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US Sanction Paper

Title:	EMS Lifecycle Hardware and Software Upgrade	Sanction Paper #:	USSC-17-374
Project #:	INVP 4914	Sanction Type:	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	Date of Request:	December 13, 2017
Author:	Douglas McCarthy	Sponsor:	John Spink, VP Control Center Operations
Utility Service:	IS	Project Manager:	Robert Hollingsworth/ Michelle McNaught

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of INVP 4914 in the amount $4.734M with a tolerance of +/- 10% for the purposes of requirements and design.

This sanction amount is $4.734M broken down into:

$4.094M Capex
$0.640M Opex
$0.000M Removal

NOTE the potential investment of $16.000M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of requirements and design.

1.2 Project Summary

The hardware and software supporting the Energy Management System (EMS) and related networks is approaching end-of-life and is therefore creating risk to National Grid. During the execution of this investment, nearly 70% of the CNI Networking assets will be at “End of Support/ End of Life”, with no ability to obtain vendor assistance to resolve problems, and limited or no ability to procure required replacement parts. The ABB Energy Management System (EMS) reached “End of Support” in December 2016, and no longer receives vendor software updates, including functionality and security patches. Upgrade of the ABB EMS requires replacement of the application and networking hardware, as these legacy assets are incompatible with current software releases. Without vendor supported assets, National Grid is at risk of not being able to recover from a system failure, resulting in the inability of operators to monitor and

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control the transmission and distribution electric systems, and the potential for customer service interruptions.
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 with these assets. An upgrade of the EMS application to the current supported version will benefit the business through increased capacity to support new initiatives including the growing distributed generation program. .

1.3 Summary of Projects

Project Number	Project Title	Estimate Amount ($M)
4914	EMS Lifecycle Hardware and Software Upgrade	16.000
	Total	16.000

1.4 Associated Projects

Project Number	Project Title	Estimate Amount ($M)
4568	EMS Lifecycle Hardware and Software Upgrade	3.189
4570	Tech Services-Network Equipment Lifecycle Replacements	9.169
	Total	12.358

1.5 Prior Sanctioning History

N/A

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Apr 2018	Project Sanction

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1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	Maintain CNI computing assets at vendor supported version levels in alignment with the US CNI End State Vision (ESV) and Target Operating Model (TOM) to meet all business SLAs and NERC CIP Compliance.

1.8 Asset Management Risk Score

Asset Management Risk Score: 44

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

1.9 Complexity Level

○ High Complexity ○ Medium Complexity ◉ Low Complexity ○ N/A

Complexity Score: 20

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

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1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18-22	○ Yes ◉ No	◉ Over ○ Under ○ NA	$16.000M

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of budget within the IS business has been managed to meet jurisdictional budgetary, statutory and regulatory requirements.

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	3.410	7.631	4.006	0.000	0.000	0.000	15.047
OpEx	0.000	0.640	0.173	0.140	0.000	0.000	0.000	0.953
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	4.050	7.804	4.146	0.000	0.000	0.000	16.000

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	Sep 2017
Partial Sanction	Dec 2017
Begin Requirements and Design	Jan 2018
Project Sanction	Apr 2018
Begin Development and Implementation	May 2018
Move to Production / Last Go Live	Aug 2019
Project Complete	Aug 2019
Sanction Closure	Nov 2019

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1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

N/A

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

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2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on December 13, 2017:

(a) APPROVED the investment of $4.734M and a tolerance of +/- 10% for the purposes of requirements and design.

(b) NOTED the potential run-the-business (RTB) impact of $0.232M (per annum) for 5 Years.

(c) NOTED the potential investment of $16.000M and a tolerance of +/-25% contingent upon submittal and approval of a Project Sanction paper following completion of requirements and design.

(d) NOTED that Michelle McNaught has the approved financial delegation to undertake the activities stated in (a).

Signature……..Date……

David H. Campbell, Vice President, ServCo Business Partnering, USSC Chair

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3 Sanction Paper Detail

Title:	EMS Lifecycle Hardware and Software Upgrade	**Sanction Paper #:**	USSC-17-374
Project #:	INVP 4914	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	December 13, 2017
Author:	Douglas McCarthy	**Sponsor:**	John Spink, VP Control Center Operations
Utility Service:	IS	**Project Manager:**	Robert Hollingsworth/ Michelle McNaught

3.1 Background

The existing computing hardware and software supporting the New York and New England CNI Energy Management System (EMS) is near end-of-life and at risk of running unsupported versions of operating systems and software. A capacity limitation of the current configuration is limiting the system's ability to respond to growing demands, including in the distributed generation area. Running the EMS systems on this hardware and software leaves National Grid at risk of losing visibility of the grid and potentially control of remotely operated devices and equipment. A failure could cause both reputational and financial impacts to National Grid from both our regulators and governmental agencies.

National Grid has a significant number of network and security related devices within the Critical National Infrastructure (CNI) environment that are also at End of Support (EoS), or will be in 2018. Running the network on this hardware and software leaves National Grid at risk of potential irrecoverable hardware failures or cyber threats due to outdated versions of software. Failure of the CNI networks could cause System Operators to lose control of electric transmission and distribution assets.

These mission critical computing assets require a refresh of infrastructure hardware and software to continue operating at the highest level of availability. The IS delivery team has determined, due to the interdependence of the EMS systems and CNI networks, that deployment of refreshed assets must be performed concurrently. Hardware and software purchased under investments "INVP 4568-EMS Lifecycle Hardware and Software Upgrade" and "INVP 4570-Tech Services-Network Equipment Lifecycle Replacements" will be deployed under this investment.

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3.2 Drivers

Key Business Drivers:

- Maintain EMS reliability in support of Control Center Operations
- Preserving reputation of National Grid by maintaining system availability
- Accommodate increasing requirement for electric system data driven by Distributed Generation program growth
- Maintain EMS on the latest supported Hardware and software, which preserves manufacturers support through maintenance agreements
- Safeguard the reliability of networks and therefore the Company's ability to effectively operate EMS, provide timely and accurate regulatory reporting, and provide customer facing outage information during storms
- Without an upgrade to supported levels of networking hardware and software, National Grid will not be able to deploy security patches, leaving National Grid vulnerable to cyber threats and at risk of NERC CIP non-compliance

3.3 Project Description

This investment will deliver the following:

- Ready the CNI data centers and associated Wide Area Network infrastructure to support the refreshed system
- Deploy hardware to refresh the EMS application infrastructure purchased under "INVP 4568-EMS Lifecycle Hardware and Software Upgrade" for Quality Assurance (QA) and production environments
- Deploy hardware to refresh the CNI Networking assets purchased under "INVP 4570-Tech Services-Network Equipment Lifecycle Replacements" for test and production environments in the CNI Data Centers, Communications rooms, Operations Centers, and Support areas across the National Grid service territory in New York and New England
- [redacted]
- Purchase and deploy additional hardware required to perform the EMS application upgrade
- Provide increased capacity of the EMS databases to accommodate future growth in National Grid territories receiving Supervisory Control and Data Acquisition (SCADA) data. This helps National Grid stay compliant with regulatory requirements to share transmission SCADA data with regional ISOs and interconnecting utilities

This project will be delivered using National Grid US CNI, Information Services, and Verizon resources.

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3.4 Benefits Summary

Benefits of this investment include:

- Increase the reliability and integrity of the EMS application and CNI networks in New York and New England
- Deliver increased capacity in the EMS application to capture information new devices, particularly distributed generation
- Prevent network outages which would impact regulatory availability requirements
- Provide a more robust network security environment, which allows National Grid to continue meeting the North American Electric Reliability Corporation Critical Infrastructure Protection (NERC CIP) requirements
- Mitigate risks associated to unsupported hardware and software affecting National Grids ability to effectively monitor, operate and control the electric bulk power supply systems

3.5 Business and Customer Issues

There are no significant business issues beyond what has been described elsewhere.

3.6 Alternatives

Alternative 1: Delay the Project
This alternative is not a viable option, because it puts the existing system at risk of system failure without the ability to procure new equipment. The current Electric Control roadmap identifies the next opportunity to upgrade software near 2020-2021, which would render all hardware out of support and not replaceable in the marketplace.

Alternative 2: Move forward with a Software only project, without new Hardware
This alternative is not a viable option, as the vendor will not support a software upgrade without hardware that can be supported.

3.7 Safety, Environmental and Project Planning Issues

There are no significant issues beyond what has been described elsewhere.

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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	There is a risk that defects discovered during the software testing may not be resolved in time for the planned cutovers for NY and/or NE.	3	3	2	9	6	Mitigate	Risk money budgeted to cover an additional month of resource costs if needed fixes are delayed.	N/A	The risk money budgeted will be used to cover the needed resource costs.
2	There is a risk that additional penetration testing may be required if any defects discovered are not properly addressed before the second planned test.	3	1	3	3	9	Mitigate	The project has planned a risk budget that could be used to cover this expense if the need materializes.	N/A	General risk money will be used to address this risk if it becomes an actual problem

3.9 Permitting

N/A

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

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3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6 + 2022/23	Total
4914	EMS Lifecycle Hardware and Software Upgrade	+/- 25%	CapEx	0.000	3.410	7.631	4.006	0.000	0.000	0.000	15.047
			OpEx	0.000	0.640	0.173	0.140	0.000	0.000	0.000	0.953
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	4.050	7.804	4.146	0.000	0.000	0.000	16.000
Total Project Sanction			CapEx	0.000	3.410	7.631	4.006	0.000	0.000	0.000	15.047
			OpEx	0.000	0.640	0.173	0.140	0.000	0.000	0.000	0.953
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	4.050	7.804	4.146	0.000	0.000	0.000	16.000

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6 + 2022/23	Total
CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Variance **(Business Plan-Project Estimate)**

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6 + 2022/23	Total
CapEx	0.000	(3.410)	(7.631)	(4.006)	0.000	0.000	0.000	(15.047)
OpEx	0.000	(0.640)	(0.173)	(0.140)	0.000	0.000	0.000	(0.953)
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	(4.050)	(7.804)	(4.146)	0.000	0.000	0.000	(16.000)

3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology. The accuracy level of estimate for each project is identified in table 3.11.1.

3.11.4 Net Present Value / Cost Benefit Analysis

This is not an NPV Project.

3.11.4.1 NPV Summary Table

N/A

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3.11.4.2 NPV Assumptions and Calculations

N/A

3.11.5 Additional Impacts

None.

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual
Business Representative	John Spink
Head of PDM	Deb Rollins
Relationship Manager	Aman Aneja
Program Delivery Director	Michelle McNaught
IS Finance Management	Michelle Harris
IS Regulatory	Dan DeMauro
DR&S	Elaine Wilson
Service Delivery	Mark Mirizio
Enterprise Architecture	Joe Clinchot

3.12.2 *Reviewers*

The reviewers have provided feedback on the content/language of the paper.

Function	Individual	Area
Regulatory	Harvey, Maria	IS
Jurisdictional Delegate(s)	Anand, Sonny	Electric - NE
	Harbaugh, Mark	Electric - NY
	Hill, Terron	FERC
Procurement	DeRosa, Stephen	All

4 Appendices

4.1 Sanction Request Breakdown by Project

$M	4914	Total
CapEx	4.094	4.094
OpEx	0.640	0.640
Removal		0.000
Total	4.734	4.734

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4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing resources**
Personnel	NG Resources	1.567	
	SDC Time & Materials	1.158	
	SDC Fixed-Price	-	
	All other personnel	6.402	
	TOTAL Personnel Costs	9.127	
Hardware	Purchase	2.111	
	Lease	-	
Software		0.252	
Risk Margin		1.657	
Other		2.853	
	TOTAL Costs	16.001	

4.2.2 Benefiting Operating Companies

The following companies will benefit from this program. The allocation of these benefits will be based upon the number of customers.

Benefiting Operating Companies Table:

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.	Electric Distribution	NY
Niagara Mohawk Power Corp.	Electric Transmission	NY
Massachusetts Electric Company	Electric Distribution	MA
Massachusetts Electric Company	Electric Transmission	MA
Nantucket Electric Company	Electric Distribution	MA
New England Power Company	Electric Transmission	MA
Narragansett Electric Company	Electric Distribution	RI
Narragansett Electric Company	Electric Transmission	RI

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4.2.3 IS Ongoing Operational Costs (RTB):

This project will impact IS ongoing operations support costs as per the following table. These are also known as Run the Business (RTB) costs.

Note: RTB costs will be refined following execution of Requirements and Design.

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 17/18**	**Yr. 2 18/19**	**Yr. 3 19/20**	**Yr. 4 20/21**	**Yr. 5 21/22**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	-	-	-	-	-	**-**
RTB if Project is Implemented	-	0.052	0.157	0.232	0.232	0.649	**1.324**
Net change in RTB	-	0.052	0.157	0.232	0.232	0.649	**1.324**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	**-**
Variance to Plan	-	0.052	0.157	0.232	0.232	0.649	**1.324**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	-	-	-	-	-	**-**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	-	-	-	-	**-**
SaaS	-	-	-	-	-	-	**-**
HW support	-	0.052	0.157	0.232	0.232	0.649	**1.324**
Other: IS	-	-	-	-	-	-	**-**
All IS-related RTB (sub-Total)	-	0.052	0.157	0.232	0.232	0.649	**1.324**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	-	0.052	0.157	0.232	0.232	0.649	**1.324**

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

N/A

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US Sanction Paper

Title:	End User Device Refresh (Windows 7 Phase 3b Deployment)	**Sanction Paper #:**	USSC-16-196 v3
Project #:	INVP 4307	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	December 14, 2016
Author:	Leslie Crook/Chris Clawson	**Sponsor:**	John Gilbert, Global Head IS Service Delivery
Utility Service:	IS	**Project Manager:**	Leslie Crook

1 Executive Summary

1.1 Sanctioning Summary

This paper requests full sanction of INVP 4307 in the amount $13.351M with a tolerance of +/- 10% for the purposes of Design and Implementation.

This sanction amount is $13.351M broken down into:

$12.708M Capex
$0.643M Opex
$0.000M Removal

1.2 Project Summary

To ensure the end user device estate continues to be reliable, remains secure and is able to meet new business demands, it is important that the operating system is capable of current performance and supported by the software vendor. The current standard operating system at National Grid is Windows 7. However, the US is still reliant on XP due to legacy applications (approximately 6000 users currently rely upon XP operating system). XP is no longer in support and Microsoft has stopped producing security patches for it. Many new applications are not XP compatible and existing applications operating on XP may require remediation to work on Windows 7. Continued use of XP also poses potential reliability and security risks.

The End User Device Refresh-Windows 7 project is intended to address the migration/transition from XP to Windows 7.

In summary, the Design and Implementation scope covered by this full sanction will deliver:

- Remediation of required applications
    - Remediation includes upgrades, virtualization, license purchases, etc.

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- Bring end user applications into Centralized IS management through rationalization, and packaging to enable expedient deployment.
- Deployment of remaining Windows 7, and recovery of associated Windows XP, devices (approximately 4500 devices).

Business support will be critical as the project will be dependent on the willingness of affected business functions to adopt the recommended changes to applications.

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
INVP 4307	IS	End User Device Refresh (Windows 7 Phase 3I	13.351

1.4 Associated Projects

Previous Win 7 Project:

Project	INVP Number	Status	Comment
Phase 1 Transformation	2382	Closed	This phase produced “workbooks” for 12175 devices. Devices also upgraded but left on XP due to applications
Phase 2 Desktop Refresh	2927	Closed	This phase has deployed 3200 devices to Win 7.
XP remediation F&A	3288	Closed	Objective to recommend remediation solutions for 35 IS Packaged applications. Outcome : performed initial testing and analysis
Phase 3a Assessment	4266	Closed	Objective to deploy 200 devices to Win 7 and perform application assessment for the framework of Ph3B.

1.5 Prior Sanctioning History

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Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
Sep 2016	USSC	$6.6M	$13.351M	End User Device Refresh (Windows 7 Phase 3b	Partial	+/-25%
June 2016	USSC	$2.5M	$13.351M	End User Device Refresh (Windows 7 Phase 3b	Partial	+/-25%

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
May 2017	Project Closure

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	National Grid strategy is to maintain operating systems are at current supported levels. To ensure that the end user device estate continues to be reliable, remains secure and is able to meet new business demands, it is important that the operating system is capable of current performance and supported by the software vendor. XP is no longer supported by Microsoft. Many new applications are not able to run on the platform and security may be compromised by its continued use.

1.8 Asset Management Risk Score

Asset Management Risk Score: 47

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Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

1.9 Complexity Level

○ High Complexity ◉ Medium Complexity ○ Low Complexity ○ N/A

Complexity Score: 20

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY17-21	◉ Yes ○ No	◉ Over ○ Under ○ NA	**$6.797M**

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio has been managed by the IS Relationship Manager with the Planning Analyst assistance to meet jurisdictional budgetary, statutory and regulatory requirements.

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1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	12.708	0.000	0.000	0.000	0.000	0.000	12.708
OpEx	0.000	0.643	0.000	0.000	0.000	0.000	0.000	0.643
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	13.351	0.000	0.000	0.000	0.000	0.000	13.351

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	April 2016
Partial Sanction	June 2016
Procurement of devices	July 2016
Application rationalization / remediation / packaging	July 2016
Deployment of devices	September 2016
Partial Sanction	September 2016
Applications rationalization / remediation / packaging	October 2016
Full Sanction	December 2016
Deployment of hardware	December 2016
Complete	March 2017
Closure Sanction	May 2017

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	◉ Amber	○ Green
Availability of external resources to deliver project:	○ Red	◉ Amber	○ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green

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Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

There is a risk to the project timescales if business resources are not available. The project team is identifying business resources in affected functions to request assignment of resources in agreement with senior management.

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

Please contact NG Project Manager for copies of these documents as needed.

1	INVP 4307 End User Device Refresh Ph3b TCO Log V1.0
2	INVP 4307 End User Device Refresh Ph3b USSC Spreadsheet V0.2

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2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on December 14, 2016:

(a) APPROVED this paper and the investment of $13.351M and a tolerance of +/-10%.

b) APPROVED the RTB of $0.200M (per annum) for 2 years.

c) NOTED that Tom Cunningham has the approved financial delegation.

Signature……..Date……

Christopher Kelly
Acting Senior Vice President, Engineering Design & Process
US Sanctioning Committee Co – Chair Person

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3 Sanction Paper Detail

Title:	End User Device Refresh (Windows 7 Phase 3b Deployment)	**Sanction Paper #:**	USSC-16-196 v3
Project #:	INVP 4307	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	December 14, 2016
Author:	Leslie Crook/Chris Clawson	**Sponsor:**	John Gilbert, Global Head IS Service Delivery
Utility Service:	IS	**Project Manager:**	Leslie Crook

3.1 Background

National Grid's initial objective under Win 7 project was to replace Windows XP with Windows 7. However, the Company has a number of applications that require use of XP and will not operate on Windows 7. A subset of users (6000) require XP operating system for a certain portion of their applications. Replacement of XP was required due to discontinuance of support by Microsoft which poses potential reliability and security risks. Among the issues of concern are:

- New hardware devices are no longer provided with a chipset that is able to support running of Windows XP, so as devices break or new users join the business areas recycled devices will need to be used. These will be increasingly difficult to obtain as time goes on.
- There is an increasing security risk as automatic security updates are not provided for Windows XP.
- Users remaining on XP are unable to use newer application technologies that only run on Win7.
- The costs for maintaining the Windows XP devices will be higher than for Windows 7 devices, due to the age of the XP devices.

3.2 Drivers

To ensure end user devices continue to be reliable, remain secure and meet new business demands, it is important the operating system is capable of current performance and supported by the software vendor. Additionally, XP users are prevented from newer application technology that will not execute on XP, often requiring users to sustain two devices (one XP and one WIN7) as applications mandate upgrades

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and migrate away from XP. The End User Device Refresh will eliminate potential security risks from the operation of XP and avoid loss of business operational capabilities if XP compatible devices cannot be found when a replacement is required.

3.3 Project Description

This project is intended to migrate/transition the remaining end users of the Windows XP operating system (estimated at 4500) in the US to National Grid's current Windows 7 standard.

The Requirements and Design phase assessed and recommended solutions to upgrade/replace applications that restrict users from moving to Windows 7. This included working with over 300 business units and key business leaders to rationalize the list of applications required in the environment to a substantially lesser number, and standardizing business unit applicaton profiles wherever possible.

The Delivery and Implementation phase will perform the actual remediation of the rationalized applications, and package and test the applictions. This involves a number of options including code remediation, application upgrades, licence purchases, and virtualization. This phase will then deploy up to 4500 devices by March 2017. Device deployments will be done utitlizing various methods including overnight deployments, business hour drop-off deployments, and standard desk-side deployments.

This project will remediate all applications possible. Some applications, such as Documentum, Team Center, Avaya, and various Contact Center applications may remain on Windows XP via a virtualized solution as they are being upgraded or replaced as part of other projects, including Document Management System, Customer Experience, and Telephony.

3.4 Benefits Summary

Once implemented, the End User Device Refresh-Windows 7 project will:

- Provide a fully supported operating system for end user devices which will allow employees to continue to perform their functions and do so more efficiently
- Improve security within National Grid systems
- Increase security from newer applications as all of the latest critical security patches and upgrades will be utilized in full across all devices in the network

3.5 Business and Customer Issues

Several business areas are reliant on XP for one or more applications and in some instances it is restricting their normal work approaches. In some instances, this has caused users to utilize two devices to perform work functions (an XP device for applications that won't run on Win7, and a Win7 device for applications that no longer

run on XP). The End User Device Refresh-Windows 7 project will rationalize this situation and improve efficiency.

3.6 Alternatives

Alternative 1: OS Upgrade is not done/Organization stays on same infrastructure: Continuing to run business essential operations on XP presents a potential elevated security risk as the devices may become targets for hackers. Windows XP is an obsolete system. Microsoft will not make any security patches or fixes for XP OS. This alternative is therefore rejected.

3.7 Safety, Environmental and Project Planning Issues

None

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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Risk that Business does not engage to support decision on Applications	4	3	3	12	12	Mitigate	Establish governance forun to present application decisions, and gain approval for outcome of each application	The residual risk could be significat if Business areas are not engaged with governance forum. Therefore the Project Management Board would need to agree to present this to the US IS Engagement meeting for a decision	Following the presentation to the Strategy Board and outcomes. The decision outcome would be presented to PMB for recording or for onward escalation to the DSG
2	Risk that applications will take significant investigation effort due to age of application, lack of existing Subject Matter Expertise not being available with: Apps suppliers, Partners, or within NG. In addition, suitablility of the technology for remediation may make the likelihood of further remediation unlikely. Particularly likely with the unpackaged apps which have been procured by the Business.	4	5	3	20	12	Mitigate	Perform Application rationalization to reduce the number of Applications in the NG estate. Assess the impact of remaining applications, and allow further investigation on suitability of application to be remediated and likely complexity. Test the applications and remediate/upgrade and package application for deployment.	Residual Risk is likely to be undetermined number of application where remediation could be complex, and there would be a high probability that significant effort would not provide a positive outcome, requiring an alternative application to be identified and agreed with the Business users. there would be a formal review with the business owners on the applications required to be remediated and confirmed to move to packaging.	There would be a number of applications that would be presented for agreement with the business/apps owners to provide alternative application to enable rationalization of applications. This could also require further engagement with Senior Business Management to decide to rationalize applications.
3	Risk of the project running beyond the end of March 2017 and the financial impact if that occurs	3	3	3	9	9	Mitigate	Project team will work closely with vendors and stakeholders to manage timeline to ensure key dates are met.	Residusal risk could be significant if ongoing licensing and contract negotiations are not completed in time to allow for application remediation.	Stakeholders would need to determine whether to continue the project, descoping impacted users or transfer users to associated application projects.

3.9 Permitting

N/A

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

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3.10.2 Customer Impact

3.10.3 CIAC / Reimbursement

N/A

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
INVP 4307	End User Device Refresh (Windows 7 Phase 3b Deployment)	Est Lvl (e.g. +/- 10%)	CapEx	0.000	12.708	0.000	0.000	0.000	0.000	0.000	12.708
			OpEx	0.000	0.643	0.000	0.000	0.000	0.000	0.000	0.643
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	13.351	0.000	0.000	0.000	0.000	0.000	13.351
Total Project Sanction			CapEx	0.000	12.708	0.000	0.000	0.000	0.000	0.000	12.708
			OpEx	0.000	0.643	0.000	0.000	0.000	0.000	0.000	0.643
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	13.351	0.000	0.000	0.000	0.000	0.000	13.351

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	5.963	0.000	0.000	0.000	0.000	0.000	5.963
OpEx	0.000	0.591	0.000	0.000	0.000	0.000	0.000	0.591
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	6.554	0.000	0.000	0.000	0.000	0.000	6.554

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	(6.745)	0.000	0.000	0.000	0.000	0.000	(6.745)
OpEx	0.000	(0.052)	0.000	0.000	0.000	0.000	0.000	(0.052)
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	(6.797)	0.000	0.000	0.000	0.000	0.000	(6.797)

3.11.3 Cost Assumptions

3.11.4 Net Present Value / Cost Benefit Analysis

This is not an NPV Project

3.11.4.1 ***NPV Summary Table***

N/A

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3.11.4.2 ***NPV Assumptions and Calculations***

N/A

3.11.5 Additional Impacts

None

3.12 Statements of Support

3.12.1 ***Supporters***

The supporters listed have aligned their part of the business to support the project.

Role	Individual's Name
Business Executive Sponsor	John Gilbert
Head of BRM/Strategy	Graham Pool
Head of PDM	Tom Cunningham
Relationship Manager	Graham Pool
Portfolio Delivery Manager – IS4IS	Mike Coyle
Program Delivery Director	David McCune
IS Finance Management	Chris Pearce
IS Regulatory	Dan DeMauro
DR&S	Muks Ravipathy
Service Transition	Brian Detota
Enterprise Architecture	Jamie Allison

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual	Area
Finance	Benson, Chip	All
Regulatory	Zschokke, Peter	All
Jurisdictional Delegate(s)	Harbaugh, Mark	Electric - NY
	Patterson, James	Electric - NE
	Hill, Terron	FERC
	Brown, Laurie	Gas - NY
	Iseler, David G.	Gas - NE
Procurement	Curran, Art	All

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4 Appendices

4.1 Sanction Request Breakdown by Project

N/A

4.2 Other Apendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing resources**
Personnel	NG Resources	3.215	
	SDC Time & Materials	-	
	SDC Fixed-Price	-	
	All other personnel	0.143	
	TOTAL Personnel Costs	3.359	
Hardware	Purchase	3.217	
	Lease	-	
Software		1.038	
Risk Margin		-	
Other		5.737	
	TOTAL Costs	13.351	

4.2.2 Benefiting Operating Companies

This project will benefit all of the list companies below

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.- Electric Distr.	Electric Distribution	NY
Massachusetts Electric Company	Electric Distribution	MA
KeySpan Energy Delivery New York	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
Boston Gas Company	Gas Distribution	MA
Narragansett Electric Company	Electric Distribution	RI
Niagara Mohawk Power Corp. - Transmission	Transmission	NY
Niagara Mohawk Power Corp. - Gas	Gas Distribution	NY
New England Power Company – Transmission	Transmission	MA, NH, RI, VT
KeySpan Generation LLC (PSA)	Generation	NY
Narragansett Gas Company	Gas Distribution	RI

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Colonial Gas Company	Gas Distribution	MA
Narragansett Electric Company – Transmission	Transmission	RI
National Grid USA Parent	Parent	
Nantucket Electric Company	Electric Distribution	MA
NE Hydro - Trans Electric Co.	Inter Connector	MA, NH
KeySpan Energy Development Corporation	Non-Regulated	NY
KeySpan Port Jefferson Energy Center	Generation	NY
New England Hydro - Trans Corp.	Inter Connector	MA, NH
KeySpan Services Inc.	Service Company	
KeySpan Glenwood Energy Center	Generation	NY
Massachusetts Electric Company – Transmission	Transmission	MA
NG LNG LP Regulated Entity	Gas Distribution	MA, NY, RI
Transgas Inc	Non-Regulated	NY
Keyspan Energy Trading Services	Other	NY
KeySpan Energy Corp.	Service Company	
New England Electric Trans Corp	Inter Connector	MA
New England Hydro Finance Co. Inc.	Inter Connector	MA, NH

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4.2.3 IS Ongoing Operational Costs (RTB)

This project will increase IS ongoing operations support costs as per the following table. These are also known as Run the Business (RTB) costs.

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 16/17**	**Yr. 2 17/18**	**Yr. 3 18/19**	**Yr. 4 19/20**	**Yr. 5 20/21**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	-	-	-	-	-	**-**
RTB if Project is Implemented	0.008	0.201	0.199	-	-	-	**0.408**
Net change in RTB	0.008	0.201	0.199	-	-	-	**0.408**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	**-**
Variance to Plan	0.008	0.201	0.199	-	-	-	**0.408**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	-	-	-	-	-	**-**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	-	-	-	-	**-**
SaaS	-	-	-	-	-	-	**-**
HW support	-	-	-	-	-	-	**-**
Other: IS	0.008	0.201	0.199	-	-	-	**0.408**
All IS-related RTB (sub-Total)	0.008	0.201	0.199	-	-	-	**0.408**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	0.008	0.201	0.199	-	-	-	**0.408**

RTB Impact

The total $0.408M RTB cost is for Med-V ($.200M per year for 2 years beginning Apr 2017)

4.3 NPV Summary

This is not an NVP Project.

4.4 Customer Outreach Plan

N/A

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US Sanction Paper

Title:	New Customer Connections Program	**Sanction Paper #:**	USSC-16-260 V2
Project #:	INVP 4411	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	May 10, 2017
Author:	Suzanne Rodriques	**Sponsor:**	Sean Mongan, VP Process and Performance
Utility Service:	IS	**Project Manager:**	Michelle McNaught

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of INVP 4411 in the amount $5.217M with a tolerance of +/- 10% for the purposes of partial program, which will deliver 4411A-Distributed Generation for NY, 4411B-Distributed Generation NE and requirements and design for 4411C-New Electric Connections.

This sanction amount is $5.217M broken down into:

$4.232M Capex
$0.985M Opex
$0.000M Removal

NOTE the potential investment of $6.203M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following design of the third of four projects in the program.

1.2 Project Summary

In September 2015, a five year Program was developed by the Customer Organization designed to systematically address a number of initiatives under the umbrella of the Customer Experience Transformation Strategy (CXT). These initiatives are expected to deliver significant Customer Experience improvements. Two of the initial projects identified were the DG Portal and the New Gas & Electric Connections portal. While these projects were initially identified separately, from the process and customer perspective, there is significant similarity in workflow management and therefore are being addressed as a combined *New Customer Connections Program* with several phases to be delivered through mid FY19.

The program will deliver the Distributed Generation Interconnection Online Application Portal (DG IOAP Phase 1, Release 1) for NY in early May, 2017. This request is to enhance the New Customer Connections portal for Massachusetts and Rhode Island

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(DG IOAP Phase 1, Release 2), as well as perform requirements and design for new electric connections.

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
4411A	IS	Distributed Generation NY	2.935
4411B	IS	Distributed Generation NE	1.587
4411C	IS	New Electric Connections	0.695
4411D	IS	New Gas Connections	0.986
		Total	6.203

1.4 Associated Projects

Project Number	Project Title	Estimate Amount ($M)
3941	Distributed Generation Application Tracking	0.429
	Total	0.429

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
Sept 2016	USSC	$3.207	$6.332	4411 New Customer Connections Program	Partial	25%
Jul 2016	ISSC	$0.429M	$0.429M	INVP 3941 Distributed Generation Application Tracking	Feasibility & Analysis	10%

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Mar 2018	Full Sanction

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1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ○ Policy- Driven ○ Justified NPV ◉ Other	This program will fund 4 projects; the first project is mandatory and the others are policy driven. The individual project sanction documents will identify the Category for the deliverables within the project

1.8 Asset Management Risk Score

Asset Management Risk Score: 49

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

1.9 Complexity Level

○ High Complexity ○ Medium Complexity ○ Low Complexity ◉ N/A

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

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1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY17 - 18	◉ Yes ○ No	○ Over ○ Under ◉ NA	$0.000M

1.12 If cost > approved Business Plan how will this be funded?

N/A

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	1.954	2.278	0.851	0.000	0.000	0.000	5.083
OpEx	0.000	0.596	0.389	0.135	0.000	0.000	0.000	1.120
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	2.550	2.667	0.986	0.000	0.000	0.000	6.203

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Partial Sanction	Sep 2016
Begin Requirements and Design	Sep 2016
Move to Production Begins	Apr 2017
Partial Sanction	May 2017
Full Sanction	Mar 2018
Move to Production / Last Go Live	Oct 2018
Project Complete	Nov 2018
Closure Sanction	Feb 2019

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1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

1	Inconsistent data quality and formatting across all business systems could cause delays in data migration and data sharing across systems. This has the potential of delaying the project to address data exceptions not accounted for in the transformation layer.

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

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2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on May 10, 2017:

(a) APPROVED the investment of $5.217M and a tolerance of +/- 10% for the purposes of partial sanction.

(b) NOTED the potential RTB Impact of $0.454M (per annum) for 5 years.

(c) NOTED the potential investment of $6.203M and a tolerance of +/-25% contingent upon submittal and approval of a Project Sanction paper following completion of second project in the program.

(d) NOTED that Michelle McNaught has the approved financial delegation to undertake the activities stated in (a).

Signature……..Date……

Christopher Kelly

Senior Vice President, Electric Process and Engineering

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3 Sanction Paper Detail

Title:	New Customer Connections Program	**Sanction Paper #:**	USSC-16-260 V2
Project #:	INVP 4411	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	May 10, 2017
Author:	Suzanne Rodriques	**Sponsor:**	Sean Mongan, VP Process and Performance
Utility Service:	IS	**Project Manager:**	Michelle McNaught

3.1 Background

Distributed Generation (DG) customer integration into the National Grid electric network is a fast growing area of our business that is regulated and mandated across all National Grid electric service territories. Each state has its own interconnection tariff, which outlines the process, forms, cost, timelines, penalties, and tracking and reporting requirements for administering the end to end DG interconnection process.

In New York, the New York Public Service Commission (NYPSC) requires that all electric distribution companies create and manage an online portal for Distributed Generation (DG) application submissions ("NY State Standardized Interconnection Requirements and Application Process for New Distributed Generators 2 MW or Less Connected in Parallel with Utility Distribution Systems," Section I. D). The Massachusetts Department of Public Utilities (DPU) has implemented a penalty-based enforcement mechanism with penalties up to $1.5 million/year, which requires verifiable tracking of application process time dependencies for DG applications.

The National Grid Distributed Generation team administers the DG interconnection process for all customer-owned DG applications in all of National Grid's electric service territories. National Grid processed over 25,000 DG applications in 2016, and it is projected that the volume will double in coming years, exceeding the capability of legacy tools and processes. Investigation into the DG process and systems revealed that a very similar workflow process is followed for new connections for gas and electric service.

National Grid is building a standard process for all connections and increasing the web-based self-service offerings to include New Gas and Electric Connections. In the Spring of 2016, an RFP was conducted, under INVP 3941, to identify a vendor to assist in fulfilling the NY mandate for an online DG portal. Six vendors responded to the RFP and were evaluated on the software functionality, workflow configuration, implementation, Customer Experience Transformation Strategy (CXT) expandability, architecture,

security, support and pricing. Two of the vendors were brought back to provide a demonstration of functionality and answer further questions. Salesforce/Accenture was the only solution that met the major criteria identified by National Grid. A Feasibility and Analysis study was then undertaken to develop the high level requirements, cost and timeline for a multi-phase implementation of a strategic, secure and reliable solution that meets regulatory requirements and implements efficient business processes. This program also will satisfy a portion of the CXT Strategy, whose goal is to enable new capabilities for delivering on an improved experience including replacing end of life digital platforms and delivering new levels of customer self-service and communication across multiple channels.

