than November 13, 2017, at which point POTUS is has 60 days to either approve the proposed remedy or determine a separate remedy
  - **Thus, <u>final remedy is not known at this time</u>**
- To model potential impact on REG 2018 Ceiling Prices, increased installed costs to reflect the requested minimum module price (MMP)
  - Difference between (publicly available) forecasted module prices pre-Suniva filing and module prices under requested remedy, weighted by months of each calendar year in the REG Program Year

Calendar/REG Program Year	2018 Calendar Year	2019 Calendar Year	2018 REG Program Year (4/1/2018-3/31/2019)
Counterfactual Forecasted Module Average Selling Price (ASP, in $/kW$_{DC}$)*	$360	$340	$355
Remedy MMP ($/kW$_{DC}$)	$780	$720	$765
Implied Module Price ▲ ($/kW$_{DC}$)	$420	$380	**$410****

**Source for publicly-available 2018 counterfactual module outlook: NREL Q3/Q4 Solar Market Report (Available at: https://www.nrel.gov/docs/fy17osti/67639.pdf). Report was selected given that it was the most recent publicly-available multi-year module price forecast SEA could find that was issued before April 2017 (when Suniva filed the initial request for a safeguard investigation)*

***Represents assumption that Year 1 of the remedy will evenly overlay with 2018, and that 9 months of the program year will overlap with Year 1, while 3 months of program year will overlap w/Year 2*

Comparison: Solar CPs with and without proposed remedy (cents/kWh)

Technology	2018 2nd Draft CP (w/o Suniva/SolarWorld Remedy) 15 year Tariff Duration	2018 2nd Draft CP with Suniva/SolarWorld Proposed Remedy 15 year Tariff Duration	2018 2nd Draft CP (w/o Suniva/SolarWorld Remedy) 20 year Tariff Duration	2018 2nd Draft CP with Suniva/SolarWorld Proposed Remedy (% Change**) 20 year Tariff Duration
Small Solar I	33.85	37.05 (9%)	30.25	**32.95 (9%)**
Small Solar II			27.35	**30.05 (10%)**
Medium Solar			22.55	**24.75 (10%)**
Carport I			25.35	**27.55 (9%)**
Commercial Solar			18.45	**20.65 (12%)**
Comm. Solar-CRDG			21.15	**23.75* (12%)**
Carport II			24.75	**26.95 (9%)**
Large Solar			14.75	**16.85 (14%)**
Large Solar-CRDG			16.96*	**19.38* (14%)**

**Maximum CRDG Ceiling Price allowed by law (115% cap). The 2nd draft calculated values (baseline) were 21.15 for Commercial and 17.25 for Large. The 2nd draft calculated values with the MMP remedy imposed were 25.65 for Commercial and 21.35 for Large.*
***% Change values represent difference from proposed 2nd Draft CPs*

Modeling Parameters

Sustainable Energy Advantage, LLC

Recap on Data Request Definition of Total Project Cost

Total Project Cost:

This represents the total expected all-in project capital cost, which should include all hardware, balance of plant, design, construction, permitting, development (including developer fee), interest during construction, financing costs and reserves. This figure should not account for any tax incentives, grants, or other cash incentives, which will be accounted for separately. It should also exclude the assumed interconnection cost, which is specified separately. This category only excludes interconnection from upfront costs, and does not include O&M expenses or replacement costs. ALL other upfront capital costs must be included.

(emphasis added)

Summary: Solar Cost & Production Assumptions

	Small I	Small II	Medium	Carport I	Commercial	Commercial CRDG	Carport II	Large	Large CRDG
Nameplate Capacity (kW_{DC})	5	25	250 [140]	250	500	500	1,000	2,000	2,000
Capacity Factor	14.00% [13.49%]	14.00% [13.49%]	14.00%	14.00%	14.00% [14.40%]	14.00%	14.00%	15.30%	15.30%
Annual Degradation	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Total Cost ($/$kW_{DC}$, w/o Suniva/SolarWorld remedy)*	~~$3,835~~ $3,823** [$3,961]	~~$3,610~~ $3,599** [$3,541]	$2,932 [$2,853]	$3,488	$2,376 [$2,390]	$2,576***	$3,839	$2,046 [$2,241]	$2,246***
Total Cost ($/$kW_{DC}$,w/Suniva/ SolarWorld remedy)*	**$4,233**	**$4,009**	**$3,302**	**$3,898**	**$2,786**	**$3,396*** **	**$4,249**	**$2,456**	**$3,066*** **

