

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
PUBLIC UTILITIES COMMISSION**

The Narragansett Electric Company  
d/b/a National Grid

Docket No. 4783

RE: FY 2019 Electric Infrastructure,  
Safety, and Reliability Plan

**PREFILED DIRECT TESTIMONY OF**

**Gregory L. Booth, PE  
President, PowerServices, Inc.  
On Behalf of Rhode Island Division of Public Utilities and Carriers**

February 21, 2018

Prepared by:  
Gregory L. Booth, PE  
1616 E. Millbrook Road, Suite 210  
Raleigh, North Carolina 27609  
(919) 256-5901 or (919) 441-6440  
gbooth@powerservices.com

**Prefiled Direct Testimony of  
Gregory L. Booth, PE, President  
PowerServices, Inc.**

**On Behalf of Rhode Island Division of Public Utilities and Carriers  
Docket No. 4783**

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**DIRECT TESTIMONY OF GREGORY L. BOOTH, PE**

**I. INTRODUCTION**

**Q. PLEASE STATE YOUR NAME AND THE BUSINESS ADDRESS OF YOUR EMPLOYER.**

A. My name is Gregory L. Booth. I am employed by PowerServices, Inc. ("PowerServices"), located at 1616 E. Millbrook Road, Suite 210, Raleigh, North Carolina 27609.

**Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS MATTER?**

A. I am testifying on behalf of the Rhode Island Division of Public Utilities and Carriers ("Division").

**Q. WHAT DOES YOUR POSITION WITH POWERSERVICES, INC., ENTAIL?**

A. As President of PowerServices, Inc., an engineering and management services firm, I am responsible for the direction, supervision, and preparation of engineering projects and management services for our clients, including the corporate involvement in engineering, planning, design, construction management, and testimony.

**Q. WOULD YOU PLEASE OUTLINE YOUR EDUCATIONAL BACKGROUND?**

A. I graduated from North Carolina State University in Raleigh, North Carolina in 1969 with a Bachelor of Science Degree in Electrical Engineering, and was inducted into the North Carolina State University Department of Electrical and Computer Engineering Alumni Hall of Fame in November 2016. I am a registered professional engineer in twenty-three (23) states, including Rhode Island, as well as the District of Columbia. I am a registered land surveyor in North Carolina. I am also registered under the National Council of Examiners for Engineering and Surveying.

**Q. ARE YOU A MEMBER OF ANY PROFESSIONAL SOCIETIES?**

1 A. I am an active member of the National Society of Professional Engineers (“NSPE”), the  
2 Professional Engineers of North Carolina (“PENC”), the Institute of Electrical and  
3 Electronics Engineers (“IEEE”), American Public Power Association (“APPA”),  
4 American Standards and Testing Materials Association (“ASTM”), the National Fire  
5 Protection Association (“NFPA”), and Professional Engineers in Private Practice  
6 (“PEPP”). I have also served as a member of the IEEE Distribution Subcommittee on  
7 Reliability and as an advisory member of the National Rural Electric Cooperative  
8 Association (“NRECA”)’-Cooperative Research Network, which is an organization  
9 similar to EPRI.

10 **Q. PLEASE BRIEFLY DESCRIBE YOUR EXPERIENCE WITH ELECTRIC**  
11 **UTILITIES.**

12 A. I have worked in the area of electric utility and telecommunication engineering and  
13 management services since 1963. I have been actively involved in all aspects of electric  
14 utility planning, design and construction, including generation and transmission systems,  
15 and North American Electric Reliability Corporation (“NERC”) compliance.

16 **Q. HAVE YOU PREVIOUSLY TESTIFIED AS AN EXPERT BEFORE THE RHODE**  
17 **ISLAND PUBLIC UTILITIES COMMISSION?**

18 A. Yes. I have testified before the Rhode Island Public Utilities Commission on numerous  
19 matters, including Docket Nos. 2489, 2509, 2930, 3564, 3732, 4029, 4218, 4237, 4307,  
20 4360, 4382, 4473, 4483, 4539, 4592, 4614, 4682, and D-11-94. My testimony in Rhode  
21 Island has included filed and live testimony on previous Electric Infrastructure, Safety  
22 and Reliability Plan Fiscal Year Proposal filings by National Grid in Docket Nos. 4218,  
23 4307, 4382, 4473, 4539, 4592, and 4682.

1 **Q. HAVE YOU PREVIOUSLY TESTIFIED AS AN EXPERT IN OTHER**  
2 **JURISDICTIONS?**

3 A. I have testified before the FERC and numerous state commissions, including in  
4 Delaware, Florida, Maine, Maryland, Massachusetts, Minnesota, New Jersey, North  
5 Carolina, Pennsylvania, and Virginia.

6

1 **II. PURPOSE OF TESTIMONY**

2 **Q. WHAT IS THE PURPOSE OF THIS TESTIMONY?**

3 A. The purpose of my testimony is to introduce *Exhibit GLB-1*, Report of Gregory L. Booth,  
4 PE on the review of National Grid's Proposed FY 2019 Electric Infrastructure, Safety and  
5 Reliability Plan provided to the Division September 29, 2017 ("ISR Plan"). My  
6 testimony will briefly summarize the collaborative process between the Division and  
7 National Grid, which resulted in preliminary consensus of the proposed ISR Plan filed  
8 with the Commission on December 21, 2017, together with summarizing the details of  
9 *Exhibit GLB-1* and my recommendations.

**III. ISR PLAN EVALUATION PROCESS**

1 **Q. WOULD YOU BRIEFLY OUTLINE THE PROCESS WHICH LEADS TO THE**  
2 **DIVISION'S SUPPORT OF THE NATIONAL GRID ISR PLAN FILED ON**  
3 **DECEMBER 21, 2017 IN THIS DOCKET?**

4 A. Yes. An evaluation and analysis process was performed, including the following actions  
5 and procedures:

- 6 • A July 27, 2017 conference was held between the Division, PowerServices, and the  
7 Company to discuss the Area Studies, and how the ISR Plan, Heat Map, SRP and  
8 DSP are all coordinated,
- 9 • An August 31, 2017 meeting was held between the Division, PowerServices and the  
10 Company, to discuss the planning process and the reports provided by National Grid  
11 in advance of the FY 2019 ISR Plan filing (“Pre-Plan Information”),
- 12 • September 29, 2017, the Company filed the initial FY 2019 ISR Plan Proposal
- 13 • PowerServices evaluated the Pre-Plan Information and proposed ISR Plan, and on  
14 October 19, 2017 provided Data Request No. 1 which was served on the Company  
15 with the Division’s Data Request No. 2,
- 16 • On November 8 and November 14, 2017, the Company provided responses to Data  
17 Request No. 1,
- 18 • On November 15, 2017, the Company provided responses to Data Request No. 2,
- 19 • On November 16, 2017, PowerServices provided Data Request No. 3,
- 20 • On December 1, 2017, the Company provided responses to Data Request No. 3,
- 21 • On December 6, 2017, the Division, PowerServices, and the Company discussed the  
22 budget and details concerning AMI expectations, VVO programs, distributed

- 1 generation impact, 3VO additions, and the other budget issues, including the vault  
2 program.
- 3 • On December 11, 2017, PowerServices provided preliminary ISR adjustments  
4 excluding the proposed metering pilot program.
  - 5 • On December 12, 2017, The Division, PowerServices and National Grid held a  
6 conference call to discuss details of the metering pilot program.
  - 7 • On December 13, 2017, National Grid provided a revised scope and proposed budget  
8 for the metering pilot program. The Division, PowerServices and National Grid held a  
9 conference call to discuss all other adjustments. Consensus was reached on a  
10 proposed FY 2019 ISR budget to include a metering pilot program.
  - 11 • On December 21, 2017, the Company filed its Electric Infrastructure, Safety, and  
12 Reliability Plan FY 2019 Proposal which included preliminary budget adjustments  
13 resulting from discussions with PowerServices and the Division. The Company  
14 recognized in its filing that although proposed spending levels were recommended by  
15 the Division, consensus on the full Plan had not been reached, and further, that the  
16 Division reserved its right to continue reviewing the Plan after filing and propose  
17 further adjustments or conditions as part of the ISR proceeding,
  - 18 • On December 26, 2017, PowerServices provided Data Request No. 4,
  - 19 • On January 16, 2018, the Company provided responses to Data Request No. 4  
20 (labeled as Division Data Requests-Set1),
  - 21 • On January 25, 2018, PowerServices provided Data Request No. 5 (labeled Data  
22 Request Set III), and
  - 23 • On February 20, 2018 the Company provided responses to Data Request No. 5  
24 (labeled Data Request Set III).

1 The following charts summarize the adjustments by category and the preliminary  
 2 agreement reached between the Division and National Grid, which are represented in  
 3 National Grid's December 21, 2017 filing:  
 4

<b>PROPOSED BUDGET by Spending Rationale</b>	<b>NG Initial Proposed Budget (9-29-17)</b>	<b>Preliminary Adjustment</b>	<b>Proposed FY2019 (12-21-17)</b>
Customer Request/Public Requirements	\$ 18,757,000	\$ 248,000	\$ 19,005,000
Damage/Failure Total	\$ 14,174,000	\$ (500,000)	\$ 13,674,000
<b>Subtotal</b>	<b>\$ 32,931,000</b>	<b>\$ (252,000)</b>	<b>\$ 32,679,000</b>
Asset Condition	\$ 33,467,000	\$ (3,699,000)	\$ 29,768,000
Non-Infrastructure	\$ 556,000	\$ -	\$ 556,000
System Capacity and Performance	\$ 47,446,000	\$ (1,682,000)	\$ 45,764,000
<b>Subtotal</b>	<b>\$ 81,469,000</b>	<b>\$ (5,381,000)</b>	<b>\$ 76,088,000</b>
<b>Grand Total</b>	<b>\$ 114,400,000</b>	<b>\$ (5,633,000)</b>	<b>\$ 108,767,000</b>

<b>VEGETATION MANAGEMENT Proposed Budget</b>	<b>NG Initial Proposed Budget (9-29-17)</b>	<b>Preliminary Adjustment</b>	<b>Proposed FY2019 (12-21-17)</b>
Cycle Pruning	\$ 6,150,000	\$ -	\$ 6,150,000
Hazard Tree	\$ 1,250,000		\$ 1,250,000
Sub-T	\$ 325,000		\$ 325,000
Police/Flagman Detail	\$ 850,000		\$ 850,000
All Other Activities	\$ 1,225,000		\$ 1,225,000
<b>Program Total</b>	<b>\$ 9,800,000</b>	<b>\$ -</b>	<b>\$ 9,800,000</b>

1 **IV. COMMENTS ON WITNESS TESTIMONY**

2 **Q. HAVE YOU REVIEWED THE PRE-FILED TESTIMONY OF PRABHJOT S.**  
3 **ANAND AND RYAN A. MOE?**

4 A. Yes.

5 **Q. WOULD YOU PROVIDE ANY COMMENTS YOU HAVE IN REGARD TO THE**  
6 **FILED TESTIMONY OF THESE TWO WITNESSES?**

7 A. Yes. The testimony of Mr. Anand and Mr. Moe accurately reflects the FY 2019 ISR  
8 Plan, for which the Division and PowerServices reached preliminary concurrence  
9 regarding what an appropriate balance between system reliability and cost would be to  
10 enable National Grid to maintain a safe and reliable electric distribution system for its  
11 Rhode Island customers. A thorough evaluation of the Company's FY 2017 ISR Plan  
12 quarterly reports, FY 2019 ISR Pre-Plan Information, and responses to data requests was  
13 performed. The materials evaluated included reliability reports, budget variance  
14 explanations, program cost benefit analysis, detailed budgets for major projects, and other  
15 supplemental information to support both ongoing programs and individual projects.  
16 Although this process ultimately resulted in the Division and the Company reaching  
17 agreement on select adjustments, consensus on the full Plan was not reached.  
18 Accordingly, the Division reserved its right to propose further adjustments or conditions  
19 as part of the ISR Plan proceeding. The South Street Substation was the dominant project  
20 in the past, but is now reaching its conclusion. The Aquidneck Island project and  
21 associated substations now comprise a significant portion of the FY 2019 ISR Plan  
22 budget, and will for several years. An Advisory Opinion 22590) on the Aquidneck Island  
23 Reliability project in Docket No. 4614 was issued on November 2, 2016. I continue to  
24 withhold support of new System Capacity or Asset Replacement projects until supported

1 by an Area Study as part of the Company's Long Range Plan process. I observed that the  
2 Company has not satisfactorily produced Area Studies in a timely manner, and I also  
3 recommended several improvements to the three of ten Area Studies. These three  
4 completed studies represent approximately 50% of the Company's load in Rhode Island.  
5 A major deficiency with the Company's project evaluation process is the lack of  
6 sufficient Non-Wires Alternatives ("NWA") analysis. This was discussed at length  
7 during the 2018 ISR Plan process, and again with this 2019 ISR Plan. In addition, several  
8 discretionary programs and projects have been delayed by the Company to the point that  
9 rationale, scope and cost should be updated given the lag in completion. The Company is  
10 addressing this going forward. The Company has developed in cooperation with the  
11 Division a revised study documents to include standard components for analysis and a  
12 more comprehensive executive summary. The NWA analysis details and cost benefit  
13 analysis work product lacks completeness. The Company still appears to be reluctant to  
14 embrace the NWA process.

15  
16 Most importantly, it has become apparent that the Company's overall planning process  
17 lacks transparency and cohesiveness, particularly the relationship between the  
18 Company's Design Criteria, SRP, Area Studies, and NWA options. In addition, project  
19 alignment with the Company's grid modernization strategy is becoming increasingly  
20 important, but is uncertain under the current planning process. To support a coordinated,  
21 transparent and proactive planning approach, I recommended that the Company develop  
22 an alignment among the multiple processes currently implemented, and the many  
23 initiatives which have been and are continuing to add to the capital requirements and  
24 ongoing O&M expenses within the ISR Plan.

1 **V. REPORT SUMMARY**

2 **Q. PLEASE BRIEFLY SUMMARIZE YOUR REPORT ATTACHED AS *EXHIBIT***  
3 ***GLB-1*.**

4 A. The report contains an Introduction describing the overall process and summarizing the  
5 adjustments, which resulted in a preliminary consensus for the FY 2019 ISR Plan  
6 Proposed Budget of \$108.8 million for capital items and proposed a Vegetation  
7 Management Program expense budget of \$9.8 million. The *Exhibit GLB-1* report section  
8 on the Capital Investment Plan discusses in detail each major category: Customer  
9 Request/Public Requirements; Asset Condition; Non-Infrastructure; System Capacity and  
10 Performance; Vegetation Management; and Inspection and Maintenance expenses,  
11 outlining the issues considered, the adjustments proposed, and the reasoning for the  
12 adjustments as accepted by National Grid. A detailed summary chart contained in  
13 *Exhibit GLB-1* as Appendix-3 shows each Spending Rationale and Budget Class with the  
14 September 29, 2017 initial proposed budget, net adjustments, preliminary budget, and the  
15 December 21, 2017 Filed Proposed Budget.

16  
17 The report contains a conclusion which addresses the FY 2019 ISR Plan Proposal Budget  
18 as filed by National Grid on December 21, 2017. The conclusion includes eleven (11)  
19 recommendations related to the capital investment, O&M, and vegetation management  
20 portions of the ISR Plan. Emphasis remains on the need for the Company to complete  
21 System Capacity Area Studies and utilize a Long Range Plan to support major projects.  
22 Specific recommendations arising from this FY 2019 ISR Plan evaluation include the  
23 need to develop an alignment between various planning and project evaluation processes,  
24 including a SRP, DSP, the Heat Maps and a grid modernization strategy. Additionally,

1           the Company should revise current and future study documents, taking into account  
2           robust evaluation metrics that include NWA where applicable.

3

1 **VI. CONCLUSION**

2 **Q. DO YOU AND THE DIVISION SUPPORT THE NATIONAL GRID FY 2019**  
3 **ELECTRIC ISR PLAN PROPOSAL FOR \$108.8 MILLION IN BUDGETED**  
4 **CAPITAL EXPENDITURES, WITH \$9.8 MILLION IN VEGETATION**  
5 **MANAGEMENT EXPENSES AND \$2.6 MILLION IN INSPECTION AND**  
6 **MAINTENANCE EXPENSES?**

7 A. Preliminary agreement was reached on several cost components, but the Division  
8 reserved its right for additional adjustments or conditions pending further evaluation. A  
9 five percent (5%) decrease in the Company's initially proposed capital budget was  
10 proposed.

11 **Q. WHAT ARE THE RECOMMENDATIONS YOU HAVE MADE IN YOUR**  
12 **REPORT *EXHIBIT GLB-1*?**

13 A. The eleven (11) recommendations related to capital investment and vegetation  
14 management I have provided in my *Exhibit GLB-1* report are summarized in the  
15 following list, and are provided with additional discussion in the Summary and  
16 Recommendations section of my report.