The first project in the program will deliver on providing the self-service portal and system of record for DG in NY, as well as a base workflow engine that can be further enhanced to provide functionality necessary for DG NE and new electric and gas connections. The DG NY portal is expected to go live in May 2017. The additional projects will continue to provide further productivity enhancements to the application management workflow as well as deliver region specific forms for MA and RI as well as for electric connections and gas connections.

The automation of Standardized Interconnection Requirements (SIR) technical screenings (DG IOAP Phase 2) and full automation (DG IOAP Phase 3) will be delivered under separate sanction papers.

3.2 Drivers

The key drivers of this investment are:

- Ensure compliance with the NY PSC's and MA DPU's Distributed Generation mandates
- Improve customer satisfaction with an online portal that provides the customer visibility of an application's progress
- Improve efficiency of National Grid US Distributed Generation processes in MA, NY and RI
- Improve efficiency of National Grid US New Customer Connections processes in MA, NY and RI
- Provide a system of record for DG information.

3.3 Project Description

This program will provide an online portal for customers to request DG interconnections and new customer connections for both electric and gas. Program will deliver on regulatory requirements pertaining to Distributed Generation (DG), and establish a system of record for all Distributed Generation information. Additionally, because of the workflow synergy with new customer connections, the program will also deliver new

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processes for the business and offer self-service for all connection processes.

The program will be implemented in multiple releases, beginning with NY DG. Delivery will consist of a full process reengineering effort to build the best future state scenario for customers. In both the DG and connections areas, new capabilities for customer self service will be added and the process will be redesigned to enable a streamlined and intuitive customer experience. As described in Section 4.4, National Grid will use Voice of Customer (VOC) feedback to inform the design of the portal throughout the process.

The New Customer Connections workflow structure is being built utilizing Salesforce and incorporating into the existing National Grid CRM solution, known as Gridforce. The core workflow structure has been built, and has been configured to the NY DG requirements. This new workflow structure provides ease of changing the workflow steps, timelines and processes that can be performed by a system administrator. Integration to the electric customer system has been established as well as to one of the existing work management systems.

In the next phases of the program, the portal will be configured to specific DG requirements for MA and RI, as well as for New Gas and New Electric Connections. Additional integration to the customer systems, existing work management systems and financial system for backend data will be implemented to automate many of the manual tasks performed today.

The online portal primarily services contractors doing repeated work with National Grid. Each contractor will have a logon profile, be able to apply for service online and be able to see the status of their work with National Grid. They will also be notified via email on status changes or if there is a need for additional information.

The projects will be delivered utilizing a hybrid agile development methodology, and will be managed as a single program to drive maximum efficiency. The project will be executed using internal National Grid and external Accenture plc. vendor resources. The program will be overseen by the New Customer Connections program board.

The program will be divided into the following four projects:

1. INVP 4411A - Distributed Generation for NY: This project is scheduled to go live in April 2017. This project includes the establishment of a robust workflow management tool that will be the foundation for all other customer connections. It include integration to back-end systems for productivity improvements, and will include the following:
- DG NY processes for Simple, Complex, Standard and CESIR applications
- Ability to track the lifecycle from beginning to end across regions according to existing and historic tariff definitions
- Milestone management and tracking
- Maximized standardization by allowing real-time validation of application input fields
- Data migration for historic and in-flight DG for NY
- Secure login and user management

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- Standardized Reporting capabilities
- Standardized emails and email capability between DG personnel and Applicants.
- Digital document generation to eliminate paper
- E-signature technology to increase processing speed and security
- External user knowledge base; streamlined and updated web content for DG

2. INVP 4411B - Distributed Generation for MA and RI: This project will enhance the system integration for all DG to further improve productivity as well as deliver:
- DG MA processes for Simple, Complex and Expedited applications, Impact studies
- DG RI processes for Simple, Complex and Expedited applications, Impact studies
- Data migration for historic and in-flight DG data for MA and RI

3. INVP 4411C - New Electric Connections: This project will utilize the base workflow to deliver:
- New Electric Connections for MA, NY and RI to include Simple, Complex, Fast Track, Upgrades and Disconnect/Reconnect
- Inspection and Permitting processes
- Bid process

4. INVP 4411D - New Gas Connections: This project will enhance the New Service workflow and integration to include:
- New Gas Connections for MA, NY and RI, to include Simple, Complex, Upgrades and Disconnect/Reconnect
- Integration to the gas customer and work management systems for automation of current manual processes.

3.4 Benefits Summary

This investment will deliver the following benefits:

- Satisfy regulatory mandates for electronic submission of Distributed Generation (DG) applications and “chess clock” like methods for tracking application processing time dependencies.
- Lower risk of potential fines for non-compliance by making timelines more visible and providing notification as due dates are approaching.
- Streamline, automate and centralize the management of DG application processes which currently rely heavily on manual processes to support 25K to 40K DG applications per year.
- Improve customer satisfaction by providing a single source for all connection information.
- Streamline, automate and centralize the management of New Electric and Gas application processes which currently rely heavily on manual processes to support 120K to 150K applications per year.

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3.5 Business and Customer Issues

Customer adoption of the new process is crucial to the success of the project. The online process will be built to be intuitive, will include a new user Knowledge Base and interactive communication for customers and contractors while working with online applications and forms. As described in Section 4.4, National Grid has and will be using the Voice of Customer (VOC) throughout the design and delivery of this portal project to ensure the project meets customer expectations.

3.6 Alternatives

Alternative 1: Do Nothing
This option was rejected because it leaves National Grid non-compliant for a Distributed Generation portal in NY. It also leaves National Grid vulnerable to being non-compliant with regulations in other states.

Alternative 2: Defer the Project
This option was rejected because of the rapid growth of Distributed Generation application volume and NY PSC target of creating Web based application monitoring capabilities.

Alternative 3: Deliver Only Distributed Generation
This option was rejected because of the rapid growth of New Connections volume. Omitting the New Connections in this program delays delivering on the Customer Experience Transformation strategy and does not allow us to take advantage of the synergies of delivering both Distributed Generation and New Customer Connections in tandem.

3.7 Safety, Environmental and Project Planning Issues

There are no significant issues beyond what has been described elsewhere.

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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Business resources may not be available due to other critical initiatives or day to day jobs.	3	4	4	12	12	Mitigate	Get a firm commitment for IS, Vendor and Business resources early on with an appropriate backfill resource plan as needed.	Cost and Schedule impacts	Re-prioritize deliverables and adjust resource allocation or secure alternate resources to keep cost and schedule in check.
2	There may be conflicts with other projects or BAU activities in SAP system that could impact SAP interfaces in this Program.	3	4	4	12	12	Mitigate	Identify any planned upgrades or dependent projects early on and adjust delivery schedule accordingly.	Service benefit impacts, Cost and Schedule impacts	Monitor availability of SAP system and deploy appropriate approach to mitigate delays.
3	Data migration of historic and in-progress applications could take longer than expected due to lack of data quality.	3	4	4	12	12	Mitigate	Get a head start for firming up data cleansing and migration plan.	Service benefit impacts, Cost and Schedule impacts	Adjust data cleansing and migration scope and monitor progress to avoid cost and schedule impacts.
4	National Grid network bandwidth may not be able to support adequate performance for information exchange by internal operational teams with Salesforce platform on the Cloud	3	4	4	12	12	Mitigate	Engage with network partner and conduct bandwidth testing early on to learn about potential impacts.	Service benefit impacts	Use alternate approaches for delivering functionality such as batch jobs instead of real time interactions.

3.9 Permitting

N/A

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will be reflected at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

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3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
4411A	Distributed Generation NY	Est Lvl (e.g. +/- 10%)	CapEx	0.000	1.954	0.373	0.000	0.000	0.000	0.000	2.327
			OpEx	0.000	0.596	0.012	0.000	0.000	0.000	0.000	0.608
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	2.550	0.385	0.000	0.000	0.000	0.000	2.935
4411B	Distributed Generation NE	Est Lvl (e.g. +/- 10%)	CapEx	0.000	0.000	1.365	0.000	0.000	0.000	0.000	1.365
			OpEx	0.000	0.000	0.222	0.000	0.000	0.000	0.000	0.222
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.000	1.587	0.000	0.000	0.000	0.000	1.587
4411C	New Electric Connections	Est Lvl (e.g. +/- 10%)	CapEx	0.000	0.000	0.540	0.000	0.000	0.000	0.000	0.540
			OpEx	0.000	0.000	0.155	0.000	0.000	0.000	0.000	0.155
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.000	0.695	0.000	0.000	0.000	0.000	0.695
4411D	New Gas Connections	Est Lvl (e.g. +/- 10%)	CapEx	0.000	0.000	0.000	0.851	0.000	0.000	0.000	0.851
			OpEx	0.000	0.000	0.000	0.135	0.000	0.000	0.000	0.135
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.000	0.000	0.986	0.000	0.000	0.000	0.986
Total Project Sanction			CapEx	0.000	1.954	2.278	0.851	0.000	0.000	0.000	5.083
			OpEx	0.000	0.596	0.389	0.135	0.000	0.000	0.000	1.120
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	2.550	2.667	0.986	0.000	0.000	0.000	6.203

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	2.373	2.282	0.000	0.000	0.000	0.000	4.655
OpEx	0.000	0.506	0.392	0.000	0.000	0.000	0.000	0.898
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	2.879	2.674	0.000	0.000	0.000	0.000	5.553

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	0.419	0.004	(0.851)	0.000	0.000	0.000	(0.428)
OpEx	0.000	(0.090)	0.003	(0.135)	0.000	0.000	0.000	(0.222)
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.329	0.007	(0.986)	0.000	0.000	0.000	(0.650)

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3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology. The accuracy level of estimate for each project is identified in table 3.11.1.

3.11.4 Net Present Value / Cost Benefit Analysis

This is not an NPV project.

3.11.4.1 NPV Summary Table

N/A

3.11.4.2 NPV Assumptions and Calculations

N/A

3.11.5 Additional Impacts

None

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual's Name
Business Executive Sponsor	Sean Mongan
Head of PDM	Deb Rollins
Relationship Manager	Aman Aneja
Program Delivery Manager	Michelle McNaught
IS Finance Management	Chip Benson
IS Regulatory	Daniel DeMauro
DR&S	Diana Simkin
Service Delivery	Brian Detota
Enterprise Architecture	Joseph Clinchot

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3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual	Area
Regulatory	Zschokke, Peter	All
Jurisdictional Delegate(s)	Harbaugh, Mark	Electric - NY
	Patterson, James	Electric - NE
	Hill, Terron	FERC
	Brown, Laurie	Gas - NY
	Currie, John	Gas - NE
Procurement	Curran, Art	All

4 Appendices

4.1 Sanction Request Breakdown by Project

$M	4411A	4411B	4411C	4411D	Proj Num	Proj Num	Proj Num	Proj Num	Proj Num	Total
CapEx	2.327	1.365	0.540	0.851						5.083
OpEx	0.608	0.222	0.155	0.135						1.120
Removal	0.000	0.000	0.000	0.000						0.000
Total	2.935	1.587	0.695	0.986	0.000	0.000	0.000	0.000	0.000	6.203

4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	0.849	
	SDC Time & Materials	-	
	SDC Fixed-Price	1.751	
	All other personnel	2.417	
	TOTAL Personnel Costs	5.017	
Hardware	Purchase	-	
	Lease	-	
Software		0.518	
Risk Margin		0.325	
Other		0.344	
TOTAL Costs		6.203	

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4.2.2 Benefiting Operating Companies

The following companies will benefit from this program. The allocation of these benefits will be based upon the number of customers, and will vary for each project within the program.

4.2.2.1 INVP 4411A Distributed Generation NY

For **INVP 4411A Distributed Generation NY** project, the costs will be allocated to Niagara Mohawk Power Corp. for Electric Distribution.

This project will also deliver the core system for all connections. Therefore, as each subsequent project is released into production, it will share in the amortization of the core system project costs as well.

Distributed Generation NY Allocation:

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.	Electric Distribution	NY

Core system Amortization Allocation:
Release of INVP 4411B – Distribution NY

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.	Electric Distribution	NY

4.2.2.2 INVP 4411B Distributed Generation NE

For **Distributed Generation NE** project, the costs will be allocated by the number of customers across all New England Electric companies.

Operating Company Name	Business Area	State
Massachusetts Electric	Electric Distribution	MA
Nantucket Electric Company	Electric Distribution	MA
Narragansett Electric Company	Electric Distribution	RI

Also, upon implementation of the Distributed Generation NE project, the core system Amortization Allocation will be modified to include the additional benefiting NE companies, and will become allocated as follows:

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.	Electric Distribution	NY
Massachusetts Electric	Electric Distribution	MA

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Nantucket Electric Company	Electric Distribution	MA
Narragansett Electric Company	Electric Distribution	RI

4.2.2.3 INVP 4411C New Electric Connections

For **New Electric Connections** project, the costs will be allocated by the number of customers across all Electric Distribution Companies. There is no change to the benefitting companies to the core system.

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.	Electric Distribution	NY
Massachusetts Electric	Electric Distribution	MA
Nantucket Electric Company	Electric Distribution	MA
Narragansett Electric Company	Electric Distribution	RI

4.2.2.4 INVP 4411D New Gas Connections

For **New Gas Connections** project, the costs will be allocated by the number of customers across all Gas Companies.

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.	Gas Distribution	NY
KeySpan Energy Delivery	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
Boston Gas Company	Gas Distribution	MA
Colonial Gas Company	Gas Distribution	MA
Narragansett Electric Company	Gas Distribution	RI

The core system Amortization Allocation will be modified to include the additional benefiting Gas companies, and will become allocated as follows:

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.	Electric Distribution	NY
Massachusetts Electric	Electric Distribution	MA
Nantucket Electric Company	Electric Distribution	MA
Narragansett Electric Company	Electric Distribution	RI
Niagara Mohawk Power Corp.	Gas Distribution	NY
KeySpan Energy Delivery	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
Boston Gas Company	Gas Distribution	MA
Colonial Gas Company	Gas Distribution	MA
Narragansett Electric Company	Gas Distribution	RI

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4.2.3 IS Ongoing Operational Costs (RTB)

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 16/17**	**Yr. 2 17/18**	**Yr. 3 18/19**	**Yr. 4 19/20**	**Yr. 5 20/21**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	-	-	-	-	-	**-**
RTB if Project is Implemented	-	0.118	0.438	0.465	0.459	1.241	**2.721**
Net change in RTB	-	0.118	0.438	0.465	0.459	1.241	**2.721**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	**-**
Variance to Plan	-	0.118	0.438	0.465	0.459	1.241	**2.721**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	0.037	0.056	0.050	0.046	0.124	**0.313**
App.Sup. - SDC 2	-	0.015	0.024	0.022	0.020	0.054	**0.135**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	0.008	0.008	0.008	0.008	0.022	**0.054**
SaaS	-	0.050	0.325	0.360	0.360	0.973	**2.068**
HW support	-	-	-	-	-	-	**-**
Other: IS	-	0.008	0.025	0.025	0.025	0.068	**0.151**
All IS-related RTB (sub-Total)	-	0.118	0.438	0.465	0.459	1.241	**2.721**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	-	0.118	0.438	0.465	0.459	1.241	**2.721**

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

Voice of Customer
National Grid has and will be using the Voice of Customer (VOC) throughout the design and delivery of this portal project; keeping the customer first. This includes:

Qualitative Research

- ☑ Initial Study: contacted 20 Account Representatives at 10 solar companies that currently work with National Grid. The goal of this research is to gauge how these

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companies feel about the quality of service National Grid provides during the Distributed Generation process.

- Conference Room Pilot Workshops: The objective of these pilots it to try, test and validate the future state design with all relevant parties and end users throughout the process.

Quantitative Research

- ☑ End-use customer and market research that was completed by the New Energy Solutions team
- Periodic customer panels
- A post-installation quantitative satisfaction study to evaluate performance following portal implementation.

Additional Communications

National Grid will communicate via several channels throughout the development of, prior to and post launching of the portal. Communication channels and messaging at each stage will be tailored to the various internal and external audience members. Communication channels may include:

Internal	External
Email	Email
Personal Outreach	Personal Outreach
Newsletters	Direct Mail
Workshops	Workshops
Round Tables	Webinars

Investment Proposal Summary Sheet
INVP 4479 – US Control-Gas Electronic Bulletin Board (EBB) Upgrade Feasibility & Analysis

Request Date: August 22, 2017	**Relationship Manager:** Aman Aneja	**Author:** Michael Olesker
Project Manager: Paula Higgins	**Program Delivery Director:** Sally Seltzer	**Sanction Type:** F & A
Region: US	**Category:** Policy	**Legal Entity:** Shared
Risk Score: 39	**Primary Driver:** Reliability	**Project Classification:** M

Project Description:

This paper requests sanction of INVP 4479 in the amount $0.430M with a tolerance of +/- 10% for the purposes of Feasibility and Analysis to evaluate options for the Gas Electronic Bulletin Board (EBB) replacement.

This sanction amount is $0.430M broken down into:

$0.000M	CapEx
$0.430M	OpEx
$0.000M	Removal

Brief Description

This policy-driven project will execute a Feasibility and Analysis (F&A) study to determine the overall costs, technical approach and select the most appropriate tool for replacing existing out of support Gas Electronic Bulletin Board (EBB) system that facilitates automated process of gas transportation confirmations.

This project will deliver the following:

- Current State Technology
- Future State Technology Roadmap
- Evaluation Summary and Recommendation
- Kick-off Implementation Readiness
- Prepare Requirements & Design sanctioning; ideally the “agile” for the process/tool selected

Following the successful completion of this F&A study, an investment will be sanctioned to procure and deploy the recommended strategy.

Background

The current legacy Gas Electronic Bulletin Board (EBB) sits on outdated hardware, and relies on aged reporting software (MicroStrategy). The software messaging function has bandwidth issues during heavy trading periods, which exposes the company to operational and potential financial impacts. The legacy EBB software designed internally 16 years ago is limited in function, and does not support the continually evolving gas trading environments, nor changing regulatory demands. Project is needed to support National Grid Gas Transmission and Distribution systems in New England and New York.

Project Costs [$M]	Prior Yrs	Yr 1 17/18	Yr 1 18/19	Yr 1 19/20	Yr 1 20/21	Yr 1 21/22	Total
Start-Up – OPEX		0.053					0.053
Start-Up – CAPEX							
Start-Up - Risk Margin							

Start-Up SUBTOTAL		**0.053**					**0.053**
Requirements & Design OPEX		0.317					0.317
Requirements & Design CAPEX							
Requirements & Design Risk Margin		0.060					0.060
R&D SUBTOTAL		**0.377**					**0.377**
Development & Implementation – OPEX							
People							
Software							
Hardware							
Telecommunications							
Service Contracts							
Risk Margin							
Development & Implementation – CAPEX							
People							
Software							
Hardware							
Telecommunications							
Service Contracts							
Risk Margin							
D&I SUBTOTAL							
TOTAL PROJECT COSTS		**0.430**					**0.430**
Non-regulated project UPLIFT							
Non-regulated project TOTAL							
IS Investment Plan FY18 thru FY22							
Budget OPEX							
Budget CAPEX							
Impact on RTB costs		**0.000**					

Benefiting Operating Companies

See Appendix A

TOTAL BENEFITS $M							
Key Business Benefits: Improved Reliability. Unmaintained software residing on outdated hardware requires the system to be updated in order to prevent loss of service, as well as allow National Grid to offer additional functionality, and improve efficiency for internal and external users.							

Key Risks:	**Key Dates**	**Date (Mmm/YYYY)**
• Complexity of business processes covered by scope may impact the study • Security risk (which will be evaluated during this project) can impact the budget and increase technical resources involved into the evaluation	Start Up	**Jul/2017**
	Sanction	**Aug/2017**
	F&A Start	**Aug/2017**
	F&A Stage of Project Complete	**Nov/2017**
	Project Closure	**Feb/2018**

The supporters listed have aligned their part of the business to support the project.

Role	Individual's Name
Business Executive Sponsor	John Spink
Business Lead	Richard Delaney
Head of PDM	Deborah Rollins
Relationship Manager	Aman Aneja
Program Delivery Director	Sally Seltzer
IS Finance Management	Chip Benson
IS Regulatory	Tom Gill
DR&S	Elaine Wilson
Service Delivery	Brian Detota
Enterprise Architecture	Joe Clinchot

RECOMMENDATIONS

The Sanctioning Authority is invited to:

a) APPROVE the investment of $0.430M including risk margin of $0.060M by August 22, 2017

b) NOTE that John Spink, VP, Control Center Operations, is the Project Sponsor

c) NOTE that Paula Higgins, is the Project Manager and has the approved financial delegation to deliver the project

Decision of the Sanctioning Authority

I hereby approve the recommendations made in this paper.

Signature…….. Date……

Anuraag Bhargava
US CIO

Appendix A

Benefiting Operating Companies

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp. - Gas	Gas Distribution	NY
KeySpan Energy Delivery New York	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
Boston Gas Company	Gas Distribution	MA
Colonial Gas Company	Gas Distribution	MA
Narragansett Gas Company	Gas Distribution	RI

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US Sanction Paper

Title:	Automate Remote Net Metering	**Sanction Paper #:**	USSC-15-259 v3
Project #:	INVP 4124	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	December 14, 2016
Author:	Phyllis Agin / Joe Howard	**Sponsor:**	Jody Allison, VP Billing and Collections Strategy
Utility Service:	IS	**Project Manager:**	Deborah Rollins

1 Executive Summary

1.1 *Sanctioning Summary*

This paper requests sanction of INVP 4124 in the amount $3.988M with a tolerance of +/- 10% for the purposes of full project implementation.

This sanction amount is $3.988M broken down into:

$3.130M CapEx
$0.858M OpEx

1.2 *Project Summary*

National Grid will fully automate the remote net metering billing process. The billing function is currently performed manually by Accounts Processing. As the volume of remote net metering customers increases, this effort will eliminate manual record keeping, minimize the risk of processing errors, generate bills as the charges are incurred, and reduce Sarbanes Oxley (SOX) compliance risks.

1.3 *Summary of Projects*

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
INVP 4124	D-LINE	Automated Remote Net Metering	3.988
		Total	3.988

1.4 *Associated Projects*

N/A

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US Sanction Paper

1.5 *Prior Sanctioning History*

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
Jun 2016	**USSC**	**$2.326M**	**$3.464M**	**INVP 4124 Automate Remote Net Metering**	**Partial Sanction**	**10%**
Nov 2015	**USSC**	**$0.480M**	**$1.190M**	**INVP 4124 Automate Remote Net Metering**	**Partial Sanction**	**25%**

1.6 *Next Planned Sanction Review*

	Purpose of Sanction Review
Jan 2018	Project Closure

1.7 *Category*

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	New York NYS-PSC: Case 02E – 1622, Case 11E – 0321, Case 14E – 0151, Case 14E – 0422, Case 15E - 0082 Massachusetts MA-DPU: 220 CMR 18.00: M.G.L. c. 164, §§ 138 through 140; St. 2014, c. 251, §§ 5 and 6. Rhode Island RI-PUC: Statute Title 39, Chapter 39-26.4

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US Sanction Paper

1.8 ***Asset Management Risk Score***

Asset Management Risk Score: _48__

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

1.9 ***Complexity Level***

○ High Complexity ○ Medium Complexity ○ Low Complexity ◉ N/A

Complexity Score: _[Project Complexity Score]___

1.10 ***Process Hazard Assessment***

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 ***Business Plan***

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY16-17	◉ Yes ○ No	◉ Over ○ Under ○ NA	$3.284M

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US Sanction Paper

1.12 *If cost > approved Business Plan how will this be funded?*

Re-allocation of funds within the portfolio has been managed by the IS Relationship Manager with the Planning Analyst assistance to meet jurisdictional budgetary, statutory and regulatory requirements.

1.13 *Current Planning Horizon*

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.043	2.294	0.793	0.000	0.000	0.000	0.000	3.130
OpEx	0.257	0.228	0.373	0.000	0.000	0.000	0.000	0.858
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.300	2.522	1.166	0.000	0.000	0.000	0.000	3.988

1.14 *Key Milestones*

Milestone	Target Date: (Month/Year)
Start Up	July 2015
Partial Sanction R&D	Nov 2015
Begin Requirements and Design	Dec 2015
Partial Sanction D&I	June 2016
Begin Development and Implementation	June 2016
Full Sanction	Dec 2016
Begin User Acceptance Testing	Feb 2017
Move to Production	Aug 2017
Project Complete	Oct 2017
Project Closure Sanction	Jan 2018

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US Sanction Paper

1.15 *Resources, Operations and Procurement*

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal		☑ Contractor
Construction/Implementation Resources to be provided	☑ Internal		☑ Contractor
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 *Key Issues (include mitigation of Red or Amber Resources)*

N/A

1.17 *Climate Change*

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 *List References*

1	INVP 4124 – Total Cost of Ownership Full Project.xls

Please contact Project Manager for copies of this document as needed.

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US Sanction Paper

2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on December 14, 2016:

(a) APPROVED this paper and the investment of $3.988M and a tolerance of +/-10%.

(b) APPROVED the RTB impact of $0.180M for 5 years.

(c) NOTED that Deborah Rollins has the approved financial delegation.

Signature……..Date……

Christopher Kelly
Acting Senior Vice President, Engineering Design & Process
US Sanctioning Committee Co – Chair Person

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US Sanction Paper

3 Sanction Paper Detail

Title:	Automate Remote Net Metering	**Sanction Paper #:**	USSC-15-259 v3
Project #:	INVP 4124	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	December 14, 2016
Author:	Phyllis Agin / Joe Howard	**Sponsor:**	Jody Allison, VP Billing and Collections Strategy
Utility Service:	IS	**Project Manager:**	Deborah Rollins

3.1 *Background*

Billing Operations and Account Maintenance & Operations currently use a manual process to track the National Grid customers in the remote net metering program which includes customers that over-generate usage and customers who will receive a portion of the over-generation. This involves maintaining customer spreadsheets, calculating the over-generation and how much each customer will receive, transferring excess dollars or kWh to the customers, and producing the bills.

Due to the rapid increase of customers signing up for remote net metering and the anticipated volume of community net metered customers, where hundreds of customers could receive credits from a customer that over-generates, the process will be automated within the Customer Service System.

3.2 *Drivers*

The primary driver is to ensure the Company has the capability to effectively comply with the statutes, regulations, and regulatory orders in the states in which National Grid provides electric service, while eliminating the risk of human error in performing complex and repetitive calculations, assignments, tracking, and associated rebilling activities.

3.3 *Project Description*

This project will automate the process of maintaining account relationships, the allocation of excess dollars or usage via percentage or cascading method, which will transfer to the accounts in the order in which they bill, and the ability to distribute the

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account's over-generation. This data will be used during the billing process to calculate the credit and apply it to the bills. This process also includes Community net metering, which will distribute excess credits via volume or monetary basis.

The project will also include automating the annual process for crediting net metering accounts with a closing credit balance by applying the applicable avoided cost.

This project is broken into 6 workstreams:

- Workstream 1 – This is the Host Satellite Relationship Set-up which will tie the host Account to the satellite account. The benefiting companies are UNY, MA and RI.

Operating Company	% Allocation
Niagara Mohawk Power Corp.- Electric Distr.	47.71%
Massachusetts Electric Company	37.69%
Nantucket Electric Company	0.38%
Narragansett Electric Company	14.22%
TOTAL	**100.00%**

- Workstream 2 – This is the SC2 Non Demand kWh Transfer which will calculate excess usage on host account, transfer total excess usage from host account to satellite accounts and calculates net metering adjustment on satellite accounts. The benefiting company is UNY.

Operating Company	% Allocation
Niagara Mohawk Power Corp.- Electric Distr.	100%

- Workstream 3 – This is the Community Net Metering which will allow the community host to provide special instructions for distributing excess credit in the anniversary month and to transfer excess usage from host account to active satellite accounts on a volume or monetary basis. The benefiting companies are UNY, MA and RI.

Operating Company	% Allocation
Niagara Mohawk Power Corp.- Electric Distr.	47.71%
Massachusetts Electric Company	37.69%
Nantucket Electric Company	0.38%
Narragansett Electric Company	14.22%
TOTAL	**100.00%**

- Workstream 4 – This is the Percentage Dollar Transfer which will allow dollars associated with excess usage from the host account to be transferred to active satellite accounts based on percentage allocation specified in the contract. The benefiting companies are; UNY, MA and RI.

Operating Company	% Allocation
Niagara Mohawk Power Corp.- Electric Distr.	47.71%
Massachusetts Electric Company	37.69%

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Nantucket Electric Company	0.38%
Narragansett Electric Company	14.22%
TOTAL	**100.00%**

- Workstream 5 – This is the Cascading Dollar Transfer which will allow dollars associated with excess usage from the host account to be transferred to active satellite accounts based on cascading allocation method, according to order of satellite billings . The benefiting company is UNY.

Operating Company	% Allocation
Niagara Mohawk Power Corp.- Electric Distr.	100%

- Worktream 6 – This is the Avoided Cost Credit which will automate the annual process for crediting net metering accounts with a closing credit balance by applying the applicable avoided cost. The benefiting company is UNY.

Operating Company	% Allocation
Niagara Mohawk Power Corp.- Electric Distr.	100%

3.4 *Benefits Summary*

- Ensure compliance with relevant statutes, regulations, and regulatory orders in the states in which National Grid provides electric service, while mitigating the risk of error in billing calculations.

3.5 *Business and Customer Issues*

There are no significant business issues beyond what has been described elsewhere.

3.6 *Alternatives*

Alternative 1: Do Nothing / Defer Project

- Continued and increasing manual account handling load may jeopardize the company's ability to accurately bill net metered accounts in a timely manner, therefore this alternative is not recommended.

3.7 *Safety, Environmental and Project Planning Issues*

There are no significant issues beyond what has been described elsewhere.

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3.8 *Execution Risk Appraisal*

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Regulatory Requirments are not finalized; New updates/ requirements are received from NY PSC on a regular basis	3	3	4	12	12		Project Investment Proposal and TCO Logs are prepared based on the information available to date. As changes are identified, impacts need to be assessed in terms of Cost, Time and Resources.		
2	There is a risk that if another billing SME is not identified and onboarded soon, the detailed design for SC2ND may take longer than expected impacting overall project schedule	4	3	3	12	12		Actively looking to identify a suitable resource who can augment existing resource and accelerate the detailed design for SC2ND workstream		

3.9 *Permitting*

N/A

3.10 *Investment Recovery*

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

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3.11 *Financial Impact to National Grid*

3.11.1 ***Cost Summary Table***

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
INVP 4124	Automated Remote Net Metering	Est Lvl (e.g. +/- 10%)	CapEx	0.043	2.294	0.793	0.000	0.000	0.000	0.000	3.130
			OpEx	0.257	0.228	0.373	0.000	0.000	0.000	0.000	0.858
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.300	2.522	1.166	0.000	0.000	0.000	0.000	3.988

Total Project Sanction	CapEx	0.043	2.294	0.793	0.000	0.000	0.000	0.000	3.130
	OpEx	0.257	0.228	0.373	0.000	0.000	0.000	0.000	0.858
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total	0.300	2.522	1.166	0.000	0.000	0.000	0.000	3.988

3.11.2 ***Project Budget Summary Table***

Project Costs Per Business Plan

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	0.657	0.000	0.000	0.000	0.000	0.000	0.657
OpEx	0.000	0.047	0.000	0.000	0.000	0.000	0.000	0.047
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.704	0.000	0.000	0.000	0.000	0.000	0.704

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	(0.043)	(1.637)	(0.793)	0.000	0.000	0.000	0.000	(2.473)
OpEx	(0.257)	(0.181)	(0.373)	0.000	0.000	0.000	0.000	(0.811)
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	(0.300)	(1.818)	(1.166)	0.000	0.000	0.000	0.000	(3.284)

3.11.3 ***Cost Assumptions***

This estimate was developed in 2016 using the standard IS estimating methodology. The accuracy level of the estimate for each project is identified in table 3.11.1.

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3.11.4 Net Present Value / Cost Benefit Analysis

3.11.4.1 NPV Summary Table

This is not an NPV project.

3.11.4.2 NPV Assumptions and Calculations

N/A

3.11.5 Additional Impacts

None

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual's Name
Business Executive Sponsor	Jody Allison
Head of BRM/Strategy	Jon Poor
Head of PDM	Jeff Dailey on behalf of Don Stahlin
Relationship Manager	Joel Semel
Program Delivery Manager	Deborah Rollins
IS Finance Management	Chip Benson
IS Regulatory	Dan DeMauro
DR&S	Elaine Wilson
Service Delivery	Brian Detota
Enterprise Architecture	Joe Clinchot

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual	Area
Finance	Benson, Chip	All
Regulatory	Zschokke, Peter	All
Jurisdictional Delegate(s)	Harbaugh, Mark	Electric - NY
	Patterson, James	Electric - NE
	Hill, Terron	FERC
Procurement	Curran, Art	All

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4 Appendices

4.1 *Sanction Request Breakdown by Project*

N/A

4.2 *Other Appendices*

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	1.328	
	SDC Time & Materials	1.814	
	SDC Fixed-Price	-	
	All other personnel	0.318	
	TOTAL Personnel Costs	3.459	
Hardware	Purchase	-	
	Lease	-	
Software		-	
Risk Margin		0.234	
Other		0.295	
	TOTAL Costs	3.988	

4.2.2 Benefitting Operating Companies

This investment will benefit the electric companies in the New York and New England geographic locations where net metering is offered.

Operating Company Name	Business Area	State	Release
Niagara Mohawk Power Corp	Electric Distribution	NY	1,2,3,4,5,6
Massachusetts Electric	Electric Distribution	MA	1,3,4
Nantucket Electric Company	Electric Distribution	MA	1,3,4
Narragansett Electric Company	Electric Distribution	RI	1,3,4

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4.2.3 IS Ongoing Operational Costs

This project will increase IS ongoing operations support costs as per the following table. These are also known as Run the Business (RTB) costs.

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 15/16**	**Yr. 2 16/17**	**Yr. 3 17/18**	**Yr. 4 18/19**	**Yr. 5 19/20**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	-	-	-	-	-	**-**
RTB if Project is Implemented	-	-	0.022	0.034	0.034	0.089	**0.180**
Net change in RTB	-	-	0.022	0.034	0.034	0.089	**0.180**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	0.011	-	-	-	-	**0.011**
Variance to Plan	-	(0.011)	0.022	0.034	0.034	0.089	**0.169**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	-	0.022	0.034	0.034	0.089	**0.180**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	-	-	-	-	**-**
SaaS	-	-	-	-	-	-	**-**
HW support	-	-	-	-	-	-	**-**
Other: IS	-	-	-	-	-	-	**-**
All IS-related RTB (sub-Total)	-	-	0.022	0.034	0.034	0.089	**0.180**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	-	-	0.022	0.034	0.034	0.089	**0.180**

The RTB increase was due to added functionality to automate complex billing processes for remote net metering customers, including new interfaces and reports.

