

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

The Narragansett Electric Company
d/b/a National Grid
R.I.P.U.C. Docket No. 4682
RE: FY 2018 Electric Infrastructure,
Safety, and Reliability Plan :

Docket No. 4682

PREFILED DIRECT TESTIMONY OF

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

February 16, 2017

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

**On Behalf of Rhode Island Division of Public Utilities and Carriers
Docket No. 4682**

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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. 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?

A. I am an active member of the National Society of Professional Engineers ("NSPE"), the Professional Engineers of North Carolina ("PENC"), the Institute of Electrical and

1 Electronics Engineers ("IEEE"), American Public Power Association ("APPA"),
2 American Standards and Testing Materials Association ("ASTM"), the National Fire
3 Protection Association ("NFPA"), and Professional Engineers in Private Practice
4 ("PEPP"). I have also served as a member of the IEEE Distribution Subcommittee on
5 Reliability and as an advisory member of the National Rural Electric Cooperative
6 Association ("NRECA")-Cooperative Research Network, which is an organization
7 similar to EPRI.

8 **Q. PLEASE BRIEFLY DESCRIBE YOUR EXPERIENCE WITH ELECTRIC**
9 **UTILITIES.**

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

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

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

22 **Q. HAVE YOU PREVIOUSLY TESTIFIED AS AN EXPERT IN OTHER**
23 **JURISDICTIONS?**

1 A. I have testified before the FERC and numerous state commissions, including in
2 Delaware, Florida, Maryland, Massachusetts, North Carolina, Pennsylvania, and
3 Virginia.
4

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 2018 Electric Infrastructure, Safety and
5 Reliability Plan provided to the Division September 27, 2016 ("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, 2016, together with summarizing the details of
9 *Exhibit GLB-1* and my recommendations.

10

1 **III. ISR PLAN EVALUATION PROCESS**

2 **Q. WOULD YOU BRIEFLY OUTLINE THE PROCESS WHICH LEADS TO THE**
3 **DIVISION'S SUPPORT OF THE NATIONAL GRID ISR PLAN FILED ON**
4 **DECEMBER 21, 2016 IN THIS DOCKET?**

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

- 7 • An August 23, 2016 meeting (Appendix-1 contains the Agenda for this meeting) was
8 held between the Division, PowerServices and the Company, to discuss the planning
9 process and the reports provided by National Grid in advance of the FY 2018 ISR
10 Plan filing ("Pre-Plan Information"),
- 11 • On September 27, 2016, the Company filed the initial FY 2018 ISR Plan Proposal,
- 12 • PowerServices evaluated the Pre-Plan Information and proposed ISR Plan, and on
13 October 24, 2016 provided Data Request No. 1,
- 14 • On November 23 and November 28, 2016, the Company provided a partial response
15 to Data Request No. 1,
- 16 • On December 1, 2016, the Division, PowerServices and the Company held a
17 teleconference to discuss each spending category in detail, review responses to data
18 requests, review Company changes to several spending categories, discuss status of
19 ongoing programs, and clarify additional outstanding information,
- 20 • Between December 1, 2016 and December 5, 2016, the Company provided remaining
21 responses to Data Request No. 1, an updated detailed budget, and clarifying
22 information requested during the December 1, 2016 conference call,
- 23 • On December 8, 2016, PowerServices and the Company held a teleconference to
24 further discuss each spending category in detail and identify outstanding information

- 1 required to complete a full review, which specifically included the delivery of
2 completed Area Studies,
- 3 • On December 14, 2016, PowerServices and the Company held a teleconference to
4 discuss materials provided by the Company during the December 8, 2016 conference
5 call. Preliminary budget adjustments were prepared subject to the Division's review
6 and concurrence,
 - 7 • On December 21, 2016, the Company filed its Electric Infrastructure, Safety, and
8 Reliability Plan FY 2018 Proposal which included preliminary budget adjustments
9 resulting from discussions with PowerServices and the Division. The Company
10 recognized in its filing that although proposed spending levels were recommended by
11 the Division, consensus on the full Plan had not been reached, and further, that the
12 Division reserved its right to continue reviewing the Plan after filing and propose
13 further adjustments or conditions as part of the ISR proceeding,
 - 14 • On January 19, 2016, the Division, PowerServices and the Company met to review in
15 detail the Company's Area Study completed to date, including process, components,
16 and results. Discussions included deficiencies, standardization, and the broader
17 concern of the lack of transparency and fragmentation between the Company's
18 multiple planning processes. This collaborative meeting provided a platform for the
19 Company to improve its Area Study process in support of the core business of safety
20 and reliability while prompting further discussions regarding the need for a cohesive
21 planning framework.

22

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, 2016 filing:

PROPOSED CAPITAL BUDGET by Spending Rationale	Initial FY2018 (9-27-16)	Preliminary Net Adjustments	Proposed FY2018 (12-21-16)
Customer Request/Public Requirements	\$ 21,646,000	\$ 207,000	\$ 21,853,000
Damage/Failure Total	\$ 13,079,000	\$ (1,700,000)	\$ 11,379,000
Subtotal Non-Discretionary	\$ 34,725,000	\$ (1,493,000)	\$ 33,232,000
South Street	\$ 25,783,000	\$ (10,000)	\$ 25,773,000
Asset Condition	\$ 20,194,000	\$ (3,225,000)	\$ 16,969,000
Non-Infrastructure	\$ 553,000	\$ -	\$ 553,000
System Capacity and Performance	\$ 23,245,000	\$ 847,000	\$ 24,092,000
Subtotal Discretionary	\$ 69,775,000	\$ (2,388,000)	\$ 67,387,000
Grand Total	\$ 104,500,000	\$ (3,881,000)	\$ 100,619,000

PROPOSED VEGETATION MANAGEMENT BUDGET	Initial FY2018 (9-27-16)	Net Adjustments	Proposed FY2018 (12-21-16)
Cycle Pruning	\$ 5,500,000	-	\$ 5,500,000
Hazard Tree	\$ 1,250,000	-	\$ 1,250,000
Sub-T	\$ 650,000	-	\$ 650,000
Police/Flagman Detail	\$ 775,000	-	\$ 775,000
All Other Activities	\$ 1,225,000	-	\$ 1,225,000
Program Total	\$ 9,400,000	\$ -	\$ 9,400,000

1 **IV. COMMENTS ON WITNESS TESTIMONY**

2 **Q. HAVE YOU REVIEWED THE PRE-FILED TESTIMONY OF JAMES H.**
3 **PATTERSON, JR. 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. Patterson and Mr. Moe accurately reflects the FY 2018 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 2018 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. A single project, South Street Substation rebuild,
20 continues to comprise a significant portion of the FY 2018 ISR Plan budget. Consistent
21 with my recommendation in the FY 2017 ISR Plan proceeding, the South Street budget
22 was managed separately from other discretionary projects, which provided more accurate
23 budget tracking and an additional level of transparency on variances. I continued 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 single completed Area Study (East Bay). A
4 major deficiency with the Company's project evaluation process is the lack of sufficient
5 Non-Wires Alternatives ("NWA") analysis. In addition, several discretionary programs
6 and projects have been delayed by the Company to the point that rationale, scope and cost
7 should be updated given the lag in completion. I recommended that the Company propose
8 a methodology to revise current and future study documents to include standard
9 components for analysis, including a robust NWA.

10
11 Most importantly, it has become apparent that the Company's overall planning process
12 lacks transparency and cohesiveness, particularly the relationship between the
13 Company's Design Criteria, SRP, and Area Studies. In addition, project alignment with
14 the Company's grid modernization strategy is becoming increasingly important, but is
15 uncertain under the current planning process. To support a coordinated, transparent and
16 proactive planning approach, I recommended that the Company develop an alignment
17 among the multiple processes currently implemented, and further, consider how a broader
18 grid modernization strategy may be incorporated in the overall planning process.

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 2018 ISR Plan
6 Proposed Budget of \$100.6 million for capital items and proposed a Vegetation
7 Management Program expense budget of \$9.4 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, 27 2016 initial proposed budget, net adjustments, preliminary budget, and the
15 December 21, 2016 Filed Proposed Budget.

16
17 The report contains a conclusion which addresses the FY 2018 ISR Plan Proposal Budget
18 as filed by National Grid on December 21, 2015. The conclusion includes thirteen (13)
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 2018 ISR Plan evaluation include the
23 need to develop an alignment between various planning and project evaluation processes,
24 including consideration of a grid modernization strategy. Additionally, the Company

1 should revise current and future study documents, taking into account robust evaluation
2 metrics that include NWA where applicable. Lastly, due to the sale of streetlights from
3 the Company to municipalities, I expect the Company to propose a methodology to
4 assign costs for Contact Voltage Program testing and remediation to municipal streetlight
5 owners.

6

7

1 **VI. CONCLUSION**

2 **Q. DO YOU AND THE DIVISION SUPPORT THE NATIONAL GRID FY 2018**
3 **ELECTRIC ISR PLAN PROPOSAL FOR \$100.6 MILLION IN BUDGETED**
4 **CAPITAL EXPENDITURES, WITH \$9.4 MILLION IN VEGETATION**
5 **MANAGEMENT EXPENSES AND \$1.2 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 four percent (4%) 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 thirteen (13) 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 and internal Design Criteria.

21
22 2. National Grid shall propose a methodology to revise current and future study
23 documents supporting Asset Replacement and System Capacity programs or projects
24 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, or
6 other requirements.
- 7 • A detailed comparison of recommendations to Area Studies to determine if
8 solutions are aligned with study outcomes, noting adjustments required to avoid
9 redundancy in planning.
- 10 • An evaluation of potential incremental investments that support the Company’s
11 long term grid modernization strategy. This includes description of technology
12 or infrastructure investment, cost, benefit to traditional safety and reliability
13 objectives, and additional operational benefits achieved if implemented.
- 14 • A robust NWA evaluation for projects passing initial screening that clearly
15 identifies alternatives considered, costs, and benefits.
- 16
- 17 3. National Grid shall develop a proposal on the methodology to assign Contact Voltage
18 program costs for the testing and remediation of elevated voltage to municipal
19 streetlight owners.
- 20
- 21 4. National Grid shall continue to develop a System Capacity Load Study and a 10-year
22 Long Range Plan in order to increase the level of support and transparency for the
23 capital budget. The Company shall submit and present the outcome of Area Studies to
24 the Division and its consultant at the time of completion. The Company shall submit a
25 report with updates on modeling activities and Areas Study status at least 120 days
-

1 prior to filing its FY 2019 ISR Plan Proposal, but in any event no later than August
2 31, 2017.