** Total Cost represents total expected all-in project capital cost, and is inclusive of interconnection, development (including developer fee), interest during construction, financing costs and reserves, and warranties to cover inverter replacements.*
*** Reduction reflects assumption that permitting fees and labor are ~3% of total project cost (DOE, Feb. 2016), and that Rhode Island's revised statewide permitting procedure will result in a 10% decrease in these costs.*
**** Reflects installed cost of non-CRDG project from same category, plus estimated cost of customer acquisition.*

Key:
Values in [Brackets] represent 2017 ceiling price inputs
~~Red strikeout~~ text denotes 1st draft input values that were updated to values in black text in 2nd draft
Bold values represent installed associated with fully granting proposed Suniva/SolarWorld remedy on top of the 2nd draft CPs

Summary: Solar Cost & Production Assumptions (Cont'd)

	Small I	Small II	Medium	Carport I	Commercial	Commercial CRDG	Carport II	Large	Large CRDG
Fixed O&M ($/kW-yr)	$50	$35 **[$50]**	$35 **[$34]**	$35	$21 **[$24]**	$36*	$21	$15	$30*
O&M Inflation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Insurance (% of Cost)	0.0%	0.0%	0.27%	0.27%	0.45% **[0.27%]**	0.45%	0.45%	0.45% **[0.27%]**	0.45%
Project Management ($/yr)	Included in O&M.	Included in O&M.	$750	$750	$3,000	$3,000	$3,000	$12,000 **[$7,700]**	$12,000
Land Lease ($/yr)	$0	$0	$6,250 **[$3,500]**	$6,250	$12,500	$12,500	$12,500	$50,000	$50,000
Decommissioning Cost ($/kW)	$0	$0	$0	~~$0~~ $37.50 **[$0]**	~~$0~~ $37.50 **[$0]**	~~$0~~ $37.50 **[$0]**	~~$0~~ $37.50 **[$0]**	~~$0~~ $37.50 **[$0]**	~~$0~~ $37.50 **[$0]**

** Reflects O&M cost of non-CRDG project from same category, plus estimated cost of customer care and replacement.*

Key:
Values in [Brackets] represent 2017 ceiling price inputs
~~Red strikeout~~ text denotes 1st draft input values that were updated to values in black text in 2nd draft

Summary: Solar Financing Assumptions

	Small I	Small II	Medium	Carport I	Commercial	Commercial CRDG	Carport II	Large	Large CRDG
% Debt	0%	0%	50%	50%	50%	50%	50%	55% **[40%]**	55%
Debt Term (years)	N/A	N/A	12	12	12	12	12	10 **[15]**	10
Interest Rate on Term Debt	N/A	N/A	6.50%	6.50%	6.00% **[6.50%]**	6.00%	6.00%	6.00% **[5.75%]**	6.00%
Lender's Fee (% of total borrowing)	N/A	N/A	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Sponsor/Tax Equity Ratio (%)	N/A	N/A	15/85	15/85	15/85	15/85	15/85	15/85	15/85
Sponsor Equity After-Tax IRR	N/A	N/A	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Tax Equity After-Tax IRR	N/A	N/A	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Target After-Tax IRR	5.9% **[5.0%]**	~~5.9%~~ 8.3% **[7.5%]**	~~7.1%~~ 8.3% **[7.5%]**	~~7.1%~~ 8.3%	~~7.1%~~ 8.3% **[7.5%]**	~~7.1%~~ 8.3%	~~7.1%~~ 8.3%	~~6.5%~~ 8.3% **[7.0%]**	~~6.5%~~ 8.3%

Key:
Values in [Brackets] represent 2017 ceiling price inputs
~~Red strikeout~~ text denotes 1st draft input values that were updated to values in black text in 2nd draft

Summary: Non-Solar Cost & Production Assumptions

	Small Wind	Large Wind	Large Wind - CRDG	Hydroelectric	Anaerobic Digestion
Nameplate Capacity (kW)	100	3,000 [4,500]	3,000	500	725
Capacity Factor	21.00%	21.00%	21.00%	55.00%	92%[1]
Annual Degradation	0.5% [0.0%]	0.5% [0.0%]	0.5%	0.0%	0.0%
Total Cost ($/kW) [2]	$3,500	$2,820 [$3,159]	$3,020[3]	~~$8,750~~ $9,250[4] [$9,250]	$10,150[5]
Fixed O&M ($/kW-yr)	$30.00	$26.50 [$23.00]	$41.50[6]	$2.00	$600
O&M Inflation	2.0%	2.0%	2.0%	~~1.0%~~ 2.0% [2.0%]	2.0%
Insurance (% of Cost)	0.3% [0.25%]	0.2% [0.43%]	0.2%	2.0% [0.5%]	1.0%
Project Management ($/yr)	$750 [Incl.]	$18,000 [$15,000]	$18,000	$3,000 [$15,000]	$75,000
Land Lease ($/yr)	$5,000	$162,000	$162,000	$8,750 [$12,500]	$35,000