4.3 *NPV Summary*

N/A

4.4 *Customer Outreach Plan*

N/A

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US Sanction Paper

Title:	Annual HR & Payroll Mandatory Service Pack Upgrade (HRSP), FY18	**Sanction Paper #:**	USSC-17-024 v3
Project #:	INVP 4400 Capex: S007583	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	October 11, 2017
Author / NG Representative:	Diane Beard / Ella Weisbord	**Sponsor:**	Christopher McConnachie, VP Finance Services
Utility Service:	IS	**Project Manager:**	Samir Parikh

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of INVP 4400 in the amount $1.662M with a tolerance of +/- 10% for the purposes of full project implementation.

This sanction amount is $1.662M broken down into:

$1.267M Capex
$0.395M Opex
$0.000M Removal

1.2 Project Summary

This project provides a funding base and governance structure that allows the Information Services (IS) organization to effectively deliver needed updates to the US SAP application portfolio in order to comply with federal, state, and local government requirements.

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1.3 Summary of Projects

Project Number	Project Title	Estimate Amount ($M)
4400	US SAP: Annual HR & Payroll Mandatory Service Pack Upgrade (HRSP), FY18	1.662
	Total	1.662

1.4 Associated Projects

Project Number	Project Title
4348	US SAP: Infrastructure Landscape
4397	Ariba TLS and CI Upgrade
4662	Travel & Expense Management (T&E)

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
Jun 2017	SESC	$0.780M	$1.662M	INVP 4400 Annual HR & Payroll Mandatory Service Pack Upgrade (HRSP) – FY18	Partial Sanction	25%
Feb 2017	SESC	$0.230M	$1.630M	INVP 4400 Annual HR & Payroll Mandatory Service Pack Upgrade (HRSP) – FY18	Partial Sanction	25%

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1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Jun 2018	Sanction Closure

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
◉ Mandatory ○ Policy- Driven ○ Justified NPV ○ Other	This project funds a budget for the 2017/18 fiscal year that will be managed by the Project Delivery Team and Business Process Support (BPS) to ensure timely delivery of upgrade components for the HR modules which include the required tax, payroll, legal, and regulatory reporting changes throughout the year.

1.8 Asset Management Risk Score

Asset Management Risk Score: 49

Primary Risk Score Driver: (Policy Driven Projects Only)

○ Reliability ○ Environment ○ Health & Safety ◉ Not Policy Driven

1.9 Complexity Level

○ High Complexity ◉ Medium Complexity ○ Low Complexity ○ N/A

Complexity Score: 16

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US Sanction Paper

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18-22	◉ Yes ○ No	○ Over ◉ Under ○ NA	$0.031M

1.12 If cost > approved Business Plan how will this be funded?

N/A

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	1.267	0.000	0.000	0.000	0.000	0.000	1.267
OpEx	0.181	0.214	0.000	0.000	0.000	0.000	0.000	0.395
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.181	1.481	0.000	0.000	0.000	0.000	0.000	1.662

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1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	JAN 2017
Partial Sanction	FEB 2017
Begin Requirements Assessments	FEB 2017
Partial Sanction	JUN 2017
Begin Summer Release Requirements, Development and Implementation	JUN 2017
Project Sanction	OCT 2017
Begin Winter Release Requirements, Development and Implementation	OCT 2017
Move to Production / Last Go Live	FEB 2018
Project Complete	MAR 2018
Sanction Closure	JUN 2018

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

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US Sanction Paper

1.16 Key Issues (include mitigation of Red or Amber Resources)

N/A

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

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US Sanction Paper

2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on October 11, 2017.

(a) APPROVE this paper and the investment of $1.662M and a tolerance of +/-10%.

(b) NOTE that Samir Parikh is the Project Manager and has the approved financial delegation.

Signature……..Date……

David H. Campbell, Vice President, ServCo Business Partnering, USSC Chair

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3 Sanction Paper Detail

Title:	Annual HR & Payroll Mandatory Service Pack Upgrade (HRSP), FY18	**Sanction Paper #:**	USSC-17-024 v3
Project #:	INVP 4400 Capex: S007583	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	October 11, 2017
Author / NG Representative:	Diane Beard / Ella Weisbord	**Sponsor:**	Christopher McConnachie, VP Finance Services
Utility Service:	IS	**Project Manager:**	Samir Parikh

3.1 Background

SAP releases an annual support pack update for components of its HR modules.

Required updates include the following:

- Tax changes
- Payroll modifications
- Legal and regulatory reporting changes
- Considerations required to produce year end employee wage statements (W2's)
- Tax table changes for correctly processing payroll and required earnings withholdings
- Revised tax withholding tables
- New annual maximum withholding requirements
- All associated legal and regulatory compliance or reporting considerations for employee and Company labor governmental reporting

The annual HR support packs contain updates for the close out Quarterly Employer Tax Reporting and current calendar year reporting cycle and for staging the requisite changes for the subsequent calendar year reporting cycle.

These are mandatory annual changes requested by Federal and State agencies, such as the Internal Revenue Services (IRS) and various State Departments of Finance, as well as different municipalities which must be applied to the SAP core solution in order to properly reflect employee wages, employee and Company withholdings, legal requirements and to comply with Federal and State regulatory reporting.

Historically, National Grid applied the service pack updates on an annual basis. As changes in applicable regulations are published more frequently, National Grid is

transitioning to semi-annual updates. The requirement analysis will define the approach and changes to prepare system updates that will occur in July and December.

3.2 Drivers

The primary driver is to comply with mandatory federal and state changes to laws and regulations in order to properly reflect employee wages, employee and Company tax withholdings, legal requirements and to comply with regulatory reporting.

3.3 Project Description

The HR support pack increases system reliability by applying upgraded service packs on a regular basis following SAP's recommended schedule. This project, known as HRSP Winter Release, will apply the changes released by SAP and will follow the IS delivery process that will oversee necessary testing (modular and integration) as well as provide overall governance for the project.

3.4 Benefits Summary

The project is intended to implement and comply with mandatory federal and state regulatory and legal changes. For example, new tax tables and any new changes to employer tax reporting is achieved through applying these HR support packs. The anticipated benefits of upgrading from current patch level to the new patch level or applying the HR support pack are listed below.

- Produce weekly, monthly and special payroll runs
- Ensure correct federal and state withholdings and legal reporting requirements
- Provide a more stable and reliable core SAP solution
- Reduce need for incident resolution and associated patches
- Provide an opportunity to eliminate and reduce custom code for changes
- Allow for faster SAP vendor resolution times for production incidents/issues.

3.5 Business and Customer Issues

There are no significant business and customer issues beyond what has been described elsewhere in this paper.

3.6 Alternatives

Alternative 1: Defer project / Do Nothing
This option is not viable as the upgrades are mandatory to comply with changes to federal and state laws and regulations.

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3.7 Safety, Environmental and Project Planning Issues

There are no significant issues beyond what has been described in this paper.

3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
2	Complexity of Quarterly Tax Reporting, 31 Union Labor contracts, time reporting and wage type configuration in the US	3	3	3	9	9	Accept	Continue to work with Business, SAP and IS Service Delivery Partners to manage the functional requirements and agree to acceptable scope		Track Mitigation Plan and Take required/ appropriate actions
4	Availability of business resources to support a full regression test of payroll and HR functions	4	1	3	4	12	Mitigate	Prioritize the business resources workload and obtain support from business project sponsors/leadership		Continue to track business resources availability
5	Increased frequency of upgrade adding complexity level	3	2	2	6	6	Mitigate	Early project start and early agreement on delivery schedule		Track Mitigation Plan and Take required/ appropriate actions

3.9 Permitting

N/A

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

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3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6 + 2022/23	Total
4400	US SAP: Annual HR & Payroll Mandatory Service Pack Upgrade (HRSP), FY18	+/- 10%	CapEx	0.000	1.267	0.000	0.000	0.000	0.000	0.000	1.267
			OpEx	0.181	0.214	0.000	0.000	0.000	0.000	0.000	0.395
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.181	1.481	0.000	0.000	0.000	0.000	0.000	1.662
Total Project Sanction			CapEx	0.000	1.267	0.000	0.000	0.000	0.000	0.000	1.267
			OpEx	0.181	0.214	0.000	0.000	0.000	0.000	0.000	0.395
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.181	1.481	0.000	0.000	0.000	0.000	0.000	1.662

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6 + 2022/23	Total
CapEx	0.000	1.126	0.000	0.000	0.000	0.000	0.000	1.126
OpEx	0.181	0.386	0.000	0.000	0.000	0.000	0.000	0.567
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.181	1.512	0.000	0.000	0.000	0.000	0.000	1.693

Variance (Business Plan-Project Estimate)

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6 + 2022/23	Total
CapEx	0.000	(0.141)	0.000	0.000	0.000	0.000	0.000	(0.141)
OpEx	0.000	0.172	0.000	0.000	0.000	0.000	0.000	0.172
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.031	0.000	0.000	0.000	0.000	0.000	0.031

3.11.3 Cost Assumptions

This estimate was developed using standard IS estimating methodology. The accuracy level of the estimate for each project is identified in table 3.11.1.

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3.11.4 Net Present Value / Cost Benefit Analysis

3.11.4.1 NPV Summary Table

This is not a NPV project.

3.11.4.2 NPV Assumptions and Calculations

N/A

3.11.5 Additional Impacts

None

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual's Name
Business Representative	Gerard Huntley
Relationship Manager	Joel Semel
Program Delivery Director	Samir Parikh
IS Finance Management	Chip Benson
IS Regulatory	Daniel DeMauro
DR&S	Elaine Wilson
Service Delivery	Brian Detota
Enterprise Architecture	Joe Clinchot

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3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual	Area
Regulatory	Harvey, Maria	IS
Jurisdictional Delegate(s)	Anand, Sonny	Electric - NE
	Harbaugh, Mark	Electric - NY
	Hill, Terron	FERC
	Currie, John	Gas – NE
	Wolf, Don	Gas – NY
Procurement	Curran, Art	All

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4 Appendices

4.1.1 Benefiting Operating Companies

Benefiting Operating Companies	Business Area	State
Niagara Mohawk Power Corp.- Electric Distr.	Electric Distribution	NY
Massachusetts Electric Company	Electric Distribution	MA
KeySpan Energy Delivery New York	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
Boston Gas Company	Gas Distribution	MA
Narragansett Electric Company	Electric Distribution	RI
Niagara Mohawk Power Corp. - Transmission	Transmission	NY
Niagara Mohawk Power Corp. - Gas	Gas Distribution	NY
New England Power Company – Transmission	Transmission	MA, NH, RI, VT
KeySpan Generation LLC (PSA)	Generation	NY
Narragansett Gas Company	Gas Distribution	RI
Colonial Gas Company	Gas Distribution	MA
Narragansett Electric Company – Transmission	Transmission	RI
National Grid USA Parent	Parent Company	
Nantucket Electric Company	Electric Distribution	MA
NE Hydro - Trans Electric Co.	Inter Connector	MA,NH
KeySpan Energy Development Corporation	Non-Regulated	NY
KeySpan Port Jefferson Energy Center	Generation	NY
New England Hydro - Trans Corp.	Inter Connector	MA, NH
KeySpan Services Inc. Service Company	Service Company	
KeySpan Glenwood Energy Center	Generation	NY
Massachusetts Electric Company – Transmission	Transmission	MA
NG LNG LP Regulated Entity	Gas Distribution	MA, NY, RI
Transgas Inc	Non-Regulated	NY
Keyspan Energy Trading Services	Other	NY
KeySpan Energy Corp. Service Company	Service Company	
New England Electric Trans Corp	Inter Connector	MA
New England Electric Trans Corp	InterConnector	MA

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Resanction Request

Title:	New Arrearage Management Program	**Sanction Paper #:**	
Project #:	INVP 4421 Capex: S007668	**Sanction Type:**	Resanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	November 17, 2017
Author / NG Representative:	Susan Stallard / Savita Gupta	**Sponsor:**	David Smith, VP Customer Care
Utility Service:	IS	**Project Manager:**	Deborah Rollins / Savita Gupta

1 *Executive Summary*

This paper requests the resanction of INVP 4421 in the amount $0.671M with a tolerance of +/- 10% for the purposes of Development and Implementation.

This sanction amount is $0.671M broken down into:

$0.447M Capex
$0.224M Opex
$0.000M Removal

Note the originally requested sanction amount of $0.472M

2 *Resanction Details*

2.1 Project Summary

In response to the 2016 amendments to Rhode Island (RI) General Laws § 39-2-1, which amended the Henry Shelton Act, changes to the Customer Service System (CSS) are needed to accurately and efficiently implement the Arrearage Management Program (AMP) for low income electric and gas residential customers.

In March 2017 the RI Public Utility Commission (PUC) approved the final tariff, which included a number of changes to the original scope resulting in added costs and time to complete and test the revised scope. The changes include: the renewal of the AMP at the end of 12 months, applying Low Income Home Energy Assistance Program (LIHEAP) credits to the customer's bill, providing a completion letter that accompanies the 12th month bill and generating a completed enrollments Daily report.

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Resanction Request

2.2 Summary of Projects

Project Number	Project Title	Estimate Amount ($M)
INVP 4421	New Arreage Foregiveness Plan	0.671
	Total	0.671

2.3 Prior Sanctioning History

Previously approved sanctions are attached and listed below (Newest to Oldest).

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Paper Reference Number	Tolerance
May 2017	ISSC	$0.472M	$0.472M	New Arrearage Forgiveness Plan	Full		+/-10%

Over / Under Expenditure Analysis

Summary Analysis ($M)	Capex	Opex	Removal	Total
Resanction Amount	$0.447M	$0.224M	$0.000M	$0.671M
Latest Approval	$0.298M	$0.174M	$0.000M	$0.472M
Change*	$0.149M	$0.050M	$0.000M	$0.199M

Change = (Re-sanction – Amount Latest Approval)

2.4 Cost Summary Table

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
INVP 4421	New Arreage Foregiveness Plan	+/- 10%	CapEx	0.000	0.447	0.000	0.000	0.000	0.000	0.000	0.447
			OpEx	0.000	0.224	0.000	0.000	0.000	0.000	0.000	0.224
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.671	0.000	0.000	0.000	0.000	0.000	0.671
Total Project Sanction			CapEx	0.000	0.447	0.000	0.000	0.000	0.000	0.000	0.447
			OpEx	0.000	0.224	0.000	0.000	0.000	0.000	0.000	0.224
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.671	0.000	0.000	0.000	0.000	0.000	0.671

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Resanction Request

2.5 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18 - 22	○ Yes ◉ No	◉ Over ○ Under ○ N/A	$0.671M

2.6 Drivers

2.6.1 Detailed Analysis Table

The following table indicates the major key variations that account for the difference between the original sanction amount and the requested resanction amount.

Detail Analysis	Over/Under Expenditure?	Amount ($M)
Increased scope for approved mandated changes per tariff with RI PUC	☒ Over ☐ Under	$0.145M
Increased duration for User Acceptance Test (UAT)	☒ Over ☐ Under	$0.030M
Increased duration for Post Implementation Support (PIS)	☒ Over ☐ Under	$0.25M

2.6.2 Explanation of Key Variations

Increased scope for approved tariff: During the requirements phase, multiple scope changes were approved by the RI PUC, requiring additional funding and time to complete. The changes include:

- Renewal of the AMP at the end of 12 months
- Applying the LIHEAP energy credit on the next month's customer bill
- Providing the Completion letter with 12th month bill
- Generating a Daily report to show daily completed enrollments

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Resanction Request

Increased duration for UAT: The business requested the time frame for UAT test to be increased as it was scheduled to occur during the holiday season.

Increased duration for PIS: The business requests additional time for PIS to ensure key project team members are available to support key activities such as: the monthly review process and application of the LIHEAP credit.

2.7 If cost > approved Business Plan how will this be funded?

Re-allocation of budget within the IS business has been managed to meet jurisdictional budgetary, statutory and regulatory requirements.

2.8 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	Apr 2017
Project Sanction	May 2017
Begin Requirements and Design	May 2017
Begin Development and Implementation	Sep 2017
Full Resanction	Oct 2017
Move to Production / Last Go Live	Feb 2018
Project Complete	Mar 2018
Sanction Closure	Jul 2018

2.9 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Jul 2018	Closure Sanction

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Resanction Request

3 ***Statements of Support***

3.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual's Name
Business Representative	Gladys Sarji
Head of PDM	Deborah Rollins
Relationship Manager	Aman Aneja
Program Delivery Director	Deborah Rollins
IS Finance Management	Michelle Harris
IS Regulatory	Tom Gill
DR&S	Elaine Wilson
Service Delivery	Mark Mirizio
Enterprise Architecture	Joe Clinchot

3.2 Reviewers

N/A

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Resanction Request

4 ***Decisions***

The US IS Sanctioning Committee (ISSC) and Executive Sponsor have reviewed and approved this paper:

(a) APPROVE this paper and the investment of $0.671M and a tolerance of +/- 10%.

(b) APPROVE the run-the-business (RTB) of $0.000M (per annum) for 5 years.

(c) NOTE that Deborah Rollins is the Project Manager and has the approved financial delegation.

Signature……..Date……

Anuraag Bhargava

US CIO

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5 *Appendices*

5.1 Sanction Request Breakdown by Project

N/A

5.2 Other Appendices

5.2.1 Project Cost Breakdown

5.2.2 Benefiting Operating Companies

The following is the benefiting operating company:

Operating Company Name	Business Area	State
Narragansett Electric Company	Electric Retail	RI
Narragansett Gas Company	Gas Retail	RI

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5.2.3 IS Ongoing Operational Costs (RTB):

This project will not increase IS ongoing operations support costs as per the following table. These are also known as Run the Business (RTB) costs.

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 17/18**	**Yr. 2 18/19**	**Yr. 3 19/20**	**Yr. 4 20/21**	**Yr. 5 21/22**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	-	-	-	-	-	-
RTB if Project is Implemented	-	-	-	-	-	-	-
Net change in RTB	-	-	-	-	-	-	-
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	-
Variance to Plan	-	-	-	-	-	-	-
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	-	-	-	-	-	-
App.Sup. - SDC 2	-	-	-	-	-	-	-
App.Sup. - other	-	-	-	-	-	-	-
SW maintenance	-	-	-	-	-	-	-
SaaS	-	-	-	-	-	-	-
HW support	-	-	-	-	-	-	-
Other: IS	-	-	-	-	-	-	-
All IS-related RTB (sub-Total)	-	-	-	-	-	-	-
Business Support (sub-Total)	-	-	-	-	-	-	-
Total RTB Costs	-	-	-	-	-	-	-

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US Sanction Paper

Title:	Customer Experience Transformation Technology Program	**Sanction Paper #:**	USSC-17-276
Project #:	INVP 4750	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	August 9, 2017
Author:	Michael Olesker	**Sponsor:**	Kelly Carney, VP Customer Exp and Systems Transformation
Utility Service:	IS	**Project Manager:**	Jeffrey Dailey

1 Executive Summary

1.1 *Sanctioning Summary*

This paper requests partial sanction of INVP 4750 in the amount $6.730M with a tolerance of +/- 10% for the purposes of Requirements & Design and implementation of the first project within the program.

This partial sanction amount is $6.730M broken down into:

$5.610M Capex
$1.120M Opex
$0.000M Removal

NOTE the potential investment of $11.616M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction papers following development of the first project in the program, My Account core solution.

1.2 *Project Summary*

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.

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US Sanction Paper

1.3 *Summary of Projects*

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
4750		Customer Experience Transformation Technology Program	11.616
		Total	11.616

1.4 *Associated Projects*

N/A

1.5 *Prior Sanctioning History*

N/A

1.6 *Next Planned Sanction Review*

Date (Month/Year)	Purpose of Sanction Review
Sep 2018	Full Sanction

1.7 *Category*

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	It is necessary to invest in our customer experience in order to mitigate an out of support technology infrastructure, meet increasing expectations, and drive self-service.

1.8 *Asset Management Risk Score*

Asset Management Risk Score: 41

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

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US Sanction Paper

1.9 *Complexity Level*

○ High Complexity ○ Medium Complexity ○ Low Complexity ◉ N/A

Complexity Score: N/A

1.10 *Process Hazard Assessment*

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 *Business Plan*

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18 - 22	◉ Yes ○ No	○ Over ◉ Under ○ NA	$0.384M

1.12 *If cost > approved Business Plan how will this be funded?*

N/A

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US Sanction Paper

1.13 *Current Planning Horizon*

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	2.211	6.800	1.485	0.000	0.000	0.000	10.496
OpEx	0.000	1.065	0.055	0.000	0.000	0.000	0.000	1.120
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	3.276	6.855	1.485	0.000	0.000	0.000	11.616

1.14 *Key Milestones*

Milestone	Target Date: (Month/Year)
Start Up	Apr 2017
Partial Sanction	Aug 2017
Begin Requirements and Design	Aug 2017
Full Sanction	Sep 2018
Move to Production / Last Go Live	Aug 2019
Project Complete	Sep 2019
Closure Sanction	Dec 2019

1.15 *Resources, Operations and Procurement*

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	◉ Amber	○ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

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US Sanction Paper

1.16 *Key Issues (include mitigation of Red or Amber Resources)*

1	Availability of internal resources with relevant subject matter expertise will be prioritized across several strategic projects including Gas Business Enablement and other competing customer projects.

1.17 *Climate Change*

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 *List References*

1	1-2 GPB_Business_Case-CXT FINAL 11-2-16

REDACTED

US Sanction Paper

2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on August 9, 2017:

(a) APPROVED the investment of $6.730M and a tolerance of +/- 10% for the purposes of Requirements and Design and Development and Implementation of the first project within the program.

(b) NOTED the potential RTB Impact of $0.450M (per annum) for 5 years.

(c) NOTED the potential investment of $11.616M and a tolerance of +/-25% contingent upon submittal and approval of a Project Sanction paper following development of the first project within the program.

(d) NOTED that Jeffrey Dailey has the approved financial delegation to undertake the activities stated in (a).

Signature……..Date……

Christopher Kelly
Senior Vice President, Electric Process and Engineering

REDACTED

US Sanction Paper

3 Sanction Paper Detail

Title:	Customer Experience Transformation Technology Program	**Sanction Paper #:**	USSC-17-276
Project #:	INVP 4750	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	August 9, 2017
Author:	Michael Olesker	**Sponsor:**	Kelly Carney, VP Customer Exp and Systems Transformation
Utility Service:	IS	**Project Manager:**	Jeffrey Dailey

3.1 *Background*

National Grid has embarked on a comprehensive Customer Experience Transformation (CXT) program to change how we interact, serve and communicate with customers. This technology enabling program is a key element and building block to our Customer strategy.

National Grid has approximately 7 million gas and electric customers in NY, MA & RI and was formed from of a series of mergers and acquisitions. Although a number of system and infrastructure consolidations have taken place, there are essentially two legacy infrastructures for Billing/Customer Information Systems and corresponding digital channels (web & Interactive Voice Response) implementations that enable self-serve functions for our customers. National Grid is seeking to re-engineer the customer digital experience and supporting processes into a single set of digital channels while mitigating risks associated with using out of support legacy customer self-service platforms.

3.2 *Drivers*

The key drivers of this investment are to:

- Improve customer satisfaction (C-SAT) through consistent processes across all digital channels
- Manage operating cost through the migration of customer transactions from human aided to self-serve digital platforms
- Create systems and processes capable of adapting to changing customer needs and expectations, and supporting National Grid's vision in becoming a recognized leader within utility sector
- Mitigate operational risk associated with outdated technology platforms

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3.3 *Project Description*

The CXT technology program will include developing a roadmap for the future state of Customer related system capabilities as well as the number of projects needed to support the US Customer strategy. A key guiding principle of the program will be to enhance functionality to the business in the shortest timeline to improve how we service customers. In some cases, tactical decisions will be made and implemented while the end state roadmap is still under development. These short term improvements will be vetted against the end state vision and for alignment to other strategic projects such as Gas Business Enablement (GBE).

A. Tactical Customer Experience Improvements

We are currently targeting the following near-term improvements to the customer experience, which are also aligned to the end state vision, for the project:
- Responsive Content for Mobile Website
- Key Customer Care Transactions enabled on Mobile Website (e.g. View Bill, Pay bill, Check Outage Status)
- Review business rules and simplify customer experience on low C-SAT transactions such as web access setup and drive more customers to self-service channels
- Reduce Customer Care Transaction errors while improving transaction error handling
- Process Excellence (PEX) re-design and implementation of Web Move Transactions

B. My Account Portal Replacement.

My Account Portal replacement will include evaluation and replacement of legacy downstate Siebel infrastructure, while preserving the 24x7 customer web experience despite the potential lack of back-end customer business application services availability. This will provide a common, unified customer experience through all National Grid service territories by incorporating and enhancing existing CSS Web customer interactions and by integrating with the Web Content Management System (WCMS) and Third party services.

Evaluation, Selection and Deployment of enabling capabilities required for this MyAccount Portal effort:

1. **Identity and Access Management (IAM)**
   Implementation of a strategic IAM solution integrated with the Business-to-Customer (B2C) Retail Web Portal. This new IAM solution will serve as a replacement for the legacy authentication and web account management solutions in legacy KeySpan and in legacy National Grid territories. This will enable Single Sign-On (SSO) access to KeySpan Customer Relations Information System (CRIS) and National Grid Customer Support System (CSS) billing and account management functions for web

self-serve customers, as well as, SSO for services provided to third-party partners (O-Power, Simple Energy, etc.)

2. User Experience Portal (UXP)
Implementation of a new web customer portal as a replacement of the existing Siebel Customer Relationship Management (CRM) system which currently provides customer facing functions for accounts that are managed within the CRIS customer system.

The project team will evaluate options for consolidating CRIS Siebel CRM and US Retail Web onto a new customer experience platform.

This new portal will provide a common customer experience which will be accessible through both web and mobile devices for targeted transactions. Any solution implemented by this project will align with Gas Business Enablement's (GBE's) current tactical and future strategic needs. Solutions implementing a new portal will be prioritized against leveraging our existing US Retail Web portal and expanding it with CRIS transactions.

3. Operational Data Store (ODS)
CRIS and CSS customer billing systems currently have isolated operational data stores that are unavailable to process customer transactions while running batch processes overnight. The ODS will be provided as a part of the solution until CRIS and CSS are replaced with a new billing system that provides full services and is available 24x7.

During this project, the solutions options for ODS capabilities will be evaluated, selected and developed in conjunction with the User Experience Portal (UXP).

4. Customer System Integration Services
Existing Customer Systems functions which are used to support the contact center agent desktop, IVR and web self-serve channels are diverse, system specific, and depend on unsupported middleware infrastructure and out of date technology platforms. During this effort, the team will analyze the existing usage of customer functions across these channels and will develop a common set of services on new strategic middleware that will serve all existing and future channels.

5. Upgrade of the Business Process Orchestration and Integration
Upgrade of the Business Process Orchestration and Integration services currently performed by Contact Centers to facilitate handling of common customer interactions (e.g. Move In, Move Out, Transfer, High Bill, Budget Billing, etc.). As part of the MyAccount program, we will look to align and reuse these processes across the contact center and web channels.

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C. Preference and Touch Point Management

After the CXT foundation of SSO, CRIS middleware and the new My Account portal are in place, the team will develop the requirements for the CRM layer which will pull all channels together into an Omni channel interaction. In close collaboration with GBE and other strategic initiatives, the team will review CRM applications which will provide the functionality to enable our customers to interact with us according to their preference. The CRM application will allow the customer to manage all their touch points and interactions which are enabled by the Omni channel portal. Included in this functionality is the touch point data base which will enable a 360 degree view of the customer and provide the Company with a view on all prior customer interaction regardless of channel.

Key enabling capabilities for preference management include:
- Customer IAM solution which enables secured access to associated self-serve transactions and provides a means for associated customers' preferences
- Integration with the Web Content Management System to provide a means for customers to define their preferences via the web-self serve channel
- Integration with the back-end customer systems for storing customer preferences and interactions
- Customer Communications Management services for applying the customer's selected preferences to outbound communications

3.4 *Benefits Summary*

This investment will deliver the following benefits:

• Improve customer satisfaction through improved and standardized processes across all digital channels
  - Statistics indicate that customers are more satisfied overall when they are successful at completing their transaction online, find websites easy to navigate, have mobile options available to them
  - Improving the overall experience builds trust and willingness to participate in programs offered

• Deliver Customer Value through Improved Experience
  - Create systems and processes capable of adapting to changing customer needs and expectations, and evolving National Grid vision
  - Improve two-way communications which allows near real time updates available to customers through their preferred channel
  - Expand availability of self-service options by mitigating problems with legacy back end systems
  - One view of all billing, services, transactions and communications no matter the channel for both the customer and company

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- Regulatory
  - Improved customer service levels and regulatory goodwill

- Operating Costs
  - Manage operating cost through the migration of customer transactions from human aided to self-serve digital platforms

- Risk Remediation
  - Mitigate operational risk associated with outdated technology platforms which provide support for over 3.5 million registered users, 1.3 million customers enrolled in paperless billing and $1.5 billion per year in payments via the web self-serve and mobile channels representing 13% of National Grid US revenue.
  - Mitigate cyber security exposure to National Grid and its customers from vendors not providing patches for out of support software

- Prepare for Future Demand
  - Support new demand for customer self-serve capabilities coming from large change program including: Gas Business Enablement, NY REV, MA Grid Modernization, etc.

3.5 *Business and Customer Issues*

There are no significant business issues beyond what has been described elsewhere.

3.6 *Alternatives*

Alternative 1: Do Nothing or Defer

Rejected. The Company is currently operating key areas of the business on technology that is outdated and no longer supported. The ability to service the entire legacy KeySpan segment that includes gas customers in MA and NY City is at risk. Furthermore, the C-SAT scores of this and other segments are not consistent with National Grid's vision. Deferring this program will also increase cyber security exposure due to vendors no longer supporting security patching of legacy versions of software.

3.7 *Safety, Environmental and Project Planning Issues*

There are no significant issues beyond what has been described elsewhere.

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3.8 *Execution Risk Appraisal*

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	There is risk that necessary CRIS resources will not be available	4	1	3	3	12	Accept	Work with IBM planning team to seek alternate options Escalate to IS leadership	Delay in developer support for analyzing code and developing short term improvements	Additional escalation
2	There is risk that the Contact Center project will cause resource conflicts for the CXT Program	4	1	2	4	8	Mitigate	Coordinate resource planning amongst PMs	Possible delays in planned efforts	Escalate to program for resolution of priorities
3	There is a risk identified between the PEX process mapping hooking into the technology plugins for "to-be" solutions	2	1	2	2	4	Accept	Working with DG Team to understand how to work around gap.		
4	There is risk that as part of the Customer Systems Strategy Roadmap, Accenture may propose an architecture pattern that would influence the MyAccount end state design	1	3	3	3	3	Mitigate	Engage with CSSR Team to ensure awareness of strategy Ensure communication with Accenture (Eva)	Recommendations of My Account in conflict with CSSR Strategy, potentially creating throw away efforts	Escalate to Senior Management
5	There is risk of implementation schedule delay due to procurement steps involved in competitive bid process if required	3	1	3	3	9	Accept	Identify needs early; work with procurement to facilitate a quick bid process	Possible delays in planned efforts	Escalate to Senior Management
6	There is risk that DR&S will not support a B2C IAM decision that supports the MyAccount timeline, leading to delays in the ability for MyAccount to deliver a quick win.	2	1	2	2	4	Mitigate	Working with DR&S to resolve requirements and establish a path to evaluate, choose and implement an IAM solution	Possible delays in planned efforts	Escalate to Senior Management

3.9 *Permitting*

N/A

3.10 *Investment Recovery*

3.10.1 Investment Recovery and Regulatory Implications

Recovery will be reflected at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

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US Sanction Paper

3.11 *Financial Impact to National Grid*

3.11.1 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6 + 2022/23	Total
4750	Customer Experience Transformation Technology Program	Est Lvl (+/- 25%)	CapEx	0.000	2.211	6.800	1.485	0.000	0.000	0.000	10.496
			OpEx	0.000	1.065	0.055	0.000	0.000	0.000	0.000	1.120
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	3.276	6.855	1.485	0.000	0.000	0.000	11.616
Total Project Sanction			CapEx	0.000	2.211	6.800	1.485	0.000	0.000	0.000	10.496
			OpEx	0.000	1.065	0.055	0.000	0.000	0.000	0.000	1.120
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	3.276	6.855	1.485	0.000	0.000	0.000	11.616

3.11.2 Project Budget Summary Table

Project Costs Per Business Plan

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6 + 2022/23	Total
CapEx	0.000	2.200	6.800	1.500	0.000	0.000	0.000	10.500
OpEx	0.000	1.500	0.000	0.000	0.000	0.000	0.000	1.500
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	3.700	6.800	1.500	0.000	0.000	0.000	12.000

Variance (Business Plan-Project Estimate)

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6 + 2022/23	Total
CapEx	0.000	(0.011)	0.000	0.015	0.000	0.000	0.000	0.004
OpEx	0.000	0.435	(0.055)	0.000	0.000	0.000	0.000	0.380
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.424	(0.055)	0.015	0.000	0.000	0.000	0.384

3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology. The accuracy level of estimate for each project is identified in table 3.11.1

3.11.4 Net Present Value / Cost Benefit Analysis

This is not an NPV project.

REDACTED

3.11.5 Additional Impacts

None

3.12 *Statements of Support*

3.12.1 ***Supporters***

The supporters listed have aligned their part of the business to support the project.

Role	Individual
Business Executive Sponsor	Kelly Carney
Head of PDM	Deborah Rollins
Relationship Manager	Aman Aneja
Program Delivery Manager	Jeff Dailey
IS Finance Management	Chip Benson
IS Regulatory	Daniel DeMauro
DR&S	Elaine Wilson
Service Delivery	Brian Detota
Enterprise Architecture	Joseph Clinchot

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual	Area
Regulatory	Harvey, Maria	IS
Jurisdictional Delegate(s)	Anand, Sonny	Electric - NE
	Harbaugh, Mark	Electric - NY
	Hill, Terron	FERC
	Brown, Laurie	Gas - NY
	Currie, John	Gas - NE
Procurement	Curran, Art	All

REDACTED

4 Appendices

4.1 Sanction Request Breakdown by Project

N/A

4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	1.456	
	SDC Time & Materials	2.443	
	SDC Fixed-Price	-	
	All other personnel	5.211	
	TOTAL Personnel Costs	9.110	
Hardware	Purchase	-	
	Lease	-	
Software		0.425	
Risk Margin		0.944	
Other		1.137	
	TOTAL Costs	11.616	

4.2.2 Benefitting Operating Companies

The following companies will benefit from this program. The allocation of these benefits will be based upon the number of customers, and will vary for each project within the program.