- 17 1. National Grid shall develop an alignment between various planning and project  
18 evaluation processes, with consideration as to how a grid modernization strategy may  
19 be incorporated. This includes, but is not limited to, the SRP, Area Studies, ISR Plan,  
20 NWA options and internal Design Criteria.
- 21 2. National Grid shall propose a methodology to revise current and future study  
22 documents supporting Asset Replacement and System Capacity programs or projects  
23 as applicable to include, at minimum:

- 1           • The traditional elements included in the Company’s current studies including,  
2           but not limited to, purpose and problem statement, scope and program  
3           description, condition assessment/criticality rankings, alternatives considered,  
4           solution, cost and timeline.
- 5           • Discussion on the impact to related Company initiatives, PUC programs, the  
6           various pilot projects, or other requirements driven by SRP, DSP, Heat Maps,  
7           and emerging initiatives.
- 8           • A detailed comparison of recommendations to Area Studies to determine if  
9           solutions are aligned with study outcomes, noting adjustments required to  
10          avoid redundancy in planning.
- 11          • An evaluation of potential incremental investments that support the Company’s  
12          long term grid modernization strategy. This includes description of technology  
13          or infrastructure investment, cost benefit to traditional safety and reliability  
14          objectives, and additional operational benefits achieved if implemented.
- 15          • A robust NWA evaluation for projects passing initial screening that clearly  
16          identifies alternatives considered, costs, and benefits.
- 17          3. National Grid shall continue to develop a System Capacity Load Study and a 10-year  
18          Long Range Plan in order to increase the level of support and transparency for the  
19          capital budget. The Company shall submit and present the outcome of Area Studies to  
20          the Division and its consultant at the time of completion. These studies shall include a  
21          separate Non-Wire Alternative analysis of the projects consistent with the  
22          requirements of other program commitments. The Company shall submit a report  
23          with updates on modeling activities and Area Study status at least 120 days prior to  
24          filing its FY 2020 ISR Plan Proposal, but in any event no later than August 31, 2018.

- 1           4. National Grid shall manage major Asset Replacement and System Capacity &  
2           Performance project budgets separate from other discretionary projects, such that any  
3           budget variances (underspend) will not be utilized in other areas of the ISR Plan. The  
4           Company shall provide quarterly budget and project management reports.
- 5           5. National Grid will continue to manage (underspend/overspend management)  
6           individual project costs within the ISR Plan discretionary category (comprised of  
7           Asset Condition and System Capacity and Performance projects), such that total  
8           portfolio costs are aligned within a discretionary budget target that excludes major  
9           substation projects.
- 10          6. National Grid shall continue to provide quarterly reporting on Damage/Failure  
11          expenditures to include the details of completed projects by operating region. The  
12          Company will separately identify Level I projects repaired as a result of the I&M  
13          program.
- 14          7. National Grid shall continue to provide a detailed budget for System Capacity &  
15          Performance and Asset Condition in order to provide transparency on a project level  
16          basis for the current and future 4-year period. The budget shall be provided in  
17          advance of the FY 2020 ISR Plan Proposal filing, but in any event no later than  
18          August 31, 2018.
- 19          8. National Grid shall submit an evaluation of future proposed Asset Condition projects  
20          as compared to the Company's Long Range Plan in advance of the FY 2020 ISR Plan  
21          Proposal filing, but in any event no later than August 31, 2018.
- 22          9. National Grid shall continue to submit its detailed substation capacity expansion  
23          plans and load projections, and include an evaluation of proposed projects against the

1           Company's Long Range Plan, in advance of the FY 2020 ISR Plan Proposal filing,  
2           but in any event no later than August 31, 2018.

3           10. National Grid shall continue to submit a cost-benefit analysis on the Vegetation  
4           Management Cycle Clearing Program and a separate cost-benefit analysis on the  
5           Enhanced Hazard Tree Management program for the Division's review prior to  
6           submitting the Company's FY 2020 ISR Plan Proposal, but in any event no later than  
7           August 31, 2018.

8           11. National Grid shall continue to submit its Metal-Clad Switchgear replacement  
9           program cost-benefit analysis to the Division prior to submitting the Company's FY  
10          2020 ISR Plan Proposal to the extent any Metal-Clad Switchgear replacements or  
11          major upgrades are proposed, but in any event no later than August 31, 2018.

12   **Q.    DOES THIS CONCLUDE YOUR TESTIMONY?**

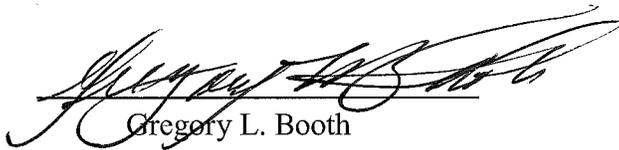
13   **A.    Yes.**

**AFFIDAVIT OF GREGORY L. BOOTH, PE**

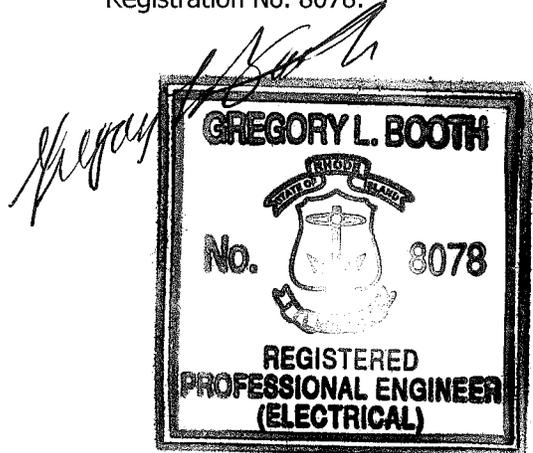
Gregory L. Booth, does hereby depose and say as follows:

I, Gregory L. Booth, on behalf of the Rhode Island Division of Public Utilities and Carriers, certify that testimony, including information responses, which bear my name was prepared by me or under my supervision and is true and accurate to the best of my knowledge and belief.

Signed under the penalties of perjury this the 21<sup>st</sup> day of February, 2018.

  
Gregory L. Booth

I hereby certify this document was prepared by me or under my direct supervision. I also certify I am a duly registered professional engineer under the laws of the State of Rhode Island, Registration No. 8078.



Gregory L. Booth, PE

**EXHIBIT GLB-1**

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
PUBLIC UTILITIES COMMISSION**

**REPORT OF**

**Gregory L. Booth, PE, President  
PowerServices, Inc. d/b/a PowerServices and Consulting, Inc.  
On Behalf of Rhode Island Division of Public Utilities and Carriers  
Concerning  
The Narragansett Electric Company d/b/a National Grid's Proposed  
FY 2019 Electric Infrastructure, Safety, and Reliability Plan  
Docket No. 4783**

**February 21, 2018**

Prepared By:  
Gregory L. Booth, PE  
1616 E. Millbrook Road, Suite 210  
Raleigh, NC 27609  
(919) 256-5901 or (919) 441-6440  
gbooth@powerservices.com

## ***PREFACE***

*PowerServices, Inc. was engaged by the State of Rhode Island Division of Public Utilities and Carriers (“RIDPUC”) to evaluate the Electric Infrastructure, Safety and Reliability (“ISR Plan” or “Plan”) Plan FY 2019 Proposal submitted by National Grid. As part of the review of the plan, numerous data requests were submitted and responses provided by National Grid. Additionally, meetings and conferences were held with National Grid and their key personnel involved in the development of the Plan. The Legislative Act amending Chapter 39-1 “Revenue decoupling”, 39-1-27.7.1, provided National Grid the right to file an ISR Plan and receive considerations for the Plan. The statute provides for evaluation by the Division, and for National Grid and the Division to attempt to reach an agreement on a proposed plan and submit a mutually agreed upon Plan. The following report describes the process and position reached between the Division and National Grid.*

**EXHIBIT GLB-1  
REPORT OF GREGORY L. BOOTH, PE**

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**REPORT OF**

**Gregory L. Booth, PE, President  
PowerServices, Inc. d/b/a PowerServices and Consulting, Inc.  
On Behalf of Rhode Island Division of Public Utilities and Carriers  
Concerning  
The Narragansett Electric Company d/b/a National Grid's Proposed  
FY 2019 Electric Infrastructure, Safety, and Reliability Plan  
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# **EXHIBIT GLB-1**

## **REPORT OF GREGORY L. BOOTH, PE**

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### **I. INTRODUCTION**

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PowerServices, Inc. ("PowerServices"<sup>1</sup>) was engaged by the Rhode Island Division of Public Utilities and Carriers ("Division") to assist in the evaluation of the initial National Grid Electric Infrastructure, Safety, and Reliability Plan FY 2019 Proposal (the "ISR Plan" or "Plan") dated September 29, 2017, and the final Electric Infrastructure, Safety, and Reliability Plan FY 2019 Proposal dated December 21, 2017 and filed in Docket 4783. The evaluation followed the same process of analysis completed for each ISR Plan filed from FY 2012 through FY 2018. This Report will include an explanation of the process for the initial FY 2019 ISR Plan proposal evaluations and collaborative efforts, resulting in a preliminary reduction of proposed FY 2019 capital spending in several areas, including Customer Request/Public Requirements, capital expenses for asset replacement and load relief projects, and for a newly proposed advanced metering infrastructure pilot project. The reductions were applied to the proposed spending levels in the Company's initial FY 2019 ISR Plan Proposal submitted to the Division September 29, 2017, and are reflected in the subsequent ISR Plan Proposal dated December 21, 2017.

This process, as provided for in Chapter 39-1-27.7.1 of the General Laws entitled "Revenue Decoupling", is for the Company, prior to the start of each fiscal year, to submit its ISR spending plan and consult with the Division regarding said Plan. The Division is also bound by statute to "cooperate in good faith to reach an agreement on a proposed plan." Although this process ultimately resulted in the Division and the Company reaching agreement on select adjustments, consensus on the full Plan was not reached. Accordingly, the Division reserved its right to propose further adjustments or conditions as part of the ISR Plan proceeding. In this report, I will

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<sup>1</sup> For the purposes of this report, reference to "PowerServices", "I", and "my" are interchangeable.

## **EXHIBIT GLB-1**

### **REPORT OF GREGORY L. BOOTH, PE**

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discuss the areas of consensus between the Division and Company, as well as areas of evaluation that are continuing after the Company filed its proposed Electric ISR Plan in Docket No. 4783. This includes an in depth assessment of the Company's justification for projects included in the Plan, their efforts to identify non-wires alternatives (NWA), and the Division's ongoing concern that the Company lacks cohesion and transparency in their multiple planning activities.

The Company's initial proposed September 29, 2017 FY 2019 ISR Plan followed very closely the format and principals agreed to in previous Plans. Most of the Company's budget line items were structurally similar to the previous Plans with modifications in the cost structure. PowerServices performed its evaluations by reviewing the Company's pre-plan information along with the proposed ISR Plan. The pre-plan information is guided by Division recommendations, and the Rhode Island Public Utilities Commission Report and Order from prior ISR proceedings. The materials evaluated included reliability reports, budget variance explanations, program cost benefit analysis, detailed budgets for major projects, completed Area Studies, and other supplemental information. The Company's quarterly updates for the FY 2018 ISR Plan were also utilized to provide trending analysis and benchmarks for proposed levels of spending. An in-depth analysis of the pre-plan information and each component of the proposed FY 2019 ISR Plan was undertaken. The evaluation and analysis process was performed, including the following actions and procedures:

1. A July 27, 2017 conference was held between the Division, PowerServices, and the Company to discuss the Area Studies, and how the ISR Plan, Heat Map, SRP and DSP are all coordinated,
2. An August 31, 2017 meeting (Appendix-1 contains the Agenda for this meeting) was held between the Division, PowerServices and the Company, to discuss the planning

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process and the reports provided by National Grid in advance of the FY 2019 ISR Plan filing (“Pre-Plan Information”),

3. September 29, 2017, the Company filed the initial FY 2019 ISR Plan Proposal
4. PowerServices evaluated the Pre-Plan Information and proposed ISR Plan, and on October 19, 2017 provided Data Request No. 1 which was served on the Company with the Division’s Data Request No. 2,
5. On November 8 and November 14, 2017, the Company provided responses to Data Request No. 1,
6. On November 15, 2017, the Company provided responses to Data Request No. 2,
7. On November 16, 2017, PowerServices provided Data Request No. 3,
8. On December 1, 2017, the Company provided responses to Data Request No. 3,
9. On December 6, 2017, the Division, PowerServices, and the Company discussed the budget and details concerning AMI expectations, VVO programs, distributed generation impact, 3VO additions, and the other budget issues, including the vault program.
10. On December 11, 2017, PowerServices provided preliminary ISR adjustments excluding the proposed metering pilot program.
11. On December 12, 2017, The Division, PowerServices and National Grid held a conference call to discuss details of the metering pilot program.
12. On December 13, 2017, National Grid provided a revised scope and proposed budget for the metering pilot program. The Division, PowerServices and National Grid held a conference call to discuss all other adjustments. Consensus was reached on a proposed FY 2019 ISR budget to include a metering pilot program.
13. On December 21, 2017, the Company filed its Electric Infrastructure, Safety, and Reliability Plan FY 2019 Proposal which included preliminary budget adjustments

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resulting from discussions with PowerServices and the Division. The Company recognized in its filing that although proposed spending levels were recommended by the Division, consensus on the full Plan had not been reached, and further, that the Division reserved its right to continue reviewing the Plan after filing and propose further adjustments or conditions as part of the ISR proceeding,

14. On December 26, 2017, PowerServices provided Data Request No. 4,
15. On January 16, 2018, the Company provided responses to Data Request No. 4 (labeled as Division Data Requests-Set1),
16. On January 25, 2018, PowerServices provided Data Request No. 5 (labeled Data Request Set III), and
17. On February 20, 2018 the Company provided responses to Data Request No. 5 (labeled Data Request Set III).

The overall analysis was an iterative process, which included detailed discussions of each ISR Plan spending rationale category, including Capital Expenditures, the VM Plan and the Inspection and Maintenance ("I&M") Plan. The Company included each of its area experts in the discussions as we worked toward preliminary adjustments in the proposed FY 2019 Plan. This series of meetings, telephone conferences and data requests were utilized in discussions with various individuals in the Company to provide full assessment and gain clarification in each area. The formal data requests and responses referred to above, excluding those that are considered confidential or critical energy infrastructure information, are to be submitted to the Commission by National Grid.

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The structure of the FY 2019 ISR Plan filing closely followed the FY 2018 ISR Plan to the extent that the Company has included several of its historic annual programs. The Company continued to incorporate key changes noted in the prior filings, including migration of substation flood mitigation programs to an overall substation capacity enhancement and reliability program and incorporation of an Inspection & Maintenance Program to replace the phased out Feeder Hardening Program. The FY 2019 Plan continued the trend of significant discretionary spending levels for major construction, including the remaining portion of South Street substation rebuild and commencement of Southeast substation and Aquidneck Island related projects. The FY 2019 Plan is transitional since it includes a blend of residual capital projects previously identified by the Company, and a series of new projects emanating from completed Area Studies. As the residual capital projects are completed, the Plan should only include those new major substation projects or large programs that have been demonstrated to be necessary in a completed and fully presented Area Study. In addition, the Company is proposing an advanced metering infrastructure (“AMI”) pilot within the ISR budget that is addressed separately from this report.

Through the analysis and assessment process, consensus on the rationale for adjustments and the preliminary dollar levels was reached between the Division and the Company, although the Division reserved its right for additional adjustments or conditions pending further evaluation. The quarterly reports<sup>2</sup> were among the items utilized by the Company, the Division, and PowerServices in reaching a consensus on the preliminary adjustments. These reports compare the prior fiscal year ISR Plan proposed budgets to forecasted expenditures, as reflected in Appendix-2, along with historical budgets by spending category. There was customary

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<sup>2</sup> For this report, PowerServices referenced the Docket 4682 – National Grid’s Electric Infrastructure, Safety, and Reliability Plan Quarterly Update - Second Quarter Ending September 30, 2017 (for FY 2018 dated November 16, 2017)

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discussion concerning correlations between the Damage/Failure, I&M and Asset Replacement program costs. Additionally, substantial discussions addressed major System Capacity and load relief projects, delays in completing Area Studies, and the Company's efforts to evaluate non-wires alternatives. I address the Company's NWA evaluation process and associated Area Studies in this report.

Historically, the Division and Company have reached consensus on proposed spending levels in all ISR categories. The FY 2019 Plan evaluation is similar to the FY 2018 Plan, however, in that preliminary agreement was reached on several adjustments but the Division withheld full consensus pending further evaluation. The need for additional review continues to be driven by the Company's delay in completing and presenting required Area Studies as part of a comprehensive Long Range Plan. Beginning with the FY 2015 ISR proceeding, I have consistently demonstrated the need for Long Range Plans to justify Asset Replacement and System Capacity & Performance projects. The Company proposed performing the studies by geographic region. As of the end of 2017, three of ten regional Area Studies have been completed (East Bay, Providence and Central Rhode Island East). Each study results in a series of multi-year projects, either compelled by asset condition or system capacity needs. Several Area Study projects are now incorporated in the ISR Plan, but there remains a lack of confidence in the Company's efforts to perform robust NWA evaluations that could defer or eliminate the need for these traditional grid investments. Moreover, there are seven remaining regions to be studied, making it difficult to support the timing and sequence of proposed projects when a later study may reveal more critical needs for capital investment.