3
4 5. National Grid shall manage major Asset Replacement project budgets separate from
5 other discretionary projects, such that any budget variances (underspend) will not be
6 utilized in other areas of the ISR Plan. The Company shall provide quarterly budget
7 and project management reports.

8
9 6. National Grid will continue to manage (underspend/overspend management)
10 individual project costs within the ISR Plan discretionary category (comprised of
11 Asset Condition and System Capacity and Performance projects), such that total
12 portfolio costs are aligned within a discretionary budget target that excludes South
13 Street.

14
15 7. National Grid shall continue to provide quarterly reporting on Damage/Failure
16 expenditures to include the details of completed projects by operating region. The
17 Company will separately identify Level I projects repaired as a result of the I&M
18 program.

19
20 8. National Grid shall continue to provide a detailed budget for System Capacity &
21 Performance and Asset Condition in order to provide transparency on a project level
22 basis for the current and future 4-year period. The budget shall be provided in
23 advance of the FY 2019 ISR Plan Proposal filing, but in any event no later than
24 August 31, 2017.

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9. 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 2019 ISR Plan Proposal filing, but in any event no later than August 31, 2017.

10. 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 2019 ISR Plan Proposal filing, but in any event no later than August 31, 2017.

11. 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 2019 ISR Plan Proposal, but in any event no later than August 31, 2017.

12. 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 2019 ISR Plan Proposal, but in any event no later than August 31, 2017.

13. National Grid shall continue to provide quarterly confidential reports to the Division concerning the progress of its negotiations with Verizon on a new Joint Ownership Agreement.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

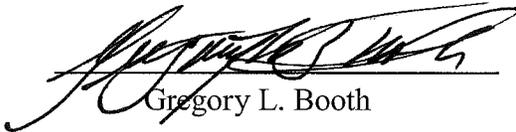
A. Yes.

AFFIDAVIT OF GREGORY L. BOOTH, PE

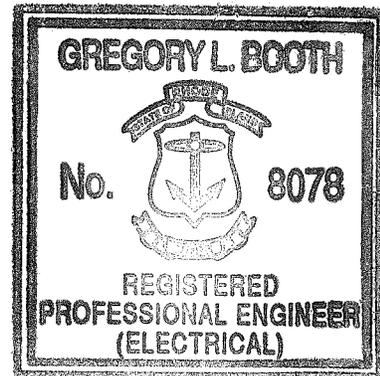
Gregory L. Booth, does hereby depose and say as follows:

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 16th day of February, 2017.


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 2018 Electric Infrastructure, Safety, and Reliability Plan
Docket No. 4682**

February 16, 2017

Prepared By:
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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 2018 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

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
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EXHIBIT GLB-1

REPORT OF GREGORY L. BOOTH, PE

I. INTRODUCTION

PowerServices, Inc. ("PowerServices"¹) 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 2018 Proposal (the "ISR Plan" or "Plan") dated September 27, 2016, and the final Electric Infrastructure, Safety, and Reliability Plan FY 2018 Proposal dated December 21, 2016 and filed in Docket 4682. The evaluation followed the same process of analysis completed for each ISR Plan filed from FY 2012 through FY 2017. This Report will include an explanation of the process for the initial FY 2018 ISR Plan proposal evaluations and collaborative efforts, resulting in a preliminary reduction of proposed FY 2018 capital spending in several areas, including Customer Request/Public Requirements, capital expenses for asset replacement and load relief projects, and operation & maintenance ("O&M") expenses for Vegetation Management ("VM"). The reductions were applied to the proposed spending levels in the Company's initial FY 2018 ISR Plan Proposal submitted to the Division September 27, 2016, and are reflected in the subsequent FY 2018 ISR Plan Proposal dated December 21, 2016.

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

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

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REPORT OF GREGORY L. BOOTH, PE

propose further adjustments or conditions as part of the ISR Plan proceeding. In this report, I will discuss the areas of consensus between the Division and Company, as well as additional adjustments and conditions recommended by the Division that were developed after the Company filed its proposed Electric ISR Plan in Docket No. 4682. I will also provide an update on the Company's Long Range Planning process, deficiencies, and the Division's desire for a cohesion and transparency in the Company's multiple planning activities.

The Company's initial proposed September 27, 2016 FY 2018 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, and other supplemental information. The Company's quarterly updates for the FY 2017 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 2018 ISR Plan was undertaken. The evaluation and analysis process was performed, including the following actions and procedures:

1. An August 23, 2016 meeting (Appendix-1 contains the Agenda for this meeting) was held between the Division, PowerServices and the Company, to discuss the planning process and the reports provided by National Grid in advance of the FY 2018 ISR Plan filing ("Pre-Plan Information"),
2. On September 27, 2016, the Company filed the initial FY 2018 ISR Plan Proposal,

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

3. PowerServices evaluated the Pre-Plan Information and proposed ISR Plan, and on October 24, 2016 provided Data Request No. 1,
4. On November 23 and November 28, 2016, the Company provided a partial response to Data Request No. 1,
5. On December 1, 2016, the Division, PowerServices and the Company held a teleconference to discuss each spending category in detail, review responses to data requests, review Company changes to several spending categories, discuss status of ongoing programs, and clarify additional outstanding information,
6. Between December 1, 2016 and December 5, 2016, the Company provided remaining responses to Data Request No. 1, an updated detailed budget, and clarifying information requested during the December 1, 2016 conference call,
7. On December 8, 2016, PowerServices and the Company held a teleconference to further discuss each spending category in detail and identify outstanding information required to complete a full review, which specifically included the delivery of completed Area Studies,
8. On December 14, 2016, PowerServices and the Company held a teleconference to discuss materials provided by the Company during the December 8, 2016 conference call. Preliminary budget adjustments were prepared subject to the Division's review and concurrence,
9. On December 21, 2016, the Company filed its Electric Infrastructure, Safety, and Reliability Plan FY 2018 Proposal which included preliminary budget adjustments 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

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

reserved its right to continue reviewing the Plan after filing and propose further adjustments or conditions as part of the ISR proceeding,

10. On January 19, 2016, the Division, PowerServices and the Company met to review in detail the Company's Area Study completed to date, including process, components, and results. Discussions included deficiencies, standardization, and the broader concern of the lack of transparency and fragmentation between the Company's multiple planning processes. This collaborative meeting provided a platform for the Company to improve its Area Study process in support of the core business of safety and reliability while prompting further discussions regarding the need for a cohesive planning framework.

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 2018 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.

The structure of the FY 2018 ISR Plan filing closely followed the FY 2017 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

EXHIBIT GLB-1

REPORT OF GREGORY L. BOOTH, PE

and incorporation of an Inspection & Maintenance Program to replace the phased out Feeder Hardening Program. The FY 2018 Plan continued the trend of significant discretionary spending levels for major construction projects, including South Street substation rebuild, initially addressed in the FY 2016 Plan and discussed extensively in the FY 2017 Plan. The Company adhered to new conditions introduced in the FY 2017 Plan, including managing the South Street budget and remaining discretionary projects separately and providing details on damage and failure expenditures within quarterly filings.

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. Among the items utilized by the Company, the Division and PowerServices in reaching a consensus on the preliminary adjustments were the quarterly reports². 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. Additionally, there was substantial discussion concerning Damage/Failure trends, major Asset Replacement programs, I&M costs, System Capacity load relief projects, and the Company's guidelines for evaluating non-wires alternatives ("NWA").

Historically, the Division and Company have reached consensus on proposed spending levels in all ISR categories. For the FY 2018 Plan, preliminary agreement was reached on several adjustments, but the Division withheld full consensus pending further evaluation. The need for

² For this report, PowerServices referenced the Company's FY 2017 ISR Plan forecast prepared on December 15, 2016. This forecast differs from the Company's Docket 4592 – National Grid's Electric Infrastructure, Safety, and Reliability Plan Quarterly Update - Second Quarter Ending September 30, 2016 (for FY 2017 dated November 22, 2016)

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further review resulted from 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. A single Area Study (East Bay) had been delivered at the time of the FY 2018 Plan evaluation, while two additional Area Studies (Providence and Central Rhode Island East) were pending. The Company proposed to present the study process and outcomes at a meeting which ultimately occurred after the Plan was filed. The FY 2018 ISR Plan, as adjusted during the evaluation process, is reflected in the Company's December 21, 2016 filing with the Rhode Island Public Utilities Commission. The Company has agreed it will not incorporate any new major substation projects or large programs in its ISR Plan that have not been demonstrated to be necessary in a completed and fully presented Area Study. Appendix-3 lists a Summary of the Capital Outlays by key driver category and budget classification, as originally proposed by the Company on September 27, 2016, with net adjustments listed. The Division, PowerServices and the Company, agreed on all preliminary adjustments. 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

A. Overview

I have evaluated the \$100.6 million FY 2018 Capital Spending Plan proposed by the Company, along with its supporting testimony and exhibits as contained in its filing dated December 21, 2016. I first reviewed the initial proposed ISR Plan submitted to the Division dated September 27, 2016 in the amount of \$104.5 million. Over a period of approximately eleven (12) 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 in September 2016, preliminary net adjustments, and the Company's proposed budget as shown in Chart 7 of the FY 2018 ISR Plan as filed on December 15, 2016 in Docket No. 4682. The \$100.6 million is the preliminary level reached through the evaluation process.

Table 1: Proposed FY 2018 Capital Outlays by Key Driver Category

PROPOSED BUDGET by Spending Rationale	Initial FY2018 (9-27-16)	Preliminary Adjustment	Proposed FY2018 (12-21-16)
Customer Request/Public Requirements	\$ 21,646,000	\$ 207,000	\$ 21,853,000
Damage/Failure Total	\$ 13,079,000	\$ (1,700,000)	\$ 11,379,000
Subtotal	\$ 34,725,000	\$ (1,493,000)	\$ 33,232,000
Asset Condition	\$ 45,979,000	\$ (3,235,000)	\$ 42,744,000
Non-Infrastructure	\$ 553,000	\$ -	\$ 553,000
System Capacity and Performance	\$ 23,245,000	\$ 847,000	\$ 24,092,000
Subtotal	\$ 69,777,000	\$ (2,388,000)	\$ 67,389,000
Grand Total	\$ 104,502,000	\$ (3,881,000)	\$ 100,621,000

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The Company projects the need for non-discretionary expenditures of \$21.9 million in Customer Request/Public Requirements spending, and \$11.4 million in Damage/Failure spending. The non-discretionary budget is approximately thirty-three percent (33%) of the ISR Plan Capital requirements, and twelve percent (12%) higher than the FY 2017 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 \$12.3 million between FY 2013 and FY 2017. The upward trend in costs is influencing the overall non-discretionary category, which is consistently exceeding annual targets. There are uncontrollable events contributing to increased spend, such as a failed substation transformer in FY 2017. However, PowerServices has questioned and closely evaluated individual projects to ensure

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that the Company is not incorporating work that is normally captured under I&M expenses. Overall, the Company agreed to a preliminary adjustment of \$1.5 million, and is proposing to spend a total of \$33.2 million for 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 2018 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 \$67.4 million for the remaining sixty-three percent (67%) of the proposed capital budget. One major project, South Street rebuild, comprises \$25.8 million or twenty-six percent (26%) of the total ISR budget. The Company is managing the South Street budget 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 is much slower than anticipated, with one study (East Bay) completed in 2016. 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.

