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

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- 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

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Consideration of a Locational Incentive

Locational Incentive Analysis: Project Findings Summary

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- 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

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- 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

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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

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- 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

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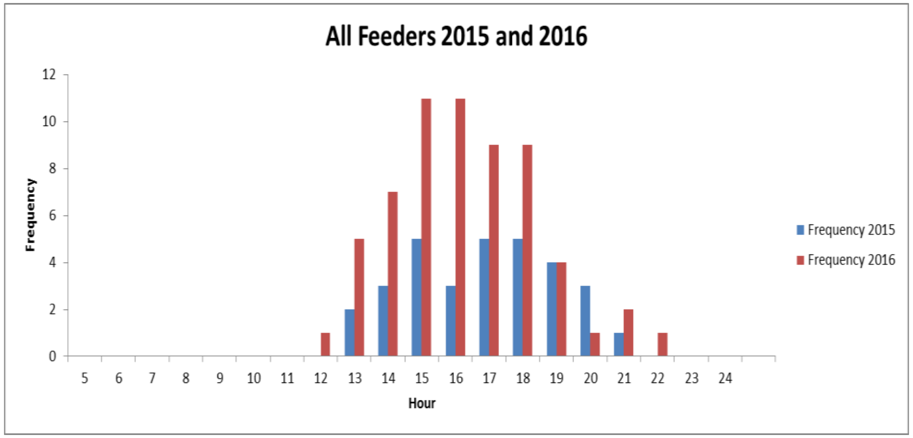
- The resulting analysis showed that the feeders peak at two different time frames (Group A 1-4:59pm, Group B 4-7:59pm).
- Summer Capacity Factor for 480 peak hours in these two separate summer peaking groups is show below, for two different azimuth headings
- The total period capacity factor is the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

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- 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

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- 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

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<table>
<tr><th>Renewable Energy Class</th><th>Second Open Enrollment Target (Nameplate MW)</th></tr>
<tr><td>Medium-Scale Solar</td><td>1.274 MW DC</td></tr>
<tr><td>Commercial-Scale Solar</td><td>1.602 MW DC</td></tr>
<tr><td>Community Remote - Commercial Solar</td><td>3.0 MW DC</td></tr>
<tr><td>Large Solar</td><td>2.314 MW DC</td></tr>
<tr><td>Community Remote - Large Solar</td><td>3.0 MW DC</td></tr>
<tr><td>Small Wind</td><td>0.400 MW DC</td></tr>
<tr><td>Community Remote and Non-Community Remote Wind I, II and III</td><td>6.0 MW DC</td></tr>
<tr><td>Anaerobic Digestion I</td><td rowspan="4">1.0 MW DC</td></tr>
<tr><td>Anaerobic Digestion II</td></tr>
<tr><td>Small-Scale Hydropower I</td></tr>
<tr><td>Small-Scale Hydropower II</td></tr>
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Second 2017 Open Enrollment Certificates of Eligibility

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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
Total	**12,953**		

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

Second Open Enrollment Capacity & Third Open Enrollment Allocation

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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

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	Total Awarded		Operational		Pending		Cancelled/Terminated	
Year	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
RI DG Projects Summary:	41,621	50	22,795	26	1,250	1	17,576	23

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

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	Total Awarded		**Operational**		**Pending**		**Cancelled/Terminated**	
Year	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
RI RE Growth Summary:	70,196	76	6,934	6	63,262	70	0	0

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.

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Discussion of Elements New to the RE Growth 2018 Filing

Elements to be Proposed in 2018 Program Year Tariff Filing

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- 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

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- 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