

# **Exhibit 1**

**Distributed Generation Board Meeting**  
**Monday, January 23, 2017**  
**4:00-5:30p.m.**  
**Department of Administration – Conference Room A**

**Board Members Present:** Kenneth Payne, Ian Springsteel, Bill Ferguson, Samuel Bradner, Sheila Dormody, Chris Kearns, Carol Grant.

**Other present:** Chris Kearns, Carol Grant, Shauna Beland, Greg and Brian (National Grid).

**Call to Order:** Chairman Kenneth Payne called the meeting to order at 4:09p.m.

**1. Approval of October Meeting Minutes**

Kenneth Payne asked if there was any adjustments to the agenda, and asked to approved meeting minutes. Bill Ferguson motioned to approval of meeting minutes, and it was seconded by Samuel Bradner.

**2. National Grid Presentation - 2017 SolarWise Program by National Grid and RISE Engineering**

Ian Springsteel from National Grid provided the presentation of the 2017 SolarWise Program, and it was followed by RISE Energy Specialist Greg and Director Brian, who provided the presentation on the RISE Engineering program.

Sheila Dormody asked a few questions in regards to what resources are available to the public to find out about the RISE Program, and also about how National Grid RISE Program will be able to provide the same great customer service every time.

**3. National Grid Presentation – Renewable Energy Credit Buy Back Program for Zero Emission Buildings and Direct Transfer Trip Interconnection Update on Renewable Energy Growth Tariff Systems**

Ian Springsteel from National Grid provided this presentation.

Sheila Dormody asked Mr. Springsteel at the end of the presentation to be clearer about what he was presenting. Chairman Payne said this presentation was simply an informational piece, since it was something that it was talked about at the previous meeting, and some members wanted more information about it.

**4. Office of Energy Resources - Update on the 2017 Renewable Energy Growth Program Docket Proceedings**

Commissioner Grant stated that the Greenhouse Gas Emission report was finalized in New Year's Eve, and that she would make a presentation about it at the next DG Board Meeting.

**5. Public Comments**

There was no public comments.

**6. Adjourn**

Kenneth Payne made motion to adjourn. Seconded by Bill Ferguson. All Approved.  
Chairman Payne adjourned the meeting at 5:21p.m.

**Distributed Generation Board Meeting  
Monday, February 27<sup>th</sup>**

**4:00-5:30p.m.**

**Department of Administration – Conference Room A**

**Board Members Present:** Kenneth Payne, Ian Springsteel, Bill Ferguson, Samuel Bradner, Sheila Dormody, Carol Grant, Chris Kearns and Kari Lang.

**Others Present:** Shauna Beland, Danny Musher, Sara Canabarro, Chris Eidam, Misha Glazomitsky, Doug Sabetti, Eric Martin and Nathan McCarthy.

**Call to Order:** Chairman Kenneth Payne called the meeting to order at 4:05p.m.

**1. Approval of January Meeting Minutes**

Kenneth Payne asked if there was any adjustments to the meeting minutes and asked members to approve it. Bill Ferguson made motion to approve and Samuel Bradner seconded it. All approved.

**2. Office of Energy Resources Presentation – Overview of the Executive Climate Change Council: Greenhouse Gas Emissions Report**

Danny Musher from the Office of Energy Resources gave a presentation on the Overview of Rhode Island EC4 GHG Emissions Reduction Plan.

**3. Discussion on Vote on Submitting 2018 Ceiling Prices Reconciliation Funding Request to Public Utility Commission.**

Chris Kearns reported that this discussion is to ask the Board permission request to Public Utilities Commission on the 2018 Ceiling Prices Reconciliation Funding. Chairman Kenneth Payne requested for OER to provide more details about the Reconciliation by next meeting in March. Ian Springsteel also asked Chris Kearns to distribute the scope of work before next meeting. All agreed to vote to approve the request for funding. Samuel Bradner made motion to approve and Carol Grant seconded it. All approved.

**4. Update from the Office of Energy Resources on the Solar Quality Assurance Study**

Shauna Beland from OER stated that the Solar Quality Assurance Study is on track and that the final report will be done by Mid-March. Shauna will provide the Board with copies of the report by April's meeting. Shauna also reported that one company had its license revoked, but will still share its findings by April's meeting as well. The Board will then decide if the results will be shared with its customers.

**5. Public Comments**

Eric Martin from Newport Solar had a presentation about the 'Capacity Factor as a small-scale REG Sizing Methodology – Status Quo, Inadequacies and Proposed Alternative Approach'. There was a brief discussion between Ian Springsteel, Doug Sabetti and Eric Martin from Newport Solar.

Ian Springsteel stated that he would share Newport Solar's presentation with his team and provide feedback by next meeting.

Also Misha Glazomitsky from Bright Planet Solar had a brief presentation about their "Total Sales Less Cancellations Last 30 Days".

Ian Springsteel from National Grid reported that he would make a presentation about the Methodology for 2017 Program.

## **6. Adjourn**

Chairman Kenneth Payne called meeting to end. Bill made motion to adjourn and Sheila Dormody seconded it. All approved. Chairman Payne adjourned the meeting at 5:48p.m.

**Distributed Generation Board Meeting  
Monday, March 27<sup>th</sup> 2017**

**4:00-5:30p.m.**

**Department of Administration – Conference Room A**

**Board Members Present:** Kenneth Payne, Ian Springsteel, Bill Ferguson, Samuel Bradner, Sheila Dormody, Carol Grant, Kari Lang and Chris Kearns.

**Others Present:** Shauna Beland, Sara Canabarro, Robert Beadle, Paul Reducha, Doug Sabetti, Annie Ratanasim, Chris Fuller, Justin Palumbo, Michael Nech, Jeffrey Medeiros, Michael Hebert, Mauricio Mevida, Todd Riley, Lauren Vundemu, Michelle Shade, Helen Drew, Eric Beecher, Tyler Ovutt, Shawn Shaw, Matt Piantedosi and Danielle Burns.

**Call to Order:** Chairman Kenneth Payne called the meeting to order at 4:00p.m.

**1. Approval of January Meeting Minutes**

Kenneth Payne asked if there was any adjustments to the meeting minutes and asked members to approve it. Bill Ferguson made motion to approve and Kari Lang seconded it. All approved.

**2. Cadmus Presentation – Solar Quality Assurance Results**

Shawn Shaw and Matt Piantedosi.... From Cadmus, gave a presentation on the Solar Quality Assurance Results. Before starting, they made sure to let everyone know that this presentation was based on Preliminary Results and General Data only, since they did not specify any company names. They also reported that the next steps were to submit the Draft Report to OER in Mid-April and that the Final Report would be send out shortly after.

**3. National Grid Update on REG Small Solar Program – Screening Application Process**

This item got moved to the next DG Board meeting in April 24<sup>th</sup>.

**4. Renewable Energy Growth Program – Legislation Update**

This item got moved to the next DG Board meeting in April 24<sup>th</sup>.

**5. Renewable Energy Growth Program – Brattle Study Status Update**

This item got moved to the next DG Board meeting in April 24<sup>th</sup>.

**6. Public Comments**

After Cadmus was done with their presentation, Chairman Kenneth Payne asked the Board members to ask questions first and then let the public ask questions after.

**7. Adjourn**

Chairman Kenneth Payne called meeting to end. Bill made motion to adjourn and Kari Lang seconded it. All approved. Chairman Payne adjourned the meeting at 5:37p.m.

**Distributed Generation Board Meeting  
Monday, April 24<sup>th</sup> 2017**

**4:00-5:30p.m.**

**Department of Administration – Conference Room A**

**Board Members Present:** Kenneth Payne, Bill Ferguson, Sheila Dormody, Carol Grant, Annie Ratanasim, Kari Lang and Chris Kearns.

**Others Present:** Shauna Beland, Sara Canabarro, Doug Sabetti, Eric Beecher, Peter Bay, Angela Tuoni, Eric Martin, Tyler Orcutt, John Kennedy and Patricia Matulaitis.

**Call to Order:** Chairman Kenneth Payne called the meeting to order at 4:09PM.

**1. Approval of March Meeting Minutes**

Chairman Kenneth Payne asked if there was any adjustments to the meeting minutes and asked members to approve it. Bill Ferguson made motion to approve and Sheila Dormody seconded it. All approved.

**2. National Grid Presentation and Update on REG Small Solar Program – Screening Application Process**

John Kennedy from National Grid gave a presentation about the REG Small Solar Program and Screening Application. The presentation highlights were: an Overview of Solar PV Capacity Factor, RE Growth System Sizing highlights and the Review of Suggested Methods.

After the presentation, Chairman Kenneth Payne asked if the Board members and the public had any questions or comments. There was a few questions asked, to which National Grid did not have the answer at the moment. Chris Kearns suggested that all questions, concerns or comments, should be emailed to him and Shauna Beland, so that they can communicate with National Grid team directly and circle back in May to give an update to the Board Members and public.

**3. Cadmus Solar Quality Assurance Report – Update from Office of Energy Resources**

Shauna Beland stated that she had sent the Cadmus Solar Quality Assurance Report to all the Board members and she would like to have their feedback about it. Some Board members had not had a chance to read the report so Shauna recommended that the discussion of the report be moved to the next Board meeting. In addition, OER is working with Cadmus on a scope of work for continuing quality assurance work on REG projects. Shauna said that she will send the scope document over to the Board Members to review, one week prior to meeting in May.

**4. 2018 Renewable Energy Growth Program: Ceiling Prices – Update from Office of Energy Resources**

Chris Kearns reported that the Public Utilities Commission approved the funding.

**5. Public Comments**

Commissioner Carol Grant reported that the Union of Concerned Scientists (UCS) created the Clean Energy Momentum State Ranking and the State of RI was ranked #4.

**6. Adjourn**

Chairman Kenneth Payne called meeting to end. Bill made motion to adjourn and Sheila Dormody seconded it. All approved. Chairman Payne adjourned the meeting at 4:59PM.

**Distributed Generation Board Meeting  
Monday, June 26, 2017**

**4:00-5:30p.m.**

**Department of Administration – Conference Room B**

**Board Members Present:** Kenneth Payne, Bill Ferguson, Kari Lang, Sheila Dormody, Samuel Bradner, Carol Grant

**Others Present:** Shauna Beland and Chris Kearns.

**Call to Order:** Chairman Kenneth Payne called the meeting to order at 4:10PM.

**1. Approval of April Meeting Minutes**

Chairman Kenneth Payne requested a motion to approve the minutes for April. Sam Bradner made a motion and Bill Ferguson seconded it. All approved.

**2. Renewable Energy Growth Program: Economics, Jobs and Environmental Impacts Study Presentation – Brattle Group**

Mark Berkman from the Brattle Group provided a presentation on their study and associated report. See attached presentation.

**3. Renewable Energy Growth Program – Quality Assurance Study – Reconciliation Funding Consideration/Vote**

The Office of Energy Resources discussed the requested funding for the Board's 2<sup>nd</sup> quality assurance study report. Chairman Kenneth Payne requested a motion to approve the reconciliation funding request. Sam Bradner made a motion and Bill Ferguson seconded it. All approved.

**4. SolarWise Program Update – National Grid**

Ian Sprinsteel from National Grid provided a presentation on the SolarWise program. See attached presentation.

**5. 2017 Renewable Legislative Updates**

Chris Kearns from the Office of Energy Resources provided a status update on the pending statewide solar permitting legislation. If passed, it would be factored into the 2018 Renewable Energy Growth Program ceiling prices development.

**6. Public Comments**

None

**7. Adjourn**

Chairman Kenneth Payne requested a motion to adjourn the meeting. Bill Ferguson made a motion to adjourn; Sam Bradner seconded the motion. All approved.

The meeting was adjourned at 5:25 PM.

# Renewable Energy Growth Program Analysis

Economic, Jobs, and Environmental Impacts for Program Years  
2015 and 2016 and the Overall Program Years 2015 to 2019

**PRESENTED TO**

The Rhode Island  
Distributed Generation Board

**PRESENTED BY**

Mark Berkman  
Jurgen Weiss

June 26, 2017

THE **Brattle** GROUP

# Disclaimer

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The analyses and market overview provided in this presentation are necessarily based on assumptions with respect to conditions or events which may or may not arise or occur in the future. While we believe these assumptions to be reasonable for purposes of preparing our analysis, they are dependent upon future events that are not within our control or the control of any other person. Actual future outcomes can and will differ, perhaps materially, from those evaluated in these projections. No one can give any assurance that the assumptions and methodologies used will prove to be correct or that the projections will match actual results of operations.

