Raquel J. Webster
Senior Counsel

March 14, 2016

BY HAND DELIVERY AND ELECTRONIC MAIL

Luly E. Massaro, Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

RE: Docket 4592 - National Grid's Proposed FY 2017 Electric Infrastructure, Safety, and Reliability Plan
Responses to Record Requests

Dear Ms. Massaro:

I have enclosed ten copies of National Grid's[1] responses to the record requests that were issued at the Public Utilities Commission's (PUC) evidentiary hearing on February 22, 2016 in the above-referenced docket.

Please be advised that National Grid is requesting confidential treatment of Attachment RR-1 in response to Record Request No. 1 pursuant to PUC Rule 1.2(g) and R.I. Gen. Laws § 38-2-2(4)(B).

The Company's response to Record Request No. 3 will be forthcoming.

Thank you for your attention to this matter. If you have any questions, please contact me at 781-907-2121.

Very truly yours,

Raquel J. Webster

Enclosures

cc: Docket 4592 Service List
Leo Wold, Esq.
Steve Scialabba, Division
Greg Booth, Division

[1] The Narragansett Electric Company d/b/a National Grid (National Grid or the Company).

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Certificate of Service

I hereby certify that a copy of the cover letter and any materials accompanying this certificate was electronically transmitted to the individuals listed below.

The paper copies of this filing are being hand delivered to the Rhode Island Public Utilities Commission and to the Rhode Island Division of Public Utilities and Carriers.

Joanne M. Scanlon

March 14, 2016
Date

Docket No. 4592 National Grid's Electric Infrastructure, Safety and Reliability Plan FY 2017 - Service List as of 1/21/16

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STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
RHODE ISLAND PUBLIC UTILTITES COMMISSION

Proposed Electric ISR Plan FY 2017 **Docket No. 4592**

NATIONAL GRID'S MOTION FOR PROTECTIVE TREATMENT OF CONFIDENTIAL INFORMATION

Pursuant to R.I. Gen. Laws § 38-2-2(4)(B) and PUC Rule 1.2(g), National Grid[1] respectfully requests that the Rhode Island Public Utilities Commission (PUC) provide confidential treatment and grant protection from public disclosure the South Street station construction agreement, which the Company has provided as an attachment to Record Request No. 1. National Grid also respectfully requests that, pending entry of that finding, the PUC preliminarily grant National Grid's request for confidential treatment pursuant to Rule 1.2 (g)(2).

I. BACKGROUND

On March 14, 2016, National Grid filed with the PUC its responses to the PUC's Record Requests in this docket. In Record Request No. 1, the PUC requests information regarding the South Street station construction contract, including the executed agreement on costs. In responding to this record request, the Company has submitted a confidential version of the executed contract for the construction work at the South Street station. This confidential agreement is the result of a competitive and proprietary bid process, and includes highly sensitive and confidential information about the South Street station project, including financial

[1] The Narragansett Electric Company d/b/a National Grid (National Grid or the Company).

and other contractual terms. Because National Grid considers this information as confidential and proprietary, National Grid respectfully requests that the PUC treat the agreement attached to its Response to Record Request No. 1 as confidential.

II. LEGAL STANDARD

The PUC's Rule 1.2(g) provides that access to public records shall be granted in accordance with the Access to Public Records Act ("APRA"), R.I.G.L. §38-2-1 *et seq.* Under the APRA, all documents and materials submitted in connection with the transaction of official business by an agency is deemed to be a "public record," unless the information contained in such documents and materials falls within one of the exceptions specifically identified in R.I.G.L. §38-2-2(4). Therefore, to the extent that information provided to the PUC falls within one of the designated exceptions to the public records law, the PUC has the authority under the terms of the APRA to treat such information as confidential and to protect that information from public disclosure.

In that regard, R.I. Gen. Laws § 38-2-2(4)(B) provides that the following types of records shall not be deemed public:

> Trade secrets and commercial or financial information obtained from a person, firm, or corporation which is of a privileged or confidential nature.

The Rhode Island Supreme Court has held that this confidential information exemption applies where disclosure of information would likely either (1) impair the Government's ability to obtain necessary information in the future; or (2) cause substantial harm to the competitive position of the person from whom the information was obtained. Providence Journal Company v. Convention Center Authority, 774 A.2d 40 (R.I. 2001). The first prong of the test is satisfied when information is voluntarily provided to the governmental agency and that information is of a

kind that would customarily not be released to the public by the person from whom it was obtained. Providence Journal, 774 A.2d at 47. National Grid meets the second prong of this test, which applies here.

III. BASIS FOR CONFIDENTIALITY

As noted above, the Company seeks confidential treatment of the agreement for the South Street station project attached to the Company's response to Record Request No. 1. Release of this type of information would be commercially harmful to the Company and to its customers since potential bidders could use this information in such a way that would impede the Company's ability to obtain the best possible contractual arrangements for its customers in the future. Moreover, the Company would not ordinarily make the information contained in the South Street station construction contract public because disclosing this information could seriously impact the Company's ability to obtain advantageous pricing in the future.

IV. CONCLUSION

Accordingly, the Company requests that the PUC grant protective treatment to the confidential agreement attached to its response to Record Request No. 1.

WHEREFORE, for the foregoing reasons, the Company respectfully requests that the PUC grant its Motion for Protective Treatment.

Respectfully submitted,

NATIONAL GRID

By its attorneys,

Raquel J. Webster, RI Bar # 9064
National Grid
40 Sylvan Road
Waltham, MA 02451
(781) 907-2121

Dated: March 14, 2016

Record Request No. 1

Request:

South Street Station - Please provide the date the construction contract was awarded to the vendor. Please identify the vendor. Please provide more updated detail to support the costs along with the executed agreement on cost. Please provide estimates for the installation of screening, specifically including a brick wall.

Response:

The construction contract for the South Street project was awarded on April 21, 2015, and TRC Engineers, Inc. is the primary contractor. Please see Attachment RR-1 for the confidential executed Agreement, which was competitively bid using National Grid's standard competitive bid process. National Grid is requesting confidential treatment of this attachment pursuant to PUC Rule 1.2(g) and R.I. Gen. Laws § 38-2-2(4)(B).

The Company is currently in the process of finalizing the agreement for screening.

Record Request No. 2

Request:

Categorization of assets - Please confirm that National Grid uses FERC's Seven Factor Test to categorize assets between distribution and transmission. If not, please provide the factors used. Please discuss the applicability of the premise that once an asset is in transmission rates, it remains there as it applies to re-categorization of assets between distribution and transmission.

Specifically related to South Street Station, please itemize each component that was categorized as transmission and its current categorization and each that was categorized as distribution and its current categorization. Please explain the basis for any re-categorization and the costs.

Response:

For all new facilities in Rhode Island, National Grid follows the FERC Seven Factor Test to categorize assets as either distribution or transmission. Exchanges or replacements keep the FERC classification as the replaced asset.

The following table itemizes the major components of the South Street Station project, their original classification, current classification, and an explanation for any re-categorization.

Category	**Original Classification**	**Current Classification**	**Explanation if Re-classified**
Site work/fencing/grading	Predominantly Transmission	Predominantly Transmission	N/A
115 kV switches	Transmission	Transmission	N/A
115/11.5 kV transformers	Transmission	Transmission	N/A
Station building housing mostly 11.5kV equipment and some 115kV relaying	Predominantly Transmission	Distribution	The project is not considered a direct replacement, and the 11.5kV equipment no longer serves a transmission function.
11.5 kV switchgear inside the building	Transmission	Distribution	The project is not considered a direct replacement, and the 11.5kV equipment no longer serves a transmission function.

Record Request No. 4

Request:

Project Development Stages - Please provide definitions for each of the four project development stages/grades, including each name by which these stages have been identified in the past 10 years to the PUC. Please explain what considerations are included in each of these stages/grades.

