

Light Water Reactor Sustainability Program

Advanced Instrumentation, Information, and Control Systems Technologies

Digital Technology

Business Case Methodology Guide



September 2014

U.S. Department of Energy

Office of Nuclear Energy

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Advanced Instrumentation, Information, and Control Systems Technologies

Digital Technology Business Case Methodology Guide

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CONTENTS

List of Acronyms	iv
Program Purpose	1
Introduction to the Methodology	1
Methodology Purpose	2
Nuclear Power Plant Cost Construct.....	3
Methodology Overview	7
Building the Business Case.....	8
Step 1: Identify Utility Common Practices	8
Step 2: Define Model Inputs/Variables	9
Step 3: Determine Key Business Output Measures	7
Step 4: Build Business Case Model	7
Step 5: Perform Input/Variable Sensitivity Analysis	14
Step 6: Present Business Case Ranges	17
Framing the Case for the Nuclear Utility Executive.....	17
Appendix 1: How to Add Labor Tasks	19
Appendix 2: Functional Area Acronyms for Labor Cost Tab.....	25

TABLE OF FIGURES

Figure 1: Key Areas of Impact.....	2
Figure 2: O&M-Online Cost Construct	4
Figure 3: O&M-Outage Cost Construct.....	5
Figure 4: Capital Cost Construct.....	6
Figure 5: Recurring vs. Non-Recurring Costs	9
Figure 6: Typical Costs/Benefits to Consider	7
Figure 7: Methodology Workbook "Overview" Tab	8
Figure 8: Methodology Workbook "Labor Costs Categories" Tab.....	9
Figure 9: Methodology Workbook "Labor Costs Tasks" Tab	10
Figure 10: Methodology Workbook "Task Library" Tab	11
Figure 11: Methodology Workbook "Non-Labor Costs" Tab	12
Figure 12: Methodology Workbook "Key Performance Indicator" Tab.....	13
Figure 13: Reference Organization Size	14
Figure 14: Sensitivity Analysis Graph 1	15
Figure 15: Sensitivity Analysis Graph 2	16
Figure 16: Sensitivity Analysis Graph 3	16
Figure 17: Sensitivity Analysis Ranges	17

LIST OF ACRONYMS

BCM	Business Case Methodology
BCMW	Business Case Methodology Workbook
DOE	Department of Energy
II&C	Instrumentation, Information, and Control
INPO	Institute for Nuclear Power Operations
KPI	Key Performance Indicator
LWR	Light Water Reactor
LWRS	Light Water Reactor Sustainability
NPP	Nuclear Power Plant
NPV	Net Present Value
O&M	Operating and Maintenance
R&D	Research and Development

Program Purpose

The Department of Energy's (DOE's) Light Water Reactor Sustainability Program aims to develop and deploy technologies that will make the existing U.S. nuclear fleet more efficient and competitive. The program has developed a standard methodology for determining the impact of new technologies in order to assist nuclear power plant (NPP) operators in building sound business cases.

Introduction to the Methodology

The Advanced Instrumentation, Information, and Control (II&C) Systems Technologies Pathway is part of the DOE's Light Water Reactor Sustainability (LWRS) Program. It conducts targeted research and development (R&D) to address aging and reliability concerns with the legacy instrumentation and control and related information systems of the U.S. operating light water reactor (LWR) fleet. This work involves two major goals: (1) to ensure that legacy analog II&C systems are not life-limiting issues for the LWR fleet and (2) to implement digital II&C technology in a manner that enables broad innovation and business improvement in the NPP operating model. Resolving long-term operational concerns with the II&C systems contributes to the long-term sustainability of the LWR fleet, which is vital to the nation's energy and environmental security.

The II&C Pathway is conducting a series of pilot projects that enable the development and deployment of new II&C technologies in existing nuclear plants. Through the LWRS program, individual utilities and plants are able to participate in these projects or otherwise leverage the results of projects conducted at demonstration plants.

The pilot projects conducted through this program serve as stepping stones to achieve longer-term outcomes of sustainable II&C technologies. They are designed to emphasize success in some crucial aspect of plant technology refurbishment and sustainable modernization. They provide the opportunity to develop and demonstrate methods to technology development and deployment that can be broadly standardized and leveraged by the commercial nuclear power fleet.