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# REG Program Overview

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- Designed to contribute to meeting RI's Renewable Energy Standard targets
- Up to 160 MW of renewable energy in RI through contracts awarded over five year period 2015-2019. Broad set of technologies qualify
- Contracts ("Tariffs") awarded for mostly 20 years
- Each year, tariff ceiling is set for each program category, which applies to all projects awarded tariff in that year
  - Tariff is lowered for each successful program year to reflect lower costs
  - Small scale solar projects receive the tariff ceiling, but all other projects make bids and receive their bid if selected (typically below tariff ceiling)
- Administered by National Grid, which recovers cost of tariffs above value received from avoided wholesale purchases, plus administrative cost and 1.75% remuneration, through a (very small) surcharge on customer bills

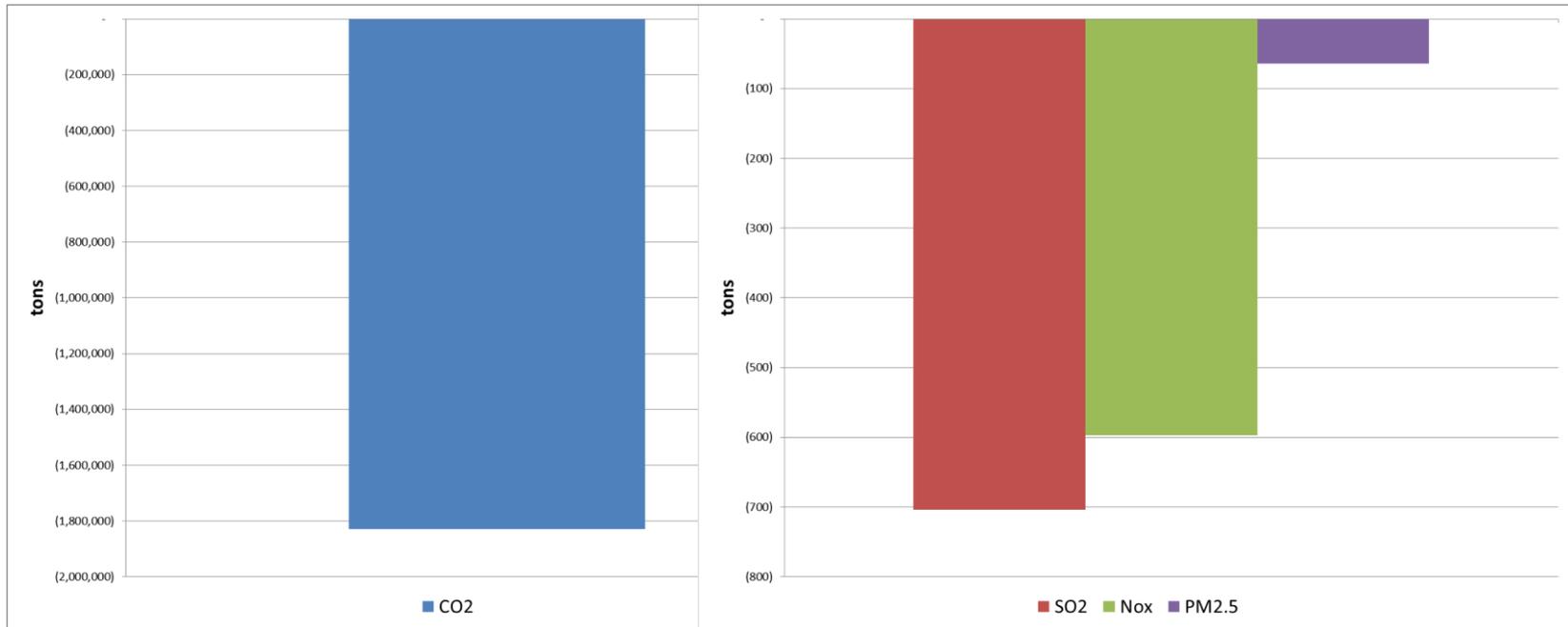
# Overall Positive Economic Impact on RI in Addition to Contributing to Meeting RES

	Employment	Labor Income	GDP	Output
Direct Effect	62	\$108,800,000	\$176,300,000	\$266,500,000
Indirect Effect	2	\$1,600,000	\$2,400,000	\$4,100,000
Induced Effect	25	\$32,000,000	\$57,300,000	\$94,000,000
Total Effect	88	\$142,400,000	\$236,000,000	\$364,700,000

Note: Employment impacts are averaged across all years. All other metrics are totals over the time period measured in present value terms.

- (Small) positive employment impact
- Positive impact on GDP (\$236 million in PV terms), mostly driven by construction phase of program (2015-2019)
  - Intuition: RI builds new power generation facilities in the state (rather than using existing and mostly out of state generation sources)
  - This impact significantly exceeds the very small increase in rates to pay for tariffs at levels above market values of energy, capacity and RECs

# REG Programs will Contribute to Significant Emissions Reductions



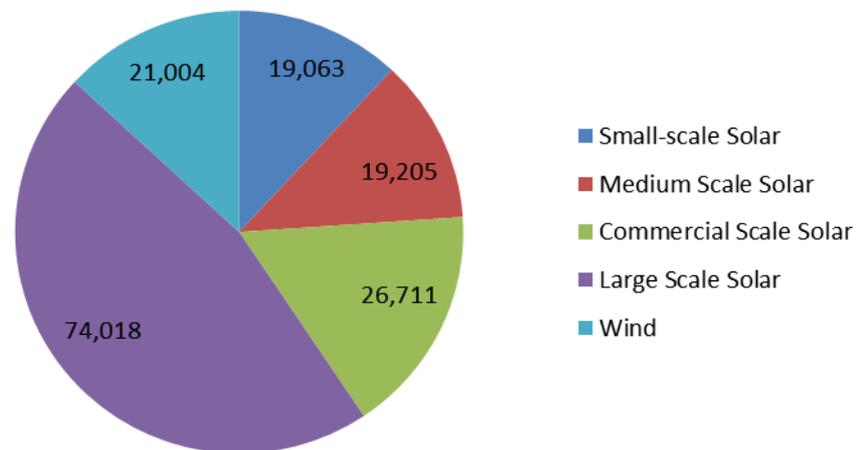
- Estimated 1.8 million tons of CO2 emissions reductions through 2040
- Estimated several hundred tons of SO2 and Nox emissions reductions, some PM2.5

# REG Program Summary (Actual and Projected)

## REG Total Capacity (kW Installed) by REG Program Category

	Actuals		2015-2016 Total	Projections			2015-2019 Total
	2015	2016		2017	2018	2019	
Small-Scale Solar	845	6,213	<b>7,059</b>	5,502	4,001	2,501	<b>19,063</b>
Medium-Scale Solar	2,705	4,496	<b>7,201</b>	4,001	4,001	4,001	<b>19,205</b>
Commercial-Scale Solar	4,147	7,559	<b>11,706</b>	5,002	5,002	5,002	<b>26,711</b>
Large-Scale Solar	6,644	7,854	<b>14,498</b>	19,840	19,840	19,840	<b>74,018</b>
Wind I	1,500	3,000	<b>4,500</b>	4,001	4,001	4,001	<b>16,504</b>
Wind II	4,500	0	<b>4,500</b>	0	0	0	<b>4,500</b>
<b>Total</b>	<b>20,341</b>	<b>29,122</b>	<b>49,464</b>	<b>38,346</b>	<b>36,845</b>	<b>35,345</b>	<b>160,000</b>

- About equal shares of small scale, medium, commercial scale solar and wind (together slightly more than 50%)
- Rest larger scale solar PV (<5 MW)



# REG Program Projected to Result in \$390M investment - \$126M in First Two Years

(Expected) REG Total Investment by Class (\$ millions)

	Actuals		2015-2016	Projections			2015-2019
	2015	2016	Total	2017	2018	2019	Total
Small-Scale Solar	\$3.66	\$24.77	<b>\$28.43</b>	\$22.16	\$16.12	\$10.07	<b>\$76.77</b>
Medium-Scale Solar	\$6.74	\$11.21	<b>\$17.95</b>	\$9.98	\$9.98	\$9.98	<b>\$47.88</b>
Commercial-Scale Solar	\$10.34	\$18.84	<b>\$29.18</b>	\$12.47	\$12.47	\$12.47	<b>\$66.59</b>
Large-Scale Solar	\$13.45	\$15.90	<b>\$29.36</b>	\$40.18	\$40.18	\$40.18	<b>\$149.89</b>
Wind I	\$3.52	\$7.04	<b>\$10.56</b>	\$9.39	\$9.39	\$9.39	<b>\$38.72</b>
Wind II	\$10.56	\$0.00	<b>\$10.56</b>	\$0.00	\$0.00	\$0.00	<b>\$10.56</b>
<b>Total</b>	<b>\$48.27</b>	<b>\$77.77</b>	<b>\$126.04</b>	<b>\$94.17</b>	<b>\$88.12</b>	<b>\$82.08</b>	<b>\$390.40</b>

- First two program years have resulted in an estimated \$126 million in investment in renewable facilities, mostly solar, but also a bit of wind
- Expect approximately two times more through the end of the program
- REG projects secured \$38million in ITC during first 2 years, expected to reach \$117million through 2019

# Expected Instate Share of Project Spending Varies by Technology

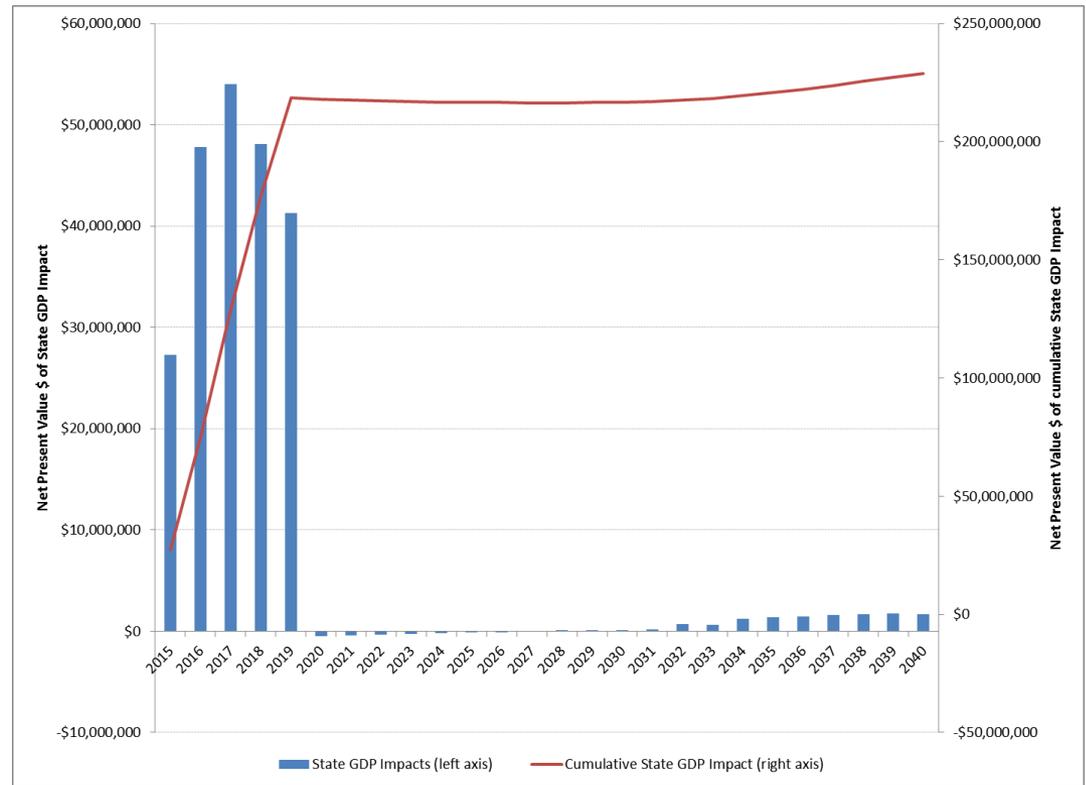
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	In-State (%)
Solar	63%
Wind	27%
Overall	58%

- Well over half of solar technology equipment and construction spending is expected to occur in Rhode Island
- Expectations for wind technology reflects the mirror image of this spending share in-state
- Across both technologies, 58% of spending is expected to occur instate

