

Post Hearing Data Request No. 1-5

Request:

Referencing National Grid's response to RR-11, while the response indicates when the items will be placed into service, please explain when and how each will be used to meet the goals of grid resiliency and efficiency, and integration of distributed generation, as set forth in the Settlement Testimony of the Power Sector Transformation Panel, page 13 of 16.

Response:

The Company's grid modernization proposals will work in concert as a portfolio of investments that meet the goals of grid resiliency, efficiency, and integration of distributed generation. The Control Center enhancements will provide new tools that provide system operators with enhanced situational awareness and the ability to control distribution connected devices remotely or in an automated fashion. These new tools will enable faster response to outage events and refine the operation of distribution devices to improve the efficiency of power delivery. In addition, the ability to monitor and manage the distribution system in real time will reduce the number of conservative assumptions used in distributed generation interconnection studies and is expected to increase hosting capacity. The operational data management tools and cyber security programs are all foundational investments necessary to support the planning and integration of the smart devices being monitored and controlled.

Control Center Enhancement Investments – DSCADA/ADMS and RTU Separation Projects

The proposed Control Center Enhancement (*i.e.*, DSCADA/ADMS and RTU Separation) investments directly support the collection and evaluation of distribution-level data necessary for rapid detection, isolation, and restoration of service at the circuit and substation levels; reduce system-level inefficiencies; and allow higher penetrations of distributed generation. In particular, the DSCADA/ADMS investments will increase the capacity of the existing SCADA system to collect an influx of new data from the devices on the network, which can be used by Control Center operators or Control Center software to better optimize distribution system operations. The DSCADA/ADMS investments will integrate the functionalities of the Company's outage management system (OMS), DSCADA, and energy management system (EMS) applications into an advanced distribution management system (ADMS). The DSCADA/ADMS investments will provide system operators the ability to monitor the distribution system in real time and model the performance of the entire distribution system in its as-is configuration, which will enable distribution operators to implement operating changes more precisely by reducing conservative assumptions that may delay service restoration, create inefficiencies, or require the curtailment of distributed generation. The proposed RTU Separation investments are necessary to segregate distribution data from transmission data. This will streamline the integration of third party equipment that are not subject to the North

American Electric Reliability Corporation (NERC) Critical Infrastructure Protection (CIP) requirements.

The proposed DSCADA/ADMS project will be placed in service the year following the conclusion of the rate plan. Therefore, the benefits of increased resilience and efficiency and more streamlined integration of distributed energy resources will be realized following the conclusion of the rate plan.

Operational Data Management Investments – PI Historian, Data Lake, ESB, and Advanced Analytics Projects

The proposed Operational Data Management (*i.e.*, PI Historian, Data Lake, ESB, and Advanced Analytics) investments will allow the Company to utilize and share increasingly granular data to enhance the planning for, and integration of, higher levels of distribution generation. For example, data provided via the Rhode Island System Data Portal will be made available at increasingly higher levels of granularity and with greater accuracy. These investments will also enable predictive analytics, greater reporting, and provide insights into, and management of, the distributed network that will facilitate the Company's planning, integration, and management of distributed generation; allow the Company to better predict and mitigate the impacts of severe weather on the T&D system; and find opportunities to improve grid efficiency. For example, the proposed investments will support the analysis of an increasing volume of customer data, including advanced meter functionality (AMF) data, which can be used by customers, the Company, and authorized third parties to help reduce peak demand and energy usage, thereby improving grid resiliency and efficiency.

The proposed PI Historian and Data Lake projects are expected to be placed in service in Rate Year 1 and the ESB project is expected to be placed in service in Rate Year 3. The Advanced Analytics project is expected to have elements placed in service in each year of the rate plan beginning in Rate Year 1. These investments will be used for the purpose of increasing resilience and efficiency and integrating distributed energy resources in the year following being placed in service.

Cyber Security Investments

The proposed Cyber Security investments will directly support improving grid resiliency by permitting the integration of the new, grid-connected devices and remote control capabilities in a reliable and secure fashion. The proposed Cyber Security projects will implement a risk-based cyber security framework that encompasses people, processes, and technologies and that recognizes that the electric grid is changing from a relatively closed system, to a complex, highly interconnected environment.

The proposed Cyber Security investments include multiple security services and assets related to each Grid Modernization project, and these would be placed in service prior to the Grid Modernization project being deployed beginning in Rate Year 1. The purpose of these

The Narragansett Electric Company
d/b/a National Grid
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investments is to avoid external threats that may adversely impact the Company's ability to provide safe and reliable service. Therefore, these investments will be used for the purpose of increasing resilience beginning in Rate Year 1.

Post Hearing Data Request No. 1-6

Request:

Referencing National Grid's response to RR-24, the response stated:

The "Other Grid Modernization Investments" outlined within the Settlement Agreement filed with the Public Utilities Commission on June 6, 2018 will be incorporated into the current IS Investment Planning cycle, which has been initiated recently. The final output from this planning cycle is the Fiscal Year 2020 IS Investment Plan, which will cover the period from April 1, 2019 to March 31, 2020, and include the investments currently shown in Schedule ISP-2 along with the Grid Modernization investments. Notably, the Grid Modernization investments and their costs will be included as an addition to those currently shown on Schedule ISP-2. Regarding overall delivery of the investments, National Grid IS will use existing and the proposed project managers and solution architects to deliver the investments in-line with the timelines proposed within this proceeding. (emphasis added).

Please provide an update to ISP-2 highlighting where in the schedule the Other Grid Modernization Investments are included.

Response:

Please note that the Company's original response to Record Request No. 24 included an incorrect Schedule number reference. The correct Schedule number should have been ISP-1 rather than ISP-2. The PST IS investments have been incorporated into Schedule ISP-1 accordingly.

Please refer to Attachment PHDR 1-6 for the update to ISP-1, which includes the total investment and rent expense associated with the individual Grid Modernization capital investments.

The capital portion of the following Grid Modernization investments was added to Attachment PHDR 1-6 because they are National Grid USA Service Company, Inc. (Service Company) assets that will benefit multiple jurisdictions and therefore will be charged to the affiliated operating companies as a rent expense:

Shared Service Company Information System Investments

1. Enterprise Service Bus
2. Data Lake
3. PI Historian
4. Advanced Analytics
5. Telecommunications

6. Cybersecurity

The RTU Separation Grid Modernization investment is not included in Attachment PHDR 1-6 because it will be owned by the Company and benefit Narragansett Electric only. Therefore the RTU Separation Grid Modernization investment will be treated as rate base with the return of and on that investment incurring to Narragansett Electric directly, not as a rental charge from the Service Company.

**Narragansett Electric and Gas
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Total		
				Rate Year 1	Data Year 1	Data Year 2
Regulatory Mandates	This investment is for Regulatory Mandates of a project size that may not be known at the beginning of the fiscal year. The funding will be used to comply with walk-in Mandates and will be used for substitution based on a priority assessment with the business.	\$60,291,184	Multiple	\$169,944	\$560,948	\$971,745
INVP 3932 Call Center Customer Contact Center/SDC Technology Upgrade Implement Solution	This investment is to upgrade the U.S. Customer Contact Centers and Service Delivery Center (SDC) which are currently operating on core technologies that are no longer supported by their respective vendors. While there may be vendor support by way of third party vendors, the ability to triage all issues is not possible, as any previously undiagnosed issue would not be able to be resolved and many components of our infrastructure no longer have replacement parts available to purchase, as they have been discontinued by the manufacturer. This represents significant risk to the business in the areas of call handling, call recording, and the issuance of Regulatory penalties for non-compliance. National Grid also has multiple vendors supporting the technology and is seeking to consolidate support to one vendor with this project. This project will facilitate the replacement and consolidation of these critical systems to support the reliability of key communication channels between National Grid, our customers, and our employees.	\$17,473,948	9/1/18	\$338,432	\$329,409	\$309,280
INVP 3737 US CNI GMS SCADA Upgrade & Consolidation	This project is the final step in the strategic evolution of the Critical National Infrastructure (CNI) Gas Management Systems (GMS) SCADA system, supporting the new consolidated control rooms and upgrades to the hardware and operating systems, which are considered to be end of life. Furthermore, the current version of the SCADA application will require an upgrade due to its incompatibility with the new operating systems. The outcome of the project will ensure continuity in service while meeting the National Grid Gas Control strategic initiative for GMS longevity and up-time performance. Additionally, this effort will provide compliance to the National Grid IS Digital Risk & Security (DR&S) policies.	\$18,828,909	12/31/18	\$154,111	\$272,204	\$255,555
Technology Modernization Program	This is a multi-year investment program to modernize and improve the technology infrastructure at National Grid. The program will address a number of risks associated with unsupported applications and aged computer infrastructure and provide the foundational improvements necessary for the Company to deliver strategic initiatives such as: Gas Enablement, Customer Experience, and Advanced Analytics. The program consists of several projects in the following areas: - End User software licensing and Desktop tools - RSA Remote Access re-platform and token refresh - Network equipment replacements and bandwidth increases - Video Conferencing enhancements - Data Center improvements - Application and Network Monitoring platforms - Wireless Network enhancements - Cloud Enhancements - Azure Core Service and Secure Cloud Interconnect - Mobility - Mobile Device Management platforms - Technology Innovation Labs - Applications and supporting infrastructure improvements	\$22,293,266	Multiple	\$282,522	\$387,291	\$426,313
Cyber 2 Program	This program will deliver new cyber security capabilities to prevent, detect, and react to existing security threats. The projects to be delivered are: -Domain Based Security Phase 1 -Endpoint Scanning (Tanium) -Identity & Access Management: Fine Grain Access Management (Unified Platform) -US CNI Security Enhancements Phase 1 -Cloud Security (Cloud Access Security Broker) -Identity & Access Management: Privileged Access Management -Vstig Scaling Upgrades -Risk Based Authentication - 2FA token alternative (Multi Factor Authentication) -US CNI Intrusion Detection/Prevention Phase 1 (CNI IDS Refresh) -Enterprise Centralized Patch Management -Fundamentals Package -Develop Robust Incident Response -Continuous review of Reference Security Architecture -Virtualized Browser -Perimeter Enhancements -Internal PKI (Public Key) Infrastructure -Identity & Access Management: Role Based Access Management -Removable Media Control - Full Roll out -Data Visualization -Threat Behavior Modeling -Security Research Lab -Network Access Control	\$19,027,558	Multiple	\$165,725	\$293,257	\$370,078

**Narragansett Electric and Gas
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Total		
				Rate Year 1	Data Year 1	Data Year 2
Cyber 1 Program	This program will deliver new cyber security capabilities to prevent, detect, and react to existing security threats. The remaining projects to be delivered are: Enterprise Network Security and CNI Network Security and CNI Security Incident and Event Management (SIEM). These projects will create a Security and Services Network (SSN) to safely store the CNI data and SIEM solutions and tools. Existing security solutions such as: Net Flow Security Analysis, Forensic Packet Capture and Anti-Malware will also be migrated to the SSN in order to hold the CNI and Enterprise together allowing a single lens into all Cyber Security Activity.	\$17,235,543	Multiple	\$299,257	\$333,048	\$312,706
INVP 4914 US CNI-EMS Lifecycle Hardware and Software Upgrade	The hardware and software supporting the Energy Management System (EMS) and related networks is 8 years old and unsupported, and is therefore creating risk to National Grid. This investment will deploy hardware and software purchased under investments "INVP 4568-EMS Lifecycle Hardware and Software Upgrade" and "INVP 4570-Tech Services-Network Equipment Lifecycle Replacements" to the electric control rooms in New York and New England thereby reducing risk associated to these unsupported and aging assets. Upgrades to the EMS application, requiring new hardware and operating systems, will benefit the business through increased capacity to support new initiatives including the growing distributed generation program.	\$24,670,565	5/30/20	\$0	\$108,836	\$414,154
INVP 4307 US Win 7 Refresh Ph3	The End User Device Refresh-Windows 7 project is intended to address the migration/transition from XP to Windows 7. The current standard operating system at National Grid is Windows 7, however, there are several legacy applications that rely on Windows XP to operate, which impacts approximately 6000 users. XP is no longer in support and Microsoft has stopped producing security patches, which poses a reliability and security risk. Thus, it is imperative to migrate the remaining applications and users onto Windows 7.	\$13,883,173	7/31/17	\$266,311	\$256,891	\$240,659
Regulatory Mandates	This investment is for the identified regulatory mandated projects that scheduled to be completed during the Rate year. The following have been identified as mandated projects of: - INVP 4400 Annual HR & Payroll Mandatory Service Pack Upgrade (HRSP) - FY18 - INVP 4421 - New Arrearage Forgiveness Plan - INVP 4411AB Distributed Generation Portal - INVP 4411C New Electric Connections - INVP 4411D New Gas Connections - INVP 4124 Auto Remote Net Meter - INVP 4479 US Control-Gas Electronic Bulletin Board (EBB) Upgrade	\$12,144,699	Multiple	\$294,043	\$312,902	\$293,794
INVP 4708 Business Innovation Projects 2	The Business Innovation project provides a funding base and governance structure that allows the Information Services (IS) organization to improve the IS experience for our employees and customers who will experience improved reliability, use ability, speed and efficiency across all functions. The program will also reduce the risk of system failure which have customer, brand and cost implications.	\$11,833,333	Multiple	\$25,933	\$98,405	\$185,388
INVP 4728 Business Innovation Projects 3	The Business Innovation project provides a funding base and governance structure that allows the Information Services (IS) organization to improve the IS experience for our employees and customers who will experience improved reliability, use ability, speed and efficiency across all functions. The program will also reduce the risk of system failure which have customer, brand and cost implications.	\$11,833,333	Multiple	\$25,933	\$98,405	\$185,388
INVP 4750 Customer Experience Transformation Tech Program	This program will replace out of support platforms to mitigate existing risks to our customer self-serve billing, payments and other communications portals, and set the foundation for the processes and technology changes needed to drive step improvements to the customer experience. Operational efficiencies will be realized through the migration of customers to self-service channels, and through re-engineering of processes and transactions. The program will focus on re-engineering the customer's digital interactions to create a universal and seamless customer experience through multiple service options: Web, Mobile, Text, Email, and future emerging channels.	\$14,373,983	10/1/19	\$0	\$205,880	\$283,176
INVP 4398 Storms/ISched Upgrade	As the primary Work Management and Scheduling tools for the legacy National Grid service territories, 'STORMS' and 'IScheduler' are critical applications in support of both Electric and Gas Operations. The applications have become increasingly unstable, experiencing multiple outages over the past several years. The vendor is no longer in a position to support the applications without upgrades that will bring the applications onto current technology. The project will upgrade the work management system (STORMS) to the latest version of technology including: server hardware, system software and database software, along with bringing both standard and custom application code to the latest version of the technology. The investment will also replace the aged middleware components with new, supported components. As part of the project, the work management scheduling tool (IScheduler) will be replaced with the vendor's latest scheduling tool and integrated with the STORMS product.	\$9,471,569	5/26/18	\$298,211	\$289,948	\$272,243
INVP 4570 US CNI Tech Services-Network Equipment Lifecycle Replacements	This Policy-driven investment will procure networking assets needed to replace out of warranty equipment and support infrastructure in the Energy Management System and Outage Management System (EMS/OMS) Data Centers, Communications rooms, Operations Centers, and Support areas across the National Grid service territory in New York and New England that are no longer supported by the hardware and software vendors.	\$9,211,230	5/31/20	\$0	\$65,602	\$249,637
S005242 M112 Systemic Improvement	This project replaces the existing FERC module with the FERC on SAP HANA solution. The new HANA solution allows for FERC data to be created in parallel with all other data leading to a faster closing process and real time reporting capabilities.	\$9,213,134	7/10/17	\$139,372	\$136,460	\$127,988