Response:

The four grades of estimates used at National Grid for Distribution projects are listed below. The Company has included alternative naming conventions that may have been used to define estimate grades, including in submissions to the PUC. The Company reviewed the past five years of Electric Infrastructure, Safety, and Reliability (ISR) filings to the PUC, and the term "Preliminary Grade", which is synonymous with "Planning Grade", was used in the FY 2015 Electric ISR Plan. The estimate grades are as follows:

Investment:	-50%/+200% (aka Order Of Magnitude, Initial, Step 0)
Conceptual:	-25%/+50% (aka Conceptual Engineering, Step 0)
Planning:	-25%/+25% (aka Study, Preliminary, Preliminary Engineering, Step 2A)
Project:	-10%/+10% (aka Construction, Final, Final Engineering, Step 2B, STORMS)

Success Enterprise, which is a unit-cost based estimating tool, and the Company's Line work management system STORMS, which includes Geographic Information System(GIS) based design functionality, are the tools primarily used to create estimates. Direct costs are determined by the information entered by the user. Indirect costs are applied to each estimate based on company-specific rates. Typical indirect costs are Sales Tax, Stores Handling, Labor Adders, Transportation, Capital Overhead Distributions, Equipment Tax, and Allowance for Funds Used During Construction (AFUDC).

The following information describes the information and processes used to create estimates. This process has evolved over time, and the descriptions should be considered current practices. Practices to create estimates for prior Electric ISR projects may have been applied differently than described in these descriptions.

Record Request No. 4, page 2

Investment Grade: Substation
Substation Engineering completes an investment grade estimate form. See Attachment RR-4. This document utilizes a checklist and, as noted in the document, develops investment grade estimates "*with only the investment grade understanding of the project . . . . The estimate has been prepared using historical cost data, data from similar projects and other identified assumptions.*"

Investment Grade: Line
Distribution Planning typically creates investment grade estimates based on the best information available using unit-cost estimating. This is often done by using the estimating tool, Success Enterprises. The unit cost estimating principals are generally based on historical costs to complete similar work.

For routine Line projects to serve a new customer, meet a public requirement, or replace failed equipment, only a project grade estimate is produced. An investment grade estimate is not created in these cases because the scope is undefined when the need is initiated, only detailed design is required (i.e. limited engineering needed), and the customer does not benefit by receiving multiple versions of estimates.

Conceptual Grade: Substation
Electric Project Estimating (EPE) is provided with a conceptual engineering report (CER). The scope of work within the CER will contain information such as Site Work, Civil/Structural Work, Primary and Secondary Electrical Work, Outages Required, Environmental Considerations, Licensing and Permitting Considerations, Potential Risks and Opportunities, Assumptions, and Exceptions. An estimator will need to make and document assumptions based on project team input and experience. The estimate is created in Success Enterprises.

Conceptual Grade: Line
Conceptual Grade estimates are not created for the majority of Line projects. The Distribution Design department may determine that a CER is necessary to further define the scope and complexities of the project, particularly when it is associated with a substation project or a complex underground system. After the CER is completed, the STORMS system is used by Distribution Design to create the estimate.

For routine Line projects to serve a new customer, meet a public requirement, or replace failed equipment, only a project grade estimate is produced. A conceptual grade estimate is not created because only detailed design is required (i.e. limited engineering required) and the customer receives no benefit from differentiation between estimate levels.

Record Request No. 4, page 3

Conceptual Grade estimates are not completed for routine Line projects that are generally less than $1 million in cost and not associated with a Substation project. The Company accepts the risk of significant increase or decrease in cost as the project progresses from Investment Grade to Project Grade, and, if necessary, manages variances in the overall portfolio of work to meet annual ISR budgets.

Planning Grade: Substation
Electric Project Estimating (EPE) is provided with a technical scope document (TSD) after preliminary engineering has been completed. The scope of work in the TSD is more refined than that contained within a CER, but contains the same essential categories of information. An Estimator will need to make and document assumptions based on project team input and experience. Not as many assumptions will be required due to the increased level of engineering, which will reduce the amount of applied contingency. Actual spend to date inclusive of purchase order amounts are utilized. The estimate is created in Success Enterprises.

Planning Grade: Line
Planning Grade estimates are not completed for Line projects. The Company accepts the risk of significant increases or decreases in cost as the project progresses from Investment Grade (or Conceptual, if created) to Project Grade, and, if necessary, manages cost variances in the overall portfolio of work to meet the to the annual ISR budgets.

Project Grade: Substation
Electric Project Estimating (EPE) is provided with a Design Package (DP) after final engineering has been completed. The scope of work within the DP will contain the same categories of information as the CER and TSD, but with further detail. An Estimator will need to make and document assumptions based on project team input and experience. Not as many assumptions will be required due to the increased level of engineering, which will further reduce the amount of applied contingency. Actual spend to date inclusive of purchase order amounts are utilized. Contractor bid award amounts are also included in this grade of estimate when work has been outsourced. Success Enterprise is used to create the estimate.

Project Grade: Line
The Distribution Design department creates the Project Grade estimated using the STORMS work management system and GIS design functionality. After completing field visits to collect detailed design requirements, the designer enters the information into the STORMS system. If requested, Line projects may be estimated by the EPE. The estimate is based on any information available, including the CER (if created), the STORMS estimate, actual spend to date, and contractor bid awards, if applicable.

INTRODUCTION

This procedure describes the investment grade report for substations. It includes alternatives, costs, and project duration.

PURPOSE

The purpose of this procedure is to define the investment grade report for substations.

ACCOUNTABILITY

This procedure applies to all National Grid personnel involved with the investment grade report for substations.

COORDINATION

Coordination shall occur with the project team members.

REFERENCES

Project Management Playbook

DEFINITIONS

Not Applicable

TRAINING

Project Management Playbook Training

REVISION HISTORY

Version	Date	Description of Revision
1.0	01/07/13	Initial version of document.
2.0	01/21/15	Document revised to incorporate comments from the Distribution Asset Management Process Excellence (PEX) team. Document to include all substations in New England and Upstate New York. Revised “Alternative” to “Estimate” throughout the document. Deleted table on report cover page. Removed Problem Statement in Introduction section. Updated all red text describing what to write for report. Section 1.1 – Added check boxes for “yes” and “no”. Section 1.1 - #11 – Added temporary transmission structures. Section 1.1 – Added #16 – Permitting Requirements. Section 1.2 – Added Cost and Yearly Cash Flow tables. Added Section 1.3 – Project Schedule, including tables.

Investment Grade Report

For

Enter station name here – **Enter project name here**

Order No. _____ Company No. ____

Order No. _____ Company No. ____

Order No. _____ Company No. ____

Order No. _____ Company No. ____

Prepared By: **Enter your name here**

Version: **1.0** Date: **mm/dd/yy**

Requested Date: **mm/dd/yy**

Requested by: _____

Request Documentation: _____

Substation Engineering Manager Approval _____ Identify Manager's name here _____ Date

DOCUMENT CONTENTS

Table of Contents

INTRODUCTION

This document describes the high level scope of work and cost estimates to < description of project here. Identify the station address - street/road, city, state. >.

Briefly mention the background to the request based on the information from the request documentation.

NOTE: If more than one estimate is being evaluated for the project, then each estimate shall be listed and described separately. The estimates shall contain all of the Scope of Work sections shown in Estimate 1 (see below). Estimates 2,3, etc., if necessary, shall be presented after Section 1.3 of Estimate 1 and in numerical order.

1.0 ESTIMATE 1

<Enter a description of this estimate here. Highlight project feasibility based on existing station configuration, need for any substation fence line or control building expansion. List any assumptions/exceptions>.