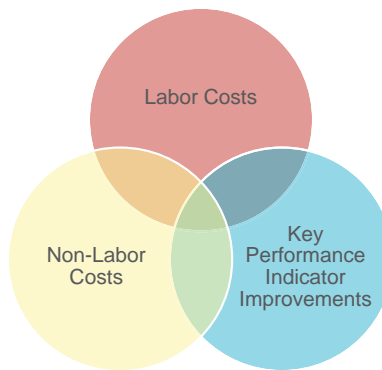
Performance advantages of the new pilot project technologies are widely acknowledged, but it has proven difficult for utilities to derive business cases for justifying investment in these new capabilities. Lack of a business case is often cited by utilities as a barrier to pursuing wide-scale application of digital technologies to nuclear plant work activities. The decision to move forward with funding usually hinges on demonstrating actual cost reductions that can be credited to budgets and thereby truly reduce O&M or capital costs. Technology enhancements, while enhancing work methods and making work more efficient, often fail to eliminate workload such that it changes overall staffing and material cost requirements. It is critical to demonstrate cost reductions or impacts on non-cost performance objectives in order for the business case to justify investment by nuclear operators.

The Business Case Methodology (BCM) addresses the "benefit" side of the analysis—as opposed to the cost side—and how the organization evaluates discretionary projects (net present value (NPV), accounting effects of taxes, discount rates, etc.). The cost and analysis side is not particularly difficult for the organization and can usually be determined with a fair amount of precision (not withstanding

implementation project cost overruns). It is in determining the “benefits” side of the analysis that utilities have more difficulty in technology projects and that is the focus of this methodology. The methodology is presented in the context of the entire process, but the tool provided is limited to determining the organizational benefits only.

This BCM approaches building a business case for a particular technology or suite of technologies by detailing how they impact an operator in one or more of the three following areas: Labor Costs, Non-Labor Costs, and Key Performance Indicators (KPIs). Key to those impacts will be identifying where the savings are “harvestable,” meaning they result in an actual reduction in headcount and/or cost.

Figure 1: Key Areas of Impact



Impacts to NPPs in these three areas should be quantified and built into a comprehensive business case for the adoption of a technology.

Methodology Purpose

The purpose of the BCM is to provide a structure for building the business case for adopting pilot project technologies in a manner that captures the total organizational benefits that can be derived from the improved work methods. This includes the direct benefit to the targeted work process, efficiencies gained in related work processes, and avoided costs through the improvement of work quality and reduction of human error.

Specifically, the BCM highlights key questions to ask and guides the utility through, as well as identifies where in the process to employ, the Business Case Methodology Workbook (BCMWB) for benefits/cost savings identification. The approach enables collaboration between the II&C Pathway and utility partners in applying new technologies across multiple NPP organizations and their respective work activities, wherever there is opportunity to derive benefit. In this manner, the BCM drives an “economy of scale” that maximizes the value of the technologies relative to the implementation cost.

The BCM leverages the fact that, in spite of what seems to be a wide and disparate array of work activities among an NPP’s operational and support organizations, the work activities themselves are largely composed of common tasks. For example, whether the work activities are in Operations, Chemistry, Radiation Protection, or even Security, they have in common such tasks as pre-job briefs, use of procedures, correct component identification, emergent conditions requiring work package alteration,

etc. It is at this task level that the technologies are applied, and therefore the benefits of the technologies can be realized across as many plant activities as can be identified to employ these tasks. In this manner, a much more comprehensive business case can be derived that greatly increases the benefit/cost ratio. This has the added benefit of driving consistency across the NPP organizations, which is a fundamental principle of successful NPP operational and safety management.

Nuclear Power Plant Cost Construct

To understand where a technology might benefit an NPP/utility, the user must understand the overall NPP's cost construct to identify what "line item" in the budget the technology affects. A typical NPP's cost model is broken down into three components:

1. O&M – Online
2. O&M – Outage
3. Capital

Figure 2 illustrates the O&M – Online Cost Construct of an NPP.