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For the FY 2019 Plan, agreement was reached on adjustments, but the Division withheld full consensus pending further evaluation. Appendix-3 lists a Summary of the Capital Outlays by key driver category and budget classification, as originally proposed by the Company on September 29, 2017, with net adjustments listed. Following is a detailed discussion of the categories and preliminary adjustments included in the Company's ISR Plan filing, in addition to observations and conditions recommended by the Division.

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**II. CAPITAL INVESTMENT PLAN**

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A. Overview

I have evaluated the \$108.8 million FY 2019 Capital Spending Plan proposed by the Company, along with its supporting testimony and exhibits as contained in its filing dated December 21, 2017. I first reviewed the initial proposed ISR Plan submitted to the Division dated September 29, 2017 in the amount of \$114.4 million. Over a period of approximately eleven (11) weeks, there was an iterative process in which modifications to the Company's original proposed Capital Spending Plan were discussed. Although full consensus was not reached, preliminary adjustments were accepted for each of the Spending Rationales and the five (5) major categories. The following Table 1 is a comparison of the Company's initial filed proposal on September 29, 2017, preliminary net adjustments, and the Company's proposed budget as shown in Chart 7 of the FY 2019 ISR Plan as filed on December 21, 2017 in Docket No. 4783. The \$108.8 million is the preliminary level reached through the evaluation process.

**Table 1: Proposed FY 2019 ISR Capital Outlays by Key Driver Category**

<b>PROPOSED BUDGET by Spending Rationale</b>	<b>NG Initial Proposed Budget (9-29-17)</b>	<b>Preliminary Adjustment</b>	<b>Proposed FY2019 (12-21-17)</b>
Customer Request/Public Requirements	\$ 18,757,000	\$ 248,000	\$ 19,005,000
Damage/Failure Total	\$ 14,174,000	\$ (500,000)	\$ 13,674,000
<b>Subtotal</b>	<b>\$ 32,931,000</b>	<b>\$ (252,000)</b>	<b>\$ 32,679,000</b>
Asset Condition	\$ 33,467,000	\$ (3,699,000)	\$ 29,768,000
Non-Infrastructure	\$ 556,000	\$ -	\$ 556,000
System Capacity and Performance	\$ 47,446,000	\$ (1,682,000)	\$ 45,764,000
<b>Subtotal</b>	<b>\$ 81,469,000</b>	<b>\$ (5,381,000)</b>	<b>\$ 76,088,000</b>
<b>Grand Total</b>	<b>\$ 114,400,000</b>	<b>\$ (5,633,000)</b>	<b>\$ 108,767,000</b>

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The Company projects the need for non-discretionary expenditures of \$19.0 million in Customer Request/Public Requirements spending, and \$13.7 million in Damage/Failure spending. The non-discretionary budget is approximately thirty (30%) of the ISR Plan Capital requirements, and thirteen percent (13%) lower than the FY 2018 budget. Except for known major projects, the majority of projects in the Customer Request/Public Requirements category are not precisely defined but are based on the Company's best forecast, since specific customer requests have not been made. The Damage/Failure category covers costs to replace equipment that unexpectedly fails or becomes damaged. Historical spending levels tend to serve as the primary method to develop a budget. Additionally, economic conditions are a factor considered in adjusting historical costs. There are both upward and downward trends in new construction activity combined with the effects of inflation on the cost of raw materials, transportation, and labor. For these reasons, it is reasonable that the Customer Request/Public Requirements will trend upward over time and, absent identification of major projects, incremental annual increases are expected.

It is anticipated that the Damage/Failure category will be similarly influenced by inflation costs, but that total spend would eventually taper once the system is fully inspected and major system projects and asset replacements under the I&M program are completed. This expectation has not fully materialized. In fact, spending in the Damage/Failure category has achieved a steep incline in spending, rising from \$7.8 million to \$13.7 million between FY 2013 and FY 2019. The upward trend in costs is influencing the overall non-discretionary category, which has historically exceeded annual targets. PowerServices continues to closely evaluate this trend and individual projects to ensure that the Company is not incorporating

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work in the Damage/Failure category that that is normally captured under I&M expenses. Overall, the Company agreed to a preliminary adjustment of \$500,000 to Damage/Failure category, and is proposing to spend a total of \$32.7 million for all non-discretionary projects. I will discuss the Damage/Failure category and cost trends for non-discretionary spending in more detail in Section C.

The remaining three (3) major categories of spending rationale for the FY 2019 budget are Asset Condition, Non-Infrastructure, and System Capacity and Performance. These categories, which are discretionary in the sense they are based on engineering, safety, reliability and economic analyses, are budgeted at \$76.1 million for the remaining seventy percent (70%) of the proposed capital budget. One major project, South Street rebuild, is nearing completion and is budgeted for less than \$4 million as compared to the FY 2018 expected spend of \$23.4 million. Offsetting reductions due to the completion of South Street are additions of major projects in the Aquidneck Island/Newport Area which are budgeted at \$21.5 million in FY 2019. The Company is managing major capital projects separately from other discretionary projects in accordance with recommendations in the FY 2017 ISR proceeding. The Company is also continuing to perform individual Area Studies as part of a Long Range Plan, which was first recommended in the FY 2015 proceeding. Delivery of the studies continues to fall short of the Division's expected schedule, with only three of ten Area Studies (East Bay, Providence, and Central Rhode Island East) completed by the end of 2017. My overall evaluation considers the delays in Areas Studies and the Company's prior commitment to include in the ISR Plan only those future projects that are supported by system studies.

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For the three categories (Asset Condition, Non-Infrastructure, and System Capacity and Performance), the initial proposed budget was \$81.5 million, which has been adjusted down to \$76.1 million in the FY 2019 ISR Plan Proposal filing based on the preliminary agreement between the Division, PowerServices, and the Company. In Sections D, E, and F, I will discuss each of these categories separately, explaining the overall reduction and budget management conditions expected of the Company. I will also compare the FY 2019 ISR proposal to historical budgets and actual expenditures to provide trending analysis for discretionary categories.

**B. Customer Request/Public Requirements Category**

The initial proposed FY 2019 ISR Plan included \$19.0 million of Customer Request/Public Requirements cost. This compares to a FY 2018 ISR budget and forecast of \$19.5 million and \$19.8 million respectively.

<b>Proposed Budget</b>	<b>NG Initial Proposed Budget (9-29-17)</b>	<b>Preliminary Adjustment</b>	<b>Proposed FY2019 (12-21-17)</b>
Customer Request/Public Requirements	\$ 18,757,000	\$ 248,000	\$ 19,005,000

<b>Budget Variance</b>	<b>Filed FY2018</b>	<b>Over/(Under) Budget</b>	<b>FY2018 Forecast (as of 11/16/17)</b>
Customer Request/Public Requirements	\$ 21,853,000	\$ (5,641,000)	\$ 16,212,000

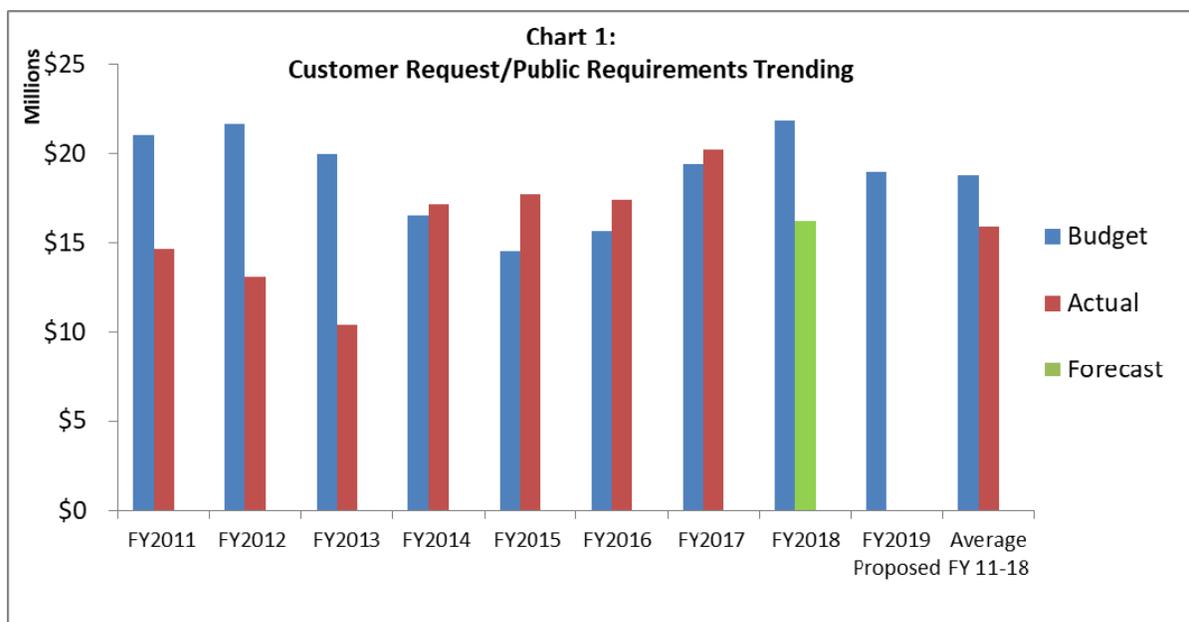
The Company expects a significant underspend in FY 2018 driven by customer reimbursements as highlighted in the Company’s quarterly update filing:

- Distributed Generation projects have a credit of \$2.6 million, which results in a total under-budget balance of \$3.7 million. This variance was driven primarily by the Company’s collection of reimbursements for prior and future capital spending on projects.

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- New Business Residential and Commercial projects are a combined \$3.2 million under-budget. This under-budget variance was also driven by capital spending on the liquefied natural gas (LNG) Plant service terminal in Providence, which was under-budget FY 2018 YTD by approximately \$2.7 million. This variance was due to a reimbursement the Company received in FY 2018, which the Company expected in FY 2017.

As shown in Chart 1 below, the Company has, on average, historically underspent in this category.



The FY 2019 proposed budget is consistent with historical average spend, although approximately \$3 million higher than forecasted costs in FY 2018. The FY 2018 forecast is lower than budget due to the Company’s receipt of customer reimbursements that offset spend. Recognizing the need to fund residential and business driven expansions, no adjustments were recommended to the Customer Request/Public Requirements proposed budget outside of those changes provided by the Company during the course of our

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discussions. Although there are components of unplanned or emergent work in this category which the Company does not control, I will continue to examine projects to ensure that those performed for customers receive the appropriate Contribution in Aid of Construction (CIAC), and that the Company does not incur expenses that are otherwise the responsibility of a third party. To the extent that the Company does not reasonably incur expenses, we will recommend against recovery from ratepayers.

In summary, I agree with the proposed budget of \$19.0 million for the Customer Request/Public Requirements category, but recovery of costs absorbed by the Company that would customarily be assigned to third parties or the inclusion of projects within this category may be challenged in future evaluations.

C. Damage Failure Category

The initial proposed FY 2019 ISR Plan included \$14.1 million in the Damage/Failure category for non-discretionary costs to replace equipment that unexpectedly fails or becomes damaged. This compares to a FY 2018 ISR budget and forecast of \$11.4 million and \$13.8 million, respectively.

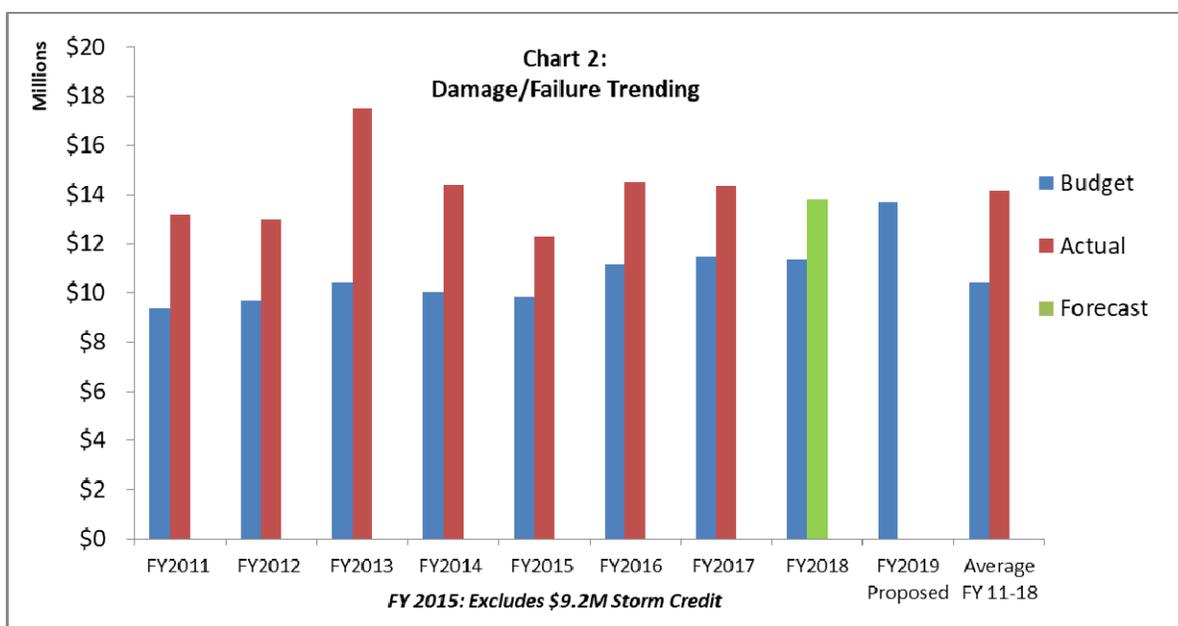
<b>Proposed Budget</b>	<b>NG Initial Proposed Budget (9-29-17)</b>	<b>Preliminary Adjustment</b>	<b>Proposed FY2019 (12-21-17)</b>
Damage/ Failure (inc. Reserves + Storms)	\$ 14,174,000	\$ (500,000)	\$ 13,674,000

<b>Budget Variance</b>	<b>Filed FY2018</b>	<b>Over/(Under) Budget</b>	<b>FY2018 Forecast (as of 11/16/17)</b>
Damage/ Failure (inc. Reserves + Storms)	\$ 11,379,000	\$ 2,409,000	\$ 13,788,000

The Company continues to incur expenses over budget in this category with an overall FY 2018 variance projected at \$2.4 million. A more granular analysis indicates that major storms, which are unpredictable, are not a contributing factor in FY 2018. The Company

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considers work in this category unplanned by nature, and states that repairs are rising due to increased identification of work identified by local Operations. The budget is also impacted by large, single equipment failures, such as a substation transformer. The derivation of the budget is somewhat subjective, as equipment damage is unforeseen and levels of failure are generally based on historical trends. A review of related Damage/Failure budgets versus actual spending (Chart 2) indicates that the Company is now consistently overspending in this category.



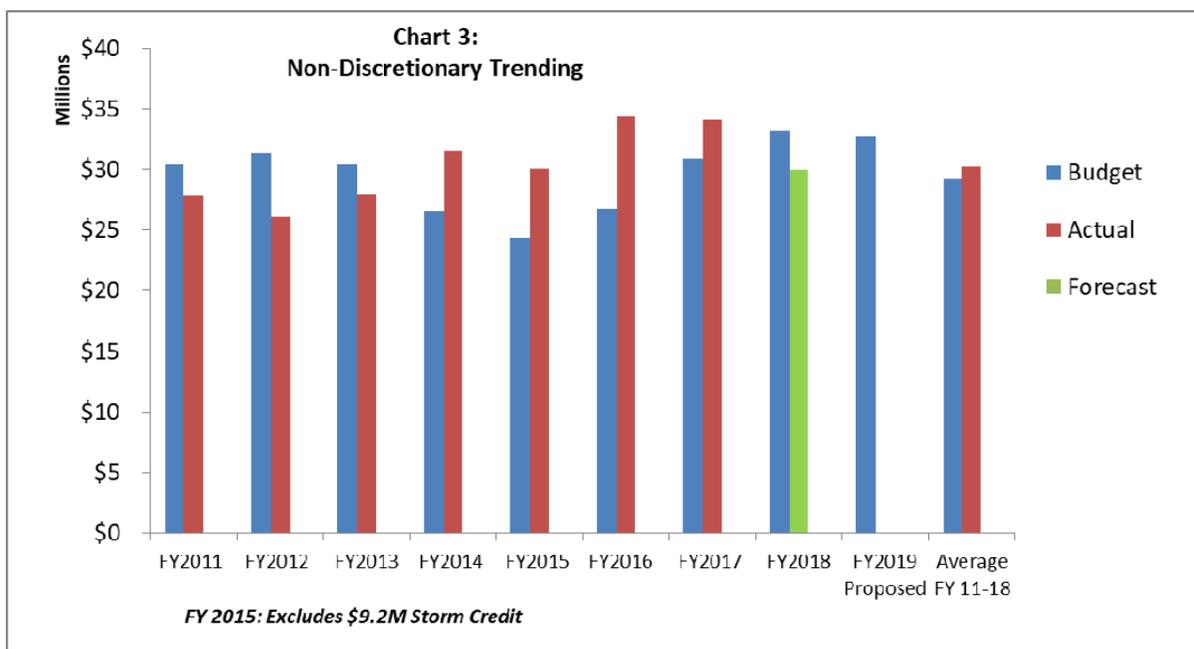
This trend of overspend has been recognized for several years and I continue to have several areas of concern, including whether the Company is accurately reflecting the type and level of work performed under the I&M program which influences the Damage/Failure expenses, and using appropriate methodologies to estimate the budget. To aid in ongoing evaluations, I recommended in my FY 2017 report, and the Company agreed, to provide quarterly reporting on Damage/Failure expenditures to include the details of completed projects by operating region. My examination of the Company's most recent Damage/Failure quarterly report does not raise concerns with project classification of spend, although the distribution line blanket

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work is over budget by \$1.7 million. A significant amount of that work is associated with underground cable and poles which is expected due to the aging infrastructure on the Company’s system. The Company reports that it monitors charges to the distribution blanket to minimize discretionary work from being incorrectly charged to the project.