For the three categories (Asset Condition, Non-Infrastructure, and System Capacity and Performance), the initial proposed budget was \$69.8 million, which has been adjusted down to \$67.4 million in the FY 2018 ISR Plan Proposal filing based on the preliminary agreement between the Division, PowerServices, and the Company. In Sections D, E, and F, I will

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discuss each of these categories separately, explaining the overall reduction and budget management conditions expected of the Company. I will also compare the FY 2018 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 2018 ISR Plan included \$21.6 million of Customer Request/Public Requirements cost. This compares to a FY 2017 ISR budget and forecast of \$19.5 million and \$19.8 million respectively.

Proposed Budget	Initial FY2018 (9-27-16)	Preliminary Adjustment	Proposed FY2018 (12-21-16)
Customer Request/Public Requirements	\$ 21,646,000	\$ 207,000	\$ 21,853,000

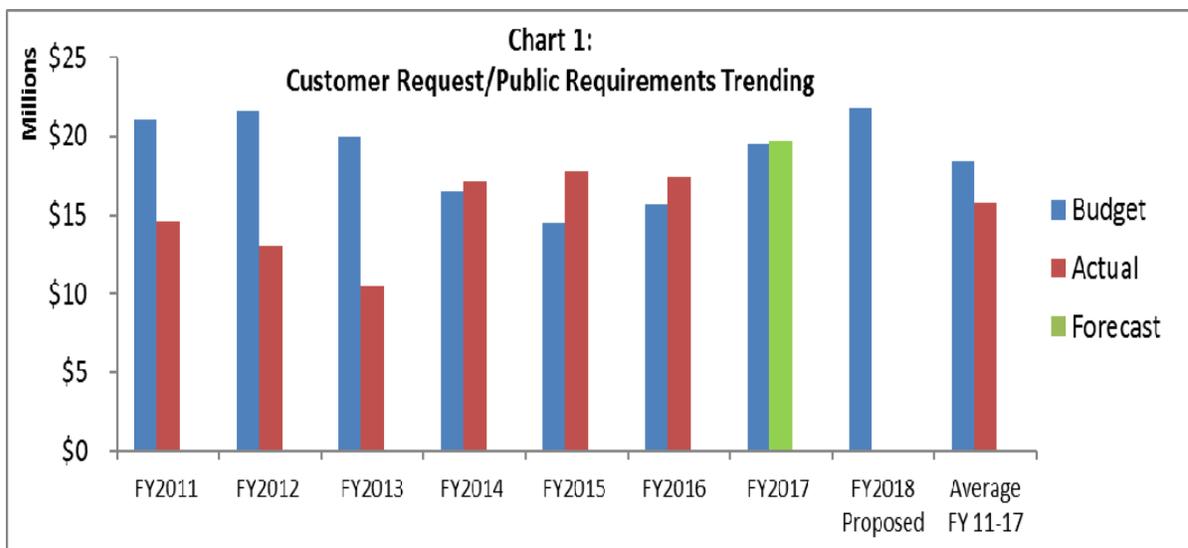
Budget Variance	Filed FY2017	Over/(Under) Budget	FY2017 Forecast (as of 12/15/16)
Customer Request/Public Requirements	\$ 19,450,550	\$ 303,450	\$ 19,754,000

The Company expects to closely meet the FY 2017 budget projection, although several projects within the category have significant variations. According to the Company’s quarterly update filing, there are several off-setting factors contributing to the forecast:

- \$1.4 million credit due to significant reimbursements collected for prior-year capital spending, such as the I-95 RIDOT project.
- \$1.3 million over-budget for the Block Island Transmission System (“BITS”) Wakefield Substation Upgrade due to higher than expected soil remediation environmental costs and increased engineering costs.
- 0.7 million for the unbudgeted WED 15 MW DG Service Line. Customer delays have extended the project while reimbursed costs were previously collected.

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



The FY 2018 proposed budget is an increase of \$2 million over the FY 2017 forecast, predominantly driven by new commercial projects, including a Liquefied Natural Gas (LNG) plant in Providence. 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 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 addition, I will screen projects that are categorized as customer driven, but should be part of other ISR discretionary programs, or alternately, part of Company programs outside of the

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ISR. An example in the FY 2018 Plan is the cost incurred for the BITS Wakefield Substation Upgrade soil remediation. It is anticipated that the Company will perform a closer evaluation of the driver for this cost and determine if recovery should be included in an environmental compliance category outside of the ISR.

In summary, I agree with the proposed budget of \$21.9 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 2018 ISR Plan included \$13.1 million in the Damage/Failure category for non-discretionary costs to replace equipment that unexpectedly fails or becomes damaged. This compares to a FY 2017 ISR budget and forecast of \$11.5 million and \$14.4 million, respectively.

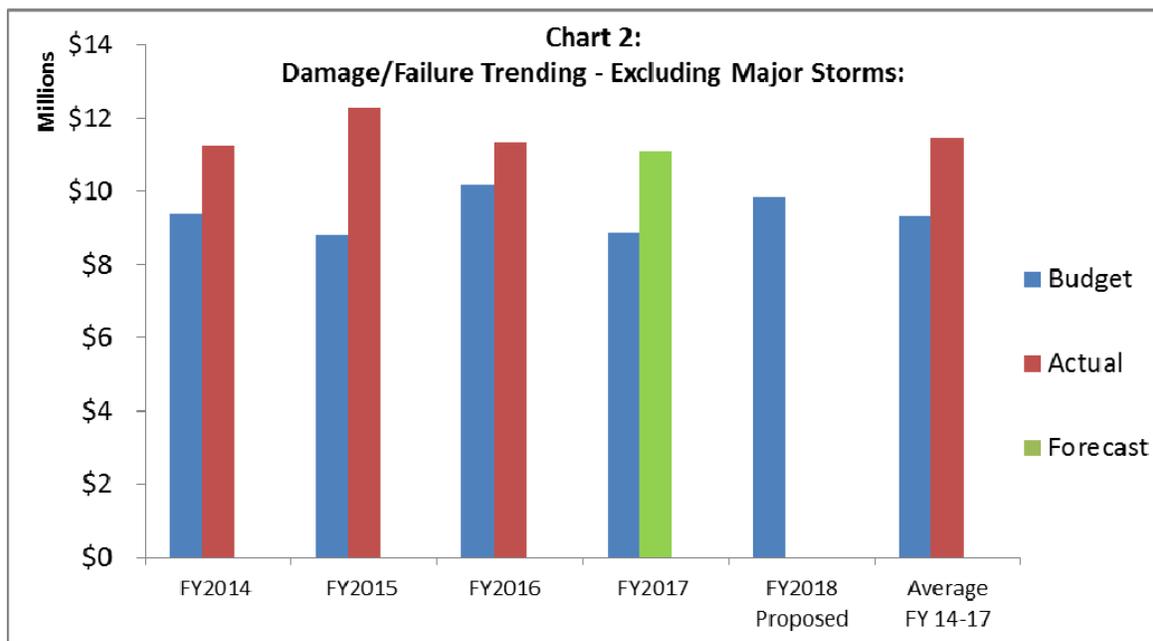
Proposed Budget	Initial FY2018 (9-27-16)	Peliminary Adjustment	Proposed FY2018 (12-21-16)
Damage/ Failure (inc. Reserves)	\$ 9,692,000	\$ (1,700,000)	\$ 7,992,000
Major Storms – Dist	\$ 3,387,000		\$ 3,387,000
Damage/Failure Total	\$ 13,079,000	\$ (1,700,000)	\$ 11,379,000

Budget Variance	Filed FY2017	Over/(Under) Budget	FY2017 Forecast (as of 12/15/16)
Damage/ Failure	\$ 8,867,000	\$ 3,442,000	\$ 12,309,000
Major Storms – Dist	\$ 2,600,000	\$ (539,000)	\$ 2,061,000
Damage/Failure Total	\$ 11,467,000	\$ 2,903,000	\$ 14,370,000

The Company continues to incur expenses over budget in this category with an overall FY 2017 variance projected at \$2.9 million. A more granular analysis indicates that major

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storms, which are unpredictable, are not a contributing factor in FY 2017. The Company's unplanned work performed under the Damage/Failure blanket category is trending \$3.4 million above budget. The biggest driver is an unbudgeted substation transformer replacement project. In addition, costs to replace distribution equipment that unexpectedly fails or becomes damaged continues to increase. 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 was recognized in my FY 2016 report where I stated that the magnitude and frequency of variances revealed several areas of concern, including whether the Company was a) accurately reflecting costs; b) monitoring the type and level of work performed under the I&M program which influences the Damage/Failure expenses; and/or c) using appropriate methodologies to estimate the budget. For the FY 2018 Plan, detailed discussions on budget variances continued to focus on the Ocean State blanket, since it comprises most of the budget. To ensure conformance to the spending rationale, I performed a historical

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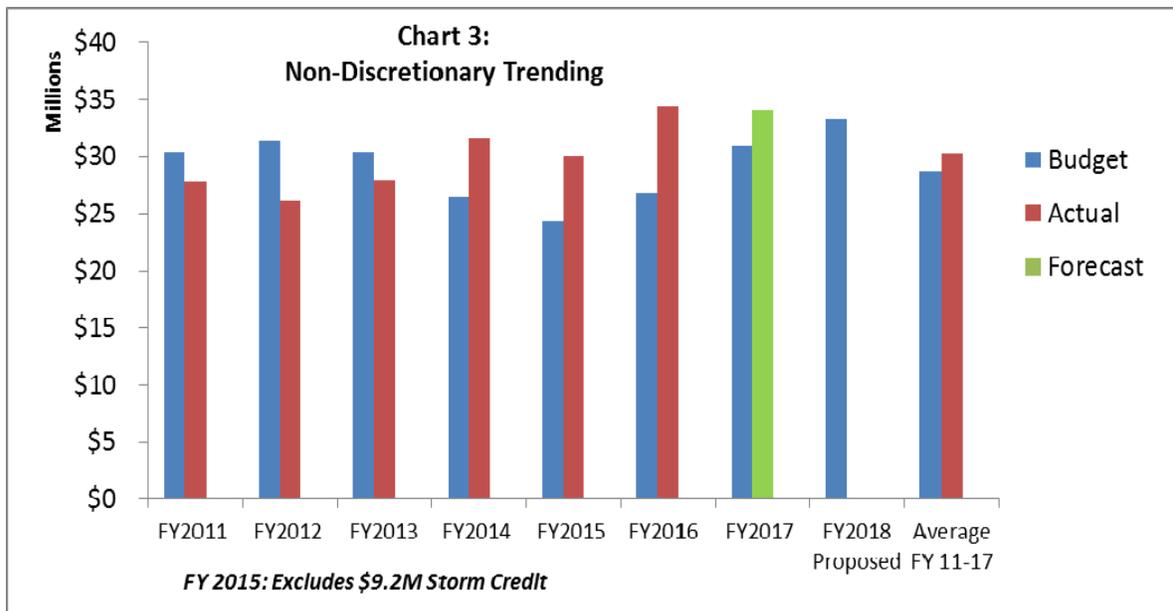
evaluation by requesting a complete list of Damage/Failure projects completed under the most recent Plan year (FY 2016). Consistent with my observations in previous reports, the list of Damage/Failure projects included several equipment replacements that were actually condition based and more discretionary in nature than non-discretionary. The Company appropriately reclassified those projects to the I&M program.