1. *Note: For Anaerobic Digestion we use an Availability Factor*
2. *Total Cost represents total expected all-in project capital cost, and is inclusive of interconnection, development (including developer fee), interest during construction, financing costs and reserves, and warranties to cover equipment replacements.*
3. *Reflects installed cost of non-CRDG project from same category plus estimated cost of customer acquisition.*
4. *2nd draft inputs were adjusted to fully capture total project cost, including interconnection.*
5. *Note: Includes $150 per kW for interconnection costs*
6. *Reflects O&M cost of non-CRDG project from same category, plus estimated cost of customer care and replacement.*

Key:
[Brackets] - 2017 inputs
~~Red strikeout~~ text - 1st draft values that were updated for 2nd draft

Summary: Non-Solar Financing Assumptions

	Small Wind	Large Wind	Large Wind - CRDG	Hydroelectric	Anaerobic Digestion
% Debt	45%	65% **[60%]**	65%	~~68%~~ 70% **[65%]**	60%
Debt Term (years)	15	15	15	~~18~~ 20 **[20]**	15
Interest Rate on Term Debt	6.0% **[6.25%]**	6.0% **[6.25%]**	6.0%	6.5% **[6.25%]**	~~5.75%~~ 6.5% **[6.25%]**
Lender's Fee (% of total borrowing)	2.0%	1.0% **[2.0%]**	1.0%	2.0%	2.0% **[0.0%]**
Sponsor/Tax Equity Ratio (%)	15/85	15/85	15/85	N/A	N/A
Sponsor Equity After-Tax IRR	10.0%	10.0%	10.0%	N/A	N/A
Tax Equity After-Tax IRR	8.0%	8.0%	8.0%	N/A	N/A
Target After-Tax IRR	~~7.1%~~ 8.3% **[10.0%]**	~~7.1%~~ 8.3% **[10.0%]**	~~7.1%~~ 8.3%	~~7.1%~~ 8.3% **[10.0%]**	~~10.0%~~ 8.3% **[10.0%]**

Key:
Values in [Brackets] represent 2017 ceiling price inputs
~~Red strikeout~~ text denotes 1st draft input values that were updated to values in black text in 2nd draft

Additional Assumptions

Sustainable Energy Advantage, LLC

Post-Tariff Market Value of Production

- Applied after tariff expires, for remainder of modeled useful life, if applicable.
  - Solar (years 21 through 25)
  - Hydro (years 21 through 30)
  - Does not apply to wind and AD, modeled as 20-year useful life
- Purpose = to take full useful life and market revenues into account when recommending ceiling price
- Methodology
  - Wholesale energy revenue +
    - Production-weighted for solar
    - All-hours for hydro
  - (Nominal) REC revenue ($5/MWh)

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Rhode Island
Renewable Energy Growth Program:

2018 Ceiling Price Recommendations to DG Board

October 23, 2017

Sustainable Energy Advantage, LLC
Mondre Energy, Inc.

Sustainable Energy Advantage, LLC

Recommended 2018 Ceiling Prices

Sustainable Energy Advantage, LLC

Summary Results (1): Solar, *(cents/kWh)*

Technology	Size Range kW (Modeled Size kW)	2017 Approved CP	2018 1st Draft CP	2018 2nd Draft CP	2018 Proposed Final CP
Small Solar I: 15 Year Tariff	1-10 (5)	34.75	33.65 / (-3%)	33.85 (-3%)	31.25 (-10%)
Small Solar I: 20 Year Tariff	1-10 (5)	30.85	30.05 / (-3%)	30.25 (-2%)	27.75 (-10%)
Small Solar II	11-25 (25)	27.75	26.85 / (-3%)	27.35 (-1%)	26.55 (-4%)
Medium Solar	26-250 (250*)	22.75	21.85 / (-4%)	22.55 (-1%)	22.45 (-1%)
Carport I	1-500 (250)	N/A	24.55	25.35	25.25
Commercial Solar	251-999 (500)	18.75	17.85 / (-5%)	18.45 (-2%)	17.65 (-6%)
Comm. Solar-CRDG	251-999 (500)	20.65	20.50** / (-1%)	21.15 (2%)	20.30** (-2%)
Carport II	500-5,000 (1,000)	N/A	23.85	24.75	24.65
Large Solar	1,000-5,000 (2,000)	15.05	14.05 / (-7%)	14.75 (-2%)	14.65 (-3%)
Large Solar-CRDG	1,000-5,000 (2,000)	16.85	16.20** / (-4%)	16.96 (1%)	16.85 (0%)