Upon conclusion of the evaluation, I recommended a \$500,000 adjustment to align with historical budgets. No adjustments were recommended to the Major Storms budget within this category. The Company agreed, resulting in a final budget of \$13.7 million for Damage/Failure, including storm reserves. The Company will continue to augment quarterly reporting by including additional detail on spending within the Damage/Failure category.

This brings the total non-discretionary categories of Customer Request/Public Requirements and Damage/Failure to \$32.7 million, which is 30% of the total Capital Investment Budget by Key Driver Category. Chart 3 shows a comparison of historical spending versus budget.



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#### D. Asset Condition Category

The Asset Condition category represents a combination of strategies and programs targeting equipment replacement to maintain reliability performance. Spending is further divided into Asset Replacement and Inspection & Maintenance components. The I&M Program is a result of successful transition of previous Feeder Hardening, Feeder Health and associated Operation & Maintenance activities. The Asset Replacement program is generally a combination of major substation upgrade projects and programs designed to replace groups of equipment throughout the system. Projects and programs in the Asset Replacement category, which have become increasingly significant in scope and budget, span multiple years. This spending category has been dominated in the past three years by a single project for the South Street Substation upgrade in Providence. Due to the significant cost of South Street and pending large substation projects, I recommended, and the Company concurred, that major projects would be tracked independently of remaining projects in the Asset Condition category. Implementing this process serves multiple purposes. It provides transparency for project components, budget, and actual spending to ensure that the Company improves their planning process from inception to completion. It also mitigates the Company's tendency to shift budgets between discretionary projects in order to meet an overall target, rather than managing independent projects based on need.

Evaluation of the Asset Condition category separately considers major projects from remaining budget areas. Within the major projects category, South Street is the currently the most significant project subject to tracking. For the FY 2019 ISR Plan, the Company initially proposed a \$3.5 million budget for South Street, \$6.9 million for other major projects, \$20.4 million for Asset Replacement recurring projects, and \$2.7 million for the I&M program.

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The FY 2019 proposed total is \$33.5 million. This compares to the FY 2018 budget and forecasted actuals of \$42.7 million and \$42.6 million respectively. Discussions with the Company regarding Asset Replacement (major projects and recurring programs), and the I&M program resulted in adjustments of \$3.7 million, and a final proposed budget of \$29.8 million, which is twenty-seven percent (27%) of the overall ISR Plan budget. A detailed evaluation of each category is discussed below.

<b>Proposed Budget</b>	<b>NG Initial Proposed Budget (9-29-17)</b>	<b>Preliminary Adjustment</b>	<b>Proposed FY2019 (12-21-17)</b>
Asset Replacement - Major Projects			
South Street	\$ 3,500,000	\$ 220,000	\$ 3,720,000
Other	\$ 6,892,000	\$ (837,000)	\$ 6,055,000
Asset Replacement - Recurring Programs	\$ 20,375,000	\$ (2,082,000)	\$ 18,293,000
Asset Replacement - I&M	\$ 2,700,000	\$ (1,000,000)	\$ 1,700,000
Total Asset Condition	\$ 33,467,000	\$ (3,699,000)	\$ 29,768,000

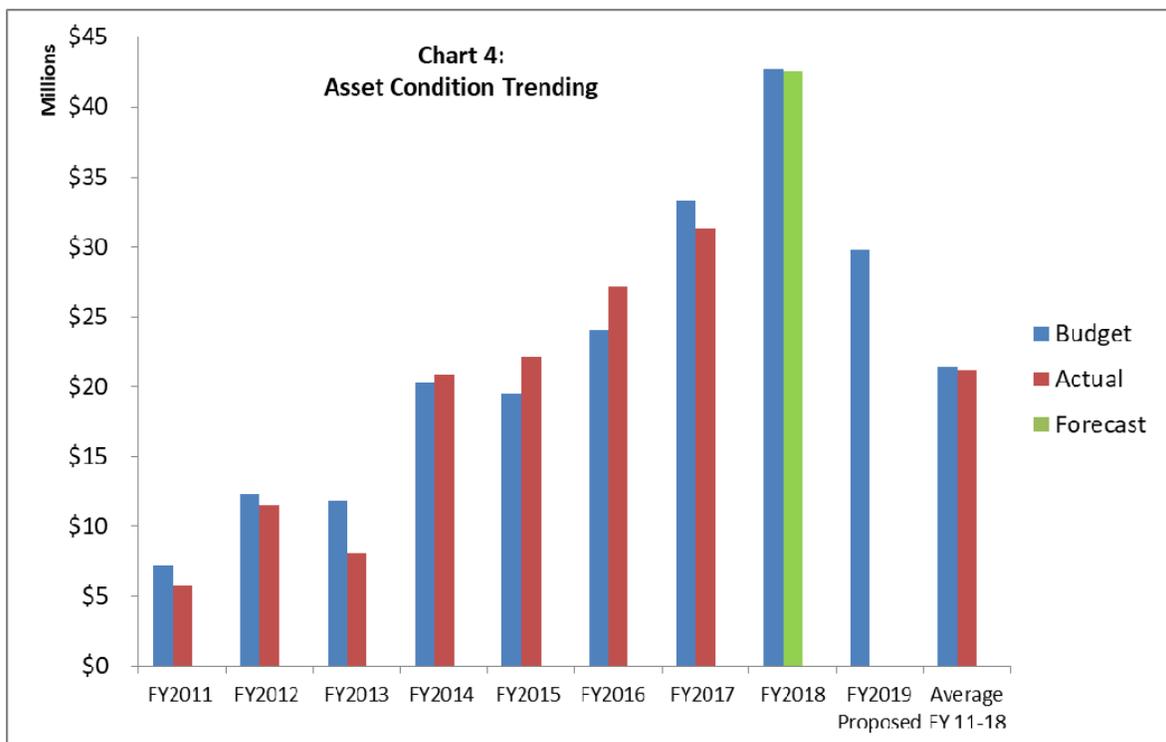
<b>Budget Variance</b>	<b>Filed FY2018</b>	<b>Over/(Under) Budget</b>	<b>FY2018 Forecast (as of 11/16/17)</b>
South Street	\$ 25,773,000	\$ (2,392,000)	\$ 23,381,000
Asset Replacement	\$ 15,371,000	\$ 2,070,000	\$ 17,441,000
Asset Replacement (I&M)	\$ 1,600,000	\$ 130,000	\$ 1,730,000
Total Asset Condition	\$ 42,744,000	\$ (192,000)	\$ 42,552,000

Asset Condition spend has steadily increased over my last four ISR Plan evaluations due to aging equipment throughout the service territory and the need for significant upgrades in highly loaded corridors. The South Street substation rebuild, estimated at \$55 million in total, has placed upward pressure on the Company's budget but is now nearing completion. Offsetting reductions from South Street are the addition of major projects, including Southeast substation and future Providence Area projects. The Company forecasts condition based major projects at nearly \$80 million over the next five years. A review of major projects along with asset replacement activities and I&M work (Chart 4) shows a dramatic increase in costs between FY 2016 and FY 2018, mostly driven by South Street. The proposed budget for FY 2019 is significantly less, and I anticipate that the Company will be

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able to achieve a more moderate level of future spend by improving the project estimating process and sequencing projects in accordance with Areas Studies rather than reacting to isolated system conditions. It should be emphasized that while major projects in the Asset Replacement budget category are trending down, the System Capacity project budgets are increasing which influences the Company's overall discretionary spend.



### 1. Asset Replacement - Major Projects

The South Street Substation rebuild is the Company's first significant Asset Replacement project. It started as an \$18 million project when originally sanctioned, and is now estimated at nearly \$59 million. The scope changes resulted from the location of the proposed work in concert with the need to coordinate with private development projects in Providence. Due to the complex scope and potential for wide budget variances, it was recommended that the Company reconcile and report on South Street progress as a

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separate Asset Condition category. The Company has complied and provides updates in its quarterly filings.

The Company forecasts that the South Street FY 2018 budget will be approximately \$2.4 million under budget, primarily due to lower overhead allocations than originally estimated. The project is nearing completion and the most recent quarterly report indicates that distribution cutover will begin in 2018 with complete demolition of the existing substation in September 2019. The FY 2019 proposed budget is \$3.5 million with a remaining \$1.8 million projected in FY 2020. Overall, evaluation of the South Street FY 2019 budget resulted in minimal changes. The Company proposed an adjustment which was found acceptable. This resulted in a final proposed budget of \$3.7 million dollars.

The Company is proposing additional major projects driven by asset condition. The majority are legacy projects that were previously considered for inclusion in the ISR (Southeast, flood related projects, and Dyer Street). Of these, Southeast substation is the most significant project with an estimated total cost of nearly \$20 million and an FY 2019 budget of \$2.7 million. The new station is planned to solve condition, safety and reliability issues with the Pawtucket No. 1 station constructed in 1907. This project is prioritized due to the age and condition of existing equipment, and continues to be supported in the ISR Plan. No adjustments were suggested for Southeast or other legacy projects except for deferral of one flood related project. It is recommended, however, that the Company track the Southeast project separately from other projects and provide

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quarterly updates on budget variances and project progress, similar to reporting provided for South Street.

The Asset Replacement category of the ISR Plan also includes condition-based projects identified in the Providence Area Study, which was completed in 2017. This is consistent with my recommendation that the Company would not add new major projects unless supported by an Area Study. The study considered the Providence urban area consisting of older, underground distribution facilities and indoor substations dating back to when the system was originally installed in the 1920's. The outcome of the study includes several area projects which are identified in the ISR Plan as Providence Study. The FY 2018 budget of \$1.1 million for Providence is allocated to engineering costs. The Company forecasts increasing annual budgets as scopes are refined and projects are sanctioned. No adjustments were made to Providence.

It is important to note that, other than South Street, no major projects are in construction in the Asset Replacement category. Prior to construction, projects progress through the Company's planning and budgeting phases. There are four levels of estimate grade accuracy starting with Investment grade at +200/-50% to Project grade at +10/-10%. In reviewing the Company's proposed major projects in the Asset Condition category, four of six projects have yet to reach a Project grade estimate (Table 2)

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**Table 2: Major Projects Estimation Grade Accuracy**

<b>South St Station Rebuild</b>	Construction : +/- 25%
<b>New Southeast Sub</b>	Engineering : +50% / -25%
<b>Flood - Westerly</b>	Early Engineering, Permitting, Procurement : +200%/-50%
<b>Flood - Warwick Mall Sub</b>	Ready to Schedule : +/- 10%
<b>Flood - Hope Substation</b>	Deferred
<b>Dyer Street - Indoor Sub</b>	Engineering : +50% / -25%
<b>Providence Study</b>	Not Yet Sanctioned - FY2019 is Engineer Study costs transfer only

This raises a continuing concern with the Company's estimating process and accuracy level. Projects in very early estimating stages within the ISR can reach as much as a 200% budget increase. Budget refinements are driven by scope changes which also impact project schedules. As with every ISR evaluation, I have highlighted my concern with the Company's failure to develop comprehensive and reasonably accurate capital project estimates and timelines. The Company's efforts in budgeting, scheduling, and reporting the South Street project is a positive step. However, I reiterate my previous recommendations that the Company refine its project estimates and schedules on the front end of the planning cycle, which should enable better success in managing annual targets in the future.

In summary, the major projects within the Asset Replacement category are a combination of legacy and Area Study projects. South Street, which has dominated the budget in recent years, is nearing completion. Southeast substation and Providence Area are expected to drive capital needs going forward. The Company initially proposed a \$10.4 million budget for all major projects, including South Street. Over the course of this ISR

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review, the Company and Division reached preliminary consensus that this category should be adjusted downward to \$9.8 million.

#### 2. Asset Replacement – Recurring Programs

The Asset Replacement category contains recurring programs that have been included and reviewed in prior ISR Plan filings. Proposed budgets in this discretionary category are generally based on equipment age, condition, criticality rankings, and the Company's planned level of work. For FY 2019, the Company proposed a \$20.4 million budget for customarily recurring programs, including URD cable strategy, underground cable replacement, metalclad switchgear replacement, transformers, substation breakers, and reclosers.

To evaluate the need and support for projects within this category, the Company was requested to provide studies, condition assessments, criticality rankings, or other planning documents containing updated information. While the Company has provided much of this information in the past, it has become apparent that many legacy programs that were previously supported have not advanced. The pace of completion has been controlled by the Company's decision to regulate discretionary spending, and projects are often deferred to accommodate more emergent work while meeting an overall budget target. This creates a lag time in project completion, but is a prudent strategy when more critical projects within the ISR Plan require capital investment.

Concurrent with project lag time, specifically over the past four years, the Company has also been performing several system Area Studies. The outcome of Area Studies tends to

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impact major projects in the Asset Replacement category more so than recurring programs, but the study status must be considered when evaluating condition based programs. My evaluation of the proposed spend for various programs, such as metalclad switchgear or transformer replacement, first determines if work is aligned with an Area Study. This ensures that equipment replacement considers broader area needs, is sufficiently sized for load growth, and includes compatible technology for future grid modernization.

Detailed discussions with the Company identified program spend that should be prioritized due to equipment condition. Where possible, proposed work that was not aligned with an Area Study was deferred. The Company also made efforts to phase projects over multiple years, without sacrificing reliability, in order to achieve reduced budget targets. This resulted in a preliminary budget reduction of \$2 million, and results in a proposed budget of \$18.3 million for recurring programs.

#### 3. Inspection & Maintenance Program

The I&M Program addresses deteriorated assets to ensure that the distribution and sub-transmission system is safe, reliable and environmentally sound. Inspections<sup>3</sup> are performed on a five-year cycle, and the proposed plan is designed to fund repair work necessary to reach a ten-year repair cycle. The program has both capital and O&M components. The Company completed the final year of the five-year inspection cycle in FY 2016, and will be in the second five-year inspection cycle in FY 2019. To date, the

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<sup>3</sup> The Company categorizes deficiencies found during inspections as Level I, II and III. Costs for Level I repairs, requiring immediate attention, are captured under the Damage/Failure category.

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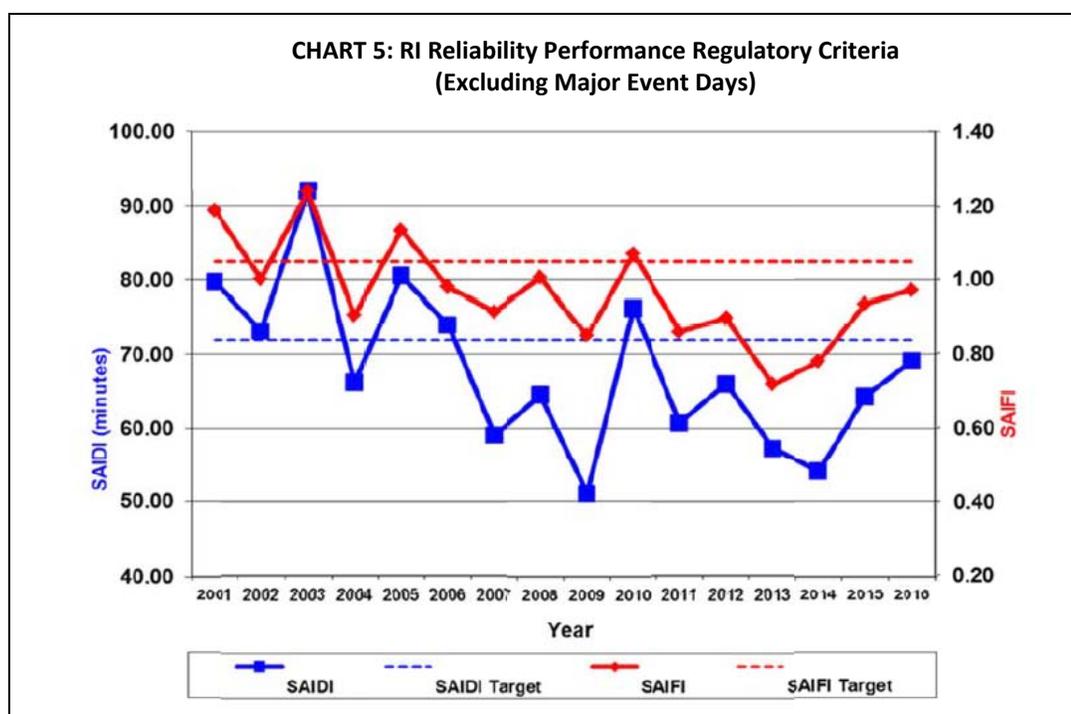
Company has completed repair work on over twenty-five percent (25%) of feeders. In addition, the Company anticipates O&M expenses for Volt-VAR Optimization and Conservation Voltage Reduction (“VVO/CVR”) expansion program, continuation of mobile elevated voltage testing, long range planning study costs, and a new AMI pilot program. The initial proposed FY 2019 ISR Plan included \$2.7 million for I&M capital costs and \$2.9 million for all O&M expenses for a total program budget of \$5.6 million. This compares to a FY 2018 ISR budget of \$1.6 million for I&M capital and \$1.2 million for O&M expenses, with forecasts of \$1.7 million and \$1.2 million, respectively. Discussions with the Company revealed several areas of refinement, particularly to components of the O&M category. This resulted in a preliminary reduction of \$1.3 million for a total program budget of \$4.3 million.