For ongoing evaluation, 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. The Company would separately identify Level I projects repaired as a result of the I&M program. My examination of Damage/Failure projects through the Company's quarterly filings does not result in recommended adjustments, although the Company has agreed to a reduction of \$1.7 million. This is to compensate for significant budget dollars included on the basis of a previous substation transformer replacement that was unplanned. No adjustments were recommended to the Major Storms category.

Upon conclusion of the evaluation, there is a \$1.7 million adjustment to the Company's proposed budget of \$13.1 million in the Damage/Failure category, resulting in a final budget of \$11.4 million. 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 \$33.2 million which is 33% 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 is currently dominated by a single project for the South Street Substation upgrade in Providence. As a result of the FY 2017 ISR evaluation, I recommended, and the Company concurred, that major projects such as South Street 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

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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 is separated into three areas. For the FY 2018 ISR Plan, the Company has proposed a \$25.8 million budget for South Street, \$18.6 million for Asset Condition projects, and \$1.6 million for the I&M program. The FY 2018 proposed total is \$46 million. This compares to the FY 2017 budget and forecasted actuals of \$33.3 million and \$35 million respectively.

Proposed Budget	Initial FY2018 (9-27-16)	Peliminary Adjustment	Proposed FY2018 (12-21-16)
South Street	\$ 25,783,000	\$ (10,000)	\$ 25,773,000
Asset Replacement	\$ 18,591,000	\$ (3,220,000)	\$ 15,371,000
Asset Replacement - I&M	\$ 1,605,000	\$ (5,000)	\$ 1,600,000
Total Asset Condition	\$ 45,979,000	\$ (3,235,000)	\$ 42,744,000

Budget Variance	Filed FY2017	Over/(Under) Budget	FY2017 Forecast (as of 12/15/16)
South Street	\$ 15,360,000	\$ 1,626,000	\$ 16,986,000
Asset Replacement	\$ 15,410,000	\$ (809,000)	\$ 14,602,000
Asset Replacement (I&M)	\$ 2,510,000	\$ 811,000	\$ 3,321,000
Total Asset Condition	\$ 33,280,000	\$ 1,628,000	\$ 34,909,000

The increase in Asset Condition spend has been noted and reported over my last three ISR Plan evaluations. Aging equipment throughout the service territory and the need for significant upgrades in highly loaded corridors has placed upward pressure on the Company’s budget. The Company’s estimates indicate that condition and capacity based projects are forecasted at over \$150 million over the next five years. The Asset Condition budget grew by 40% between FY 2016 and FY 2017, and is over twenty percent (20%) above last year.

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Over the course of this ISR review, the Company and Division reached preliminary consensus that this category should be adjusted downward by \$3.24 million to \$42.7 million. Results of PowerServices' evaluation, the rationale for adjustments, and additional conditions requested of the Company, are addressed separately between the South Street, Asset Replacement and I&M categories.

1. South Street

The South Street Substation rebuild is the Company's first major Asset Replacement project. It started as an \$18 million project when originally sanctioned, was estimated at \$55 million in the Company's FY 2017 filing, and is now estimated at nearly \$59 million. Significant scope changes have occurred due to the location of the proposed work in concert with the need to coordinate with private development projects in Providence. It comprises nearly twenty-six percent (26%) of the total ISR capital budget, or \$26 million dollars. Due to the significant scope and potential for wide budget variances, it was recommended that the Company reconcile South Street as a separate Asset Condition category.

Review of the FY 2017 South Street forecast indicates that the Company forecasts a \$1.6 million variance or approximately ten percent (10%) over-budget. One million dollars of the variance is due to the transfer of Providence Study costs from a discretionary category to South Street. The Company is tracking closely to current cost estimates. In addition, the Company represented that the milestones established last year have not changed. This is an improvement over previous years where I have highlighted my concern with the Company's failure to develop comprehensive and accurate capital project estimates and

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timelines. It is clearly a positive step that the Company has improved its budget and scheduling process for mature projects. I re-iterate 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.

The Company has provided, and is following, a proposed South Street construction timeline and contractor payment schedule. The site has undergone significant infrastructure improvements and work continues to meet a September 2019 completion date. Several risk components attributed to unknown underground work, coordination with developers and outages have been identified that may impact the future construction schedule and budget. It is anticipated that the Company will continue quarterly reporting to keep the Division apprised of significant changes. Overall, evaluation of the South Street FY 2018 budget resulted in minimal changes. The Company proposed a minor adjustment of \$10,000, which was found acceptable. This resulted in a final proposed budget of \$25.7 million dollars.

2. Asset Replacement

The Asset Replacement category contains sanctioned projects spanning multiple years, along with 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 2018, the Company proposed a \$16.4 million budget for customarily recurring programs, including URD cable strategy, underground cable replacement, metalclad switchgear replacement, transformers, substation breakers and reclosers. The Company also

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budgeted \$2.1 million for specific major projects excluding South Street. This brought the Asset Replacement category to a total of \$18.6 million.

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 projects or 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.

Concurrent with project lag time, specifically over the past three years, the Company has also been performing several Area System Studies. To date, the Company has delivered only one completed study (East Bay), which is discussed in Section G. The lack of timely studies and delay of Asset Replacement projects has compelled a closer analysis to determine if legacy programs should now be re-evaluated against Area Studies since a great deal of time has passed since they were initially proposed. In addition, it has become evident that industry technology advancements may outpace project implementation. This does not imply that new technology mitigates the need for equipment replacement, but that previously proposed solutions may be enhanced. The Company is well positioned to consider economic investments that not only meet the primary objectives of safety and reliability, but incorporate grid modernization elements in their long range capital plans.

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An example of this screening is the Form 3A replacement program, which was not adequately described in detail until the planning meeting with the Company. This is actually an old, oil filled recloser Form 3A control replacement program where the Company is targeting thirty-eight (38) obsolete units on the system. The Company proposed an increase in spend for FY 2018 in an effort to prioritize replacement. I evaluated in detail the components and rationale for the program. Reclosers are protective devices that open and close in response to system conditions to limit outage exposure, protect system components, and protect the public. When coupled with advanced communications, they have the ability to send and receive system data that can be used for more sophisticated grid operations. In my discussion with the Company, it was confirmed that the old and deteriorated units had limited communications ability, and that the Company would deploy units manufactured with upgraded technology compatible with current and future needs of the system. The Company's study document actually referenced compatibility with future Grid Modernization projects, as the following excerpt indicates, although limited details were provided:

Grid Mod

National Grid's future Grid Modernization projects will require field switching devices that are capable of sensing voltage and current, and are equipped with special communication features. Units installed by this replacement effort should have the ability to be modified as required, and be compatible with any technology we are currently adopting. Today's construction standards call for the use of modern Viper reclosers which offer multiple alternatives for communications, provide readings for voltage and current, and are reasonably flexible to allow some future modifications, so they are the best choice for replacement at this time.

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In this case, the proposed equipment did not require an incremental investment. Where additional costs for technology would be incurred under the ISR Plan, however, the Company should evaluate both technology cost and benefit.

The Division and PowerServices have held lengthy discussions with the Company to address key issues in the ISR Planning process, including project latency, Area Study delays, and the fundamental intersection of reliability improvements and grid modernization. The Company has historically relied on ISR Plan objectives of safety and reliability to support discretionary projects. The Company must also consider multiple factors when evaluating projects, including, but not limited to, engineering studies and Design Criteria, guidelines established through the SRP, and PUC approved programs or pilots, which I discuss in more detail in Section G. The delays in completing both Area Studies and Asset Replacement programs present ample opportunity for the Company to refresh their evaluations to not only ensure that solutions meet comprehensive system planning needs, but that technology improvements for a modernized grid are considered. In support of this concept, it is important to create a more robust study process and strategic implementation schedule for Asset Replacement projects and programs. I recommend that the Company propose a methodology to revise current and future study documents for Asset Replacement programs to include, at minimum, standard components below. In addition, all proposed major Asset Replacement projects that have not commenced should include these same components.

- The traditional elements included in the Company's current studies including, but not limited to, purpose and problem statement, scope and program description,

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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 grid modernization, including cost/benefit. This includes description of technology or infrastructure investment, benefit to traditional safety and reliability objectives, and additional operational benefits achieved if implemented.

In summary, evaluation of the FY 2018 Asset Replacement budget yielded a preliminary reduction of \$3.24 million dollars for projects that should be deferred until aligned with an approved Area Study (see Table 2). This category sparked extensive discussions regarding program latency, the continued need for comprehensive planning, and the Division's interest in a more transparent process that recognizes the need and impacts of grid modernization. PowerServices and the Division had productive discussions with the Company on Areas Study deficiencies, the need to formalize Asset Replacement program documentation, and grid modernization initiatives. I recommend that discussions continue in preparation for the FY 2019 filing such that the Company may refine and incorporate concepts presented in this report.