Notes: All CP represent 20 year tariffs, with the exception of the first row for Small Solar I under a 15 year tariff.
Percentage changes denote changes from the 2017 approved CP.
**Adjusted from 140 kW based on composition of 2017 Medium Solar award group.*
*** This is the maximum CRDG Ceiling Price allowed by law. The calculated values were 20.65 for Commercial and 16.55 for Large in the 1st draft, 21.15 for Commercial and 17.25 for Large in the 2nd draft, and 20.35 for Commercial and 17.15 for Large in the proposed final. Rounding in the 1st draft erroneously allowed the proposed ceiling prices to exceed the 115% cap and was adjusted in the 2nd draft. Note, however, that this CP would allow cost-competitive projects (bidding below the CP) access to > a 15% premium compared to actual project costs.*

Summary Results (2): Wind, Hydro & AD

Technology	Size Range kW (Modeled Size kW)	2017 Approved CP 20 year Tariff Duration	2018 1st Draft CP 20 year Tariff Duration	2018 2nd Draft CP 20 year Tariff Duration	2018 Proposed Final CP 20 year Tariff Duration
Small Wind	1-999 (100)	21.45	20.15 / (-6%)	20.85 / (-3%)	20.85 (-3%)
Large Wind	1,000-5,000 (3,000)	17.35	16.25 / (-6%)	16.35 / (-6%)	16.35 (-6%)
Large Wind - CRDG	1,000-5,000 (3,000)	18.55	17.95 / (-3%)	18.05 / (-3%)	18.05 (-3%)
Hydroelectric	1-5,000 (500)	22.45	22.25 / (-1%)	23.35 (4%)*	23.35 (4%)
Anaerobic Digestion	1-5,000 (750)	20.15	18.95 / (-6%)	19.75 (-2%)	19.75 (-2%)

**Change between 1st Draft CP and 2nd Draft CP is driven by adjustments to assumptions installed cost including interconnection, and on bonus depreciation. As projects must be placed in service by the end of 2019 to qualify for bonus depreciation, the 2nd Draft CPs assume hydro projects will not qualify.*

Identification and Explanation of Changes

- All Solar:
  - Assume 15% cost reduction (on 3% of total project cost) due to statewide permitting
- Small Solar I
  - Estimate total project cost as weighted-average of 2017 reported cost data (75% weighting) and 2017 bid pricing recently released by Energy Sage (25% weighting)
  - Revert to assumed return on equity to 2017 CP value of 5%, after tax (from 5.9%)
  - Attribution of change in proposed CP:
    - 0.60¢ decrease from adjustment to installed cost based on bid data released by EnergySage
    - 2.00¢ decrease from reversion of return to 2017 level
    - 0.20¢ decrease from solar permitting cost reduction
- Small Solar II
  - Installed cost weighted to 75% of the 2017 average price data and 25% of the lower quartile 2017 data as a proxy for small commercial installations.
- Wind, Hydro, & AD
  - Added cost of bonding to secure decommissioning

Stakeholder Comments

Sustainable Energy Advantage, LLC

Stakeholder Feedback on Ceiling Prices: Round 1

- After-tax internal rate of return (IRR)
  - *Assumed equity returns produce thin margins (particularly for Medium Solar projects)*
  - *~10% IRR likely to be more representative of financier needs*
  - *Concern that assumed returns are not comparable to National Grid regulated return on equity*
  - Modeling Implications: (M.I.)
    - Sponsor Equity = 10% AT IRR on 15% of total equity contributions;
    - Tax Equity = 8% AT IRR on 85% of total equity contributions;
    - AD/Hydro = blended 8.3% AT IRR on all equity contributions.
- ITC monetization assumptions
  - *Assume ITC haircut; investors won't contribute $1 of capital for $1 of return.*
  - M.I.: Equity returns are realized through IRR. Monetization does not mean that $1 contribution translates to $1 return. Monetization represents assumption that project owner has enough taxable income to use tax incentives as generated.
- Post-contract REC price assumptions
  - *$5/MWh too high; seem aggressive, as market values are $1 to $2/MWh now.*
  - M.I.: Commenter units are incorrect. Market values are $10 to $20/MWh now; $5 assumption is conservative.
- Bill crediting assumptions
  - *Concern that selected approach leads to under-estimation of taxes*
  - M.I.: Tax impact adjusted to include all observed tax impacts
- Other assumed project costs or cost reductions
  - *General support for current estimates of CRDG incremental costs (given 15% statutory limit)*
  - *Evaluate inclusion of decommissioning reserve* M.I.: Cost of surety bond added for decommissioning cost
  - *Land lease: mixed comments received* M.I.: no change
  - *Consider including impact of reduced permitting costs due to statewide permit*