# Incremental Impact of REG Program on RI State GDP Strongest During Construction, then Mildly Positive

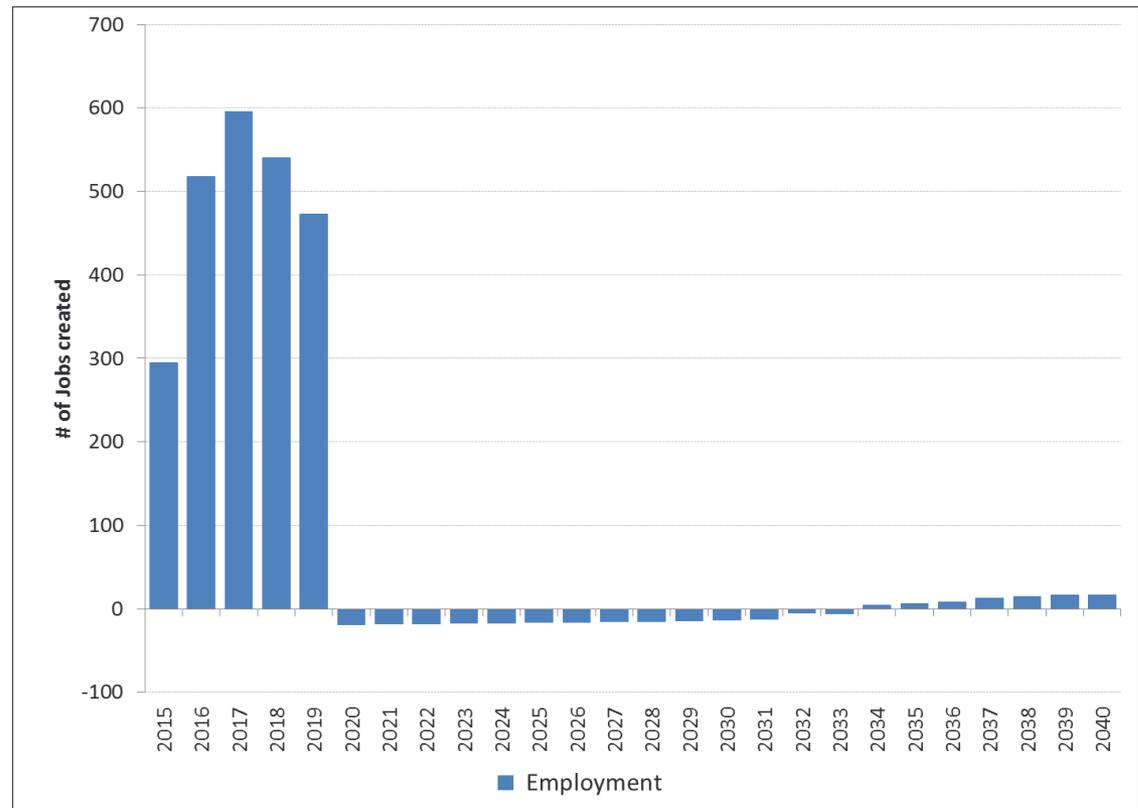
- Construction Phase (2015-2019) leads to \$30-\$50 million in additional economic activity
- Tariff Phase (2020-2040) is mix of tariff impacts (slightly negative) and taxes, and Operations and Maintenance (slightly positive)



# The Same Pattern Applies to Job Creation due to REG Program

Several hundred additional jobs during construction phase, followed by essentially no job impacts during tariff phase

- Tariffs slightly above market value result in very small increase in customer bills
  - NG estimates \$0.05 per month
  - Leads to very small impact on jobs
- O&M and taxes have offsetting positive impacts



# Tariff Ceilings and Actual Tariff Prices drive Tariff Payments

	Program Year				
	2015	2016	2017	2018	2019
	cents/kWh	cents/kWh	cents/kWh	cents/kWh	cents/kWh
Small Scale Solar 15	41.35	37.65	34.75	31.86	29.20
Small Scale Solar 20	37.75	33.45	30.85	27.89	25.22
Medium Scale Solar	24.40	22.55	22.75	21.99	21.25
Commercial Scale Solar	18.86	17.77	16.74	15.77	14.86
Large Scale Solar	16.27	13.03	11.73	11.14	10.87
Wind I	22.75	18.75	19.45	19.10	19.10
WindII	22.35	18.00	18.25	18.13	18.13

Note: 2015-2016 Actual, 2017-2019 Estimated

- Tariff Ceilings (and average tariffs) decline over time as technology costs drop
- Only small-scale solar receive tariff caps, otherwise competitive bids - actual prices could decline more rapidly

# Construction Phase Results in Close to 500 Additional Jobs on Average over 5 Years

	Employment	Labor Income	GDP	Output
Direct Effect	312	\$93,600,000	\$140,500,000	\$230,200,000
Indirect Effect	48	\$14,800,000	\$23,900,000	\$40,600,000
Induced Effect	124	\$31,400,000	\$56,300,000	\$92,300,000
Total Effect	484	\$139,800,000	\$220,700,000	\$363,100,000

Note: Employment impacts are averaged across all years. All other metrics are totals over the time period measured in present value terms.

- Mostly direct jobs related to construction of renewable facilities

# Tariff Phase Likely Leads to Very Small Rate Increase due to Tariffs above Market Value

## Sample year shows

- About \$18 million in tariff costs above market value
- NG estimates bill impact to residential customers of \$0.05 per month
- REG projects also pay some taxes that flow to various RI state and local entities (tangible, gross earnings, sales and RI income)
- Net Program costs about \$12 million during “tariff phase”, much lower than during “construction phase”

## Sample Tariff Phase Year

[1]	<b>Total MWh</b>	209,311
[2]	<b>Total Tariff Costs</b>	<b>\$37,236,720</b>
	<b>Avoided Costs</b>	
	Total Energy Value REG program	-\$11,512,126
	Total REC Value REG program	-\$8,581,766
	Total Capacity Value REG program	-\$841,174
[3]	<b>Total Avoided Costs</b>	<b>-\$20,935,066</b>
	<b>Administrative Costs</b>	
	Remuneration for NG	\$651,643
	REG Program Admin Costs	\$625,000
	Capacity Market Admin Costs	\$157,210
[4]	<b>Total Administrative Costs</b>	<b>\$1,433,852</b>
[5]	<b>Total Net Market Cost of REG Program</b>	<b>\$17,735,506</b>
[6]	<b>Total Offsetting Tax Revenues</b>	<b>-\$5,768,122</b>
[7]	<b>Total Net Program Cost</b>	<b>\$11,967,385</b>

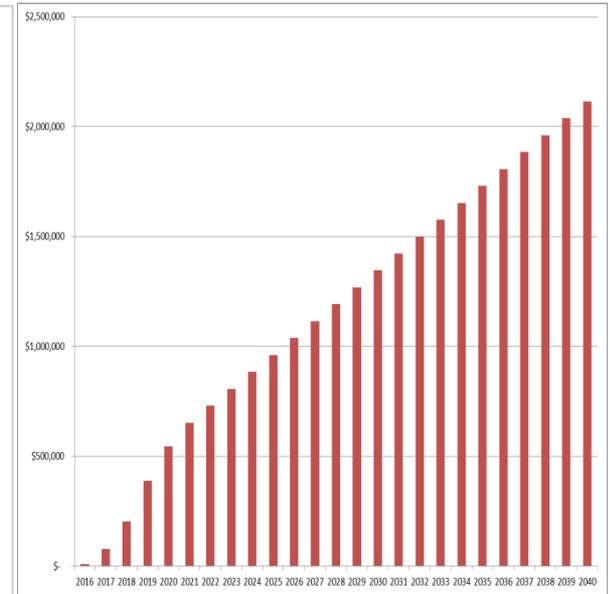
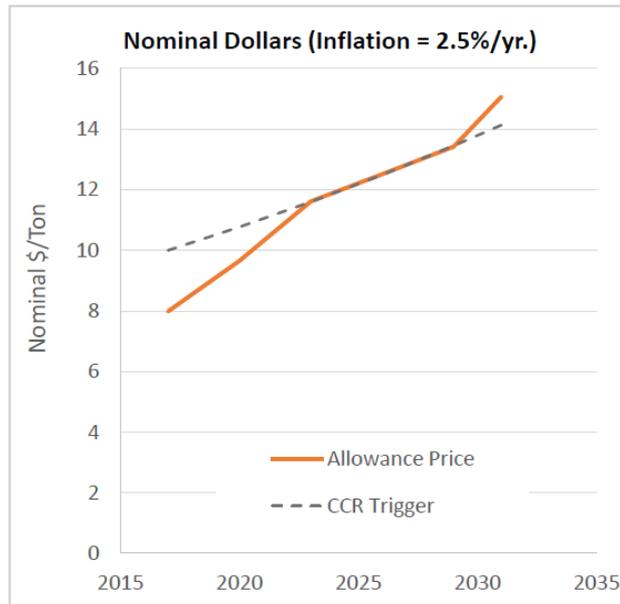
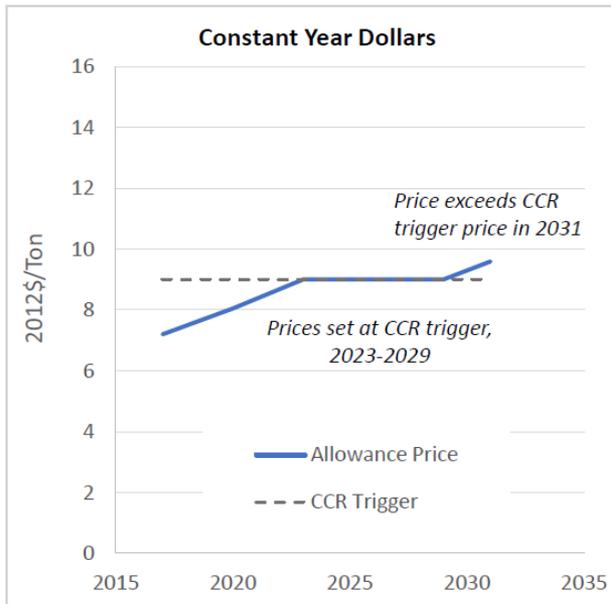
# Average Tariff Phase Economic Impacts are Very Small

	Employment	Labor Income	GDP	Output
Direct Effect	2	\$15,200,000	\$35,800,000	\$36,400,000
Indirect Effect	-9	-\$13,200,000	-\$21,500,000	-\$36,500,000
Induced Effect	1	\$600,000	\$1,000,000	\$1,700,000
Total Effect	-6	\$2,600,000	\$15,300,000	\$1,600,000

Note: Employment impacts are averaged across all years. All other metrics are totals over the time period measured in present value terms.

- Very small (statistically not different from zero) negative jobs impact due to higher taxes
  - reverses and becomes positive due to ongoing operations and maintenance after projects roll off tariffs
- Small positive GDP impact
  - Intuition: in-state O&M jobs are **higher** paying than the in-state jobs that get displaced due to slightly lower disposable income

# Value of Avoided RGGI Allowance Reflects Potential GHG Value of REG Program

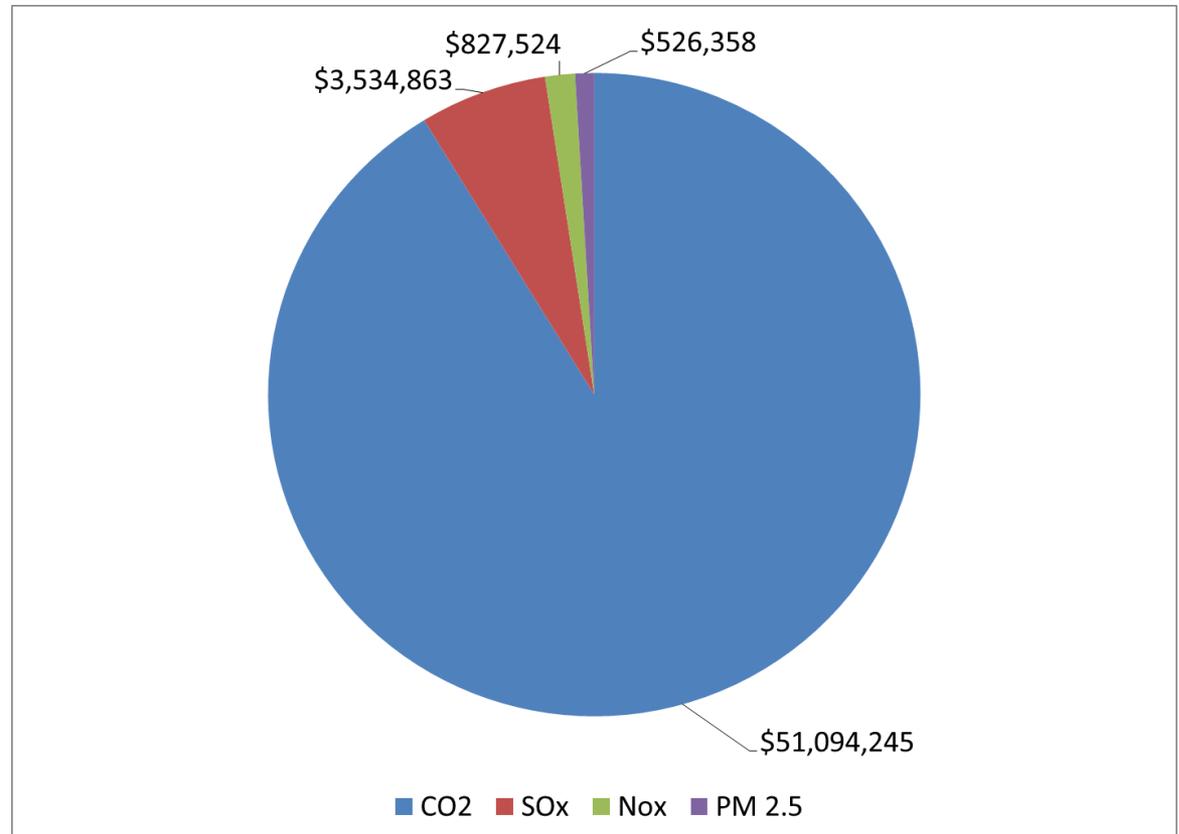


- RGGI allowance prices are projected to increase
  - Even current projections don't reflect carbon prices needed to meet longer term regional GHG reduction goals
- Assuming RGGI prices will increase at the rate projected between now and 2030 all the way through 2040 would result in NPV of \$13 million
  - Not additional benefit, since allowance value gets recycled and benefits RI

# Alternative Measures of Avoided Damages due to Lower Emissions are Also Significant

- Using \$42/ton of CO2 (social cost of carbon) would result in NPV of \$51 million in avoided GHG damages
- Approximately \$5 million in avoided damages from criteria pollutants
- Again, greening grid and pollution reduction post tariff phase not considered

	Damages (\$/ton)	
SO2	\$	7,500
Nox	\$	2,000
PM2.5	\$	12,400



# Presenter Information



## MARK BERKMAN

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**Dr. Mark Berkman** is an expert in applied microeconomics. His experience spans the areas of the environment, energy, and natural resources; and environmental health and safety. Dr. Berkman has frequently quantified the costs and benefits and economic impacts of projects and regulations. He has also published numerous articles and several book chapters on related topics and testified before the courts, regulatory commissions, and legislative bodies on related matters.