<b>Proposed Budget I&amp;M Capital and O&amp;M</b>	<b>NG Initial Proposed Budget (9-29-17)</b>	<b>Preliminary Adjustment</b>	<b>Proposed FY2019 (12-21-17)</b>
<b>Capital Costs (included in capital budget)</b>	\$ 2,700,000	\$ (1,000,000)	\$ 1,700,000
Opex Related to Capex	\$ 405,000	\$ (150,000)	\$ 255,000
Inspections and Repair Related Costs	\$ 612,000	\$ -	\$ 612,000
Removal Costs	\$ 243,000	\$ (90,000)	\$ 153,000
Long Range Plan Study	\$ 25,000	\$ -	\$ 25,000
AMI-Opex Costs	\$ 1,150,000	\$ (50,000)	\$ 1,100,000
VVO/CVR Program Removal	\$ 220,000	\$ -	\$ 220,000
VVO/CVR Program O&M	\$ 244,000	\$ -	\$ 244,000
<b>Total Operation and Maintenance Expenses</b>	\$ 2,899,000	\$ (290,000)	\$ 2,609,000
<b>Total Program Costs</b>	\$ 5,599,000	\$ (1,290,000)	\$ 4,309,000

<b>Budget Variance I&amp;M Capital and O&amp;M</b>	<b>Filed FY2018</b>	<b>Over/(Under) Budget</b>	<b>FY2018 Forecast (as of 11/16/17)</b>
<b>Capital Costs (included in capital budget)</b>	\$ 1,600,000	\$ 130,000	\$ 1,730,000
Opex Related to Capex	\$ 362,000	\$ -	\$ 362,000
Inspections and Repair Related Costs	\$ 623,000	\$ -	\$ 623,000
Removal Costs	\$ 161,000	\$ (5,000)	\$ 156,000
Long Range Plan Study	\$ 25,000	\$ -	\$ 25,000
VVO/CVR Program	\$ 60,000	\$ -	\$ 60,000
<b>Total Operation and Maintenance Expenses</b>	\$ 1,231,000	\$ (5,000)	\$ 1,226,000
<b>Total Program Costs</b>	\$ 2,831,000	\$ 125,000	\$ 2,956,000

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For the FY 2019 I&M capital budget, the Company requests \$2.7 million, which is \$1 million above the FY 2018 forecasted spending level, but a substantial decrease from the early program years when the Company first implemented its feeder hardening initiatives. This is consistent with PowerServices' observation that the I&M program has warranted budget reductions over previous years. The program is mature, and successful implementation has produced excellent reliability results. The Company continues to meet or exceed annual service reliability targets since 2010. (Chart 5).<sup>4</sup>



Additionally, inspection costs are expected to be lower now that the Company is starting its second pass of the system while maintaining a five-year cycle. Offsetting this progress are construction delays which place the Company closer to a twenty-five year cycle to complete system work rather than the targeted ten-year cycle. The Company tracks and prepares an annual report on the costs and benefits for its I&M Program. The most recent

<sup>4</sup> Docket 4783 - National Grid's Proposed FY 2019 Electric ISR: Section 2, page 3

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report<sup>5</sup> contains reliability statistics for 99 feeders that had work completed since 2013. To calculate the reliability benefits for the I&M Program, the Company uses the average number of events and customer interruptions (CI) due to deteriorated equipment, animals, and lightning over a three year period prior to the repair work year as the baseline. Extensive data is presented and analyzed with a general conclusion of mixed results. Some feeders experience improvements in the immediate years following repairs, while others have higher numbers of customer interruptions from varying causes. The Company advises, and I agree, that the data is a small sample size and more time and feeder repairs are needed to reach definitive conclusions. Given the mixed results of the cost/benefit analysis, I continue to support an annual spending level for the I&M Program that extends the repair cycle since the Company's overall reliability statistics are exceeding goals, which does not present any reliability or operational concerns.

Additional evaluation of the I&M Program capital budget focuses on my previous concerns that I&M work may be shifting to a non-discretionary category, which arbitrarily affects budgets and the construction cycle. To better monitor activity and expenses between both categories, PowerServices previously requested that the Company supplement quarterly filings with more detail in the Damage and Failure subcategory, including identification of Level I I&M construction. The Company is now filing these reports and, as discussed in Section C, my review does not raise concerns other than noting increased spending in blanket projects which is driven by underground cable and pole work.

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<sup>5</sup> National Grid's Inspection & Maintenance Program Cost/Benefit Study – Working Document for August 31, 2017 meeting (dated August 11, 2017)

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Overall, my review continues to support moderate spending for the I&M Program. I recommend, and the Company agreed, to reduce the capital budget by \$1 million in order to align with FY 2018 cost projections. The Company made an additional adjustment of \$240,000 to the associated O&M, resulting in a final proposed I&M capital budget of \$1.7 million and \$428,000 for O&M. I encourage the Company to continue monitoring results of the I&M cost/benefit analysis as additional data becomes available, and expect that the Company will raise concerns with program results and propose adjustments when warranted.

The remaining O&M components of the ISR Plan relate to the mobile elevated voltage testing program, system planning study costs, and VVO/CVR expansion. There are no budget adjustments to these categories. I will address elevated voltage testing in this section and VVO/CVR in the System Capacity section. The AMI pilot O&M costs were reduced by \$50,000 which is incorporated in the ISR Plan budget, although the program is evaluated separately from this report.

The Company's mobile elevated testing program, which emanates from the Rhode Island Contact Voltage statute § 39-2-25(b)(6), is undergoing changes due to a shift in asset ownership. In my FY 2018 ISR Plan evaluation, I noted that the Company has historically surveyed and tested 100% of the system as opposed to the statutory minimum of 20%. This PUC approved methodology proved efficient, while supporting the Company's commitment to public safety. By FY 2019, however, the Company will have sold all municipal streetlights to respective towns and cities in its service territory.

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Although asset ownership will change, the Company, by statute, remains responsible for testing and surveying for elevated voltage within the municipal rights-of-ways.

To manage asset ownership changes and comply with statutory requirements, I recommended in my FY 2018 ISR Plan report that:

- The Company develop a proposal on the methodology to assign program costs for testing municipality owned infrastructure to respective municipalities,
- The Company and each streetlight owner develop a remediation plan when elevated voltage is detected. This includes a mechanism for the Company to recover its cost from the new streetlight owners, and
- The Company revert to a testing cycle consistent with the statutory requirement of 20% of the system annually.

The Company's 2017 Contact Voltage Annual Report filed in Docket 4237 addresses my recommendations and affirms that the Contact Voltage Survey and Testing is now scheduled for 20% of the system annually. The time commitment to perform the work is reduced from two weeks to three days each year, and results in a lower O&M costs. To address program cost sharing and remediation, the Company also provided the following agreement reached with the City of Providence<sup>6</sup>:

“The Company and Municipalities will work together to determine mutually agreed upon Contact Voltage Survey and Testing dates. The Company/TRC will perform the contact voltage survey and testing. Contractor(s) hired by Municipalities to perform repair/mitigation work will shadow the Company/TRC

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<sup>6</sup> Docket 4237 - National Grid 2017 Contact Voltage Annual Report; page 32

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performing the survey and testing so they are available to immediately mitigate any elevated voltage findings discovered during the surveying and testing. Municipality-hired Contractor(s) will then directly invoice the Municipalities for any and all costs associated with mitigation efforts.”

I have reviewed and discussed the proposal with the Division, and confirm that the Company’s approach is acceptable and appropriately balances statutory obligations with safety requirements. The Company should continue to report test results in all areas surveyed.

In summary, concurrence was reached on net budget reductions of \$1.3 million for the total I&M program, resulting in a FY 2019 proposed capital budget of \$1.7 million and \$2.6 million for O&M. This brings the total FY 2019 ISR proposed capital budget for Asset Condition to \$29.8 million, comprised of \$9.8 million for major projects, \$18.3 million for recurring projects, and \$1.7 million for the I&M program.

#### **E. Non-Infrastructure Category**

This category is for telecommunications and other capital expenditures needed for operation, which are neither related to condition nor system capacity. I consider this \$556,000 of capital expenditures prudent and necessary, while consistent with prior costs.

#### **F. System Capacity and Performance Category**

The System Capacity and Performance category is comprised of both Load Relief and Reliability Projects. A significant portion of this discretionary budget is dedicated to

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substation capacity expansion projects. The Company initially proposed to expend \$47.5 million in FY 2019 which is nearly double the FY 2018 budget of \$24 million. Additional adjustments were applied during the course of my evaluation, discussed below, which decreased the final proposed budget to \$45.8 million, or forty-two percent (42%) of the total FY 2019 ISR Plan budget.

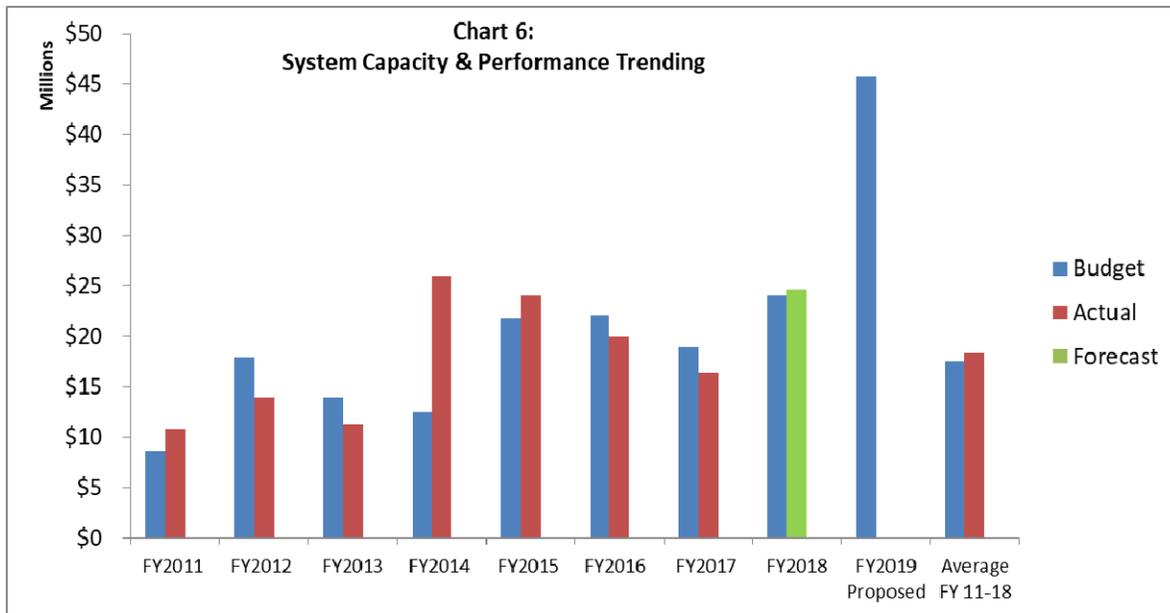
<b>Proposed Budget</b>	<b>NG Initial Proposed Budget (9-29-17)</b>	<b>Preliminary Adjustment</b>	<b>Proposed FY2019 (12-21-17)</b>
System Capacity and Performance	\$ 47,446,000	\$ (1,682,000)	\$ 45,764,000

<b>Budget Variance</b>	<b>Filed FY2018</b>	<b>Over/(Under) Budget</b>	<b>FY2018 Forecast (as of 11/16/17)</b>
System Capacity and Performance	\$ 24,092,000	\$ 549,000	\$ 24,641,000

The Company is managing the FY 2018 forecast close to budget by balancing projects solely within this category, rather than measuring performance against other significant projects. In the past, the Company tended to adjust projects in the System Capacity and Performance category in order to compensate for over-spend in the Asset Condition category, specifically for major projects that exceeded budget, such as South Street. Consistent with my previous recommendation in the FY 2017 proceeding, System Capacity and Performance is now managed separately from other major projects to encourage the Company to focus on transparency and accountability for projects within this specific category. Review of prior actual expenses as compared to budget (Chart 6) shows that the Company, on average, is trending very close to budget, as opposed to previous years that incurred significant over-spend. The chart also shows dramatically increasing costs in FY 2019, which are driven by major projects.

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The FY 2019 ISR System Capacity and Performance budget category is substantially higher than previous years. The main driver is commencement of significant projects in the Aquidneck Island/Newport area. Evaluation of the proposed budget followed my customary process and included the significant analysis completed as part of Docket 4614, resulting in the Commissions Advisory Opinion 22590 dated November 2, 2016. I continue to place emphasis on the following guidelines:

- Capacity projects, unless previously included, must be supported by a completed Area Study as part of a Long Range Plan that has been reviewed and accepted by PowerServices and the Division.
- Significant spend should not occur for a capacity project unless sanctioned by the Company; major construction should not commence until the project budget has reached a Project Grade estimate ( $\pm 10\%$ ).
- Reliability projects should be supported by a planning document or evidence indicating the need, alternatives considered, scope, cost/benefit, timeline, and other customary program analysis.

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The Load Relief category is a mixture of legacy projects, or those projects that have been independently studied and historically considered for inclusion in the ISR, in addition to two projects associated with the East Bay Area Study. This is consistent with my observation that the FY 2019 Plan is transitional, since it includes a blend of residual capital projects previously identified by the Company and a series of new projects emanating from completed Area Studies. To illustrate the sequencing between legacy and Area Study projects, a comparison of FY 2018 and FY 2019 system capacity projects is provided in Table 3. Most legacy projects, with the exception of Aquidneck Island, are expected to be complete in FY 2019 while the East Bay Area projects are commencing.

**Table 3: Comparison of FY 2018 and FY 2019 System Capacity Projects**

System Capacity and Performance Load Relief Projects		FY 2018		FY 2019	
Legacy Project or Area Study	Project	Budget	Notes	Budget	Notes
Legacy Project	<b>Aquidneck Island (includes former Jepson &amp; Newport projects)</b>	\$ 4,302,000		\$ 21,534,000	Construction starting
Legacy Project	<b>Chase Hill (Hopkinton) &amp; Related</b>	\$ 3,856,000		\$ 3,900,000	Final budget year
Legacy Project	<b>Kent County</b>	\$ 312,000	Final budget year	\$ -	Complete
Legacy Project	<b>New London Ave Substation #150</b>	\$ 5,670,000		\$ 6,416,000	Final budget year (only \$100K in FY2020)
Legacy Project	<b>Quonset Sub</b>	\$ 2,789,000		\$ 1,288,000	Final budget year
Legacy Project	<b>Highland Drive</b>	\$ 1,329,000	Final budget year	\$ -	Complete
East Bay Area Study	<b>Warren Substation</b>	\$ 80,000	Engineering only pending LRP approval	\$ 450,000	LRP accepted
East Bay Area Study	<b>East Providence</b>	\$ -	Defer pending LRP approval	\$ 400,000	LRP accepted
<b>Load Relief Total</b>		<b>\$ 18,338,000</b>		<b>\$ 33,988,000</b>	

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Aquidneck Island projects (formerly Jepson and Newport projects), or the most significant Load Relief projects, are budgeted at \$21.5 million in FY 2019 and estimated to reach \$55 million in total. The portfolio of related projects, particularly Jepson Substation, is driven by the outcome of an area reliability study. The purpose of a reliability study is to identify potential problems on a system under contingency conditions, or the loss of critical components, and provide the most economical long term solution to meet reliability criteria when issues are identified. The transmission reliability criteria is set forth by the North American Electric Reliability Corporation (“NERC”), the Northeast Power Coordinating Council, Inc. (“NPCC”), and the New England Power Pool (“NEPOOL”) and ISO-NE. The outcome of the Company’s reliability study indicates that load in Aquidneck Island/Newport area would be unserved for loss of the transmission line. Separately, the Company also identified unserved load for loss of transformers at Jepson and Dexter substations, in addition to multiple condition issues with critical equipment. The Company’s proposed solution to meet transmission reliability criteria includes a transmission upgrade that necessitates a majority of the work in the ISR Plan, including rebuild of the Jepson Substation.