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp - Electric	Electric Distribution	NY
Niagara Mohawk Power Corp – Gas	Gas Distribution	NY
Massachusetts Electric Company	Electric Distribution	MA
Nantucket Electric Company	Electric Distribution	MA
Narragansett Gas Company	Gas Distribution	RI
Narragansett Electric Company	Electric Distribution	RI
KeySpan Energy Delivery New York	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
Boston Gas Company	Gas Distribution	MA
Colonial Gas Company	Gas Distribution	MA

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nationalgrid

US Sanction Paper

4.2.3 IS Ongoing Operational Costs (RTB)

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	Yr. 1 17/18	Yr. 2 18/19	Yr. 3 19/20	Yr. 4 20/21	Yr. 5 21/22	Yr. 6+	Total
RTB if Status Quo Continues	0.375	0.375	0.375	0.375	0.375	0.947	**2.822**
RTB if Project is Implemented	0.390	0.828	0.852	0.822	0.822	2.075	**5.789**
Net change in RTB	0.015	0.453	0.477	0.447	0.447	1.128	**2.968**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	-
Variance to Plan	0.015	0.453	0.477	0.447	0.447	1.128	**2.968**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	-	-	-	-	-	-
App.Sup. - SDC 2	-	-	-	-	-	-	-
App.Sup. - other	-	-	-	-	-	-	-
SW maintenance	-	-	-	-	-	-	-
SaaS	-	-	-	-	-	-	-
HW support	-	-	-	-	-	-	-
Other: IS	0.390	0.828	0.852	0.822	0.822	2.075	**5.789**
All IS-related RTB (sub-Total)	0.390	0.828	0.852	0.822	0.822	2.075	**5.789**
Business Support (sub-Total)	-	-	-	-	-	-	-
Total RTB Costs	0.390	0.828	0.852	0.822	0.822	2.075	**5.789**

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

N/A

REDACTED

US Sanction Paper

Title:	STORMS-IScheduler Stabilization Upgrade	**Sanction Paper #:**	USSC-16-283 v3
Project #:	INVP 4398	**Sanction Type:**	Sanction
Operating Company:	Allocated	**Date of Request:**	April 12, 2017
Author / NG Representative:	Diane Beard / Martin McDermott	**Sponsor:**	Ross Turrini, SVP Gas Process and Engineering
Utility Service:	IS	**Project Manager:**	Sally Seltzer, PDM Operations

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of INVP 4398 in the amount $10.594M with a tolerance of +/- 10% for the purposes of Full implementation.

This sanction amount is $10.594M broken into:

$9.919M Capex
$0.675M Opex
$0.000M Removal

1.2 Project Summary

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.

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1.3 Summary of Projects

Project Number	Project Title	Estimate Amount ($M)
INVP 4398	STORMS-IScheduler Stabilization Upgrade	10.594
	Total	10.594

1.4 Associated Projects

N/A

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
Feb 2017	USSC	$5.100M	$9.969M	STORMS-IScheduler Stabilization Upgrade	Partial Re-sanction	25%
Oct 2016	USSC	$4.064M	$8.232M	STORMS-IScheduler Stabilization Upgrade	Partial	25%

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Aug 2018	Project Closure

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	Reliability

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US Sanction Paper

1.8 Asset Management Risk Score

Asset Management Risk Score: 41

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

1.9 Complexity Level

○ High Complexity ◉ Medium Complexity ○ Low Complexity ○ N/A

Complexity Score: 24

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18-22	◉ Yes ○ No	○ Over ○ Under ◉ NA	$0.000

1.12 If cost is not aligned with approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio has been managed by the IS Relationship Manager with the Planning Analyst assistance to meet jurisdictional budgetary, statutory and regulatory requirements.

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1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	4.734	4.638	0.547	0.000	0.000	0.000	0.000	9.919
OpEx	0.330	0.174	0.171	0.000	0.000	0.000	0.000	0.675
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	5.064	4.812	0.718	0.000	0.000	0.000	0.000	10.594

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	AUG 2016
Partial Sanction	OCT 2016
Begin Requirements and Design	OCT 2016
Partial Sanction	FEB 2017
Sanction	APR 2017
Begin Development and Implementation	MAY 2017
Move to Production	APR 2018
Project Complete	MAY 2018
Project Closure Sanction	AUG 2018

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green

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Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

N/A

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

REDACTED

2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on April 12, 2017:

(a) APPROVED this paper and the investment of $10.594M and a tolerance of +/-10%.

(b) APPROVED the RTB impact of $0.045M per annum for 5 years.

(c) NOTED that Sally Seltzer has the approved financial delegation.

Signature……..Date……

Christopher Kelly
Senior Vice President, Electric Process & Engineering
US Sanctioning Committee Co – Chair Person

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3 Sanction Paper Detail

Title:	STORMS-IScheduler Stabilization Upgrade	**Sanction Paper #:**	USSC-16-283 v3
Project #:	INVP 4398	**Sanction Type:**	Sanction
Operating Company:	Allocated	**Date of Request:**	April 12, 2017
Author / NG Representative:	Diane Beard / Martin McDermott	**Sponsor:**	Ross Turrini, SVP Gas Process and Engineering
Utility Service:	IS	**Project Manager:**	Sally Seltzer, PDM Operations

3.1 Background

Electric and Gas Operations are dependent on work management and work force scheduling tools to record and meet customer obligations for electric and gas services. These systems also provide for the efficient scheduling, movement and tracking of work out to the field for completion. As the primary Work Management and Scheduling tool for legacy National Grid territories, STORMS and IScheduler are critical in support of Electric and Gas Operations. These applications, which were installed back in 2003, with a minor upgrade in 2006, have become increasingly unstable, experiencing multiple outages over the past several years. The vendor of the software has indicated the need to upgrade the components and technology to ensure continued support and security of the applications. This project will upgrade STORMS to the latest versions of server hardware components, database software; replace middleware components along with bringing both the standard and custom application code to the latest version of the technology. As part of the project, IScheduler will be upgraded to the vendor's latest scheduling tool. This investment should extend the life of the current applications by 5-6 years while the company embarks on a roadmap and review of a suite of new applications.

	Length of Outage (Hrs)	Number of Incidents
2017		9
	1-3	2
	3-6	1
	6-12	6
2016		58
	1-3	33
	3-6	10
	6-12	4
	12-24	6
	24-48+	5
2015		43
	1-3	23
	3-6	13
	6-12	3
	12-24	4

Figure 1 Outage Report

System Component	Status
STORMS	Legacy CGI application but still supportable with upgraded technology base (servers, database)
iScheduler	Legacy CGI application with performance issues
Oracle Version 10.2	Oracle support ended in 2013
Windows XP Clients	No longer supported by Microsoft
Windows 2003 Servers	No longer supported by Microsoft
MapPoint	No Longer supported by the Vendor
JACAPS Middleware	Unstable legacy system and limited SME skills available to make modifications
STORMS and iScheduler password management	Not in compliance with National Grid security policies

Figure 2 Figure 2 Key STORMS iScheduler Systems and Disposition

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3.2 Drivers

The key drivers of this Investment are:

- Deliver increased reliability of the Work Management System (STORMS) and the Work Force Scheduling tool by moving to supported versions of the application systems and components.
- Reduce the risk of system outages due to failing components which are no longer supportable or available.
- Allow users to use newer, more readily available technology and devices.

Because of the importance of the applications, it is strongly recommended that the Company upgrade the applications at this time.

3.3 Project Description

The project will upgrade the Work Management system 'STORMS' to utilize the latest version of technology including application servers, upgrade the database to Oracle version 12, replace the older outdated middleware with new supported middleware, and convert the standard and custom application code (programs and stored procedures) to the latest version of the components. The vendor will convert all code, upgrade the database, and support testing and implementation of the re-platformed system. They will also assist in the conversion and rewrite the interfaces to the systems utilizing the new middleware. The look and feel of the application will remain the same allowing users to continue using the application with no new training. Additionally, the Field Force Scheduling tool 'IScheduler' will be replaced with the vendor's current scheduling tool 'ARM-Scheduler' which has a similar look and feel to the current IScheduler tool but will provide for increased functionality and stability. Minimal training will be required on the new scheduling tool.

3.4 Benefits Summary

The upgrade of the Storms application and replacement of the Scheduling tool will extend the service life of these key systems for several more years as the company embarks on its enablement projects. This investment will upgrade and enhance some of the higher at-risk Operations applications in addition to replacing outdated components. Continued reliable operation of these systems is necessary to provide the level of service the business requires.

3.5 Business and Customer Issues

There are no significant Business issues beyond what has been described elsewhere.

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3.6 Alternatives

Alternative 1: Do Nothing
Rejected - the applications are running on operating systems and components for which support has ended or will be ending. If a component were to fail recovery may not be possible and the application could be lost to the business. Additionally, as security risks are uncovered with the systems, they would no longer be patched.

Alternative 2: Defer the Investments
Rejected - based on the current dates of end-of-support and the risks associated with the failure of older components, delaying the investment would lead to new higher risks and costs.

Alternative 3: Replace Applications
Rejected - It is not possible to replace the applications and all of their functionality in a short period of time. A review is being done to determine a road map and replacement strategies for these Operations applications, but until the future state is determined these applications will continue to be utilized. Due to the complexity of the STORMS application we estimate that it will take several years to completely replace this.

3.7 Safety, Environmental and Project Planning Issues

There are no significant issues beyond what has been described elsewhere.

3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Business Resource Availability	2	2	3	4	6	Mitigate	Work with the Business to ensure resources are available as required	Provide the Business with fixed timelines for resource planning	Augment the Business resources with external resources
2	Technology Issues	2	2	3	4	6	Transfer	The risk to being moved to the vendor as part of the contract, they will be the technical integrators	National Grid Enterprise Architecture will work closely with the vendor to ensure issue are quickly addressed. Both primary and alternate solutions will be designed	Quickly evaluate/select fallback solution to resolved issue

3.9 Permitting

N/A

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3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
INVP 4398	STORMS-IScheduler Stabilization Upgrade	+/- 10%	CapEx	4.734	4.638	0.547	0.000	0.000	0.000	0.000	9.919
			OpEx	0.330	0.174	0.171	0.000	0.000	0.000	0.000	0.675
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	5.064	4.812	0.718	0.000	0.000	0.000	0.000	10.594

Total Project Sanction	CapEx	4.734	4.638	0.547	0.000	0.000	0.000	0.000	9.919
	OpEx	0.330	0.174	0.171	0.000	0.000	0.000	0.000	0.675
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total	5.064	4.812	0.718	0.000	0.000	0.000	0.000	10.594

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3.11.2 Project Budget Summary Table

Project Costs per Business Plan

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	4.734	4.638	0.547	0.000	0.000	0.000	0.000	9.919
OpEx	0.330	0.174	0.171	0.000	0.000	0.000	0.000	0.675
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	5.064	4.812	0.718	0.000	0.000	0.000	0.000	10.594

Variance **(Business Plan-Project Estimate)**

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

3.11.3 Cost Assumptions

This estimate was developed in 2017 using standard IS estimating methodology. The accuracy level of the estimate for each project is identified in table 3.11.1.

3.11.4 Net Present Value / Cost Benefit Analysis

3.11.4.1 NPV Summary Table

This is not an NPV project.

3.11.4.2 NPV Assumptions and Calculations

3.11.5 Additional Impacts

None

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3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual's Name
Business Executive Sponsor	Ross Turrini
Head of PDM	Deb Rollins
Relationship Manager	Richard Sheer
Program Delivery Manager	Sally Seltzer
IS Finance Management	Chip Benson
IS Regulatory	Daniel DeMauro
DR&S	Elaine Wilson
Service Delivery	Brian Detota
Enterprise Architecture	Svetlana Lyba

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual	Area
Regulatory	Zschokke, Peter	All
Jurisdictional Delegate(s)	Harbaugh, Mark	Electric - NY
	Amand, Sonny	Electric - NE
	Hill, Terron	FERC
	Brown, Laurie	Gas - NY
	Currie, John	Gas - NE
Procurement	Curran, Art	All

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4 Appendices

4.1 Sanction Request Breakdown by Project

N/A

4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	0.820	
	SDC Time & Materials	0.741	IBM, Wipro
	SDC Fixed-Price	-	
	All other personnel	4.548	CGI, Bridge, Oracle, CSC, Verizon
	TOTAL Personnel Costs	6.109	
Hardware	Purchase	-	
	Lease	-	
Software		2.592	
Risk Margin		0.871	
Other		1.021	
	TOTAL Costs	10.594	

4.2.2 Benefiting Operating Companies

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp - Electric	Electric Distribution	NY
Niagara Mohawk Power Corp – Gas	Gas Distribution	NY
Niagara Mohawk Power Corp - Transmission	Transmission	NY
Massachusetts Electric Company	Electric Distribution	MA
Massachusetts Electric Company – Transmission	Transmission	MA
Nantucket Electric Company	Electric Distribution	MA
Narragansett Gas Company	Gas Distribution	RI
Narragansett Electric Company	Electric Distribution	RI
Narragansett Electric Company – Transmission	Transmission	RI
New England Power Company - Transmission	Transmission	MA, NH, RI, VT

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4.2.3 IS Ongoing Operational Costs (RTB):

This project will increase IS ongoing operations support costs as per the following table. These are also known as Run the Business (RTB) costs.

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 16/17**	**Yr. 2 17/18**	**Yr. 3 18/19**	**Yr. 4 19/20**	**Yr. 5 20/21**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	0.500	0.594	0.602	0.602	1.304	**3.601**
RTB if Project is Implemented	-	0.429	0.501	0.501	0.836	1.810	**4.077**
Net change in RTB	-	(0.071)	(0.093)	(0.101)	0.234	0.507	**0.476**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	**-**
Variance to Plan	-	(0.071)	(0.093)	(0.101)	0.234	0.507	**0.476**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	0.050	0.050	0.050	0.050	0.108	**0.308**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	0.150	0.150	0.150	0.150	0.325	**0.925**
SW maintenance	-	0.157	0.157	0.157	0.492	1.065	**2.028**
SaaS	-	-	-	-	-	-	**-**
HW support	-	0.072	0.144	0.144	0.144	0.312	**0.816**
Other: IS	-	-	-	-	-	0.000	**0.000**
All IS-related RTB (sub-Total)	-	0.429	0.501	0.501	0.836	1.810	**4.077**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	-	0.429	0.501	0.501	0.836	1.810	**4.077**

4.3 NPV Summary (if applicable)

N/A

4.4 Customer Outreach Plan

N/A

REDACTED

US Sanction Paper

Title:	US CNI Tech Services-Network Equipment Lifecycle Replacements	**Sanction Paper #:**	USSC-17-026
Project #:	INVP 4570 Capex: S0007569	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	February 27, 2017
Author:	Michael Olesker	**Sponsor:**	John Spink, VP, Control Center Operations
Utility Service:	IS	**Project Manager:**	Phil Lavallee

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of INVP 4570 in the amount $9.400M with a tolerance of +/- 10% for the purposes of Full Project Implementation.

This sanction amount is $9.400M broken down into:

$9.400M Capex
$0.000M Opex
$0.000M Removal

1.2 Brief Description:

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.

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
4570	Project Type	US CNI Tech Services-Network Equipment Lifecycle Replacements	9.400
		Total	9.400

1.4 Associated Projects

N/A

REDACTED

1.5 Prior Sanctioning History

N/A

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
May 2017	Project Closure

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	This project is important to support the equipment replacement schedule to mitigate risk of in-service failure. Failure of such resources could lead to unacceptable system disruption and/or loss of monitoring and control.

1.8 Asset Management Risk Score

Asset Management Risk Score: 45

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

1.9 Complexity Level

○ High Complexity ◉ Medium Complexity ○ Low Complexity ○ N/A

Complexity Score: 23

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

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1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18-22	◉ Yes ○ No	○ Over ○ Under ◉ NA	$0M

1.12 If cost is not aligned with approved Business Plan how will this be funded?

Re-allocations of funds within the US business has been managed to meet jurisdictional budgetary, statutory and regulatory requirements. Future fiscal year forecasts will be addressed in future year business plans.

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	9.400	0.000	0.000	0.000	0.000	0.000	9.400
OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	9.400	0.000	0.000	0.000	0.000	0.000	9.400

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	Jan 2017
Full Sanction	Feb 2017
Begin Development and Implementation	Feb 2017
Move to Production	Mar 2017
Project Complete	Mar 2017
Project Closure Sanction	May 2017

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US Sanction Paper

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

N/A

1.17 Climate Change

Are financial incentives (e.g. carbon credits) available?		○ Yes	◉ No
Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

REDACTED

2 Decisions

The Senior Executive Sanctioning Committee (SESC) at a meeting held on February 27, 2017:

(a) APPROVED this paper and the investment of $9.400M and a tolerance of +/-10%.

(b) NOTED that Phil Lavallee has the approved financial delegation.

Signature……..Date……

Margaret Smyth
US Chief Financial Officer
Chair, US Sanctioning Committee

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3 Sanction Paper Detail

Title:	US CNI Tech Services-Network Equipment Lifecycle Replacements	**Sanction Paper #:**	USSC-17-026
Project #:	INVP 4570	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	February 27, 2017
Author:	Michael Olesker	**Sponsor:**	John Spink, VP, Control Center Operations
Utility Service:	IS	**Project Manager:**	Phil Lavallee

3.1 Background

National Grid has a significant number of network and security related devices within the Critical National Infrastructure (CNI) environment that are either currently at End of Support (EoS), or will be in 2018. Running the network on this hardware and software leaves National Grid at risk of potential irrecoverable hardware failures or cyber threats due to outdated versions of software. Also, in the event that a system or application were to go down, the System Operators may lose visibility of the grid as well as the ability to remotely control devices and equipment from the Control Center. Loss of visibility and/or control can affect system performance and reliability, and have adverse reputational and financial impacts to National Grid.

National Grid has developed a plan to replace these at-risk assets with new hardware and software. Verizon has identified the inventory that will be EoS, the replacement costs and timeframes to implement the new replacement devices. The devices identified support the Energy Management System and Outage Management System (EMS/OMS) across all of New York and New England.

3.2 Drivers

Failure of the networks may result in the Company's inability to effectively operate EMS, as well as an inability to provide timely and accurate regulatory information and customer facing outage information during worst case scenarios.
Failure of the CNI network will affect users of EMS and OMS applications in New York and New England Electric Operations, Contact Centers, and Electric/Generation Control Rooms.
Without an upgrade to supported levels of networking hardware and software, National Grid will not be able to deploy security patches, leaving National Grid vulnerable to cyber threats.

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3.3 Project Description

This Policy-driven investment will procure networking assets to replace out of 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 hardware and software vendors. Hardware and software assets to be replaced include routers, switches, firewalls, load balancers, and other network management devices.

The Project will be delivered using National Grid US CNI, Information Services, and Verizon resources.

3.4 Benefits Summary

The benefits of this investment include:

- Maintain the integrity of the business and critical operating systems in New York and New England;
- Prevent network outages which would impact regulatory availability requirements;
- Provide a more robust network security environment, which allows National Grid to continue meeting the North American Electric Reliability Corporation Critical Infrastructure Protection (NERC CIP) requirements;
- Mitigate risk of networking failures resulting in inability to effectively monitor, operate and control the electric bulk power supply systems.

3.5 Business and Customer Issues

There are no significant business issues beyond what has been described elsewhere.

3.6 Alternatives

Alternative 1: Do Nothing

This is not a viable option. Once these assets are at end of support, the manufacturers no longer develop updates for the operating systems, no longer offer support agreements, and do not maintain hardware inventory. This leaves CNI exposed to reliability concerns and potential cyber security risks. Operating issues (“bugs”) that arise once an asset is at its end of support will have no recourse resource available to resolve the issue.

Alternative 2: Defer until next year

This option would increase risk. There are assets that will be end of support this year and by the end of next year approximately 69 percent of the assets will be end of support. Replacing these assets is complex and requires significant time due to the time to configure, test, and deploy in an operationally critical environment. Given the volume of the assets that need to replaced, deferring will likely put us in to a position where we

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will end up operating with end of support assets and be exposed to the risks identified in Alternative 1.

3.7 Safety, Environmental and Project Planning Issues

N/A

3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Project depends on purchase of large quantities of equipment with high level of Procurement resources involved	4	3	3	12	12	Mitigate	Early engagement and mobilization of National Grid procurement resources and vendors	Backlog of procurement requests for other projects.	Priorities outstanding procurement activities

3.9 Permitting

N/A

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

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US Sanction Paper

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
4570	US CNI Tech Services-Network Equipment Lifecycle Replacements	+/- 10%	CapEx	0.000	9.400	0.000	0.000	0.000	0.000	0.000	9.400
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	9.400	0.000	0.000	0.000	0.000	0.000	9.400
Total Project Sanction			CapEx	0.000	9.400	0.000	0.000	0.000	0.000	0.000	9.400
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	9.400	0.000	0.000	0.000	0.000	0.000	9.400

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Variance (Business Plan-Project Estimate)

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.000	(9.400)	0.000	0.000	0.000	0.000	0.000	(9.400)
OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	(9.400)	0.000	0.000	0.000	0.000	0.000	(9.400)

3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology and refined for this paper. The accuracy level of estimate for each project is identified in table 3.11.1.

3.11.4 Net Present Value / Cost Benefit Analysis

This is not an NPV project

3.11.5 Additional Impacts

None

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3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual's Name
Business Executive Sponsor	John Spink
Head of PDM	Deb Rollins
Relationship Manager	Aman Aneja
Program Delivery Manager	Phil Lavallee
IS Finance Management	Chip Benson
IS Regulatory	Dan DeMauro
DR&S	Elaine Wilson
Service Delivery	Biran Detota
Enterprise Architecture	Joe Clinchot

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual	Area
Finance	Benson, Chip	All
Regulatory	Zschokke, Peter	All
Jurisdictional Delegate(s)	Harbaugh, Mark	Electric - NY
	Patterson, James	Electric - NE
	Hill, Terron	FERC
Procurement	Curran, Art	All

4 Appendices

4.1 Sanction Request Breakdown by Project

N/A

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4.2 Other Appendices

4.2.1 Project Cost Breakdown

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Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	-	
	SDC Time & Materials	-	
	SDC Fixed-Price	-	
	All other personnel	-	
	TOTAL Personnel Costs	-	
Hardware	Purchase	9.176	
	Lease	-	
Software		-	
Risk Margin		-	
Other		0.224	
	TOTAL Costs	9.400	

4.2.2 Benefiting Operating Companies

The following companies will benefit from this program. The allocation of these benefits will be based upon the number of customers, and will vary for each project within the program.

Benefiting Operating Companies Table:

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.	Electric Distribution	NY
Niagara Mohawk Power Corp.	Electric Transmission	NY
Massachusetts Electric Company	Electric Distribution	MA
Massachusetts Electric Company	Electric Transmission	MA
Nantucket Electric Company	Electric Distribution	MA
Narragansett Electric Company	Electric Distribution	RI
Narragansett Electric Company	Electric Transmission	RI
New England Power Company	Electric Transmission	MA

4.2.3 IS Ongoing Operational Costs (RTB):

N/A

4.3 NPV Summary

N/A

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4.4 Customer Outreach Plan

N/A

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US Sanction Paper

Title:	Data Visualization	**Sanction Paper #:**	USSC-16-337
Project #:	INVP 4464	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	Dec 14 2016
Author:	Martin McDermott	**Sponsor:**	Anuraag Bhargava
Utility Service:	IS	**Project Manager:**	Alexis Shaw

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of INVP 4464 in the amount $7.934M with a tolerance of +/- 10% for the purposes of Full Implementation.

This sanction amount is $7.934M broken down into:

$7.819M Capex
$0.115M Opex
$0.000M Removal

1.2 Project Summary

This project will establish Tableau and Altreyx software solutions in a cloud environment to enable self-service reporting and data visualization capabilities for the organization. The proposed solution will provide the opportunity for improved decision-making by providing capabilities to enhance data access to very large data sets, analytics, data visualization and export to other analytical software capabilities. Over time, it will also establish the foundation to replace software tools for reporting that are no longer supported by the original vendor and produce essential reports for oversight of the operation.

The project will provide the base infrastructure required to run the services, including:

- procurement of software
- installation of Tableau and Alteryx in a Cloud Environment
- packaging of software for deployment to desktops
- implementation of user and system support services
- end user training

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nationalgrid

US Sanction Paper

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
4464	Project Type	Data Visualization	7.934
		Total	7.934

1.4 Associated Projects

N/A

1.5 Prior Sanctioning History

N/A

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Jan 2018	Project closure

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ○ Policy- Driven ○ Justified NPV ◉ Other	This investment will provide capabilities to all participating functions within National Grid This new capability will: • Enable capability to develop data driven decision-making across the organization • Automate many standard reports • Provide a platform for processing and analyzing data • Establish the foundation for the replacement of software tools for reporting that are no longer supported by the original vendor and produce essential reports for oversight of operational and financial performance.

1.8 Asset Management Risk Score

Asset Management Risk Score: N/A

Primary Risk Score Driver: (Policy Driven Projects Only)

○ Reliability ○ Environment ○ Health & Safety ◉ Not Policy Driven

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1.9 Complexity Level

○ High Complexity ◉ Medium Complexity ○ Low Complexity ○ N/A

Complexity Score: 19

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY16-21	○ Yes ◉ No	◉ Over ○ Under ○ NA	$7.934M

1.12 If cost is not aligned with approved Business Plan how will this be funded?

The incremental spend has been approved by the jurisdictional presidents and/or CFO as appropriate.

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	6.852	0.967	0.000	0.000	0.000	0.000	7.819
OpEx	0.000	0.101	0.014	0.000	0.000	0.000	0.000	0.115
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	6.953	0.981	0.000	0.000	0.000	0.000	7.934

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1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	Oct 2016
Full Sanction	Dec 2016
Begin Requirements and Design	Jan 2017
Begin Development and Implementation	Mar 2017
Move to Production / Last Go Live	Jul 2017
Project Complete	Nov 2017
Project Closure Sanction	Jan 2018

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☐ Contractor	
Construction/Implementation Resources to be provided	☐ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

1	SEI Bandwidth may need to be increased
2	Deployment may need to be accelerated

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1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

1	TCO Log
2	USSC Master Spreadsheet
3	1 Page Summary

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US Sanction Paper

2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on December 14, 2016:

(a) APPROVED this paper and the investment of $7.934M including a tolerance of +/- 10%.

(b) APPROVED the RTB impact of $0.506M (per annum) for 5 years.

(c) NOTED that Jeffery Dailey has the approved financial delegation.

Signature……..Date……

Ross Turrini
Senior Vice President, Gas Process & Engineering
Group Chief Engineer - Gas

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3 Sanction Paper Detail

Title:	Data Visualization	**Sanction Paper #:**	USSC-16-337
Project #:	INVP 4464	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	Dec 14 2016
Author:	Martin McDermott	**Sponsor:**	Anuraag Bhargava
Utility Service:	IS	**Project Manager:**	Alexis Shaw

3.1 Background

Currently within National Grid large amounts of data exist but there are a lack of tools and knowledge to utilize this data for decision-making. Data is stored in multiple unrelated databases with no way to link the information together to provide complete reporting without duplication of data between systems. Current tools in use are limited to accessing only data within their storage databases limiting reporting capability. The need to replicate data for reporting causes complex processes and limits reporting based on what information was predetermined to be needed. Reporting tools in use tend to be complex and require the design and building of predefined reports.

Additionally, some of the current reporting tools in use are at risk of failure and are no longer supported by the original vendor or third party companies due to their outdated technology. One such tool Microstrategy, which is used extensively within operations and finance, has experienced prolonged outages and there are concerns that upon a complete system failure it may not be recoverable. Older desktop versions of Crystal Reports, which are currently unsupported by the vendor or third party companies, are in use as the reporting tool for some departmental systems and have suffered from capability and support issues. Upgrades would require rewriting the software in the latest version of the product or replacement with a new, different tool. Old versions of Microsoft Access and Excel are still being utilized to access databases, which creates compatibility and support issues.

This solution is recommended to improve current reporting and analytic capability utilizing the next generation of tools which feature data visualization and analytics.

3.2 Drivers

This project will deliver new capability that provides the opportunity to:

- Enable capability to provide greater insight through data for decision-making
- Provide an enterprise platform for processing and analyzing data
- Automate standard reports which are currently performed manually

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- Allow for self-service reporting to provide timely access of information
- Mitigate risk by establishing a foundation to replace failing reporting systems

3.3 Project Description

This project will enable self-service reporting through the deployment of Tableau and self-service data preparation through deployment of Alteryx. In addition to standard predefined reports, it will also provide for performance dash boards, big data analytics, along with data visualization for enhanced reporting. The project will; implement the platform in a cloud environment; install the software on users' desktops; and provide training for users. Additionally the project will establish oversight and governance rules user data access, create links to data and ensure security of data. As part of the project, several dash boards will be created to provide for operational and financial reporting. This project will establish the foundation for migration of operational and financial reports from at risk reporting tools.

3.4 Benefits Summary

Type	Benefit	Description
Direct	Reporting self Service	Tableau is a data visualization tool providing access to many data sources; it provides the ability for the business to access, analyze and report data independent of IT involvement.
Direct	Risk reduction on current tools	Enabling the platform as a foundation for future migration from software tools for reporting that are no longer supported by the original vendor. As the technology is no longer supported a failure of the system will mean the potential for a loss of reporting capability and data.
Intangible (Indirect benefits)	Enable deeper insights and promote and enable decisions based upon data analytics	Most reporting is done through flat files (Excel and PPT). With the use of a data visualization tool, users can select and process data within seconds compared to creating Excel based macros or performing lookups. Additionally, since data preparation will be easier, the ability to blend multiple data sources together will be easier, meaning that there are no roadblocks to having all data available for analytics
Intangible (Indirect benefits)	Increase automation	Business analysts will be able to focus on data analytics for decision-making as compared to the need to clean, prepare and aggregate data sources by business analysts. This project will allow the ability to automate this workflow resulting in minimal manual effort for monthly reporting and freeing analysts to perform more

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		analysis on data.
Intangible (Indirect benefits)	Improved accuracy of reports	The data workflow from source will be documented and automated reducing the likelihood of manual errors in reporting and data after the implementation of this project.

3.5 Business and Customer Issues

NA

3.6 Alternatives

Alternative 1: Do Nothing
Rejected – This option does not address the project drivers and will not deliver the benefits including self-service analytics and visualization. Additionally several of the current software tools for reporting are no longer supported by the original vendor and produce essential reports for oversight of operations and finance. The tools have had extended outages and there are concerns they may not be recoverable if a critical failure were to occur. A foundation needs to be put in place to migrate from these older technologies which are no longer available in the market.

Alternative 2: Defer investment
Rejected - This option does not address the project drivers and will not deliver the benefits including self-service, analytics and visualization. Additionally several of the current software tools for reporting are no longer supported by the original vendor and produce essential reports for oversight of operations and finance. The tools have had extended outages and there are concerns they may not be recoverable if a critical failure were to occur. A foundation needs to be put in place to migrate from these older technologies which are no longer available in the market. Due to the risks associated with the possible inability to recover these tools if a failure were to occur deferring the investment is not a viable option.

Alternative 3: Deploy alternative solution
Rejected – Leverage legacy Microstrategy or Business Objects for complex reporting and analytics was reviewed; however, these solutions are not viable for the business given: the use case for data visualization capabilities, the need to upgrade the systems, the complexity of the user interface, and the fact that not all of the data sets are available in these systems. Additionally the version of Microstrategy is currently unsupported by the vendor, is running on older soon to be unsupported hardware, which cannot be upgraded due to the version of software and would require a complete new solution. The proposed solution w/ Tableau, Alteryx, in a Cloud Environment was developed based on business demand and use cases, the ability to perform self-service analytics, and the reduced time to standup a production solution (2 months). It also provides the ability to link to multiple data sources and provide cross system reporting.

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3.7 Safety, Environmental and Project Planning Issues

N/A

3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	SEI Bandwidth may need to be increased	2	2	2	4	4	Accept	Run Verizon reports and review results	Confirm bandwidth capacity	Increase bandwidth
2	Deployment may need to be accelerated	2	2	2	4	4	Exploit	Monitior User requests for onboarding to system	Confirm user requests, control expectations	More consultant resources to create reports
3	Finding a Data Analyst with right skillset may take a long time	3	2	4	6	12	Accept	Review job description & skill sets	Consult HR	Keep Consultants for longer period of time for coverage
4	Data may be of poor quality for some applications	4	2	3	8	12	Mitigate	Analysis of data	Run extra data cleansing	Consult with Alteryx specialists

3.9 Permitting

N/A

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

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nationalgrid

US Sanction Paper

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
4464	Data Visualization	+/- 10%	CapEx	0.000	6.852	0.967	0.000	0.000	0.000	0.000	7.819
			OpEx	0.000	0.101	0.014	0.000	0.000	0.000	0.000	0.115
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	6.953	0.981	0.000	0.000	0.000	0.000	7.934
Total Project Sanction			CapEx	0.000	6.852	0.967	0.000	0.000	0.000	0.000	7.819
			OpEx	0.000	0.101	0.014	0.000	0.000	0.000	0.000	0.115
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	6.953	0.981	0.000	0.000	0.000	0.000	7.934

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Variance (Business Plan-Project Estimate)

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.000	(6.852)	(0.967)	0.000	0.000	0.000	0.000	(7.819)
OpEx	0.000	(0.101)	(0.014)	0.000	0.000	0.000	0.000	(0.115)
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	(6.953)	(0.981)	0.000	0.000	0.000	0.000	(7.934)

3.11.3 Cost Assumptions

- This investment will be managed by a National Grid Project Manager.
- November 2016 to January 2017 activities are listed as Opex as part of startup and requirement phases
- Closure activities for the last month of the TCO log are also listed as Opex
- All other costs are listed as Capex
- Project will utilize internal National Grid Resources, external consultants, Verizon, CSC and IBM technical resources
- Costs of license and services have been confirmed
- The accuracy level of estimate for each project is identified in table 3.11.1

3.11.4 Net Present Value / Cost Benefit Analysis

3.11.4.1 NPV Summary Table

N/A

3.11.4.2 NPV Assumptions and Calculations

3.11.5 Additional Impacts

N/A

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual's Name
Business Executive Sponsor	Anuraag Bhargava
Head of BRM/Strategy	Richard Sheer
Head of PDM	Donald Stahlin
Relationship Manager	Richard Sheer
Program Delivery Manager	Jeffery Dailey
IS Finance Management	Chip Benson
IS Regulatory	Dan DeMauro
DR&S	Elaine Wilson
Service Delivery	Brian Detota
Enterprise Architecture	Svetlana Lyba

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

REDACTED

Appendices

3.13 Sanction Request Breakdown by Project

N/A

3.14 Benefitting Operating Companies

This project will benefit all the companies listed below.