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Table 2: Asset Replacement Projects Detail

Asset Replacement Projects (\$000)	FY17 ISR Budget	FY 2017 Forecast	FY 2018 Budget
Battery Replacement	411	253	199
Indoor Sub Replacement	25		-
Metalclad Replacement	2,285	2,259	586
Substation Transformers	956	502	1,535
T-Body	-	92	-
Relay Replacements	746	600	432
Substation Breakers & Reclosers	1,175	1,536	1,600
Network Arc Flash	598	383	417
RAPR	182	61	231
UG Cable	2,500	2,760	2,750
URD	2,500	2,500	3,000
Blanket Projects	2,805	2,358	2,450
Other Asset Replacement	449	854	924
Recloser Replacement			410
Reserves	-	-	-
Sub-Total Recurring Projects	14,632	14,158	14,534
South St Station Rebuild	15,360	16,986	25,773
Dyer Street-Indoor Substation		26	402
Eldred Substation Rebuild	-		-
New Southeast Sub	25	19	435
Langworthy Substation Rebuild (flood)	-		-
Memorial Blvd_Cable Relocation	532	331	-
Flood - Hope Substation	221	65	-
Flood - Pontiac	-		-
Flood - Warwick Mall Sub	-	3	-
Flood - Westerly	-	-	-
Sub-Total Individual Projects	16,138	17,430	26,610
TOTAL (exc. I&M)	30,770	31,588	41,144

3. Inspection & Maintenance Program

The I&M Program addresses deteriorated assets to ensure that the distribution and sub-

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transmission system is safe, reliable and environmentally sound. Inspections³ 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 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 2018. To date, the Company has designed 42% of feeders inspected in the first cycle and has completed repair work on 28%. The Company will also continue inspections of its manhole-based underground assets, sub-transmission system, and mobile elevated voltage testing as part of the I&M Program.

Proposed spending for FY 2018 is comprised of \$1.6 million for capital and \$1.4 million for O&M components, for a total program budget of \$3 million. This compares to a total program budget of \$4.1 million and forecast of \$4.9 million for FY 2017. Discussions with the Company revealed several areas of refinement, particularly to components of the O&M category. This resulted in a preliminary reduction of \$151,000 for a total program budget of \$2.8 million.

Proposed Budget I&M Capital and O&M	Initial FY2018 (9-27-16)	Peliminary Adjustment	Proposed FY2018 (12-21-16)
Capital Costs (included in capital budget)	\$ 1,605,000	\$ (5,000)	\$ 1,600,000
Opex Related to Capex	\$ 361,800		\$ 361,800
Inspections and Repair Related Costs	\$ 829,000	\$ (206,000)	\$ 623,000
Removal Costs	\$ 161,000		\$ 161,000
Long Range Plan Study	\$ 25,000		\$ 25,000
VVO/CVR Program	\$ -	\$ 60,000	\$ 60,000
Total Operation and Maintenance Expenses	\$ 1,376,800	\$ (146,000)	\$ 1,230,800
Total Program Costs	\$ 2,981,800	\$ (151,000)	\$ 2,830,800

³ 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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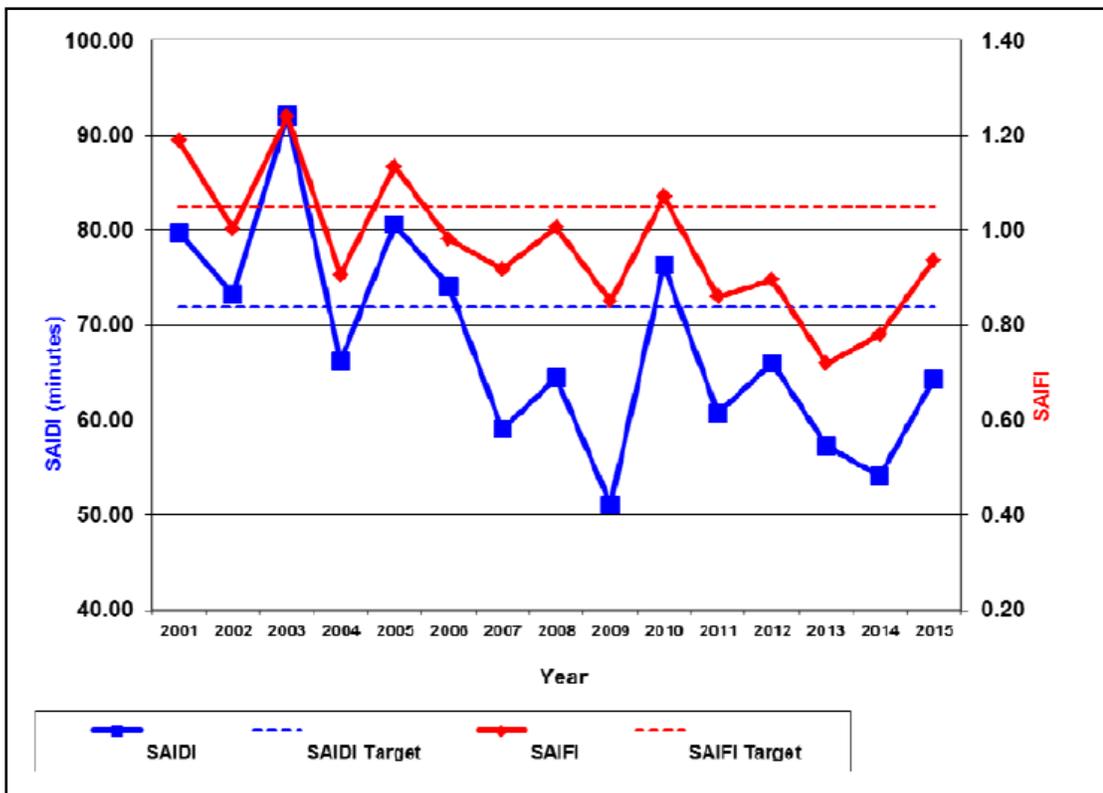
Budget Variance I&M Capital and O&M	Filed FY2017	Over/(Under) Budget	FY2017 Forecast (as of 12/15/16)
Capital Costs (included in capital budget)	\$ 2,510,000	\$ 811,000	\$ 3,321,000
Opex Related to Capex	\$ 450,000	\$ 25,000	\$ 475,000
Inspections and Repair Related Costs	\$ 817,000	\$ -	\$ 817,000
Removal Costs	\$ 320,000	\$ (70,000)	\$ 250,000
Long Range Plan Study	\$ 25,000	\$ -	\$ 25,000
VVO/CVR Program	\$ -	\$ -	\$ -
Total Operation and Maintenance Expenses	\$ 1,612,000	\$ (45,000)	\$ 1,567,000
Total Program Costs	\$ 4,122,000	\$ 766,000	\$ 4,888,000

For FY 2018, the Company continues I&M capital budget decreases compelled by their desire to achieve a total ISR Plan capital budget target. This is consistent with PowerServices' observation that the I&M program has warranted budget reductions over previous years, but not for the purpose of meeting a total ISR budget goal. The program is mature, and successful implementation has influenced excellent reliability results. The Company is meeting or exceeding annual service reliability targets for most years. (Chart 4).⁴

⁴ Docket 4682 - National Grid's Proposed FY 2018 Electric ISR: Section 2, page 3

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**CHART 4: RI Reliability Performance Regulatory Criteria
(Excluding Major Event Days)**



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 is the potential delay in the construction cycle. At the current construction rate (28% complete after 6 years), the Company is closer to a twenty-five year construction cycle, which exceeds the targeted ten-year cycle. This extended cycle does not currently present any reliability or operational concerns. However, as noted at length in my previous evaluations, I&M work may be shifting to a non-discretionary category, which arbitrarily affects budgets and the construction cycle. It is anticipated that the Company will take additional efforts to screen projects in the Damage/Failure category to exclude I&M work. In addition, to better monitor activity and expenses between both categories,

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PowerServices has requested that the Company supplement future quarterly filings with more detail in the Damage and Failure subcategory, including identification of Level I I&M construction. The detailed reporting will aid in understanding the rationale for expenditures and whether projects are pursued due to imminent failure as opposed to preventative maintenance. This reporting has recently commenced and future evaluation may prompt recommendations to re-allocate budgets between the categories, but will not prevent the Company from performing necessary work. In addition, tracking progress in both categories will provide a better understanding of the true construction cycle for system repair work. No adjustments were recommended to the I&M capital component beyond the Company's slight reduction of \$5,000.

Regarding adjustments to the O&M category, additional discussions with the Company focused on the mobile elevated voltage testing program. This program emanated from the Rhode Island Contact Voltage statute signed into law on June 6, 2012. The statute directed the Rhode Island Public Utilities Commission ("PUC") to establish a contact voltage detection, repair and reporting program applicable to National Grid. The PUC issued a program order on November 9, 2012 establishing thirteen (13) areas for the Company to conduct testing and surveys for contact voltage on all conductive surfaces in the public rights-of-ways. The PUC issued a subsequent order on February 1, 2013, requiring the Company to complete initial testing and surveying in all thirteen (13) areas within the first year. Since that time, the Company has maintained a schedule to complete 100% of system testing each year in lieu of the statutory minimum of 20%. This PUC approved methodology proved efficient, while supporting the Company's commitment to public safety.