I performed an extensive review of the proposed transmission upgrade and work related to Jepson substation under RIPUC Docket 4614, including assessment of both traditional and non-wires alternatives. My review resulted in concurrence that the projects present the most cost effective solutions to contingency issues. Non-wires alternatives do not provide a viable option due to the magnitude and duration of load loss, coupled with the age and condition of equipment. I also agree with the related work at Newport and all associated substation retirements. The remaining legacy projects, each previously

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approved for inclusion in the Plan, are in the final year of construction with a proposed budget of \$11.5 million. I anticipate minimal expenses beyond FY 2019 for these projects. This results in a total proposed budget of \$33.1 million for all legacy load relief projects.

The FY 2019 ISR Plan load relief category now includes two projects supported by the East Bay Area Study, which is the first regional planning study to be completed by the Company. These projects consist of East Providence and Warren Substations, which are aligned with the recommended solutions identified in the study that I previously evaluated. The Area Study projects a six-year timeline for both projects, and indicates an Investment grade cost estimate level (+200/-50%). The Company proposes expenditures of less than \$1 million FY 2019 for early engineering, permitting and procurement. Based on the study outcome, the Company's proposal to include East Bay projects in the FY 2019 ISR plan is acceptable. Consistent with my evaluation criteria, I expect the Company to reach a Project grade estimate level prior to expending major capital. Furthermore, I continue to emphasize that there are deficiencies in the Company's project evaluation process that were raised in my FY 2018 ISR report and have not been addressed. Specifically, I observe a lack of sufficient NWA analysis in the Company's Area Studies which I discuss in more detail in Section G. This is an important component of the overall study process where a system issue is identified, and the Company evaluates both traditional and non-traditional solutions. The outcome yields a portfolio of projects that solve long-term system conditions, taking into account cost and performance from a broad range of options. The Company's failure to comprehensively consider

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NWAs in the Area Study process creates uncertainty that optimal solutions have been identified.

Through the course of the Load Relief project analysis, including discussions with the Company, review of Area Study alignment, and moderate adjustments, consensus was reached for a final budget of \$33.9 million. However, until the Division is satisfied that thorough NWA evaluations have been executed, including hybrid solutions, ISR Plan approval for these System Capacity projects remains limited.

In the Reliability category, the Company proposed a \$13.1 million budget for several ongoing projects, including a \$1.4 million VVO/CVR program expansion. In my FY 2018 ISR Plan report, I expressed that this initiative was an example of technology deployment that brings necessary grid enhancements, but it must be well-vetted to ensure that the Company is deploying optimal technology that is compatible with current operations as well as long term strategies. For the VVO/CVR project, the Company satisfied this requirement by performing a pilot which documented a favorable cost/benefit ratio. The Company's most recent results from the VVO/CVR pilot program for seven (7) feeders indicates successful voltage control, leading to demand reductions of over three percent (3%) and improving system losses. In the FY 2018 ISR Plan, the Company proposed to expand the project to forty (40) additional feeders over the next four (4) years. I concurred with the Company's request for capital investment in this area. The FY 2019 ISR Plan now proposes to expand the project with the addition of AMI meters on select feeders. With AMI, the Company intends to measure and integrate secondary voltage readings into the VVO/CVR control system to optimize voltage

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reductions. The Company expects an incremental demand reduction of one percent (1%) by adding AMI. The AMI pilot capital budget is proposed at \$7.4 million.

Extensive discussions were held with the Company and Division to assess the AMI pilot and incremental costs to the VVO/CVR program. The underlying VVO/CVR pilot has shown consistently favorable results, and I fully support continued capital and O&M funding. Although not addressed in my report, the AMI pilot capital and O&M components were supported by the Division with an adjustment to reduce the number of meter installations. The Division's recommendations to reduce the size and scope of the AMI pilot were discussed during the December 6, 2017 conference with the Company, and the Company concurred with both the cost reduction and the enhancement in the scope discussion. Taking into account adjustments, the VVO/CVR program final budget amounts to \$1.9 million capital, and \$244,000 for O&M. The AMI adjustments result in a proposed budget of \$6.0 million for capital, and \$1.1 million for O&M. AMI is an enabling technology which will enhance the Company's planning processes, including area studies and NWA analysis, by providing greater detail on loads, specific locations, and impacts on a much more granular level. Additionally, AMI provides a superior technology for time-varying-rate applications. The AMI pilot program and budget adjustments are addressed in significant detail by a separate consultant, and not evaluated in my report.

Remaining Reliability projects consist of initiatives carried forward from previous years. This includes EMS/RTU expansion, overhead transformer and recloser replacement, substation protection for reverse flow from distributed generation ("3VO"), flood related

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work, and blanket projects. My discussions with the Company focused on the need and level of spend for each of these discretionary categories. I examined the technologies being implemented and supporting studies to understand alignment with National Grid's long term grid modernization strategy. This has become more relevant as the Company's distribution system, like most utilities, is in a transformative stage where improvements are not focused on "one-way" power delivery, but rather a system integrated with distributed generation, sophisticated sensors and controls, advanced metering, predictive outage management, and other emerging technologies. My evaluation of Reliability projects produces a recurring observation that the Company is pursuing projects within the ISR Plan that originate from multiple and unrelated initiatives.

To illustrate the varying rationale for Reliability projects, the following Table 4 defines the underlying project justification, proposed budget, and has a brief description for the projects. For FY 2019, the majority of the proposed budget funds pilot programs to test advanced infrastructure and capabilities as opposed to traditional ISR programs.

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**Table 4: Reliability Projects Summary for 2019**

System Capacity and Performance Reliability Projects		FY 2019	
Project Justification	Project	Budget	Description
Pilot Project: Power Sector Transformation Vision and Implementation Plan RIPUC Dockets 4600, 4770, and 4780	<b>AMI</b>	\$ 6,000,000	Test benefits of advanced metering when combined with VVO. Company considers AMI to be a foundational component of a modern grid
Pilot Project	<b>Volt/Var</b>	\$ 1,900,000	Test benefits "intelligent" controls to flatten voltage profile for demand reductions
ISR Program Expansion	<b>EMS/RTU (SCADA)</b>	\$ 551,000	Substation equipment & communication improvements for reliability performance and operational effectiveness
ISR	<b>OH Line Transformer Replacement</b>	\$ 550,000	Funds distribution transformer replacement
National Grid Climate Change Study	<b>Other Flood</b>	\$ 1,020,000	Substation storm hardening to manage flood risk
National Grid Form 3A Recloser Replacement Study NE	<b>Recloser Replacement</b>	\$ 600,000	Strategy to replace older reclosers prone to malfunctions. Driven by reliability and asset condition. Includes improved communication technology for future grid mod.
Distributed Generation	<b>3VO</b>	\$ 200,000	Protection scheme to prevent DG reverse power flow from contributing to transmission faults
ISR	<b>Blanket Projects - SCP</b>	\$ 1,732,000	Funds reliability projects under \$100,000

I use this table for illustrative purposes to show that there are a few “traditional” ISR projects in the Company’s Plan, which are systematic equipment replacements due to reliability concerns. The Company is now considering distribution grid modernization, and there are multiple external factors that influence their initiatives and capital requirements. These include, for example, the Energy Efficiency and System Reliability Procurement Reports, the State of Rhode Island Power Sector Transformation Vision and Implementation Plan, and state renewable generation goals. Programs or projects that are prompted by these external sources are included in ISR Plan capital and O&M requirements, yet broader impacts to the Plan may not be considered at the time the

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project is proposed. This raises additional elements that I must consider during my analysis such as;

- Evaluate the external initiative that prompted the Reliability project, such as studies, regulatory proceedings, or legislative actions,
- Determine whether the proposed project compliments or conflicts with other ISR Plan projects,
- Verify alignment with Area Studies,
- Evaluate alignment with the Company's overall grid modernization strategy,
- Verify that the proposed project takes into account similar studies performed by the Company to leverage "lessons learned" and avoid duplicative costs,
- Determine reasonableness of budget and impact on current and future years, and
- Identify ISR Plan work that may be deferred by the project.

These factors are difficult to differentiate during a single ninety (90) day annual review. I firmly believe that more frequent dialogue with the Division and the Company is necessary to keep apprised of external initiatives that result in ISR Plan projects. Recurring meetings should be established to discuss the status of various programs and policies, regulatory proceedings, or legislative actions that ultimately influence the ISR Plan. An ongoing, collaborative approach will serve to keep the Division apprised of the Company's activities and provide a platform to not only discuss alignment of multiple initiatives, but also address the Company's planning deficiencies, such as NWA analysis. I address this recommendation in more detail in Section G.

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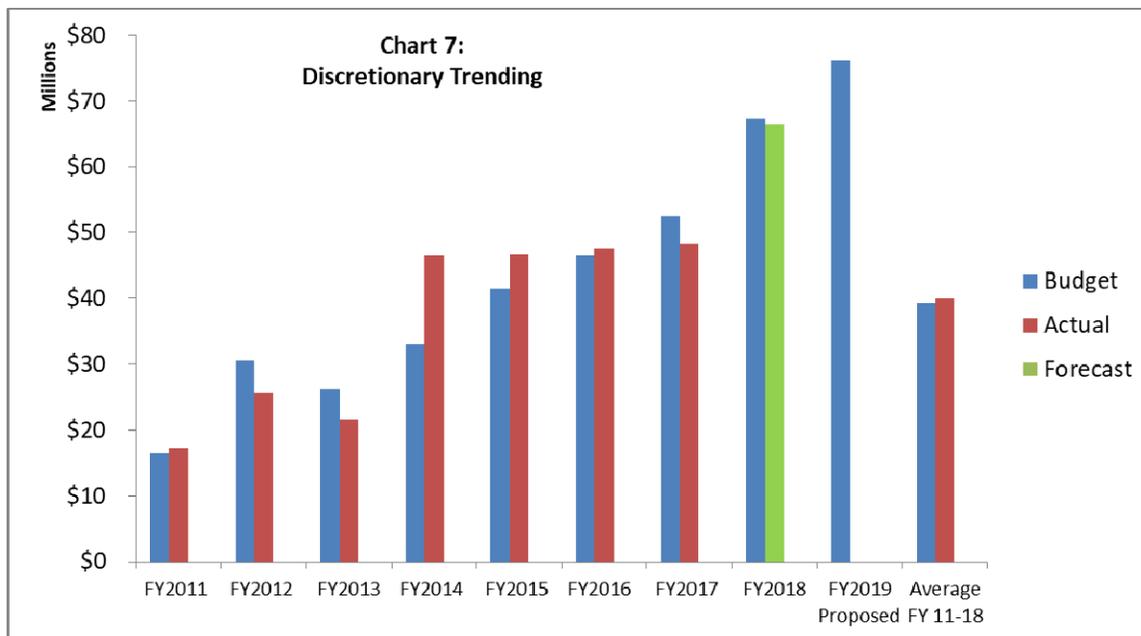
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Although the relationship between various Reliability projects, the ISR Plan, and the Company's overall grid modernization strategy are unclear, my review of the Reliability projects results in concurrence for all proposed programs, including Company proposed adjustments to VVO/CVR and storm flood hardening, for a total proposed budget of \$11.8 million in the Reliability category. This brings the budget for discretionary projects to \$45.8 million in the System Capacity and Performance category for FY 2019.

Evaluation of discretionary projects indicates that one major legacy project, Aquidneck Island/Newport, is commencing and comprises over twenty-five percent (25%) of the budget, while solutions emanating from Area Studies are undergoing preliminary engineering. I continue to encourage advancement of major projects supported by an Area Study, but withhold full consensus on Load Relief projects until the Division is satisfied that thorough NWA evaluations have been executed, including hybrid solutions. In addition, due to the increasing number of independent Reliability projects that are driven by initiatives external to traditional ISR planning, I recommend that the Company derive a methodology to link the relationship between various Reliability projects, the ISR Plan and Areas Studies, and the Company's overall grid modernization strategy. I believe this is best accomplished by establishing recurring meetings with the Division which will serve multiple purposes, including project alignment and addressing NWA deficiencies. I discuss this approach in more detail in Section G.

This brings the total discretionary categories of Asset Condition, Non-Infrastructure, and System Capacity & Performance to \$76.1 million, which is seventy (70%) of the total Capital Investment of the ISR Plan budget (Chart 7).

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**G. Long Range Planning**

A significant portion of my ISR Plan evaluation over the past four years has been dedicated to the Company’s need to evaluate projects against the results of capacity Area Studies with a resulting system Long Range Plan before inclusion in the ISR Plan. In response, the Company is in the fourth year of performing Area Studies to be used to support projects in the ISR Plan, and has provided the following update in the FY 2019 ISR filing:

**National Grid’s Study Areas: Current Priority and Statistics**

Rank	Study Area	Load (MVA)	% State Load	# of Feeders	# of Stations	Study Status
1	Providence	364	19%	95	17	100%
2	East Bay	157	8%	23	7	100%
3A	Blackstone Valley North	145	7%	20	5	50%
3B	North Central RI	254	13%	35	10	50%
4	Central RI East	197	10%	38	10	100%
5	South County East	184	10%	21	9	85%
6	Central RI West	178	9%	30	11	
7	Newport	136	7%	54	14	
8	Blackstone Valley South	198	10%	60	13	
9	Tiverton	30	2%	4	1	
10	South County West	97	5%	12	6	
	<b>Total:</b>	<b>1,940</b>	<b>100%</b>	<b>392</b>	<b>103</b>	<b>56%</b>

\* Study Status Total = % State Load Weighted Total

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I have several concerns with the Company's study process. Of primary concern is the rate at which studies are completed, delivered and reviewed with PowerServices and the Division. For example, East Bay was deemed 100% complete in the FY 2017 ISR Plan filing, yet it was not covered in depth until a January 19, 2017 meeting. The Company's FY 2018 ISR Pre-filing Planning information indicated that both the Providence Area and Central Rhode Island East studies were expected to be finalized by September 2016. I received those studies on July 11, 2017, and they were reviewed during the August 31, 2017 ISR Plan meeting. The Company is clearly failing to deliver studies in a timely manner.

Once a study is delivered, additional time is required for evaluation. Upon receipt of an initial Area Study, the Company provides an overview during a meeting with the Division and PowerServices. I then perform an in-depth evaluation of items including, but not limited to, the underlying system models, loading assumptions, and design criteria. I assess the Company's proposed solutions against identified alternatives. This leads to additional data exchanges, revisions and rearrangements that take several months. Ultimately, the Company produces a final Area Study that becomes the basis for project additions to the ISR Plan. However, the study is often finalized after the ISR Plan filing. This poses several challenges, and I have encouraged the Company to accelerate production of Area Studies so that evaluation can be concluded prior to annual ISR planning. The Company has now completed three studies and has a solid template going forward. I expect that the next round of studies will be completed expeditiously and well in advance of the FY 2020 ISR Plan.

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Another observation highlighted in my FY 2018 ISR evaluation and continued here is the minimal discussion and inclusion of non-wires alternatives in the Company's Area Studies. After review of three full regional studies, including specific data requests on NWA analysis, my concern is elevated. During both the Area Study meetings and the ISR Plan evaluation, I discussed the NWA process and analysis related to each project, which is not exclusively required due to infrastructure condition. Both the Division and PowerServices have been strongly encouraging the Company take a more aggressive NWA approach, including improved formalization of its process and documentation. The Company's Area Studies continue to include cursory evaluations which essentially only address whether the Company believes there is a NWA suitable to eliminate the proposed capital project. The Company has not provided any detailed cost benefit analysis within Area Studies that demonstrates the viability for a total or partial NWA solution.

As a point of reference, the threshold for NWA consideration is established in Rhode Island's Reliability Procurement Standards ("SRP Standards"). The Company utilizes the following screening guidelines to determine if, and when, a NWA should be considered:

- a. The Wires solution, based on Engineering judgment, will likely be more than \$1M;
- b. If load reduction is necessary, then it will be less than 20 percent of the total load in the area of the defined need;
- c. Start of construction is at least 36 months in the future; and
- d. The need is not based on Asset Condition.

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To date, applying the screening guidelines has produced minimal projects eligible for NWA evaluation, and of those, traditional solutions have been selected in all cases. I do not believe, and the Division concurs, that the Company has fully embraced a detailed NWA process. It is proposed that the Company take a more aggressive stance to incorporate non-traditional solutions to solve system issues. I specifically recommend that the Company consider projects below the \$1 million level, and also incorporate non-wires alternatives within segments of major projects, essentially creating a hybrid solution that results in a least cost plan.