Stakeholder Feedback on Policy: Round 1

- Carports
  - *Concern that creating Carport I and Carport II allocations would detract from allocations for more mature/cost-effective sectors*
  - *Some support for considering a Carport "adder" (akin to what is proposed in MA SMART program)*
- Consider specific efforts to increase program participation
  - *Compare 40 MW annual totals (and annual per-category allocations) w/total bid MW to determine which sectors may be over- or under-performing* [see later slides]
  - *Consider increasing ceiling prices to ensure 40 MW is hit*
- Coordination between REGrowth and RIPUC Docket 4600/Power Sector Transformation processes
  - *Consider moving to a "value of solar" instead of cost of solar approach (thus eliminating Ceiling Prices)*
  - *OER should coordinate Ceiling Price process more closely with PUC business model and rate transformation processes*
- Suniva/SolarWorld Section 201 investigation
  - *Support expressed for proposed approach of revising Ceiling Prices to incorporate weighted average module price impact once trade decision is made*
  - *Concern that "Suniva effect" (of higher pre-tariff module prices driven by developer action to hoard modules ahead of a negative decision) already being felt by RI developers*

Stakeholder Feedback on Policy: Round 1 (cont.)

- Use/emailing of W9s to National Grid
  - *Concern that National Grid requirement that W9s be emailed to the company creates a security risk for participating customers*
  - *Recommend using a more secure customer-facing portal (stakeholder suggested use of Clean Power Research's PowerClerk platform) that would increase consumer confidence, reduce installation time and non-hardware "soft" costs*
- National Grid notarized affidavit requirements
  - *Requiring a "wet" (non-digital) signature adds time and cost for installers*
  - *Consider use of DocuSign or similar approach to avoid customer dissatisfaction or project cancellations*
- National Grid 3-year customer usage requirements
  - *Requiring customers to provide 3-year usage values adds time and costs installers must bear (but acknowledges statutory requirement)*
- DC vs. AC requirements
  - *Net metering program and REGrowth use of differing measurements of nameplate capacity creates confusion*
- Onerous hydro permitting process creates disproportionate pre-contract risk
  - *Selection for REG contract prior to FERC permitting process would create a more balanced risk/reward profile. Current framework puts all development expense at risk, with full exposure to regulatory risk (od program changes)*

Stakeholder Feedback: Round 2

- Return on equity: *"8% too low for tax equity"*
  - Research indicates market-based IRR for tax equity =
    - ~9% for DG projects with limited or no revenue guarantee
    - ~8% for DG projects with long-term contracts
    - ~6% for utility-scale projects
  - Modeling Implications (M.I.): no change

- *"Permitting cost reduction should be applied to all solar system scales"*
  - (M.I.): 15% cost reduction assumed on 3% of project costs → per DOE 2016

- *"Expense of bond to secure decommissioning expense should be applied to all projects"*
  - (M.I.): applied to all projects

- "Hydro permitting risk and cost not adequately represented"
  - (M.I.): Adjustments between draft 1 and draft 2 intended to address this concern.

Historic Bid Data

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Large Solar

Tariff Year	Total MWs bid	Total MWs selected (or pending)	MW Allocation	MWs bid as a % of MW Allocation	MWs selected as a % of MW Allocation
2015	6.644	6.644	6	111%	111%
2016	10.849	4.999	9	121%	56%
2017	18.213	9.736	12.05	151%	81%

All 2017 values reflect YTD progress (1st enrollment only)

Notes:
1. The DG Board is empowered to alter the MW allocation after enrollments to better reflect anticipated growth of different sub-categories. This explains how the Board approved more MWs in 2015 than was initially approved by the Public Utilities Commission.
2. Stakeholder feedback from Meeting #1 highlighted 3 MWs of missing wind projects in 2016. The 3 MWs were misclassified as Large Solar projects, which is why the 2016 figures are 3 MWs lower here.
3. Large Solar projects under the first enrollment of 2017 were either rejected or are pending – all MW shown in "selected" are pending.