Dr. Berkman earned a B.A. in from George Washington University, a Master's degree in planning and public policy from Harvard University and a Ph.D. in public policy and applied microeconomics from the University of Pennsylvania's Wharton School.



## JURGEN WEISS

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**Dr. Jurgen Weiss** is an energy economist with 20 years of consulting experiences. He specializes in issues broadly motivated by climate change concerns, such as renewable energy, energy efficiency, energy storage, the interaction between electricity, gas and transportation, and carbon market design and the impact these changes have on existing assets, market structures, and long-term planning needs for electric utilities in North America, Europe, and the Middle East.

Dr. Weiss holds a B.A. from the European Partnership of Business Schools, an M.B.A. from Columbia University, and a Ph.D. in Business Economics from Harvard University.



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# SolarWise Rhode Island FY17 Recap and FY18 Redesign



RI Energy Efficiency



Online Solar Shopping



Solar Bonus for EE Action



# Outline

- Overview
- Results Program Year 2017
- Analysis
- Research Results
- Recommendations for Program Year 2018
- Next Steps

# Overview: Goals

SolarWise was designed with a number of goals in mind:

- **Accelerate adoption of solar** in Rhode Island
- **Encourage customers to implement EE measures first**
- Help customers save money when installing solar by **reducing the size of the system needed** to meet their electricity consumption
- Provide customers **access to competitive bids** by solar installation vendors
- **Increase the number of participants in RE Growth** because the fixed amount of capacity available in RE Growth will be available to more customers when average system sizes are smaller *[based on customers' reducing their PV size based on expected EE savings]*
- **Broaden the product portfolio being introduced through EE customer channels**

*Source: November 2015 National Grid program proposal testimony for RI PUC*

# How are these goals being addressed?

- **Accelerate adoption of solar** in Rhode Island
  - RE Growth has been successful with driving additional interconnection applications, but SolarWise has played a small role in that acceleration
- **Encourage customers to implement EE measures first**
  - Utilizing the RISE auditors, over 8,000 energy efficiency audits were completed since April 2016
  - In year 1, SolarWise was marketed to existing EE customers and did not meaningfully increase EE participation (via increased savings) by customers going solar.

# How are these goals being addressed?

- Help customers save money when installing solar by **reducing the size of the system needed** to meet their electricity consumption
  - 3 year baseline requirement from RI currently addresses “right sizing”
- Provide customers **access to competitive bids** by solar installation vendors
  - Achieved through EnergySage Marketplace

# How are these goals being addressed?

- **Increase the number of participants in RE Growth** because the fixed amount of capacity available in RE Growth will be available to more customers when average system sizes are smaller *[based on customers' reducing their PV size based on expected EE savings]*
  - Research on RE Growth participants shows that a minority maximize system size without using the SolarWise program – 68% are less than 90% of max
  - Additionally, flexibility in MW available for Small Solar has avoided participation restrictions

# Results FY 17

- Year one program participation was lower than expected
- RI small PV applications in 2016-2017 were strong
  - 901 applications, over subscription in 2016-17 year
- SolarWise participation
  - About 1,500 screenings for SolarWise assessment eligibility
  - 116 Marketplace registrations
  - 26 sales through the Marketplace
- SolarWise Bonus applications
  - 6 Received and Approved

- Implementation was more challenging than expected
  - Integration with EE channels and processes has been time-consuming and delayed launches to all segments
- Marketing beyond the EE channels is needed to achieve meaningful levels of participation in the Marketplace
  - Customers request audits to focus on EE; a minority are interested in solar
  - Auditors make good effort to deliver solar content; however, their priority is EE
- Other elements of customer experience may also contribute to performance based on anecdotal inputs
  - Complexity of customer experience and application process
  - PV system sizing limit based on estimated EE reductions

- National Grid collected feedback on the SolarWise program from a number of stakeholders:
  - Customer survey
  - Conversations with RISE auditors
  - Feedback from NG and DG Board Member experiences
  - Evaluation of customer system sizing factors

# Research Results

- The customer survey provided great insight into customer's understanding of the SolarWise program
  - Customers were not uniformly well versed in the SolarWise program despite introduction by auditors
  - NG is listed as a top source for solar information but half of the participants don't know where to find the information
  - Only 8% of customers attempted to participate in the program
  - Audit participants are selectively interested in solar (20%) and have a variety of barriers that do not relate to the PBI

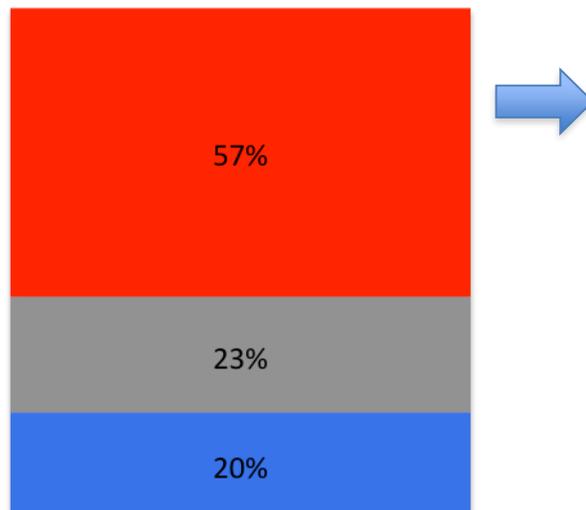
## Interest in Converting To Solar

- Of those who have not installed solar, 1 in 5 participants indicate that they are highly interested (8 to 10).
- Roughly 6 in 10 have low levels of interest (1 to 4).
- Open ended participant feedback indicates that lack of interest is driven by cost/lack of return, aesthetics and the possibility of moving/selling the home.

### Interest In Converting Home To Solar

(Have Not Installed Solar: n=193)

■ High (8 to 10)   ■ Mod (5 to 7)   ■ Low (1 to 4)



How interested are you in installing a solar energy system at your home in the future? Please use a 10-point scale, where 1 means "not interested at all" and 10 means "extremely interested".

### Reasons Not Interested in Solar

#### **COST/LACK OF RETURN**

- "I am interested but the return on investment is not there."
- "I would not reap its full benefit in my lifetime."
- "I do not believe New England is the best place to install solar panels. I have heard it takes a long time to get the money back in savings."
- "It costs too much."
- "I don't have a high enough electric bill to warrant it."

#### **AESTHETICS**

- "Don't want solar panels on roof, on front side of my house."
- "Because it is not very attractive from the street."

#### **SELLING/MOVING**

- "I may be selling soon and it is not worth my investment."
- "We are selling the home."

#### **HISTORIC HOME**

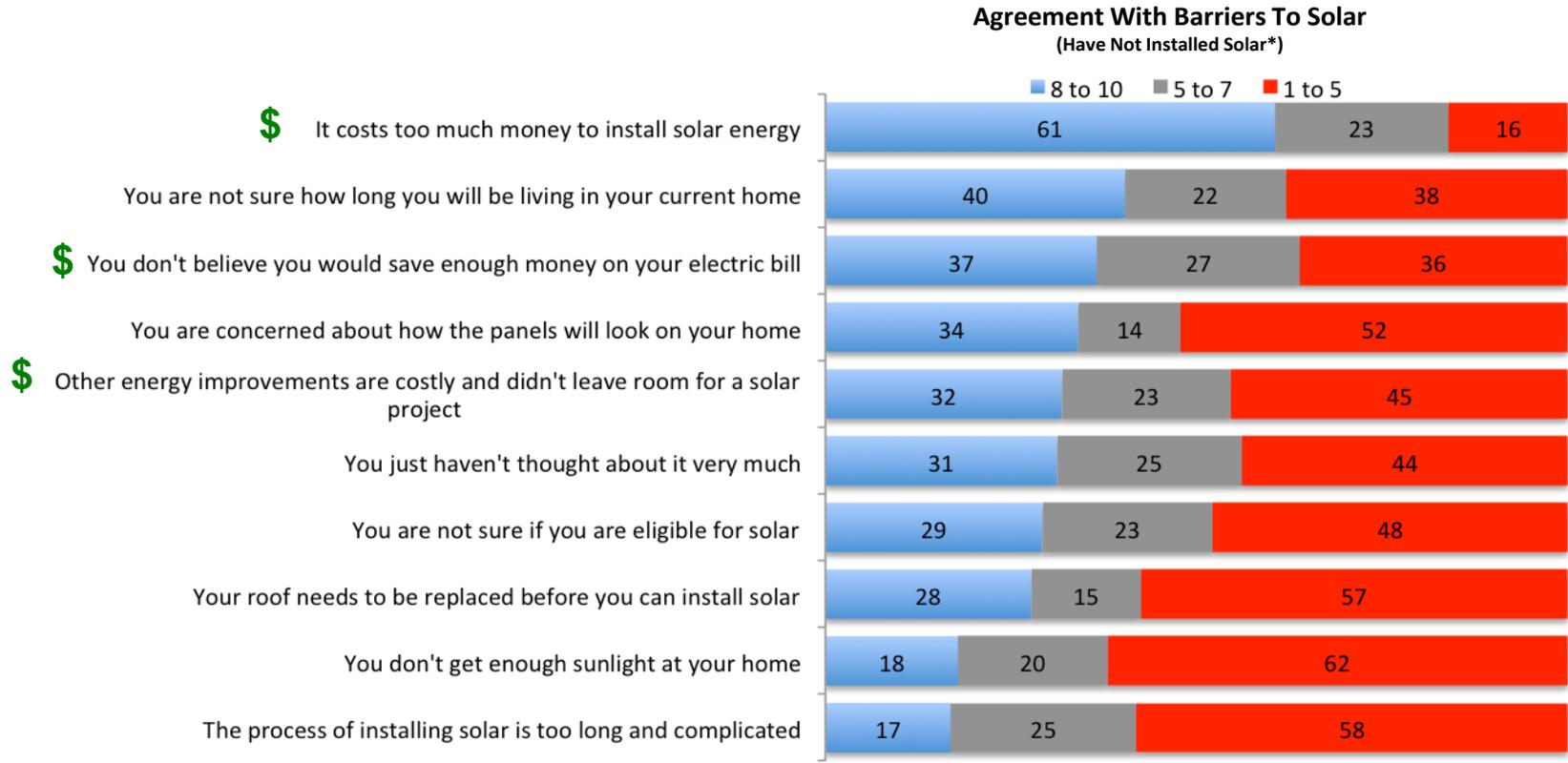
- "Historic home."
- "We have a historical home and don't believe solar energy panels would work for us."

#### **OTHER**

- "I am 75 years old. Let the next owner of the house do it!!"
- "I have not thought about it."
- "I would have to cut the trees down."
- "It was not compatible with the electric box with the generator connected to it."