1.1 Investment Level Checklist

Task	Changes Required? (Yes or No)
1) Site Work & Fencing: *Applies to yard grading, roads, paving, storm water remedial measure, surveying, duct cleaning, manhole cleaning, site access, fence, gates, etc.*	Yes ☐ or No ☐
Notes:	
2) Civil Work: *Applies to foundations, trench, oil containment, etc.*	Yes ☐ or No ☐
Notes:	
3) Structural Work: *Applies to structures, buildings, etc.*	Yes ☐ or No ☐
Notes:	
4) Primary Electrical Work: *Applies to ground grid, conduit, cables, major equipment (i.e. transformers, circuit breakers, etc).*	Yes ☐ or No ☐
Notes:	
5) Station Service Work: *Applies to AC, DC Power System, etc.*	Yes ☐ or No ☐
Notes:	
6) Protection Work: *Applies to protective relay systems, etc.*	Yes ☐ or No ☐
Notes:	
7) Control & Integration Work: *Applies to RTU, etc.*	Yes ☐ or No ☐
Notes:	
8) Revenue Metering Work:	Yes ☐ or No ☐
Notes:	

Task	Changes Required? (Yes or No)
9) Telecomm Work: *Applies to phone lines, microwave, etc):*	Yes ☐ or No ☐
Notes:	
10) Site Security Work: *Applies to animal protection, fire alarms, physical/cyber security, etc.*	Yes ☐ or No ☐
Notes:	
11) Temporary Facilities: *Mobile Transformer, Mobile DC (battery), temporary transmission structure, etc.*	Yes ☐ or No ☐
Notes:	
12) Removal & Retirements:	Yes ☐ or No ☐
Notes:	
13) Environmental: *Applies to permits, asbestos, etc.*	Yes ☐ or No ☐
Notes:	
14) Restoration: *Applies to paving, landscaping, plantings, etc.)*	Yes ☐ or No ☐
Notes:	
15) Outage Requirements:	Yes ☐ or No ☐
Notes:	
16) Permitting Requirements:	Yes ☐ or No ☐
Notes:	

Yes or No

1.2 Cost Estimate

An investment grade estimate has been developed with only the investment grade understanding of the project as described in this report. The estimate has been prepared using historical cost data, data from similar projects and other identified assumptions. The accuracy of this study grade estimate is expected to be -50% to +200%.

This cost estimate was created using Success Enterprise. <Yes/No>
<where applicable, identify SU Code for Level 3 Estimate>
<for NE only: If Transmission has identified PTF and non-PTF facilities on the proposed one-line, provide breakdown below separately for PTF and non-PTF>

Cost	Transmission $	Distribution $
Capital		
O&M		
Removal		
Total		

Yearly Cash Flows	FY1 ($k)	FY2 ($k)	FY3 ($k)	FY4 ($k)	FY5 ($k)	FY6 ($k)	Total ($k)
Prelim. Eng.							
Capital							
O&M							
Removal							
Total							

1.3 Project Schedule

Activity (PM Playbook Step)	Duration (in weeks)	Additional Comments
Preliminary Eng [1]. (**step 2A**).		
Final Eng. & Design (**step 2B**)		
Material Procurement [2]		
Permitting & Licensing [3]		
Construction [4] (**step 3**)		
Closeout (**step 5**)		
Total Project Duration		

NOTE:
1. Start after approval to begin (project initiation), include time to sanction
2. Performed in parallel with Final Eng. & Design.
3. Performed in parallel with Preliminary Eng. and Final Eng. & Design
4. Duration to include the 90 day construction bid / award window

1.4 Operating Diagram or Sketch (existing and proposed additions/removals)

2.0 ESTIMATE2 (IF NECESSARY)

<Enter a description of this estimate here>.

3.0 ESTIMATE 3 (IF NECESSARY)

<Enter a description of this estimate here>.

4.0 REVISION HISTORY OF PROJECT DOCUMENT

Version	Date	Description of Revision
1.0	mm/dd/yy	Initial version of document. Based on discussion with planning engineer and review of drawings.

Record Request No. 5

Request:

Priority Scoring - Please provide a copy to the priority scoring documentation used by the Company.

Response:

Please see Attachment RR-5 for a copy of the priority scoring documentation used by National Grid.

Investment Planning Review

Risk Scoring Guide

Final V1.0 January 2008

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LOX-NGT011-20071101-MHJP

Risk scoring methodology

Contents

- **What is the end-to-end risk scoring process and why do we need it?**

- Risk scoring methodology process steps
  - How does Project Classification work?
  - How does Risk Scoring work?
  - How does Prioritisation work?

Final V1.0 January 2008

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Risk scoring methodology – What is it and why do we need it?

Purpose	• Create a **single risk score** which can be used to compare the safety, reliability and environmental risks addressed in the capital plan for each of our businesses
How will it be used	• Provide **transparency** within the Lines of Business and to the Executive on the amount of risk being mitigated in each business relative to the capital plan • **Link the return** on investment to the risk eliminated by investing into the business
Relevance	• Previously **no common method** to assess risk across the business • Opportunity for you to **shape**, going forward, the standardised way this should be done • Opportunity to **inform regulatory dialogue** and debate
What this concept is not	• Is not a technical measure of **residual** system risk, i.e. the risk remaining to be mitigated once the proposed projects have been completed

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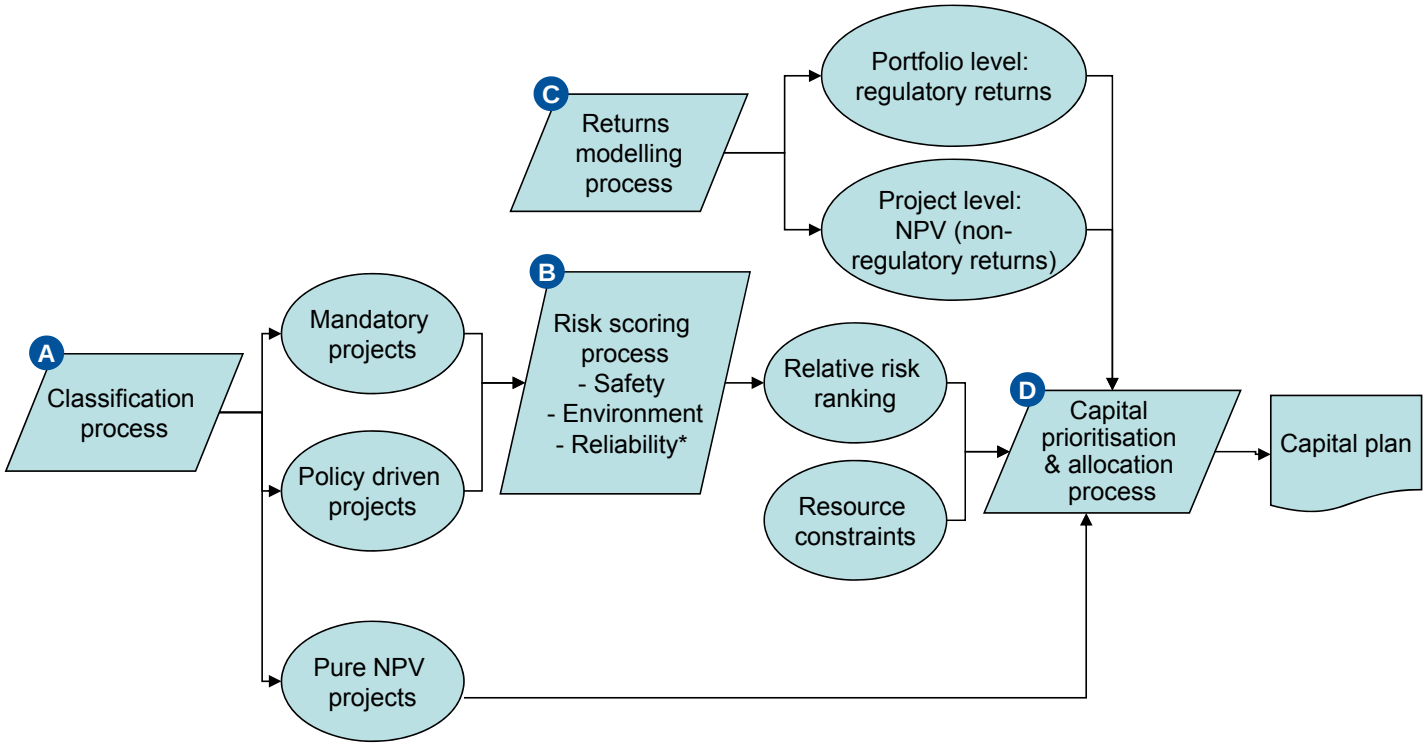
Risk scoring and capital prioritisation process (1/2)



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* Includes avoided penalties and incentives relating to reliability

Risk scoring and capital prioritisation process (2/2)