Commercial Solar

Tariff Year	Total MWs bid	Total MWs selected (or pending)	MW Allocation	MWs bid as a % of MW Allocation	MWs selected as a % of MW Allocation
2015	5.799	4.147	5.5	105%	75%
2016	8.553	7.559	8	107%	94%
2017	3.398	3.398	5	68%	68%

All 2017 values reflect YTD progress (1st enrollment only)

Notes:

1. *All projects bid under the first enrollment of 2017 are still pending review.*
2. *All 2017 values reflect YTD progress (1st enrollment only)*

Medium Solar

Tariff Year	Total MWs bid	Total MWs selected	MW Allocation	MWs bid as a % of MW Allocation	MWs selected as a % of MW Allocation
2015	2.705	2.705	4	68%	68%
2016	4.694	4.496	5	94%	90%
2017	1.976	1.726	3	66%	58%

All 2017 values reflect YTD progress (1st enrollment only)

Notes:

1. *All projects bid under the first enrollment of 2017 are still pending review.*
2. *All 2017 values reflect YTD progress (1st enrollment only)*

Wind I, II

Tariff Year	Total MWs bid	Total MWs selected	MW Allocation	MWs bid as a % of MW Allocation	MWs selected as a % of MW Allocation
2015	6	6	5	120%	120%
2016	3	3	9	33%	33%
2017	0	0	6	0%	0%

Notes:
1. No Wind III projects bid into the program during 2015 or 2016.
2. The DG Board is empowered to alter the MW allocation after enrollments to better reflect anticipated growth of different sub-categories. This explains how the Board approved more MWs in 2015 than was initially approved by the Public Utilities Commission.
3. MW Allocation plans for 2015, 2016, and 2017 rolled Wind I, II, and III (where applicable) into the same MW allocation bucket. Thus, it is accurate for our purposes to roll them up here.
4. Stakeholder feedback from Meeting #1 highlighted 3 MWs of missing Large Wind projects in 2016. The 3 MWs were misclassified as Large Solar projects, which is why the 2016 figures are 3 MWs higher here. In the 2016 program year, wind facilities sized between 1.5-3 MWs were classified as Wind I. For the 2017 program year, wind facilities sized between 1-5 MWs are classified as Large Wind.

Small Solar I + II

Tariff Year	Total MWs Bid	MW Allocation	MWs bid as a % of MW allocation
2015	3.067	3	102%
2016	7.172	5.5	130%
2017	0.684	6.55	10%

All 2017 values reflect YTD progress (1st enrollment only)

Notes:

1. *Small Solar I and II comprised the same MW allocation block for program years 2015, 2016, and 2017. Thus, we have rolled them up as one here.*
2. *All 2017 values reflect YTD progress (1st enrollment only)*

Modeling Parameters

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Summary: Solar Cost & Production Assumptions

	Small I	Small II	Medium	Carport I	Commercial	Commercial CRDG	Carport II	Large	Large CRDG
Nameplate Capacity (kW_{DC})	5	25	250 [140]	250	500	500	1,000	2,000	2,000
Capacity Factor	14.00% [13.49%]	14.00% [13.49%]	14.00%	14.00%	14.00% [14.40%]	14.00%	14.00%	15.30%	15.30%
Annual Degradation	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Total Cost ($/$kW_{DC}$, w/o Suniva/SolarWorld remedy) [1]	~~$3,823~~ $3,732[2] [$3,961]	~~$3,599~~ $3,482[3] [$3,541]	~~$2.932~~ $2,919[4] [$2,853]	~~$3,488~~ $3,472[4]	~~$2,376~~ $2,224[4] [$2,390]	~~$2,576~~ $2,424[5]	~~$3,839~~ $3,822[4]	~~$2,046~~ $2,037[4] [$2,241]	~~$2,246~~ $2,237[5]
Total Cost ($/$kW_{DC}$,w/Suniva/ SolarWorld remedy) [1]	**~~$4,233~~ $4,107**	**~~$4,009~~ $3,857**	**~~$3,342~~ $3,294**	**~~$3,898~~ $3,847**	**~~$2,786~~ $2,599**	**~~$3,396~~ $2,799[5]**	**~~$4,249~~ $4,197**	**~~$2,456~~ $2,412**	**~~$3,066~~ $2,987[5]**

[1]Total Cost represents total expected all-in project capital cost, and is inclusive of interconnection, development (including developer fee), interest during construction, financing costs and reserves, and warranties to cover inverter replacements.

[2]Reduction from 2nd draft reflects newly acquired data from Energy Sage. Total cost number is a weighted average of 25% Energy Sage data and 75% 2017 reported cost data, adjusted for the assumption that permitting fees and labor are ~3% of total project cost (DOE, Feb. 2016), and that Rhode Island's revised statewide permitting procedure will result in a 15% decrease in these costs.

[3] Weighted to 75% of the 2017 average price data and 25% of the lower quartile 2017 data.

[4] Adjusted from 2nd draft for the assumption that permitting fees and labor are ~3% of total project cost (DOE, Feb. 2016), and that Rhode Island's revised statewide permitting procedure will result in a 10% decrease in these costs

[5] Reflects installed cost of non-CRDG project from same category, plus estimated cost of customer acquisition.