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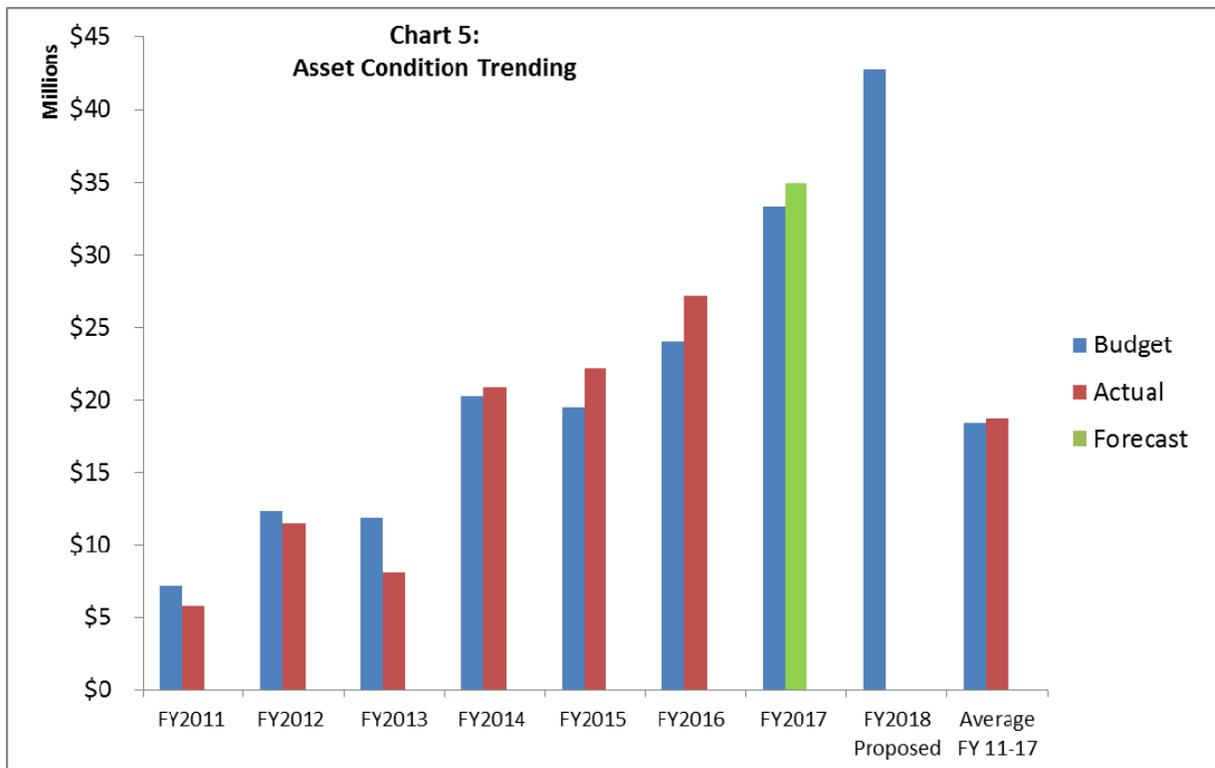
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Recent activities regarding municipal streetlights has raised awareness of the Company's elevated voltage testing schedule and budget. By FY 2018, the Company will have sold all municipal streetlights to respective towns and cities in its service territory. Although asset ownership will change, the Company, by statute, remains responsible for testing and surveying for elevated voltage within the municipal rights-of-ways. I recommend that the Company develop a proposal on the methodology to assign program costs for testing municipality owned infrastructure to respective municipalities. Furthermore, the Company and each streetlight owner must 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. Additionally, I recommend, and the Company has agreed, to revert to a testing cycle consistent with the statutory requirement of 20% of the system annually. This results in a \$206,000 reduction to the inspections and repairs O&M budget. Offsetting the reduction to the inspection and repair costs is a \$60,000 increase in O&M to advance the VVO/CVR program. I find the additional O&M budget acceptable.

In summary, concurrence was reached on net budget reductions of \$151,000 for the total I&M program, resulting in a FY 2018 proposed capital budget of \$1.6 million and \$1.2 million for O&M. This brings the total FY 2018 ISR proposed capital budget for Asset Condition to \$42.7 million, comprised of \$25.7 million for South Street, \$15.4 million for other Asset Replacement projects, and \$1.6 million for the I&M program. A chart reflecting historical spend compared to the current proposal continues to highlight the continuous upward pressure on the Company's capital needs due to significant projects. (Chart 5).

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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 \$553,000 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 substation capacity expansion projects. The Company initially proposed to expend \$23.3 million in the System Capacity and Performance Category, or twenty-two percent (22%) of the total FY 2018 ISR Plan budget. The proposed budget is over twenty percent (20%) higher than the FY 2017 budget of \$19 million. Additional adjustments were applied during the

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course of my evaluation, discussed below, which increased the final proposed budget to \$24.1 million.

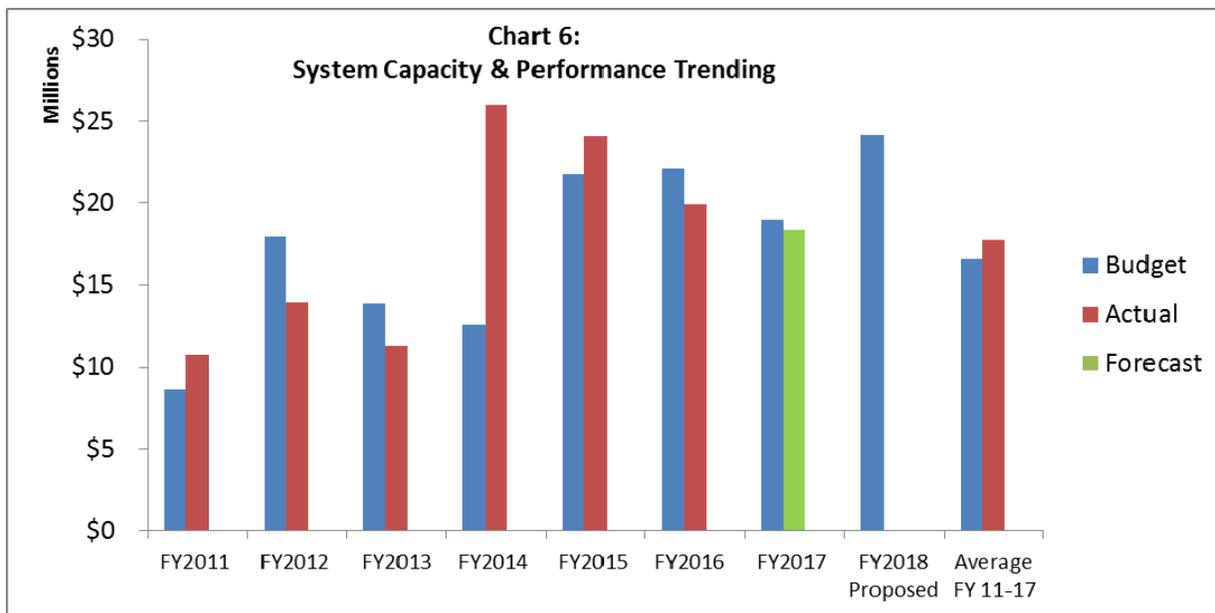
Proposed Budget	Initial FY2018 (9-27-16)	Peliminary Adjustment	Proposed FY2018 (12-21-16)
System Capacity and Performance	\$ 23,245,000	\$ 847,000	\$ 24,092,000

Budget Variance	Filed FY2017	Over/(Under) Budget	FY2017 Forecast (as of 12/15/16)
System Capacity and Performance	\$ 18,968,000	\$ (609,000)	\$ 18,359,000

The Company is managing the FY 2017 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 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.

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Evaluation of the FY 2018 proposed System Capacity and Performance budget followed my customary process with an 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.

For the Load Relief category, the Company proposed eight (8) projects, of which six (6) had been previously accepted and were supported by independent studies before Long

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Range Plan alignment was required. The Company included new projects for Warren Substation and the East Bay area, which are line items in anticipation of projects resulting from the East Bay Area Study. This Study has not undergone complete review by the Division and PowerServices. During the course of discussions, the Company proposed an increase of \$811,000 to advance several legacy projects, which I preliminarily accepted. Alternately, the Company agreed to eliminate the budget for the East Bay project, and to limit spend for preliminary engineering for Warren Substation, until both projects are supported by a pending Area Study. The net impact was a \$681,000 increase for capacity projects for a total proposed budget of \$18.3 million.

Although preliminary consensus was reached on the budget, significant issues were raised during the analysis of System Capacity projects and the East Bay Study which becomes the basis for a portfolio of future projects in this category. The Division has expressed a strong interest in understanding the Company's comprehensive project evaluation and planning process, particularly alternatives that support grid modernization. I discussed this concept in the Asset Condition section, and similar concerns apply to projects in the System Capacity and Performance Section. Consistent with my recommendations for the Asset Condition category, it is important that the Company develop comprehensive project support documents that provide transparency and cohesiveness between multiple planning processes that are both internally and externally driven. I discuss the Long Term Planning process and desired improvements in greater detail in Section G.

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In the Reliability Category, the Company proposed a \$5.6 million budget for several ongoing projects with the most significant spend for VVO/CVR and Substation EMS/RTU expansion. These two initiatives are examples of technology deployment that bring necessary grid enhancements, but 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 indicate successful voltage control leading to demand reductions and improvements in system losses. The Company was careful to ensure that related technologies, such as communications, met compatibility standards or were adjusted during the pilot to achieve success before full expansion. The Company is seeking to complete the communications portion of the current pilot program, and is set to expand the project to forty (40) additional feeders over the next four (4) years. I concur with the Company's request for capital investment in this area and, specifically, for the \$1.4 million budget proposal to expand VVO/CVR to eight feeders in FY 2018. The VVO/CVR technology is being deployed and evaluated across the country. There are active pilots, programs and dockets from Rhode Island to Maine. I am very supportive of the Company's VVO/CVR program.

The EMS/RTU expansion is a \$7 million dollar initiative that the Company proposes to "improve reliability performance, increase operational effectiveness, and provide data for asset expansion or operation studies." The characteristics of equipment replaced or installed within this project make it integral to grid operations. EMS/RTU infrastructure, when combined with communications, creates the backbone of a modernized grid and

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supports those very asset expansions that the Company states as support for the project. As such, I recommend advancing the project in FY 2018 with a focus on preliminary engineering and technology evaluation, but that future investment is contingent on the program's alignment with National Grid's long term grid modernization strategy. There remains an open question as to whether the Company's strategy for grid modernization in Massachusetts will be reflected in its plans for Rhode Island.

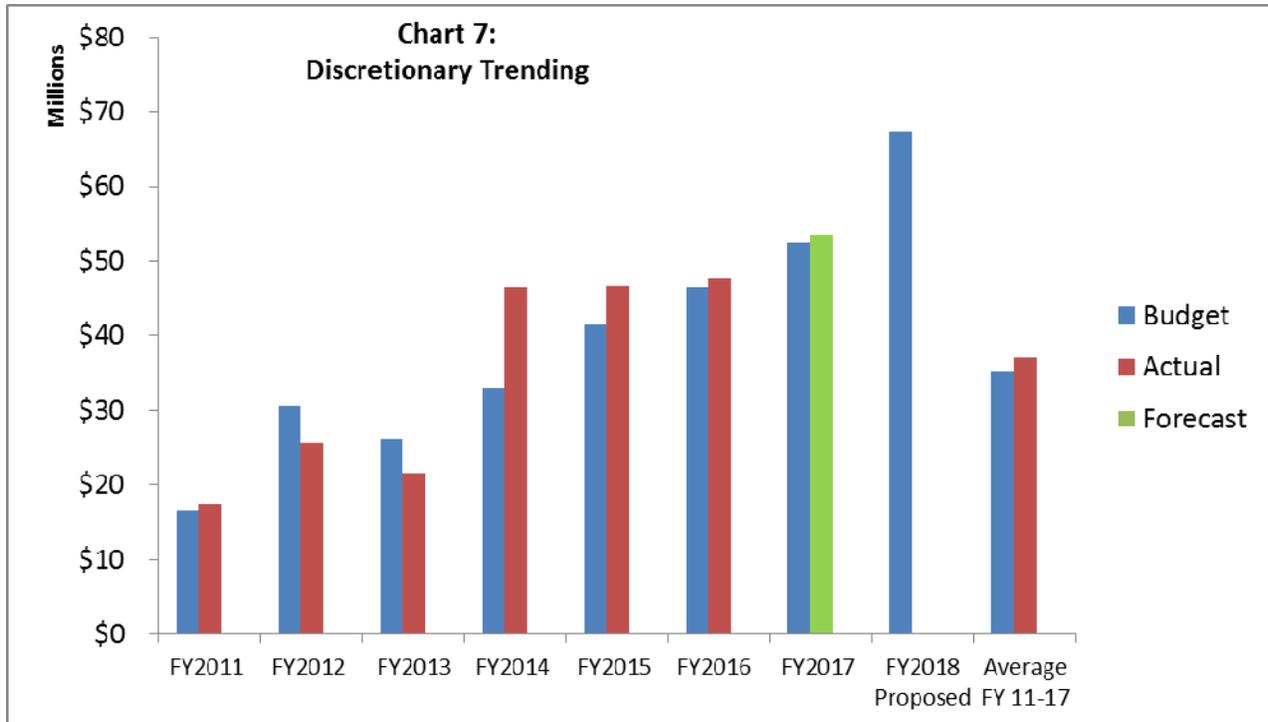
Taking into account minor adjustments to smaller projects, the total budget in the Reliability category amounts to \$5.8 million bringing the total budget for discretionary projects to \$24.1 million in the System Capacity and Performance category for FY 2018. Evaluation of major discretionary projects raised several questions regarding the status and quality of the Company's pending Area Studies. Extensive discussions with the Company and Division revealed several areas for improvement in current processes, plus an overarching need for the Company to develop standard screening processes, design criteria, and comprehensive planning guidelines. Consistent with my evaluation of discretionary projects in the Asset Condition category, I continue to discourage advancement of any project that fails to be supported by an Area Study. I discuss in more detail deficiencies and concerns with the Company's Long Term Study process in Section G.