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.- Electric Distr.	Electric Distribution	NY
Massachusetts Electric Company	Electric Distribution	MA
KeySpan Energy Delivery New York	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
Boston Gas Company	Gas Distribution	MA
Narragansett Electric Company	Electric Distribution	RI
Niagara Mohawk Power Corp. - Transmission	Transmission	NY
Niagara Mohawk Power Corp. - Gas	Gas Distribution	NY
New England Power Company – Transmission	Transmission	MA, NH, RI, VT
KeySpan Generation LLC (PSA)	Generation	NY
Narragansett Gas Company	Gas Distribution	RI
Colonial Gas Company	Gas Distribution	MA
Narragansett Electric Company – Transmission	Transmission	RI
National Grid USA Parent	Parent	
Nantucket Electric Company	Electric Distribution	MA
NE Hydro - Trans Electric Co.	Inter Connector	MA, NH
KeySpan Energy Development Corporation	Non-Regulated	NY
KeySpan Port Jefferson Energy Center	Generation	NY
New England Hydro - Trans Corp.	Inter Connector	MA, NH
New England Hydro Finance Company Inc.	Inter Connector	MA, NH
KeySpan Services Inc.	Service Company	
KeySpan Glenwood Energy Center	Generation	NY
Massachusetts Electric Company – Transmission	Transmission	MA
NG LNG LP Regulated Entity	Gas Distribution	MA, NY, RI
Transgas Inc	Non-Regulated	NY
Keyspan Energy Trading Services	Other	NY
KeySpan Energy Corp.	Service Company	
New England Electric Trans Corp	Inter Connector	MA

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3.15 NPV Summary

N/A

3.16 Customer Outreach Plan

N/A

3.17 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	0.580	
	SDC Time & Materials	-	
	SDC Fixed-Price	-	
	All other personnel	-	
	TOTAL Personnel Costs	0.580	
Hardware	Purchase	-	
	Lease	-	
Software		4.800	
Risk Margin		0.680	
Other		1.873	
	TOTAL Costs	7.934	

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nationalgrid

US Sanction Paper

3.18 IS Ongoing Operational Costs (RTB)

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 16/17**	**Yr. 2 17/18**	**Yr. 3 18/19**	**Yr. 4 19/20**	**Yr. 5 20/21**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	-	-	-	-	-	**-**
RTB if Project is Implemented	-	0.423	0.506	0.506	0.506	0.696	**2.639**
Net change in RTB	-	0.423	0.506	0.506	0.506	0.696	**2.639**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	**-**
Variance to Plan	-	0.423	0.506	0.506	0.506	0.696	**2.639**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	-	-	-	-	-	**-**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	-	-	-	-	**-**
SaaS	-	0.229	0.250	0.250	0.250	0.343	**1.321**
HW support	-	-	-	-	-	-	**-**
Other: IS	-	0.194	0.257	0.257	0.257	0.353	**1.318**
All IS-related RTB (sub-Total)	-	0.423	0.506	0.506	0.506	0.696	**2.639**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	-	0.423	0.506	0.506	0.506	0.696	**2.639**

Note: U.S. Policy dictates that RTB Variance = forecasted Net Δ RTB - Net Δ RTB funded by Investment Plan

This is a supplemental table - it is NOT required to be pasted in the Investment Paper **Net Change in RTB - by Cost Type**							
App.Sup. - SDC 1	-	-	-	-	-	-	**-**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	-	-	-	-	**-**
SaaS	-	0.229	0.250	0.250	0.250	0.343	**1.321**
HW support	-	-	-	-	-	-	**-**
Other: IS	-	0.194	0.257	0.257	0.257	0.353	**1.318**
All IS-related RTB (sub-Total)	-	0.423	0.506	0.506	0.506	0.696	**2.639**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total Net Change in RTB	-	0.423	0.506	0.506	0.506	0.696	**2.639**

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US Sanction Paper

Not bad thanks Title:	Document Management Systems Replacement-Delivery	**Sanction Paper #:**	USSC-16-297 V3
Project #:	INVP 4408	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	January 10, 2018
Author:	John Kastler	**Sponsor:**	Ross Turrini SVP Gas Process Engineering
Utility Service:	IS	**Project Manager:**	John Kastler

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of INVP4408 in the amount $11.441M with a tolerance of +/- 10% for the purposes of Development and Implementation for Wave 1 of the Document Management Replacement project delivery.

This partial sanction amount is $11.441M broken down into:

$10.050M *Capex*
$1.391M *Opex*
$0.000M *Removal*

NOTE the potential investment of $12.816M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of Wave 1.

1.2 Project Summary

The Document Management Systems used to store, retrieve, and update electric, gas and power plant engineering drawings and documents at National Grid are beyond their useful lifespan and are creating an unacceptable level of risk to the company. Inability to retrieve electric, gas and power plant information and mapping could lead to non-compliance with legal obligations for document storage, and programs including “Dig-Safe”, leading to risk of accidental system damage. The applications have not been upgraded since their deployment and are now unsupportable due to their aging computing technology and software. The downstate TeamCenter application has started to collapse, as some components of the system have shut down and will no longer function properly. The Documentum desktop versions 5.3 and 6.0 are no longer supported by the vendor and are not compatible with Windows 7 operating system.

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TeamCenter is also not compatible with Windows7. As a result, some business units have not been able to upgrade to the Windows 7 environment and are still working on the Windows XP operating system. Some areas are using the web version of Documentum which is cumbersome, slow, and creating inefficiencies. Continued use of the XP operating system presents a significant cyber security risk.

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
4408		DMS Replacement Delivery	12.816
		Total	12.816

1.4 Associated Projects

Project Number	Project Title	Estimate Amount ($M)
3985	Document Management System Replacement	0.660
	Total	0.660

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
Jan 11, 2017	USSC	5.653M	8.177M	Document Management System Replacement - Delivery	Partial Sanction	+/- 25%
Nov 9, 2016	USSC	1.192M	3.657M	Document Management System Replacement - Delivery	Partial Sanction	+/- 25%

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1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Oct 2018	Full Sanction

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	Maintain supported levels of computing technology used to obtain compliance with the following: NY state law, Code rule 753, "Dig Safely"; NY State Public Service Commission NYCRR Title 16 Part 255.17 Preservation of records; Pipeline and Hazardous Materials Safety Administration (PHMSA) Bulletin 11-01.

1.8 Asset Management Risk Score

Asset Management Risk Score: 48

Primary Risk Score Driver: (Policy Driven Projects Only)

○ Reliability ○ Environment ○ Health & Safety ◉ Not Policy Driven

1.9 Complexity Level

○ High Complexity ○ Medium Complexity ◉ Low Complexity ○ N/A

Complexity Score: 17

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1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY 18/22	◉ Yes ○ No	◉ Over ○ Under ○ NA	$3.852

1.12 If cost > approved Business Plan how will this be funded?

Re-allocations of funds within the US business has been managed to meet jurisdictional budgetary, statutory and regulatory requirements. Future fiscal year forecasts will be addressed in future year business plans.

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	2.624	4.933	3.706	0.000	0.000	0.000	11.263
OpEx	0.000	0.264	0.714	0.575	0.000	0.000	0.000	1.553
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	2.888	5.647	4.281	0.000	0.000	0.000	12.816

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	Oct 2016
Partial Sanction	Nov 2016

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US Sanction Paper

Milestone	Target Date: (Month/Year)
Begin Requirements and Design	Nov 2016
Partial Sanction	Jan 2018
Begin Development and Implementation	Jan 2018
Full Sanction	Oct 2018
Move to Production / Last Go Live	Jan 2019
Project Complete	Feb 2019
Sanction Closure	May 2019

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

Not Applicable

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1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

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2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on January 10, 2018:

(a) APPROVED the investment of $11.441 M and a tolerance of +/-10% for the purposes of development and implementation for Wave 1.

(b) NOTED the potential run-the-business (RTB) impact of $1.179M (per annum) for 5 years.

(c) NOTED the potential investment of $12.816M and a tolerance of +/-25% contingent upon submittal and approval of a Project Sanction paper following completion of Wave 1.

(d) NOTED that John Kastler has the approved financial delegation to undertake the activities stated in (a).

Signature……..Date……

David H. Campbell, Vice President, ServCo Business Partnering, USSC Chair

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3 Sanction Paper Detail

Title:	Document Management Systems Replacement-Delivery	**Sanction Paper #:**	USSC-16-297 V3
Project #:	INVP 4408	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	November 28, 2017
Author:	John Kastler	**Sponsor:**	Ross Turrini SVP Gas Process Engineering
Utility Service:	IS	**Project Manager:**	John Kastler

3.1 Background

The Document Management Systems used to store, retrieve, and update electric, gas and power plant engineering drawings and documents at National Grid are beyond their useful lifespan and are creating an unacceptable level of risk to the company. Inability to retrieve electric, gas and power plant system information and mapping could lead to non-compliance with legal obligations for document storage, and programs including "Dig-Safe", leading to risk of accidental system damage. The applications have not been upgraded since their deployment and are now unsupportable due to their aging computing technology and software. The downstate TeamCenter application has started to collapse, as some components of the system have shut down and will no longer function properly. The Documentum desktop versions 5.3 and 6.0 are no longer supported by the vendor and are not compatible with Windows 7 operating system. TeamCenter is also not compatible with Windows 7. As a result, some business units have not been able to upgrade to the Windows 7 environment and are still working on the Windows XP operating system. Some areas are using the web version of Documentum which is cumbersome, slow, and creating inefficiencies. Continued use of the XP operating system presents a significant cyber security risk.

During the first half of 2016, National Grid conducted a study of five vendors to identify a suitable application for the replacement of the current Document Management Systems. This investment will provide funding for the purchase and deployment of the preferred application from the commercial Request For Proposal (RFP) event. By investing in a new Document Management System, National Grid will reduce or eliminate risks associated to the current document storage methodologies in use by the electric, gas and power plant business units.

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3.2 Drivers

Failure of the Document Management System, including an inability to retrieve detail system drawings and maps, would adversely affect Company efficiency and may prevent National Grid from meeting regulatory and legal obligations such as:

- NY state law, Code rule 753, "Dig Safely" requires National Grid to mark out gas mains in 48 to 72 hours.
- NY State Public Service Commission NYCRR Title 16 Part 255.17 "Preservation of Records," which requires records for any pipeline designed to operate at 125 psig or more to be retained for as long as the line remains in service.
- Pipeline and Hazardous Materials Safety Administration (PHMSA) Bulletin 11-01, which requires a pipeline operator to "search, review and scrutinize documents and records, including but not limited to, all as-built drawings, alignment sheets, and specifications, and all design, construction, inspection, testing, maintenance, manufacturer, and other related records. These records shall be traceable, verifiable, and complete."

Inability to accurately locate gas and electric assets could result in the loss of productivity of our crews, expose the company to the risk of fines for not meeting regulatory requirements for system documentation, expose the company to a potential for lawsuits, and may result in reputational damage to National Grid.

Over time, the business has adopted different strategies to manage document storage, including the use of TeamCenter, Documentum, and uncontrolled shared file systems. The result is that the business has multiple processes for storing documents, and has difficulty sharing information across departments. "File Share" based document storage methods do not provide the necessary controls, and documents are at risk of being inaccurate or deleted altogether. Different unsupported Document Management systems across the enterprise have created many inefficiencies and support issues.

3.3 Project Description

This investment will deploy the OpenText 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 project will be executed using internal National Grid resources, Solution Delivery Center partners, and professional services from the software vendor. Included in the scope of this project:

- Secure the necessary licenses, computing infrastructure, and professional services to deploy the product with minimal risk;
- Design solution to meet business end to end process requirements;
- Deployment of the new Document Management System will follow a phased in approach, with the scheduling and deployment determined by business priority;

- Deployment of the new Document Management System will include conversion of existing gas and electric documents stored in the current applications and shared file folders;
- Upgrade existing AutoCAD 2008 clients to current AutoCAD version to be compatible with the replacement Document Management System.

The scope of the project has been increased to include:

- ~ 7K additional documents to be migrated for Gas Engineering Design (GED) – Downstate NY beyond what was originally known
- Addition of GED Upstate NY group
- Addition of GED NE group
- Addition of Operations and Support NY group
- There are ~250K additional documents to be migrated for Electric beyond what was originally known
- Addition of Transmission NY and NE groups
- Addition of Distribution group
- Some minor customization work
- Additional Open Text Modules/Licenses (Blazon for Content Suite, Blazon for Content Suite Add On, Object Importer, Remote Cache)
- AutoDesk product related work:
  - Purchase of additional AutoCAD and AutoDesk Architecture licenses
  - Replacing AutoDesk product license servers
  - Migrating AutoCAD customizations
  - Creating AutoDesk product installer packages
  - AutoCAD training for Power Plant Operations team (for differences between AutoCAD 2009 and AutoCAD 2017).

3.4 Benefits Summary

Investment in a Document Management System will result in the following benefits to National Grid:

- Mitigates risk associated with inability of the document management system to retrieve accurate system documentation and maps. Key risks include:
  - More than two million drawings supporting Electric System, Gas engineering and Power Plant Operations, could be lost if our current Document Management Systems fail. These drawings and files are the backbone of the business and serve as documentation of assets;
  - Accidental damage to company assets due to improper mark out or site details, and/or fines and litigation costs associated with improper site mark out;
  - Power Plant Operation process safety hazards;
  - Degradation of relationships with municipalities should National Grid be unable to produce requested information in a reasonable amount of time;

  - Risk of fines if National Grid documentation is not up to regulatory requirements;
  - Negative Impact to normal operations if detail drawings and maps are unavailable.
  - Mitigates cyber security risk associated with the continued use of the unsupported XP operating systems.
- Assures reliability of document retrieval and version control allowing National Grid to accurately locate gas mains and electric assets.

3.5 Business and Customer Issues

There are no significant business issues beyond what has been described elsewhere.

3.6 Alternatives

Alternative 1: Do Nothing
The risks to National Grid associated to the current Document Management Systems are unacceptable and require remediation at this time. Delaying this investment is not an acceptable option due to the risk associated to the current document storage methods.

Alternative 2: Store documents without a Document Management System
The business has adopted different strategies to manage document storage, including the use of uncontrolled shared file systems. “File Share” based document storage does not provide the necessary controls, and documents are at risk of being inaccurate or deleted altogether.

Alternative 3: Upgrade Teamcenter and Documentum
This alternative would not allow National Grid to benefit from synergy savings associated with deployment of a common solution for all US businesses. Optimal alignment of business requirements to the replacement Document Management System capabilities may not be achieved without the execution of the Request For Proposal (RFP) process. With the Purchase of Documentum from Dell EMC we would end up on Open Text eventually at greater cost.

3.7 Safety, Environmental and Project Planning Issues

There are no significant issues beyond what has been described elsewhere.

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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	There is a risk that the TeamCenter application may fail before new DMS system is deployed	5	5	1	25	5	Mitigate	Project implementation planning will favor high risk business areas first.	None.	Continue delivery strategy while clients execute Business Continuity Plans.
2	There is a risk that Documentum may fail due to unsupported software levels	2	5	1	10	2	Mitigate	Monitor Documentum system health and usability.	None.	Continue delivery strategy while clients execute Business Continuity Plans.
3	There is a risk that the data/document migration may be more complex than anticipated.	3	4	3	12	9	Mitigate	Data reviews, migration design reviews, and mock migrations will be planned.	None.	Risk money many be needed or worst case a resanction could be required for the time and money to complete the work.
4	There is a risk of additional delays in the provisioning of the MS Azure virtual machines (servers) needed for the project.	4	3	3	12	12	Mitigate	Project is seeking a partial sanction at this time and can further adjust as needed for the full sanction.	None.	Adjust the schedule and budget for the full sanction.

3.9 Permitting

Not Applicable.

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

Not Applicable.

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3.10.3 CIAC / Reimbursement

Not Applicable.

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
4408	DMS Replacement Delivery	Est Lvl (e.g. +/- 10%)	CapEx	0.000	2.624	4.933	3.706	0.000	0.000	0.000	11.263
			OpEx	0.000	0.264	0.714	0.575	0.000	0.000	0.000	1.553
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	2.888	5.647	4.281	0.000	0.000	0.000	12.816
Total Project Sanction			CapEx	0.000	2.624	4.933	3.706	0.000	0.000	0.000	11.263
			OpEx	0.000	0.264	0.714	0.575	0.000	0.000	0.000	1.553
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	2.888	5.647	4.281	0.000	0.000	0.000	12.816

3.11.2 Project Budget Summary Table

Project Costs Per Business Plan

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.000	2.895	3.404	0.000	0.000	0.000	0.000	6.299
OpEx	0.000	1.780	0.885	0.000	0.000	0.000	0.000	2.665
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	4.675	4.289	0.000	0.000	0.000	0.000	8.964

Variance (Business Plan-Project Estimate)

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.000	0.271	(1.529)	(3.706)	0.000	0.000	0.000	(4.964)
OpEx	0.000	1.516	0.171	(0.575)	0.000	0.000	0.000	1.112
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	1.787	(1.358)	(4.281)	0.000	0.000	0.000	(3.852)

3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology. The accuracy level of estimate for each project is identified in table 3.11.1

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3.11.4 Net Present Value / Cost Benefit Analysis

This is not an NPV project.

3.11.4.1 NPV Summary Table

This is not an NPV project.

3.11.4.2 NPV Assumptions and Calculations

Not Applicable.

3.11.5 Additional Impacts

None.

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual
Business Executive Sponsor	Ross Turrini
Head of PDM	Deb Rollins
Relationship Manager	Aman Aneja
Program Delivery Manager	Michelle McNaught
IS Finance Management	Michelle Harris
IS Regulatory	Dan DeMauro
DR&S	Marc Mandel
Service Delivery	Mark Mirizio
Enterprise Architecture	Joe Clinchot

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3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual	Area
Regulatory	Harvey, Maria	IS
Jurisdictional Delegate(s)	Anand, Sonny	Electric - NE
	Harbaugh, Mark	Electric - NY
	Hill, Terron	FERC
	Currie, John	Gas - NE
	Wolf, Don	Gas - NY
Procurement	DeRosa, Steve	All

4 Appendices

4.1 Sanction Request Breakdown by Project

$M	4408	Total
CapEx	10.050	10.050
OpEx	1.391	1.391
Removal	0.000	0.000
Total	11.441	11.441

4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	1.250	
	SDC Time & Materials	1.009	IBM, Wipro
	SDC Fixed-Price	0.373	
	All other personnel	5.377	Open Text
	TOTAL Personnel Costs	8.009	
Hardware	Purchase	0.038	CSC
	Lease	0.276	MS Azure, CSC
Software		2.052	Open Text, Microsoft, AutoDesk
Risk Margin		0.599	
Other		1.840	Open Text, Verizon,AFUDC, Overheads
	TOTAL Costs	12.816	

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4.2.2 Benefiting Operating Companies

This investment will benefit electric generation, transmission, and distribution, and gas transmission and distribution companies.

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.	Electric Distribution	NY
Niagara Mohawk Power Corp.	Gas T&D	NY
Niagara Mohawk Power Corp.	Transmission	NY
KeySpan Energy Delivery New York	Gas T&D	NY
KeySpan Energy Delivery Long Island	Gas T&D	NY
Massachusetts Electric Company	Electric Distribution	MA
Massachusetts Electric Company	Transmission	MA
Nantucket Electric Company	Electric Distribution	MA
Boston Gas Company	Gas T&D	MA
Colonial Gas Company	Gas T&D	MA
Narragansett Electric Company	Electric Distribution	RI
Narragansett Gas Company	Gas Distribution	RI
Narragansett Electric Company	Transmission	RI
New England Power Company	Transmission	MA
NE Hydro - Trans Electric Co.	Transmission Hydro	MA
New England Hydro - Trans Corp.	Transmission Hydro	NH
New England Electric Trans Corp	Transmission Hydro	NH
KeySpan Generation LLC (PSA)	Ele Generation	NY
KeySpan Glenwood Energy Center	Ele Generation	NY
KeySpan Port Jefferson Energy Center	Ele Generation	NY

4.2.3 Ongoing Operational Costs (RTB):

This project will impact IS ongoing operations support costs as per the following table. These are also known as Run the Business (RTB) costs.

Note: RTB costs will be refined following execution of Requirements and Design.

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Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 16/17**	**Yr. 2 17/18**	**Yr. 3 18/19**	**Yr. 4 19/20**	**Yr. 5 20/21**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	0.167	0.334	0.334	0.334	0.334	1.053	**2.555**
RTB if Project is Implemented	0.167	0.334	1.485	1.533	1.522	4.797	**9.837**
Net change in RTB	-	-	1.151	1.199	1.188	3.744	**7.282**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	0.276	1.103	1.103	1.103	1.103	**4.688**
Variance to Plan	-	(0.276)	0.048	0.096	0.085	2.641	**2.594**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	0.110	0.221	0.126	0.126	0.126	0.396	**1.104**
App.Sup. - SDC 2	0.032	0.065	0.065	0.065	0.065	0.205	**0.496**
App.Sup. - other	-	-	0.219	0.292	0.292	0.921	**1.725**
SW maintenance	-	-	0.354	0.390	0.390	1.230	**2.364**
SaaS	-	-	-	-	-	-	**-**
HW support	0.024	0.048	0.722	0.660	0.649	2.044	**4.147**
Other: IS	0.000	0.000	(0.000)	(0.000)	(0.000)	0.000	**(0.000)**
All IS-related RTB (sub-Total)	0.167	0.334	1.485	1.533	1.522	4.797	**9.837**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	0.167	0.334	1.485	1.533	1.522	4.797	**9.837**

4.3 NPV Summary

Not Applicable.

4.4 Customer Outreach Plan

Not Applicable.

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US Sanction Paper

Title:	WiFi for Fleet Services Diagnostic Laptops	**Sanction Paper #:**	
Project #:	INVP 3956	**Sanction Type:**	Sanction
Operating Company:	Allocated	**Date of Request:**	February 17, 2017
Author:	Martin McDermott	**Sponsor:**	William Hilbrunner
Utility Service:	IS	**Project Manager:**	Craig Costanzo

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of INVP 3956 in the amount $0.705M with a tolerance of +/- 10% for the purposes of full implementation..

This sanction amount is $0.705M broken down into:

$0.680M Capex
$0.025M Opex
$0.000M Removal

1.2 Project Summary

This project will introduce WiFi into each of the Fleet Service garages to allow for its use during vehicle diagnostic testing. Currently the majority of the Fleet garages do not have WiFi making it difficult and hazardous to perform this testing. In some cases the vehicles need to be sent out to other facilities due to the lack of connectivity in the Fleet Service garage to perform the diagnostics.

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
INVP 3956	Project Type	WiFi for Fleet Diagnostics	0.705
		Total	0.705

1.4 Associated Projects

NA

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US Sanction Paper

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
Jan 10 2017	ISSC	$0.162M	$0.705M	WiFi for Fleet Services Diagnostic Laptops	Partial Sanction	25%

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Jul 2017	Closure Paper

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	Safety and Productivity: currently cable is run along the service bay floor creating a safety and tripping hazard to allow connectivity to the manufacturer site to do diagnostics. In the case where a network connection is not available the vehicle is sent out causing lost productivity and added expense.

1.8 Asset Management Risk Score

Asset Management Risk Score: 21

Primary Risk Score Driver: (Policy Driven Projects Only)

○ Reliability ○ Environment ◉ Health & Safety ○ Not Policy Driven

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US Sanction Paper

1.9 Complexity Level

○ High Complexity ○ Medium Complexity ◉ Low Complexity ○ N/A

Complexity Score: 11

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY17-21	○ Yes ◉ No	◉ Over ○ Under ○ NA	$0.705M

1.12 If cost is not aligned with approved Business Plan how will this be Funded

Re-allocation of funds within the US business has been managed to met jurisdictional udgetary, statutory and regulatory requirements. Future fiscal years forcasts will be addressed in future year business plans.

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	0.680	0.000	0.000	0.000	0.000	0.000	0.680
OpEx	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.025
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	0.705	0.000	0.000	0.000	0.000	0.000	0.705

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1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	Dec 2016
Partial Sanction	Jan 2017
Begin Requirements and Design	Jan 2017
Full Sanction	Feb 2017
Begin Development and Implementation	Feb 2017
Move to Production / Last Go Live	Mar 2017
Project Complete	Apr 2017
Project Closure Sanction	Jul 2017

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	◉ Amber	○ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

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1.16 Key Issues (include mitigation of Red or Amber Resources)

1	Verizon resource will be dedicated to the effort
2	Facilities and 3rd Party resources will need close coordination
3	

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

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2 Decisions

The US IS Sanctioning Committee (ISSC) and Key External Stakeholders, reviewed and approved the content of the investment including:

(a) APPROVED the investment of $0.705M and a tolerance of +/- 10%

(b) APPROVED the RTB Impact of $0.035M (per annum) for 5 years

(c) NOTED that Sally Seltzer has the approved financial delegation.

Signature……..Date……

Anuraag Bhargava

US CIO

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3 Sanction Paper Detail

Title:	WiFi for Fleet Services Diagnostic Laptops	**Sanction Paper #:**	
Project #:	INVP 3956	**Sanction Type:**	Partial Sanction
Operating Company:	Allocated	**Date of Request:**	February 17, 2017
Author:	Martin McDermott	**Sponsor:**	William Hilbrunner
Utility Service:	IS	**Project Manager:**	Craig Costanzo

3.1 Background

Many of the new vehicles in use at National Grid have complex systems which require network connectivity to the vehicle manufacturer's site to perform diagnosis of issues. Currently, the majority of the Fleet garages do not have WiFi making it difficult and hazardous to perform this testing. Network cables are run along the floor or strung through the air of the service bay to allow for the connection. In other cases the vehicles need to be sent to other facilities to perform the diagnostics due to the lack of connectivity in the Fleet Service garage. This investment will allow the fleet garages the capability to safely diagnose and resolve issues with the vehicles.

3.2 Drivers

- Provide for the safe, efficient use of diagnostic laptops in the Fleet Service Garages by replace wire running along the floor/air with WiFi connectivity
- Increase productivity of the Service Tech by allowing access to the network at the vehicle location
- Reduce the transfer of vehicles to other locations for Service

3.3 Project Description

This project will introduce WiFi into each of the Fleet Service garages to allow for its use during vehicle diagnostic testing. Verizon will perform site visits and RF surveys at each of the selected fleet garages to determine the number and proper location for the wireless access points. In the Development and Installation phase of the project, the network will be installed and activated.

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3.4 Benefits Summary

Type	Benefit	Description
Direct	Improved Safety	WiFi will eliminate the need to run cabling along the floor or hang through the bay area reducing risk of tripping or falling.
Direct	Increase operational efficiencies	In addition to not having to drag and work around cable, diagnostics should be quicker and easier as the laptop will already be connected to the network.
Direct	Cost avoidance	Garages which had to send their vehicles out for diagnostics due to lack of network connectivity can now perform the testing in house.

3.5 Business and Customer Issues

None

3.6 Alternatives

Alternative 1: No Nothing
This was rejected due to the current safety and productivity issues not being addressed under this option.

Alternative 2: Defer Investment
This was rejected due to the need to resolve the safety and productivity issues in a timely cost effective manner.

Alternative 3: Create hardwired connections to the Vehicle Bays
This option was rejected due to cost, time to complete and the need to still run cable between the bays to the vehicle, only partially eliminating the safety issues.

3.7 Safety, Environmental and Project Planning Issues

NA

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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Verizon Resource availability	2	2	3	4	6	Mitigate	Verizon is putting together a dedicated team for this effort	Monitor schedule and performance to ensure timeline is met	High level leadership meetings and commitment
2	Availability of 3rd part Resources for Network wiring	2	2	2	4	4	Avoid	PM will ensure 3rd party resources are available and committed	PM will keep all parts involved and aware of timelines	Find additional 3rd party resources
3	Network equipment Availability	2	2	3	4	6	Share	As site visits are completed, ensure equipment is available	Work with Verizon to create backup plan for areas where equipment may be unavailable	Implement backup plan

3.9 Permitting

NA

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

NA

3.10.3 CIAC / Reimbursement

NA

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US Sanction Paper

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
INVP 3956	WiFi for Fleet Diagnostics	+/- 10% R&D; 25% D&I	CapEx	0.000	0.680	0.000	0.000	0.000	0.000	0.000	0.680
			OpEx	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.025
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.705	0.000	0.000	0.000	0.000	0.000	0.705
Total Project Sanction			CapEx	0.000	0.680	0.000	0.000	0.000	0.000	0.000	0.680
			OpEx	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.025
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.705	0.000	0.000	0.000	0.000	0.000	0.705

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Variance (Business Plan-Project Estimate)

$M	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.000	(0.680)	0.000	0.000	0.000	0.000	0.000	(0.680)
OpEx	0.000	(0.025)	0.000	0.000	0.000	0.000	0.000	(0.025)
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	(0.705)	0.000	0.000	0.000	0.000	0.000	(0.705)

3.11.3 Cost Assumptions

- Project will utilize internal National Grid Resources, External contractors as required and Verizon resources
- The Project will be managed jointly between National Grid and Verizon
- The accuracy level of estimate for each project is identified in table 3.11.1

3.11.4 Net Present Value / Cost Benefit Analysis

NA - This is not an NPV investment.

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3.11.5 Additional Impacts

NA

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual's Name
Business Executive Sponsor	William Hilbrunner
Head of PDM	Deborah Rollins
Relationship Manager	Richard Sheer
Program Delivery Manager	Sally Seltzer
IS Finance Management	Chip Benson
IS Regulatory	Dan DeMauro
DR&S	Elaine Wilson
Service Delivery	Brian Detota
Enterprise Architecture	Svetlana Lyba

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

3.13 Sanction Request Breakdown by Project

N/A

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3.14 Benefitting Operating Companies

This project will benefit all the companies listed below.

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.- Electric Distr.	Electric Distribution	NY
Massachusetts Electric Company	Electric Distribution	MA
KeySpan Energy Delivery New York	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
Boston Gas Company	Gas Distribution	MA
Narragansett Electric Company	Electric Distribution	RI
Niagara Mohawk Power Corp. - Transmission	Transmission	NY
Niagara Mohawk Power Corp. - Gas	Gas Distribution	NY
New England Power Company – Transmission	Transmission	MA, NH, RI, VT
KeySpan Generation LLC (PSA)	Generation	NY
Narragansett Gas Company	Gas Distribution	RI
Colonial Gas Company	Gas Distribution	MA
Narragansett Electric Company – Transmission	Transmission	RI
Nantucket Electric Company	Electric Distribution	MA
KeySpan Port Jefferson Energy Center	Generation	NY
KeySpan Glenwood Energy Center	Generation	NY
Massachusetts Electric Company – Transmission	Transmission	MA

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4 Appendices

4.1 Sanction Request Breakdown by Project

NA

4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	0.101	
	SDC Time & Materials	-	
	SDC Fixed-Price	-	
	All other personnel	0.414	
	TOTAL Personnel Costs	0.515	
Hardware	Purchase	0.110	
	Lease	-	
Software		-	
Risk Margin		0.063	
Other		0.018	
	TOTAL Costs	0.705	

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US Sanction Paper

4.2.2 RTB Analysis

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 16/17**	**Yr. 2 17/18**	**Yr. 3 18/19**	**Yr. 4 19/20**	**Yr. 5 20/21**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	-	-	-	-	-	**-**
RTB if Project is Implemented	-	0.035	0.035	0.035	0.035	0.036	**0.175**
Net change in RTB	-	0.035	0.035	0.035	0.035	0.036	**0.175**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	**-**
Variance to Plan	-	0.035	0.035	0.035	0.035	0.036	**0.175**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	-	-	-	-	-	**-**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	-	-	-	-	**-**
SaaS	-	-	-	-	-	-	**-**
HW support	-	-	-	-	-	-	**-**
Other: IS	-	0.035	0.035	0.035	0.035	0.036	**0.175**
All IS-related RTB (sub-Total)	-	0.035	0.035	0.035	0.035	0.036	**0.175**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	-	0.035	0.035	0.035	0.035	0.036	**0.175**

Note: U.S. Policy dictates that RTB Variance = forecasted Net Δ RTB - Net Δ RTB funded by Investment Plan

This is a supplemental table - it is NOT required to be pasted in the Investment Paper **Net Change in RTB - by Cost Type**							
App.Sup. - SDC 1	-	-	-	-	-	-	**-**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	-	-	-	-	**-**
SaaS	-	-	-	-	-	-	**-**
HW support	-	-	-	-	-	-	**-**
Other: IS	-	0.035	0.035	0.035	0.035	0.036	**0.175**
All IS-related RTB (sub-Total)	-	0.035	0.035	0.035	0.035	0.036	**0.175**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total Net Change in RTB	-	0.035	0.035	0.035	0.035	0.036	**0.175**

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Planning & Performance Management ▸
FY19 - Investment Request Summaries - IRSs: STORMS Capital Cost Estimates

I Like It Tags & Notes

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Investment Request Summary - IS US FISCAL YEAR 2019

INV ID:	4467	*Project Name:*	***STORMS Capital Cost Estimates***
Program:	***Generation Reliability & Efficiency***		*IRS Status:* ACTIVE
Sponsor:	*Kelly, Chris*	Title:	*SVP Electric Process and Engineering*
Relationship Manager:	*Richard Sheer*	Title:	*IS Business Relationship Manager (Operations & Engineering)*
Progr Delivery Director:	*Michelle McNaught*	Title:	*IS Program Delivery Manager (Customer)*
Paper Author:	*Rashmi Kadam*	Title:	*IS BRM Business Consultant (Operations & Engineering)*

Business Area: ***Operations & Engineering*** *Portfolio:* ***Generation Reliability & Efficiency***

☐ *In-Flight Project?* *Invest Classification:* Medium *Category:* Policy Driven *Primary Policy Driver:* Reliability *Region:* ***US***

Strategic Program:	*End to End Process (Primary)::*	*Business Priority:*	*IS Focus Area:*	*Application Strategy:*
Not Applicable	*Operate the Network - Electric*	*Medium*	*Address Reliability*	*Sustain*
	End to End Process (Secondary): *System Development & Complex Construction - Elec*			

Project Description: *The context for the project with background information*
Re-Estimate - IBM and Wipro estimates seem high.

The Utility Services Analysis and Support department recently discovered unexpected accounting related to SAP release 3. As a result there are a few issues which make data coming out of the STORMS system unreliable for its intended purpose as follows:

1. As a result of implementation high-level split operations with USFP BI Release 3, Powerplan is currently allocating too many dollars to capital for each work order coming out of STORMS.
2. The Overhead rates in STORMS are out of date and cannot be updated without exacerbating issue #1 above. In addition, current estimates coming out of STORMS reflect a CAD allocation methodology that no longer is being used by the company.

This investment will make enhancements to STORMS to correct the calculation and processing of capital overheads to be aligned with current accounting methodologies.

Project Rationale: *Highlight business challenge, capability or process the project addresses*

1. Mis-reporting financial results – Orders that are processed by utilizing Simplified Operations (created as part of SAP Release 3) are not being recorded correctly on the books and records of the company. Simplified Operations rely on the STORMS system to allocate costs between Capex, Opex, and Retirement. The Storms system does not handle Capital Overheads in a manner that would allow a correct allocation, generally resulting in an over allocating to Capex . Misallocations vary from work order to work order, depending upon the operating company involved and the mix of cost components (labor vs. materials etc.) within the estimate.

2. Inaccurate STORMS Estimates – SAP implementation result in one consistent overhead allocation methodology, resulting in certain changes in how overheads are applied for those operating companies who utilize STORMS. These changes cannot be modeled in STORMS in its current configuration. Because of this, overhead rates within STORMS are over 4 years old and cannot be updated without adversely impacting problem #1 above. Any estimates that use the STORMS system do not reflect the current overhead rates nor do they reflect National Grid's current cost accounting policies. Results could impact:

a. Regulatory Filings that rely on estimates from STORMS
b. Capital Budgeting decisions
c. Customer billings that rely on STORMS estimates

Project Scope: *Explain what is in scope and what is not in scope for the project*

Implement corrections to STORMS, interfaces, and reporting to correct operation/ activity information being sent from STORMS to PowerPlan.
SEE Attached requirements.

Project Dependencies: *Identify any core program or project dependencies, please include INVP numbers if known*
Other STORMS & Power Plan Related initiatives:

- Power Plan Upgrade
- Blanket Work Orders
- Crew Headquarter Estimate Factor
- STORMs Support/ Infrastructure Upgrade
- Potential impact from Gas Enablement

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Basic Project Assumptions:

9/21/2016 Doug McCarthy - Change sponsor from John Bruckner to Chris Kelly.
Project estimated by the BRM April 2016

Incremental Capital Costs by Fiscal Year

($M)	Prior Years	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
CapEx		7.0								7.0
OpEx		1.0								1.0
Impact on RTB										0.0

Incremental Capital Costs by Delivery Phase

($M)	Start-up	R & D	D & I	Closure	Total
CapEx		2.0	5.0		7.0
OpEx	0.0	0.0	1.0	0.0	1.0

Expenditure Type I or II

($M)	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
Type I - CapEx									0.0
Type I - OpEx									0.0
Revenue Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Key Business Benefits:
Describe benefits, both financial and non-financial, and when those benefits will be delivered.Provide a clear & concise business case stating the investment drivers - why do we need to do something and why now? Explain any Regulatory considerations and how this initiative aligns with the US Business Strategy.