Key:
Values in [Brackets] represent 2017 ceiling price inputs
~~Red strikeout~~ text denotes 2nd draft input values that were updated to values in black text in proposed final version
Bold values represent installed associated with fully granting proposed Suniva/SolarWorld remedy

Summary: Solar Cost & Production Assumptions (Cont'd)

	Small I	Small II	Medium	Carport I	Commercial	Commercial CRDG	Carport II	Large	Large CRDG
Fixed O&M ($/kW-yr)	$50	$35 **[$50]**	$35 **[$34]**	$35	$21 **[$24]**	$36*	$21	$15	$30*
O&M Inflation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Insurance (% of Cost)	0.0%	0.0%	0.27%	0.27%	0.45% **[0.27%]**	0.45%	0.45%	0.45% **[0.27%]**	0.45%
Project Management ($/yr)	Included in O&M.	Included in O&M.	$750	$750	$3,000	$3,000	$3,000	$12,000 **[$7,700]**	$12,000
Land Lease ($/yr)	$0	$0	$6,250 **[$3,500]**	$6,250	$12,500	$12,500	$12,500	$50,000	$50,000
Decommissioning Cost ($/kW)	$0	$0	$0	$37.50 **[$0]**	$37.50 **[$0]**	$37.50 **[$0]**	$37.50 **[$0]**	$37.50 **[$0]**	$37.50 **[$0]**

** Reflects O&M cost of non-CRDG project from same category, plus estimated cost of customer care and replacement.*

Key:
Values in [Brackets] represent 2017 ceiling price inputs
Values in black text represent proposed final inputs

Summary: Solar Financing Assumptions

	Small I	Small II	Medium	Carport I	Commercial	Commercial CRDG	Carport II	Large	Large CRDG
% Debt	0%	0%	50%	50%	50%	50%	50%	55% **[40%]**	55%
Debt Term (years)	N/A	N/A	12	12	12	12	12	10 **[15]**	10
Interest Rate on Term Debt	N/A	N/A	6.50%	6.50%	6.00% **[6.50%]**	6.00%	6.00%	6.00% **[5.75%]**	6.00%
Lender's Fee (% of total borrowing)	N/A	N/A	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Sponsor/Tax Equity Ratio (%)	N/A	15/85	15/85	15/85	15/85	15/85	15/85	15/85	15/85
Sponsor Equity After-Tax IRR	N/A	10%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Tax Equity After-Tax IRR	N/A	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Target After-Tax IRR	~~5.9%~~ 5.0% **[5.0%]**	8.3% **[7.5%]**	8.3% **[7.5%]**	8.3%	8.3% **[7.5%]**	8.3%	8.3%	8.3% **[7.0%]**	8.3%

Key:
Values in [Brackets] represent 2017 ceiling price inputs
~~Red strikeout~~ text denotes 2nd draft input values that were updated to values in black text in proposed final draft

Summary: Non-Solar Cost & Production Assumptions

	Small Wind	Large Wind	Large Wind - CRDG	Hydroelectric	Anaerobic Digestion
Nameplate Capacity (kW)	100	3,000 [4,500]	3,000	500	725
Capacity Factor	21.00%	21.00%	21.00%	55.00%	92%[1]
Annual Degradation	0.5% [0.0%]	0.5% [0.0%]	0.5%	0.0%	0.0%
Total Cost ($/kW) [2]	$3,500	$2,820 [$3,159]	$3,020[3]	$9,250[4] [$9,250]	$10,150[5]
Fixed O&M ($/kW-yr)	$30.00	$26.50 [$23.00]	$41.50[6]	$2.00	$600
O&M Inflation	2.0%	2.0%	2.0%	2.0%	2.0%
Insurance (% of Cost)	0.25%	0.20% [0.43%]	0.20%	2.0% [0.5%]	1.0%
Project Management ($/yr)	$750 [Incl.]	$18,000 [$15,000]	$18,000	$3,000 [$15,000]	$75,000
Land Lease ($/yr)	$5,000	$162,000	$162,000	$8,750 [$12,500]	$35,000
Decommissioning Cost ($/kW)	~~$0~~ $37.50 [$0]	~~$0~~ $37.50 [$0]	~~$0~~ $37.50 [$0]	~~$0~~ $37.50 [$0]	~~$0~~ $37.50 [$0]

1. *Note: For Anaerobic Digestion we use an Availability Factor*
2. *Total Cost represents total expected all-in project capital cost, and is inclusive of interconnection, development (including developer fee), interest during construction, financing costs and reserves, and warranties to cover equipment replacements.*
3. *Reflects installed cost of non-CRDG project from same category plus estimated cost of customer acquisition.*
4. *Note: Includes $150 per kW for interconnection costs*
5. *Reflects O&M cost of non-CRDG project from same category, plus estimated cost of customer care and replacement.*