A Classification process

- Categorise projects into
  - Mandatory
  - Policy driven
  - Pure NPV
- Where necessary, bundle projects into programmes, for ease of risk scoring and sanctioning

B Risk scoring process

Mandatory
- Default to highest risk score

Policy driven
- Compute risk score on following criteria
  - Safety
  - Environment
  - Reliability (including avoided penalties)

C Returns modelling process

Mandatory and Policy driven
- Calculate portfolio returns
- Calculate incremental returns for projects with opex savings

Pure NPV
- Compute NPV

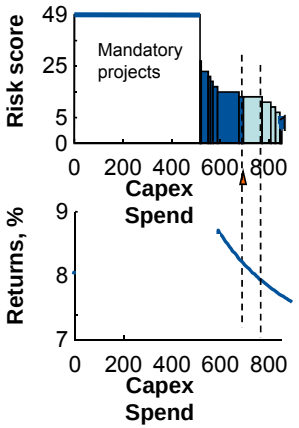
D Capital prioritisation & allocation process

Prioritisation

- Unconstrained prioritisation based on:
  - Risk score
- Constrained prioritisation based on
  - Operational and timing constraints
  - Incremental financial benefits
- Strong governance for projects the LOB wants to justify on:
  - Incremental financial benefits
  - 'Strategic' rationale

Risk-return trade-off

Mandatory and policy driven



- Trade-off level of investment in terms of risk and return

Pure NPV
- Do all positive NPV projects

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Risk scoring methodology

Contents

- What is the end-to-end risk scoring process and why do we need it?
- Risk scoring methodology process steps
  - **How does Project Classification work?**
  - How does Risk Scoring work?
  - How does Prioritisation work?

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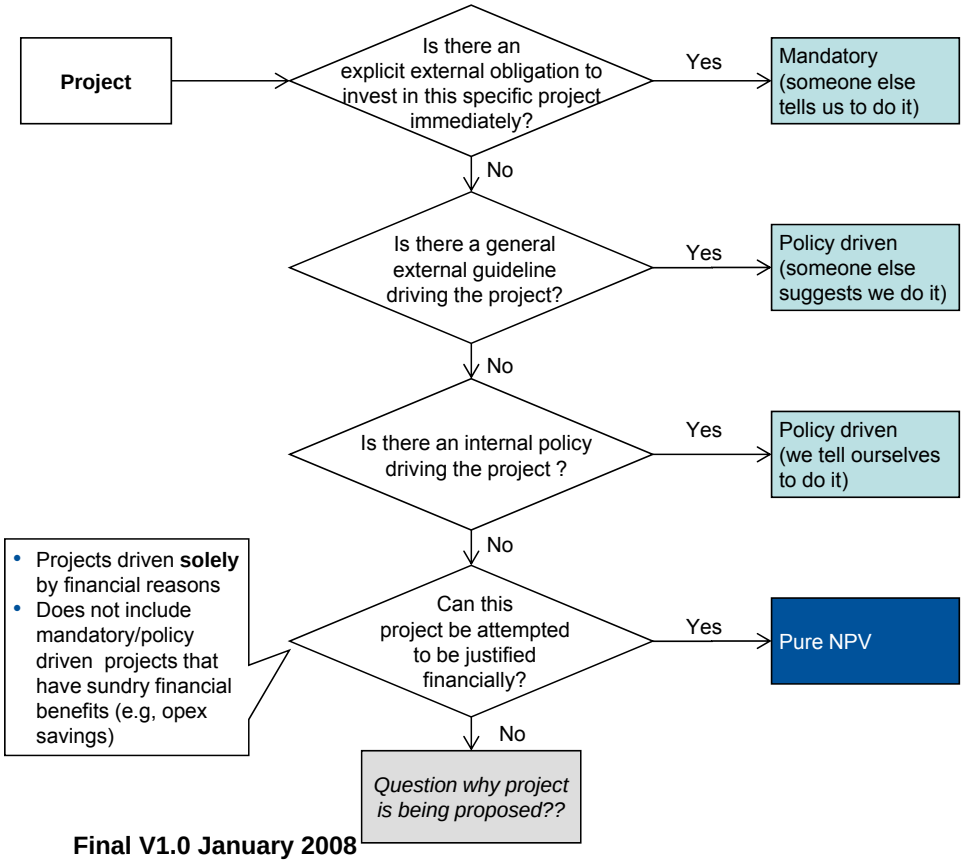
A Projects will be classified as mandatory, policy driven and pure NPV, using the following decision tree



Definitions

- Projects done to fulfil an explicit, deterministic statutory/regulatory obligation, where there is absolutely no discretion on timing or options and there is an immediate and palpable risk of regulatory or legal breach
- Projects undertaken to fulfil a statutory/regulatory obligation, where there is some discretion* on timing or options
- Projects necessary to meet internal policies**
- Projects undertaken to deliver financial benefits at complete discretion of NG, not driven by external or internal policies
- Residual projects that should be questioned/ policies to be reviewed

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* Decision on project elements (i.e., timing, which option, etc.) reflect corporate risk appetite

** Internal policies reflect corporate risk appetite

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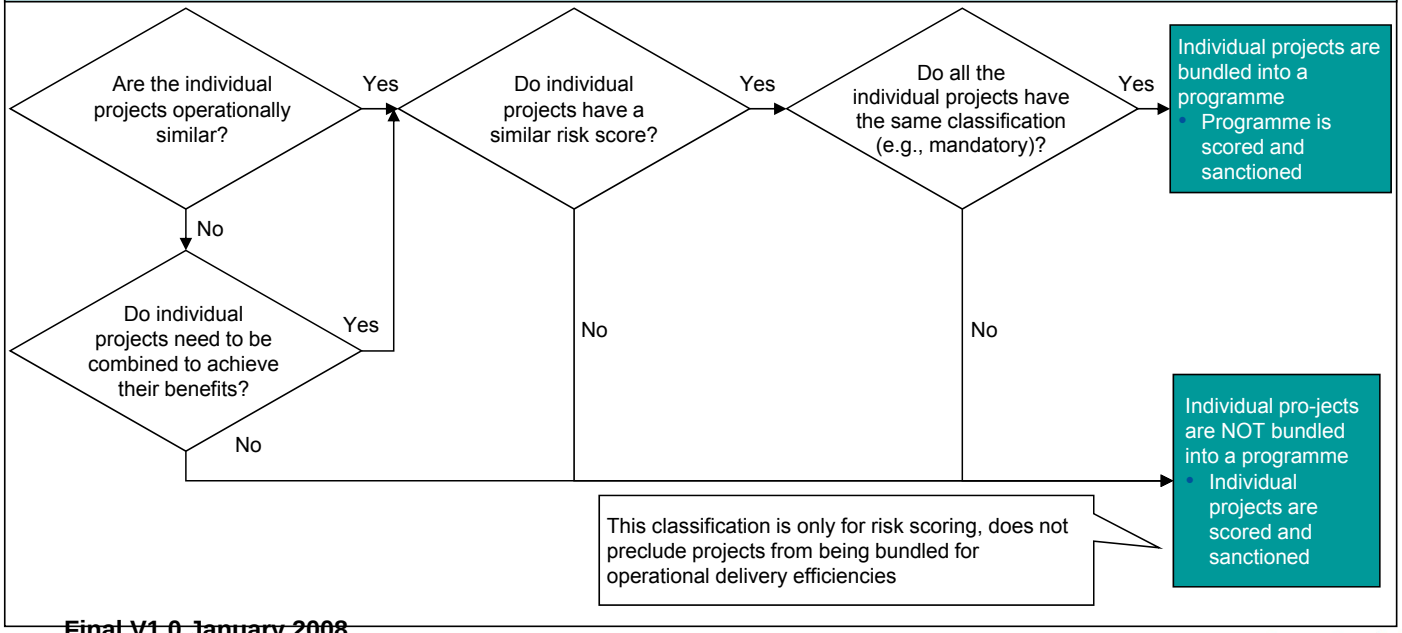
A A portfolio of projects will be bundled into a programme for risk scoring and sanctioning

Definition of programme

- A portfolio of individual projects, that are can be scored and sanctioned together, which are:
  - Either operationally similar or required to be combined in order to achieve benefits
  - Have similar risk scores and same classification (mandatory, policy driven, etc.)