**Narragansett Electric and Gas
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Total		
				Rate Year 1	Data Year 1	Data Year 2
INVP 3683X7 Big Data Security Analytics Phase 1 & Phase 2	This project will introduce the new business capability focused on Big Data Security Analytics to enhance and support existing Security Data Analytics. This capability will be integrated with the Cyber Security Operations Center to provide intelligence and further enhance analytical capabilities to respond to threats/attacks in a pro-active manner. The Project will provide National Grid security operational capability to examine large volumes of security related data sets containing a variety of data from multiple sources - including traditional security sources, such as log or audit files, and emerging sources such as images, social data, sensors, etc. - to uncover hidden threats, detect attack patterns and trends, identify suspicious anomalies, and aid in the removal of security threats, in an expeditious and cost effective manner. Real-time analysis will provide prediction and mitigation means for National Grid to discover new threats early and react quickly before they propagate. This capability will be integrated with the Cyber Security Operations Center to provide intelligence and further enhance analytical capabilities to respond to threats/attacks in a pro-active manner. This project consists of two phases.	\$8,865,599	Multiple	\$0	\$66,078	\$131,755
INVP 4464 Data Visualization	This investment will establish two cloud based self service reporting tools (Tableau and Alteryx). The proposed solution will provide the opportunity for improved decision making through enhanced data mining, decision support, and data visualization capabilities. This will lay the ground work for the migration from current reporting tools which have reached end of life, in addition to providing readily available and proven modern technology.	\$8,228,372	3/16/18	\$160,936	\$156,305	\$146,768
Physical Security Replacements	This is annual capital replacement program for Physical Security. Physical Security is responsible for protecting National Grid's personnel and assets, and incorporates a security system as part of the overall security plan. To fulfill this responsibility, it is necessary to ensure that all security related equipment and assets in New England are in good condition. This project replaces assets that are at or near end of life and/or assets that are no longer under vendor warranty.	\$10,003,615	Multiple	\$108,134	\$140,849	\$170,861
INVP 4408 Doc Mgmt Systems Replacement Delivery	This investment will provide funding for the purchase and deployment of the Document Management System selected in the commercial RFP event executed in the first half of 2016. Deployment of the new Document Management System will provide a secure and reliable storage solution to serve the needs of the gas and electric business units. The initial partial sanction for this project included funding for the purchase of non-perpetual licenses for a period of one year. Negotiations with the selected vendor "OpenText" has resulted in a lower lifecycle cost the through the purchase of pre-paid perpetual licenses. Purchase of pre-paid perpetual license reduces overall cost of the product by \$1.3 million dollars on a nominal basis over a sixteen year period. This partial sanction will provide the necessary funding to proceed with this purchase.	\$10,565,380	9/30/19	\$0	\$157,293	\$204,296
INVP 3683X13 Domain Based Security Phase 2 (Network Segregation)	This project will implement a Domain-based approach to information assurance for the identification, analysis, and documentation of security issues in the enterprise. Domain Based Security approach helps to analyze information security risks in a business context and provide a clear and direct mapping between the risks and the security controls needed to mitigate those risks. The policy domains will also address the variable risk appetites and requirements for the various business units, enabling National Grid to target the appropriate policies for each unit. Deliver the requirements for security in the organization, taking into account the business that needs to be supported. Security Policy Domains will establish a set of entities, physical and logical, that are subject to a common security policy and also allow each business within National Grid to adopt a risk-based approach to the implementation of information security controls. The approach helps to analyze information security risks in a business context and provide a clear and direct mapping between the risks and the security controls needed to mitigate those risks. The policy domains will also address the variable risk appetites and requirements for the various business units, enabling National Grid to target the appropriate policies for each unit.	\$6,486,000	5/31/20	\$0	\$35,634	\$135,600
Other fiscal plan initiatives	These annual investment plan projects were derived from business need. - INVP 3956 WIFI for Fleet Services Diagnostic Laptops - INVP 4467 STORMS Capital Cost Estimates - INVP 3982 Substation Monitoring-DobleARMS - INVP 4466 Gas Capital Investment Planning Tool - INVP 4480 US Control-Gas System Operating Procedure (SOP) Upgrade - INVP 4390 Plastic Fusion II - INPV 4462 Computapole Enhancements to Support Inspection Types - INVP 4487 Changes to ACIS for PMCC Civil Vendor Billing - INVP 3986 Cascade Electric Application Upgrade Project - INVP 4588 US SAP: Solution Manager Upgrade - INVP 3718 New Medical System	\$4,750,022	Multiple	\$77,011	\$93,871	\$87,313

**Narragansett Electric and Gas
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Total		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4564 US SAP: Enhancement Pack 9 Upgrade	The SAP Enhancement pack upgrade is an investment to provide for the upgrade of the core SAP application every two years (biennially) excluding the upgrade work associated with the annual HR service pack which is accounted for under a separate mandatory annual investment. The project would apply the latest agreed SAP service packs for ECC, SRM, PI, Portal, BPC and SolMan to ensure that the SAP application stays within current vendor support and mitigates the risk of system failure by remaining current every two years on the SAP core application. The investment would only include the upgrade packs (non HR) which are supplied by the SAP and would exclude any discretionary enhancements as part of this upgrade or any upgrades associated with ancillary USFP systems (ex. PowerPlan, uPerform, OpenText, SABRIX). The investment would also not account for any upgrade work which may be required on the BI/BW SAP platform. This biennial patching/upgrade strategy is to ensure that National Grid applies the latest service packs every two year in order to ensure proper system operation and application maintenance support.	\$5,328,000	3/31/20	\$0	\$41,645	\$110,626
INVP 4395 US Mobile Device Refresh	This policy-driven project will implement 750 mobile devices previously purchased as part of INVP 4671 – Mobile device refresh FY17 project. In addition, the project will purchase 200 new mobile devices and mounting accessories to continue the effort of eliminating old devices from the field. A majority of mobile devices used in the field are more than 5 years old and these devices impact day to day productivity. These old devices break down frequently and can't be easily repaired due to unavailability of parts and accessories (in some cases manufacturers have stopped supporting the devices). The replacement of old mobile devices with latest tough books will allow field technicians to have the reliable equipment and data required to perform their work in a safe and efficient manner.	\$4,772,237	3/31/18	\$119,649	\$115,126	\$108,145
INVP 4843 Virtualized Branches	In coordination with the SD_WAN core infrastructure project, this project will build and deploy the SD-WAN environment at the branch locations. This will support the delivery of WAN automation, application based routing and use of the Internet for network transport.	\$3,700,000	3/1/20	\$0	\$33,216	\$76,558
INVP 4489 Active Directory Improvements	Active Directory (AD) is a key service that supports core authentication for all National Grid computers and servers logging onto the corporate network in both the United States (US) and United Kingdom (UK). Therefore, AD provides access to all Information Systems (IS). The scope of this initiative is to implement a refreshed global AD infrastructure and support services. The new AD environment will unify all global applications that use the AD service. It is critical that National Grid can ensure that the AD service is reliable and supports core authentication requirements to all current and proposed applications.	\$6,550,515	12/1/19	\$0	\$81,622	\$134,129
INVP 4491 ICE Replacement	This investment is required to replace the current Instant Messaging, Collaboration, and Email (ICE) services with a set of similar, or enhanced, services provided by Office 365. Office 365 will provide a more effective collaboration and email service (Microsoft Office 365) to meet the business demand for additional capabilities (e.g.: collaboration with external parties) and provide any enabling infrastructure technology necessary before the ICE service contract expires.	\$3,766,701	9/30/18	\$74,578	\$93,295	\$87,629
INVP 4606 Data Visualization Expansion	Building upon the success of the Data Visualization (Tableau) core implementation last year, this investment expands its use with additional data and analytics capabilities. Data Visualization will be extended with the build out of dashboards across more business areas in support of their reporting, data retention and regulatory obligations. In addition to enhanced data access, this investment will provide for more advanced analytics through the use of new tools and longer term storage of information within the environment for audit and trending. The investment will introduce additional dashboards within Finance, Customer and Operations in support of reporting requirements.	\$3,932,607	6/28/18	\$78,045	\$75,910	\$71,274
INVP 4707 Business Innovation Projects 1	The Business Innovation project provides a funding base and governance structure that allows the Information Services (IS) organization to improve the IS experience for our employees and customers who will experience improved reliability, use ability, speed and efficiency across all functions. The program will also reduce the risk of system failure which have customer, brand and cost implications.	\$2,802,000	3/31/18	\$55,004	\$53,441	\$50,180
INVP 4568 US CNI-EMS Lifecycle Hardware and Software Upgrade	The server and workstation hardware for the Energy Management System (EMS) replacement project was purchased in 2010. The hardware is now near peak operating capacity and may constrain the capacity of the associated databases in EMS. The application vendor ASEA Brown Boveri (ABB), is recommending a hardware refresh for the EMS environments in order to increase the capacity of the databases to accommodate future growth. This Policy-driven investment will procure the equipment needed for the project stages for the hardware and software refresh of the current ABB EMS.	\$3,231,181	5/31/20	\$0	\$14,255	\$51,304
INVP 4706 1327 Interfaces - 523 FTS, 340 RDX, 245 MQSI, 253 JCAPS, 44 PM4D, 7 VB	The primary driver for this project is to mitigate the risks of continuing to be reliant on out of support infrastructure. These risks are : <ul style="list-style-type: none"> •Increased Security risk as out of support infrastructure will not receive security patches. •In the event of failure National Grid IS will be unable to meet the agreed Service Level Agreements (SLAs) for many key applications once the middleware infrastructure goes out of support. The majority of these applications currently have Gold or Platinum SLA's. •The FTS environment has a single point of failure/no redundancy. •The new technology provides functional benefits which will provide productivity improvements enabling improvements in the efficiency of data and file transfer. The 1327 interfaces (523 FTS, 340 RDX, 245 MQSI, 253 JCAPS, 44 PM4D, 7 VB) included in this scope of work will be divided into sprints that will focus on a specific set of interfaces that touch specific sets of applications. Each sprint will be executed sequentially.	\$3,501,046	3/1/20	\$0	\$31,430	\$72,441

**Narragansett Electric and Gas
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Total		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4348 US SAP: Infrastructure Landscape	This project will create a permanent set of servers used for project development in support of initiatives pertaining to the SAP portfolio.	\$543,843	4/22/18	\$8,484	\$8,341	\$7,828
INVP 4217 US SAP: Business Planning	SAP's Business Planning and Consolidation (BPC) platform is a module that supports National Grid's financial processes, such as financial reporting, budgeting and forecasting. It allows for real-time monitoring of financial results and improved strategic decisions. SAP HANA is an in-memory database developed by SAP. BPC on HANA has been used by National Grid since November 2012. Upgrading the platform from version 7.5 to 10.1 will allow National Grid to utilize the current version's enhancements and leverage additional benefits, such as reading and aggregating data for reporting purposes, transforming data, and reporting on greater volumes of data.	\$2,589,265	11/13/17	\$49,899	\$48,391	\$45,441
INVP 4680 WAP Density deployment	This project will deploy new wireless access points in high density configurations to improve wireless capacity and coverage at 30 identified U.S. sites. In addition, it will decommission and replace currently unsupported wireless bridge equipment to migrate risks associated with failure of that equipment.	\$2,127,968	3/30/18	\$53,352	\$51,335	\$48,223
INVP 3683X11 IT/OT Discovery and Implementation Phase 1	This project will allow National Grid the capabilities to discover Smart/IT/OT computing and other devices across the National Grid environment in a centralized location, allowing the business to gain a full inventory of devices/applications/technologies, determine risks associated with those components, identify relevant controls, and management of devices/applications /technologies through their lifecycle.	\$2,837,360	8/1/19	\$8,637	\$57,598	\$54,070
INVP 4222 Governance Risk & Compliance (GRC) Optimization/Upgrade	This project updates the Governance, Risk and Compliance (GRC) solution of SAP to the vendor supported version. In addition, the project will update the GRC environments from Service Pack 4 to the latest version, Service Pack 17. These updates will ensure that the module, which provides control / roles segregation and Sarbanes-Oxley Act (SOX) guidelines, will be stable and incorporate the necessary program fixes in the new version. It will also integrate the newest features and improvements released by SAP.	\$2,464,347	11/20/17	\$47,669	\$46,245	\$43,426
INVP 4562 US SAP: Business Warehouse (BW) Consolidation to HANA Enterprise Cloud (HEC)	This investment is to provide funding to consolidate National Grid Business Intelligence (BI) / Business Warehouse (BW) to HANA Enterprise Cloud (HEC). This project supports Strategy Alignment by delivering <ul style="list-style-type: none"> •Reporting Platform Consolidation •Maintenance Cost Reduction •Reporting Infrastructure Enhancement 	\$2,366,000	3/31/19	\$18,214	\$47,304	\$44,409
INVP 3683X8 Enhanced DLP Gateway and Endpoint	Data Loss Prevention (DLP) will enable National Grid's businesses to detect sensitive data in the organization and then be able to identify, implement, and enforce policies for protecting the data without forcing any modifications to the data. The aim of this project will provide enhancements to the existing DLP gateway solution and introduce DLP capability on corporate endpoint devices (Corporate assets such as laptops and mobile devices). Implementation of such technology provides the business with the ability to manage and reduce risk exposure to key information assets, thus protecting National Grid's reputation and shareholder value.	\$2,782,325	6/1/21	\$0	\$0	\$18,096
INVP 4364 Wireless Network	This is a policy driven project to replace end of life equipment, decommission legacy wireless networks, and install or expand the current coverage and capacity of the Wireless Local Area Network (WLAN) at various National Grid sites that have been identified as a priority. The project will also strengthen the stability of the wireless network by providing current supported equipment with additional capacity. In addition this project will renew the outdoor (Yard) wireless network for these prioritize sites by replacing out of support access points at field locations to ensure Wi-Fi vehicle communications remain supportable.	\$2,472,812	3/27/18	\$48,542	\$47,163	\$44,284
INVP 4481 US MDS-Energy Accounting System (EAS) migration to Wholesale Settlement Application (WSA)	This policy-driven project will consolidate the existing wholesale settlement processing applications into one application for New York (NY) and New England (NE), in order to improve upon the wholesale settlement market reporting and existing business processes. The expanded Wholesale Settlement Application (WSA) will provide enhanced functionality around wholesale settlement quality control in each load zone within the NY and NE jurisdictions. A consolidated, automated, and vendor supported wholesale settlement platform will reduce the risk of settlement reporting failure and data inconsistencies, making the settlement process more streamlined and efficient. As a result of the migration of Energy Accounting System (EAS) into WSA, the project will also decommission the existing EAS application.	\$2,007,000	3/20/19	\$20,029	\$52,016	\$48,832
INVP 4563 US SAP: FERC on Hana (FOH)	This project provides funding structure to support FERC on HANA (FOH) upgrade. Electric and gas utilities of all sizes must comply with the Uniform System of Accounts from the Federal Energy Regulatory Commission (FERC) or the National Association of Utility Regulatory Commissioners (NARUC). As government reemphasizes regulatory oversight, National Grid is facing increasingly stringent compliance requirements. To reduce the challenges of FERC compliance, such that filing reports and responding to data requests, National Grid is using the FERC on HANA SAP tool, which, in order to stay in compliance, has to be upgraded as required.	\$2,115,000	2/28/19	\$18,743	\$42,123	\$39,546