In addition to deficient NWA evaluations, I continue to observe that that ISR Plan is expanding to include projects that are driven by external initiatives, and that the evaluation criteria used to determine core projects for reliability and safety are influenced, but not necessarily coordinated, by other Company processes. ISR Plan projects include significant studies of advanced technologies, yet the overarching concern is whether National Grid Rhode Island has a comprehensive grid modernization strategy, and, if so, how ISR projects either reflect or compliment that strategy. This is a complex matter which I addressed in the FY 2018 ISR report as follows:

“The Division has begun to stress the importance of considering grid modernization impacts and technologies within ISR Plan projects. In support of this effort, the SRP screening and evaluation criteria for NWA provide comprehensive guidelines to consider grid enhancements that would not traditionally be incorporated in the ISR Plan. What is not apparent is the

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cohesiveness between the Company's Design Criteria and SRP guidelines. Compounding the issue is the Area Study process that produces a comprehensive strategic investment plan based on engineering principles and Design Criteria, but is not necessarily aligned with SRP guidelines. Although this discussion extends beyond the ISR Plan filing, I find that it is an appropriate time for the Company to develop an alignment between the various planning and project evaluation processes, and to consider how a broader grid modernization strategy may be incorporated.

In summary, the Company's planning process is evolving and there are separate, but inter-related activities being pursued at multiple levels within the Company and driven by various outside factors. The ISR Plan Area Studies introduce a unique opportunity to consolidate activities where possible, add robustness to alternative evaluations, and make transparent the entire process. It would be advisable for the Company to propose improvements that would integrate various planning requirements that allow for a more forward-looking, proactive approach. This may be accomplished through collaborative dialogue with the Division with the outcome being refinements to this ISR process.”<sup>7</sup>

My observations resulted in two specific recommendations as part of the FY 2018 ISR Plan proceeding. Those recommendations, a summary of the Company's response within the FY 2019 Electric ISR Pre-File material (page 6), and my comments are as follows:

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<sup>7</sup> RIPUC Docket 4682, Exhibit GLB-1, page 39

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Recommendation 1: National Grid shall develop an alignment between various planning and project evaluation processes, with consideration as to how a grid modernization strategy may be incorporated. This includes, but is not limited to, the SRP, Area Studies, ISR Plan, and internal Design Criteria.

Company Response: National Grid uses a study area based approach to planning and project evaluation, stating that this “ensures alignment between issues and solutions with incorporation of existing strategies and internal design criteria.” The Company includes emerging strategies, such as grid modernization, following measurement and verification efforts based on pilot test areas. The Company states that grid modernization “evaluations are ongoing and therefore have not yet been formally added to the study process” but are expected to be added in the “near future”. The Company adds that they have “communicated in various external stakeholder engagement sessions that a common sense approach has been used to install the latest processor based controls to enable ease of implementation of a potential pending grid modernization program.” Flowcharts of planning processes were provided.

PowerServices Comment: The Company has simply repeated the individual processes used in ISR Planning and believes that communication during stakeholder engagement sessions serves as support for implementation of advanced technology. The Company’s response that grid modernization evaluations are expected to be added in the near future, which is after advanced technology projects in the ISR plan are implemented, indicates that the Company

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does not have a grid modernization strategy. The Company's overall response is inadequate and fails to meet the recommendation.

Recommendation 2: National Grid shall propose a methodology to revise current and future study documents supporting Asset Replacement and System Capacity programs or projects, as applicable, to include, at minimum:

- The traditional elements included in the Company's current studies including, but not limited to, purpose and problem statement, scope and program description, condition assessment/criticality rankings, alternatives considered, solution, cost and timeline.
- Discussion on the impact to related Company initiatives, PUC programs, or other requirements.
- A detailed comparison of recommendations to Area Studies to determine if solutions are aligned with study outcomes, noting adjustments required to avoid redundancy in planning.
- An evaluation of potential incremental investments that support the Company's long term grid modernization strategy. This includes description of technology or infrastructure investment, cost benefit to traditional safety and reliability objectives, and additional operational benefits achieved if implemented.
- A robust NWA evaluation for projects passing initial screening that clearly identifies alternatives considered, costs, and benefits.

Company Response: National Grid states that they follow a "uniform planning criteria and ensures that there is well executed coordination among stakeholder departments

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and groups.” The Company provides a list of improvements for several aspects of the planning process and states that it is updating its study process document. Many of the improvements rely on communication and engagement with internal stakeholders, but those interactions or outcomes are not obvious in the ISR Plan.

PowerServices Comment: Overall, the Company’s response is more of a generic confirmation that improvements have, or will be, incorporated. Absent additional detail, there is no way to confirm that my recommendation will be satisfied. Discussions with the Company throughout the previous year, along with analysis of their responses to my FY 2018 ISR Plan recommendations, reveal that the Company is reacting to increasing complexities in ISR planning process. They have not kept pace with delivering Area Studies while managing increasing external initiatives that result in incremental projects to the core ISR Plan. As I expressed earlier, examples of the many external initiatives that drive ISR Plan projects include, but are not limited to, the Energy Efficiency and System Reliability Procurement Reports, the State of Rhode Island Power Sector Transformation Vision and Implementation Plan, and state renewable generation goals. I do not believe that a single annual review with narrow input from the Company, mostly through data requests, results in a clearly integrated, robust and transparent planning process. Going forward, I recommend that the Division establish recurring meetings with the Company to address the various issues I have highlighted, including improved NWA evaluations that take into account lower capital thresholds or consider hybrid alternatives.

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**III. VEGETATION MANAGEMENT**

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The Company’s initial FY 2019 ISR Plan proposed expenditures of \$9.8 million for the Vegetation Management Program, which includes the Enhanced Hazard Tree Mitigation (EHTM) program, is four percent (4%) higher than the FY 2018 budget. Both the FY 2018 budget and forecasted spend are \$9.4 million. Consistent with historical budgets, the major spending component is Cycle Pruning with a proposed budget of \$6.2 million which is above the FY 2018 spend due to an increase in the number of rural miles cleared that have higher tree density. The Company also forecasts a higher level of spend in the EHTM category, consistent with FY 2018, to manage increased tree mortality due to the spread of the Gypsy Moth throughout Rhode Island. The Company is successfully executing the Vegetation Management program while meeting budget targets. No adjustments were recommended and concurrence was reached on the proposed Vegetation Management Program budget of \$9.8 million for FY 2019 (Chart 8).

**CHART 8: Vegetation Management Program Budget**

<b>VEGETATION MANAGEMENT Proposed Budget</b>	<b>NG Initial Proposed Budget (9-29-17)</b>	<b>Preliminary Adjustment</b>	<b>Proposed FY2019 (12-21-17)</b>
Cycle Pruning	\$ 6,150,000	\$ -	\$6,150,000
Hazard Tree	\$ 1,250,000		\$1,250,000
Sub-T	\$ 325,000		\$ 325,000
Police/Flagman Detail	\$ 850,000		\$ 850,000
All Other Activities	\$ 1,225,000		\$1,225,000
<b>Program Total</b>	<b>\$ 9,800,000</b>	<b>\$ -</b>	<b>\$9,800,000</b>

I have evaluated the Vegetation Management Program in detail and on multiple levels in prior ISR Plan assessments, and continue to support the Company’s funding level and frequency

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of cycle pruning work, which is consistent with industry practices. The Company reports<sup>8</sup> that, on average, a twenty percent (20%) improvement in customer interruptions (CI) per circuit occurs in the first year after pruning. The Company implements a four-year pruning cycle for overhead distribution circuits. Reliability indices indicate that the Company continues to meet or exceed annual goals, suggesting that budget increases, unless warranted by upward pressure in contractor labor, are not required since the cycle pruning is not expanding or changing.

EHTM is another program component that the Company continues to perform and justify with favorable reliability statistics. The ISR Plan filing states<sup>9</sup> that three years of tree-related interruption data for Rhode Island indicates that fallen trees account for forty-six percent (46%) of tree-related customer interruptions. Reliability data (Chart 9) shows that trees continue to account for a significant number of interruptions.

**CHART 9: Reliability Data**  
**Rhode Island Customer Interrupted by Cause**  
**Major Event Days Excluded**  
**By Fiscal Year (2008-2017)**

Cause	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Adverse Environment	1,673	5,651	4,018	5,992	3,674	6,584	811	6,786	5,922	10,108
Animal	15,103	16,303	14,751	15,335	15,008	9,864	10,098	21,232	32,266	31,931
Deteriorated Equipment	71,336	69,296	88,655	78,009	84,052	43,196	59,239	68,992	69,921	50,930
Human Element/Company	20,633	24,393	8,846	27,305	17,722	8,500	9,304	11,507	17,943	8,266
Human Element/Other	28,547	35,531	44,248	51,837	46,171	45,152	48,008	25,659	45,280	36,344
Intentional	50,735	36,569	59,581	33,987	41,879	42,989	44,451	55,268	54,661	67,444
Lightning	44,176	19,577	27,874	36,883	11,098	9,362	23,882	5,234	17,639	11,044
Substation	55,282	53,391	12,120	82,926	51,866	38,492	23,243	26,527	71,115	26,558
Sub-Transmission	24,298	31,628	22,243	39,770	29,805	44,084	53,550	26,191	33,727	33,741
Transmission	20,176	6,000	7,093	11,370	2,973	19,099	4,568	18,284	11,594	72,808
Tree	104,023	79,977	83,311	88,714	88,474	90,726	56,964	63,009	109,023	85,147
Unknown	29,583	26,146	15,807	29,629	29,163	34,143	18,501	23,529	35,829	34,689
<b>Grand Total</b>	<b>465,565</b>	<b>404,462</b>	<b>388,547</b>	<b>501,757</b>	<b>421,885</b>	<b>392,191</b>	<b>352,619</b>	<b>352,218</b>	<b>504,920</b>	<b>469,010</b>

<sup>8</sup> Docket 4783 - National Grid's Proposed FY 2019 Electric ISR: Section 3, page 2

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The EHTM program accounts for thirteen (13%) of the proposed Vegetation Management budget, and has been a source of annual discussions to better understand the cost/benefit of the program. Under the program, the Company identifies and removes dying or structurally weakened trees along the three-phase sections of the worst performing circuits. The Company is now expanding beyond the mainline portion of feeders that are experiencing multiple interruptions. The Company reports that from FY 2007 to FY 2017, tree-related customer interruptions improved on an average of seventy percent (70%) for the first year following completion of EHTM work.

I continue to believe that hazard tree identification and removal, particularly on the worst performing feeders, remains critical. In the FY 2017 ISR Plan, the Company initially proposed increasing EHTM spend to manage the potential threat of the Emerald Ash Borer. I did not concur with the requested level of spend, and recommended that the Company continue to take steps to fully understand and devise a strategy for controlling or protecting from the Emerald Ash Borer before selectively identifying and removing hazard trees. The Company ultimately reported that the Emerald Ash Borer threat has not advanced, but requested a moderate increase of \$300,000 in the FY 2018 Plan to manage tree mortality expected from spread of the Gypsy Moth. The Company requests the same funding level in the FY 2019 ISR plan, and I concur with the requested EHTM budget of \$1.25 million.

The remaining components of Vegetation Management include sub-transmission work, police detail, and a general category for all other (core) activities. The Core Activities proposed budget is acceptable and consistent with FY 2018 levels at \$1.2 million. This brings the total Vegetation Management Program proposed budget to \$9.8 million.

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### **IV. SUMMARY AND RECOMMENDATIONS**

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The process between the Company and the Division resulted in a FY 2019 Electric ISR Plan which sets forth a capital budget, VM Program and I&M Program, and associated O&M activities that balance the need for safety and reliability with the efficient benefit/cost considerations. Appendix-3, Summary of Chart of Capital Outlays by Key Driver Category and Budget Classification, summarizes, by spending rationale (category) and individual budget class within each category, differences between the Company's initially proposed ISR Plan of September 29, 2017, and the resulting December 21, 2017 filing of the FY 2019 ISR Plan Proposal. The consensus ISR Plan is a less than one percent (1%) reduction of \$252,000 in the non-discretionary capital spending budget and a seven percent (7%) reduction of \$5.4 million in the discretionary capital spending budget, for an overall reduction of \$5.6 million or five percent (5%).

For FY 2019, review of the proposed ISR Plan and discussions with the Company continued to address the reasonableness of budget levels for customary projects, many of which are part of mature programs. Overall, PowerServices supported ongoing investment in proposed categories and continues to monitor work performed under the non-discretionary category that may actually be discretionary. Additional detailed support, provided by the Company in its quarterly filings, will aid in understanding the rationale and proper cost allocation for these projects.

The Company continues to pursue a portfolio of capital investments to replace aging and obsolete infrastructure. Focus is shifting from small, individual projects to multi-year major projects. The South Street Substation upgrade project which is nearing completion and the

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Aquidneck Island projects just beginning dominate the current discretionary budget and will be followed by many significant projects resulting from Area Studies being developed as part of a system Long Range Plan. Efforts to improve project management to meet scope and budgets have resulted in incremental improvements. However, evaluation of the FY 2019 ISR Plan revealed several issues that have been noted in prior Plan assessments, and now warrant Company action. First, the Company has not satisfactorily produced Area Studies in a timely manner. For the three Area Studies completed, several opportunities for improvement were noted, with the major deficiency being the lack of sufficient NWA analysis. Secondly, several existing long term programs and projects have been delayed by the Company to the point that rationale, scope and cost should be updated given the lag in completion. Given the delays, I recommend that the Company propose a methodology to revise current and future study documents to include standard components for analysis. Among these components is a robust NWA for applicable projects, which is clearly documented with cost benefit analyses being provided for each project analyzed. Thirdly, the Company relies on several sources for planning which are related but developed independently. The process lacks transparency and cohesiveness, particularly the relationship between the Company's Design Criteria, SRP, and Area Studies.

The number of programs external from the ISR Plan process continues to expand. These programs are requiring additional capital and O&M expenses be added to the ISR plan. These include the Contact Voltage Testing Program, Programs from the SRP process, Volt/Var and AMI programs, and a meaningful NWA program. I recommend that the Company develop an alignment among the multiple processes. Lastly, the Division has begun to stress the importance of considering grid modernization impacts and technologies and a robust NWA analysis program

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within ISR Plan. To ensure that those impacts are recognized, I recommend that the Company make a clear distinction between the previously conventional ISR Plan categories and the new emerging programs driven by other initiatives and dockets.

The longer term challenge continues to be how the Company globally prioritizes and schedules projects arising from pending Area Studies, and other requirements arising from separate but interrelated dockets while balancing competing interests of safety, reliability, NWA options benefit to cost, and economic impacts to its ratepayers. There will be significant upward pressure on the ISR Plan budget to accommodate future projects and the requirements of other initiatives, and the Company must be diligent in preparing and adhering to planning criteria that supports orderly development of the system. Emphasis on creating a cohesive and transparent long-term planning process, combined with enhanced budgeting and project management, are critical to successful ISR Plan execution.

I support the FY 2019 Capital Budget as proposed at \$108.8 million. I also support the FY 2019 proposed VM Program at \$9.8 million. Lastly, I support the I&M Program Operations and Maintenance Expenses at \$2.6 million, including the Company's new mechanism for cost allocation to municipal streetlight owners for contact voltage program mitigation costs.

#### **Recommendations**

1. National Grid shall develop an alignment between various planning and project evaluation processes, with consideration as to how a grid modernization strategy may be incorporated. This includes, but is not limited to, the SRP, Area Studies, ISR Plan, NWA options and internal Design Criteria.

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2. National Grid shall propose a methodology to revise current and future study documents supporting Asset Replacement and System Capacity programs or projects as applicable to include, at minimum:
- The traditional elements included in the Company's current studies including, but not limited to, purpose and problem statement, scope and program description, condition assessment/criticality rankings, alternatives considered, solution, cost and timeline.
  - Discussion on the impact to related Company initiatives, PUC programs, the various pilot projects, or other requirements driven by SRP, DSP, Heat Maps, and emerging initiatives.
  - A detailed comparison of recommendations to Area Studies to determine if solutions are aligned with study outcomes, noting adjustments required to avoid redundancy in planning.
  - An evaluation of potential incremental investments that support the Company's long term grid modernization strategy. This includes description of technology or infrastructure investment, cost benefit to traditional safety and reliability objectives, and additional operational benefits achieved if implemented.
  - A robust NWA evaluation for projects passing initial screening that clearly identifies alternatives considered, costs, and benefits.
3. National Grid shall continue to develop a System Capacity Load Study and a 10-year Long Range Plan in order to increase the level of support and transparency for the capital budget. The Company shall submit and present the outcome of Area Studies to the Division and its consultant at the time of completion. These studies shall include a separate Non-Wire

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Alternative analysis of the projects consistent with the requirements of other program commitments. The Company shall submit a report with updates on modeling activities and Area Study status at least 120 days prior to filing its FY 2020 ISR Plan Proposal, but in any event no later than August 31, 2018.

4. National Grid shall manage major Asset Replacement and System Capacity & Performance project budgets separate from other discretionary projects, such that any budget variances (underspend) will not be utilized in other areas of the ISR Plan. The Company shall provide quarterly budget and project management reports.
5. National Grid will continue to manage (underspend/overspend management) individual project costs within the ISR Plan discretionary category (comprised of Asset Condition and System Capacity and Performance projects), such that total portfolio costs are aligned within a discretionary budget target that excludes major substation projects.
6. National Grid shall continue to provide quarterly reporting on Damage/Failure expenditures to include the details of completed projects by operating region. The Company will separately identify Level I projects repaired as a result of the I&M program.
7. National Grid shall continue to provide a detailed budget for System Capacity & Performance and Asset Condition in order to provide transparency on a project level basis for the current and future 4-year period. The budget shall be provided in advance of the FY 2020 ISR Plan Proposal filing, but in any event no later than August 31, 2018.