Decision tree for bundling individual projects into a programme



LOX-NGT011-20071101-MHJP

A How project classification will be done in practice

Goals

- To ensure consistent classification by all LOBs into mandatory, policy-driven, pure NPV
- To provide guidance on interpretation of above definitions
- To ensure sufficient transparency on bundling of projects into programmes
- To update definitions and checklists if required

	How will governance work?	What will this entail?
Guidance notes	• Customised checklist will be provided to LOBs to assist them in classifying projects into mandatory, policy-driven, etc. as well as to bundle projects into programmes	• A checklist will be developed (in conjunction with LOBs) to classify projects
Guidance meetings	• Investment Planning project team/Investment Decision Support* (IDS) team member to interact periodically with LOB investment planners on risk scoring	• Project team/IDS member to review classification of projects to ensure consistency and provide guidance

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* IDS = Investment Decision Support: explained in detail later in document

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Risk scoring methodology

Contents

- What is the end-to-end risk scoring process and why do we need it?
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  - **How does Risk Scoring work?**
  - How does Prioritisation work?

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B Risk scoring process will use following principles

1 Determine Impact and likelihood levels

Step 1 – Score project on **impact** in each of the following criteria

Impact	Safety	Reliability	Environment
Very low	(1)	1	(1)
Low	2	2	2
Moderately low	3	3	3
Moderate	4	(4)	4
Moderately high	5	5	5
High	6	6	6
Very high	7	7	7

Any impact of penalties for reliability/ health and environment to be considered when scoring project on impact

Step 2 – Score project on **likelihood** of occurrence in each of the following criteria

Likelihood	Safety	Reliability	Environment
Very low	1	1	1
Low	2	2	2
Moderately low	3	3	3
Moderate	(4)	(4)	4
Moderately high	5	5	(5)
High	6	6	6
Very high	7	7	7

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2 Obtain blended risk score* for each criterion

Safety score

Impact \ Likelihood	1	2	3	4	5	6	7
7	25	32	38	43	47	48	49
6	20	29	33	40	44	45	46
5	15	22	26	35	39	41	42
4	9	17	19	28	34	36	37
3	5	10	14	21	27	30	31
2	3	6	8	16	18	23	24
1	1	2	4	(7)	11	12	13

Reliability score*

Impact \ Likelihood	1	2	3	4	5	6	7
7	25	32	38	43	47	48	49
6	20	29	33	40	44	45	46
5	15	22	26	35	39	41	42
4	9	17	19	(28)	34	36	37
3	5	10	14	21	27	30	31
2	3	6	8	16	18	23	24
1	1	2	4	7	11	12	13

Scores are ranked based on the expected monetary value of each outcome

Environmental score*

Impact \ Likelihood	1	2	3	4	5	6	7
7	25	32	38	43	47	48	49
6	20	29	33	40	44	45	46
5	15	22	26	35	39	41	42
4	9	17	19	28	34	36	37
3	5	10	14	21	27	30	31
2	3	6	8	16	18	23	24
1	1	2	4	7	(11)	12	13

3 Obtain overall risk score

- Overall score is maximum of
  - Safety (7)
  - Environment (11)
  - Reliability (28)
- Maximum score method was selected because:
  - Impact levels are assessed on an exponential scale, hence the highest score outweighs other lower scores (e.g.,Level 7 has a monetary impact > £20Mn and Level 1 has a a monetary impact of <£5k)
  - Aggregating different scores into a simple score is mathematically inaccurate
  - Maximum score ensures that projects with a high score on a single criteria are not ignored
  - Most projects are expected to have a single driver that dominates

* Scores are grouped and colour coded for ease of viewing (40 and above - red, 16-39 - yellow and 15 and below - green)

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B1 Impact Matrix – Safety & Environment (1/3)

Score	Financial Impact	Health and Safety	Environment
1	• < £5K • < $10K	• Minor injury requiring First Aid with a quick and complete recovery (£100-200/$200-400) • Minor illness with up to one –week absence. No permanent health consequences (£500/$1000)	• Non-significant Environmental Incident without agency oversight (e.g., minor spillage (e.g., < 5 litres) that does not enter drain or water course, small quantities of hazardous waste left on site, temporary impact to the environment) (£1K- 2K/$2K-4K) or a minor regulatory compliance issue.
2	• £5K-50K • $10K-100K	• Illness with over one week absence but no permanent health consequences (£5K/$10K)	• Significant Environmental Incident usually without agency oversight (e.g., spillage that does not enter drain or water course, fly tipping on National Grid land or site, a release of methane gas under 200 tonnes) (£5K-50K/$10K-100K) or regulatory non-compliance issues that may result in minimal fines.
3	• £50K-250K • $100K-500K	• Injury to member of public requiring medical treatment but no permanent consequences (£50K/$100K)	• Significant Environmental Incident with agency oversight (e.g., minor silt run off to reservoir, discolouration noted around edges, mitigation measures required and some clean up required, a release of more than 200kg of sulphur hexafluoride gas) (£50K-250K/$100K-500K) or a non-compliance issue that results in significant fines and/or actions taken by regulatory authorities (e.g. permit limits for air emissions exceeded).
4	• £250K-1Mn • $500K-2Mn	• Permanently incapacitating injury or illness to employees (Moderate to severe pain for 1 – 4 weeks with possible recurrence of pain for certain activities and some permanent restrictions to leisure or work) (£500K/$1000K) • Injury to member of public requiring extended medical treatment but no permanent consequences	• Significant Environmental Incident with agency oversight (e.g., uncontained release of liquid (e.g silty water or bentonite drilling fluid, petroleum) to a drain or water course that has the potential for enforcement action and which may cause fish or aquatic plants to die) (£250K-1Mn/$500K-2Mn) non-compliance issue that results in significant fines and/or actions taken by regulatory authorities (e.g. permit limits for air emissions exceeded, noise abatement order issued).
5	• £1Mn-5Mn • $2Mn-10Mn	• Permanently incapacitating injury to a member of public or fatality to employee (£4.5Mn/$9Mn)	• Significant Environmental Incident (e.g., several full drums of oil spill contents on to ground and significant quantity enters high quality water course leading to >500 fish killed and damage to river bed requiring remediation and leading to prosecution, damage to environmentally sensitive sites, listed buildings, or damage to a Site of Special Scientific Interest) (£1Mn-5Mn/$2Mn-10Mn) or non-compliance issue results in significant fines and actions taken by regulatory authorities.
6	• £5Mn-20Mn • $10Mn-40Mn	• Fatality to a single member of public/ Multiple fatalities to employees (<4 people) (£20Mn/$40Mn)	• Catastrophic Environmental incident (e.g., contamination of a ground water source leading to prosecution, enforced clean up, and provision of alternative water supply) (£5Mn-20Mn/$10Mn–40Mn) or a non-compliance issue that results in fines and actions taken by regulatory authorities and presents a risk of affecting future business operations.
7	• £20Mn + • $40Mn +	• Multiple public fatalities or Multiple fatality of 5 or more employees (£50 Mn/$100Mn)	

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B1 Impact Matrix – Reliability (2/3)

Score	Financial Impact	Reliability – EDx	Reliability – EDx
1	• < £5K • < $10K		
2	• £5K-50K • $10K-100K	• Loss to less than 500 customers • Less than <50K CMI • Loss of 0.5 (13KV) feeder • Loading: 95-100%	• Voltage (P.U.): 0.93-0.95 • MWh:<= 4 • Pocket Frequency:3
3	• £50K-250K • $100K-500K	• Loss to 500-5,000 customers • 50K to 500K CMI • Loss of 0.5-1 (13KV) feeder • Loading: 100-105%	• Voltage (P.U.): 0.92-0.93 • MWh:>4<=8 • Pocket Frequency:4-5
4	• £250K-1Mn • $500K-2Mn	• Loss to 5,000-10,000 customers • 500K to 1M CMI • Loss of 1-3 (13 KV) feeder • Loading: 105-110%	• Voltage (P.U.): 0.90-0.92 • MWh:>8<=16 • Pocket Frequency:6-10
5	• £1Mn-5Mn • $2Mn-10Mn	• Loss to 10,000-25,000 customers • 1M to 5M CMI • Loss of 3-6 (13KV) feeder • Loading: 110-115%	• Voltage (P.U.): 0.87-0.90 • MWh:>16<=40 • Pocket Frequency:10-15
6	• £5Mn-20Mn • $10Mn-40Mn	• Loss to 25,000-50,000 customers • 5M to 20M CMI • Loss of 6-10 (13KV) feeder • Loading: 115-120%	• Voltage (P.U.): 0.85-0.87 • MWh:>40<=80 • Pocket Frequency:16-20
7	• £20Mn + • $40Mn +	• Loss to 50,000 customers • More than 20M CMI • Loss of more than 10 (13KV) feeders • Loading: 120%	• Voltage (P.U.): less than 0.85 • MWh:>80 • Pocket Frequency:>20