**Narragansett Electric and Gas
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Total		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4704Q Customer Bill Redesign	The last major bill redesign at National Grid concluded in 2007 with the rollout of the HP-Exstream software and the new "blue-bar" design. The now 10-year-old "blue bar" bill needs a refresh, and the priorities from contact center engagement need to be addressed. The bill refresh and changes implemented will result in direct benefits to customer satisfaction and effectiveness of customer interactions – both direct and digital channels. New "best practices" will give the company a "current" customer interaction – which occurs millions of times each month. No other form of communication affects the company's customers more. Imaging and eBilling will naturally follow as a set of benefits to this project.	\$2,108,147	3/31/19	\$18,324	\$47,588	\$44,675
INVP 4280 US VSTIG Bandwidth Ph2	The purpose of the Verizon Secured Telecommunications Gateway (VSTIG) network services is to connect National Grid securely to the internet and other external business partners. Due to the growth of these services, and other demands within the VSTIG environment, an upgrade is now required. The utilization of both VSTIGs (Billerica and Ashburn) are reaching the capacity limits of the network hardware, which, if not addressed, will lead to poor network performance, impact key business processes, and result in the potential loss of gateway services (such as internet access, cloud services and guest wireless internet access). This "phase 2" project builds upon the additional capacity provided by the phase 1 VSTIG upgrade, which will only alleviate the most pressing capacity constraint issues. Phase 2 will enable the network capacity to be increased up to 1gb/s per VSTIG. This capacity will meet the National Grid demands in the short to medium term. It will also be an enabler for other projects that are dependent upon the capacity increase, such as legacy De-Militarized Zone (DMZ) migration, Wide Area Network (WAN) and cloud services.	\$2,324,288	2/23/18	\$45,460	\$44,152	\$41,458
INVP 4709 Data Center Consolidation	A number of applications were not able to move in the timescales of Transformation and so the physical legacy Data Centers have had to be retained while remediation work is carried out on these applications (retained apps). Once all retained applications are remediated and moved to the new Data Center, the legacy Data Centers will need to be decommissioned. In addition there is a risk to continuing to run systems in the legacy data centres. A number of mission critical systems remain in the legacy data centers running in aged systems connected to aged network platforms. There is a likelihood that either the compute platform or network could fail and the hardware would not easily be restored. A compute platform failure would impact one system, but a network failure could impact multiple systems. Reliability - Old technology is vulnerable to more DRS threats - removing the old technology will mitigate this risk.	\$2,000,000	3/31/19	\$15,397	\$39,986	\$37,539
INVP 3683X4 Security Incident Event Management Phase 4 and Phase 5	The Security Incident and Event Management solution provides National Grid with the capabilities to analyze security event data in real time for internal and external threat management, and to collect, store, analyze, and report on log data for compliance and forensics. It provides the capabilities of gathering, analyzing and presenting information from network and security devices; identity and access management applications; vulnerability management and policy compliance tools; operating systems, database and application logs; and external threat data. his security capability will ensure alignment with best practices for cyber security and will provide CSOC and Network teams with actionable information to allow faster response to security incidents and demonstrate the effectiveness of controls and evidence in compliance with security regulations. This business capability will ensure key stakeholders have access to timely, useful security information relevant to protecting National Grid assets including CNI and Enterprise systems.	\$3,179,279	Multiple	\$0	\$19,289	\$42,307
INVP 3683X5 Identity & Access Management: Shared Area Access Management	This project is National Grid's continual effort to strengthen its Identity & Access Management (IAM) across its businesses. This multi-phase project will continue to expand on the existing capabilities delivered by the IAM Program as part of the Cyber Security Program. Shared Area Access Management will administer access to various shared file areas that exist across National Grid.	\$3,108,258	6/1/21	\$0	\$0	\$20,216
INVP 4761 US Foundation Hosting Renewal	In order to address its growing business environment, National Grid must enhance its SAP and High Performance Analytic Appliance (HANA) application support and hosting services. Currently, the application hosting support is provided by T-Systems out of Houston, Texas and SAP HANA services are provided by SAP HANA Enterprise Cloud (HEC) out of Virginia. This project and Freudenberg Information Technology (FIT) will consolidate these two datacenters under one platform for both primary and Disaster Recovery (DR) in the US. The new service provider FIT was selected through a formal Request For Proposal (RFP) process supported by INVP 3924. FIT will supply Platform as a Service (PaaS) for SAP and HANA applications, and ancillary applications including PowerPlan, Open Text, upPerform and SABRIX. National Grid IS will work with FIT to move the SAP application portfolio to a new datacenter. By moving to the new platform, National Grid will eliminate the need to renegotiate contract extensions with current hosting providers SAP, T-Systems and Wipro as well as having to conduct costly upgrades of the existing SAP infrastructure hosted by T-Systems.	\$6,318,123	10/31/18	\$85,396	\$123,896	\$116,321
INVP 4632 US Video Conferencing upgrade for RW	The current video conferencing units at Reservoir Woods are on old technology meaning that they are not able to integrate with the rest of the Video conferencing estate and do not provide a consistent user interface. This project will replace the Video Conference units in Res Woods with the current Video Conferencing platform of CISCO's Call Manager. This upgrade will provide consistent integration with the rest of the Video Conferencing estate. Improvements to the effectiveness of meetings are enabled through video conference services. The current services at Reservoir Woods are inconsistent; users find them difficult to use and performance of the service is unreliable. This restricts the number of people using the service and minimizes the opportunity for the Company in providing service to customers. To improve consistency, this project proposes to upgrade videoconference capability at Reservoir Woods to improve the user interface and ensure flexible, compatible technology is in use to ease ability for future upgrades.	\$1,860,290	9/12/17	\$46,270	\$43,729	\$40,927

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Project	Description	Total Investment	In Service Date	Total		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4830 Migration of Oracle to Linux	This project will migrate our Oracle Database applications that reside on expensive Unix P-Series hardware, to less expensive Wintel/Linux based hardware. Funding for the Wintel hardware along with the application effort to repurpose from Unix to Linux will be covered from this project.	\$1,500,000	8/1/21	\$0	\$0	\$6,265
INVP 4397 Ariba TLS and CI Update	The project will address the upgrade of two Systems Applications Processing (SAP) Enterprise Infrastructure components to mitigate the risk of losing the Ariba connection to National Grid suppliers for the purposes of collaboration, and network activities such as the sending and receiving of purchase orders, as well as other necessary interfaces, such as GridForce. The TLS (Transport Layer Security) provides inbound and outbound communications security over the internet.	\$1,727,180	9/11/17	\$27,119	\$26,059	\$24,240
INVP 4188 Aging System Stabilize	National Grid's Electric and Gas Operations are dependent on several critical applications that are running on older technology and components which are beyond their support life cycle. For example, several Operations applications are dependent on outdated and soon to be non-supported operating systems, components and platforms such as Windows 2003. This investment will upgrade, enhance and redesign some of the higher at risk Operations applications and replace outdated components.	\$1,360,803	3/17/18	\$28,147	\$27,337	\$25,669
INVP 4461 Unix51 Interface Migration	At National Grid, a majority of the file transfers are facilitated through the UNIX 51 File Transfer Service (FTS) tool. There are over 70 third parties receiving and sending critical data to National Grid via this service. UNIX 51 is running on aged technology and infrastructure without any support. The FTS service (downstate) was developed almost 20 years ago and is running on an unsupported and unpatchable platform. The business critical interfaces that utilize UNIX 51 from the Customer Related Information System (CRIS) and Customer Service System (CSS) systems to numerous third parties are at risk of failure with no viable contingency plan in place. This investment will provide a centralized expandable environment - Comprehensive Integration Services (CIS) - for additional interfaces to be implemented. Migrating UNIX 51 interfaces to the CIS platform will enable decommissioning of the UNIX 51 server. In Phase 1, analysis, tactical work and migration of the initial set of interfaces will be performed. Target completion for Phase 1 is November 2017. This project, Phase 2, will deliver the migration of the remaining set of business critical interfaces from the unsupported UNIX 51 platform onto the selected National Grid strategic middleware platform (CIS). By leveraging the experience, processes and infrastructure setup from Phase 1, the Phase 2 business critical interfaces are expected to be implemented more efficiently.	\$1,706,971	6/29/18	\$33,876	\$32,949	\$30,937
INVP 4693 Enterprise Labs	The project is an initiative within IS to construct and equip an Enterprise Laboratory, which will be available as a Proving Ground or Forum to accelerate the speed of innovation and new technology integration into the Enterprise. The E-Lab will be used to perform trials, tests, and showcase technologies for our customers. The Project Team will manage both the procurement and the suppliers' execution of the design, delivery and implementation of the construction and the technological aspects (hardware and software) that is required. The E-Lab will be located at Reservoir Woods on the second floor in the former High Density File (HDF) room W2-873.	\$457,635	4/30/18	\$11,520	\$11,089	\$10,417
INVP 4662 - Concur Licenses	This project allows National Grid to implement an end-to-end corporate travel booking and expense process. Concur allows setup of customizable audit rules which should reduce review time of expense items. It also will auto-generate notifications out to end users on outstanding expense items which currently is manually triggered. Both the audit rules and automated notifications should cut down on administrative efforts. This is the second phase of the investment, following last year's license agreement which was completed as part of a broader negotiation with SAP, via a discounted pricing model.	\$2,827,778	4/30/18	\$55,713	\$54,150	\$50,844
INVP 4289 US Network Improvement	The original IS Transformation Network implementation project delivered a new National Grid Verizon network and migrated almost every site onto a single Wide Area Network (WAN) using a consistent set of designs, hardware, services and delivery method. A small number of sites were not migrated for various reasons such as potential site closure and Long Island Power Authority separation complexities. The sites that were omitted now need to be migrated to the Verizon WAN service because the legacy services are using unsupported network infrastructure and are unable to offer the functionality and reliability required by the business.	\$1,645,972	5/14/18	\$32,429	\$31,519	\$29,595
INVP 4837 SD-WAN Core, automation, orchestration tools and pilot sites	This project will build and deploy the SD-WAN core infrastructure and tools in the Network data centers that will be used to support the SD-WAN as it is deployed throughout the branch locations.	\$1,200,000	1/1/20	\$0	\$13,559	\$24,657
INVP 3486 US MDS-Itron Enterprise Edition (IEE)	This project will deliver a consistent meter reading platform utilizing the Itron Enterprise Edition (IEE) version 8.1 cloud based solution. This solution will support the migration of meter groups in work streams. Initially targeted are approximately 3,000 MV90 interval collection system New York electric meters that need to be upgraded from 2G to 4G, as the 2G technology is being retired by the communication vendor, and 4G is the current standard wireless communication technology. There are also 400 Massachusetts and 170 Rhode Island meters that are in scope for migration. Currently these 3,600 C&I meters are on the existing MV90 platform with a goal to eventually replace the MV90 with IEE 8.1. This project is necessary as all known carriers are retiring the 2G technology and moving to 4G. A technology has been selected that will align with the roadmap for any future AMI initiatives that may be implemented and will avoid near-term replacement costs at the time of such implementation.	\$1,806,968	5/30/18	\$46,318	\$45,035	\$42,285

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Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Total		
				Rate Year 1	Data Year 1	Data Year 2
INVP 3430 Mobility - (MDM) Mobile Device	This project will implement an Enterprise Mobility Management (EMM) service that will allow National Grid to secure and manage mobile apps and content across a variety of mobile devices. National Grid has over 4000 corporate owned mobile devices that are used by the workforce to store information and gain access to network applications, such as email. In addition, Time Transformation project (Time entry system) will be integrated between mobile devices and our backend systems (i.e. iphones, ipads, making external and internal apps available to NG via NG site - push and pull) to enable our workforce to work in a more flexible and efficient manner. Due to the growing use of mobile devices, it is more critical than ever that we have a way to manage these devices so that we can comply with Internal corporate policy, distribute applications, and secure the data on these devices through a central EMM platform. This project will establish and deploy a central EMM service capable of on-boarding 4000 mobile devices. Included in this delivery is the implementation of device and security policies, a corporate apps store, mobile device containers and the infrastructure required to support mobile device access to corporate systems and data in a secure fashion.	\$1,065,794	11/3/17	\$20,540	\$19,919	\$18,704
Grid Mod - Enterprise Service Bus	Implementation of ESB to serve as the enterprise middleware integration platform that is required to securely move data between systems, automate and manage business processes, transfer files between entities, and enable real-time and batch integration.		Rate Year 3	\$0	\$0	\$674,220
Grid Mod - Data Lake	Implementation of a data lake repository, with a scalable enterprise data warehouse, for all of National Grid that will leverage the overall grid modernization program.		Multiple	\$37,321	\$71,377	\$66,252
Grid Mod - PI Historian	Implementation of PI Historian that links with the data lake where select data sets will be maintained for use by other applications.		Multiple	\$12,069	\$23,078	\$21,416
Grid Mod - Advanced Analytics	Implementation for computation and data storage, which utilizes various cloud providers for agility. The advanced analytics required to efficiently manage a modern grid require processing massive quantities of data from countless data sources.		Multiple	\$335,671	\$801,627	\$1,005,081
Grid Mod - Telecommunications	Implementation of increased bandwidth at a number of facilities to handle an increase in the amount of data traversing over the networks.		Multiple	\$12,795	\$30,988	\$41,766
Grid Mod - Cybersecurity	Implementation of cybersecurity and privacy provisions in the form of multiple security services to support each functional area. These security services will serve as the cornerstone for any cybersecurity or privacy-related component of the overall solution. A program to provide regular privacy training and ongoing awareness of communications and activities to all workers and third parties who have access to customer information within the distributed system platform will be included.		Multiple	\$422,042	\$1,016,336	\$1,290,054

<i>Total Capital Investment</i>	\$416,772,110			
<i>Rent Expense allocation to Narragansett Electric and Gas</i>	\$23,193,740			
		<u>\$4,693,125</u>	<u>\$7,863,632</u>	<u>\$10,636,984</u>