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8. National Grid shall submit an evaluation of future proposed Asset Condition projects as compared to the Company's Long Range Plan in advance of the FY 2020 ISR Plan Proposal filing, but in any event no later than August 31, 2018.
  
9. National Grid shall continue to submit its detailed substation capacity expansion plans and load projections, and include an evaluation of proposed projects against the Company's Long Range Plan, in advance of the FY 2020 ISR Plan Proposal filing, but in any event no later than August 31, 2018.
  
10. National Grid shall continue to submit a cost-benefit analysis on the Vegetation Management Cycle Clearing Program and a separate cost-benefit analysis on the Enhanced Hazard Tree Management program for the Division's review prior to submitting the Company's FY 2020 ISR Plan Proposal, but in any event no later than August 31, 2018.
  
11. National Grid shall continue to submit its Metal-Clad Switchgear replacement program cost-benefit analysis to the Division prior to submitting the Company's FY 2020 ISR Plan Proposal to the extent any Metal-Clad Switchgear replacements or major upgrades are proposed, but in any event no later than August 31, 2018.

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**FY 2019 ISR Plan Meeting Agenda**  
**9:00 a.m., August 31, 2017**

- |  |         |
|--|---------|
| 1. Safety Message                        | 5 min   |
| 2. Introductions                         | 5 min   |
| 3. Review of FY2019 Pre-filing Documents | 120 min |
| 4. Next Steps for FY2019 Filing          | 10 min  |
| 5. Working Lunch                         |         |
| 6. Long-Term Study Discussion            |         |
| a. Providence                            | 90 min  |
| b. Central RI East                       | 60 min  |
| 7. Open Discussion                       | 10 min  |

**APPENDIX 2**

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**Historical Budgets versus Actual**

Spending Rationale	FY 2006	FY 2006	FY 2007	FY 2007	FY 2008	FY 2008
	Budget	Actual	Budget	Actual	Budget	Actual
Customer Request/Public Requirements	20,302,000	22,885,193	17,902,500	21,012,048	24,630,000	23,887,492
Damage/Failure	3,250,000	8,264,656	4,550,000	7,442,272	5,660,000	7,642,277
<b>Total Discretionary</b>	<b>23,552,000</b>	<b>31,149,849</b>	<b>22,452,500</b>	<b>28,454,320</b>	<b>30,290,000</b>	<b>31,529,769</b>
Asset Condition	9,323,000	5,828,465	8,641,000	8,342,907	10,020,000	12,559,436
Non-Infrastructure	793,000	(2,196,297)	990,000	3,041,061	75,000	385,109
System Capacity & Performance	10,276,500	10,980,393	12,961,500	11,545,608	12,434,000	13,558,424
<b>Total Non-Discretionary</b>	<b>20,392,500</b>	<b>14,612,561</b>	<b>22,592,500</b>	<b>22,929,576</b>	<b>22,529,000</b>	<b>26,502,969</b>
<b>Grand Total</b>	<b>43,944,500</b>	<b>45,762,410</b>	<b>45,045,000</b>	<b>51,383,896</b>	<b>52,819,000</b>	<b>58,032,738</b>
Vegetation Management	-	-	-	-	-	6,630,000
Inspection & Maintenance Program	-	-	-	-	-	-

Spending Rationale	FY 2009	FY 2009	FY 2010	FY 2010	FY 2011	FY 2011
	Budget	Actual	Budget	Actual	Budget	Actual
Customer Request/Public Requirements	24,022,668	21,171,756	23,726,000	19,311,885	21,014,000	14,631,340
Damage/Failure	6,596,000	8,345,442	7,919,000	9,031,133	9,365,000	13,194,101
<b>Total Discretionary</b>	<b>30,618,668</b>	<b>29,517,198</b>	<b>31,645,000</b>	<b>28,343,018</b>	<b>30,379,000</b>	<b>27,825,441</b>
Asset Condition	10,090,732	10,941,238	14,253,000	13,065,303	7,201,000	5,830,800
Non-Infrastructure	242,600	284,808	168,000	(590,138)	685,000	705,603
System Capacity & Performance	16,707,000	14,595,922	22,434,000	17,454,290	8,635,000	10,758,714
<b>Total Non-Discretionary</b>	<b>27,040,332</b>	<b>25,821,968</b>	<b>36,855,000</b>	<b>29,929,455</b>	<b>16,521,000</b>	<b>17,295,117</b>
<b>Grand Total</b>	<b>57,659,000</b>	<b>55,339,166</b>	<b>68,500,000</b>	<b>58,272,473</b>	<b>46,900,000</b>	<b>45,120,558</b>
Vegetation Management	-	7,857,000	-	6,882,000	-	4,829,000
Inspection & Maintenance Program	-	-	-	-	-	-

Spending Rationale	FY 2012	FY 2012	FY 2013	FY 2013	FY 2014	FY 2014
	Budget	Actual	Budget	Actual	Budget	Actual
Customer Request/Public Requirements	21,636,500	13,075,154	20,006,000	10,410,223	16,509,000	17,137,642
Damage/Failure	9,705,000	12,992,859	10,422,000	17,515,452	10,050,000	14,373,392
<b>Total Discretionary</b>	<b>31,341,500</b>	<b>26,068,013</b>	<b>30,428,000</b>	<b>27,925,675</b>	<b>26,559,000</b>	<b>31,511,034</b>
Asset Condition	12,318,050	11,520,099	11,863,000	8,070,832	20,242,000	20,904,838
Non-Infrastructure	278,000	266,545	336,000	2,269,065	255,000	(346,246)
System Capacity & Performance	17,962,450	13,955,240	13,913,000	11,249,210	12,544,000	25,972,338
<b>Total Non-Discretionary</b>	<b>30,558,500</b>	<b>25,741,884</b>	<b>26,112,000</b>	<b>21,589,107</b>	<b>33,041,000</b>	<b>46,530,930</b>
<b>Grand Total</b>	<b>61,900,000</b>	<b>51,809,897</b>	<b>56,540,000</b>	<b>49,514,782</b>	<b>59,600,000</b>	<b>78,041,964</b>
Vegetation Management	9,826,000	8,176,000	8,256,000	8,248,749	8,476,000	8,529,815
Inspection & Maintenance Program	2,479,230	1,465,884	2,270,900	1,480,205	3,779,000	3,611,958

**EXHIBIT GLB-1**  
**REPORT OF GREGORY L. BOOTH, PE**

**Historical Budgets versus Actual**  
**(Continued)**

Spending Rationale	FY 2015	FY 2015	FY 2016	FY 2016	FY 2017	FY 2017
	Budget	Actual	Budget	Actual	Budget	Actual
Customer Request/Public Requirements	14,537,000	17,759,797	15,647,000	17,412,295	19,450,550	20,232,661
Damage/Failure	9,816,000	3,044,445	11,177,000	14,531,159	11,467,000	15,614,335
<b>Total Discretionary</b>	<b>24,353,000</b>	<b>20,804,242</b>	<b>26,824,000</b>	<b>31,943,454</b>	<b>30,917,550</b>	<b>35,846,996</b>
Asset Condition	19,511,000	25,140,871	24,053,000	27,178,961	33,280,427	31,274,161
Non-Infrastructure	277,000	1,216,345	275,000	457,389	275,000	621,795
System Capacity & Performance	21,759,000	25,889,850	22,148,000	19,919,705	18,968,000	16,370,536
<b>Total Non-Discretionary</b>	<b>41,547,000</b>	<b>52,247,066</b>	<b>46,476,000</b>	<b>47,556,055</b>	<b>52,523,427</b>	<b>48,266,492</b>
<b>Grand Total</b>	<b>65,900,000</b>	<b>73,051,308</b>	<b>73,300,000</b>	<b>79,499,509</b>	<b>83,440,977</b>	<b>84,113,488</b>
Vegetation Management	7,726,000	8,029,095	8,884,000	8,893,000	8,719,000	8,719,000
Inspection & Maintenance Program	2,995,000	2,022,743	3,333,000	1,196,756	1,611,750	1,611,750

Spending Rationale	FY 2018	FY 2018	FY 2019
	Budget	Forecast	Proposed
Customer Request/Public Requirements	21,853,000	16,212,000	19,005,000
Damage/Failure	11,379,000	13,788,000	13,674,000
<b>Total Discretionary</b>	<b>33,232,000</b>	<b>30,000,000</b>	<b>32,679,000</b>
Asset Condition	42,744,000	42,552,000	29,768,000
Non-Infrastructure	553,000	(722,000)	556,000
System Capacity & Performance	24,092,000	24,641,000	45,764,000
<b>Total Non-Discretionary</b>	<b>67,389,000</b>	<b>66,471,000</b>	<b>76,088,000</b>
<b>Grand Total</b>	<b>100,621,000</b>	<b>96,471,000</b>	<b>108,767,000</b>
Vegetation Management	9,400,000	9,400,000	9,800,000
Inspection & Maintenance Program	1,230,800	1,225,800	2,609,000

**APPENDIX 3**

**EXHIBIT GLB-1**  
**REPORT OF GREGORY L. BOOTH, PE**

FY2019 ISR Plan PowerServices Adjustments						
Capital Outlays by Key Driver Category and Budget Classification						
SPENDING RATIONALE	BUDGET CLASS	FY2019				
		NG Initial Proposed Budget (9-29-17)	NG Adjustments (12-6-17)	NG Revised Proposed Budget (12-6-17)	PowerServices Adjustments (12-13-17)	National Grid Proposed Budget (12-13-17)
Customer Request/ Public Requirements	3rd Party Attachments	81,000		81,000		81,000
	Distributed Generation	(940,000)	248,000	(692,000)		(692,000)
	Land and Land Rights - Dist	225,000		225,000		225,000
	Meters – Dist	2,247,000		2,247,000		2,247,000
	New Business - Commercial	7,061,000		7,061,000		7,061,000
	New Business - Residential	5,247,000		5,247,000		5,247,000
	Outdoor Lighting - Capital	123,000		123,000		123,000
	Block Island	-		0		-
	Public Requirements	2,454,000		2,454,000		2,454,000
	Transformers & Related Equipment	2,259,000		2,259,000		2,259,000
<b>Customer Request/ Public Requirements</b>		<b>18,757,000</b>	<b>248,000</b>	<b>19,005,000</b>		<b>19,005,000</b>
Damage/ Failure	Damage/ Failure (inc. Reserves)	12,574,000		12,574,000	(500,000)	12,074,000
	Major Storms – Dist	1,600,000		1,600,000		1,600,000
<b>Damage/Failure Total</b>		<b>14,174,000</b>		<b>14,174,000</b>	<b>(500,000)</b>	<b>13,674,000</b>
<b>Subtotal Non-Discretionary</b>		<b>32,931,000</b>	<b>248,000</b>	<b>33,179,000</b>	<b>(500,000)</b>	<b>32,679,000</b>
Asset Condition	Major Projects					
	South Street	3,500,000	220,000	3,720,000		3,720,000
	Southeast	2,700,000		2,700,000		2,700,000
	Flood - Westerly	635,000	(99,000)	536,000		536,000
	Flood - Hope Substation	738,000		738,000	(738,000)	-
	Flood-Warwick Mall Substation	580,000		580,000		580,000
	Dyer Street-Indoor Substation	1,124,000		1,124,000		1,124,000
	Providence Study	1,115,000		1,115,000		1,115,000
	Major Projects Total	10,392,000	121,000	10,513,000	(738,000)	9,775,000
	Asset Replacement					
	Battery Replacement	300,000		300,000		300,000
	Metalclad Switchgear	4,298,000		4,298,000	(2,000,000)	2,298,000
	Substation Transformer Replacement	3,550,000		3,550,000		3,550,000
	Relay Replacements	-		0		-
	Substation Breakers & Reclosers	425,000		425,000		425,000
	Network Arc Flash	300,000		300,000		300,000
	RAPR	195,000		195,000		195,000
	URD Cable Strategy	3,000,000		3,000,000		3,000,000
	UG Cable Replacement	4,000,000	(100,000)	3,900,000		3,900,000
	UG Improvements	250,000		250,000		250,000
Others	1,551,000	46,000	1,597,000	(28,000)	1,569,000	
Blanket Projects	2,506,000		2,506,000		2,506,000	
Asset Replacement Total	20,375,000	(54,000)	20,321,000	(2,028,000)	18,293,000	
Asset Replacement - I&M (NE)	2,700,000		2,700,000	(1,000,000)	1,700,000	
<b>Asset Condition Total</b>		<b>33,467,000</b>	<b>67,000</b>	<b>33,534,000</b>	<b>(3,766,000)</b>	<b>29,768,000</b>
Non-Infrastructure	General Equipment	306,000		306,000		306,000
	Telecommunications Capital - Dist	250,000		250,000		250,000
<b>Non-Infrastructure Total</b>		<b>556,000</b>		<b>556,000</b>		<b>556,000</b>

**EXHIBIT GLB-1**  
**REPORT OF GREGORY L. BOOTH, PE**

FY2019 ISR Plan PowerServices Adjustments						
Capital Outlays by Key Driver Category and Budget Classification						
SPENDING RATIONALE	BUDGET CLASS	FY2019				
		NG Initial Proposed Budget (9-29-17)	NG Adjustments (12-6-17)	NG Revised Proposed Budget (12-6-17)	PowerServices Adjustments (12-13-17)	National Grid Proposed Budget (12-13-17)
System Capacity and Performance	Load Relief					
	Aquidneck Island (Newport projects)	12,250,000		12,250,000		12,250,000
	Aquidneck Island (Jepson projects)	9,284,000		9,284,000		9,284,000
	Chase Hill (Hopkinton) & Related	3,900,000		3,900,000		3,900,000
	Quonset Sub	1,488,000	(200,000)	1,288,000		1,288,000
	New London Ave Substation #150	6,151,000	265,000	6,416,000		6,416,000
	East Providence Substation	800,000	(400,000)	400,000		400,000
	Warren Substation	450,000		450,000		450,000
	Load Relief Total	34,323,000	(335,000)	33,988,000		33,988,000
	Reliability					
	AMI	7,367,000		7,367,000	(1,367,000)	6,000,000
	Volt/Var	1,400,000	500,000	1,900,000		1,900,000
	EMS	551,000		551,000		551,000
	OH Line Transformer Replacement	550,000		550,000		550,000
	Other Flood	1,500,000	(480,000)	1,020,000		1,020,000
	Other Load Relief & Reliability	(777,000)		(777,000)		(777,000)
	Recloser Replacement	600,000		600,000		600,000
	3VO	200,000		200,000		200,000
	Blanket Projects - SCP	1,732,000		1,732,000		1,732,000
	Reliability Total	13,123,000	20,000	13,143,000	(1,367,000)	11,776,000
	<b>System Capacity and Performance Total</b>	<b>47,446,000</b>	<b>(315,000)</b>	<b>47,131,000</b>	<b>(1,367,000)</b>	<b>45,764,000</b>
<b>Subtotal Discretionary</b>	<b>81,469,000</b>	<b>(248,000)</b>	<b>81,221,000</b>	<b>(5,133,000)</b>	<b>76,088,000</b>	
<b>Total Electric Distribution</b>	<b>114,400,000</b>	<b>-</b>	<b>114,400,000</b>	<b>(5,633,000)</b>	<b>108,767,000</b>	
Vegetation Management Program	Cycle Trimming	6,150,000		6,150,000		6,150,000
	Hazard Tree	1,250,000		1,250,000		1,250,000
	Sub-T	325,000		325,000		325,000
	Police/Flagman Detail	850,000		850,000		850,000
	All Other Activities	1,225,000		1,225,000		1,225,000
<b>Vegetation Management Program Total</b>	<b>9,800,000</b>		<b>9,800,000</b>		<b>9,800,000</b>	
Inspection and Maintenance Program	Operation and Maintenance Expenses:					
	Opex related to Capex	405,000		405,000	(150,000)	255,000
	Repair - Related Costs	-		-		-
	Inspections and Repair- Related Costs	612,000		612,000		612,000
	Removal Costs	243,000		243,000	(90,000)	153,000
	System Planning & Protection					
	Coordination Study	25,000		25,000		25,000
	AMI - Opex Costs	1,150,000		1,150,000	(50,000)	1,100,000
	VVO/CVR Removal Costs	220,000		220,000		220,000
	VVO/CVR Program O&M	244,000		244,000		244,000
<b>Inspection and Maintenance Program Total</b>	<b>2,899,000</b>		<b>2,899,000</b>	<b>(290,000)</b>	<b>2,609,000</b>	
<b>Grand Total ISR- All Programs</b>	<b>127,099,000</b>	<b>-</b>	<b>127,099,000</b>	<b>(5,923,000)</b>	<b>121,176,000</b>	