1. More accurate accounting
    a. Correcting a known systemic accounting error
    b. More accurate billings on customer reimbursable projects
    c. Better decision making that follows with more accurate accounting
2. More accurate STORMS estimates
    a. Repairing STORMS so that it can mirror National Grid Cost Accounting Policies
    b. Allowing for timely updating of overhead rates in STORMS
    c. Improved estimates on customer reimbursable projects

The STORMS system should be brought back into a status where the estimates produced can be deemed reliable for business purposes which include updating the overhead methodology to meet the POST SAP process, as well as providing the opportunity to deliver updated overhead rates into the system to be reflected in future estimates.

Correct reporting of CAPEX and OPEX project costs.

Investment Score

Benefits	Impact	Weight	Score
OpEx Annual Savings		10.3%	0
CapEx Annual Savings		5.1%	0
Revenue Generation (annual)	0.0	6.2%	0.0
Financial Control	High	6.2%	5.0
Soft Financial Benefits	Low	3.8%	3.0
Regulatory Impact	Medium	11.2%	3.0
Process & Personal Safety	does not apply	19.4%	0
Reliability	does not apply	10.3%	0
Customer & Community Responsiveness	Low	5.3%	3.0
Employee Satisfaction	Low	4.8%	6.0
Mitigates a Corporate Risk / Risk of not Doing	Medium - 16 to 39	8.3%	3.0
Jurisdictional Engagement	High	8.2%	1

Cost	Impact	Weight	Score
OpEx Cost	0.19	-24.4%	-7.32
CapEx Cost	0.6	-11.2%	0
RTB Efficiency	0.0 %	-22.5%	0
Union Labor Relations	does not apply	-9.3%	0
Dependencies	Low	-10.6%	-0.106
Elapse Time Duration	Medium	-6.6%	-0.198
Change Management Effort	Low	-14.9%	-0.149

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Benefit Score: 2.10 Cost Score: -1.52

Overall Priority Score: 30

Investment Risk and Complexity

Project Risk Score:	37	Risk Score Description: The Risk Score is 37 based upon an Impact level of 4 and a likelihood value of 7
Project Complexity Score::	18	Project Complexity Score Description: See attached Project Complexity Matrix

Key Risks Description: *Provide detail on project risks & mitigation strategy:*
There are a limited number of resources qualified to work on STORMS.

IS Project Dependencies

if you don't see a project in the drop-down please contact the Planning & Performance team.

IS Projects: 4467 - STORMS Capital Cost Estimates

Has a dependency on IS Project;
Has a dependency on IS Project;
Has a dependency on IS Project;
Has a dependency on IS Project;
Has a dependency on IS Project;
Has a dependency on IS Project;

Business Initiative Dependencies

IS Projects: 4467 - STORMS Capital Cost Estimates

Has a dependency on Bus Initiative,
Has a dependency on Bus Initiative,
Has a dependency on Bus Initiative,
Has a dependency on Bus Initiative,

Project Relationship

☐ Minor Works

Project Relationship:

Related Projects:

Impacted Operating Companies:

Check all that apply

☐ Select All Companies ☐ Clear All Companies
☐ Select All Gas ☐ Select All Electric ☐ Select All Gen

☐ National Grid USA Parent
☐ KeySpan Energy Development Corporation
☐ KeySpan Services Inc.
☐ KeySpan Energy Corp
☑ KeySpan Energy Delivery New York
☑ KeySpan Energy Delivery Long Island
☐ KeySpan Generation LLC (PSA)
☐ KeySpan Glenwood Energy Center
☐ KeySpan Port Jefferson Energy Center
☐ KeySpan Energy Trading Svcs LLC
☑ Niagara Mohawk Power Corp- Electric Distribution
☑ Niagara Mohawk Power Corp - Gas
☑ Niagara Mohawk Power Corp - Transmission
☑ Massachusetts Electric Company
☑ Massachusetts Electric Company - Transmission
☑ Nantucket Electric Company
☑ Boston Gas Company
☑ Colonial Gas Company
☑ Narragansett Gas Company
☑ Narragansett Electric Company
☑ Narragansett Electric Company - Transmission
☑ New England Power Company - Transmission
☐ New England Hydro - Trans Corp
☑ New England Electric Trans Corp
☐ NE Hydro Trans Electric Co
☐ NGNGP Regulated Entity

Enabling IS Capability

Select all that apply

☐ Enterprise Content Management (ECM)
☐ Comprehensive Integration Services (CIS)
☐ Hybrid Cloud
☐ Next Gen Workplace
☐ Enterprise Mobility
☑ Reporting and Analytics
☐ Networks

Key Milestone Dates

Select the 1st, 15th or last day of the month

Initiative Estimated Duration (Months): 12

Begin Start-up	Begin Requirements & Deign	Begin Development & Implementation	Begin User Acceptance Testing	Go Live	Project Completion	Project Closure

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Business Resource Estimates: #Total Equivalents

Start-up	Requirements & Design	Develop & Implement	Business Resources UAT	Go Live Readiness	Post Go Live Support
3	3	3	3	3	0

Resourcing Strategy:

Project will be sourced using Solution Delivery Center (SDC) and National Grid IS resources.

Attached Supporting Documents

STORMS - SIR#4 Estimate V3.xlsx
SIR_#4_CAD_Proposal_V2.docx
STORMS CAD Rates-Vendor.pdf
IRS_Data_Collection_Form_STORMS_Change_to_CAD_Overhead_Rate.docx

Recommendation Signoff

Role	Name	Title	Date
Business Project Sponsor	Kelly, Chris	SVP Electric Process and Engineering	
Business Relationship Manager	Richard Sheer	IS Business Relationship Manager	
IS Program Delivery Manager	Michelle McNaught	IS Program Delivery Manager	

nationalgrid

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US Sanction Paper

Title:	Substation Monitoring-DobleARMS	**Sanction Paper #:**	
Project #:	INVP 3982	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	November 28, 2017
Author:	Dennis Leung	**Sponsor:**	Rudy Wynter, FERC Judisdiction President
Utility Service:	IS	**Project Manager:**	Carol Keane-Leone

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of INVP 3982 in the amount $0.371M with a tolerance of +/- 10% for the purposes of requirements and design.

This sanction amount is $0.371M broken down into:

$0.110M Capex
$0.261M Opex
$0.000M Removal

NOTE: The potential investment of $0.993M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of requirements and design.

1.2 Project Summary

DobleARMS is a system that provides near real time online monitoring of substation assets with details such as failure mode, asset health, and risk indexes. This cloud based solution provides a portal that presents data on a geospatial display for all substations installed with Doble sensors in the National Grid network. Implementation of online monitoring at National Grid would lead to optimization of various business functions (primarily substation Operations & Maintenance (O&M) and Asset Management) and reduce the number of asset failures. This project will set up the communications and server side aspects of the overall architecture. This includes integration into a Demilitarized Zone (DMZ) and the Corporate Network.

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1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
3982		Substation Monitoring - DobleARMS	0.993
		Total	0.993

1.4 Associated Projects

Project Number	Project Title	Estimate Amount ($M)
C068409	Substation Monitoring Wachusett # 47	2.600
C065407	Substation Monitoring Kent County # 22	2.600
C077506	Substation Monitoring Millbury # 5	2.600
	Total	7.800

1.5 Prior Sanctioning History

N/A

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
May 2018	Full Sanction

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	The primary driver for this project is reliability. Implementation of online monitoring at National Grid would lead to optimization of various business functions (primarily substation Operations & Maintenance (O&M) and Asset Management) and reduce the number of asset failures.

1.8 Asset Management Risk Score

Asset Management Risk Score: 39

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US Sanction Paper

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

1.9 Complexity Level

○ High Complexity ○ Medium Complexity ◉ Low Complexity ○ N/A

Complexity Score: 16

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18/22	◉ Yes ○ No	◉ Over ○ Under ○ NA	$0.105M

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of budget within the IS business has been managed to meet jurisdictional budgetary, statutory and regulatory requirements.

1.13 Current Planning Horizon

		Current Planning Horizon						
$M	Prior Yrs	Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6 + 2022/23	Total
CapEx	0.000	0.000	0.702	0.000	0.000	0.000	0.000	0.702
OpEx	0.000	0.261	0.030	0.000	0.000	0.000	0.000	0.291
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	0.261	0.732	0.000	0.000	0.000	0.000	0.993

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1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	June 2017
Partial Sanction	Nov 2017
Begin Requirements and Design	Dec 2017
Project Sanction	May 2018
Begin Development and Implementation	June 2018
Move to Production / Last Go Live	Oct 2018
Project Complete	Nov 2018
Closure Sanction	Jan 2019

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

N/A

REDACTED

US Sanction Paper

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

2 Decisions

The US IS Sanctioning Committee (ISSC) and Key External Stakeholders reviewed and approved the content of the investment including:

(a) APPROVED the investment of $0.371M and a tolerance of +/- 10% for the purposes of Requirements and Design.

(b) NOTED the potential RTB Impact of $0.156M (per annum) for 5 years.

(c) NOTED the potential investment of $0.993M and a tolerance of +/- 25% contingent upon submittal and approval of a Project Sanction paper following completion of Requirements and Design.

(d) NOTED that Michelle McNaught has the approved financial delegation to undertake the activities stated in (a).

Signature……..Date……

Anuraag Bhargava
US CIO

REDACTED

3 Sanction Paper Detail

Title:	Substation Monitoring-DobleARMS	**Sanction Paper #:**	
Project #:	INVP 3982	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	November 28, 2017
Author:	Dennis Leung	**Sponsor:**	Rudy Wynter, FERC Judisdiction President
Utility Service:	IS	**Project Manager:**	Carol Keane-Leone

3.1 Background

National Grid's current methods and processes for substation maintenance and asset replacement are lagging behind industry best practice and rely on static reporting and human proximity to address issues with potentially dangerous assets. This lag in asset lifecycle best practice exposes National Grid to high mobilization costs, unexpected system down-time, and the chance for collateral damage.

National Grid is preparing to incorporate substation online monitoring solutions at substations within the electric system. Substation online monitoring can greatly enhance National Grid's capability by providing real-time substation asset health data and analytics to maintenance and asset engineers allowing the process to move from using static data to leveraging real-time data and information for a proactive stance on each asset's lifecycle.

The monitoring equipment requires data passage from the substation, through the NG corporate network, fed to a 3rd party (Doble) application suite for exclusive NG viewing and analysis. This project's scope is to prepare the NG corporate network for current, in-development, and future substation online monitoring installations, and to ensure telecom facilities at the 3 substations currently in scope of the in-flight Business-managed "Substation Monitoring" project are sufficient to support data transfer requirements from those 3 substations to the NG corporate network.

3.2 Drivers

The primary driver for this project is reliability. Installation of online monitoring sensors on substation equipment allows National Grid to optimize resource allocation for O&M on monitored assets. Additional long-term benefits include strategic allocation of capital spending and resources towards asset replacement programs to bolster and retain the reliability of the electric grid.

The secondary driver for this project is safety. Online condition monitoring will give internal stakeholders the visibility on asset condition issues to reduce the number of asset failures in the electric system. Through the optimized use of O&M resources, negation of any chance of catastrophic failure can be achieved. This will indirectly reduce the likelihood that any internal or external injuries could occur as a result of a catastrophic incident.

This project also aligns with the Elevate 2018 priority: Future customer expectations – New Energy Solutions.

3.3 Project Description

The scope of the project is to setup proper network infrastructure and security requirements for the data flow from the substations through the corporate network to the Doble Asset Risk Management System (DobleARMS) by working with Doble and Verizon. A Doble Enterprise Gateway server is being provided by Doble and will need to be tested, as well as any new equipment being installed by Verizon within the NG corporate network. Doble will provide the support and administrative services for the equipment/systems related to the online monitoring solution they provide.

Project Scope is as follows:

- Networking to 3 substations including any required port configuration, routers, firewalls, etc
- Deployment of "Maxi-DEG Doble Enterprise Gateway" in corporate network.
- Security testing for deployed devices

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- Networking (IPSEC) and security for communication to DobleARMS cloud service

3.4 Benefits Summary

Improved resource utilization by eliminating in-person inspections of substations in good health.

- Improved just-in time maintenance / failure prevention
- Better visibility of Asset status should allow for prioritization of O&M work to address most critical issues before any catastrophic failures

Data analytics:

- Minimizes errors from inaccurate reporting
- Use of Data analytics run on asset data to improve the scheduling of maintenance activites within projects.
- Usage of Data trending as input for asset replacement or refurbishment

3.5 Business and Customer Issues

There are no significant issues beyond what has been described elsewhere.

3.6 Alternatives

Alternative 1: Do Nothing/Defer: Without investing into online monitoring, National Grid will remain behind the industry in asset lifecycle best practices. This will continue to expose National Grid to high mobilization costs, unexpected system down-time, and the chance for collateral damage.

3.7 Safety, Environmental and Project Planning Issues

There are no significant issues beyond what has been described elsewhere.

3.8 Execution Risk Appraisal

N/A

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3.9 Permitting

N/A

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
3982	Substation Monitoring - DobleARMS	Est Lvl (e.g. +/- 25%)	CapEx	0.000	0.000	0.702	0.000	0.000	0.000	0.000	0.702
			OpEx	0.000	0.261	0.030	0.000	0.000	0.000	0.000	0.291
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.261	0.732	0.000	0.000	0.000	0.000	0.993
Total Project Sanction			CapEx	0.000	0.000	0.702	0.000	0.000	0.000	0.000	0.702
			OpEx	0.000	0.261	0.030	0.000	0.000	0.000	0.000	0.291
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.261	0.732	0.000	0.000	0.000	0.000	0.993

3.11.2 Project Budget Summary Table

Project Costs Per Business Plan

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.622	0.000	0.000	0.000	0.000	0.000	0.622
OpEx	0.000	0.261	0.005	0.000	0.000	0.000	0.000	0.266
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.883	0.005	0.000	0.000	0.000	0.000	0.888

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Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.622	(0.702)	0.000	0.000	0.000	0.000	(0.080)
OpEx	0.000	0.000	(0.025)	0.000	0.000	0.000	0.000	(0.025)
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.622	(0.727)	0.000	0.000	0.000	0.000	(0.105)

3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology. The accuracy level of estimate for each project is identified in table 3.11.1

3.11.4 Net Present Value / Cost Benefit Analysis

N/A

3.11.4.1 NPV Summary Table

N/A

3.11.4.2 NPV Assumptions and Calculations

N/A

3.11.5 Additional Impacts

N/A

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual
Business Representative	Eileen Duarte
Head of PDM	Deborah Rollins
Relationship Manager	Aman Aneja
Program Delivery Director	Michelle McNaught
IS Finance Management	Michelle Harris
IS Regulatory	Thomas Gill
DR&S	Elaine Wilson
Service Delivery	Mark Mirizio

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Enterprise Architecture	Svetlana Lyba

3.12.2 Reviewers

N/A

4 Appendices

4.1 Sanction Request Breakdown by Project

$M	3982	Total
CapEx	0.110	0.110
OpEx	0.261	0.261
Removal		0.000
Total	0.371	0.371

4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	sub-category	$ (millions)	Name of Firm(s) providing
Personnel	NG Resources	0.473	
	SDC Time & Materials	-	
	SDC Fixed-Price	-	
	All other personnel	0.038	
	TOTAL Personnel Costs	0.510	
Hardware	Purchase	0.017	
	Lease	-	
Software		-	
Risk Margin		0.147	
Other		0.318	
	TOTAL Costs	0.993	

4.2.2 Benefiting Operating Companies

Benefiting Operating Companies	Business Area	State

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Massachusetts Electric Company - Transmission	Elec Transmission	MA
Narragansett Electric Company - Transmission	Elec Transmission	RI
Niagara Mohawk Power Corp – Transmission	Elec Transmission	NY
New England Power - Transmission	Elec Transmission	FERC

4.2.3 IS Ongoing Operational Costs (RTB):

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 17/18**	**Yr. 2 18/19**	**Yr. 3 19/20**	**Yr. 4 20/21**	**Yr. 5 21/22**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	-	-	-	-	-	**-**
RTB if Project is Implemented	-	0.065	0.156	0.156	0.156	0.296	**0.829**
Net change in RTB	-	0.065	0.156	0.156	0.156	0.296	**0.829**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	0.080	0.080	0.080	0.080	0.240	**0.560**
Variance to Plan	-	(0.015)	0.076	0.076	0.076	0.056	**0.269**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	-	-	-	-	-	**-**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	-	-	-	-	**-**
SaaS	-	-	-	-	-	-	**-**
HW support	-	0.065	0.156	0.156	0.156	0.296	**0.829**
Other: IS	-	-	-	-	-	-	**-**
All IS-related RTB (sub-Total)	-	0.065	0.156	0.156	0.156	0.296	**0.829**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	-	0.065	0.156	0.156	0.156	0.296	**0.829**

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4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

N/A

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Investment Request Summary - IS US FISCAL YEAR 2018

INV ID: 4466 Project Name: ***Gas Capital Investment Planning Tool***

Program:

Sponsor: *Ross Turrini* Title: *SVP Gas Process and Engineering*

Relationship Manager: *Aman Aneja* Title: *Director, IS BRM Network Strategy*

Prog Delivery Manager: *Michelle Mcnaught* Title: *Director, Portfolio Network Strategy*

Paper Author: *Douglas McCarthy* Title: *Lead Business Consultant*

IS Roadmap Category: TBD *Business Area:* ***Network Strategy*** *Portfolio:* ***Other***

☐ *In-Flight Project?* *Invest Classification:* Medium *Category:* Policy Driven *Primary Policy Driver:* Reliability *Region:* ***US***

☐ *Growth Playbook Project?* ☐ *Shaping Our Future Project?* ☐ *Energy Efficiency Project?*

Project Description: The context for the project with background information
The purpose of this project is to implement a Capital Investment Planning tool with risk scoring and prioritization methodology to optimize the portfolio. This will aid in the completion of highest valued projects and assist in decision making with minimal impact on safety, reliability, and regulatory compliance for the Gas organization.

Project Rationale: Highlight business challenge, capability or process the project addresses

The U.S. 5 year Gas capital plan for FY17-21 (~$1.6 billion for 7 Gas companies) is being built using multiple spreadsheets. Given the size of the portfolio, it is cumbersome to develop and optimize the plan. This limits our ability to see the whole portfolio, mitigate risk and prioritize work.

Project Scope: Explain what is in scope and what is not in scope for the project

Included in the scope of this investment: Purchase and deployment of a suitable Capital Investment Planning tool that meets the needs of the business. See attached business requirements document.

Exclusive of the scope of this investment: Integration with SAP, Work Management Systems (Maximo/Storms), PowerPlan, P6. Business requests that solution have the capability to deploy future integrations with these systems.

Note the execution of an RFP during FY16-17 resulting in proposals from Copperleaf and Primavera. (Responses attached). Copperleaf selected as primary vendor.

Project Dependencies: Identify any core program or project dependencies, please include INVP numbers if known
None Identified

Basic Project Assumptions:

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9/15/2016 - Doug McCarthy – Update Enabling IS Capabilities Section (Networks).

The following are the key project assumptions for this SOW:

The Copperleaf C55 solution is licensed for use in the National Grid natural gas distribution organization that includes seven companies in Northeastern United States. All seven National Grid companies have the same investment planning process including the same types of work and same method to evaluate investments.
Two C55 environments assumed DEVELOPMENT and PRODUCTION, either hosted by Armor or on premise.
Two user groups: (a) Process Owner, and (b) Investment Planner.
Train the trainer - Copperleaf will train the National Grid trainers and they will train all the end-users (assume up to 5 NG trainers to be trained). Two training courses will be provided: (1) Process Owner, and (2) Investment Planner. The Process Owner course is a prerequisite for the Investment Planner course. National Grid to provide training room with projector and workspace/workstation for 10 people.
National Grid has existing process maps that outline their current process they use for investment planning and to make investment decisions.
No integrations as all data sourced via report/convert/import. No assets are imported into C55.
National Grid locates and mines the required investment data from their target systems and this is quickly completed (one week).
Investment data is imported from an existing system. One-time exercise to load all investments prior to project start -- no ongoing process to import.

Program Delivery Assumptions:

- Assumes the project will be completed within FY18.
- Assumes on premise hosting
- Assumes Project will start in April 2017.
- Assumes an RFP will be needed.

Estimate Team: John Kastler, Dave Natale, Brian Detota, Svetlana Lyba, Doug McCarthy

Estimation accuracy: -50% / +200%

Indicative Project Costs by Fiscal Year

($M)	Prior Years	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Total
CapEx		0.572								0.572
OpEx		0.240	0.005							0.245
Impact on RTB			0.112	0.112	0.112	0.112	0.112	0.112	0.112	0.784

Indicative Project Costs by Delivery Phase

($M)	Start-up	R & D	D & I	Closure	Total
CapEx		0.176	0.396		0.572
OpEx	0.070	0.134	0.034	0.007	0.245

Project Benefits - Type I only

($M)	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Total
Type I - CapEx									0.000
Type I - OpEx									0.000
Revenue Generation									0.000

Key Business Benefits:
Describe benefits, both financial and non-financial, and when those benefits will be delivered. Provide a clear & concise business case stating the investment drivers – why do we need to do something and why now? Explain any Regulatory considerations and how this initiative aligns with the US Business Strategy.

The business benefits include:
- Ability to optimize the gas capital investment plan valued at 1.6 billion dollars;
- Ability to process complex risk scores for improved project selection;
- Improved decision making capabilities.
- One common process for all business performing capital planning.

Investment Prioritization

Benefits	Impact	Weight	Score
OpEx Annual Savings		10.3%	0
CapEx Annual Savings		5.1%	0
Revenue Generation (annual)		6.2%	0
Financial Control	High	6.2%	0.558

Cost	Impact		Weight	Score
OpEx Cost	0.245		-24.4%	-.732
CapEx Cost	0.572		-11.2%	0
RTB Efficiency	137.063	%	-22.5%	-2.025
Union/Labor Relations	does not apply		-9.8%	0

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Soft Financial Benefits	Low	3.8%	***0.038***
Regulatory Impact	Medium	11.2%	***0.336***
Process & Personal Safety	does not apply	19.4%	***0***
Reliability	High	10.9%	***0.981***
Customer & Community Responsiveness	Low	5.3%	***0.053***
Employee Satisfaction	does not apply	4.6%	***0***
Mitigates a Corporate Risk / Risk of not Doing	Medium=16 to 39	8.9%	***0.267***
Jurisdictional Engagement	High	8.2%	***1***
	Benefit Score:		***2.97***

Dependencies	does not apply	-10.6%	**0**
Elapse Time Duration	Medium	-6.6%	**-0.198**
Change Management Effort	Low	-14.9%	**-0.149**
		Cost Score:	***-3.44***

Overall Priority Score: ***-0.469***

Investment Risk and Complexity

Project Risk Score:	*39*	*Risk Score Description:* The Risk Score is 39 based upon an Impact level of 5 and a Likelihood value of 5
Project Complexity Score::	*15*	*Project Complexity Score Description:* See attached

Key Risks Description: Provide detail on project risks & mitigation strategy:

IS Project Dependencies if you don't see a project in the drop-down please contact the Planning & Performance team.

IS Projects: ***4466 - Gas Capital Investment Planning Tool***

1. *Has a* *dependency on IS Project;*
2. *Has a* *dependency on IS Project;*
3. *Has a* *dependency on IS Project;*
4. *Has a* *dependency on IS Project;*
5. *Has a* *dependency on IS Project;*
6. *Has a* *dependency on IS Project;*

Business Initiative Dependencies

IS Projects: **4466 - Gas Capital Investment Planning Tool**

1. *Has a* *dependency on Biz Initiative,*
2. *Has a* *dependency on Biz Initiative,*
3. *Has a* *dependency on Biz Initiative,*
4. *Has a* *dependency on Biz Initiative,*

Project Relationships

☐ *Minor Works* *Project Relationship:*

Related Projects:

Benefiting Operating Companies: Check all that apply

☐ *Select All Companies* ☐ *Clear All Companies*
☐ *Select All Gas* ☐ *Select All Electric* ☐ *Select All Gen*

- ☐ National Grid USA Parent
- ☐ KeySpan Energy Development Corporation
- ☐ KeySpan Services Inc.
- ☐ KeySpan Energy Corp
- ☑ KeySpan Energy Delivery New York
- ☑ KeySpan Energy Delivery Long Island
- ☐ KeySpan Generation LLC (PSA)
- ☐ KeySpan Glenwood Energy Center
- ☐ KeySpan Port Jefferson Energy Center
- ☐ KeySpan Energy Trading Svc LLC
- ☐ Niagara Mohawk Power Corp- Electric Distribution
- ☑ Niagara Mohawk Power Corp - Gas
- ☐ Niagara Mohawk Power Corp - Transmission
- ☐ Massachusetts Electric Company
- ☐ Massachusetts Electric Company - Transmission
- ☐ Nantucket Electric Company
- ☑ Boston Gas Company
- ☑ Colonial Gas Company
- ☑ Narragansett Gas Company
- ☐ Narragansett Electric Company
- ☐ Narragansett Electric Company - Transmission
- ☐ New England Power Company - Transmission
- ☐ New England Hydro - Trans Corp
- ☐ New England Electric Trans Corp
- ☐ NG LNG LP Regulated Entity

Enabling IS Capabilities check all that apply

- ☐ *Enterprise Content Management (ECM)*
- ☐ *Comprehensive Integration Services (CIS)*
- ☐ *Hybrid Cloud*
- ☐ *Next Gen Workplace*
- ☐ *Enterprise Mobility*
- ☐ *Reporting and Analytics*
- ☑ *Networks*

Key Milestone Dates: Select the 1st, 15th or last day of the month

Begin Start-up	*Begin Requirements & Deign*	*Begin Development & Implementation*	*Begin User Acceptance Testing*	*Go Live*	*Project Completion*	*Project Closure*
April, 2017	*August, 2017*	*November, 2017*	*December, 2017*	*January, 2018*	*January, 2018*	*April, 2018*

Business Resource Estimates: # of Full Time Equivalents

Start-up	*Requirements & Deign*	*Develop & Implement*	*Business Resources UAT*	*Go Live Readiness*	*Post Go Live Support*
2	*2*	*2*	*2*	*2*	*2*

Resourcing Strategy:

Project will be sourced using Solution Delivery Center (SDC) and National Grid IS resources.

Attached Supporting Documents

IRS_Data_Collection_4466 - Gas Capital Investment Planning Tool.Bus.2016.09.01.docx
INVP 4466 Gas Cap Inv Plan FY18 Estimate.zip
National Grid - Gas Investment Planning Requirement 03082016 V3 (3).docx

Recommendation Sign-off

Role	*Name*	*Title*	*Date*
Business Project Sponsor	*Ross Turrini*	SVP Gas Process and Engineering	
Business Relationship Manager	*Aman Aneja*	*IS Business Relationship Manager*	
IS Program Delivery Manager	*Michelle Mcnaught*	*IS Program Delivery Manager*	

nationalgrid

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US Sanction Paper

Title:	Gas System Operating Procedure (SOP) Upgrade	**Sanction Paper #:**	
Project #:	INVP 4480	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	November 17, 2017
Author:	Douglas McCarthy	**Sponsor:**	John Spink, VP Control Center Operations
Utility Service:	IS	**Project Manager:**	Lakmal Egodawatte

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of INVP 4480 in the amount $0.305M with a tolerance of +/- 10% for the purposes of Requirements and Design.

This sanction amount is $0.305M broken down into:

$0.139M Capex
$0.166M Opex
$0.000M Removal

NOTE the potential investment of $0.774M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of Requirements and Design.

1.2 Project Summary

The System Operating Procedure (SOP) application is the system used to communicate and manage all gas main work in all regions of National Grid US. SOP orders are a National Grid Process Safety requirement to communicate and facilitate safe operations while maintaining National Grid's gas infrastructure. The existing system was internally developed and deployed eleven years ago and is reaching end-of-life due to the age of its computing infrastructure. Supporting software including operating systems and databases are at unsupported release levels. The system is becoming unstable, and is difficult to modify and enhance. Service interruptions of the SOP system result in increased safety risks as well as increased costs as all main and service work being governed by an SOP is halted until a paper based business continuity plan is enacted.

This investment will deliver a refresh of the aging SOP application infrastructure assets to current supported versions. Functionality enhancements supporting Corporate Safety and Regulatory requirements will be evaluated for delivery in this investment.

REDACTED

1.3 Summary of Projects

Project Number	Project Title	Estimate Amount ($M)
4480	Gas System Operating Procedure (SOP) Upgrade Project	0.774
	Total	0.774

1.4 Associated Projects

N/A

1.5 Prior Sanctioning History

N/A

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Jan 2018	Full Sanction

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	Maintain business critical computing assets and infrastructure at supported release levels.

REDACTED

1.8 Asset Management Risk Score

Asset Management Risk Score: 39

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

1.9 Complexity Level

○ High Complexity ○ Medium Complexity ◉ Low Complexity ○ N/A

Complexity Score: 19

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18 - 22	◉ Yes ○ No	○ Over ◉ Under ○ NA	$0.001M

1.12 If cost > approved Business Plan how will this be funded?

N/A

REDACTED

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.323	0.218	0.000	0.000	0.000	0.000	0.541
OpEx	0.000	0.197	0.036	0.000	0.000	0.000	0.000	0.233
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	0.520	0.254	0.000	0.000	0.000	0.000	0.774

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	Sep 2017
Partial Sanction	Oct 2017
Begin Requirements and Design	Oct 2017
Project Sanction	Jan 2018
Begin Development and Implementation	Feb 2018
Move to Production / Last Go Live	May 2018
Project Complete	Aug 2018
Sanction Closure	Nov 2018

REDACTED

US Sanction Paper

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

N/A

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

REDACTED

2 Decisions

The US IS Sanctioning Committee (ISSC) and Key External Stakeholders reviewed and approved the content of the investment including:

(a) APPROVED the investment of $0.305M and a tolerance of +/- 10% for the purposes of requirements and design.

(b) NOTED the potential run-the-business (RTB) impact of $0.036M (per annum) for 5 years.

(c) NOTED the potential investment of $0.774M and a tolerance of +/-25% contingent upon submittal and approval of a Project Sanction paper following completion of requirements and design.

(d) NOTED that Sally Seltzer has the approved financial delegation to undertake the activities stated in (a).

Signature……..Date…….

Anuraag Bhargava

US CIO

REDACTED

3 Sanction Paper Detail

Title:	Gas System Operating Procedure (SOP) Upgrade	**Sanction Paper #:**	
Project #:	INVP 4480	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	November 17, 2017
Author:	Douglas McCarthy	**Sponsor:**	John Spink, VP Control Center Operations
Utility Service:	IS	**Project Manager:**	Lakmal Egodawatte

3.1 Background

The Gas System Operating Procedure (SOP) was developed internally at National Grid to manage construction work in the gas systems in New York and New England. SOP orders are a Process Safety requirement to communicate and facilitate safe operations while maintaining National Grid's gas infrastructure. The existing system was deployed eleven years ago and is reaching end-of-life due to the age of its computing infrastructure. Loss of the SOP system will result in an increased safety risk to the Company along with a significant cost increase as all gas work is halted until a paper based business continuity plan is enacted. Applying updates and enhancements to the SOP system is difficult. The current system is becoming unstable due to the age of infrastructure assets, does not support mobile platforms, and requires updates to support Corporate Safety and regulatory needs.

The objective of the project is to update the application platform for SOP with supported technologies, and refresh the computing infrastructure with current and supported assets.

3.2 Drivers

The following are drivers for this investment:

- The current system is at risk of service interruptions due to its aging and unsupported infrastructure assets. The system has experienced 5 major service interruptions in the past 18 months
- Loss or downtime of this system will halt all work in the field until a paper based BCP plan can be enacted. Crews will be forced to delay or defer work until such time as a paper copy of the existing SOP can be communicated to all departments in the SOP process.

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- Loss or downtime of the system will increase the safety risk to the Company as crews will be working off outdated paper copies with limited access to records until the system is restored.
- The application is running on the unsupported Windows Server 2003 operating system (OS). The end of support for this OS was July 14, 2015 resulting in the following services being unavailable:
  - Security patches that help protect PCs from harmful viruses, spyware, and other malicious software
  - Assisted technical support from Microsoft
  - Software and content updates
- Assets within the computing infrastructure are running IBM AIX 5.3 operating system. This OS was "End-of-Service" in April 2010. Fix Packs, Service Packs, and other fixes will no longer be shipped for this release
- Data base assets are running Oracle 10g R2. Extended support for this product ended in July 2013
- Difficulty in modifying the current SOP application prevents National Grid from making functional enhancements to satisfy new demands of daily operations and making changes to support corporate Safety and Regulatory requirements
- The existing application does not support mobile technology or external facing website access

3.3 Project Description

This project will leverage National Grid and partner resources to deliver the following:

- Refresh the computing infrastructure supporting the SOP application to current and supported levels of software including operating systems and data bases
- Migrate application code base from the unsupported .Net version 3.5 to .Net version 4.7
- Evaluate the following enhancements for impact to and potential inclusion in delivery:
  - Enhanced reporting functionality in support of regulatory requests
  - Support for a mobile platform interface
  - External Face Website Functionality for Contractors
  - Increased notification functionality for mapping and compliance
  - Workflow for routing changes in the revision process

3.4 Benefits Summary

This project will deliver the following benefits:

- Improved application reliability due to running supported technology assets
- Reduced risk of safety related incidents due to SOP availability incidents
- Improved alignment to regulatory requirements and business needs

- Reduced risk of impact to field work productivity and work stoppage
- Improved capability to support and modify upgraded SOP application for new requirements
- Position the application for future support of mobile and web interfaces

3.5 Business and Customer Issues

None.

3.6 Alternatives

Alternative 1: Do nothing

If no action is taken, system will continue to experience periods of down time. Down time on the SOP system leads to lost productivity, increased safety risks, and potential for regulatory impact should an event occur due to an SOP application outage.

Alternative 2: Procure an External System

Gas Control went into the market during FY17 to engage software vendors in the "Lock Out/Tag Out" space to gauge availability of product to replace SOP. Three large vendors (TK Pro "Stillwell Software", LINK360 "Brady Safety", and SAP) were engaged to look at our business process. These vendors could not provide a commercial product to satisfy the requirement.

3.7 Safety, Environmental and Project Planning Issues

None.

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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Project completion is highly dependent on vendor on time delivery	2	2	1	4	2	Avoid	Discuss the project plan and milestone date clearly with vendors. Have vendors sign on work packs to have them committed to given dates.	Conduct weekly status calls to communicate the status of the project to avoided last minute surprises. Take action to attain the milestones as initially planned. If delays are anticipated advise the vendor to onboard more resources to accomplish deliverables on time.	Conduct an impact analysis. Revise the cost and schedule if impacted. Re-basline project plan after change board approval.
2	IRS paper state dependencies with two other projects. However, business confirmed that there are no dependancies.	1	2	2	2	2	Exploit	Take necessory steps to formally identify if there are dependancies and address them accordingly	N/A	Revise the project plan accordingly to avoid dependencies

3.9 Permitting

N/A

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

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US Sanction Paper

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
4480	Gas System Operating Procedure (SOP) Upgrade Project	+/- 10%	CapEx	0.000	0.323	0.218	0.000	0.000	0.000	0.000	0.541
			OpEx	0.000	0.197	0.036	0.000	0.000	0.000	0.000	0.233
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.520	0.254	0.000	0.000	0.000	0.000	0.774
Total Project Sanction			CapEx	0.000	0.323	0.218	0.000	0.000	0.000	0.000	0.541
			OpEx	0.000	0.197	0.036	0.000	0.000	0.000	0.000	0.233
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.520	0.254	0.000	0.000	0.000	0.000	0.774

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.542	0.000	0.000	0.000	0.000	0.000	0.542
OpEx	0.000	0.233	0.000	0.000	0.000	0.000	0.000	0.233
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.775	0.000	0.000	0.000	0.000	0.000	0.775

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.219	(0.218)	0.000	0.000	0.000	0.000	0.001
OpEx	0.000	0.036	(0.036)	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.255	(0.254)	0.000	0.000	0.000	0.000	0.001

3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology. The accuracy level of estimate for each project is identified in table 3.11.1.