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Project	Description	Total Investment	In Service Date	Distribution		
				Rate Year 1	Data Year 1	Data Year 2
Regulatory Mandates	This investment is for Regulatory Mandates of a project size that may not be known at the beginning of the fiscal year. The funding will be used to comply with walk-in Mandates and will be used for substitution based on a priority assessment with the business.	\$60,291,184	Multiple	\$121,876	\$402,286	\$696,890
INVP 3932 Call Center Customer Contact Center/SDC Technology Upgrade Implement Solution	This investment is to upgrade the U.S. Customer Contact Centers and Service Delivery Center (SDC) which are currently operating on core technologies that are no longer supported by their respective vendors. While there may be vendor support by way of third party vendors, the ability to triage all issues is not possible, as any previously undiagnosed issue would not be able to be resolved and many components of our infrastructure no longer have replacement parts available to purchase, as they have been discontinued by the manufacturer. This represents significant risk to the business in the areas of call handling, call recording, and the issuance of Regulatory penalties for non-compliance. National Grid also has multiple vendors supporting the technology and is seeking to consolidate support to one vendor with this project. This project will facilitate the replacement and consolidation of these critical systems to support the reliability of key communication channels between National Grid, our customers, and our employees.	\$17,473,948	9/1/18	\$207,733	\$202,194	\$189,839
INVP 3737 US CNI GMS SCADA Upgrade & Consolidation	This project is the final step in the strategic evolution of the Critical National Infrastructure (CNI) Gas Management Systems (GMS) SCADA system, supporting the new consolidated control rooms and upgrades to the hardware and operating systems, which are considered to be end of life. Furthermore, the current version of the SCADA application will require an upgrade due to its incompatibility with the new operating systems. The outcome of the project will ensure continuity in service while meeting the National Grid Gas Control strategic initiative for GMS longevity and up-time performance. Additionally, this effort will provide compliance to the National Grid IS Digital Risk & Security (DR&S) policies.	\$18,828,909	12/31/18	\$0	\$0	\$0
Technology Modernization Program	This is a multi-year investment program to modernize and improve the technology infrastructure at National Grid. The program will address a number of risks associated with unsupported applications and aged computer infrastructure and provide the foundational improvements necessary for the Company to deliver strategic initiatives such as: Gas Enablement, Customer Experience, and Advanced Analytics. The program consists of several projects in the following areas: - End User software licensing and Desktop tools - RSA Remote Access re-platform and token refresh - Network equipment replacements and bandwidth increases - Video Conferencing enhancements - Data Center improvements - Application and Network Monitoring platforms - Wireless Network enhancements - Cloud Enhancements - Azure Core Service and Secure Cloud Interconnect - Mobility - Mobile Device Management platforms - Technology Innovation Labs - Applications and supporting infrastructure improvements	\$22,293,266	Multiple	\$202,612	\$277,747	\$305,732
Cyber 2 Program	This program will deliver new cyber security capabilities to prevent, detect, and react to existing security threats. The projects to be delivered are: -Domain Based Security Phase 1 -Endpoint Scanning (Tanium) -Identity & Access Management: Fine Grain Access Management (Unified Platform) -US CNI Security Enhancements Phase 1 -Cloud Security (Cloud Access Security Broker) -Identity & Access Management: Privileged Access Management -Vstig Scaling Upgrades -Risk Based Authentication - 2FA token alternative (Multi Factor Authentication) -US CNI Intrusion Detection/Prevention Phase 1 (CNI IDS Refresh) -Enterprise Centralized Patch Management -Fundamentals Package -Develop Robust Incident Response -Continuous review of Reference Security Architecture -Virtualized Browser -Perimeter Enhancements -Internal PKI (Public Key) Infrastructure -Identity & Access Management: Role Based Access Management -Removable Media Control - Full Roll out -Data Visualization -Threat Behavior Modeling -Security Research Lab -Network Access Control	\$19,027,558	Multiple	\$118,850	\$210,310	\$265,403

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Project	Description	Total Investment	In Service Date	Distribution		
				Rate Year 1	Data Year 1	Data Year 2
Cyber I Program	This program will deliver new cyber security capabilities to prevent, detect, and react to existing security threats. The remaining projects to be delivered are: Enterprise Network Security and CNI Network Security and CNI Security Incident and Event Management (SIEM). These projects will create a Security and Services Network (SSN) to safely store the CNI data and SIEM solutions and tools. Existing security solutions such as: Net Flow Security Analysis, Forensic Packet Capture and Anti-Malware will also be migrated to the SSN in order to hold the CNI and Enterprise together allowing a single lens into all Cyber Security Activity.	\$17,235,543	Multiple	\$214,613	\$238,847	\$224,258
INVP 4914 US CNI-EMS Lifecycle Hardware and Software Upgrade	The hardware and software supporting the Energy Management System (EMS) and related networks is 8 years old and unsupported, and is therefore creating risk to National Grid. This investment will deploy hardware and software purchased under investments "INVP 4568-EMS Lifecycle Hardware and Software Upgrade" and "INVP 4570-Tech Services-Network Equipment Lifecycle Replacements" to the electric control rooms in New York and New England thereby reducing risk associated to these unsupported and aging assets. Upgrades to the EMS application, requiring new hardware and operating systems, will benefit the business through increased capacity to support new initiatives including the growing distributed generation program.	\$24,670,565	5/30/20	\$0	\$108,836	\$414,154
INVP 4307 US Win 7 Refresh Ph3	The End User Device Refresh-Windows 7 project is intended to address the migration/transition from XP to Windows 7. The current standard operating system at National Grid is Windows 7, however, there are several legacy applications that rely on Windows XP to operate, which impacts approximately 6000 users. XP is no longer in support and Microsoft has stopped producing security patches, which poses a reliability and security risk. Thus, it is imperative to migrate the remaining applications and users onto Windows 7.	\$13,883,173	7/31/17	\$190,986	\$184,230	\$172,589
Regulatory Mandates	This investment is for the identified regulatory mandated projects that scheduled to be completed during the Rate year. The following have been identified as mandated projects of: - INVP 4400 Annual HR & Payroll Mandatory Service Pack Upgrade (HRSP) - FY18 - INVP 4421 - New Arrearage Forgiveness Plan - INVP 4411AB Distributed Generation Portal - INVP 4411C New Electric Connections - INVP 4411D New Gas Connections - INVP 4124 Auto Remote Net Meter - INVP 4479 US Control-Gas Electronic Bulletin Board (EBB) Upgrade	\$12,144,699	Multiple	\$233,136	\$226,587	\$212,755
INVP 4708 Business Innovation Projects 2	The Business Innovation project provides a funding base and governance structure that allows the Information Services (IS) organization to improve the IS experience for our employees and customers who will experience improved reliability, use ability, speed and efficiency across all functions. The program will also reduce the risk of system failure which have customer, brand and cost implications.	\$11,833,333	Multiple	\$18,598	\$70,571	\$132,952
INVP 4728 Business Innovation Projects 3	The Business Innovation project provides a funding base and governance structure that allows the Information Services (IS) organization to improve the IS experience for our employees and customers who will experience improved reliability, use ability, speed and efficiency across all functions. The program will also reduce the risk of system failure which have customer, brand and cost implications.	\$11,833,333	Multiple	\$18,598	\$70,571	\$132,952
INVP 4750 Customer Experience Transformation Tech Program	This program will replace out of support platforms to mitigate existing risks to our customer self-serve billing, payments and other communications portals, and set the foundation for the processes and technology changes needed to drive step improvements to the customer experience. Operational efficiencies will be realized through the migration of customers to self-service channels, and through re-engineering of processes and transactions. The program will focus on re-engineering the customer's digital interactions to create a universal and seamless customer experience through multiple service options: Web, Mobile, Text, Email, and future emerging channels.	\$14,373,983	10/1/19	\$0	\$126,371	\$173,816
INVP 4398 Storms/ISched Upgrade	As the primary Work Management and Scheduling tools for the legacy National Grid service territories, 'STORMS' and 'IScheduler' are critical applications in support of both Electric and Gas Operations. The applications have become increasingly unstable, experiencing multiple outages over the past several years. The vendor is no longer in a position to support the applications without upgrades that will bring the applications onto current technology. The project will upgrade the work management system (STORMS) to the latest version of technology including: server hardware, system software and database software, along with bringing both standard and custom application code to the latest version of the technology. The investment will also replace the aged middleware components with new, supported components. As part of the project, the work management scheduling tool (IScheduler) will be replaced with the vendor's latest scheduling tool and integrated with the STORMS product.	\$9,471,569	5/26/18	\$213,481	\$207,566	\$194,892
INVP 4570 US CNI Tech Services-Network Equipment Lifecycle Replacements	This Policy-driven investment will procure networking assets needed to replace out of warranty equipment and support infrastructure in the Energy Management System and Outage Management System (EMS/OMS) Data Centers, Communications rooms, Operations Centers, and Support areas across the National Grid service territory in New York and New England that are no longer supported by the hardware and software vendors.	\$9,211,230	5/31/20	\$0	\$65,602	\$249,637

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Project	Description	Total Investment	In Service Date	Distribution		
				Rate Year 1	Data Year 1	Data Year 2
S005242 M112 Systemic Improvement	This project replaces the existing FERC module with the FERC on SAP HANA solution. The new HANA solution allows for FERC data to be created in parallel with all other data leading to a faster closing process and real time reporting capabilities.	\$9,213,134	7/10/17	\$99,951	\$97,863	\$91,787
INVP 3683X7 Big Data Security Analytics Phase 1 & Phase 2	This project will introduce the new business capability focused on Big Data Security Analytics to enhance and support existing Security Data Analytics. This capability will be integrated with the Cyber Security Operations Center to provide intelligence and further enhance analytical capabilities to respond to threats/attacks in a pro-active manner. The Project will provide National Grid security operational capability to examine large volumes of security related data sets containing a variety of data from multiple sources - including traditional security sources, such as log or audit files, and emerging sources such as images, social data, sensors, etc. - to uncover hidden threats, detect attack patterns and trends, identify suspicious anomalies, and aid in the removal of security threats, in an expeditious and cost effective manner. Real-time analysis will provide prediction and mitigation means for National Grid to discover new threats early and react quickly before they propagate. This capability will be integrated with the Cyber Security Operations Center to provide intelligence and further enhance analytical capabilities to respond to threats/attacks in a pro-active manner. This project consists of two phases.	\$8,865,599	Multiple	\$0	\$47,388	\$94,489
INVP 4464 Data Visualization	This investment will establish two cloud based self service reporting tools (Tableau and Alteryx). The proposed solution will provide the opportunity for improved decision making through enhanced data mining, decision support, and data visualization capabilities. This will lay the ground work for the migration from current reporting tools which have reached end of life, in addition to providing readily available and proven modern technology.	\$8,228,372	3/16/18	\$115,416	\$112,095	\$105,255
Physical Security Replacements	This is annual capital replacement program for Physical Security. Physical Security is responsible for protecting National Grid's personnel and assets, and incorporates a security system as part of the overall security plan. To fulfill this responsibility, it is necessary to ensure that all security related equipment and assets in New England are in good condition. This project replaces assets that are at or near end of life and/or assets that are no longer under vendor warranty.	\$10,003,615	Multiple	\$74,487	\$96,816	\$117,266
INVP 4408 Doc Mgmt Systems Replacement Delivery	This investment will provide funding for the purchase and deployment of the Document Management System selected in the commercial RFP event executed in the first half of 2016. Deployment of the new Document Management System will provide a secure and reliable storage solution to serve the needs of the gas and electric business units. The initial partial sanction for this project included funding for the purchase of non-perpetual licenses for a period of one year. Negotiations with the selected vendor "OpenText" has resulted in a lower lifecycle cost through the purchase of pre-paid perpetual licenses. Purchase of pre-paid perpetual license reduces overall cost of the product by \$1.3 million dollars on a nominal basis over a sixteen year period. This partial sanction will provide the necessary funding to proceed with this purchase.	\$10,565,380	9/30/19	\$0	\$112,810	\$146,520
INVP 3683X13 Domain Based Security Phase 2 (Network Segregation)	This project will implement a Domain-based approach to information assurance for the identification, analysis, and documentation of security issues in the enterprise. Domain Based Security approach helps to analyze information security risks in a business context and provide a clear and direct mapping between the risks and the security controls needed to mitigate those risks. The policy domains will also address the variable risk appetites and requirements for the various business units, enabling National Grid to target the appropriate policies for each unit. Deliver the requirements for security in the organization, taking into account the business that needs to be supported. Security Policy Domains will establish a set of entities, physical and logical, that are subject to a common security policy and also allow each business within National Grid to adopt a risk-based approach to the implementation of information security controls. The approach helps to analyze information security risks in a business context and provide a clear and direct mapping between the risks and the security controls needed to mitigate those risks. The policy domains will also address the variable risk appetites and requirements for the various business units, enabling National Grid to target the appropriate policies for each unit.	\$6,486,000	5/31/20	\$0	\$25,555	\$97,246
Other fiscal plan initiatives	These annual investment plan projects were derived from business need. - INVP 3956 WIFI for Fleet Services Diagnostic Laptops - INVP 4467 STORMS Capital Cost Estimates - INVP 3982 Substation Monitoring-DobleARMS - INVP 4466 Gas Capital Investment Planning Tool - INVP 4480 US Control-Gas System Operating Procedure (SOP) Upgrade - INVP 4390 Plastic Fusion II - INVP 4462 Computapole Enhancements to Support Inspection Types - INVP 4487 Changes to ACIS for PMCC Civil Vendor Billing - INVP 3986 Cascade Electric Application Upgrade Project - INVP 4588 US SAP: Solution Manager Upgrade - INVP 3718 New Medical System	\$4,750,022	Multiple	\$49,152	\$63,659	\$59,457

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Project	Description	Total Investment	In Service Date	Distribution		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4564 US SAP: Enhancement Pack 9 Upgrade	The SAP Enhancement pack upgrade is an investment to provide for the upgrade of the core SAP application every two years (biennially) excluding the upgrade work associated with the annual HR service pack which is accounted for under a separate mandatory annual investment. The project would apply the latest agreed SAP service packs for ECC, SRM, PI, Portal, BPC and SolMan to ensure that the SAP application stays within current vendor support and mitigates the risk of system failure by remaining current every two years on the SAP core application. The investment would only include the upgrade packs (non HR) which are supplied by the SAP and would exclude any discretionary enhancements as part of this upgrade or any upgrades associated with ancillary USFP systems (ex. PowerPlan, uPerform, OpenText, SABRIX). The investment would also not account for any upgrade work which may be required on the BI/BW SAP platform. This biennial patching/upgrade strategy is to ensure that National Grid applies the latest service packs every two year in order to ensure proper system operation and application maintenance support.	\$5,328,000	3/31/20	\$0	\$29,866	\$79,336
INVP 4395 US Mobile Device Refresh	This policy-driven project will implement 750 mobile devices previously purchased as part of INVP 4671 – Mobile device refresh FY17 project. In addition, the project will purchase 200 new mobile devices and mounting accessories to continue the effort of eliminating old devices from the field. A majority of mobile devices used in the field are more than 5 years old and these devices impact day to day productivity. These old devices break down frequently and can't be easily repaired due to unavailability of parts and accessories (in some cases manufacturers have stopped supporting the devices). The replacement of old mobile devices with latest tough books will allow field technicians to have the reliable equipment and data required to perform their work in a safe and efficient manner.	\$4,772,237	3/31/18	\$85,807	\$82,563	\$77,557
INVP 4843 Virtualized Branches	In coordination with the SD_WAN core infrastructure project, this project will build and deploy the SD-WAN environment at the branch locations. This will support the delivery of WAN automation, application based routing and use of the Internet for network transport.	\$3,700,000	3/1/20	\$0	\$23,821	\$54,904
INVP 4489 Active Directory Improvements	Active Directory (AD) is a key service that supports core authentication for all National Grid computers and servers logging onto the corporate network in both the United States (US) and United Kingdom (UK). Therefore, AD provides access to all Information Systems (IS). The scope of this initiative is to implement a refreshed global AD infrastructure and support services. The new AD environment will unify all global applications that use the AD service. It is critical that National Grid can ensure that the AD service is reliable and supports core authentication requirements to all current and proposed applications.	\$6,550,515	12/1/19	\$0	\$58,536	\$96,191
INVP 4491 ICE Replacement	This investment is required to replace the current Instant Messaging, Collaboration, and Email (ICE) services with a set of similar, or enhanced, services provided by Office 365. Office 365 will provide a more effective collaboration and email service (Microsoft Office 365) to meet the business demand for additional capabilities (e.g.: collaboration with external parties) and provide any enabling infrastructure technology necessary before the ICE service contract expires.	\$3,766,701	9/30/18	\$53,484	\$66,907	\$62,843
INVP 4606 Data Visualization Expansion	Building upon the success of the Data Visualization (Tableau) core implementation last year, this investment expands its use with additional data and analytics capabilities. Data Visualization will be extended with the build out of dashboards across more business areas in support of their reporting, data retention and regulatory obligations. In addition to enhanced data access, this investment will provide for more advanced analytics through the use of new tools and longer term storage of information within the environment for audit and trending. The investment will introduce additional dashboards within Finance, Customer and Operations in support of reporting requirements.	\$3,932,607	6/28/18	\$55,970	\$54,439	\$51,114
INVP 4707 Business Innovation Projects 1	The Business Innovation project provides a funding base and governance structure that allows the Information Services (IS) organization to improve the IS experience for our employees and customers who will experience improved reliability, use ability, speed and efficiency across all functions. The program will also reduce the risk of system failure which have customer, brand and cost implications.	\$2,802,000	3/31/18	\$39,447	\$38,326	\$35,987
INVP 4568 US CNI-EMS Lifecycle Hardware and Software Upgrade	The server and workstation hardware for the Energy Management System (EMS) replacement project was purchased in 2010. The hardware is now near peak operating capacity and may constrain the capacity of the associated databases in EMS. The application vendor ASEA Brown Boveri (ABB), is recommending a hardware refresh for the EMS environments in order to increase the capacity of the databases to accommodate future growth. This Policy-driven investment will procure the equipment needed for the project stages for the hardware and software refresh of the current ABB EMS.	\$3,231,181	5/31/20	\$0	\$14,255	\$51,304