## Barriers To Conversion

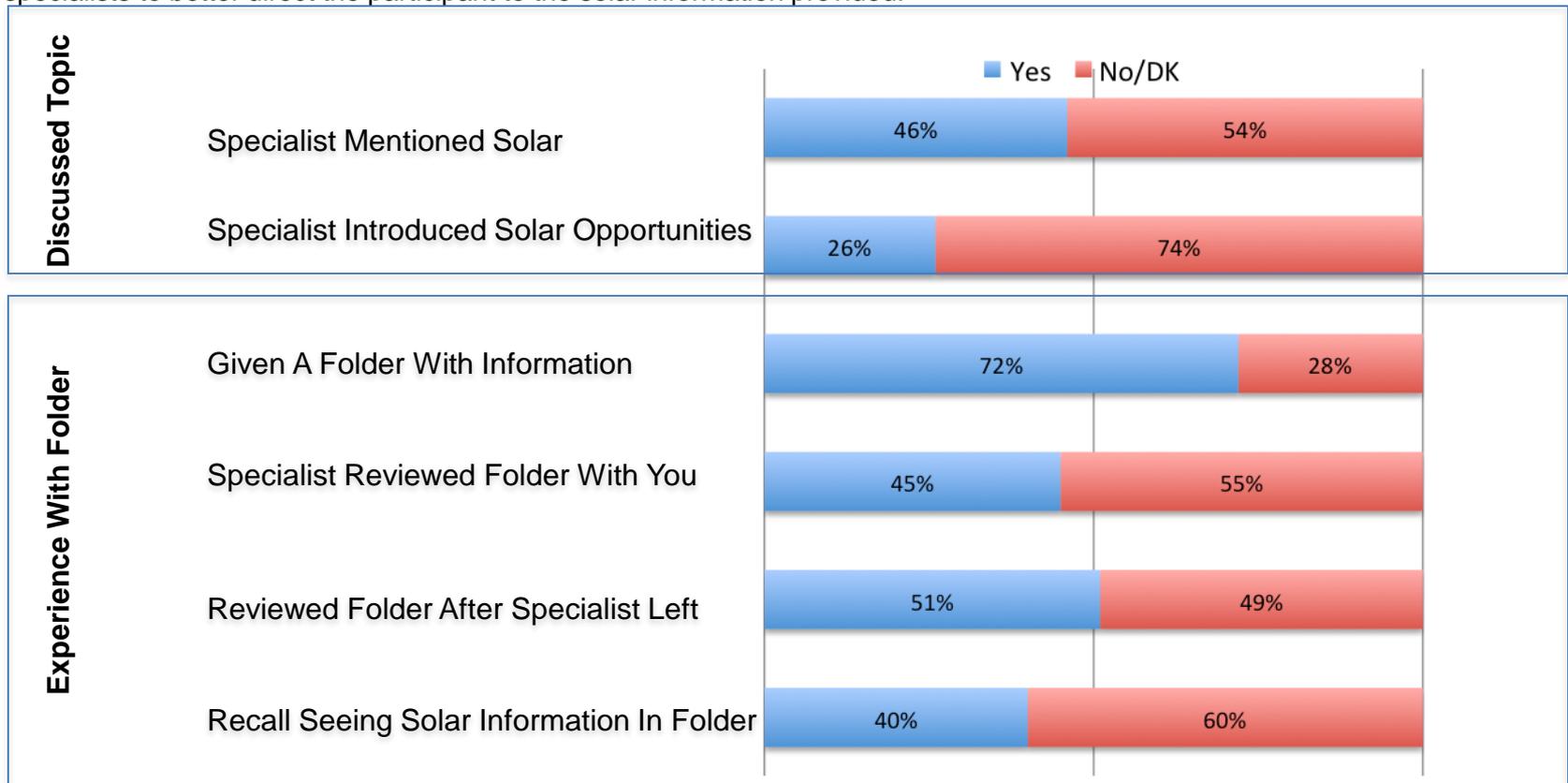
- Ratings on barriers to conversion are consistent with open ended reasons for not converting to solar.
- Cost, uncertainty about staying in the home, lack of return and aesthetics are top barriers.



Next I am going to read you] a list of reasons describing why some people have said they have not installed solar. For each reason, please tell me how much you agree or disagree. Please use a 10-point scale, where 1 means "strongly disagree" and 10 means "strongly agree".  
\* Don't Knows Excluded From Base – Base Varies For Each Statement

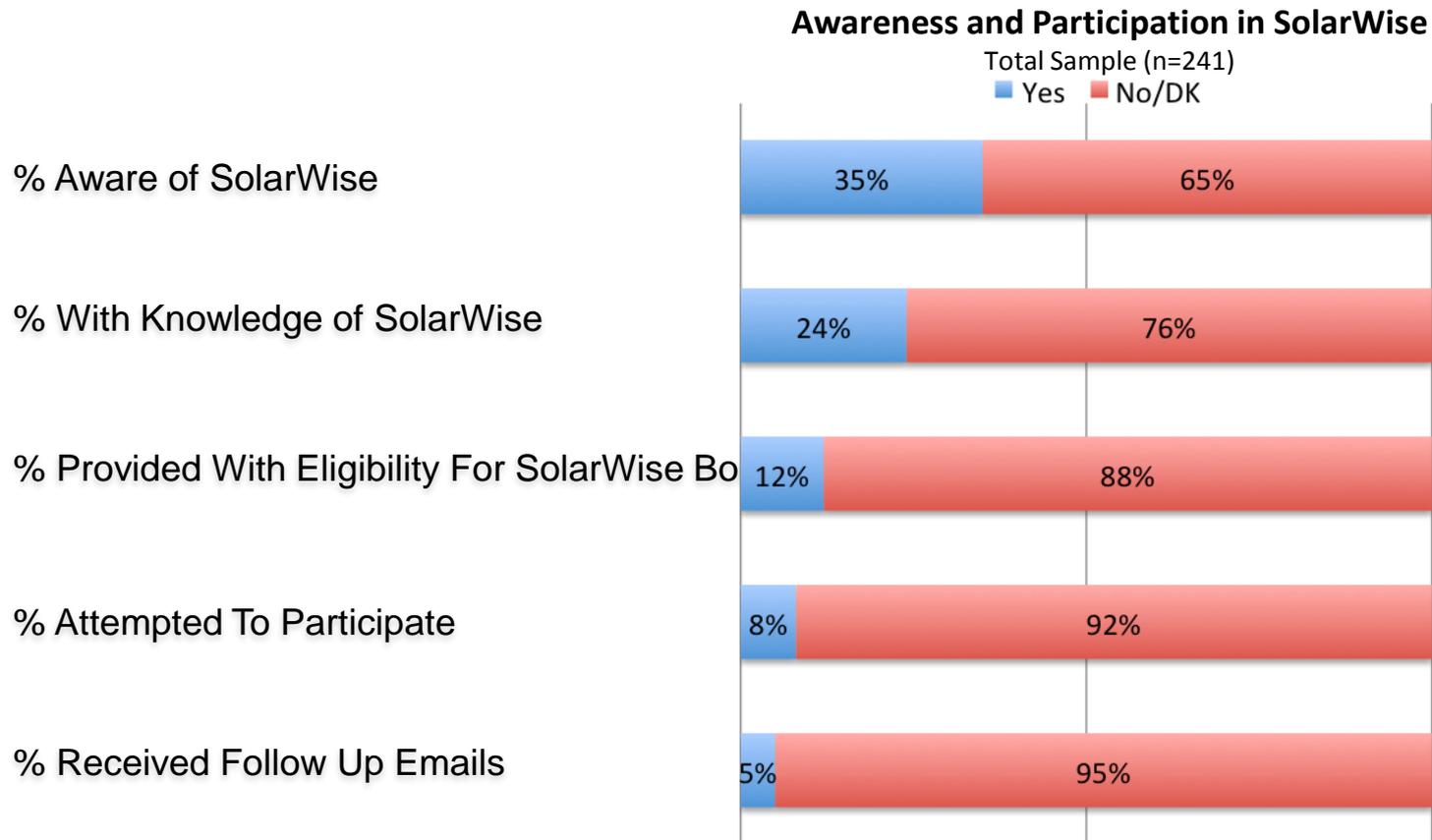
## Recall of Solar Conversations and Materials

- The research reveals that there is considerable opportunity to increase the amount of discussion around the topic of solar conversion with participants. Less than half recall the topic being mentioned by the specialist.
- Furthermore, while most recall being given a folder with energy efficiency information, there is clearly an opportunity for specialists to better direct the participant to the solar information provided.



## Awareness and Participation in SolarWise

- There is a clear opportunity to build awareness and understanding of the SolarWise program.
- Only 1/3<sup>rd</sup> indicate that they are aware of SolarWise – and only 8% indicate they have attempted to participate.



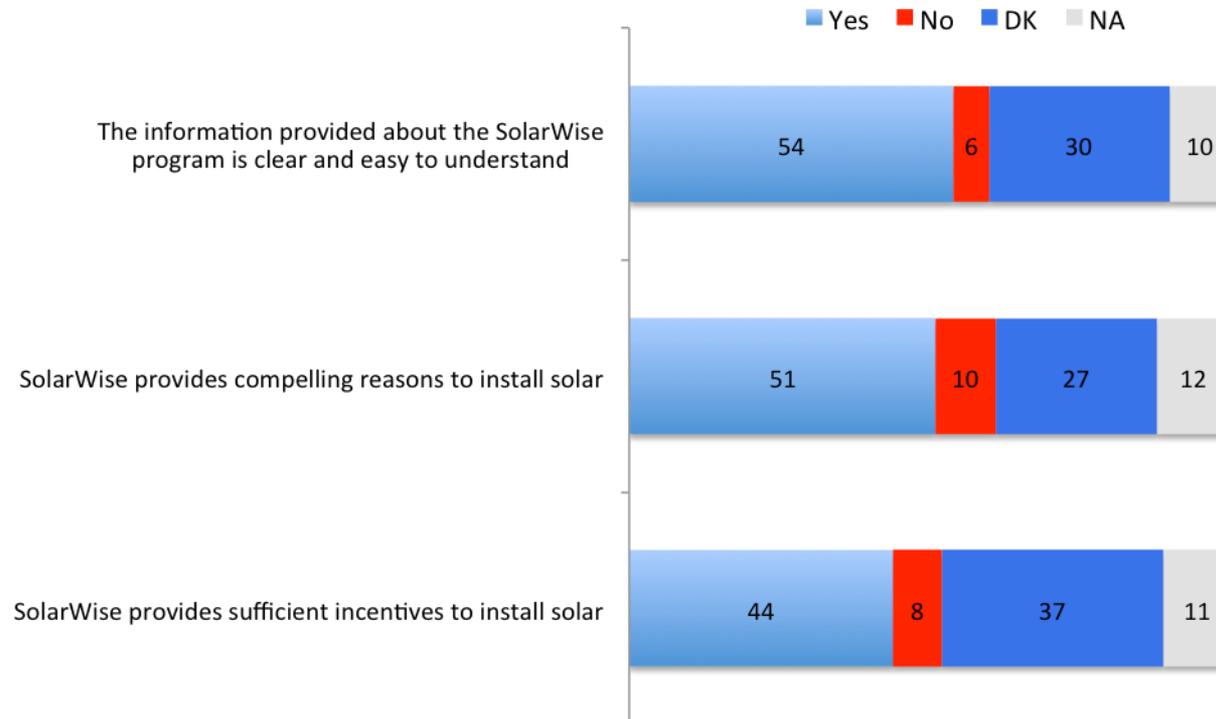
Note: All percentages shown are among total sample.

## Perceptions of SolarWise

- Many of those aware of SolarWise are not knowledgeable about the information, reasons to convert and incentives. This signals an opportunity to better educate individuals about the program.
- Among those with an opinion about SolarWise, most believe the information is provided in a clear and easy to understand manner and that SolarWise provides compelling reasons to install solar and sufficient incentives.

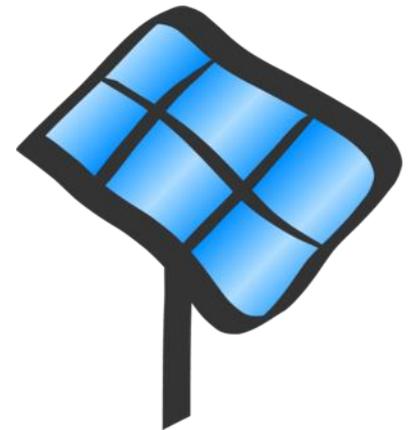
### SolarWise Perceptions

(Aware of SolarWise n=84)



# Recommendations FY18

- Simply, simplify, simplify
- Increase Solar Marketplace participation to help customers save money
- Drive EE and DG implementation on a voluntary basis



# Project Design Recommendations

**A simpler program would be more likely to overcome the Year 1 challenges and meet the goals in the original filing**

- Remove SolarWise “re-sizing” requirement, in lieu of existing size limit based on 3-year average – utilize current RI law
- Remove Bonus tiers, along with application materials, etc.
- Launch a strategic marketing campaign to all RI residential customers through a number of channels on EE and solar

# Benefits to 2018 Design: Customer/Installer

- Customer benefits
  - Simplified process that promotes cost effective EE as well as solar
  - Provides more customers with choices and lower costs through the EnergySage Marketplace
- Solar installer benefits
  - Reduced soft costs from participation of more customers in the Marketplace
  - Customer receives standard PBI options through RE Growth for less complexity

# Next Steps

- Finalize the redesign for submission to PUC
  - Incorporate feedback of Board and other stakeholders
- File petition to modify SolarWise and cease bonus and audit spending in July
- Re-launch new program design in mid-late Fall 2017, post approval

**Distributed Generation Board Meeting  
Monday, July 24<sup>th</sup> 2017**

**4:00-5:30p.m.**

**Department of Administration – Conference Room B**

**Board Members Present:** Kenneth Payne, Bill Ferguson, Carol Grant, Samuel Bradner, Ian Springsteel and Chris Kearns.

**Others Present:** Sara Canabarro, Doug Sabetti, Eric Beecher.

**Call to Order:** Chairman Kenneth Payne called the meeting to order at 4:08PM.

**1. Approval of June Meeting Minutes**

Chairman Kenneth Payne requested motion to defer approval of meeting minutes until the next DG Board Meeting. Bill Ferguson made a motion and Sam Bradner seconded it. All approved.