This brings the total discretionary categories of Asset Condition, Non-Infrastructure, and System Capacity & Performance to \$67.4 million, which is sixty-seven percent (67%) of the total Capital Investment of the ISR Plan budget. A trending analysis of discretionary spending (Chart 7)

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indicates a spike in proposed spend for FY 2018 and that the Company is, on average, slightly exceeding budget.



G. Long Range Planning

A significant portion of my ISR Plan evaluation over the past three years has been dedicated to the Company's need to evaluate projects against the results of capacity Area Studies and a resulting system Long Range Plan before inclusion in the ISR Plan. In response, the Company is in the third year of performing Area Studies to be used to support projects in the ISR Plan, and has provided the following update in the FY 2018 ISR filing:

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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	96%
2	East Bay	157	8%	23	7	100%
3A	Blackstone Valley North	145	7%	20	5	30%
3B	North Central RI	254	13%	35	10	30%
4	Central RI East	197	10%	38	10	95%
5	South County East	184	10%	21	9	
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	
	Total:	1,940	100%	392	103	42%

* Study Status Total = % State Load Weighted Total

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. East Bay was deemed 100% complete in the last ISR filing, yet it was not covered in depth until a January 19, 2017 meeting. The Company's 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 and provided to the Division after review and approval by the Company (pages 7 and 13 of 65 of Pre-file working document). They have yet to be received. I recognize that the Company was seeking considerable feedback on the first study (East Bay) to ensure that they provided a comprehensive document that met the Divisions' expectations before releasing subsequent studies, but forthcoming studies do not appear to be advancing in a timely manner. My in depth review of the East Bay system model and study document resulted in several observations that I shared with the Company prior to, and during, the January 19, 2017 meeting. It is expected that the Company will utilize

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these suggestions to finalize East Bay and that improvements will be incorporated into the next Area Studies that have yet to be delivered.

Another observation is the minimal discussion and inclusion of Non-Wires Alternatives (“NWA”) and the opportunity to make NWA analysis consistent and more transparent among the Company’s various planning processes. The Company’s Distribution Planning Guide, dated February 15, 2011, recommends Distribution Analysis Alternatives (page 9 of 20) for both traditional capacity enhancements as well as NWA. It lists factors that could impact capacity planning analysis including:

- a. Distributed Generation,
- b. Controllable Load Curtailment,
- c. Energy Storage device,
- d. Demand Side Management,
- e. Distribution Automation, and
- f. Smart Grid solution.

As a point of reference, Rhode Island has adopted System Reliability Procurement Standards (“SRP Standards”) designed to provide detailed guidance to the Company regarding acquisition of cost-effective energy efficiency resources and implementation of system reliability through three year and annual plans. Among many items, these standards establish the following screening guidelines that determine if, and when, a NWA should be considered:

- a. The Wires solution, based on Engineering judgment, will likely be more than \$1M;

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- 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.

The Company appears to be appropriately applying the screening criteria, yet it is not entirely clear how the Company is applying the criteria past the initial NWA screening process. For instance, in the Division's Data Request R-1-7, the Company was asked to provide guidelines for consideration of NWAs that solve capacity deficiencies. The Company provided their internal NWA guidelines dated February 11, 2011. The Company also provided an example of NWA analysis for a proposed project in the East Bay Study Area. According to the Company, a single project passed the screening criteria and warranted further consideration of NWA feasibility. The Company goes on to say that a traditional wires solution cost estimate for the project was \$2 million, and that after conducting additional analysis, "the Company determined that given the relatively low cost of the preferred wires solution and the amount of load reduction necessary to achieve those savings, it could not propose a cost effective NWA solution." The Company offers no evaluation support, including the identification of alternatives considered, the cost, or the benefit. This analysis is not transparent, has limited scope, and fails to meet the Company's Design Criteria and SRP guidelines on many levels. The Company cannot continue this minimal approach.

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Regarding technologies considered as NWA, I also received conflicting information during the January 19, 2017 meeting, where Company representatives stated that customer owned Distributed Generation and energy storage were not considered NWA. I find it troublesome that the Company is failing to follow their own internal guidelines, and appear to be simply dismissing a technology if it is owned by a third party or is not considered cost effective without supporting data.

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 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

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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.

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III. VEGETATION MANAGEMENT

The Company’s initial FY 2018 ISR Plan proposed expenditures of \$9.4 million for the Vegetation Management Program, which includes the Enhanced Hazard Tree Mitigation (EHTM) program, is eight percent (8%) higher than the FY 2017 budget. Both the FY 2017 budget and forecasted spend are \$8.7 million. Consistent with historical budgets, the major spending component is Cycle Pruning with a proposed budget of \$5.5 million which is above FY 2017 spend due to an increase in the number of rural miles cleared that have higher tree density. The Company also included \$300,000 in the EHTM category 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 \$9.4 million for FY 2018 (Chart 8).

CHART 8

PROPOSED VEGETATION MANAGEMENT BUDGET	Initial FY2018 (9-27-16)	Net Adjustments	Proposed FY2018 (12-21-16)
Cycle Pruning	\$ 5,500,000	-	\$ 5,500,000
Hazard Tree	\$ 1,250,000	-	\$ 1,250,000
Sub-T	\$ 650,000	-	\$ 650,000
Police/Flagman Detail	\$ 775,000	-	\$ 775,000
All Other Activities	\$ 1,225,000	-	\$ 1,225,000
Program Total	\$ 9,400,000	\$ -	\$ 9,400,000

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 reports⁵ that, on average, a 32% improvement in customer interruptions (CI) per circuit occurs in the first year after pruning. The Company has adhered to a four-year cycle for overhead distribution circuits, with the first cycle being completed in FY 2014. 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 states⁶ that three years of tree-related interruption data for Rhode Island indicates that fallen trees account for 50% of tree-related customer interruptions. Reliability data (Chart 9) show that trees continue to account for a significant number of interruptions.

CHART 9
Rhode Island Customer Interrupted by Cause
Major Event Days Excluded
By Fiscal Year (2008-2016)

Cause	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Adverse Environment	1,573	5,651	4,018	5,992	3,674	6,584	811	6,785	5,922
Animal	15,103	16,303	14,751	15,335	15,008	9,864	10,098	21,232	32,266
Deteriorated Equipment	71,336	69,296	88,655	78,009	84,052	43,196	59,239	68,992	69,921
Human Element/Company	20,533	24,393	8,846	27,305	17,722	8,500	9,304	11,507	17,943
Human Element/Other	28,547	35,531	44,248	51,837	46,171	45,152	48,008	25,659	45,280
Intentional	50,735	36,569	59,581	33,987	41,879	42,989	44,451	55,268	54,661
Lightning	44,176	19,577	27,874	36,883	11,098	9,362	23,882	5,234	17,639
Substation	55,282	53,391	12,120	82,926	51,866	38,492	23,243	26,527	71,115
Sub-Transmission	24,298	31,628	22,243	39,770	29,805	44,084	53,550	26,191	33,727
Transmission	20,176	6,000	7,093	11,370	2,973	19,099	4,568	18,284	11,594
Tree	104,023	79,977	83,311	88,714	88,474	90,726	56,964	63,009	109,023
Unknown	29,583	26,146	15,807	29,629	29,163	34,143	18,501	23,529	35,829
Grand Total	465,565	404,462	388,547	501,757	421,885	392,191	352,619	352,218	504,920

⁵ Docket 4682 - National Grid's Proposed FY 2018 Electric ISR: Section 3, page 2

⁶ Docket 4682 - National Grid's Proposed FY 2018 Electric ISR: Section 3: page 3

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The EHTM program accounts for over ten percent (10%) of the proposed Vegetation Management budget, and has been a source of annual discussions to better understand the cost/benefit of the program. The Company previously responded to the Division's data request that, since 2008 hazard trees have accounted for 39% of tree related interruptions and annual removals have ranged from 84 to 1,307 trees. We recommend the Company, in future ISR Plans, rely more heavily on granular statistics supported by its own data, or data of other northeast utilities, that account for actual hazard tree outages in order to establish a more cost justifiable EHTM program budget.

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 reported for the FY 2018 ISR Plan evaluation that the Emerald Ash Borer threat has not advanced, but that an increased budget of \$300,000 was requested to manage tree mortality expected from spread of the Gypsy Moth. I concur with this expense item and requested budget increase, bringing the total EHTM budget to \$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 2017 levels at \$1.3 million. Lastly, as addressed in the FY

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2017 ISR Plan proceeding, I continue to recommend that the Company file confidential, bi-monthly reports to the Division regarding Verizon Joint Operating Agreement negotiations that adequately recover Verizon's obligation for vegetation management costs as a pole attacher. This brings the total Vegetation Management Program proposed budget to \$9.4 million.