Narragansett Electric
Post Test Year Information System Investments

Project	Description	Total Investment	In Service Date	Distribution		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4706 1327 Interfaces - 523 FTS, 340 RDX, 245 MQSI, 253 JCAPS, 44 PM4D, 7 VB	The primary driver for this project is to mitigate the risks of continuing to be reliant on out of support infrastructure. These risks are : <ul style="list-style-type: none"> •Increased Security risk as out of support infrastructure will not receive security patches. •In the event of failure National Grid IS will be unable to meet the agreed Service Level Agreements (SLAs) for many key applications once the middleware infrastructure goes out of support. The majority of these applications currently have Gold or Platinum SLA's. •The FTS environment has a single point of failure/no redundancy. •The new technology provides functional benefits which will provide productivity improvements enabling improvements in the efficiency of data and file transfer. The 1327 interfaces (523 FTS, 340 RDX, 245 MQSI, 253 JCAPS, 44 PM4D, 7 VB) included in this scope of work will be divided into sprints that will focus on a specific set of interfaces that touch specific sets of applications. Each sprint will be executed sequentially.	\$3,501,046	3/1/20	\$0	\$22,540	\$51,951
INVP 4348 US SAP: Infrastructure Landscape	This project will create a permanent set of servers used for project development in support of initiatives pertaining to the SAP portfolio.	\$543,843	4/22/18	\$6,084	\$5,982	\$5,614
INVP 4217 US SAP: Business Planning	SAP's Business Planning and Consolidation (BPC) platform is a module that supports National Grid's financial processes, such as financial reporting, budgeting and forecasting. It allows for real-time monitoring of financial results and improved strategic decisions. SAP HANA is an in-memory database developed by SAP. BPC on HANA has been used by National Grid since November 2012. Upgrading the platform from version 7.5 to 10.1 will allow National Grid to utilize the current version's enhancements and leverage additional benefits, such as reading and aggregating data for reporting purposes, transforming data, and reporting on greater volumes of data.	\$2,589,265	11/13/17	\$35,786	\$34,704	\$32,588
INVP 4680 WAP Density deployment	This project will deploy new wireless access points in high density configurations to improve wireless capacity and coverage at 30 identified U.S. sites. In addition, it will decommission and replace currently unsupported wireless bridge equipment to migrate risks associated with failure of that equipment.	\$2,127,968	3/30/18	\$38,262	\$36,815	\$34,583
INVP 3683X11 IT/OT Discovery and Implementation Phase 1	This project will allow National Grid the capabilities to discover Smart/IT/OT computing and other devices across the National Grid environment in a centralized location, allowing the business to gain a full inventory of devices/applications/technologies, determine risks associated with those components, identify relevant controls, and management of devices/applications /technologies through their lifecycle.	\$2,837,360	8/1/19	\$6,194	\$41,307	\$38,776
INVP 4222 Governance Risk & Compliance (GRC) Optimization/Upgrade	This project updates the Governance, Risk and Compliance (GRC) solution of SAP to the vendor supported version. In addition, the project will update the GRC environments from Service Pack 4 to the latest version, Service Pack 17. These updates will ensure that the module, which provides control / roles segregation and Sarbanes-Oxley Act (SOX) guidelines, will be stable and incorporate the necessary program fixes in the new version. It will also integrate the newest features and improvements released by SAP.	\$2,464,347	11/20/17	\$34,186	\$33,165	\$31,143
INVP 4562 US SAP: Business Warehouse (BW) Consolidation to HANA Enterprise Cloud (HEC)	This investment is to provide funding to consolidate National Grid Business Intelligence (BI) / Business Warehouse (BW) to HANA Enterprise Cloud (HEC). This project supports Strategy Alignment by delivering <ul style="list-style-type: none"> •Reporting Platform Consolidation •Maintenance Cost Reduction •Reporting Infrastructure Enhancement 	\$2,366,000	3/31/19	\$13,062	\$33,924	\$31,848
INVP 3683X8 Enhanced DLP Gateway and Endpoint	Data Loss Prevention (DLP) will enable National Grid's businesses to detect sensitive data in the organization and then be able to identify, implement, and enforce policies for protecting the data without forcing any modifications to the data. The aim of this project will provide enhancements to the existing DLP gateway solution and introduce DLP capability on corporate endpoint devices (Corporate assets such as laptops and mobile devices). Implementation of such technology provides the business with the ability to manage and reduce risk exposure to key information assets, thus protecting National Grid's reputation and shareholder value.	\$2,782,325	6/1/21	\$0	\$0	\$12,978
INVP 4364 Wireless Network	This is a policy driven project to replace end of life equipment, decommission legacy wireless networks, and install or expand the current coverage and capacity of the Wireless Local Area Network (WLAN) at various National Grid sites that have been identified as a priority. The project will also strengthen the stability of the wireless network by providing current supported equipment with additional capacity. In addition this project will renew the outdoor (Yard) wireless network for these prioritize sites by replacing out of support access points at field locations to ensure Wi-Fi vehicle communications remain supportable.	\$2,472,812	3/27/18	\$34,812	\$33,823	\$31,759

Narragansett Electric
Post Test Year Information System Investments

Project	Description	Total Investment	In Service Date	Distribution		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4481 US MDS-Energy Accounting System (EAS) migration to Wholesale Settlement Application (WSA)	This policy-driven project will consolidate the existing wholesale settlement processing applications into one application for New York (NY) and New England (NE), in order to improve upon the wholesale settlement market reporting and existing business processes. The expanded Wholesale Settlement Application (WSA) will provide enhanced functionality around wholesale settlement quality control in each load zone within the NY and NE jurisdictions. A consolidated, automated, and vendor supported wholesale settlement platform will reduce the risk of settlement reporting failure and data inconsistencies, making the settlement process more streamlined and efficient. As a result of the migration of Energy Accounting System (EAS) into WSA, the project will also decommission the existing EAS application.	\$2,007,000	3/20/19	\$20,029	\$52,016	\$48,832
INVP 4563 US SAP: FERC on Hana (FOH)	This project provides funding structure to support FERC on HANA (FOH) upgrade. Electric and gas utilities of all sizes must comply with the Uniform System of Accounts from the Federal Energy Regulatory Commission (FERC) or the National Association of Utility Regulatory Commissioners (NARUC). As government reemphasizes regulatory oversight, National Grid is facing increasingly stringent compliance requirements. To reduce the challenges of FERC compliance, such that filing reports and responding to data requests, National Grid is using the FERC on HANA SAP tool, which, in order to stay in compliance, has to be upgraded as required.	\$2,115,000	2/28/19	\$13,442	\$30,209	\$28,360
INVP 4704Q Customer Bill Redesign	The last major bill redesign at National Grid concluded in 2007 with the rollout of the HP-Exstream software and the new "blue-bar" design. The now 10-year-old "blue bar" bill needs a refresh, and the priorities from contact center engagement need to be addressed. The bill refresh and changes implemented will result in direct benefits to customer satisfaction and effectiveness of customer interactions – both direct and digital channels. New "best practices" will give the company a "current" customer interaction – which occurs millions of times each month. No other form of communication affects the company's customers more. Imaging and eBilling will naturally follow as a set of benefits to this project.	\$2,108,147	3/31/19	\$11,349	\$29,474	\$27,670
INVP 4280 US VSTIG Bandwidth Ph2	The purpose of the Verizon Secured Telecommunications Gateway (VSTIG) network services is to connect National Grid securely to the internet and other external business partners. Due to the growth of these services, and other demands within the VSTIG environment, an upgrade is now required. The utilization of both VSTIGs (Billerica and Ashburn) are reaching the capacity limits of the network hardware, which, if not addressed, will lead to poor network performance, impact key business processes, and result in the potential loss of gateway services (such as internet access, cloud services and guest wireless internet access). This "phase 2" project builds upon the additional capacity provided by the phase 1 VSTIG upgrade, which will only alleviate the most pressing capacity constraint issues. Phase 2 will enable the network capacity to be increased up to 1gb/s per VSTIG. This capacity will meet the National Grid demands in the short to medium term. It will also be an enabler for other projects that are dependent upon the capacity increase, such as legacy De-Militarized Zone (DMZ) migration, Wide Area Network (WAN) and cloud services.	\$2,324,288	2/23/18	\$32,602	\$31,664	\$29,732
INVP 4709 Data Center Consolidation	A number of applications were not able to move in the timescales of Transformation and so the physical legacy Data Centers have had to be retained while remediation work is carried out on these applications (retained apps). Once all retained applications are remediated and moved to the new Data Center, the legacy Data Centers will need to be decommissioned. In addition there is a risk to continuing to run systems in the legacy data centres. A number of mission critical systems remain in the legacy data centers running in aged systems connected to aged network platforms. There is a likelihood that either the compute platform or network could fail and the hardware would not easily be restored. A compute platform failure would impact one system, but a network failure could impact multiple systems. Reliability - Old technology is vulnerable to more DRS threats - removing the old technology will mitigate this risk.	\$2,000,000	3/31/19	\$11,042	\$28,676	\$26,921
INVP 3683X4 Security Incident Event Management Phase 4 and Phase 5	The Security Incident and Event Management solution provides National Grid with the capabilities to analyze security event data in real time for internal and external threat management, and to collect, store, analyze, and report on log data for compliance and forensics. It provides the capabilities of gathering, analyzing and presenting information from network and security devices; identity and access management applications; vulnerability management and policy compliance tools; operating systems, database and application logs; and external threat data. his security capability will ensure alignment with best practices for cyber security and will provide CSOC and Network teams with actionable information to allow faster response to security incidents and demonstrate the effectiveness of controls and evidence in compliance with security regulations. This business capability will ensure key stakeholders have access to timely, useful security information relevant to protecting National Grid assets including CNI and Enterprise systems.	\$3,179,279	Multiple	\$0	\$13,833	\$30,340
INVP 3683X5 Identity & Access Management: Shared Area Access Management	This project is National Grid's continual effort to strengthen its Identity & Access Management (IAM) across its businesses. This multi-phase project will continue to expand on the existing capabilities delivered by the IAM Program as part of the Cyber Security Program. Shared Area Access Management will administer access to various shared file areas that exist across National Grid.	\$3,108,258	6/1/21	\$0	\$0	\$14,498

**Narragansett Electric
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Distribution		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4761 US Foundation Hosting Renewal	In order to address its growing business environment, National Grid must enhance its SAP and High Performance Analytic Appliance (HANA) application support and hosting services. Currently, the application hosting support is provided by T-Systems out of Houston, Texas and SAP HANA services are provided by SAP HANA Enterprise Cloud (HEC) out of Virginia. This project and Freudenberg Information Technology (FIT) will consolidate these two datacenters under one platform for both primary and Disaster Recovery (DR) in the US. The new service provider FIT was selected through a formal Request For Proposal (RFP) process supported by INVP 3924. FIT will supply Platform as a Service (PaaS) for SAP and HANA applications, and ancillary applications including PowerPlan, Open Text, uPerform and SABRIX. National Grid IS will work with FIT to move the SAP application portfolio to a new datacenter. By moving to the new platform, National Grid will eliminate the need to renegotiate contract extensions with current hosting providers SAP, T-Systems and Wipro as well as having to conduct costly upgrades of the existing SAP infrastructure hosted by T-Systems.	\$6,318,123	10/31/18	\$61,242	\$88,852	\$83,420
INVP 4632 US Video Conferencing upgrade for RW	The current video conferencing units at Reservoir Woods are on old technology meaning that they are not able to integrate with the rest of the Video conferencing estate and do not provide a consistent user interface. This project will replace the Video Conference units in Res Woods with the current Video Conferencing platform of CISCO's Call Manager. This upgrade will provide consistent integration with the rest of the Video Conferencing estate. Improvements to the effectiveness of meetings are enabled through video conference services. The current services at Reservoir Woods are inconsistent; users find them difficult to use and performance of the service is unreliable. This restricts the number of people using the service and minimizes the opportunity for the Company in providing service to customers. To improve consistency, this project proposes to upgrade videoconference capability at Reservoir Woods to improve the user interface and ensure flexible, compatible technology is in use to ease ability for future upgrades.	\$1,860,290	9/12/17	\$33,182	\$31,361	\$29,351
INVP 4830 Migration of Oracle to Linux	This project will migrate our Oracle Database applications that reside on expensive Unix P-Series hardware, to less expensive Wintel/Linux based hardware. Funding for the Wintel hardware along with the application effort to repurpose from Unix to Linux will be covered from this project.	\$1,500,000	8/1/21	\$0	\$0	\$4,493
INVP 4397 Ariba TLS and CI Update	The project will address the upgrade of two Systems Applications Processing (SAP) Enterprise Infrastructure components to mitigate the risk of losing the Ariba connection to National Grid suppliers for the purposes of collaboration, and network activities such as the sending and receiving of purchase orders, as well as other necessary interfaces, such as GridForce. The TLS (Transport Layer Security) provides inbound and outbound communications security over the internet.	\$1,727,180	9/11/17	\$19,448	\$18,688	\$17,384
INVP 4188 Aging System Stabilize	National Grid's Electric and Gas Operations are dependent on several critical applications that are running on older technology and components which are beyond their support life cycle. For example, several Operations applications are dependent on outdated and soon to be non-supported operating systems, components and platforms such as Windows 2003. This investment will upgrade, enhance and redesign some of the higher at risk Operations applications and replace outdated components.	\$1,360,803	3/17/18	\$20,196	\$19,615	\$18,418
INVP 4461 Unix51 Interface Migration	At National Grid, a majority of the file transfers are facilitated through the UNIX 51 File Transfer Service (FTS) tool. There are over 70 third parties receiving and sending critical data to National Grid via this service. UNIX 51 is running on aged technology and infrastructure without any support. The FTS service (downstate) was developed almost 20 years ago and is running on an unsupported and unpatchable platform. The business critical interfaces that utilize UNIX 51 from the Customer Related Information System (CRIS) and Customer Service System (CSS) systems to numerous third parties are at risk of failure with no viable contingency plan in place. This investment will provide a centralized expandable environment - Comprehensive Integration Services (CIS) - for additional interfaces to be implemented. Migrating UNIX 51 interfaces to the CIS platform will enable decommissioning of the UNIX 51 server. In Phase 1, analysis, tactical work and migration of the initial set of interfaces will be performed. Target completion for Phase 1 is November 2017. This project, Phase 2, will deliver the migration of the remaining set of business critical interfaces from the unsupported UNIX 51 platform onto the selected National Grid strategic middleware platform (CIS). By leveraging the experience, processes and infrastructure setup from Phase 1, the Phase 2 business critical interfaces are expected to be implemented more efficiently.	\$1,706,971	6/29/18	\$24,294	\$23,630	\$22,186
INVP 4693 Enterprise Labs	The project is an initiative within IS to construct and equip an Enterprise Laboratory, which will be available as a Proving Ground or Forum to accelerate the speed of innovation and new technology integration into the Enterprise. The E-Lab will be used to perform trials, tests, and showcase technologies for our customers. The Project Team will manage both the procurement and the suppliers' execution of the design, delivery and implementation of the construction and the technological aspects (hardware and software) that is required. The E-Lab will be located at Reservoir Woods on the second floor in the former High Density File (HDF) room W2-873.	\$457,635	4/30/18	\$8,261	\$7,953	\$7,470
INVP 4662 - Concur Licenses	This project allows National Grid to implement an end-to-end corporate travel booking and expense process. Concur allows setup of customizable audit rules which should reduce review time of expense items. It also will auto-generate notifications out to end users on outstanding expense items which currently is manually triggered. Both the audit rules and automated notifications should cut down on administrative efforts. This is the second phase of the investment, following last year's license agreement which was completed as part of a broader negotiation with SAP, via a discounted pricing model.	\$2,827,778	4/30/18	\$39,955	\$38,834	\$36,463