Key:
[Brackets] - 2017 inputs
~~Red strikeout~~ text - 2nd draft values that were updated for proposed final

Summary: Non-Solar Financing Assumptions

	Small Wind	Large Wind	Large Wind - CRDG	Hydroelectric	Anaerobic Digestion
% Debt	45%	65% **[60%]**	65%	70% **[65%]**	60%
Debt Term (years)	15	15	15	20	15
Interest Rate on Term Debt	6.0% **[6.25%]**	6.0% **[6.25%]**	6.0%	6.5% **[6.25%]**	6.5% **[6.25%]**
Lender's Fee (% of total borrowing)	2.0%	1.0% **[2.0%]**	1.0%	1.88% **[2.0%]**	2.0% **[0.0%]**
Sponsor/Tax Equity Ratio (%)	15/85	15/85	15/85	N/A	N/A
Sponsor Equity After-Tax IRR	10.0%	10.0%	10.0%	N/A	N/A
Tax Equity After-Tax IRR	8.0%	8.0%	8.0%	N/A	N/A
Target After-Tax IRR	8.3% **[10.0%]**	8.3% **[10.0%]**	8.3%	8.3% **[10.0%]**	8.3% **[10.0%]**

Key:
Values in [Brackets] represent 2017 ceiling price inputs
Values in black text represent proposed final inputs

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Appendix A: Estimated impact of solar trade case price remedy

Sustainable Energy Advantage, LLC

Suniva/SolarWorld Section 201 action: Implications on CPs (if approved as proposed)

- On September 22, 2017, the USITC found that c-Si imports from a variety of nations constituted a "serious injury" to American solar manufacturers
- Next steps: USITC expected to propose a remedy no later than November 13, 2017, at which point POTUS is has 60 days to either approve the proposed remedy or determine a separate remedy
  - **Thus, final remedy is not known at this time**
- To model potential impact on REG 2018 Ceiling Prices, increased installed costs to reflect the requested minimum module price (MMP)
  - Difference between (publicly available) forecasted module prices pre-Suniva filing and module prices under requested remedy (*revised as of October 3 hearing*), weighted by months of each calendar year in the REG Program Year

Calendar/REG Program Year	2018 Calendar Year	2019 Calendar Year	2018 REG Program Year (4/1/2018-3/31/2019)
Counterfactual Forecasted Module Average Selling Price (ASP, in $/kW$_{DC}$)*	$360	$340	$355
Remedy MMP ($/kW$_{DC}$)	$740	$700	$730
Implied Module Price ▲ ($/kW$_{DC}$)	$380	$360	**$375****

**Source for publicly-available 2018 counterfactual module outlook: NREL Q3/Q4 Solar Market Report (Available at: https://www.nrel.gov/docs/fy17osti/67639.pdf). Report was selected given that it was the most recent publicly-available multi-year module price forecast SEA could find that was issued before April 2017 (when Suniva filed the initial request for a safeguard investigation)*

***Represents assumption that Year 1 of the remedy will evenly overlay with 2018, and that 9 months of the program year will overlap with Year 1, while 3 months of program year will overlap w/Year 2*

Comparison: Solar CPs with and without proposed remedy (cents/kWh)

Technology	2018 Proposed Final CP (w/o Suniva/SolarWorld Remedy) 15 year Tariff Duration	2018 Proposed Final CP with Suniva/SolarWorld Proposed Remedy 15 year Tariff Duration	2018 Proposed Final CP (w/o Suniva/SolarWorld Remedy) 20 year Tariff Duration	2018 Proposed Final CP with Suniva/SolarWorld Proposed Remedy (% Change**) 20 year Tariff Duration
Small Solar I	31.25	**34.05 (9%)**	27.75	**30.05 (8%)**
Small Solar II			26.55	**29.05 (9%)**
Medium Solar			22.45	**24.45 (9%)**
Carport I			25.25	**27.25 (8%)**
Commercial Solar			17.65	**19.65 (11%)**
Comm. Solar-CRDG			20.30	**22.35* (10%)**
Carport II			24.65	**26.65 (8%)**
Large Solar			14.65	**16.55 (13%)**
Large Solar-CRDG			16.85	**19.03* (13%)**

**Maximum CRDG Ceiling Price allowed by law (115% cap). The 2nd draft calculated values (baseline) were 21.15 for Commercial and 17.25 for Large. The proposed final calculated values with the MMP remedy imposed were 22.35 for Commercial and 20.95 for Large.*
***% Change values represent difference from proposed final CPs without the MMP remedy*