Assumed exchange rate: £1=$2

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B1 Impact Matrix – Reliability (3/3)

Score	Financial Impact	Reliability – Global IS and shared services	Reliability – LNG
1	• < £5K • < $10k	• -	• -
2	• £5K-50K • $10K-100K	• Local failure of infrastructure or business systems affecting <100 employees for a day	• Loss of liquefaction capability for up to 3 days
3	• £50K-250K • $100K-500K	• Local failure of infrastructure or business system affecting <100 employees for <1 week	• Loss of liquefaction capability for between 4 and 14 days
4	• £250K-1Mn • $500K-2Mn	• Failure of infrastructure or business system at a major business location (>300 employees) for a day. Potential impact into more critical IS systems	• Loss of liquefaction capability for between 15 and 50 days • Loss of site export capability for up to 1 day at time of winter peak
5	• £1Mn-5Mn • $2Mn-10Mn	• Enterprise wide or multiple major location failure of infrastructure or business systems for <24 hours. More critical IS systems impacted	• Loss of liquefaction capability for between 51 and 150 days • Loss of site export capability for between 1 and 5 days at time of winter peak
6	• £5Mn-20Mn • $10Mn-40Mn	• Enterprise wide or multiple major location of infrastructure or business systems for >24 hours. More critical IS systems seriously impacted	• -
7	• £20Mn + • $40Mn +	• Extended enterprise failure or infrastructure or business systems that impact national Grid's ability to function as a commercial business. More critical IS systems highly impacted	• -

Assumed exchange rate: £1=$2

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B1 Likelihood Matrix 1 of 5 – Guide to use the likelihood tables

- **Safety projects caused by a single event (e.g., installation of handrails)** 3 of 5

Asset failure	No coincident event needed for impact	Coincident event needed for impact
• Time to failure known and earliest asset of failure has not been reached	2 of 5	4 of 5
• Time to failure known and earliest asset of failure has already been reached	3 of 5	5 of 5
• Time to failure not known, but history of similar failures is available	3 of 5	5 of 5

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B1 Likelihood Matrix (2 of 5) – Using a *time to failure* approach

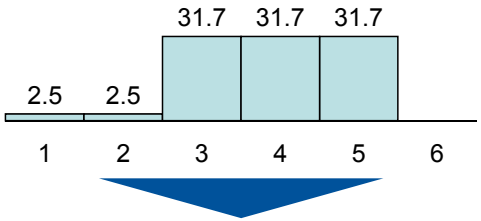
Resulting likelihood scores after considering time to failure

Time to failure (in years)	Likelihood level
<1 years	7
1 to 3 years	6
3 to 5 years	5
5 to 10 years	4
10 to 20 years	3
20 to 100 years	2
>100 years	1

Example

An asset is not expected to fail in the next 2 years, but it is expected to fail in 3 to 5 years

Probability of failure, %



Guidance to use this table

- Step 1 – Establish the earliest and latest time to failure for an asset
- Step 2 – Derive the resulting likelihood score by scrolling across the table – e.g., if an asset is not expected to fail in the next 3 years, but it is expected to fail in 3 to 5 years, the likelihood score is 5

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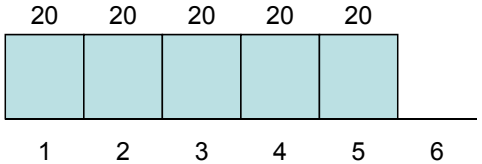
B1 Likelihood Matrix (3 of 5) – Using *time to certain event* or *probability* approach

Resulting likelihood scores after considering the time to a certain impact or the probability of an impact happening next year (assuming a uniform distribution)

Years to certain impact	Likelihood level	Probability of certain impact happening next year
1	7	100%
2	7	50%
3	6	33%
5	6	20%
6	5	17%
10	5	10%
20	4	5%
100	4	1%
200	3	0.5%
500	2	0.2%
1000	2	0.1%
2000	1	0.05%

Example
An event will happen in the next 5 years (on the probability of the event happening next year is 20%)

Probability of an event occurring, %



Guidance to use this table

- Step 1 – Establish the time to a certain impact or the probability of a certain impact happening next year
- Step 2 – Derive the resulting likelihood score from the central column by scrolling across the table above – e.g., if an event will happen in the next 5 years (or the probability of the event happening next year is 20%), the likelihood score is 6

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Likelihood score – 6

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B1 Likelihood Matrix (4 of 5) – Using a *time to failure* approach and *coincident event*

Resulting likelihood scores after considering time to asset failure and coincident event required for the impact

Time to failure	Time to coincident event									
	1	2	3	4	5	10	20	33	100	1000
>1 years	7	7	6	6	6	5	4	4	4	2
1 to 3 years	6	6	6	6	5	5	4	4	4	2
3 to 5 years	5	5	5	5	5	4	4	4	3	1
5 to 10 years	4	4	4	4	3	3	2	2	1	1
10 to 20 years	3	3	3	3	3	2	2	1	1	1
20 to 100 years	2	2	2	2	2	2	1	1	1	1
>100 years	1	1	1	1	1	1	1	1	1	1
	100%	50%	33%	25%	20%	10%	5%	3%	1%	0.1%
	Likelihood of coincident event									

Guidance to use this table

- Step 1 – Establish the earliest and latest time to failure for an asset
- Step 2 – Establish the likelihood of co-incident event required to result in the impact (say failure of another asset required to result in the impact of loss of supply). If no coincident event is required, assume 100%
- Step 3 – Derive resulting likelihood score by scrolling across the table – e.g., 3–5 years to failure and coincident event likelihood of 25% (will happen in the next years) results in a likelihood score of 5

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B1 Likelihood Matrix (5 of 5) – Using a *probability of impact in the next year* approach and *coincident event*

Resulting likelihood scores after considering likelihood of primary and coincident event required for the impact

Years to certain impact (assuming uniform likelihood)	Time to coincident event: 1	2	3	4	5	10	20	33	100	1000	Probability of certain impact happening in the next year
1	7	7	6	6	6	5	4	4	4	2	100%
2	7	6	6	6	6	5	4	4	4	2	50%
3	6	6	6	6	5	5	4	4	4	2	33%
4	6	6	6	6	5	5	4	4	4	2	25%
5	6	6	5	5	5	5	4	4	3	2	20%
6	5	5	5	5	5	4	4	4	3	1	17%
7	5	5	5	5	5	4	4	4	3	1	14%
8	5	5	5	5	5	4	4	4	3	1	13%
9	5	5	5	5	5	4	4	4	3	1	11%
10	5	5	5	5	5	4	4	4	3	1	10%
20	4	4	4	4	4	4	4	3	2	1	5%
50	4	4	4	4	4	3	3	2	2	1	2%
100	4	4	4	4	3	3	2	2	1	1	1%
200	3	3	3	3	3	2	2	1	1	1	0.5%
500	2	2	2	2	2	2	1	1	1	1	0.2%
1,000	2	2	2	2	2	1	1	1	1	1	0.1%
2,000	1	1	1	1	1	1	1	1	1	1	0.05%
	100%	50%	33%	25%	20%	10%	5%	3%	1%	0.1%	