Figure 2: O&M-Online Cost Construct

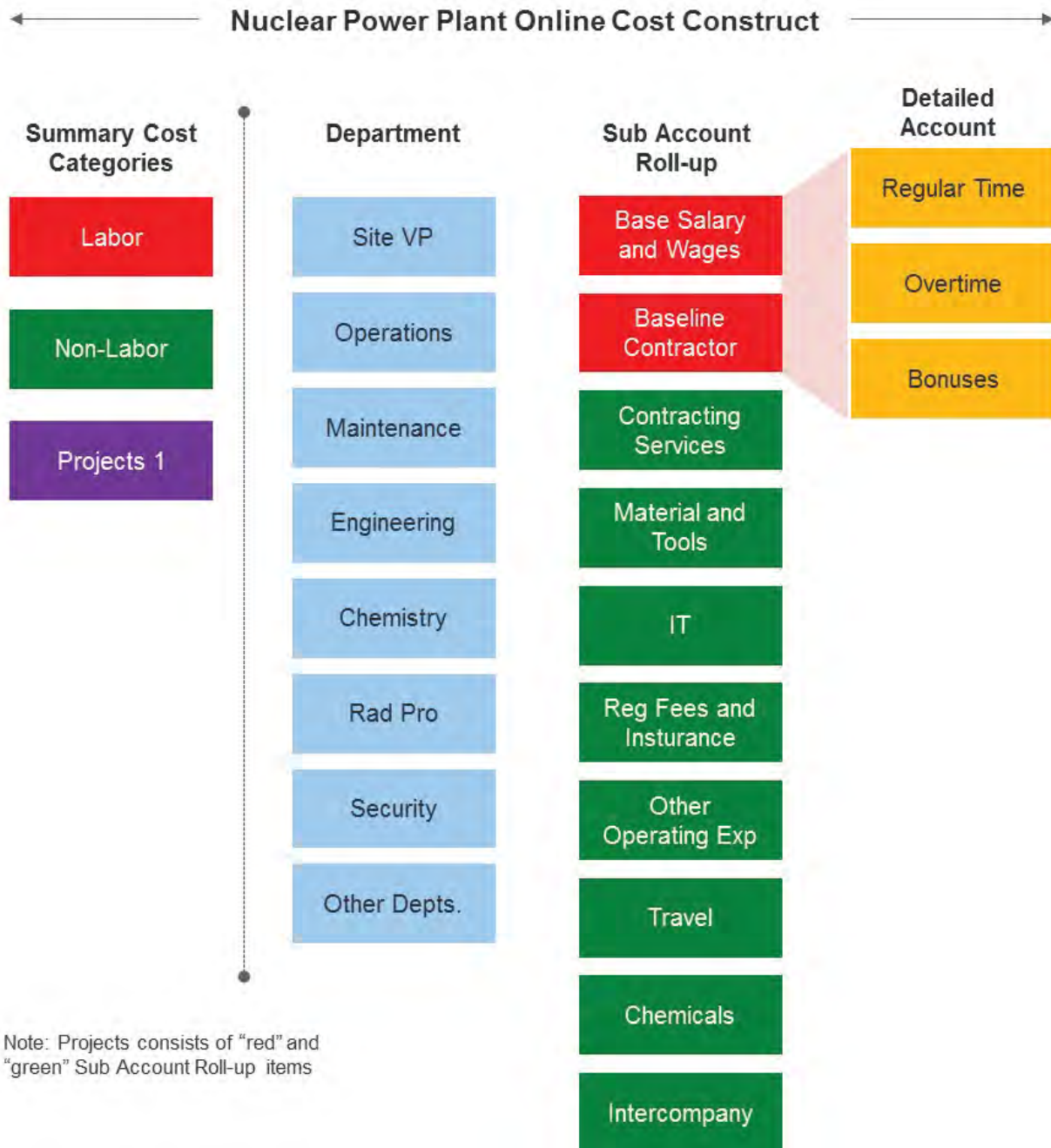


Figure 3 illustrates the O&M – Outage Cost Construct of an NPP.