**Narragansett Electric
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Distribution		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4289 US Network Improvement	The original IS Transformation Network implementation project delivered a new National Grid Verizon network and migrated almost every site onto a single Wide Area Network (WAN) using a consistent set of designs, hardware, services and delivery method. A small number of sites were not migrated for various reasons such as potential site closure and Long Island Power Authority separation complexities. The sites that were omitted now need to be migrated to the Verizon WAN service because the legacy services are using unsupported network infrastructure and are unable to offer the functionality and reliability required by the business.	\$1,645,972	5/14/18	\$23,257	\$22,604	\$21,224
INVP 4837 SD-WAN Core, automation, orchestration tools and pilot sites	This project will build and deploy the SD-WAN core infrastructure and tools in the Network data centers that will be used to support the SD-WAN as it is deployed throughout the branch locations.	\$1,200,000	1/1/20	\$0	\$9,724	\$17,683
INVP 3486 US MDS-Itron Enterprise Edition (IEE)	This project will deliver a consistent meter reading platform utilizing the Itron Enterprise Edition (IEE) version 8.1 cloud based solution. This solution will support the migration of meter groups in work streams. Initially targeted are approximately 3,000 MV90 interval collection system New York electric meters that need to be upgraded from 2G to 4G, as the 2G technology is being retired by the communication vendor, and 4G is the current standard wireless communication technology. There are also 400 Massachusetts and 170 Rhode Island meters that are in scope for migration. Currently these 3,600 C&I meters are on the existing MV90 platform with a goal to eventually replace the MV90 with IEE 8.1. This project is necessary as all known carriers are retiring the 2G technology and moving to 4G. A technology has been selected that will align with the roadmap for any future AMI initiatives that may be implemented and will avoid near-term replacement costs at the time of such implementation.	\$1,806,968	5/30/18	\$46,318	\$45,035	\$42,285
INVP 3430 Mobility - (MDM) Mobile Device	This project will implement an Enterprise Mobility Management (EMM) service that will allow National Grid to secure and manage mobile apps and content across a variety of mobile devices. National Grid has over 4000 corporate owned mobile devices that are used by the workforce to store information and gain access to network applications, such as email. In addition, Time Transformation project (Time entry system) will be integrated between mobile devices and our backend systems (i.e. iphones, ipads, making external and internal apps available to NG via NG site - push and pull) to enable our workforce to work in a more flexible and efficient manner. Due to the growing use of mobile devices, it is more critical than ever that we have a way to manage these devices so that we can comply with Internal corporate policy, distribute applications, and secure the data on these devices through a central EMM platform. This project will establish and deploy a central EMM service capable of on-boarding 4000 mobile devices. Included in this delivery is the implementation of device and security policies, a corporate apps store, mobile device containers and the infrastructure required to support mobile device access to corporate systems and data in a secure fashion.	\$1,065,794	11/3/17	\$14,730	\$14,285	\$13,414
Grid Mod - Enterprise Service Bus	Implementation of ESB to serve as the enterprise middleware integration platform that is required to securely move data between systems, automate and manage business processes, transfer files between entities, and enable real-time and batch integration.		Rate Year 3	\$0	\$0	\$436,827
Grid Mod - Data Lake	Implementation of a data lake repository, with a scalable enterprise data warehouse, for all of National Grid that will leverage the overall grid modernization program.		Multiple	\$24,180	\$46,245	\$42,925
Grid Mod - PI Historian	Implementation of PI Historian that links with the data lake where select data sets will be maintained for use by other applications.		Multiple	\$12,069	\$23,078	\$21,416
Grid Mod - Advanced Analytics	Implementation for computation and data storage, which utilizes various cloud providers for agility. The advanced analytics required to efficiently manage a modern grid require processing massive quantities of data from countless data sources.		Multiple	\$217,481	\$519,374	\$651,192
Grid Mod - Telecommunications	Implementation of increased bandwidth at a number of facilities to handle an increase in the amount of data traversing over the networks.		Multiple	\$8,290	\$20,077	\$27,060
Grid Mod - Cybersecurity	Implementation of cybersecurity and privacy provisions in the form of multiple security services to support each functional area. These security services will serve as the cornerstone for any cybersecurity or privacy-related component of the overall solution. A program to provide regular privacy training and ongoing awareness of communications and activities to all workers and third parties who have access to customer information within the distributed system platform will be included.		Multiple	\$273,441	\$658,484	\$835,826

Total Capital Investment \$416,772,110
Rent Expense allocation to Narragansett Electric - Distribution Segment \$15,923,726

\$3,197,389 \$5,332,582 \$7,393,755

**Narragansett Gas
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Gas		
				Rate Year 1	Data Year 1	Data Year 2
Regulatory Mandates	This investment is for Regulatory Mandates of a project size that may not be known at the beginning of the fiscal year. The funding will be used to comply with walk-in Mandates and will be used for substitution based on a priority assessment with the business.	\$60,291,184	Multiple	\$48,068	\$158,662	\$274,855
INVP 3932 Call Center Customer Contact Center/SDC Technology Upgrade Implement Solution	This investment is to upgrade the U.S. Customer Contact Centers and Service Delivery Center (SDC) which are currently operating on core technologies that are no longer supported by their respective vendors. While there may be vendor support by way of third party vendors, the ability to triage all issues is not possible, as any previously undiagnosed issue would not be able to be resolved and many components of our infrastructure no longer have replacement parts available to purchase, as they have been discontinued by the manufacturer. This represents significant risk to the business in the areas of call handling, call recording, and the issuance of Regulatory penalties for non-compliance. National Grid also has multiple vendors supporting the technology and is seeking to consolidate support to one vendor with this project. This project will facilitate the replacement and consolidation of these critical systems to support the reliability of key communication channels between National Grid, our customers, and our employees.	\$17,473,948	9/1/18	\$130,700	\$127,215	\$119,441
INVP 3737 US CNI GMS SCADA Upgrade & Consolidation	This project is the final step in the strategic evolution of the Critical National Infrastructure (CNI) Gas Management Systems (GMS) SCADA system, supporting the new consolidated control rooms and upgrades to the hardware and operating systems, which are considered to be end of life. Furthermore, the current version of the SCADA application will require an upgrade due to its incompatibility with the new operating systems. The outcome of the project will ensure continuity in service while meeting the National Grid Gas Control strategic initiative for GMS longevity and up-time performance. Additionally, this effort will provide compliance to the National Grid IS Digital Risk & Security (DR&S) policies.	\$18,828,909	12/31/18	\$154,111	\$272,204	\$255,555
Technology Modernization Program	This is a multi-year investment program to modernize and improve the technology infrastructure at National Grid. The program will address a number of risks associated with unsupported applications and aged computer infrastructure and provide the foundational improvements necessary for the Company to deliver strategic initiatives such as: Gas Enablement, Customer Experience, and Advanced Analytics. The program consists of several projects in the following areas: - End User software licensing and Desktop tools - RSA Remote Access re-platform and token refresh - Network equipment replacements and bandwidth increases - Video Conferencing enhancements - Data Center improvements - Application and Network Monitoring platforms - Wireless Network enhancements - Cloud Enhancements - Azure Core Service and Secure Cloud Interconnect - Mobility - Mobile Device Management platforms - Technology Innovation Labs - Applications and supporting infrastructure improvements	\$22,293,266	Multiple	\$79,910	\$109,544	\$120,581

**Narragansett Gas
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Gas		
				Rate Year 1	Data Year 1	Data Year 2
Cyber 2 Program	<p>This program will deliver new cyber security capabilities to prevent, detect, and react to existing security threats. The projects to be delivered are:</p> <ul style="list-style-type: none"> -Domain Based Security Phase 1 -Endpoint Scanning (Tanium) -Identity & Access Management: Fine Grain Access Management (Unified Platform) -US CNI Security Enhancements Phase 1 -Cloud Security (Cloud Access Security Broker) -Identity & Access Management: Privileged Access Management -Vstig Scaling Upgrades -Risk Based Authentication - 2FA token alternative (Multi Factor Authentication) -US CNI Intrusion Detection/Prevention Phase 1 (CNI IDS Refresh) -Enterprise Centralized Patch Management -Fundamentals Package -Develop Robust Incident Response -Continuous review of Reference Security Architecture -Virtualized Browser -Perimeter Enhancements -Internal PKI (Public Key) Infrastructure -Identity & Access Management: Role Based Access Management -Removable Media Control - Full Roll out -Data Visualization -Threat Behavior Modeling -Security Research Lab -Network Access Control 	\$19,027,558	Multiple	\$46,875	\$82,947	\$104,675
Cyber 1 Program	<p>This program will deliver new cyber security capabilities to prevent, detect, and react to existing security threats. The remaining projects to be delivered are: Enterprise Network Security and CNI Network Security and CNI Security Incident and Event Management (SIEM). These projects will create a Security and Services Network (SSN) to safely store the CNI data and SIEM solutions and tools. Existing security solutions such as: Net Flow Security Analysis, Forensic Packet Capture and Anti-Malware will also be migrated to the SSN in order to hold the CNI and Enterprise together allowing a single lens into all Cyber Security Activity.</p>	\$17,235,543	Multiple	\$84,644	\$94,202	\$88,448
INVP 4914 US CNI-EMS Lifecycle Hardware and Software Upgrade	<p>The hardware and software supporting the Energy Management System (EMS) and related networks is 8 years old and unsupported, and is therefore creating risk to National Grid. This investment will deploy hardware and software purchased under investments "INVP 4568-EMS Lifecycle Hardware and Software Upgrade" and "INVP 4570-Tech Services-Network Equipment Lifecycle Replacements" to the electric control rooms in New York and New England thereby reducing risk associated to these unsupported and aging assets. Upgrades to the EMS application, requiring new hardware and operating systems, will benefit the business through increased capacity to support new initiatives including the growing distributed generation program.</p>	\$24,670,565	5/30/20	\$0	\$0	\$0
INVP 4307 US Win 7 Refresh Ph3	<p>The End User Device Refresh-Windows 7 project is intended to address the migration/transition from XP to Windows 7. The current standard operating system at National Grid is Windows 7, however, there are several legacy applications that rely on Windows XP to operate, which impacts approximately 6000 users. XP is no longer in support and Microsoft has stopped producing security patches, which poses a reliability and security risk. Thus, it is imperative to migrate the remaining applications and users onto Windows 7.</p>	\$13,883,173	7/31/17	\$75,325	\$72,661	\$68,070
Regulatory Mandates	<p>This investment is for the identified regulatory mandated projects that scheduled to be completed during the Rate year. The following have been identified as mandated projects of:</p> <ul style="list-style-type: none"> - INVP 4400 Annual HR & Payroll Mandatory Service Pack Upgrade (HRSP) - FY18 - INVP 4421 - New Arrearage Forgiveness Plan - INVP 4411AB Distributed Generation Portal - INVP 4411C New Electric Connections - INVP 4411D New Gas Connections - INVP 4124 Auto Remote Net Meter - INVP 4479 US Control-Gas Electronic Bulletin Board (EBB) Upgrade 	\$12,144,699	Multiple	\$60,907	\$86,315	\$81,039