Likelihood of coincident event

Guidance to use this table

- Step 1 – Establish the likelihood (or time to event) of the primary event
- Step 2 – Establish the likelihood (on time to event) of co-incident event required to result in the impact
- Step 3: Derive resulting likelihood score by scrolling across the table – e.g., Probability of primary event happening next year is 50% (or a max of 2 years to a certain event) and coincident event likelihood of 25% (or max of 4 years to a coincident event) results in a likelihood score of 6

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B2 The blended score for each outcome is derived from ranking the product of impact (£/$) and likelihood (%)

Blended Impact and Likelihood scores*

Impact \ Likelihood	1	2	3	4	5	6	7
7	25	32	38	43	47	48	49
6	20	29	33	40	44	45	46
5	15	22	26	35	39	41	42
4	9	17	19	28	34	36	37
3	5	10	14	21	27	30	31
2	3	6	8	16	18	23	24
1	1	2	4	7	11	12	13

- Blended scores are derived by ranking expected monetary values of each possible outcome
- Expected monetary value (EMV) for a given outcome is the product of the average monetary impact and the average probability. For example:
  - Impact of 6 and likelihood of 2 gives an expected monetary value of £75,000, derived as product of:
    - Level 6 impact of £12.5 M (average of £5M and £20M)
    - Level 2 average cumulative probability of 0.60% (between 0.2% and 1%)
- All the expected monetary values are ranked from 1 to 49 to give blended scores. For example:
  - The highest EMV of £33.25M is assigned a score of 49 (highest possible score)
  - Likewise, the EMV of £75,000 is assigned a score of 29

Expected monetary value, £

Impact \ Likelihood	Average monetary impact, £	1	2	3	4	5	6	7
7	*35,000,000*	35,000	210,000	612,500	3,937,500	13,125,000	25,375,000	33,250,000
6	*12,500,000*	12,500	75,000	218,750	1,406,250	4,687,500	9,062,500	11,875,000
5	*3,000,000*	3,000	18,000	52,500	337,500	1,125,000	2,175,000	2,850,000
4	*625,000*	625	3,750	10,938	70,313	234,375	453,125	593,750
3	*150,000*	150	900	2,625	16,875	56,250	108,750	142,500
2	*27,500*	28	165	481	3,094	10,313	19,938	26,125
1	*2,500*	3	15	44	281	938	1,813	2,375
	Average likelihood	*0.10%*	*0.60%*	*1.8%*	*11%*	*38%*	*73%*	*95%*

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* Scores are grouped and colour coded for ease of viewing (40 and above - red, 16-39 - yellow and 15 and below - green)

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How to . . .

Classify Score as 50

1. Diagnostic studies
2. Projects to comply with targets set by the regulator
3. Blankets

Risk score

4. Projects whose impact requires a coincident event
5. Asset failure projects for assets that have reached the earliest onset of failure
6. Projects with mitigation alternatives
7. Programs that are bundles of similar projects
8. Projects on interdependent assets

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Source: Team analysis

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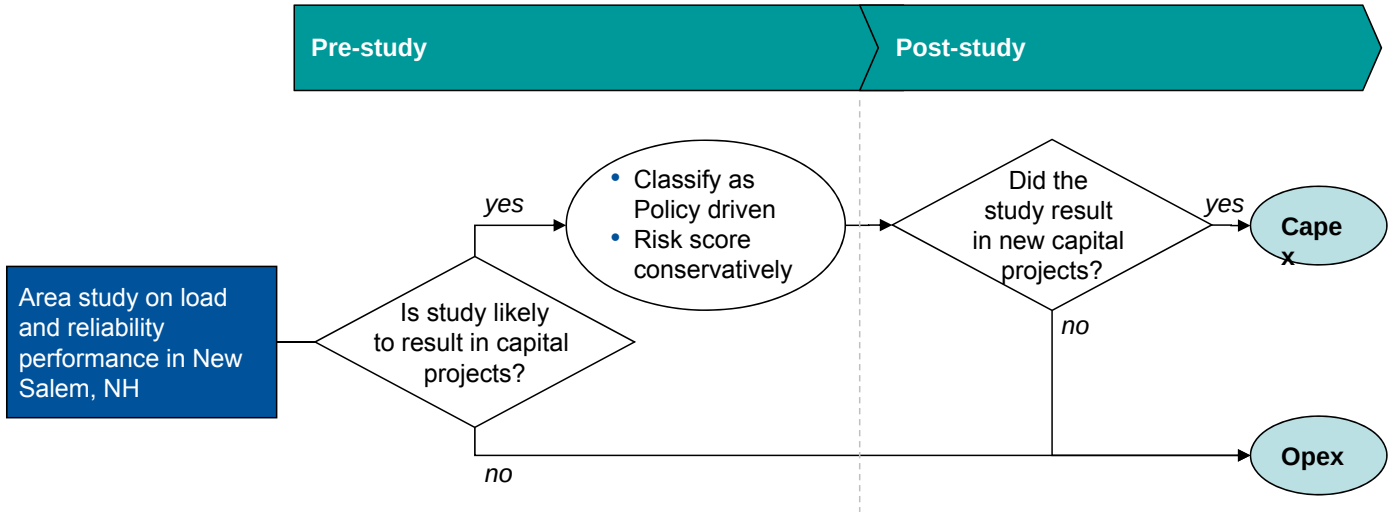
1 How to classify diagnostic studies

- A study should be considered **opex** unless it is likely to result in a capital project
- Capex studies should be classified as **policy driven and scored conservatively** (i.e., worst possible consequence that the study may uncover)
- Studies that were considered capex and do not result in capital investments should be expensed and written off the capital plan

Example



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Source: Risk scoring pilots; team analysis

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2 How to classify projects to comply with targets set by the regulator

- **Policy driven** if the targets are on reliability, safety or environmental parameters, as there is **discretion on projects needed** to achieve these targets
- **Mandatory** if the targets are on capex (or capex equivalent) spent on **specific project/programmes immediately**

Examples

Project	Classification	Rationale
1 Transformer replacement to maintain reliability targets/ standards	• Policy driven	• Discretion on specific projects needed to achieve targets
2 Replacement of specified length of gas mains (e.g. KED LI regulatory target – 60 mile **per year**)	• Policy driven	• Obligation to achieve target immediately, but there is discretion on which mains to replace, and the mix will affect the capex required
3 Replacement of specific length of miles of gas mains (regulatory target – 300 miles in **5 years**)	• Policy driven	• Capex-equivalent target on specific program, but there is discretion on timing of the replacement

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3 How to classify blankets

- Blankets (or provisions) are capital allocations for unspecified expenditures during capital plan period – e.g., new connections, load relief
- Blankets should be classified in the same way as one of its expenditures (i.e. mandatory or policy driven)
- If policy driven, they should be scored according to the risk/likelihood of a single expenditure

Examples

Project	Classification	Rationale
1 **New connections** blanket providing capital for expected new connections	• Mandatory	• New connections will be required by regulator immediately
2 Blanket for **load relief** work	• Policy driven	• Load relief projects occur at the discretion of an LOB
3 Damage and failure	• Mandatory	• Repairs will be required by regulator immediately

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Source: Risk scoring pilots; team analysis

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4 How to risk score projects whose impact requires a coincident event

- Estimate the time to failure for the asset or the probability of the asset failing. This is the **primary event**
- Estimate the probability of the **coincident event**, making sure that you **correct for exposure**
- Look up the likelihood score in pages 4/5 or 5/5

Example

Replacement of a circuit breaker. There is a risk of catastrophic failure and subsequent injury to an employee. The breaker is expected to fail in 5–10 years

Primary event	Coincident event	Likelihood score
Time to failure: 5–10 years	An employee spends 8 hours a day on site Monday–Friday and is near the breaker for 50% of the time he spends on site	• Time to failure: 5–10 years • Probability of coincident event: 12% • Likelihood page 4/5

% of time spent on site: $\frac{8 \text{ h} \times 5}{24 \text{ h} \times 7} = 24\%$

× *% of time near breaker:* 50%

= *Probability of coincident event:* **12%**

Likelihood score is 3

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Source: Risk scoring pilots; team analysis

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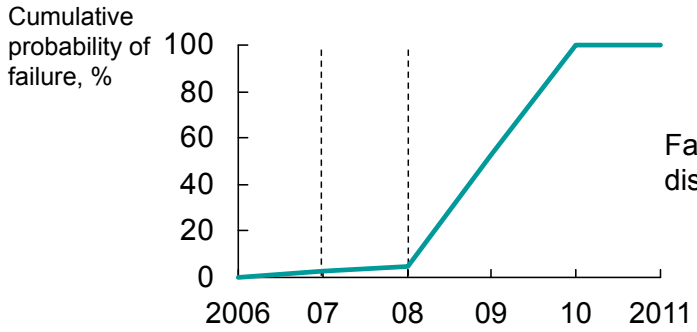
5 How to risk score asset failure projects for assets that have reached their earliest onset of failure

- Estimate the time to failure in years and use likelihood page 3/5 if asset has reached its earliest onset of failure

Example

Replacement of a disconnector



Failure curve for one disconnector

Impact may be caused by disconnector failure. What is the likelihood score?