Figure 3: O&M-Outage Cost Construct

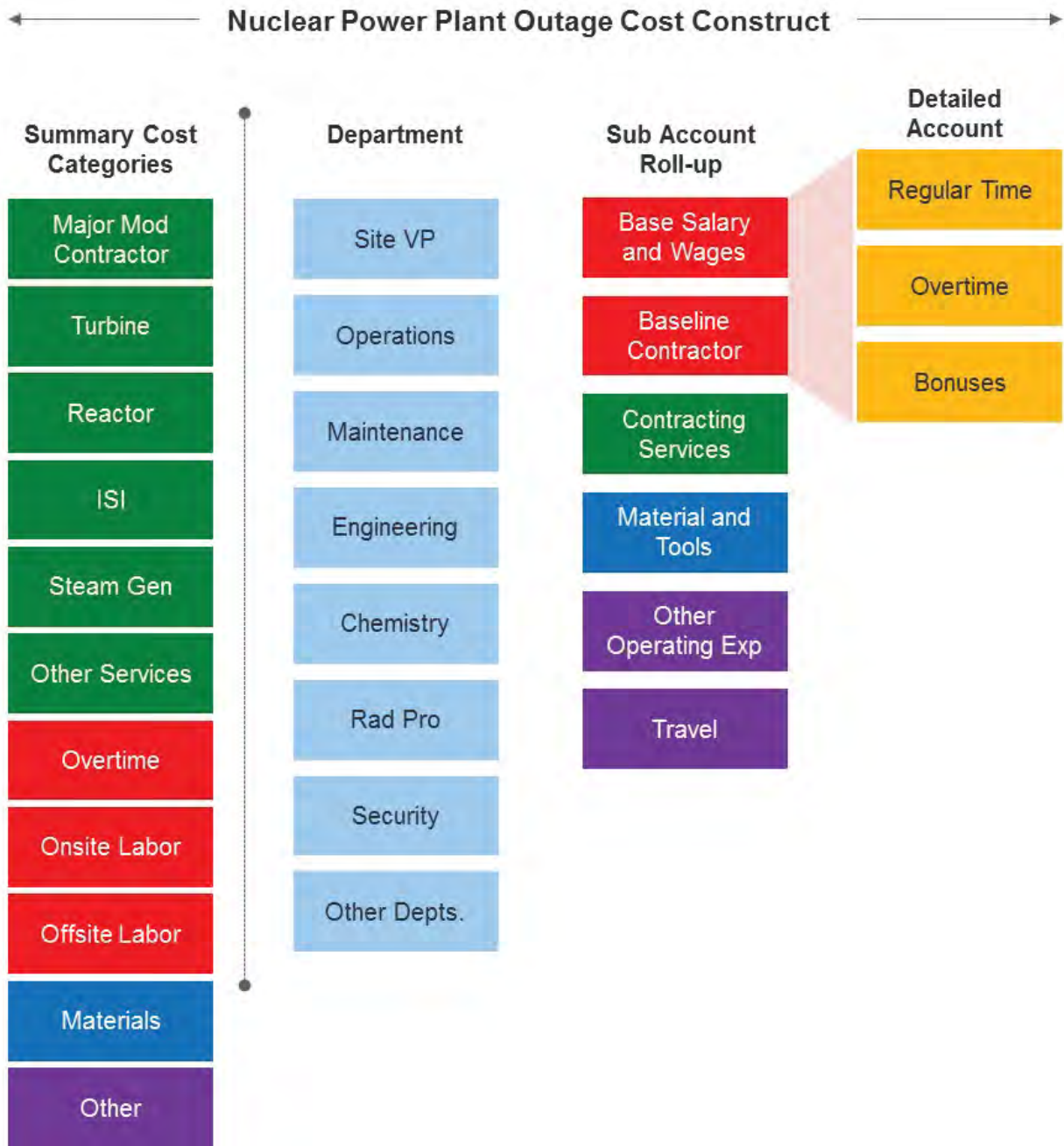
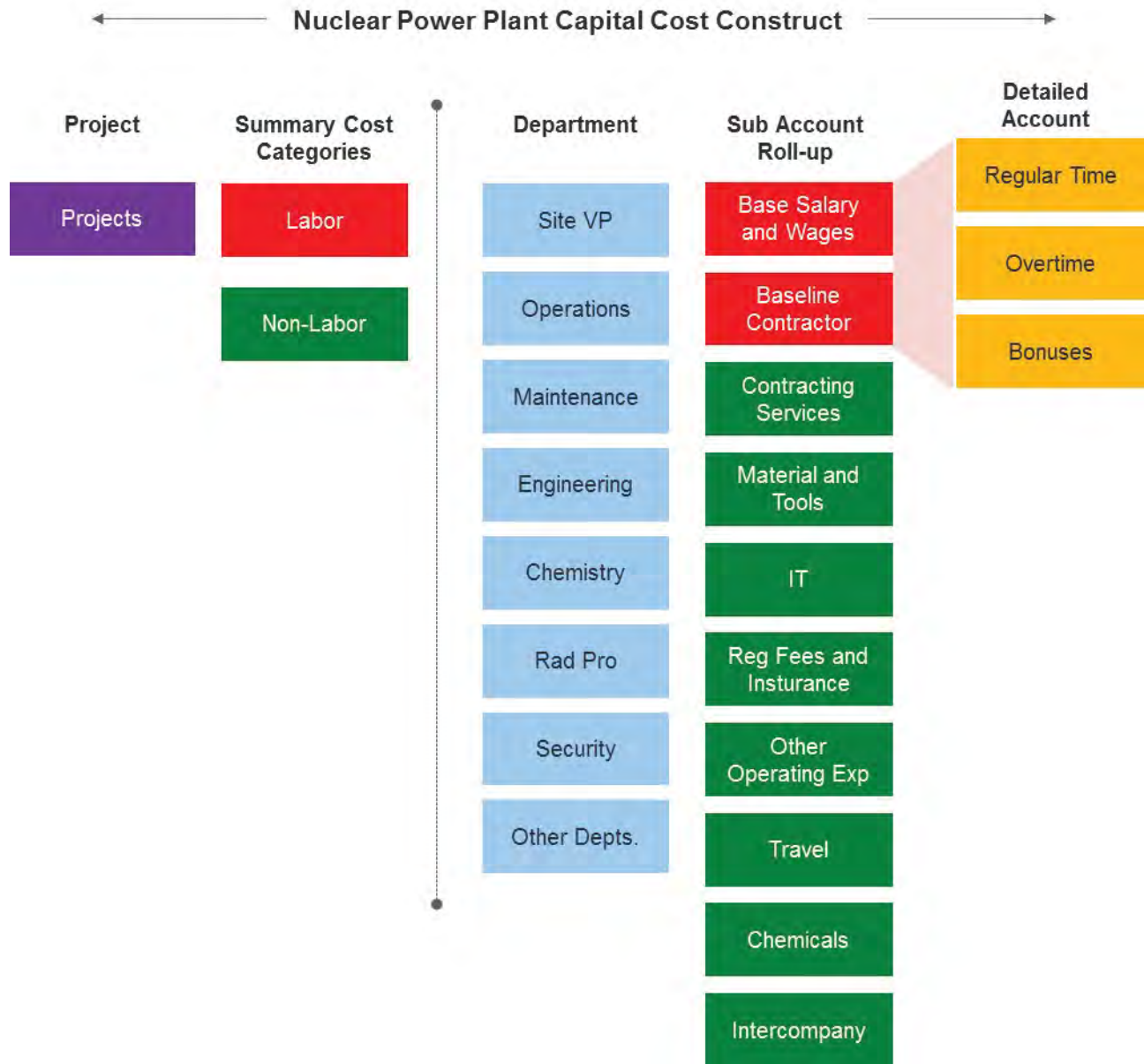