3.11.4 Net Present Value / Cost Benefit Analysis

This is not an NPV Project.

3.11.4.1 NPV Summary Table

N/A

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3.11.4.2 NPV Assumptions and Calculations

N/A

3.11.5 Additional Impacts

None.

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual
Business Representative	John Spink
Head of PDM	Deb Rollins
Relationship Manager	Aman Aneja
Program Delivery Director	Sally Seltzer
IS Finance Management	Michelle Harris
IS Regulatory	Tom Gill
DR&S	Elaine Wilson
Service Delivery	Mark Mirizio
Enterprise Architecture	Joe Clinchot

3.12.2 Reviewers

N/A

4 Appendices

4.1 Sanction Request Breakdown by Project

$M	4480	Total
CapEx	0.139	0.139
OpEx	0.166	0.166
Removal		0.000
Total	0.305	0.305

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4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown $ (millions)					
Cost Category	**sub-category**	**VOWD**	**FTC**	**FAC=VOWD+FTC**	**Name of Firm(s) providing**
Personnel	NG Resources	0	0.310	0.310	
	SDC Time & Materials	0	-	-	IBM
		0	-	-	WiPro
		0	-	-	DXC
		0	-	-	Verizon
	SDC Fixed-Price	0	-	-	IBM
		0	-	-	WiPro
		0	-	-	DXC
		0	-	-	Verizon
	All other personnel	0	0.081	0.081	
	TOTAL Personnel Costs	**0**	0.391	0.391	
Hardware	Purchase	0	-	-	
	Lease	0	0.056	0.056	
Software		0	0.072	0.072	
Risk Margin			0.115	0.115	
AFUDC		0	0.004	0.004	
Other		0	0.136	0.136	
	TOTAL Costs	-	0.774	0.774	

4.2.2 Benefiting Operating Companies

The following companies will benefit from this program. The allocation of these benefits will be based upon the number of customers.

Benefiting Operating Companies Table:

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.	Gas Distribution	NY
KeySpan Energy Delivery New York	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
Boston Gas Company	Gas Distribution	MA
Colonial Gas Company	Gas Distribution	MA
Narragansett Gas Company	Gas Distribution	RI

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4.2.3 IS Ongoing Operational Costs (RTB):

This project will impact IS ongoing operations support costs as per the following table. These are also known as Run the Business (RTB) costs.

Note: RTB costs will be refined following execution of Requirements and Design.

RTB Forecast Sheet						
Investment Plan No:	4480				**Forecast Date:**	05/01/18
Investment Name:	SOP Upgrade				**Go-Live Date:**	**May-18**
Project Manager:	Lakmal Egodawatte			**PDM:**	Sally Seltzer	
All figures in $ thousands	**Yr. 1**	**Yr. 2**	**Yr. 3**	**Yr. 4**	**Yr. 5**	**Total**
	FY 17/18	**FY 18/19**	**FY 19/20**	**FY 20/21**	**FY 21/22**	
Last Sanctioned Net Impact to RTB						
Last Sanction IS Net Impact to RTB						-
Last Sanction Business Net Impact to RTB						-
Last Sanction Total Net Impact to RTB	-	-	-	-	-	-
Planned/Budgeted Net Impact to RTB						
IS Investment Plan Net Impact to RTB			36.0	36.0	36.0	**108.0**
Business Budgeted Net Impact to RTB						-
Currently Forecasted Net Impact to RTB						
IS Funded Net Impact to RTB Forecasted at Go-Live	-	-	-	-	-	-
Business Funded Net Impact to RTB Forecasted at Go-Live	-	-	-	-	-	-
Variance to Planned/Budgeted Net Impact to RTB						
IS Investment Plan Net Impact to RTB Variance	-	-	36.0	36.0	36.0	108.0
Business Budgeted Net Impact to RTB Variance	-	-	-	-	-	-

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

N/A

REDACTED

US Sanction Paper

Title:	Mobile app for Standards and Processes	**Sanction Paper #:**	
Project #:	INVP 4390	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	March 24, 2017
Author:	Rashmi Kadam	**Sponsor:**	Dan McNamara
Utility Service:	IS	**Project Manager:**	Sally Seltzer

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of INVP 4390 in the amount $0.492M with a tolerance of +/- 10% for the purposes of Requirements and Design

This sanction amount is $0.492M broken down into:

$0.209M Capex
$0.283M Opex
$0.000M Removal

NOTE the potential investment of $0.0.990M with a tolerance of +/- 10%, contingent upon submittal and approval of a Project Sanction paper following completion of requirements and design for deploying suitable solution for Gas Works Methodology Procedures.

1.2 Project Summary

The project will transfer Gas standards and policies from an existing intranet solution to a mobile friendly, web based solution. An existing enterprise solution, BOX and external software such as Comply365 are potential options. Further validation of the suitability of these solutions will be performed as part of the R&D phase. The key capabilities include but are not limited to selecting an application that contains an auto sync feature along with a download feature to access in offline mode. The application will also need to send notification of a change to field workers directly as opposed to the supervisor responsibility for notification. Lastly, the applications need to track usage information to ensure appropriate oversight on the use of procedures to meet standards and safety goals.

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
INVP 4390	Project Type	Mobile Apps for Standards and Processes	0.990
		Total	0.990

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1.4 Associated Projects

Project Number	Project Title	Estimate Amount ($M)
INVP 4102	Mobile Capture of Plastic Fusion Data	1.203
	Total	1.203

1.5 Prior Sanctioning History

None

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
August, 2017	Full Sanction

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	Safety - The benefit of having the latest information available directly to crew members will reduce risk of employees missing important pipeline safety information. Informed employees are proven to be safer employees. Higher compliance to the policies and procedures will lead to reduction in penalties.

1.8 Asset Management Risk Score

Asset Management Risk Score: _____49

Primary Risk Score Driver: (Policy Driven Projects Only)

○ Reliability ○ Environment ◉ Health & Safety ○ Not Policy Driven

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US Sanction Paper

1.9 Complexity Level

○ High Complexity ○ Medium Complexity ◉ Low Complexity ○ N/A

Complexity Score: __20__

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY 17-21	○ Yes ◉ No	◉ Over ○ Under ○ NA	$0.990M

1.12 If cost is not aligned with approved Business Plan how will this be funded?

Costs are funded through exception process to transfer dollars from INVP 4102 – Plastic Fusion Phase 1 project to this initiative

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	0.000	0.538	0.000	0.000	0.000	0.000	0.538
OpEx	0.000	0.003	0.449	0.000	0.000	0.000	0.000	0.452
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	0.003	0.987	0.000	0.000	0.000	0.000	0.990

REDACTED

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	October, 2016
Partial Sanction	March, 2017
Begin Requirements and Design	April, 2017
Full Sanction	August, 2017
Begin Development and Implementation	Sep, 2017
Move to Production / Last Go Live	March, 2018
Project Complete	May, 2018
Project Closure Sanction	June, 2018

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☐ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

Not Applicable

REDACTED

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

1	
2	
3	

REDACTED

2 Decisions

The US IS Sanctioning Committee (ISSC) and Key External Stakeholders reviewed and approved the content of the investment including:

INVP 4390 - Mobile app for Standards and Processes - Partial Sanction

(a) APPROVED the investment of $*0.492M* and a tolerance of +/- 10% for the purposes of requirements and design.

(b) NOTED the potential RTB Impact of $0.264M (per annum) for 5 years.

(c) NOTED the potential investment of $0.990M and a tolerance of +/-25% contingent upon submittal and approval of a Project Sanction paper following completion of requirements and design.

(d) NOTED that Sally Seltzer has the approved financial delegation to undertake the activities stated in (a).

Signature……..Date……

Anuraag Bhargava

US CIO

REDACTED

3 Sanction Paper Detail

Title:	Mobile app for Standards and Processes	**Sanction Paper #:**	
Project #:	INVP 4390	**Sanction Type:**	Partial Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	March 24, 2017
Author:	Rashmi Kadam	**Sponsor:**	Dan McNamara
Utility Service:	IS	**Project Manager:**	Sally Seltzer

3.1 Background

For Gas operations, currently, standards and policies are maintained on the internal website. Field workers do not have access to the website when they are offline. National Grid gets penalized if standards and procedures are not properly followed in the field. To ensure field workers have access to latest policies and procedures in online and offline mode, this project will deploy an application to be used on desktops and mobile devices. The Standards & Policies application will allow National Grid staff to verify that work is being performed by contractors and field workers in accordance with National Grid procedures.

3.2 Drivers

National Grid puts the safety of field workers as a top priority. Field workers will receive notification and instant access to bulletins that cover deficiencies in the field and crew will be kept up-to-date on product features and advisories.

3.3 Project Description

Project will deploy suitable application to access Gas department standards and policies. The application will need to contain an auto sync feature along with a download feature to access in offline mode. The application will send notification of a change to field worker directly as opposed to the supervisor responsible for the notification. Lastly, the application will track usage information to ensure appropriate oversight on the use of procedures to meet standards and safety goals.
The detailed requirements are as follows:

- The ability for the entire Gas workforce, which compromise both company employees and external contractors, to access Gas department documentation.
- Support communication of procedures through a variety of mobile devices and standalone computers (Windows 7 Server). Users should access both through the cloud and standalone if connectivity is an issue

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- Track revised procedures are reviewed by users. Tracking data to be stored offline and synced with cloud when connectivity is available
- Capability for NG employee to upload documents on cloud server
- Provide enhanced indexing and search capabilities for Gas Works Methods
- Provide a learning video library for access by procedure users
- Segregate out just the day to day procedures for easy access by task by area
- Conversion of existing standards and policies from web server to selected application
- IS activities for support transition will be documented. Rollout plan to be confirmed with selected vendor infrastructure team to secure appropriate licenses
- Assess network capacity requirements and assess changes in scope if capacity improvement is required
- Mobility Device Management is not factored into the existing investment paper and scope. Align IPAD connectivity improvements with MDM project.
- Training requirements to roll out the solution to the early adopters and larger groups.

3.4 Benefits Summary

The benefit of having the latest information available directly to crew members will reduce risk of employees missing important pipeline safety information. Informed employees are proven to be safer employees. Higher compliance to the policies and procedures will lead to reduction in penalties.

3.5 Business and Customer Issues

There are no significant business issues beyond what has been described elsewhere

3.6 Alternatives

Alternative 1: Rejected - Do Nothing. This solution will not solve current issues in the field and can lead to NG field operational being out of compliance.

Alternative 2: Rejected - Other software solutions available in market. These solutions provide niche solutions for accessing process and procedures however can be expensive over time.

3.7 Safety, Environmental and Project Planning Issues

There are no significant issues beyond what has been described elsewhere.

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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Conversion of Standards & Procedure documents could take longer than the vendor (Box) estimated	2	2	3	4	6	Accept	To have frequent status update meetings with the vendor to stay updated on their progress	The Standard and procedure documents would be delayed in being posted for User Acceptance Testing	The project team would attempt to accelerate some of the tasks to avoid impact on the overall project schedule
2	There could be a delay in the provisioning of the iPad applications in the Maas360 environment	1	1	1	1	1	Accept	We have provided more than enough time in the schedule for this task to be accomplished.	If the delay exceeds the additional time allocated then the User Acceptance Testing would be impacted.	The User Acceptance Testing would potentially need to be restructured to accommodate the delay.
3	There is a chance that the Business testers are not available when required for the User Acceptance testing due to an immediate need that arises.	2	2	2	4	4	Mitigate	To have frequent project status to keep the Business informed of the User Acceptance schedule and to have more than one tester committed.	The User Acceptance Testing could be impacted.	Request replacement testers and re-arrange the Testing plan.

3.9 Permitting

Not Applicable

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US Sanction Paper

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
INVP 4390	Mobile Apps for Standards and Processes	0	CapEx	0.000	0.000	0.538	0.000	0.000	0.000	0.000	0.538
			OpEx	0.000	0.003	0.449	0.000	0.000	0.000	0.000	0.452
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.003	0.987	0.000	0.000	0.000	0.000	0.990

Total Project Sanction	CapEx	0.000	0.000	0.538	0.000	0.000	0.000	0.000	0.538
	OpEx	0.000	0.003	0.449	0.000	0.000	0.000	0.000	0.452
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total	0.000	0.003	0.987	0.000	0.000	0.000	0.000	0.990

3.11.2 Project Budget Summary Table

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Total
CapEx	0.000	0.000	(0.538)	0.000	0.000	0.000	0.000	(0.538)
OpEx	0.000	(0.003)	(0.449)	0.000	0.000	0.000	0.000	(0.452)
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	(0.003)	(0.987)	0.000	0.000	0.000	0.000	(0.990)

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3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology. The accuracy level of estimate for each project is identified in table 3.11.1

3.11.4 Net Present Value / Cost Benefit Analysis

This is not an NPV project.

3.11.4.1 NPV Summary Table

Not Applicable

3.11.4.2 NPV Assumptions and Calculations

Not Applicable

3.11.5 Additional Impacts

None

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Role	Individual's Name
Business Executive Sponsor	Tom Bennett
IS Head of Program Delivery Management (PDM)	Jeff Dailey obo Deb Rollins
IS Business Relationship Manager	Richard Sheer
IS Program Delivery Manager	Sally Seltzer
IS Finance Management	Chip Benson
IS Regulatory	Tom Gill
IS Digital Risk & Security (DR&S)	Elaine Wilson
IS Service Delivery	Brian Detota
IS Enterprise Architecture	Svetlana Lyba

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4 Appendices

4.1 Sanction Request Breakdown by Project

$M	INVP 4390	Proj Num	Proj Num	Proj Num	Proj Num	Proj Num	Proj Num	Proj Num	Proj Num	Total
CapEx	0.209									0.209
OpEx	0.283									0.283
Removal										0.000
Total	0.492	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.492

4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	0.462	
	SDC Time & Materials	0.195	
	SDC Fixed-Price	-	
	All other personnel	-	
	TOTAL Personnel Costs	0.657	
Hardware	Purchase	-	
	Lease	-	
Software		0.110	
Risk Margin		0.090	
Other		0.133	
	TOTAL Costs	0.990	

4.2.2 Benefiting Operating Companies

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp – Gas	Gas Distribution	NY
Narragansett Gas Company	Gas Distribution	RI
KeySpan Energy Delivery New York	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
Boston Gas Company	Gas Distribution	MA
Colonial Gas Company	Gas Distribution	MA

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4.2.3 IS Ongoing Operational Costs (RTB):

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 16/17**	**Yr. 2 17/18**	**Yr. 3 18/19**	**Yr. 4 19/20**	**Yr. 5 20/21**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	-	-	-	-	-	**-**
RTB if Project is Implemented	-	-	0.264	0.264	0.264	0.572	**1.364**
Net change in RTB	-	-	0.264	0.264	0.264	0.572	**1.364**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	**-**
Variance to Plan	-	-	0.264	0.264	0.264	0.572	**1.364**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	-	-	-	-	-	**-**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	-	-	-	-	**-**
SaaS	-	-	-	-	-	-	**-**
HW support	-	-	-	-	-	-	**-**
Other: IS	-	-	0.264	0.264	0.264	0.572	**1.364**
All IS-related RTB (sub-Total)	-	-	0.264	0.264	0.264	0.572	**1.364**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	-	-	0.264	0.264	0.264	0.572	**1.364**

Note: U.S. Policy dictates that RTB Variance = forecasted Net Δ RTB - Net Δ RTB funded by Investme

This is a supplemental table - it is NOT required to be pasted in the Investment Paper **Net Change in RTB - by Cost Type**							
App.Sup. - SDC 1	-	-	-	-	-	-	**-**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	-	-	-	-	**-**
SaaS	-	-	-	-	-	-	**-**
HW support	-	-	-	-	-	-	**-**
Other: IS	-	-	0.264	0.264	0.264	0.572	**1.364**
All IS-related RTB (sub-Total)	-	-	0.264	0.264	0.264	0.572	**1.364**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total Net Change in RTB	-	-	0.264	0.264	0.264	0.572	**1.364**

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US Sanction Paper

Title:	Computapole Inspection Types	**Sanction Paper #:**	
Project #:	INVP 4462	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	October 20, 2017
Author:	Martin McDermott	**Sponsor:**	Keith McAfee, VP Maint & Constr NY Electric
Utility Service:	IS	**Project Manager:**	Sally Seltzer

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of INVP 4462 in the amount $0.385M with a tolerance of +/- 10% for the purposes of full implementation.

This sanction amount is $0.385M broken down into:

$0.310M Capex
$0.075M Opex
$0.000M Removal

1.2 Project Summary

This investment will add inspection types to the Computapole application which will allow both mandated and non-mandated inspections on electric transmission and distribution assets to be recorded and tracked. The current application allows for one inspection per asset, per year, and any additional inspections will overwrite previous inspection data causing a loss of information and invalid reporting. This investment will increase the flexibility of the application and reduce the possibility of the loss of inspection data.

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
INVP 4462		Computapole Inspection Types	0.385
		Total	0.385

1.4 Associated Projects

N/A

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US Sanction Paper

1.5 Prior Sanctioning History

N/A

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Jun 2018	Sanction Closure

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	This Policy-Driven investment seeks to ensure the Safe reliability of operations of the Electric Transmission and Distribution systems through the accurate tracking of mandated and non-mandated inspections of the assets.

1.8 Asset Management Risk Score

Asset Management Risk Score: 39

Primary Risk Score Driver: (Policy Driven Projects Only)

○ Reliability ○ Environment ◉ Health & Safety ○ Not Policy Driven

1.9 Complexity Level

○ High Complexity ○ Medium Complexity ◉ Low Complexity ○ N/A

Complexity Score: 11

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US Sanction Paper

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18-22	◉ Yes ○ No	○ Over ◉ Under ○ NA	$0.140M

1.12 If cost > approved Business Plan how will this be funded?

N/A

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.310	0.000	0.000	0.000	0.000	0.000	0.310
OpEx	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.075
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	0.385	0.000	0.000	0.000	0.000	0.000	0.385

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	Aug 2017
Project Sanction	Oct 2017
Begin Requirements and Design	Oct 2017
Begin Development and Implementation	Dec 2017
Move to Production / Last Go Live	Feb 2018
Project Complete	Mar 2018
Sanction Closure	Jun 2018

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1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

N/A

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

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2 Decisions

The US IS Sanctioning Committee (ISSC) and Key External Stakeholders, reviewed and approved the content of the investment including:

(a) APPROVE this paper and the investment of $0.385M and a tolerance of +/-10%.

(b) APPROVE the run-the-business (RTB) impact of $0.030M (per annum) for 5 years.

(c) NOTE that Sally Seltzer is the Project Manager and has the approved financial delegation.

Signature……..Date……

Anuraag Bhargava

US CIO

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3 Sanction Paper Detail

Title:	Computapole Inspection types	**Sanction Paper #:**	
Project #:	INVP 4462	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	October 20, 2017
Author:	Martin McDermott	**Sponsor:**	Keith McAfee, VP Maint & Constr NY Electric
Utility Service:	IS	**Project Manager:**	Sally Seltzer

3.1 Background

The Computapole application is used to schedule, track and record the results of Electric Transmission and Distribution system inspections. The inspections can be done by foot patrols, overhead flights, in addition to newer technologies such as drone flights/automated inspections. The current system does not allow inspections to be recorded by inspection type, allows only one inspection per asset per year, and any additional inspections will overwrite previous inspection data causing a loss of information and invalid reporting.

The Company has targeted goals for transmission asset inspections which, if missed, will results in penalties, causing a reduction in allowable return. The loss of data due to multiple inspections on an asset would cause rework to ensure the proper reporting of performance against goals. This investment will help ensure proper tracking and reporting, along with providing the flexibility to perform non-mandated inspections on an asset.

3.2 Drivers

The primary drivers for this project include:

- Maintain compliance with NY Public Service Commission (PSC) and NE Department of Public Utilities (DPU) regulatory mandates to avoid penalties
- Continue to ensure Public Safety
- Continue to ensure system reliability
- Maintain the ability to provide information for rate cases

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3.3 Project Description

This investment covers the modification of the Computapole application to add inspection types to the asset inspection record allowing multiple inspections per asset. This will enable the tracking of non-mandated inspections, as well as the continued tracking of mandated inspections. Reports will be modified to reflect the new inspection types and the ability to continue to provide accurate reporting against mandated goals. In addition, the solution will provide the ability to report on and track non-mandated inspections. This will increase the functionality of the application to handle new inspection types without jeopardizing mandated reporting.

3.4 Benefits Summary

Type	Benefit	Description
Direct	Allow for non-mandated inspections	This change will enhance the application to allow additional inspections including non-mandated inspections to be done on an asset without affecting mandated inspection reporting.
Direct	Reduce risk of inspection data loss and incorrect reporting	With the current system if a secondary inspection is done on an asset (including a non-mandated inspection), the previous inspection data would be lost. This could lead to under reporting of progress against targeted goals. This investment will segregate the inspections reducing the chance of overwriting previous inspections.
Direct	Improve Safety and Reliability	With the ability to allow and capture multiple inspection types of an asset, a more accurate reflection of the assets health can be determined.
Intangible (Indirect benefits)	Allow for the use of new technologies for inspections	This investment will allow for the capture and tracking of inspections which could use new processes and tools such as drones.

3.5 Business and Customer Issues

There are no significant business issues beyond what has been described elsewhere.

3.6 Alternatives

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Alternative 1: Do Nothing
Due to limitations of the current system only one inspection type is allowed per asset in any given year, a subsequent inspection of the asset will overwrite the original inspection record. This could lead to underreporting of inspections against goals if not resolved through a manual rework to reapply the original inspection record, thus losing the new inspection. To provide for accurate tracking and reporting doing nothing is not a preferred option.

Alternative 2: Delay Investment
A delay in the investment will prolong the chance that an overwrite of inspection data may occur and incorrectly show we are behind in the inspection of assets triggering a missed goal when in fact we are meeting the targets.

Alternative 3: Replace System
The Computapole system was upgraded for the Windows7 environment within the last three years and is expected to be in use for several more years. A longer term strategy will take place in future years but due to the complexities and regulatory reporting requirements Computapole is the system of record for transmission line inspections.

3.7 Safety, Environmental and Project Planning Issues

None

3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Availability of Vendor Resources with knowledge of the software	2	2	3	4	6	Mitigate	Vendor has reviewed the code and committed to schedule.	Hold weekly project meeetings with Vendor to ensure resource commitment and availability.	Elevate concerns to Vendor leadership and rework schedule to meet National Grid's requirements.
2	Availability of Business Resources to Test changes	2	2	3	4	6	Accept	Schedule project to occur when resources will be available.	Work with business to identify backup to resources	Work with Business leadership and Vendor to create an acceptable schedule.

3.9 Permitting

N/A

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

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3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
INVP 4462	Computapole Inspection Types	(+/- 10%)	CapEx	0.000	0.310	0.000	0.000	0.000	0.000	0.000	0.310
			OpEx	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.075
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.385	0.000	0.000	0.000	0.000	0.000	0.385

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.450	0.000	0.000	0.000	0.000	0.000	0.450
OpEx	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.075
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.525	0.000	0.000	0.000	0.000	0.000	0.525

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.140	0.000	0.000	0.000	0.000	0.000	0.140
OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.140	0.000	0.000	0.000	0.000	0.000	0.140

3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology. The accuracy level of estimate for each project is identified in table 3.11.1.

3.11.4 Net Present Value / Cost Benefit Analysis

This is not an NPV investment.

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3.11.5 Additional Impacts

None

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual
Business Representative	Bartholemew Cass
Head of PDM	Deborah Rollins
Relationship Manager	Richard Sheer
Program Delivery Director	Sally Seltzer
IS Finance Management	Michelle Harris
IS Regulatory	Daniel DeMauro
DR&S	Elaine Wilson
Service Delivery	Mark Mirizio
Enterprise Architecture	Svetlyna Lybra

3.12.2 Reviewers

N/A

3.13 Benefitting Operating Companies

This project will benefit all the companies listed below.

Operating Company Name	Business Area	State
Niagara Mohawk Power Corp.- Electric Distr.	Electric Distribution	NY
Massachusetts Electric Company	Electric Distribution	MA
Narragansett Electric Company	Electric Distribution	RI

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Nantucket Electric Company	Electric Distribution	MA
Niagara Mohawk Power Corp. - Transmission	Transmission	NY
Massachusetts Electric Company – Transmission	Transmission	MA
Narragansett Electric Company – Transmission	Transmission	RI
New England Power Company – Transmission	Transmission	MA, NH, RI, VT

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4 Appendices

4.1 Sanction Request Breakdown by Project

4.1.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	0.097	
	SDC Time & Materials	0.072	IBM
	SDC Fixed-Price	-	
	All other personnel	0.010	DxC
	TOTAL Personnel Costs	0.179	
Hardware	Purchase	-	
	Lease	-	
Software		-	
Risk Margin		0.034	
Other		0.172	QUES
	TOTAL Costs	0.385	

Vendor/Supplier Breakdown for 1-slide PowerPoint Summary: In order to complete the 1-slide Summary that accompanies each Investment Paper, it is necessary to identify key vendors and the spending amounts associated with each. The table below provides the information necessary to address this portion of the 1-Slide Summary.

Vendor	$ millions
SDC.1 - IBM	0.072
SDC.2 - Wipro	-
SDC.3 - tbd	-
IBM, non-SDC	-
Wipro, non-SDC	-
QUES	0.135
DxC	0.010
n/a	-
n/a	-
n/a	-
Other	0.025

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4.1.2 IS Ongoing Operational Costs (RTB):

This project will impact IS on-going operations support costs as per the following table. These are also known as Run the Business (RTB) costs.

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 17/18**	**Yr. 2 18/19**	**Yr. 3 19/20**	**Yr. 4 20/21**	**Yr. 5 21/22**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	-	-	-	-	-	**-**
RTB if Project is Implemented	-	0.030	0.030	0.030	0.030	0.031	**0.151**
Net change in RTB	-	0.030	0.030	0.030	0.030	0.031	**0.151**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	0.030	0.030	0.030	0.030	0.030	0.030	**0.180**
Variance to Plan	(0.030)	-	-	-	-	0.001	**(0.029)**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	-	-	-	-	-	**-**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	0.030	0.030	0.030	0.030	0.031	**0.151**
SaaS	-	-	-	-	-	-	**-**
HW support	-	-	-	-	-	-	**-**
Other: IS	-	-	-	-	-	-	**-**
All IS-related RTB (sub-Total)	-	0.030	0.030	0.030	0.030	0.031	**0.151**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	-	0.030	0.030	0.030	0.030	0.031	**0.151**

Note: U.S. Policy dictates that RTB Variance = forecasted Net Δ RTB - Net Δ RTB funded by Investment Plan

4.2 Other Appendices

N/A

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

N/A

REDACTED

US Sanction Paper

Title:	ACIS Infrastructure Upgrade	**Sanction Paper #:**	
Project #:	INVP 4487	**Sanction Type:**	Partial Sanction
Operating Company:	Allocated	**Date of Request:**	January 9, 2018
Author:	Dennis Leung	**Sponsor:**	Fredrick Raymond, VP Project Management
Utility Service:	IS	**Project Manager:**	Anthony Bussard

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of INVP 4487 in the amount $*0.281M* with a tolerance of +/- 10% for the purposes of Requirements and Design.

This sanction amount is $0.281M broken down into:

$0.117M Capex
$0.164M Opex
$0.000M Removal

NOTE the potential investment of $1.461M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of

1.2 Project Summary

This investment provides funding for an infrastructure upgrade to the Automated Contractor Invoicing System (ACIS) used for managing contractor invoicing. ACIS is a Gold band application and the current infrastructure is identified as out-of-support.

This project upgrades the ACIS infrastructure and brings it back into compliance for a Gold band application. A Gold Band application is considered operationally critical because the system supports the management of the physical network infrastructure and/or emergency response that if not available for an extended period will impact upon the safe and reliable operation of National Grid. This includes replacing the server hardware and software, upgrading the .NET environments, upgrading the Oracle databases and re-pointing existing interfaces to the new database. Also included is migrating the existing ACIS modules and associated data to the newly deployed environments.

REDACTED

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
4487	IS	ACIS Infrastructure Upgrade	1.461
		Total	1.461

1.4 Associated Projects

N/A

1.5 Prior Sanctioning History

N/A

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Apr 2018	Project Sanction

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	This project makes the necessary upgrades to the ACIS infrastructure to meet requirements for a Gold band application. This includes the deployment of new hardware, software and databases and migrating the existing ACIS applications and associated data to the new environments.

REDACTED

1.8 Asset Management Risk Score

Asset Management Risk Score: 31

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

1.9 Complexity Level

○ High Complexity ○ Medium Complexity ◉ Low Complexity ○ N/A

Complexity Score: 12

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18 - 22	◉ Yes ○ No	◉ Over ○ Under ○ NA	$0.915M

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of budget within the IS business has been managed to meet jurisdictional budgetary, statutory and regulatory requirements.

REDACTED

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.058	1.205	0.000	0.000	0.000	0.000	1.263
OpEx	0.000	0.164	0.034	0.000	0.000	0.000	0.000	0.198
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	0.222	1.239	0.000	0.000	0.000	0.000	1.461

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	Aug 2017
Partial Sanction	Jan 2018
Begin Requirements and Design	Feb 2018
Project Sanction	Apr 2018
Begin Development and Implementation	May 2018
Move to Production / Last Go Live	Jan 2019
Project Complete	Jan 2019
Sanction Closure	Apr 2019

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal		☑ Contractor
Construction/Implementation Resources to be provided	☑ Internal		☑ Contractor
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			

REDACTED

Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

N/A

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

REDACTED

US Sanction Paper

2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on January 10, 2018:

(a) APPROVED the investment of $0.281M and a tolerance of ±10% for the purposes of Requirements & Design (R&D).

(b) NOTED the potential run-the-business (RTB) Impact of $0.080M (per annum) for 5 years.

(c) NOTED the potential investment of $1.461M and a tolerance of ±25% contingent upon submittal and approval of a Project Sanction paper following completion of Requirements & Design.

(d) NOTED that Michelle McNaught has the approved financial delegation to undertake the activities stated in (a).

Signature……Date……

David H. Campbell, Vice President, ServCo Business Partnering, USSC Chair

REDACTED

3 Sanction Paper Detail

Title:	ACIS Infrastructure Upgrade	**Sanction Paper #:**	
Project #:	INVP 4487	**Sanction Type:**	Partial Sanction
Operating Company:	Allocated	**Date of Request:**	January 9, 2018
Author:	Dennis Leung	**Sponsor:**	Fredrick Raymond, VP Project Management
Utility Service:	IS	**Project Manager:**	Anthony Bussard

3.1 Background

National Grid has contractual agreements with specific contractors of choice to reduce costs and improve performance. There are currently three contractor groups with these agreements in place – Forestry (Veg), Overhead & Underground Construction (Line) and Civil. All of these contractor groups focus on electric construction only. The National Grid Contract Management Group is responsible for managing these contracts and the associated invoicing. The Contract Management Group has used the Automated Contractor Invoicing System (ACIS) – a unit price driven invoicing system – since August 2005 with Line and Veg contractors to:

- Assign work and make construction documents available to the contractors
- Track the work done by the contractors
- Generate invoices on the contractor's behalf
- Pay contractors for the work completed

Aside from the application itself, ACIS leverages other business systems as part of its overall workflow automation. This is achieved through interfaces with the following systems:

- iReports: Receives work requests (orders) assigned to contractors and houses the related construction documents
- STORMS/iScheduler: Used to assign and schedule contracted work
- SAP General Ledger: Validates accounting strings (work orders and operations)
- SAP Accounts Payable: Initiates electronic payments to contractors after automatically generated invoices have been approved by the appropriate National Grid representative

REDACTED

US Sanction Paper

The ACIS infrastructure has been identified as out-of-support and requires upgrades. ACIS currently leverages Microsoft Windows Server 2003, IBM AIX 5.3, Microsoft .NET 1.1 and Oracle Database 10.2g. As a result of the outdated infrastructure, the business has experienced significant performance and latency issues, as well as repeated outages. This has negatively impacted both the National Grid business and the contractor users.

3.2 Drivers

The primary drivers for this investment are to:

- Replace ageing servers and the application and the Oracle database environments that are at risk of failure and are out of support
- Reduce the risk of business interruption by replacing out of support hardware and software

3.3 Project Description

The ACIS Infrastructure Upgrade will include:

- Upgrading the existing ACIS infrastructure to meet the requirements for a Gold band application. The upgrade applies to the Production and Development/Test environments. Included is new server hardware, application software and database environments and associated licenses, and environment setup
- Upgrading the existing ACIS Line and Veg applications from .NET 1.1 to .NET 4.5
- Migrating the ACIS Line and Veg modules to the new servers
- Deploying new Oracle 12c databases and migrating existing data from the current databases
- Repointing the existing ACIS/STORMS/iScheduler and SAP interfaces to the new database
- Conduct security (penetration) testing on the new environments

3.4 Benefits Summary

The upgrade to the ACIS infrastructure will extend the service life of this key application and reduce the risk of repeated business interruption caused by hardware failure. This investment will complete upgrades to hardware and software that have been identified as out-of-support and is necessary to provide the level of service that the business requires to support the contractor invoicing process.

3.5 Business and Customer Issues

N/A

REDACTED

3.6 Alternatives

Alternative 1: Do Nothing / Defer

From a technology perspective, the current ACIS infrastructure is identified as out-of-support to the point it will not support the addition of any new business/contractor users. The ACIS application, which is operationally critical, will continue to run on out-of-support technology which is at risk of failure. As a result of the outdated infrastructure, there have been significant performance and latency issues, along with numerous outages. This has a negative impact on both business and contractor users.

3.7 Safety, Environmental and Project Planning Issues

There are no significant issues beyond what has been described elsewhere.

3.8 Permitting

N/A

3.9 Investment Recovery

3.9.1 Investment Recovery and Regulatory Implications

Recovery will be reflected at the time of the next rate case for any operating company receiving allocations of these costs.