**2. Results of the 1<sup>st</sup> Commercial Enrollment of the 2017 REG- Program – National Grid Presentation**

Ian Springsteel gave a presentation on the First 2017 Renewable Energy Growth Program Open Enrollment Results Summary. Ian went over the open enrollment Allocation, the Approved Renewable Energy classes, Standard PBI's & Ceiling Prices applicable to current program year. He also shared the Projects Awarded Certificates of Eligibility, and a review of the Application Bid Prices.

**3. Updates from April's Board Meeting Regarding REG Small Solar Program: Screening Application Process and Questions from Solar Industry – National Grid Presentation**

Ian Springsteel stated that this presentation is made for the audience who do not know what Capacity Factor means- and this presentation explains it. He first went over what Capacity Factor for Solar PV is, the highlights for RE Growth System Sizing, Class Qualification and Sizing, Net Metering Application, the Review of Suggested Method, and he went over other Sizing Issues.

**4. Updates on the 2018 Ceiling Prices Development – Office of Energy Resources**

Chris Kearns reported that the first draft for the 2018 Ceiling Prices Development is due by August, the second draft is due by September. They want to allow the market to react to the ceiling prices. OER hopes to file everything to PUC prior to Thanksgiving, in order to start the Docket Project.

**5. Public Comments**

Eric Beecher asked Ian Springsteel if elements such as, new construction vs old construction, and electrification vs gas initiative, were taken into consideration in regards to the REG Small Solar Program Application process. Doug Sabetti also asked about the estimates for the Energy Growth Program.

**6. Adjourn**

Chairman Kenneth Payne requested a motion to adjourn the meeting. Bill made a motion and Sam Bradner seconded it. All approved. Chairman Kenneth Payne adjourned the meeting at 5:06PM.

# First 2017 Renewable Energy Growth Program Open Enrollment Results Summary



Presentation to Distributed Generation Board  
July 24, 2017



# First 2017 Open Enrollment Allocation

Renewable Energy Class	Annual Enrollment Target (Nameplate MW)
Medium-Scale Solar	3.0 MW DC
Commercial-Scale 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 MW 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	

# Approved Renewable Energy Classes, Standard PBIs & Ceiling Prices Applicable to Current Program Year

Renewable Energy Class (Nameplate kW)	Standard PBI* (¢/kWh)	Ceiling Price* (¢/kWh)	Term of Service (years)
Medium-Scale Solar (26-250 kW DC)	22.75	N/A	20
Commercial-Scale Solar (251-999 kW DC)	N/A	18.75	20
Large-Scale Solar (1,000-5,000 kW DC)	N/A	15.05	20
Small Wind (10-999 kW)	N/A	21.45	20
Wind I (1,000-2,999 kW)	N/A	19.45	20
Wind II (3,000-5,000 kW; 2-turbine)	N/A	18.25	20
Wind III (3,000-5,000 kW; 3-turbine)	N/A	17.35	20
Anaerobic Digestion I (150-500 kW)	N/A	20.15	20
Anaerobic Digestion II (501-1,000 kW)	N/A	20.15	20
Small Scale Hydropower I (10-250 kW)	N/A	22.45	20
Small Scale Hydropower II (251-1,000)	N/A	22.45	20

\*Inclusive of assumed eligible federal incentives

# Community Remote Distributed Generation (CRDG) Approved Renewable Energy Classes & Ceiling Prices Applicable to Current Program Year

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Renewable Energy Class (Nameplate kW)	Ceiling Price (Inclusive of assumed eligible federal incentives) (¢/kWh)	Term of Service (years)
CRDG - Commercial Solar (251-999 kW DC)	20.65	20
CRDG - Large Solar (1,000-5,000 kW DC)	16.85	20
CRDG - Wind I (1,000-2,999 kW DC)	20.65	20
CRDG - Wind II (3,000-5,000 kW DC; 2-turbine)	19.35	20
CRDG - Wind III (3,000-5,000 kW DC; 3-turbine)	18.55	20

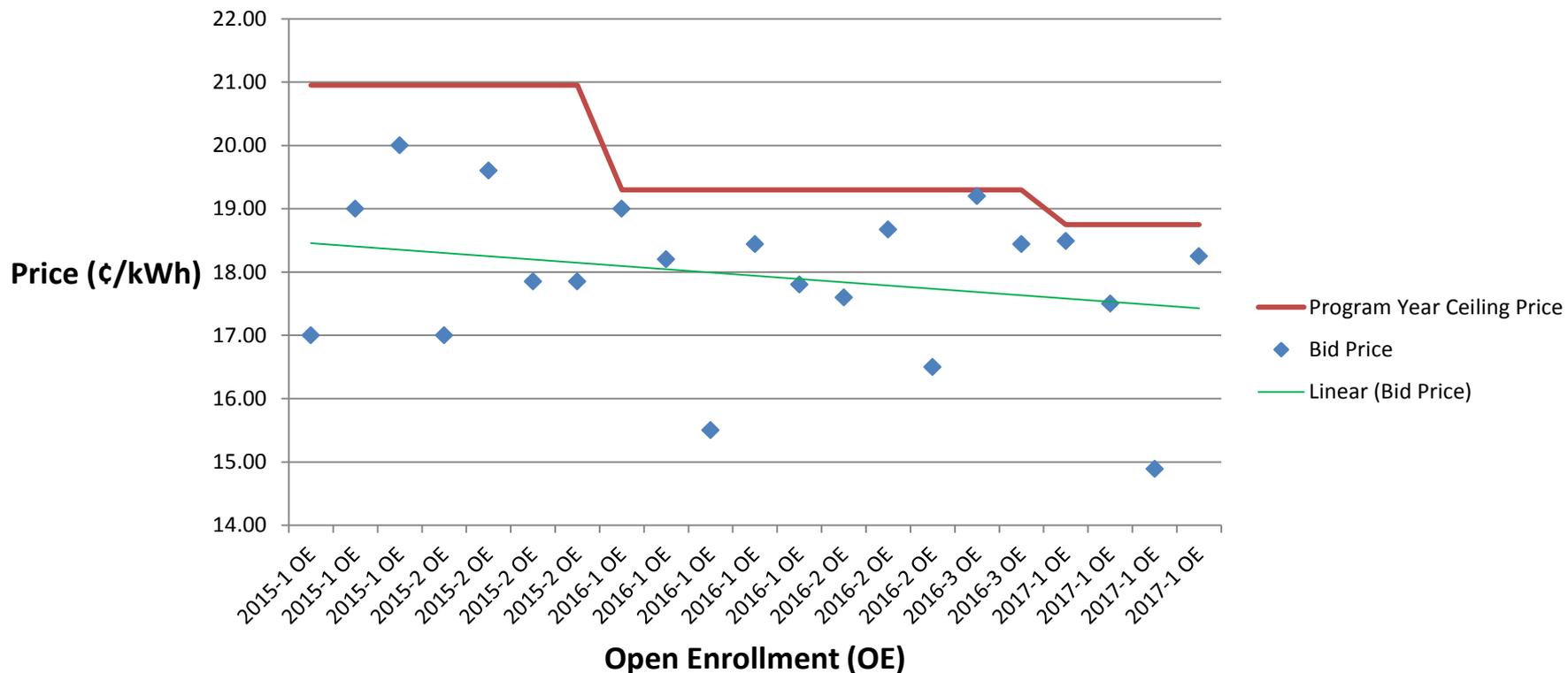
# First 2017 Open Enrollment Summary – Projects Awarded Certificates of Eligibility

Class	Nameplate Capacity (kW)	PBI (cents/kWh)	Ceiling Price (cents/kWh)	Project Location
Medium-Scale Solar (26-250 kW DC)	250	22.75	Not Applicable	Richmond
Medium-Scale Solar	228	22.75		Hopkinton
Medium-Scale Solar	250	22.75		Hopkinton
Medium-Scale Solar	250	22.75		Richmond
Medium-Scale Solar	250	22.75		Richmond
Medium-Scale Solar	249	22.75		Coventry
Medium-Scale Solar	249	22.75		Warwick
Commercial-Scale Solar (251-999 kW DC)*	653	18.49	18.75	Foster
Commercial-Scale Solar*	998	18.25		Glocester
Commercial-Scale Solar*	997	17.50		Richmond
Commercial-Scale Solar*	750	14.89		Exeter
Large-Scale Solar (1,000-5,000 kW DC)*	2,700	14.50	15.05	Foster
Large-Scale Solar*	1,570	14.50		Ashaway
Large-Scale Solar*	2,766	13.90		North Kingstown
Large-Scale Solar*	2,700	12.89		Richmond
<b>Total</b>	<b>14,860</b>			

- \*Pending Rhode Island Public Utilities Commission review and approval
- Nameplate capacity weighted average PBI of all projects above = 15.70 cents/kWh

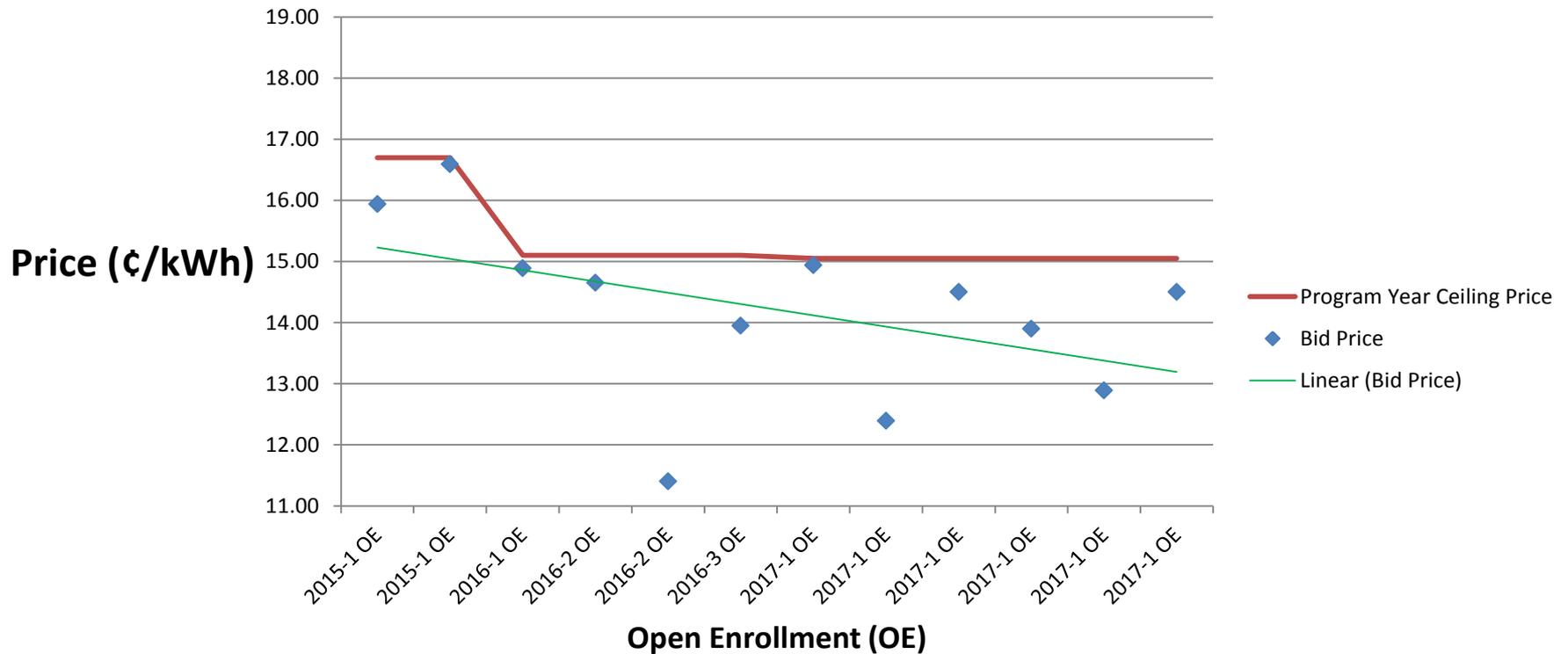
# Review of Application Bid Prices – Program to Date

## Commercial Solar (251 to 999 kW) Bid Prices



# Review of Application Bid Prices – Program to Date

## Large Solar (1 to 5 MW) Bid Prices



# 2017 Second Open Enrollment Allocation

Renewable Energy Class	Annual Enrollment Target (Nameplate Capacity MW DC)	2017-2 Target Nameplate Capacity (MW DC)
Medium-Scale Solar	3.0	1.274
Commercial-Scale Solar	5.0	1.602
Community Remote - Commercial Solar	3.0	3.0
Large Solar	12.05	2.314
Community Remote - Large Solar	3.0	3.0
Small Wind, Wind I, Wind II, and Wind III	0.4	0.4
Community Remote and Non-Community Remote Wind I, II and III	6.0	6.0
Anaerobic Digestion I	1.0	1.0
Anaerobic Digestion II		
Small-Scale Hydropower I		
Small-Scale Hydropower II		