	Likelihood page	Years to failure	Likelihood score
Before earliest onset of failure (2007)	2/5	• 1–3 (earliest asset in 2008 and failure expected by 2010)	6
After earliest onset of failure (2008)	3/5	• 2 (failure expected anytime before 2010)	7

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Source: Risk scoring pilots; team analysis

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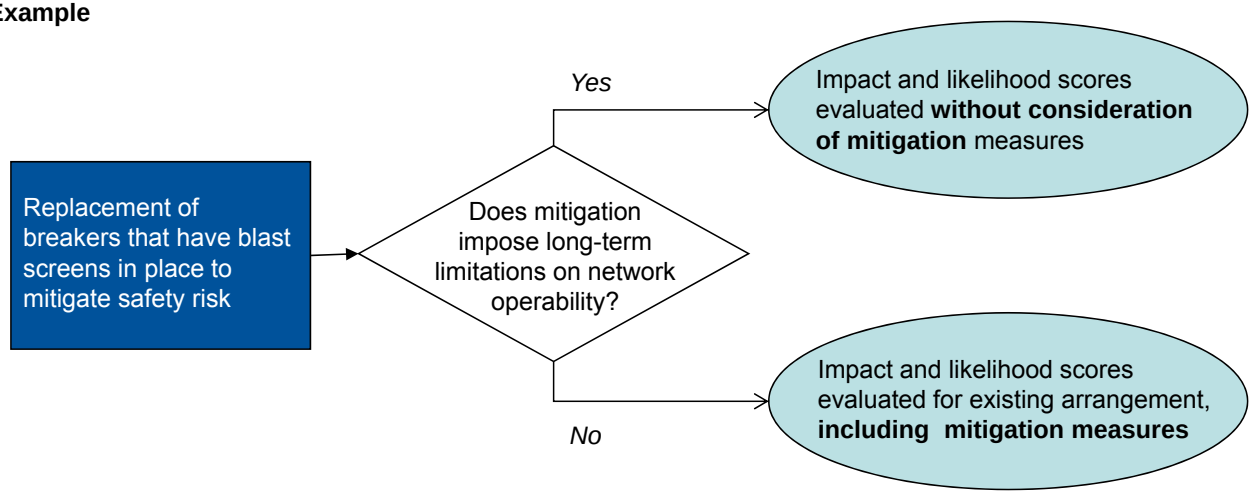
6 How to risk score projects with mitigation alternatives

- Risk mitigation measures are sometimes available as alternatives to asset replacement or permanent repair
- In cases where alternative mitigation measures may be undertaken, the scoring approach is driven by the long-term liability of the mitigation:
  - If mitigation can remain **stable** with little/no impact on network operability in the long term, projects should be considered **post-mitigation**
  - If mitigations are **temporary** in nature or impose limitations on network operability (unacceptable long-term), risk scores should be evaluated **pre-mitigation**

Example



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Source: Risk scoring pilots; team analysis

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7 How to risk score programmes made up of several similar projects

- Similar projects bundled into a single programme of work should be scored according to the risk/likelihood appropriate for **one** such project.
- If bundled projects vary in impact and/or likelihood (i.e., equipment of varying ages or with different levels of connectivity), programme should be disaggregated and risk scores evaluated for each component project

Example Programme 1

A replacement programme to upgrade 60 governor stations with similar risk profiles:

Project	Impact	Likelihood	Risk score
Each of the 60 governor stations	5	6	41
Total programme	**5**	**6**	**41**

Project scored to evaluate impact / likelihood of a single failure, not the combined total impact

Example Programme 2

A replacement programme to upgrade 60 governor stations with different risk profiles:

Project	Impact	Likelihood	Risk score
15 governor stations	5	5	39
45 governor stations	5	6	41

This program should be disaggregated to appropriately reflect the different risk profiles

Source: Risk scoring pilots; team analysis

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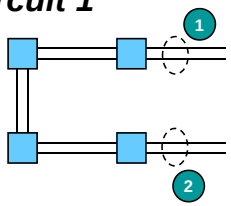
8 How to risk score projects on interdependent assets

- Risk score the project considering the failure of the individual asset
- Risk score the project considering coincident failures (e.g., within the same electrical zone) of the **interdependent assets within the network**
- **The higher of the two scores is used for prioritisation**

Example

Electricity transmission – overhead line work ***The project is to refurbish double-circuit 1***



Double-circuit (DC) 1 is expected to fail within 5 years

	Impact	Likelihood	Risk
Individual failure	• **2** Disruption and maintenance costs	• **6** Expected to fail within 5 years	• **23**
Coincident failure	• **6** Loss of both lines would cause supply loss between 250–1,000 MW	• **3** Probability of coincident failure of DC 2 is 1%	• **33**

Risk of the project is 33

Source: Risk scoring pilots; team analysis

Record Request No. 6

Request:

LNG Facility on Terminal Road in Providence - Please indicate whether an impact study was performed, the cost of the impact study, whether the funds were collected, and the status of the project cost grade, and a calculation of the Contribution in Aid of Construction.

Response:

An impact study was performed to determine the characteristics of service to the LNG facility. The cost of the impact study was not determined in advance and study fees were not collected. So far, the cost estimates have been engineering Investment Grade. Final Project Grade estimates are expected this summer. The Contribution in Aid of Construction (CIAC) has been estimated but will ultimately be based on the customer's final loads and the final Project Grade estimates.

Under the Company's CIAC policy, National Grid has the discretion to collect advanced engineering fees, which are then applied to any construction advance when the project progresses. At times, the Company collects study fees for engineering associated with determining the method of service to a large new/added customer load. This is done at National Grid's discretion based in part on the certainty of the development of the customer's load. Since this LNG service was considered favorable for load development, consistent with Company practice, a study fee was not collected.

The plan for FY17 is to finalize the cost estimates and receive final load numbers from the customer in order to finalize the CIAC and service agreement. Once the CIAC is collected, the materials can be ordered and paid for in preparation for FY18 construction. The FY17 forecast was $2.8 million in materials and engineering and design fees and was offset by an estimated $2.1 million customer CIAC for a net cost of $0.7 million.

Record Request No. 7

Request:

Watch Hill - Please provide a listing of the Watch Hill overhead to underground project at each of the four grades and a final accounting.

Response:

The investment grade estimate for project CD00373 "Watch Hill UG Phase 2" was $1.258 million. No conceptual or preliminary estimates were developed for this project. The project grade estimate was $1.2 million. The total-to-date cost, without the impact of reimbursements, is $1.15 million. This project is in the closing phase, which may result in changes in the final cost. The estimates and actual costs include capital, removal, and O&M costs.

Record Request No. 8

Request:

Poles - What is the average age of National Grid's distribution poles? Is there an industry standard for replacement? If so, please provide a copy of documentation or please summarize.

Response:

National Grid is not aware of any industry standard that governs pole replacements. The Company determines whether to replace poles by doing a variety of things, including inspecting the physical condition of poles on a rolling five-year basis, responding to additional clearance requirements for added conductor from third-party attachment requests, and upgrading company conductors and equipment to ensure that there is adequate clearance and the pole strength complies with the National Electric Safety code.

There are approximately 265,545 poles on the distribution system in Rhode Island. The average distribution pole age is 41.36 years