3.9.2 Customer Impact

N/A

3.9.3 CIAC / Reimbursement

N/A

REDACTED

3.10 Financial Impact to National Grid

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
4487	ACIS Infrastructure Upgrade	Est Lvl (e.g. +/- 25%)	CapEx	0.000	0.058	1.205	0.000	0.000	0.000	0.000	1.263
			OpEx	0.000	0.164	0.034	0.000	0.000	0.000	0.000	0.198
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.222	1.239	0.000	0.000	0.000	0.000	1.461

Total Project Sanction	CapEx	0.000	0.058	1.205	0.000	0.000	0.000	0.000	1.263
	OpEx	0.000	0.164	0.034	0.000	0.000	0.000	0.000	0.198
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total	0.000	0.222	1.239	0.000	0.000	0.000	0.000	1.461

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3.11.2 Project Budget Summary Table

Project Costs Per Business Plan

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.382	0.000	0.000	0.000	0.000	0.000	0.382
OpEx	0.000	0.164	0.000	0.000	0.000	0.000	0.000	0.164
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.546	0.000	0.000	0.000	0.000	0.000	0.546

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.324	(1.205)	0.000	0.000	0.000	0.000	(0.881)
OpEx	0.000	0.000	(0.034)	0.000	0.000	0.000	0.000	(0.034)
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.324	(1.239)	0.000	0.000	0.000	0.000	(0.915)

3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology. The accuracy level of estimate for each project is identified in table 3.11.1

3.11.4 Net Present Value / Cost Benefit Analysis

3.11.4.1 NPV Summary Table

N/A

3.11.4.2 NPV Assumptions and Calculations

N/A

3.11.5 Additional Impacts

N/A

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3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual
Business Representative	Carol Hamilton
Head of PDM	Deborah Rollins
Relationship Manager	Aman Aneja
Program Delivery Director	Michelle McNaught
IS Finance Management	Michelle Harris
IS Regulatory	Daniel DeMauro
DR&S	Marc Mandel
Service Delivery	Mark Mirizio
Enterprise Architecture	Svetlana Lyba

3.12.2 *Reviewers*

Function	Individual	Area
Regulatory	Harvey, Maria	IS
Jurisdictional Delegate(s)	Anand, Sonny	Electric - NE
	Harbaugh, Mark	Electric - NY
	Hill, Terron	FERC
Procurement	DeRosa, Steve	All

4 Appendices

4.1 Sanction Request Breakdown by Project

$M	4487	Total
CapEx	0.117	0.117
OpEx	0.164	0.164
Removal		
Total	0.281	0.281

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4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	0.329	
	SDC Time & Materials	0.404	
	SDC Fixed-Price	-	
	All other personnel	0.050	
	TOTAL Personnel Costs	0.783	
Hardware	Purchase	-	
	Lease	0.010	
Software		0.291	
Risk Margin		0.244	
Other		0.132	
	TOTAL Costs	1.461	

4.2.2 Benefiting Companies

Benefiting Operating Companies	Business Area	State
Niagara Mohawk Power Corp	Elec Distribution	NY
Massachusetts Electric Company	Elec Distribution	MA
Nantucket Electric Company	Elec Distribution	MA
Narragansett Electric Company	Elec Distribution	RI

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4.2.3 IS Ongoing Operational Costs (RTB):

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 17/18**	**Yr. 2 18/19**	**Yr. 3 19/20**	**Yr. 4 20/21**	**Yr. 5 21/22**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	0.009	0.052	0.052	0.052	0.098	**0.261**
RTB if Project is Implemented	-	0.010	0.132	0.132	0.132	0.250	**0.655**
Net change in RTB	-	0.001	0.080	0.080	0.080	0.152	**0.393**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	**-**
Variance to Plan	-	0.001	0.080	0.080	0.080	0.152	**0.393**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	0.007	0.040	0.040	0.040	0.075	**0.201**
App.Sup. - SDC 2	-	-	-	-	-	-	**-**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	0.073	0.073	0.073	0.138	**0.357**
SaaS	-	-	-	-	-	-	**-**
HW support	-	0.003	0.019	0.019	0.019	0.036	**0.097**
Other: IS	-	0.000	0.000	0.000	0.000	(0.000)	**0.000**
All IS-related RTB (sub-Total)	-	0.010	0.132	0.132	0.132	0.250	**0.655**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	-	0.010	0.132	0.132	0.132	0.250	**0.655**

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

N/A

REDACTED

US Sanction Paper

Title:	Cascade Electric Application Upgrade	**Sanction Paper #:**	
Project #:	INVP 3986	**Sanction Type:**	Partial Sanction
Operating Company:	Allocated	**Date of Request:**	November 17, 2017
Author:	Dennis Leung	**Sponsor:**	Kasia Kulbacka, VP Elec Sys Engineering
Utility Service:	IS	**Project Manager:**	Lynne Santangelo

1 Executive Summary

1.1 Sanctioning Summary

This paper requests Partial Sanction of INVP 3986 in the amount $0.455M with a tolerance of +/- 25% for the purposes of Requirements and Design.

This sanction amount is $0.455M *broken down into:*

$0.174M *Capex*
$0.281M *Opex*
$0.000M *Removal*

NOTE the potential investment of $0.956M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of Requirements and Design.

1.2 Project Summary

This investment will provide funding for an upgrade to the Cascade Electric Application used for predictive maintenance, asset health and compliance tracking of field assets. The Cascade Electric Application version 3.3.1 is no longer supported by the vendor.

This project will upgrade Cascade Electric Environments on desktop, laptop, field devices, Citrix and background server applications to release 3.5.1, the Oracle 10 database to the newest compatible version and re-point the existing interfaces to the new databases, and it will replace server hardware.

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
INVP 3986		Cascade Electric App Upgrade	0.956
		Total	0.956

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1.4 Associated Projects

N/A

1.5 Prior Sanctioning History

N/A

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Feb 2018	Full Sanction

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
○ Mandatory ◉ Policy- Driven ○ Justified NPV ○ Other	This policy-driven project will upgrade the Cascade Electric Application and Oracle Databases to vendor supported versions.

1.8 Asset Management Risk Score

Asset Management Risk Score: 48

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

REDACTED

US Sanction Paper

1.9 Complexity Level

○ High Complexity ○ Medium Complexity ◉ Low Complexity ○ N/A

Complexity Score: 11

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18/22	◉ Yes ○ No	◉ Over ○ Under ○ NA	$0.420M

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of budget within the IS business has been managed to meet jurisdictional budgetary, statutory and regulatory requirements.

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.257	0.258	0.000	0.000	0.000	0.000	0.514
OpEx	0.000	0.284	0.158	0.000	0.000	0.000	0.000	0.442
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	0.541	0.416	0.000	0.000	0.000	0.000	0.956

REDACTED

nationalgrid

US Sanction Paper

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	Aug 2017
Partial Sanction	Oct 2017
Begin Requirements and Design	Nov 2017
Full Sanction	Feb 2018
Begin Development and Implementation	Mar 2018
Move to Production / Last Go Live	Jun 2018
Project Complete	Jun 2018
Closure Sanction	Sep 2018

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

N/A

REDACTED

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

REDACTED

US Sanction Paper

2 Decisions

The US IS Sanctioning Committee (ISSC) and Key External Stakeholders reviewed and approved the content of the investment including:

(a) APPROVED the investment of $0.455M and a tolerance of +/- 25% for the purposes of requirements and design.

(b) NOTED the potential RTB Impact of $0.008M (per annum) for 5 years.

(c) NOTED the potential investment of $0.956M and a tolerance of +/-25% contingent upon submittal and approval of a Project Sanction paper following completion of requirements and design.

(d) NOTED that Lynne Santangelo has the approved financial delegation to undertake the activities stated in (a).

Signature……..Date……

Anuraag Bhargava
US CIO

REDACTED

3 Sanction Paper Detail

Title:	Cascade Electric Application Upgrade	**Sanction Paper #:**	
Project #:	INVP 3986	**Sanction Type:**	Partial Sanction
Operating Company:	Allocated	**Date of Request:**	November 17, 2017
Author:	Dennis Leung	**Sponsor:**	Kasia Kulbacka, VP Elec Sys Engineering
Utility Service:	IS	**Project Manager:**	Lynne Santangelo

3.1 Background

Cascade is the technical asset management tool used for predictive maintenance, asset health and compliance tracking which allows us to minimize the risk of failures and maximize equipment lifetimes. Cascade is an integral part of the Visual and Operational Inspection (V&O) process. National Grid relies on Cascade data to determine equipment maintenance activities to ensure compliance with both internal and external mandated maintenance requirements. It is used to report on the number of maintenance activities performed and dollar expenditures to the Massachusetts Department of Public Utilities (DPU), New York Public Service Commision (PSC) and Rhode Island Public Utilities Comission (PUC).

This investment will deliver upgrades to the “Cascade Electric Application”, the asset and maintenance management system for Electric Substations, high-voltage, direct current (HVDC) electric power transmission system, Relay & Telecommunication Assets and Underground Network Systems. The current version of Cascade is unsupported by the vendor. Moreover, the hardware and software supporting Cascade, Oracle 10g, Windows Server 2003 and Citrix version 9, are out of support. The vendor has indicated an upgrade to the latest software release is required in order to remain compliant with regulatory reporting requirements. Additionally, the out of support hardware and software increase the likelihood of equipment/database failures that may delay regulatory reporting.

Cascade tracks and reports on compliance of maintenance activities required by Northeast Power Coordinating Council, Inc. (NPCC), North American Electric Reliability Corporation (NERC), Environmental Protection Agency (EPA), Department of Public Utilities (DPU), Public Service Commission (PSC) and local government jurisdictions. Failure to accurately track, schedule, and complete mandated maintenance activates will require self-reporting and non-compliances will result in future monetary penalties.

REDACTED

Dollar value will be imposed by the agency based on severity of violation and number of violations with maximum penalties reaching 1 million dollars per day until violations are corrected.

3.2 Drivers

- Increased system reliability by running current/ supported version of software as current version experiences many database blocks which causes the system to lock up.

- Mitigation of risk associated with running out of support hardware/software, such as lack of security patching, poor reliability from running aging hardware, increased support costs and lead-times due to difficult to obtain hardware and outside specialized expertise.

- Regulatory compliance tracking was added to the latest release satisfying the utility's reporting requirements

- Improved field data collection through the use of a new inspection application has the potential to increase data reliability and overall system reliability, reducing the risk of potential fines. This aligns with the new data collection tablet already rolled out

- Ability to generate completed work orders deemed compliance related versus manual tracking and reporting to Reliability Compliance group.

- Additional maintenance triggers that are required by the PTO organization are included in the release. This will allow this group to prioritize and plan its maintenance program

3.3 Project Description

This investment will provide the funding required to modernize the Cascade Electric Application including:

- Upgrade the Cascade Application to a vendor supported version
- Database upgrade from Oracle 10 to newest compatible version
- Replacement of server hardware
- Repointing of interfaces

3.4 Benefits Summary

- Reduced vulnerabilities from the lack of vendor support and security patching on out of support hardware and software.

REDACTED

- Improved tracking & reporting of maintenance activities required by the NPCC, NERC, EPA, DPU,PSC, PSC and local government jurisdictions resulting in a reduction of the man-hour effort needed on a monthly/yearly basis.

- Enhanced data collection as latest release support modern field devices (tablets) resulting in an increase of the accuracy of equipment readings collected which in turn will lead to improved predictions of asset, thus reducing potential outages.

- Resources utilized for manual tracking efforts will be freed up for other duties.

3.5 Business and Customer Issues

There are no significant issues beyond what has been described elsewhere.

3.6 Alternatives

Alternative 1: Do Nothing/Defer:
This is not a viable alternative. If Cascade remains on its current unsupported platform, there is: the increased likelihood of equipment/database failure, the risk of not meeting regulatory reporting obligations and additional yearly support costs to keep platform operational.

3.7 Safety, Environmental and Project Planning Issues

There are no significant issues beyond what has been described elsewhere.

3.8 Execution Risk Appraisal

N/A

3.9 Permitting

N/A

REDACTED

US Sanction Paper

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

N/A

3.10.3 CIAC / Reimbursement

N/A

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
INVP 3986	Cascade Electric App Upgrade	Est Lvl (e.g. +/- 25%)	CapEx	0.000	0.257	0.258	0.000	0.000	0.000	0.000	0.514
			OpEx	0.000	0.284	0.158	0.000	0.000	0.000	0.000	0.442
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.541	0.416	0.000	0.000	0.000	0.000	0.956

Total Project Sanction	CapEx	0.000	0.257	0.258	0.000	0.000	0.000	0.000	0.514
	OpEx	0.000	0.284	0.158	0.000	0.000	0.000	0.000	0.442
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total	0.000	0.541	0.416	0.000	0.000	0.000	0.000	0.956

REDACTED

US Sanction Paper

3.11.2 Project Budget Summary Table

Project Costs Per Business Plan

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.375
OpEx	0.000	0.161	0.000	0.000	0.000	0.000	0.000	0.161
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.536	0.000	0.000	0.000	0.000	0.000	0.536

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.118	(0.258)	0.000	0.000	0.000	0.000	(0.139)
OpEx	0.000	(0.123)	(0.158)	0.000	0.000	0.000	0.000	(0.281)
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	(0.005)	(0.416)	0.000	0.000	0.000	0.000	(0.420)

3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology. The accuracy level of estimate for each project is identified in table 3.11.1

3.11.4 Net Present Value / Cost Benefit Analysis

N/A

3.11.4.1 NPV Summary Table

N/A

3.11.4.2 NPV Assumptions and Calculations

N/A

3.11.5 Additional Impacts

N/A

REDACTED

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual
Business Representative	Jeffrey White
Head of PDM	Deb Rollins
Relationship Manager	Aman Aneja
Program Delivery Director	Michelle Mcnaught
IS Finance Management	Michelle Harris
IS Regulatory	Tom Gill
DR&S	Peter Shattuck
Service Delivery	Mark Mirizio
Enterprise Architecture	Svetlana Lyba

3.12.2 Reviewers

N/A

4 Appendices

4.1 Sanction Request Breakdown by Project

$M	INVP 3986	Total
CapEx	0.174	0.174
OpEx	0.281	0.281
Removal	0.000	0.000
Total	0.455	0.455

REDACTED

4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing**
Personnel	NG Resources	0.407	
	SDC Time & Materials	0.211	
	SDC Fixed-Price	-	
	All other personnel	0.073	
	TOTAL Personnel Costs	0.691	
Hardware	Purchase	-	
	Lease	0.053	
Software		0.065	
Risk Margin		0.071	
Other		0.076	
	TOTAL Costs	0.956	

4.2.2 Benefiting Operating Companies

Benefiting Operating Companies	Business Area	State
Niagara Mohawk Power Corp	Elec Distribution	NY
Massachusetts Electric Company	Elec Distribution	MA
Nantucket Electric Company	Elec Distribution	MA
Narragansett Electric Company	Elec Distribution	RI
Niagara Mohawk Power Corp - Transmission	Elec Transmission	NY
Massachusetts Electric Company - Transmission	Elec Transmission	FERC
Narragansett Electric Company - Transmission	Elec Transmission	FERC
New England Power Company - Transmission	Elec Transmission	FERC
NE Hydro – Trans Electric Co.	Elec Transmission	FERC
New England Hydro – Trans Corp	Elec Transmission	FERC
New England Electric – Trans Corp	Elec Transmission	FERC

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4.2.3 IS Ongoing Operational Costs (RTB):

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	Yr. 1 17/18	Yr. 2 18/19	Yr. 3 19/20	Yr. 4 20/21	Yr. 5 21/22	Yr. 6+	Total
RTB if Status Quo Continues	-	0.072	0.086	0.086	0.086	0.141	**0.471**
RTB if Project is Implemented	-	0.078	0.094	0.094	0.094	0.153	**0.512**
Net change in RTB	-	0.006	0.008	0.008	0.008	0.012	**0.042**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	-
Variance to Plan	-	0.006	0.008	0.008	0.008	0.012	**0.042**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	0.037	0.044	0.044	0.044	0.073	**0.243**
App.Sup. - SDC 2	-	-	-	-	-	-	-
App.Sup. - other	-	-	-	-	-	-	-
SW maintenance	-	0.012	0.014	0.014	0.014	0.024	**0.079**
SaaS	-	-	-	-	-	-	-
HW support	-	0.029	0.035	0.035	0.035	0.057	**0.190**
Other: IS	-	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	**(0.000)**
All IS-related RTB (sub-Total)	-	0.078	0.094	0.094	0.094	0.153	**0.512**
Business Support (sub-Total)	-	-	-	-	-	-	-
Total RTB Costs	-	0.078	0.094	0.094	0.094	0.153	**0.512**

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

N/A

Investment Proposal Summary Sheet
US SAP: Solution Manager Upgrade – Project No. INVP 4588
March 17, 2017

Region:	US	**Category:**	Policy	**Legal Entity:**	Shared
Risk Score:	36	**Primary Driver:**	Reliability	**Project Classification:**	L

Project Description:

This paper requests sanction of INVP 4588 in the amount $0.529M with a tolerance of +/- 10% for the purposes of a Full Project.

This sanction amount is $0.529M broken down into:

$ 0.295M CapEx
$ 0.233M OpEx
$ 0.000M Removal

Brief Description

This policy-driven project goal is to upgrade and enhance US SAP Solution Manager. US SAP Solution Manager is an integrated end-to-end platform which is used by National Grid to adopt new developments, managing the application lifecycle, and running US SAP Portfolio of Applications.

Background

US SAP Solution Manager module used by National Grid is at Version 7.1 which does not have robust capabilities for System Monitoring and Alerting. As a result, lot of manual effort is spent in system monitoring and metrics reporting. This project upgrades Solution Manager to Version 7.2 and activates the functionality required for enhanced System Monitoring and Alerting, Data Volume Management, and Change and Release Management.

This project is part of INVP4688, US SAP: Improve Back-office Systems Functionality Program of work.

Business Sponsor: Anuraag Bhargava (IS), Shibu George (IS Service Delivery).

Project Costs [$]k	**Yr 1 16/17**	**Yr 2 17/18**	**Yr 3 18/19**	**Yr 4 19/20**	**Yr 5 20/21**	**Total**
Start-Up – OPEX	20.00					20.00
Start-Up – CAPEX						
Start-Up – risk margin	2.00					2.00
Start-Up SUBTOTAL	**22.00**					**22.00**
Requirements & Design - OPEX	30.00					30.00
Requirements & Design – CAPEX						
Requirements & Design – risk margin	3.00					3.00
R&D SUBTOTAL	**33.00**					**33.00**
Development & Implementation – OPEX						
People	41.00	118.00				159.00
Software						
Hardware						
Telecommunications						
Service Contracts						
Risk Margin	5.00	14.00				19.00
Development & Implementation – CAPEX						
People	210.00	3.00				213.00
Software						
Hardware	53.00					53.00

Telecommunications							
Service Contracts							
Risk Margin		30.00					30.00
D&I SUBTOTAL		**338.00**	**135.00**				**474.00**
TOTAL PROJECT COSTS		**394.00**	**135.00**				**529.00**
Non-regulated project – UPLIFT							
Non-regulated project – TOTAL							
Investment Plan No: 4588	Budget OPEX	101.00	132.00				233.00
Budget Exception	Budget CAPEX	293.00	3.00				296.00
Impact on RTB costs		0	0	0	0	0	0

Benefiting Operating Companies	Business Area	State
Niagara Mohawk Power Corp.- Electric Distr.	Electric Distribution	NY
Massachusetts Electric Company	Electric Distribution	MA
KeySpan Energy Delivery New York	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
Boston Gas Company	Gas Distribution	MA
Narragansett Electric Company	Electric Distribution	RI
Niagara Mohawk Power Corp. - Transmission	Transmission	NY
Niagara Mohawk Power Corp. - Gas	Gas Distribution	NY
New England Power Company – Transmission	Transmission	MA, NH, RI, VT
KeySpan Generation LLC (PSA)	Generation	NY
Narragansett Gas Company	Gas Distribution	RI
Colonial Gas Company	Gas Distribution	MA
Narragansett Electric Company – Transmission	Transmission	RI
National Grid USA Parent	Parent Company	
Nantucket Electric Company	Electric Distribution	MA
NE Hydro - Trans Electric Co.	Inter Connector	MA,NH
KeySpan Energy Development Corporation	Non-Regulated	NY
KeySpan Port Jefferson Energy Center	Generation	NY
New England Hydro - Trans Corp.	Inter Connector	MA, NH
KeySpan Services Inc. Service Company	Service Company	
KeySpan Glenwood Energy Center	Generation	NY
Massachusetts Electric Company – Transmission	Transmission	MA
NG LNG LP Regulated Entity	Gas Distribution	MA, NY, RI
Transgas Inc	Non-Regulated	NY
Keyspan Energy Trading Services	Other	NY
KeySpan Energy Corp. Service Company	Service Company	
New England Electric Trans Corp	Inter Connector	MA
New England Electric Trans Corp	InterConnector	MA

TOTAL BENEFITS [$]k						

Key Business Benefits:

- Automate system monitoring processes and reduce efforts in manual labor. Benefits can be realized as early as upgrade is completed and functionality/configuration has been activated.
- Improved System Monitoring with proactive status overview for technical systems, instances, databases and hosts.
- Unified Alert inbox:
  - Central access point for all alert from the different monitoring scenarios
  - Integration of Incident & Notification Management
  - Root-cause Analysis and collaboration features
- Prepare and meet prerequisite for future EHP upgrade across ECC, BW, NW, SRM systems.
- Enhance system reliability and integration with other SAP / 3rd party systems.
- Additional business functionalities can be enabled like:
  - Data volume management
  - Business Process Monitoring

Key risks:	**Key Dates (Month/ Year)**: Start Up **Jan/2017** Requirements and Design **Feb/2017** Development and Implementation **Apr/2017** Project Complete **May/2017** Project Closure **Jul/2017**

The supporters listed have aligned their part of the business to support the project.

Role	Individual's Name
Business Executive Sponsor	Anuraag Bhargava, SVP CIO
Business Lead	Ronald Pascual
Head of PDM	Deb Rollins
Relationship Manager	Joel Semel
Program Delivery Manager	Samir Parikh
IS Finance Management	Chip Benson
Enterprise Architect	Henrik Magnusson
IS Regulatory	Tom Gill

RECOMMENDATIONS

The Sanctioning Authority is invited to:

a) APPROVE the investment of $0.529M including risk margin of $0.055M.

b) NOTE that Anuraag Bhargava, SVP Chief Information Officer, is the Project Sponsor.

c) NOTE that Samir Parikh, is the Project Delivery Manager and has the approved financial delegation to deliver the project.

Decision of the Sanctioning Authority

I hereby approve the recommendations made in this paper.

Signature…….. Date……

Anuraag Bhargava, SVP Chief Information Officer

REDACTED

US Sanction Paper

Title:	New Medical System	**Sanction Paper #:**	
Project #:	INVP 3718 Capex: S007669	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	October 13, 2017
Author:	Susan Stallard / Sarah Slade	**Sponsor:**	David Way, SVP Safety, Health, Environment
Utility Service:	IS	**Project Manager:**	Sally Seltzer / Sarah Slade

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of INVP 3718 in the amount $0.699M with a tolerance of +/- 10% for the purposes of Development and Implementation.

This sanction amount is $0.699M broken down into:

$0.388M Capex
$0.311M Opex
$0.000M Removal

1.2 Project Summary

This project seeks to consolidate multiple systems and processes into a new single Medical System solution by replacing the outdated in-house legacy National Grid Medical Systems Database and antiquated paper file systems residing in multiple locations. Cority's Medical System was selected as the system which closely matches National Grids requirements. The system is a SaaS solution which is hosted and maintained by the vendor. This project will implement the solution along with converting existing data and building interfaces to support its use at National Grid.

1.3 Summary of Projects

Project Number	Project Title	Estimate Amount ($M)
INVP 3718	New Medical System	0.699
	Total	0.699

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1.4 Associated Projects

Project Number	Project Title	Estimate Amount ($M)
INVP 4365	New Medical System F&A	0.085
	Total	0.085

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
Apr 2017	ISSC	$0.268M	$0.752M	New Medical System	Partial	+/- 10%

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
May 2018	Project Closure

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
◉ Mandatory ○ Policy- Driven ○ Justified NPV ○ Other	OSHA, HIPPA and Regulatory requirements call for the securely handing of Employee Medical information with regards to limited access and controls in place.

REDACTED

US Sanction Paper

1.8 Asset Management Risk Score

Asset Management Risk Score: 45

Primary Risk Score Driver: (Policy Driven Projects Only)

○ Reliability ○ Environment ○ Health & Safety ◉ Not Policy Driven

1.9 Complexity Level

○ High Complexity ○ Medium Complexity ◉ Low Complexity ○ N/A

Complexity Score: 14

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
IS Investment Plan FY18 - 22	◉ Yes ○ No	◉ Over ○ Under ○ NA	$0.314M

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the US business has been managed to meet jurisdictional budgetary, statutory and regulatory requirements. Future fiscal year forecasts will be addressed in future year business plans.

REDACTED

1.13 Current Planning Horizon

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.388	0.000	0.000	0.000	0.000	0.000	0.388
OpEx	0.000	0.311	0.000	0.000	0.000	0.000	0.000	0.311
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	0.699	0.000	0.000	0.000	0.000	0.000	0.699

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Up	Mar 2017
Partial Sanction	Apr 2017
Begin Requirements and Design	May 2017
Project Sanction	Sep 2017
Begin Development and Implementation	Sep 2017
Move to Production / Last Go Live	Jan 2018
Project Complete	Feb 2018
Sanction Closure	May 2018

REDACTED

US Sanction Paper

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources)

N/A

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References

N/A

REDACTED

2 Decisions

The US IS Sanctioning Committee (ISSC) and Key External Stakeholders, reviewed and approved the content of the investment including:

(a) APPROVE this paper and the investment of $0.699M and a tolerance of +/-10%.

(b) APPROVE the run-the-business (RTB) impact of $0.115M (per annum) for 5 years.

(c) NOTE that Sally Seltzer is the Project Manager and has the approved financial delegation.

Signature……..Date…….

Anuraag Bhargava
US CIO

REDACTED

3 Sanction Paper Detail

Title:	New Medical System	**Sanction Paper #:**	
Project #:	INVP 3718 Capex: S007669	**Sanction Type:**	Sanction
Operating Company:	National Grid USA Svc. Co.	**Date of Request:**	October 13, 2017
Author:	Susan Stallard / Sarah Slade	**Sponsor:**	David Way, SVP Safety, Health, Environment
Utility Service:	IS	**Project Manager:**	Sally Seltzer / Sarah Slade

3.1 Background

National Grid currently utilizes several in house developed systems, and paper files, to track employee Health, Safety and Wellness issues. These systems are old and provide limited functionality to support new OSHA and other regulatory requirements. Manual workarounds and use of Third Party Vendors are required to support reporting requirements.

This investment will consolidate all National Grid employees and medical information to a single system which meets mandatory tracking and reporting requirements.

The Medical System from Cority was selected from a Feasibility and Analysis study which was conducted under the project INVP 4365 New Medical System F&A, as the system which most closely matched National Grid's requirements along with determining costs and time frames.

3.2 Drivers

The primary drivers of this investment are:

- Maintain compliance with Federal, State and Local regulations regarding the storage, accessibility and use of Employee Medical information;
- Maintain National Grids policies concerning:
  - Drug Testing;
  - Worker Injury; and
  - Employee Health and Wellbeing.

REDACTED

US Sanction Paper

3.3 Project Description

The scope of this project will be to:

- Implement Cority's New Medical System;
- Convert employee information from the existing medical system to the new medical system;
- Build new interface with National Grids employee record database (SAP) to synchronize employee information;
- Build data import process with 3rd party drug testing results partner; and
- Decommissioning of the existing medical system and associtated Business Object reports.

Out of scope activities for this project will include:

- Conversion of employee medical paper files to electronic files;
- Random drug testing interface with the JJ Keller; and
- Medical card process interface with the Federal department of transportation (Federal DOT system).

Cority's Medical System is a SaaS based solution where the vendor will host and support the application.

3.4 Benefits Summary

Non Financial Benefits of this project are:

- Enable National Grid to meet its Regulatory obligation by securely maintaining Employee Medical information;
- Store medical records electronically, providing quicker access and reducing the number of paper files kept containing employee medical information;
- Provide the ability to manage, track and report on employee health and medical related information and enabling better control of employee medical information;
- Consolidate the information and eliminate use of multiple antiquated systems;
- Support electronic submission of prescriptions;
- Track injured workers, including those with light duty assignments and medical restrictions; and
- Manage exam requirements and compliance of those exams.

3.5 Business and Customer Issues

There are no significant business issues beyond what has been described elsewhere.

3.6 Alternatives

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US Sanction Paper

Alternative 1: Do Nothing
This alternative has been rejected as utilizing the current collection of older systems and paper processes to support employee Medical and Health management, tracking and reporting requirements is becoming increasingly difficult. The current systems do not easily support new requirements, causing manual workarounds and outsourcing to third parties to support compliance. With additional requirements being planned doing nothing is not a viable option.

Alternative 2: Delay Investment into the Future
This alternative has been rejected as new requirements such as the electric submission of all prescriptions is now required and additional requirements are being planned to take effect in the near future. Driven by the need for interaction with vendors and providers utilizing ICD codes to ensure proper communications, along with the need to easily manage and track required exams by job title, thus requiring a solution be implemented in the near term.

Alternative 3: Upgrade Current Medical Databases
This alternative has been rejected as the current National Grid systems are old custom built databases and paper files which do not meet National Grid required functionality and reporting. The costs to upgrade these systems and add new functionality would far exceed the costs of a new industry standard Medical System.

3.7 Safety, Environmental and Project Planning Issues

N/A

3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	The Business has many paper files, and have not decided on a plan on how to convert these files to digital files. If this will be included in the project, it may impact schedule and cost.	2	3	3	6	6	Mitigate	The Business is looking at hiring a vendor to scan the paper documents. The conversion to Medgate maybe included in a second phase.	The Business will continue to access the paper files until they are converted to digial copies.	

3.9 Permitting

N/A

REDACTED

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Recovery will occur at the time of the next rate case for any operating company receiving allocations of these costs.

3.10.2 Customer Impact

The is no expected impact to Customers related to this investment.

3.10.3 CIAC / Reimbursement

N/A

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

					Current Planning Horizon						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
INVP 3718	New Medical System	+/- 10%	CapEx	0.000	0.388	0.000	0.000	0.000	0.000	0.000	0.388
			OpEx	0.000	0.311	0.000	0.000	0.000	0.000	0.000	0.311
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.699	0.000	0.000	0.000	0.000	0.000	0.699

Total Project Sanction	CapEx	0.000	0.388	0.000	0.000	0.000	0.000	0.000	0.388
	OpEx	0.000	0.311	0.000	0.000	0.000	0.000	0.000	0.311
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total	0.000	0.699	0.000	0.000	0.000	0.000	0.000	0.699

REDACTED

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OpEx	0.000	0.385	0.000	0.000	0.000	0.000	0.000	0.385
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	0.385	0.000	0.000	0.000	0.000	0.000	0.385

Variance **(Business Plan-Project Estimate)**

		Current Planning Horizon						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
CapEx	0.000	(0.388)	0.000	0.000	0.000	0.000	0.000	(0.388)
OpEx	0.000	0.074	0.000	0.000	0.000	0.000	0.000	0.074
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan	0.000	(0.314)	0.000	0.000	0.000	0.000	0.000	(0.314)

3.11.3 Cost Assumptions

This estimate was developed in 2017 using the standard IS estimating methodology. The accuracy level of estimate for each project is identified in table 3.11.1.

3.11.4 Net Present Value / Cost Benefit Analysis

This is not a NPV project.

3.11.4.1 NPV Summary Table

3.11.4.2 NPV Assumptions and Calculations

3.11.5 Additional Impacts

None.

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3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual
Business Representative	Denise Griffing
Head of PDM	Deborah Rollins
Relationship Manager	Rick Sheer
Program Delivery Director	Sally Seltzer
IS Finance Management	Michelle Harris
IS Regulatory	Tom Gill
DR&S	Elaine Wilson
Service Delivery	Mark Mirizo
Enterprise Architecture	Svetlana Lyba

3.12.2 Reviewers

N/A

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4 Appendices

4.1 Sanction Request Breakdown by Project

N/A

4.2 Other Appendices

4.2.1 Project Cost Breakdown

Project Cost Breakdown			
Cost Category	**sub-category**	**$ (millions)**	**Name of Firm(s) providing resources**
Personnel	NG Resources	0.128	National Grid
	SDC Time & Materials	0.160	IBM, Wipro
	SDC Fixed-Price	0.026	
	All other personnel	0.176	Medgate Professional Services
	TOTAL Personnel Costs	0.489	
Hardware	Purchase	0.005	
	Lease	-	
Software		0.116	Medgate Medical Software, Dragon Software
Risk Margin		0.061	Risk
Other		0.028	Shared Costs, AFUDC, Other
	TOTAL Costs	0.699	

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4.2.2 Benefitting Operating Companies

The following are the benefitting operating companies:

Operating Company Name	Business Area	State
KeySpan Energy Delivery New York	Gas Distribution	NY
KeySpan Energy Delivery Long Island	Gas Distribution	NY
KeySpan Generation LLC (PSA)	Generation	NY
KeySpan Glenwood Energy Center	Generation	NY
KeySpan Port Jefferson Energy Center	Generation	NY
Niagara Mohawk Power Corp.- Electric Distr.	Electric Distribution	NY
Niagara Mohawk Power Corp. - Gas	Gas Distribution	NY
Niagara Mohawk Power Corp. - Transmission	Transmission	NY
Massachusetts Electric Company	Electric Distribution	MA
Massachusetts Electric Company – Transmission	Transmission	MA
Nantucket Electric Company	Electric Distribution	MA
Boston Gas Company	Gas Distribution	MA
Colonial Gas Company	Gas Distribution	MA
Narragansett Gas Company	Gas Distribution	RI
Narragansett Electric Company	Electric Distribution	RI
Narragansett Electric Company – Transmission	Transmission	RI
New England Power Company – Transmission	Transmission	MA, NH, RI, VT
New England Hydro – Trans Corp	Transmission	MA, NH, RI, VT
New England Electric Trans Corp	Transmission	MA, NH, RI, VT
NG LNG LP Regulated Entity	Gas Distribution	MA, NY, RI

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4.2.3 IS Ongoing Operational Costs (RTB)

This project will decrease IS on-going operations support costs as per the following table. These are known as Run the Business (RTB) costs.

Summary Analysis of RTB Costs							
All figures in $ millions **Forecast of RTB Impact**	**Yr. 1 16/17**	**Yr. 2 17/18**	**Yr. 3 18/19**	**Yr. 4 19/20**	**Yr. 5 20/21**	**Yr. 6+**	**Total**
RTB if Status Quo Continues	-	-	0.009	0.009	0.009	0.018	**0.045**
RTB if Project is Implemented	-	-	0.124	0.124	0.124	0.247	**0.620**
Net change in RTB	-	-	0.115	0.115	0.115	0.229	**0.575**
RTB Variance Analysis (if Project is Implemented)							
Net Δ RTB funded by Plan(s)	-	-	-	-	-	-	**-**
Variance to Plan	-	-	0.115	0.115	0.115	0.229	**0.575**
Total RTB Costs - by Cost Type (if Project is Implemented)							
App.Sup. - SDC 1	-	-	0.005	0.005	0.005	0.010	**0.025**
App.Sup. - SDC 2	-	-	0.015	0.015	0.015	0.030	**0.075**
App.Sup. - other	-	-	-	-	-	-	**-**
SW maintenance	-	-	-	-	-	-	**-**
SaaS	-	-	0.104	0.104	0.104	0.207	**0.520**
HW support	-	-	-	-	-	-	**-**
Other: IS	-	-	(0.000)	(0.000)	(0.000)	-	**(0.000)**
All IS-related RTB (sub-Total)	-	-	0.124	0.124	0.124	0.247	**0.620**
Business Support (sub-Total)	-	-	-	-	-	-	**-**
Total RTB Costs	-	-	0.124	0.124	0.124	0.247	**0.620**