2017 Second Open Enrollment is July 17<sup>th</sup> through July 28<sup>th</sup>

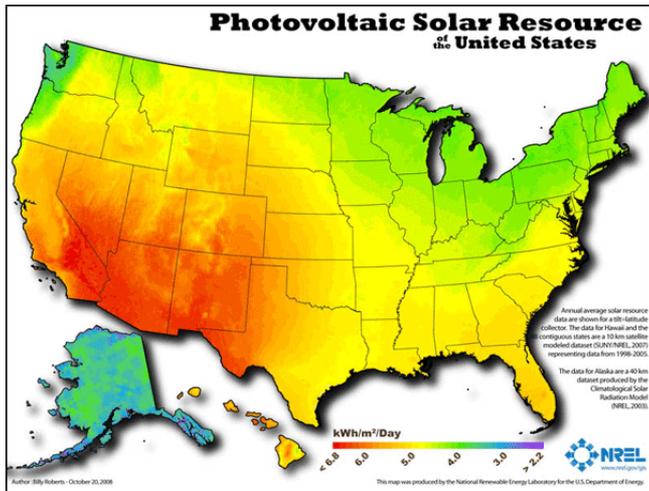
# Rhode Island Renewable Energy Growth Program

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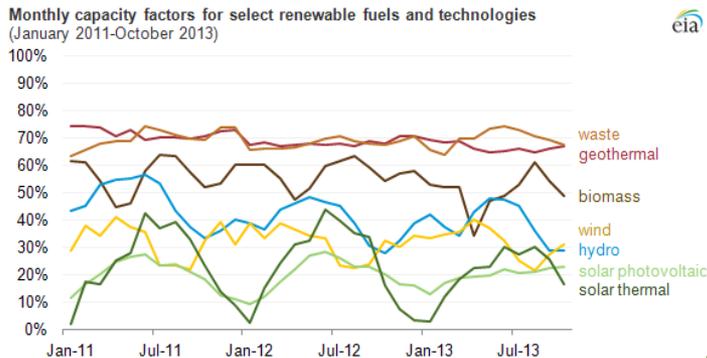


## Overview of Solar PV Capacity Factor And System Sizing Issues July 24, 2017

# What is Capacity Factor for Solar PV?



- Capacity factor is a measure of the percentage of time a system can operate at its peak nameplate rating over a period of time on average
- Solar PV capacity factor is the result of system losses and solar insolation, driven by latitude, cloud and snow cover, shading, and orientation of any tilt
- Capacity factor varies by hour, day and month, and averages out to an annual number
- The peak rating and efficiency of a panel has more to do with power density (kWp/ sq. meter)
- An easy measure of capacity factor is kWh AC/kW-DC per year divided by total hours
  - $1226 \text{ kWh AC} / 1 \text{ kW DC} / 8760 = 14\%$



# RE Growth System Sizing Highlights

- To receive bill credits, RE Growth systems must be sized like Net Metering systems to not produce more than the 3-year annual average use of the customer
- Net Metered systems are measured in Alternating Current (AC)
- RE Growth Systems are measured by Direct Current (DC)
- Capacity factor between DC and AC accounts for losses in the system and inverter efficiency, and inverter sizes are typically smaller than the DC rating of the panels
  - RE Growth average is 115% DC/AC ratio, or an 87% derate
- **An average Rhode Island capacity factor for DC nameplate is 14%**
- **The AC capacity factor is this rate divided by the derate ( $.14/.87$ ) or 16.1%**

# Class Qualification and Sizing

- The RE Growth program classes for solar are all measured in peak power DC, and include all fractions up to the next kW of total DC nameplate
  - Systems in the 1-10 kW class include 10.9 kW DC; systems in 26-250 kW class include 250.9 kW DC; etc.
- Sizing of maximum allowed system is calculated to the DC nameplate using 14% capacity factor. The following example illustrates:
  - $9,000 \text{ kWh avg. 3-yr annual use} / 14\% \text{ capacity factor} / 8,760 \text{ hours/year} = 7.34 \text{ kW DC (round to } 1/100^{\text{th}})$

# Net Metering Application

- Sizing of maximum allowed system for Net Metering uses the AC nameplate of the inverter, for which we now use a 16.1% capacity factor. The following example illustrates:
  - $9,000 \text{ kWh avg. 3-yr annual use} / 16.1\% \text{ capacity factor} / 8,760 \text{ hours/year} = 6.38 \text{ kW AC (round to } 1/100^{\text{th}})$
  - This maximum AC inverter size would be serving panels totaling approximately 7.34 kW DC at the 115% DC/AC average ratio

# Former Sizing by Comparison

- PV Watts shows for a 20% tilt, 180 degrees south 1 kW DC array an average annual output of 1,332 kWh AC, or 15.2% capacity factor
- Previously to the recent change, the Company had been using 13.5% for Net Metered systems on the AC rating of the inverter:
  - $9,000 \text{ kWh avg. 3-yr annual use} / 13.5\% \text{ capacity factor} / 8,760 \text{ hours/year} = 7.61 \text{ kW AC (round to } 1/100^{\text{th}})$
  - If this system had panels of 115% AC rating, or 8.44 DC, its output would be 10,350 kWh, or even 11,238 kWh at the PV Watts rate, which is greater than 3-year avg.
  - This old CF was underestimating how much a typical residential system actually produces, and allowed customers to oversize their systems
  - 13.5% was an acceptable DC capacity factor before recent improvements in inverter and system efficiency, but should not have been applied to the AC inverter rating

# Review of Suggested Method

- Consideration of a more detailed capacity factor calculation for RE Growth and Net Metering, as suggested by Newport Solar, is ongoing
- Would take into account system tilt and azimuth, and perhaps DC/AC ratio, all of which have an impact on the output and capacity factor
- Need to review integration of PV Watts or similar sizing tool into our process (version control, underlying data, input control, etc.)
- Process will undergo some changes with release of online application and interconnection portal, and we are reviewing the coordination of this potential process change with that release

# Other Sizing Issues

- Appreciate comments on consistent approach to estimation of use when three year history is not available
- New construction load at an existing residence is allowable if 1) construction is complete, and 2) modeled load estimate is available and provided
- We will launch a process improvement effort to determine a better way to estimate the usage of a customer when load history is not available or meaningful, and a streamlined process for customers to obtain their own usage history
  - We will explore a consistent means to providing permission for a vendor to obtain customer usage history as part of this

**Distributed Generation Board Meeting  
Monday, September 25<sup>th</sup> 2017**

**4:00-5:30p.m.**

**Department of Administration – Conference Room B**

**Board Members Present:** Kenneth Payne, Bill Ferguson, Carol Grant, Samuel Bradner, Ian Springsteel, Kari Lang, Sheila Dormody, Annie Ratanasim and Chris Kearns.

**Others Present:** Shauna Beland, Sara Canabarro, Danny Musher, Robert Beadle, Hannah Morini, Natasha Muhan and Kara Kilmartin.

**Call to Order:** Chairman Kenneth Payne called the meeting to order at 4:10PM.

**1. Approval of July Meeting Minutes**

Chairman Kenneth Payne requested motion to approve July's meeting minutes. Sam Bradner made a motion and Kari Lang seconded it. All approved.

**2. Office of Energy Resources – Brief Update on the 2018 REG Program Development**

Chris Kearns reported that the Board will be voting on a plan during October's meeting, which will be filed by the Public Utilities Commission. Chris added that by the October meeting they should have a proposal on what the Tariff prices should be.

**3. National Grid Status Update – REG Web Portal for State/Federal Tax Related Form Filings Associated with REG Tariff Income**

Ian Springsteel stated that the nCAP is launching at the end of October., however the development team has determined that the platform selected with appropriate encryption of private information will not interface with the current system used by our payments group to establish bank transfers. However, a process is currently ongoing to determine a solution to this incapability, but this solution may not be available when nCAP launches, and one may not be found in the near term without significant cost.

**4. National Grid Presentation and Discussion**

Ian Springsteel gave an update on the Zonal Incentives, stating that their screening looked at feeders at least 80% loaded. However, none of the feeders that passed screening are forecast to be constrained within their planning horizon and criteria, so there is presently no cost to avoid. Having said that, as a result, the Company decided to defer proposing a Locational Incentive for this program next year. Ian then went over feeder analysis for the screening. Ian Springsteel continued National Grid's presentation by going over the results of the 2<sup>nd</sup> round of the 2017 Commercial REG Program. Ian finalized his presentation by going over the Elements to be Proposed in 2018 Program Year Tariff Filing and stated that the Performance Standards are being finalized and will be part of the 11/15 Filing to the Public Utilities Commission. Ian Springsteel went over the Minimum Value for CRDG, and stated that they roughly 60-70MW unused capacity set aside for the year of 2019. This led to a discussion amongst the Board members regarding the tariffs. Chris Kearns suggested to get stakeholders involved in

CRDG before National Grid decides to file it. Chris will have a meeting with the stakeholders, and then brainstorm with Shauna Beland, and Ian Springsteel about any potential recommendations. Will share results two weeks prior to the next DG Board meeting in October.

**5. Public Comment**

No public comments were made.

**6. Adjourn**

Chairman Kenneth Payne requested a motion to adjourn the meeting. Sheila Dormody made a motion and Bill Ferguson seconded it. All approved. Chairman Kenneth Payne adjourned the meeting at 5:05PM.

# Rhode Island Renewable Energy Growth Program

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Distributed Generation Board Presentation  
September 25, 2017

# Overview

- Update on nCAP portal and applicability to sensitive customer data
- Consideration of a Locational Incentive
- Results from 2017 Second Open Enrollment
- Summary of DG Standard Contract and RE Growth Operational Progress
- Summary of tariff changes for 2018 RE Growth program

# nCAP and Sensitive Customer Data Submittals

- National Grid has been developing a web-based portal called nCAP, or “national grid Customer Application Portal” launching at the end of October
- nCAP will help manage customer connection applications, and allow for upload of many required documents, progress tracking, and payment of fees
- Customers currently submit tax (W-9) and bank account information to National Grid either through email, or via physical mail for the RE Growth program
- The nCAP portal development team, however, has determined that the platform selected with appropriate encryption of private information will not interface with the current system used by our payments group to establish bank transfers
- A process is currently ongoing to determine a solution to this incompatibility, but this solution may not be available when nCAP launches, and one may not be found in the near term without significant cost
- Any new or interim process will be communicated to the installer community at least 30 days before it is required to be used

## Consideration of a Locational Incentive

# Locational Incentive Analysis: Project Findings Summary

- Our research and analysis focused on:
  - 1) an expedited method for screening feeders;
  - 2) understanding the benefits solar could provide; and
  - 3) estimating a benefit value that provides the basis for a locational incentive.
- Our screening looked at feeders at least 80% loaded. However, none of the feeders that passed screening are forecast to be constrained within our planning horizon and criteria, so there is presently no cost to avoid.
- As a result, the Company decided to defer proposing a Locational Incentive for this program year
- Development of a potential valuation and payment methodology did proceed and is summarized in the following slides

# Feeder Analysis for Screening

- The criteria used in this analysis include:
  - Feeder must be at least 80% loaded in last year
  - Asset must not be scheduled for upgrade due to asset age or condition
  - Load on the asset must not be declining
  - This screening resulted in a list of 25 feeders
- This screening is not as detailed at the “Heat Map” results of system area studies, and leaves out sectional analysis and voltage issues, for example.
- None of the feeders are predicted to reach 100% and thus are not in need of any upgrades which can be deferred
- Of these feeders, 20 had hourly load data immediately available in a form ready to be analyzed for the times of its peak hours of loading

# Feeder Loading Analysis

- Asset Planning determines load constraint upgrades should be planned when a feeder is projected to reach 100% or more of allowed capacity within three years
- None of the feeders that are heavily loaded and passed screening meet this criterion

Feeder ID	Line Capacity (kW)	Projected 2020 Usage	Capacity Loaded %
100F1	7632	6685	87.6%
17F2	6360	5897	92.7%
27F2	8106	6615	81.6%
27F4	6422	5811	90.5%
27F5	8106	7304	90.1%
33F2	6422	6049	94.2%
33F4	7183	6991	97.3%
46F4	7632	7044	92.3%
54F1	6983	5609	80.3%
59F3	8106	6538	80.7%
63F6	8106	6722	82.9%
68F2	7632	6251	81.9%
72F3	8106	7173	88.5%
72F6	8043	6554	81.5%
76F1	6110	5706	93.4%
76F2	7632	7603	99.6%
76F4	7632	7252	95.0%
76F5	7108	6697	94.2%
76F6	7632	7227	94.7%
76F7	7632	6887	90.2%

# Three Approaches to Determining Potential Avoided Cost Benefits

We examined three different approaches to estimate potential benefits from load relief, both broadly and at specific locations:

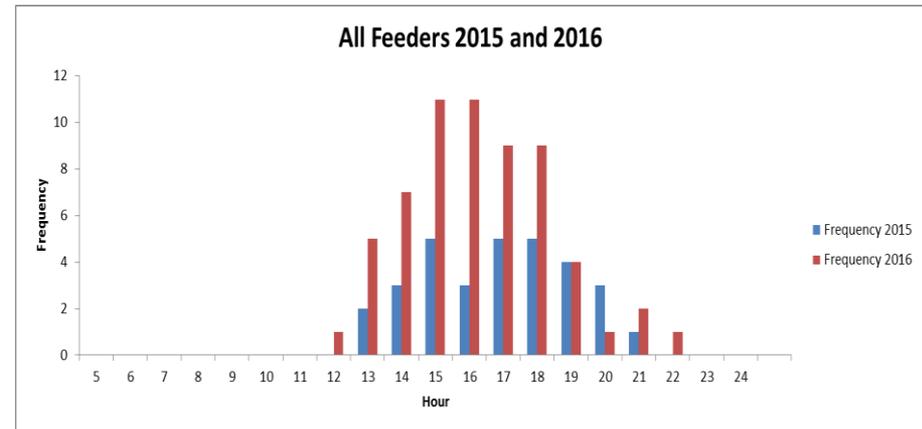
1. System-wide Avoided Transmission and Distribution Cost
2. Line-specific deferral value of distribution system upgrades as measured by the avoided revenue requirement NPV, multiplied by the probability of a spot load developing necessitating an upgrade
3. Time-value deferral NPV, similar to what has been used for the System Reliability Plan area.