**Narragansett Gas
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Gas		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4708 Business Innovation Projects 2	The Business Innovation project provides a funding base and governance structure that allows the Information Services (IS) organization to improve the IS experience for our employees and customers who will experience improved reliability, use ability, speed and efficiency across all functions. The program will also reduce the risk of system failure which have customer, brand and cost implications.	\$11,833,333	Multiple	\$7,335	\$27,833	\$52,436
INVP 4728 Business Innovation Projects 3	The Business Innovation project provides a funding base and governance structure that allows the Information Services (IS) organization to improve the IS experience for our employees and customers who will experience improved reliability, use ability, speed and efficiency across all functions. The program will also reduce the risk of system failure which have customer, brand and cost implications.	\$11,833,333	Multiple	\$7,335	\$27,833	\$52,436
INVP 4750 Customer Experience Transformation Tech Program	This program will replace out of support platforms to mitigate existing risks to our customer self-serve billing, payments and other communications portals, and set the foundation for the processes and technology changes needed to drive step improvements to the customer experience. Operational efficiencies will be realized through the migration of customers to self-service channels, and through re-engineering of processes and transactions. The program will focus on re-engineering the customer's digital interactions to create a universal and seamless customer experience through multiple service options: Web, Mobile, Text, Email, and future emerging channels.	\$14,373,983	10/1/19	\$0	\$79,509	\$109,360
INVP 4398 Storms/ISched Upgrade	As the primary Work Management and Scheduling tools for the legacy National Grid service territories, 'STORMS' and 'IScheduler' are critical applications in support of both Electric and Gas Operations. The applications have become increasingly unstable, experiencing multiple outages over the past several years. The vendor is no longer in a position to support the applications without upgrades that will bring the applications onto current technology. The project will upgrade the work management system (STORMS) to the latest version of technology including: server hardware, system software and database software, along with bringing both standard and custom application code to the latest version of the technology. The investment will also replace the aged middleware components with new, supported components. As part of the project, the work management scheduling tool (IScheduler) will be replaced with the vendor's latest scheduling tool and integrated with the STORMS product.	\$9,471,569	5/26/18	\$84,730	\$82,382	\$77,351
INVP 4570 US CNI Tech Services-Network Equipment Lifecycle Replacements	This Policy-driven investment will procure networking assets needed to replace out of warranty equipment and support infrastructure in the Energy Management System and Outage Management System (EMS/OMS) Data Centers, Communications rooms, Operations Centers, and Support areas across the National Grid service territory in New York and New England that are no longer supported by the hardware and software vendors.	\$9,211,230	5/31/20	\$0	\$0	\$0
S005242 M112 Systemic Improvement	This project replaces the existing FERC module with the FERC on SAP HANA solution. The new HANA solution allows for FERC data to be created in parallel with all other data leading to a faster closing process and real time reporting capabilities.	\$9,213,134	7/10/17	\$39,421	\$38,597	\$36,201
INVP 3683X7 Big Data Security Analytics Phase 1 & Phase 2	This project will introduce the new business capability focused on Big Data Security Analytics to enhance and support existing Security Data Analytics. This capability will be integrated with the Cyber Security Operations Center to provide intelligence and further enhance analytical capabilities to respond to threats/attacks in a pro-active manner. The Project will provide National Grid security operational capability to examine large volumes of security related data sets containing a variety of data from multiple sources - including traditional security sources, such as log or audit files, and emerging sources such as images, social data, sensors, etc. - to uncover hidden threats, detect attack patterns and trends, identify suspicious anomalies, and aid in the removal of security threats, in an expeditious and cost effective manner. Real-time analysis will provide prediction and mitigation means for National Grid to discover new threats early and react quickly before they propagate. This capability will be integrated with the Cyber Security Operations Center to provide intelligence and further enhance analytical capabilities to respond to threats/attacks in a pro-active manner. This project consists of two phases.	\$8,865,599	Multiple	\$0	\$18,690	\$37,267
INVP 4464 Data Visualization	This investment will establish two cloud based self service reporting tools (Tableau and Alteryx). The proposed solution will provide the opportunity for improved decision making through enhanced data mining, decision support, and data visualization capabilities. This will lay the ground work for the migration from current reporting tools which have reached end of life, in addition to providing readily available and proven modern technology.	\$8,228,372	3/16/18	\$45,520	\$44,210	\$41,513

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Project	Description	Total Investment	In Service Date	Gas		
				Rate Year 1	Data Year 1	Data Year 2
Physical Security Replacements	This is annual capital replacement program for Physical Security. Physical Security is responsible for protecting National Grid’s personnel and assets, and incorporates a security system as part of the overall security plan. To fulfill this responsibility, it is necessary to ensure that all security related equipment and assets in New England are in good condition. This project replaces assets that are at or near end of life and/or assets that are no longer under vendor warranty.	\$10,003,615	Multiple	\$33,646	\$44,033	\$53,595
INVP 4408 Doc Mgmt Systems Replacement Delivery	This investment will provide funding for the purchase and deployment of the Document Management System selected in the commercial RFP event executed in the first half of 2016. Deployment of the new Document Management System will provide a secure and reliable storage solution to serve the needs of the gas and electric business units. The initial partial sanction for this project included funding for the purchase of non-perpetual licenses for a period of one year. Negotiations with the selected vendor “OpenText” has resulted in a lower lifecycle cost through the purchase of pre-paid perpetual licenses. Purchase of pre-paid perpetual license reduces overall cost of the product by \$1.3 million dollars on a nominal basis over a sixteen year period. This partial sanction will provide the necessary funding to proceed with this purchase.	\$10,565,380	9/30/19	\$0	\$44,483	\$57,776
INVP 3683X13 Domain Based Security Phase 2 (Network Segregation)	This project will implement a Domain-based approach to information assurance for the identification, analysis, and documentation of security issues in the enterprise. Domain Based Security approach helps to analyze information security risks in a business context and provide a clear and direct mapping between the risks and the security controls needed to mitigate those risks. The policy domains will also address the variable risk appetites and requirements for the various business units, enabling National Grid to target the appropriate policies for each unit. Deliver the requirements for security in the organization, taking into account the business that needs to be supported. Security Policy Domains will establish a set of entities, physical and logical, that are subject to a common security policy and also allow each business within National Grid to adopt a risk-based approach to the implementation of information security controls. The approach helps to analyze information security risks in a business context and provide a clear and direct mapping between the risks and the security controls needed to mitigate those risks. The policy domains will also address the variable risk appetites and requirements for the various business units, enabling National Grid to target the appropriate policies for each unit.	\$6,486,000	5/31/20	\$0	\$10,079	\$38,354
Other fiscal plan initiatives	These annual investment plan projects were derived from business need. - INVP 3956 WIFI for Fleet Services Diagnostic Laptops - INVP 4467 STORMS Capital Cost Estimates - INVP 3982 Substation Monitoring-DobleARMS - INVP 4466 Gas Capital Investment Planning Tool - INVP 4480 US Control-Gas System Operating Procedure (SOP) Upgrade - INVP 4390 Plastic Fusion II - INPV 4462 Computapole Enhancements to Support Inspection Types - INVP 4487 Changes to ACIS for PMCC Civil Vendor Billing - INVP 3986 Cascade Electric Application Upgrade Project - INVP 4588 US SAP: Solution Manager Upgrade - INVP 3718 New Medical System	\$4,750,022	Multiple	\$27,859	\$30,212	\$27,856
INVP 4564 US SAP: Enhancement Pack 9 Upgrade	The SAP Enhancement pack upgrade is an investment to provide for the upgrade of the core SAP application every two years (biennially) excluding the upgrade work associated with the annual HR service pack which is accounted for under a separate mandatory annual investment. The project would apply the latest agreed SAP service packs for ECC, SRM, PI, Portal, BPC and SolMan to ensure that the SAP application stays within current vendor support and mitigates the risk of system failure by remaining current every two years on the SAP core application. The investment would only include the upgrade packs (non HR) which are supplied by the SAP and would exclude any discretionary enhancements as part of this upgrade or any upgrades associated with ancillary USFP systems (ex. PowerPlan, uPerform, OpenText, SABRIX). The investment would also not account for any upgrade work which may be required on the BI/BW SAP platform. This biennial patching/upgrade strategy is to ensure that National Grid applies the latest service packs every two year in order to ensure proper system operation and application maintenance support.	\$5,328,000	3/31/20	\$0	\$11,779	\$31,290

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Project	Description	Total Investment	In Service Date	Gas		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4395 US Mobile Device Refresh	This policy-driven project will implement 750 mobile devices previously purchased as part of INVP 4671 – Mobile device refresh FY17 project. In addition, the project will purchase 200 new mobile devices and mounting accessories to continue the effort of eliminating old devices from the field. A majority of mobile devices used in the field are more than 5 years old and these devices impact day to day productivity. These old devices break down frequently and can't be easily repaired due to unavailability of parts and accessories (in some cases manufacturers have stopped supporting the devices). The replacement of old mobile devices with latest tough books will allow field technicians to have the reliable equipment and data required to perform their work in a safe and efficient manner.	\$4,772,237	3/31/18	\$33,842	\$32,563	\$30,589
INVP 4843 Virtualized Branches	In coordination with the SD_WAN core infrastructure project, this project will build and deploy the SD-WAN environment at the branch locations. This will support the delivery of WAN automation, application based routing and use of the Internet for network transport.	\$3,700,000	3/1/20	\$0	\$9,395	\$21,654
INVP 4489 Active Directory Improvements	Active Directory (AD) is a key service that supports core authentication for all National Grid computers and servers logging onto the corporate network in both the United States (US) and United Kingdom (UK). Therefore, AD provides access to all Information Systems (IS). The scope of this initiative is to implement a refreshed global AD infrastructure and support services. The new AD environment will unify all global applications that use the AD service. It is critical that National Grid can ensure that the AD service is reliable and supports core authentication requirements to all current and proposed applications.	\$6,550,515	12/1/19	\$0	\$23,087	\$37,938
INVP 4491 ICE Replacement	This investment is required to replace the current Instant Messaging, Collaboration, and Email (ICE) services with a set of similar, or enhanced, services provided by Office 365. Office 365 will provide a more effective collaboration and email service (Microsoft Office 365) to meet the business demand for additional capabilities (e.g.: collaboration with external parties) and provide any enabling infrastructure technology necessary before the ICE service contract expires.	\$3,766,701	9/30/18	\$21,094	\$26,388	\$24,785
INVP 4606 Data Visualization Expansion	Building upon the success of the Data Visualization (Tableau) core implementation last year, this investment expands its use with additional data and analytics capabilities. Data Visualization will be extended with the build out of dashboards across more business areas in support of their reporting, data retention and regulatory obligations. In addition to enhanced data access, this investment will provide for more advanced analytics through the use of new tools and longer term storage of information within the environment for audit and trending. The investment will introduce additional dashboards within Finance, Customer and Operations in support of reporting requirements.	\$3,932,607	6/28/18	\$22,075	\$21,471	\$20,160
INVP 4707 Business Innovation Projects 1	The Business Innovation project provides a funding base and governance structure that allows the Information Services (IS) organization to improve the IS experience for our employees and customers who will experience improved reliability, use ability, speed and efficiency across all functions. The program will also reduce the risk of system failure which have customer, brand and cost implications.	\$2,802,000	3/31/18	\$15,558	\$15,116	\$14,193
INVP 4568 US CNI-EMS Lifecycle Hardware and Software Upgrade	The server and workstation hardware for the Energy Management System (EMS) replacement project was purchased in 2010. The hardware is now near peak operating capacity and may constrain the capacity of the associated databases in EMS. The application vendor ASEA Brown Boveri (ABB), is recommending a hardware refresh for the EMS environments in order to increase the capacity of the databases to accommodate future growth. This Policy-driven investment will procure the equipment needed for the project stages for the hardware and software refresh of the current ABB EMS.	\$3,231,181	5/31/20	\$0	\$0	\$0

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Project	Description	Total Investment	In Service Date	Gas		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4706 1327 Interfaces - 523 FTS, 340 RDX, 245 MQSI, 253 JCAPS, 44 PM4D, 7 VB	The primary driver for this project is to mitigate the risks of continuing to be reliant on out of support infrastructure. These risks are : <ul style="list-style-type: none"> •Increased Security risk as out of support infrastructure will not receive security patches. •In the event of failure National Grid IS will be unable to meet the agreed Service Level Agreements (SLAs) for many key applications once the middleware infrastructure goes out of support. The majority of these applications currently have Gold or Platinum SLA's. •The FTS environment has a single point of failure/no redundancy. •The new technology provides functional benefits which will provide productivity improvements enabling improvements in the efficiency of data and file transfer. The 1327 interfaces (523 FTS, 340 RDX, 245 MQSI, 253 JCAPS, 44 PM4D, 7 VB) included in this scope of work will be divided into sprints that will focus on a specific set of interfaces that touch specific sets of applications. Each sprint will be executed sequentially.	\$3,501,046	3/1/20	\$0	\$8,890	\$20,490
INVP 4348 US SAP: Infrastructure Landscape	This project will create a permanent set of servers used for project development in support of initiatives pertaining to the SAP portfolio.	\$543,843	4/22/18	\$2,400	\$2,359	\$2,214
INVP 4217 US SAP: Business Planning	SAP's Business Planning and Consolidation (BPC) platform is a module that supports National Grid's financial processes, such as financial reporting, budgeting and forecasting. It allows for real-time monitoring of financial results and improved strategic decisions. SAP HANA is an in-memory database developed by SAP. BPC on HANA has been used by National Grid since November 2012. Upgrading the platform from version 7.5 to 10.1 will allow National Grid to utilize the current version's enhancements and leverage additional benefits, such as reading and aggregating data for reporting purposes, transforming data, and reporting on greater volumes of data.	\$2,589,265	11/13/17	\$14,114	\$13,687	\$12,853
INVP 4680 WAP Density deployment	This project will deploy new wireless access points in high density configurations to improve wireless capacity and coverage at 30 identified U.S. sites. In addition, it will decommission and replace currently unsupported wireless bridge equipment to migrate risks associated with failure of that equipment.	\$2,127,968	3/30/18	\$15,091	\$14,520	\$13,640
INVP 3683X11 IT/OT Discovery and Implementation Phase 1	This project will allow National Grid the capabilities to discover Smart/IT/OT computing and other devices across the National Grid environment in a centralized location, allowing the business to gain a full inventory of devices/applications/technologies, determine risks associated with those components, identify relevant controls, and management of devices/applications /technologies through their lifecycle.	\$2,837,360	8/1/19	\$2,443	\$16,292	\$15,294
INVP 4222 Governance Risk & Compliance (GRC) Optimization/Upgrade	This project updates the Governance, Risk and Compliance (GRC) solution of SAP to the vendor supported version. In addition, the project will update the GRC environments from Service Pack 4 to the latest version, Service Pack 17. These updates will ensure that the module, which provides control / roles segregation and Sarbanes-Oxley Act (SOX) guidelines, will be stable and incorporate the necessary program fixes in the new version. It will also integrate the newest features and improvements released by SAP.	\$2,464,347	11/20/17	\$13,483	\$13,080	\$12,283
INVP 4562 US SAP: Business Warehouse (BW) Consolidation to HANA Enterprise Cloud (HEC)	This investment is to provide funding to consolidate National Grid Business Intelligence (BI) / Business Warehouse (BW) to HANA Enterprise Cloud (HEC). This project supports Strategy Alignment by delivering <ul style="list-style-type: none"> •Reporting Platform Consolidation •Maintenance Cost Reduction •Reporting Infrastructure Enhancement 	\$2,366,000	3/31/19	\$5,152	\$13,380	\$12,561
INVP 3683X8 Enhanced DLP Gateway and Endpoint	Data Loss Prevention (DLP) will enable National Grid's businesses to detect sensitive data in the organization and then be able to identify, implement, and enforce policies for protecting the data without forcing any modifications to the data. The aim of this project will provide enhancements to the existing DLP gateway solution and introduce DLP capability on corporate endpoint devices (Corporate assets such as laptops and mobile devices). Implementation of such technology provides the business with the ability to manage and reduce risk exposure to key information assets, thus protecting National Grid's reputation and shareholder value.	\$2,782,325	6/1/21	\$0	\$0	\$5,118