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IV. SUMMARY AND RECOMMENDATIONS

The process between the Company and the Division resulted in a FY 2018 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 27, 2016, and the resulting December 21, 2016 filing of the FY 2018 ISR Plan Proposal. The consensus ISR Plan is a four percent (4%) reduction of \$1.5 million in the non-discretionary capital spending budget and four percent (4%) reduction of \$2.4 million in the discretionary capital spending budget, for an overall reduction of \$3.9 million or four percent (4%).

For FY 2018, 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 dominates the current discretionary budget

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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 2018 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 single Area Study 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. 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. 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 within ISR Plan projects. To ensure that those impacts are recognized, I recommend that the Company consider how a broader grid modernization strategy may be incorporated in the overall planning process, to include the ISR Plan.

The longer term challenge continues to be how the Company globally prioritizes and schedules projects arising from pending Area Studies, while balancing competing interests of safety, reliability, grid modernization, benefit to cost, and economic impacts to its ratepayers. There will be significant upward pressure on the ISR Plan budget to accommodate future

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projects 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 2018 Capital Budget as proposed at \$100.6 million. I also support the FY 2018 proposed VM Program at \$9.4 million. Lastly, I support the I&M Program Operations and Maintenance Expenses at \$1.2 million, subject to the Company assessing cost allocation to municipal streetlight owners for contact voltage detection and mitigation costs. Furthermore, I am a proponent for an annual adjustment process for the categories of Customer Request/Public Requirements and Damage/Failure.

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, and internal Design Criteria.
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.

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- 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.
3. National Grid shall develop a proposal on the methodology to assign Contact Voltage program costs for the testing and remediation of elevated voltage to municipal streetlight owners.
4. 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. The Company shall submit a report with updates on modeling activities and Areas Study status at least 120 days prior to filing its FY 2019 ISR Plan Proposal, but in any event no later than August 31, 2017.

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5. National Grid shall manage major Asset Replacement 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.

6. 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 South Street.

7. 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.

8. 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 2019 ISR Plan Proposal filing, but in any event no later than August 31, 2017.

9. 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 2019 ISR Plan Proposal filing, but in any event no later than August 31, 2017.

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10. 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 2019 ISR Plan Proposal filing, but in any event no later than August 31, 2017.

11. 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 2019 ISR Plan Proposal, but in any event no later than August 31, 2017.

12. 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 2019 ISR Plan Proposal, but in any event no later than August 31, 2017.

13. National Grid shall continue to provide quarterly confidential reports to the Division concerning the progress of its negotiations with Verizon on a new Joint Ownership Agreement.

APPENDIX 1

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FY 2018 ISR Plan Meeting Agenda
10:30 a.m., August 23, 2016

- 1) Opening statements
- 2) FY16 Review
- 3) FY17 YTD Review
- 4) FY18 ISR Draft Budget
- 5) Study overview
- 6) Asset Condition/System Capacity & Performance Project Overview
- 7) Vegetation Management
- 8) I&M
- 9) VVO
- 10) Wrap-up

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APPENDIX 2

EXHIBIT GLB-1
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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
Total Discretionary	23,552,000	31,149,849	22,452,500	28,454,320	30,290,000	31,529,769
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
Total Non-Discretionary	20,392,500	14,612,561	22,592,500	22,929,576	22,529,000	26,502,969
Grand Total	43,944,500	45,762,410	45,045,000	51,383,896	52,819,000	58,032,738
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
Total Discretionary	30,618,668	29,517,198	31,645,000	28,343,018	30,379,000	27,825,441
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
Total Non-Discretionary	27,040,332	25,821,968	36,855,000	29,929,455	16,521,000	17,295,117
Grand Total	57,659,000	55,339,166	68,500,000	58,272,473	46,900,000	45,120,558
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
Total Discretionary	31,341,500	26,068,013	30,428,000	27,925,675	26,559,000	31,511,034
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
Total Non-Discretionary	30,558,500	25,741,884	26,112,000	21,589,107	33,041,000	46,530,930
Grand Total	61,900,000	51,809,897	56,540,000	49,514,782	59,600,000	78,041,964
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

Spending Rationale	FY 2015	FY 2015	FY 2016	FY 2016	FY 2017	FY 2017
	Budget	Actual	Budget	Actual	Budget	Forecast
Customer Request/Public Requirements	14,537,000	17,759,797	15,647,000	17,412,295	19,450,550	19,754,000
Damage/Failure	9,816,000	3,044,445	11,177,000	14,531,159	11,467,000	14,370,000
Total Discretionary	24,353,000	20,804,242	26,824,000	31,943,454	30,917,550	34,124,000
Asset Condition	19,511,000	25,140,871	24,053,000	27,178,961	33,280,427	34,909,000
Non-Infrastructure	277,000	1,216,345	275,000	457,389	275,000	301,000
System Capacity & Performance	21,759,000	25,889,850	22,148,000	19,919,705	18,968,000	18,359,000
Total Non-Discretionary	41,547,000	52,247,066	46,476,000	47,556,055	52,523,427	53,569,000
Grand Total	65,900,000	73,051,308	73,300,000	79,499,509	83,440,977	87,693,000
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	1,567,000

APPENDIX 3

EXHIBIT GLB-1

REPORT OF GREGORY L. BOOTH, PE

FY2018 ISR Plan PowerServices Adjustments						
Capital Outlays by Key Driver Category and Budget Classification						
SPENDING RATIONALE	BUDGET CLASS	FY2018		FY2018		National Grid Proposed Budget (12-21-16)
		NG Initial Proposed Budget (9-27-16)	NG Adjustments (12-1-16)	PowerServices Preliminary Adjustments (12-21-16)	Notes	
Customer Request/ Public Requirements	3rd Party Attachments	204,000				204,000
	Distributed Generation	1,073,000	13,000			1,086,000
	Land and Land Rights - Dist	233,000	(10,000)			223,000
	Meters - Dist	1,786,000				1,786,000
	New Business - Commercial	7,920,000	263,000			8,183,000
	New Business - Residential	5,616,000				5,616,000
	Outdoor Lighting - Capital	153,000				153,000
	Block Island	1,000	20,000			21,000
	Public Requirements	2,600,000	(79,000)			2,521,000
	Transformers & Related Equipment	2,060,000				2,060,000
Customer Request/ Public Requirements		21,646,000	207,000			21,853,000
Damage/ Failure	Damage/ Failure (inc. Reserves)	11,529,000		(1,700,000)		9,829,000
	Major Storms - Dist	1,550,000				1,550,000
Damage/Failure Total		13,079,000		(1,700,000)		11,379,000
Subtotal Non-Discretionary		34,725,000	207,000	(1,700,000)		33,232,000
Asset Condition	Major Projects					
	South Street	25,783,000	(10,000)			25,773,000
	Southeast	400,000	35,000			435,000
	Flood - Hope Substation	738,000		(738,000)		-
	Flood-Warwick Mall Substation	580,000		(580,000)		-
	Dyer Street-Indoor Substation	402,000				402,000
	Major Projects Total	27,903,000	25,000	(1,318,000)		26,610,000
	Asset Replacement					
	Battery Replacement	280,000	(81,000)			199,000
	Metalclad Switchgear	2,057,000	(1,471,000)			586,000
	Substation Transformer Replacement	1,538,000	(3,000)			1,535,000
	Relay Replacements	464,000	(32,000)			432,000
	Substation Breakers & Reclosers	1,600,000				1,600,000
	Network Arc Flash	417,000				417,000
	Recloser Replacement	600,000	(190,000)			410,000
	RAPR	156,000	75,000			231,000
	URD Cable Strategy	3,000,000				3,000,000
	UG Cable Replacement	2,750,000				2,750,000
	Others	906,000	565,000	(547,000)		924,000
	Blanket Projects	2,703,000	(253,000)			2,450,000
Asset Replacement Total	16,471,000	(1,390,000)	(547,000)		14,534,000	
Asset Replacement - I&M (NE)	1,605,000	(5,000)			1,600,000	
Asset Condition Total		45,977,000	(1,370,000)	(1,865,000)		42,744,000
Non-Infrastructure	General Equipment	378,000				378,000
	Telecommunications Capital - Dist	175,000				175,000
Non-Infrastructure Total		553,000				553,000
System Capacity and Performance	Load Relief					
	Aquidneck Island (includes former Jepson & Newport projects)	4,302,000				4,302,000
	Chase Hill (Hopkinton) & Related	3,361,000	495,000			3,856,000
	Kent County	210,000	102,000			312,000
	New London Ave Substation #150	5,623,000	47,000			5,670,000
	Quonset Sub	2,622,000	167,000			2,789,000
	Highland Drive	1,329,000				1,329,000
	Warren Substation	80,000				80,000
	East Bay Study	130,000		(130,000)		-
	Load Relief Total	17,657,000	811,000	(130,000)		18,338,000
	Reliability					
	Volt/Var	2,000,000	(600,000)			1,400,000
	EMS	1,047,000	363,000			1,410,000
	OH Line Transformer Replacement	475,000				475,000
	Other Flood	240,000	148,000	(188,000)		200,000
	Other Load Relief & Reliability	478,000	443,000			921,000
	Blanket Projects - SCP	1,348,000				1,348,000
	Reliability Total	5,588,000	354,000	(188,000)		5,754,000
System Capacity and Performance Total		23,245,000	1,165,000	(318,000)		24,092,000
Subtotal Discretionary		69,775,000	(205,000)	(2,183,000)		67,389,000
Total Electric Distribution		104,500,000	2,000	(3,883,000)		100,621,000

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FY2018 ISR Plan PowerServices Adjustments						
Capital Outlays by Key Driver Category and Budget Classification						
SPENDING RATIONALE	BUDGET CLASS	FY2018		FY2018		
		NG Initial Proposed Budget (9-27-16)	NG Adjustments (12-1-16)	PowerServices Preliminary Adjustments (12-21-16)	Notes	National Grid Proposed Budget (12-21-16)
Vegetation Management Program	Cycle Trimming	5,500,000				5,500,000
	Hazard Tree	1,250,000				1,250,000
	Sub-T	650,000				650,000
	Police/Flagman Detail	775,000				775,000
	All Other Activities	1,225,000				1,225,000
Vegetation Management Program Total		9,400,000				9,400,000
Inspection and Maintenance Program	Operation and Maintenance Expenses:	-				
	Opex related to Capex	361,800				361,800
	Repair - Related Costs	-				-
	Inspections and Repair- Related Costs	829,000		(206,000)		623,000
	Removal Costs	161,000				161,000
	System Planning & Protection Coordination Study	25,000				25,000
VVO/CVR Program O&M		60,000			60,000	
Inspection and Maintenance Program Total		1,376,800	60,000	(206,000)		1,230,800
Grand Total ISR- All Programs		115,276,800	62,000	(4,089,000)		111,251,800