# Potential Approach to a Locational Incentive Structure

- Constraint solutions would on average increase line capacity by 20%, based on past experience
  - One approach is to distribute the value over the kW value of such additional capacity
- Lump sum payments or annualized payments are possible
  - Lump sum more closely mimics installation costs
  - Annualized based on output in peak period better incentivizes actual performance
- Annual payments can be divided over the peak load windows – 480 summer hours – to create \$/kWh value
- Examined whether revenue losses for westerly facing systems would be greater or less than Locational Incentives suggested by these approaches

# “Distribution Contribution Percentage” (DCP): the capacity factor for solar systems over peak period

- The resulting analysis showed that the feeders peak at two different time frames (Group A 1-4:59pm, Group B 4-7:59pm).
- Summer Capacity Factor for 480 peak hours in these two separate summer peaking groups is show below, for two different azimuth headings
- The total period capacity factor is the DCP for use in the payment methodology



## Summer Capacity Factor for South Facing 180 azimuth

Time	June	July	August	Sept.	Summer Capacity
Group A 1-4:59 pm	37.24%	40.45%	38.29%	28.32%	36.07%
Group B 4-7:59 pm	7.82%	8.83%	6.56%	3.25%	6.62%

## Summer Capacity Factor for West Facing 270 azimuth

Time	June	July	August	Sept.	Summer Capacity
Group A 1-4:59 pm	43.4%	48.8%	44.2%	31.8%	42.1%
Group B 4-7:59 pm	13.3%	16.2%	11.8%	5.7%	11.7%

# Illustration of a Program Tariff Structure

- Use Method 2 to determine the NPV of a 10-year deferral of an upgrade
- Divide this value over the 20% of avoided increase in average line capacity for a \$/kW value
- For small ( $<$  or  $=$  25 kW) systems, multiply the \$/kW by a sharing factor, like 50%, to determine a lump benefit value
- For large systems, use an annual 10-year payment value to determine a \$/kWh rate
  - Divide the \$/kW annual value by 480 hours
  - Pay that amount \$/kWh for each kWh produced to systems enrolled for a set period of time, e.g. five years
- Using lost revenue estimates, in some cases these values would be higher than losses, but in others there would be no incentive to point more westerly
- The analysis showed values of \$250-500 for lump sums per kW, and hourly values of \$0.08-0.18/kWh for peak period output

# Future Plan for Locational Incentives Research

- National Grid will reexamine the opportunity again in winter/spring with 2017 data, application of the BCA Framework, and any changes in forecasting, such as for beneficial electrification
- If data point to constraints in the future, the Company will consider if a targeted or general locational incentive approach could help defer an upgrade
- Future steps include:
- Feb-May 2018 – Restart investigation of research with updated line data and new forecasts, new forecast elements (if any), and more robust constraint analysis that is line specific
- June 2018 – Stakeholder engagement on potential program, if warranted
- July 2018 -- Present and discuss additional findings with OER and Division, and make recommendation on inclusion in Program filing

## Results of Second Open Enrollment 2017



# Second 2017 Open Enrollment Allocation

Renewable Energy Class	Second Open Enrollment Target (Nameplate MW)
Medium-Scale Solar	1.274 MW DC
Commercial-Scale Solar	1.602 MW DC
Community Remote - Commercial Solar	3.0 MW DC
Large Solar	2.314 MW DC
Community Remote - Large Solar	3.0 MW DC
Small Wind	0.400 MW 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	

# Second 2017 Open Enrollment Certificates of Eligibility

Class	Nameplate Capacity (kW)	PBI (cents/kWh)	Project Location
Medium-Scale Solar (26-250 kW DC)	200	22.75	Bristol
Medium-Scale Solar	250	22.75	Middletown
Medium-Scale Solar	250	22.75	Woonsocket
Medium-Scale Solar	95	22.75	East Providence
Medium-Scale Solar	250	22.75	Richmond
Commercial-Scale Solar (251-999 kW DC)	914	16.35	South Kingstown
Wind II (3,000-5,000 kW; 2-turbine)	3,000	18.24	Johnston
Wind II	3,000	18.24	Johnston
CRDG Commercial Solar (251-999 kW DC)	997	20.60	Hopkinton
CRDG Commercial Solar	997	20.50	Hopkinton
CRDG Large Solar (1,000-5,000 kW DC)	3,000	16.50	Burrillville
<b>Total</b>	<b>12,953</b>		

- Nameplate capacity weighted average PBI of all projects above = 18.42 cents/kWh

# Second Open Enrollment Capacity & Third Open Enrollment Allocation

Renewable Energy Class	2017-2 Enrollment Target (Nameplate kW)	2017-2 Actual Nameplate Capacity (kW) Offered COE	Unused Allocation (kW)	2017-3 Target Nameplate Capacity (kW)
Medium-Scale Solar	1,274	1,045	229	229
Commercial-Scale Solar	1,602	914	688	688
Community Remote - Commercial Solar	3,000	1,994	1,006	1,006
Large Solar	2,314	0	2,314	2,314
Community Remote - Large Solar	3,000	3,000	0	0
Small Wind, Wind I, Wind II, and Wind III	400	0	400	400
Community Remote and Non-Community Remote Wind I, II and III	6,000	6,000	0	0
Anaerobic Digestion I	1,000	0	1,000	1,000
Anaerobic Digestion II				
Small-Scale Hydropower I				
Small-Scale Hydropower II				



# Summary of DG Standard Contract and RE Growth Programs Enrollment and Operational Status, 2011-2017



# RI DG Standard Contracts Program Summary



Year	Total Awarded		Operational		Pending		Cancelled/Terminated	
	Nameplate (kW)	Number of Projects	Nameplate (kW)	Number of Projects	Nameplate (kW)	Number of Projects	Nameplate (kW)	Number of Projects
2011	5,000	4	4,000	3	0	0	1,000	1
2012	11,177	12	10,028	9	0	0	1,149	3
2013	8,471	15	5,025	11	0	0	3,446	4
2014	16,973	19	3,742	3	1,250	1	11,981	15
<b>RI DG Projects Summary:</b>	<b>41,621</b>	<b>50</b>	<b>22,795</b>	<b>26</b>	<b>1,250</b>	<b>1</b>	<b>17,576</b>	<b>23</b>

*Note#1: The one remaining 2014 Solar project is expected to be commercially operational by end of year.*

*Note#2: Data is current as of 9/19/2017.*

# RI RE Growth Program Summary



Year	Total Awarded		Operational		Pending		Cancelled/Terminated	
	Nameplate (kW)	Number of Projects	Nameplate (kW)	Number of Projects	Nameplate (kW)	Number of Projects	Nameplate (kW)	Number of Projects
2015	19,474	20	6,934	6	12,540	14	0	0
2016	22,909	30	0	0	22,909	30	0	0
2017	27,813	26	0	0	27,813	26	0	0
<b>RI RE Growth Summary:</b>	<b>70,196</b>	<b>76</b>	<b>6,934</b>	<b>6</b>	<b>63,262</b>	<b>70</b>	<b>0</b>	<b>0</b>

*Note#1: The 2017 data includes projects awarded Certificates of Eligibility in the 2017 Second Open Enrollment and six of those projects are pending PUC approval.*

*Note#2: Data is current as of 9/19/2017.*

## Discussion of Elements New to the RE Growth 2018 Filing

# Elements to be Proposed in 2018 Program Year Tariff Filing

- Performance Standards to which the Company's remuneration could be subject
  - PUC directed the Company to propose such standards in 2017 proceeding Open Meeting to exercise its authority in § 39-26.6-12
  - Performance Standards are still being finalized, and will be part of 11/15 filing
  - Seek to show that the Company "has processed applications for service and completed interconnections in a timely and prudent manner" and fully enrolled projects that were eligible for available capacity
- Potential inclusion of a minimum value for Community Remote DG facility credits to off-takers

# Minimum Value for CRDG

- The CRDG provision of the tariff allow a project owner to transfer credits at a level they determine, not to exceed the Standard Offer rate in effect at the time
- There is no minimum value discussed
- The Board has approved ceiling prices for CRDG that envisioned both material credit value transferred to customers, and administrative costs for collecting payments from recipients
- With *de minimus* credit values, like .05 cent, owners could simply not bill the recipient yet still receive the benefit of the higher ceiling price
- As an energy policy and consumer protection matter, National Grid would support a minimum value for such credits of one-half the difference in ceiling price between non-CRDG and CRDG classes, and could include such in its filing
- In 2017 program year, these CRDG Minimum Credit Values would have been:
  - Wind I : 0.6 cent
  - Wind II: 0.55 cent
  - Wind III: 0.6 cent
  - Comm. Solar: 0.95 cent
  - Large Solar: 0.9 cent

**Distributed Generation Board Meeting  
Monday, October 23<sup>rd</sup> 2017**

**4:00-5:30p.m.**

**Department of Administration – Conference Room B**

**Board Members Present:** Kenneth Payne, Bill Ferguson, Samuel Bradner, Carol Grant and Chris Kearns.

**Others Present:** Sara Canabarro, Palmer Moore, Jim Kennerly, David Milner, Casey Ackerman and Greg Rechou.

**Call to Order:** Chairman Kenneth Payne called the meeting to order at 4:10PM.

**1. Approval of September Meeting Minutes**

Chairman Kenneth Payne requested a motion to approve the minutes for September with the amended note. Sam Bradner made a motion and Bill Ferguson seconded it. All approved.

**2. Voting on the 2018 Renewable Energy Growth Program Plan:**

Mr. Payne requested a motion to vote to approve the Megawatt Allocation Plan. Mr. Ferguson made a motion to approve, Mr. Bradner seconded this motion. All approved.

Prior to the vote on the 2018 ceiling prices and associated categories, there was a discussion by the Office of Energy Resources and the Board to shift the medium scale solar class to a competitive process beginning in 2018, if the medium scale solar class was oversubscribed in 2017, based on the results of the 3<sup>rd</sup> Renewable Energy Growth Commercial Enrollment.

The Office of Energy Resources recommended that the solar carport category also be delayed in 2018 and reexamined for the 2019 program year, due to the ongoing issues and challenges of commercial scale solar development within municipalities for standard ground mount solar projects and that municipalities were not ready to also see solar carport proposals, with some municipalities incorporating height restrictions into their local solar siting ordinances.

Mr. Payne requested a motion to vote to approve the Ceiling Prices. Mr. Ferguson made a motion to approve, Mr. Bradner seconded this motion. All approved.

Mr. Payne requested a motion to vote to approve National Grid's Adjustments to the Community Remote Distributed Program. Mr. Bradner made a motion to approve, Mr. Ferguson seconded this motion. All approved.

Mr. Payne requested a motion to vote to approve National Grid Renewable Energy Tariff/Application Documents. Mr. Ferguson made a motion to approve, Mr. Bradner seconded this motion. All approved.

**3. 2019 Renewable Energy Growth Program – Reconciliation Funding for 2019 Ceiling Price Services**

Chris Kearns requested the Board \$68,000 for the Funding for 2019 Ceiling Price Services. He stated that it is the same amount as 2017. The previous years (2015-2016) were \$65,000.

**4. Public Comments**

None.

**5. Adjourn**

Chairman Kenneth Payne requested a motion to adjourn the meeting. Bill Ferguson made a motion to adjourn; Sam Bradner seconded the motion. All approved.

The meeting was adjourned at 4:55 PM.