Figure 4 illustrates the Capital Cost Construct of an NPP. Please note this is broken down by project.

Figure 4: Capital Cost Construct



Methodology Overview

The BCM consists of six steps, as follows:

1. Identify Utility Common Practices
2. Define Model Inputs/Variables
3. Determine Key Business Output Measures
4. Build Business Case Model
5. Perform Input/Variable Sensitivity Analysis
6. Present Business Case Ranges

The outcome of the methodology is a robust financial analysis of the costs and benefits associated with the adoption of a new technology on a nuclear site.

Building the Business Case

Step 1: Identify Utility Common Practices

In order to evaluate projects across the organization effectively, utilities may already have a set of business case process requirements that are to be adhered to and leveraged. The BCMW supplements the utility's project evaluation process to determine the value provided by the technology to the utility. The following questions should be explored as part of the first steps of engaging a utility.

Financial Output Measures

- What financial measures are typically used to assess and compare business cases for projects?
 - Net Present Value (NPV)
 - Payback Period
 - Internal Rate of Return (IRR)
 - Others?

Typical Financial Variables

- Does the NPP/utility use certain financial variables for all projects?
 - Corporate-wide discount rate used for all projects?
 - Standard inflation assumption used for all projects?
 - Common payroll/merit increase assumption used for all labor-related projects?

Time Horizon for Investment

- Are projects evaluated on a common time horizon?
 - 5-year time horizon?
 - 10-year time horizon?
- Note: Important to understand upfront as this will impact financial output measures

Business Case Templates/Format

- Are there business case templates/formats that should be used?
- Is there a common business case review process that will need to be followed?