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Project	Description	Total Investment	In Service Date	Gas		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4364 Wireless Network	This is a policy driven project to replace end of life equipment, decommission legacy wireless networks, and install or expand the current coverage and capacity of the Wireless Local Area Network (WLAN) at various National Grid sites that have been identified as a priority. The project will also strengthen the stability of the wireless network by providing current supported equipment with additional capacity. In addition this project will renew the outdoor (Yard) wireless network for these prioritize sites by replacing out of support access points at field locations to ensure Wi-Fi vehicle communications remain supportable.	\$2,472,812	3/27/18	\$13,730	\$13,340	\$12,526
INVP 4481 US MDS-Energy Accounting System (EAS) migration to Wholesale Settlement Application (WSA)	This policy-driven project will consolidate the existing wholesale settlement processing applications into one application for New York (NY) and New England (NE), in order to improve upon the wholesale settlement market reporting and existing business processes. The expanded Wholesale Settlement Application (WSA) will provide enhanced functionality around wholesale settlement quality control in each load zone within the NY and NE jurisdictions. A consolidated, automated, and vendor supported wholesale settlement platform will reduce the risk of settlement reporting failure and data inconsistencies, making the settlement process more streamlined and efficient. As a result of the migration of Energy Accounting System (EAS) into WSA, the project will also decommission the existing EAS application.	\$2,007,000	3/20/19	\$0	\$0	\$0
INVP 4563 US SAP: FERC on Hana (FOH)	This project provides funding structure to support FERC on HANA (FOH) upgrade. Electric and gas utilities of all sizes must comply with the Uniform System of Accounts from the Federal Energy Regulatory Commission (FERC) or the National Association of Utility Regulatory Commissioners (NARUC). As government reemphasizes regulatory oversight, National Grid is facing increasingly stringent compliance requirements. To reduce the challenges of FERC compliance, such that filing reports and responding to data requests, National Grid is using the FERC on HANA SAP tool, which, in order to stay in compliance, has to be upgraded as required.	\$2,115,000	2/28/19	\$5,301	\$11,914	\$11,185
INVP 4704Q Customer Bill Redesign	The last major bill redesign at National Grid concluded in 2007 with the rollout of the HP-Exstream software and the new "blue-bar" design. The now 10-year-old "blue bar" bill needs a refresh, and the priorities from contact center engagement need to be addressed. The bill refresh and changes implemented will result in direct benefits to customer satisfaction and effectiveness of customer interactions – both direct and digital channels. New "best practices" will give the company a "current" customer interaction – which occurs millions of times each month. No other form of communication affects the company's customers more. Imaging and eBilling will naturally follow as a set of benefits to this project.	\$2,108,147	3/31/19	\$6,975	\$18,114	\$17,005
INVP 4280 US VSTIG Bandwidth Ph2	The purpose of the Verizon Secured Telecommunications Gateway (VSTIG) network services is to connect National Grid securely to the internet and other external business partners. Due to the growth of these services, and other demands within the VSTIG environment, an upgrade is now required. The utilization of both VSTIGs (Billerica and Ashburn) are reaching the capacity limits of the network hardware, which, if not addressed, will lead to poor network performance, impact key business processes, and result in the potential loss of gateway services (such as internet access, cloud services and guest wireless internet access). This "phase 2" project builds upon the additional capacity provided by the phase 1 VSTIG upgrade, which will only alleviate the most pressing capacity constraint issues. Phase 2 will enable the network capacity to be increased up to 1gb/s per VSTIG. This capacity will meet the National Grid demands in the short to medium term. It will also be an enabler for other projects that are dependent upon the capacity increase, such as legacy De-Militarized Zone (DMZ) migration, Wide Area Network (WAN) and cloud services.	\$2,324,288	2/23/18	\$12,858	\$12,488	\$11,726
INVP 4709 Data Center Consolidation	A number of applications were not able to move in the timescales of Transformation and so the physical legacy Data Centers have had to be retained while remediation work is carried out on these applications (retained apps). Once all retained applications are remediated and moved to the new Data Center, the legacy Data Centers will need to be decommissioned. In addition there is a risk to continuing to run systems in the legacy data centres. A number of mission critical systems remain in the legacy data centers running in aged systems connected to aged network platforms. There is a likelihood that either the compute platform or network could fail and the hardware would not easily be restored. A compute platform failure would impact one system, but a network failure could impact multiple systems. Reliability - Old technology is vulnerable to more DRS threats - removing the old technology will mitigate this risk.	\$2,000,000	3/31/19	\$4,355	\$11,310	\$10,618

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Project	Description	Total Investment	In Service Date	Gas		
				Rate Year 1	Data Year 1	Data Year 2
INVP 3683X4 Security Incident Event Management Phase 4 and Phase 5	The Security Incident and Event Management solution provides National Grid with the capabilities to analyze security event data in real time for internal and external threat management, and to collect, store, analyze, and report on log data for compliance and forensics. It provides the capabilities of gathering, analyzing and presenting information from network and security devices; identity and access management applications; vulnerability management and policy compliance tools; operating systems, database and application logs; and external threat data. his security capability will ensure alignment with best practices for cyber security and will provide CSOC and Network teams with actionable information to allow faster response to security incidents and demonstrate the effectiveness of controls and evidence in compliance with security regulations. This business capability will ensure key stakeholders have access to timely, useful security information relevant to protecting National Grid assets including CNI and Enterprise systems.	\$3,179,279	Multiple	\$0	\$5,456	\$11,966
INVP 3683X5 Identity & Access Management: Shared Area Access Management	This project is National Grid's continual effort to strengthen its Identity & Access Management (IAM) across its businesses. This multi-phase project will continue to expand on the existing capabilities delivered by the IAM Program as part of the Cyber Security Program. Shared Area Access Management will administer access to various shared file areas that exist across National Grid.	\$3,108,258	6/1/21	\$0	\$0	\$5,718
INVP 4761 US Foundation Hosting Renewal	In order to address its growing business environment, National Grid must enhance its SAP and High Performance Analytic Appliance (HANA) application support and hosting services. Currently, the application hosting support is provided by T-Systems out of Houston, Texas and SAP HANA services are provided by SAP HANA Enterprise Cloud (HEC) out of Virginia. This project and Freudenberg Information Technology (FIT) will consolidate these two datacenters under one platform for both primary and Disaster Recovery (DR) in the US. The new service provider FIT was selected through a formal Request For Proposal (RFP) process supported by INVP 3924. FIT will supply Platform as a Service (PaaS) for SAP and HANA applications, and ancillary applications including PowerPlan, Open Text, uPerform and SABRIX. National Grid IS will work with FIT to move the SAP application portfolio to a new datacenter. By moving to the new platform, National Grid will eliminate the need to renegotiate contract extensions with current hosting providers SAP, T-Systems and Wipro as well as having to conduct costly upgrades of the existing SAP infrastructure hosted by T-Systems.	\$6,318,123	10/31/18	\$24,154	\$35,043	\$32,901
INVP 4632 US Video Conferencing upgrade for RW	The current video conferencing units at Reservoir Woods are on old technology meaning that they are not able to integrate with the rest of the Video conferencing estate and do not provide a consistent user interface. This project will replace the Video Conference units in Res Woods with the current Video Conferencing platform of CISCO's Call Manager. This upgrade will provide consistent integration with the rest of the Video Conferencing estate. Improvements to the effectiveness of meetings are enabled through video conference services. The current services at Reservoir Woods are inconsistent; users find them difficult to use and performance of the service is unreliable. This restricts the number of people using the service and minimizes the opportunity for the Company in providing service to customers. To improve consistency, this project proposes to upgrade videoconference capability at Reservoir Woods to improve the user interface and ensure flexible, compatible technology is in use to ease ability for future upgrades.	\$1,860,290	9/12/17	\$13,087	\$12,369	\$11,576
INVP 4830 Migration of Oracle to Linux	This project will migrate our Oracle Database applications that reside on expensive Unix P-Series hardware, to less expensive Wintel/Linux based hardware. Funding for the Wintel hardware along with the application effort to repurpose from Unix to Linux will be covered from this project.	\$1,500,000	8/1/21	\$0	\$0	\$1,772
INVP 4397 Ariba TLS and CI Update	The project will address the upgrade of two Systems Applications Processing (SAP) Enterprise Infrastructure components to mitigate the risk of losing the Ariba connection to National Grid suppliers for the purposes of collaboration, and network activities such as the sending and receiving of purchase orders, as well as other necessary interfaces, such as GridForce. The TLS (Transport Layer Security) provides inbound and outbound communications security over the internet.	\$1,727,180	9/11/17	\$7,670	\$7,371	\$6,856
INVP 4188 Aging System Stabilize	National Grid's Electric and Gas Operations are dependent on several critical applications that are running on older technology and components which are beyond their support life cycle. For example, several Operations applications are dependent on outdated and soon to be non-supported operating systems, components and platforms such as Windows 2003. This investment will upgrade, enhance and redesign some of the higher at risk Operations applications and replace outdated components.	\$1,360,803	3/17/18	\$7,951	\$7,722	\$7,251

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Project	Description	Total Investment	In Service Date	Gas		
				Rate Year 1	Data Year 1	Data Year 2
INVP 4461 Unix51 Interface Migration	At National Grid, a majority of the file transfers are facilitated through the UNIX 51 File Transfer Service (FTS) tool. There are over 70 third parties receiving and sending critical data to National Grid via this service. UNIX 51 is running on aged technology and infrastructure without any support. The FTS service (downstate) was developed almost 20 years ago and is running on an unsupported and unpatchable platform. The business critical interfaces that utilize UNIX 51 from the Customer Related Information System (CRIS) and Customer Service System (CSS) systems to numerous third parties are at risk of failure with no viable contingency plan in place. This investment will provide a centralized expandable environment - Comprehensive Integration Services (CIS) - for additional interfaces to be implemented. Migrating UNIX 51 interfaces to the CIS platform will enable decommissioning of the UNIX 51 server. In Phase 1, analysis, tactical work and migration of the initial set of interfaces will be performed. Target completion for Phase 1 is November 2017. This project, Phase 2, will deliver the migration of the remaining set of business critical interfaces from the unsupported UNIX 51 platform onto the selected National Grid strategic middleware platform (CIS). By leveraging the experience, processes and infrastructure setup from Phase 1, the Phase 2 business critical interfaces are expected to be implemented more efficiently.	\$1,706,971	6/29/18	\$9,582	\$9,320	\$8,750
INVP 4693 Enterprise Labs	The project is an initiative within IS to construct and equip an Enterprise Laboratory, which will be available as a Proving Ground or Forum to accelerate the speed of innovation and new technology integration into the Enterprise. The E-Lab will be used to perform trials, tests, and showcase technologies for our customers. The Project Team will manage both the procurement and the suppliers' execution of the design, delivery and implementation of the construction and the technological aspects (hardware and software) that is required. The E-Lab will be located at Reservoir Woods on the second floor in the former High Density File (HDF) room W2-873.	\$457,635	4/30/18	\$3,258	\$3,137	\$2,946
INVP 4662 - Concur Licenses	This project allows National Grid to implement an end-to-end corporate travel booking and expense process. Concur allows setup of customizable audit rules which should reduce review time of expense items. It also will auto-generate notifications out to end users on outstanding expense items which currently is manually triggered. Both the audit rules and automated notifications should cut down on administrative efforts. This is the second phase of the investment, following last year's license agreement which was completed as part of a broader negotiation with SAP, via a discounted pricing model.	\$2,827,778	4/30/18	\$15,758	\$15,316	\$14,381
INVP 4289 US Network Improvement	The original IS Transformation Network implementation project delivered a new National Grid Verizon network and migrated almost every site onto a single Wide Area Network (WAN) using a consistent set of designs, hardware, services and delivery method. A small number of sites were not migrated for various reasons such as potential site closure and Long Island Power Authority separation complexities. The sites that were omitted now need to be migrated to the Verizon WAN service because the legacy services are using unsupported network infrastructure and are unable to offer the functionality and reliability required by the business.	\$1,645,972	5/14/18	\$9,172	\$8,915	\$8,371
INVP 4837 SD-WAN Core, automation, orchestration tools and pilot sites	This project will build and deploy the SD-WAN core infrastructure and tools in the Network data centers that will be used to support the SD-WAN as it is deployed throughout the branch locations.	\$1,200,000	1/1/20	\$0	\$3,835	\$6,974
INVP 3486 US MDS-Itron Enterprise Edition (IEE)	This project will deliver a consistent meter reading platform utilizing the Itron Enterprise Edition (IEE) version 8.1 cloud based solution. This solution will support the migration of meter groups in work streams. Initially targeted are approximately 3,000 MV90 interval collection system New York electric meters that need to be upgraded from 2G to 4G, as the 2G technology is being retired by the communication vendor, and 4G is the current standard wireless communication technology. There are also 400 Massachusetts and 170 Rhode Island meters that are in scope for migration. Currently these 3,600 C&I meters are on the existing MV90 platform with a goal to eventually replace the MV90 with IEE 8.1. This project is necessary as all known carriers are retiring the 2G technology and moving to 4G. A technology has been selected that will align with the roadmap for any future AMI initiatives that may be implemented and will avoid near-term replacement costs at the time of such implementation.	\$1,806,968	5/30/18	\$0	\$0	\$0

**Narragansett Gas
Post Test Year Information System Investments**

Project	Description	Total Investment	In Service Date	Gas		
				Rate Year 1	Data Year 1	Data Year 2
INVP 3430 Mobility - (MDM) Mobile Device	This project will implement an Enterprise Mobility Management (EMM) service that will allow National Grid to secure and manage mobile apps and content across a variety of mobile devices. National Grid has over 4000 corporate owned mobile devices that are used by the workforce to store information and gain access to network applications, such as email. In addition, Time Transformation project (Time entry system) will be integrated between mobile devices and our backend systems (i.e. iphones, ipads, making external and internal apps available to NG via NG site - push and pull) to enable our workforce to work in a more flexible and efficient manner. Due to the growing use of mobile devices, it is more critical than ever that we have a way to manage these devices so that we can comply with Internal corporate policy, distribute applications, and secure the data on these devices through a central EMM platform. This project will establish and deploy a central EMM service capable of on-boarding 4000 mobile devices. Included in this delivery is the implementation of device and security policies, a corporate apps store, mobile device containers and the infrastructure required to support mobile device access to corporate systems and data in a secure fashion.	\$1,065,794	11/3/17	\$5,810	\$5,634	\$5,291
Grid Mod - Enterprise Service Bus	Implementation of ESB to serve as the enterprise middleware integration platform that is required to securely move data between systems, automate and manage business processes, transfer files between entities, and enable real-time and batch integration.		Rate Year 3	\$0	\$0	\$237,393
Grid Mod - Data Lake	Implementation of a data lake repository, with a scalable enterprise data warehouse, for all of National Grid that will leverage the overall grid modernization program.		Multiple	\$13,141	\$25,132	\$23,327
Grid Mod - PI Historian	Implementation of PI Historian that links with the data lake where select data sets will be maintained for use by other applications.		Multiple	\$0	\$0	\$0
Grid Mod - Advanced Analytics	Implementation for computation and data storage, which utilizes various cloud providers for agility. The advanced analytics required to efficiently manage a modern grid require processing massive quantities of data from countless data sources.		Multiple	\$118,190	\$282,253	\$353,889
Grid Mod - Telecommunications	Implementation of increased bandwidth at a number of facilities to handle an increase in the amount of data traversing over the networks.		Multiple	\$4,505	\$10,911	\$14,706
Grid Mod - Cybersecurity	Implementation of cybersecurity and privacy provisions in the form of multiple security services to support each functional area. These security services will serve as the cornerstone for any cybersecurity or privacy-related component of the overall solution. A program to provide regular privacy training and ongoing awareness of communications and activities to all workers and third parties who have access to customer information within the distributed system platform will be included.		Multiple	\$148,601	\$357,852	\$454,228

Total Capital Investment \$416,772,110
Rent Expense allocation to Narragansett Electric - Gas Segment \$7,270,014

\$1,495,736 \$2,531,050 \$3,243,228