Incremental vs Non-Incremental

- How does the NPP/utility intend to view costs associated with the project?
 - Incremental costs ONLY – new cost directly associated with the implementation of the project
 - Example: Technology implementation would consider costs of the new technology, and any new staff dedicated to the implementation, but current IT personnel allocated to the implementation would not be considered
 - Non-incremental (or total) costs – all costs associated with supporting the implementation of the project
 - Example: Time-value of any personnel helping the project would need to be factored into the overall cost. If a VP is going to spend 5% of their time on the project, their associated cost would be included

One-Time vs. Recurring Costs

- One-time costs (also known as “project implementation” costs) – these can be treated differently related to cost allocation and accounting in the general ledger
- Recurring costs (also known as “running” costs) – these are often compared to current state base cases and can often be incorporated into current general ledger accounts

Chargeback Approach/Method

- Does the NPP/utility intend to allocate costs of the project back to various business units/departments or incur all costs centrally?
 - Allocation to business units/departments – identify how costs will be allocated and which costs will have this condition; your business case model will have to be built with this in mind

Differentiating between Recurring and Non-Recurring Costs

Differentiating between recurring and non-recurring costs can facilitate comparison of current and future costs, support any cost-allocation discussions, and help the internal project team sell the nuclear technology concept.

Figure 5: Recurring vs. Non-Recurring Costs

<p>Recurring</p>	<p>Non-Recurring</p>
<p>On-going costs to run and operate the technology. Typical costs can include:</p> <ul style="list-style-type: none"> ▪ End-state staff costs to support technology ▪ Technology maintenance costs ▪ Monthly lease costs for the site 	<p>One-time costs incurred to build and set up the shared services center for the given functions. Typical costs can include:</p> <ul style="list-style-type: none"> ▪ Redundant staff costs ▪ Technology implementation costs ▪ Site refurbishment costs ▪ End-state staff costs to support new technology
<ul style="list-style-type: none"> ▪ Use of per-transaction costs permits business unit comparison of current and future costs ▪ Separation of one-time implementation costs provides clarity to future, end-state costs (often much lower than one-time costs) 	<ul style="list-style-type: none"> ▪ Identification of non-recurring costs facilitates cost allocation discussion between parent group and business units

Step 2: Define Model Inputs/Variables

A clear identification of all the business case inputs and variables will facilitate future adjustments and “what if” scenario analyses as well as help utilities review all the assumptions of the model. The cost side of the benefit will be derived by the utility or NPP. The benefits side of the table below can be derived from the BCMW.

Figure 6: Typical Costs/Benefits to Consider

Typical Costs/Benefits to Consider	
COSTS	BENEFITS
Technology	
One-time implementation/setup costs	Sunset of older technologies (saving of ongoing costs)
Ongoing maintenance/service costs	Reduction in licenses or hosted feed for older technologies
License fees or hosted fees	
Equipment	
Labor	
Cost of severance and outplacement	Headcount reduction*
Other	
Consulting and project team	Non-labor cost reduction (materials, etc.)*
Training	Improvements in KPIs*
	Reduction in vendors/optimization of contracts

*Indicates key areas of impact for technology projects. Quantifying these benefits is discussed in Step 4.

Step 3: Determine Key Business Output Measures

Many business cases will typically have several financial metrics which are used as reference points for comparison to other cases and as key “take-away” metrics for the business.

	Guidance/Definition	Impacted by...
<div style="background-color: #444; color: white; padding: 10px; text-align: center; width: 150px; margin-bottom: 10px;"> Net Present Value (NPV) </div> <div style="font-size: 2em; color: #444; margin: 0 10px;">▶</div>	<ul style="list-style-type: none"> ▪ Dollar value of the initiative for the organization – how much the organization will make on this initiative, accounting for time 	<ul style="list-style-type: none"> ▪ Time horizon of business case ▪ Speed of implementation ▪ Size of investment (and benefit) ▪ Discount rate
<div style="background-color: #444; color: white; padding: 10px; text-align: center; width: 150px; margin-bottom: 10px;"> Payback Period </div> <div style="font-size: 2em; color: #444; margin: 0 10px;">▶</div>	<ul style="list-style-type: none"> ▪ Time (often in years) it takes for the cumulative benefits to equal the cumulative investments 	<ul style="list-style-type: none"> ▪ Speed of implementation ▪ Size of investment (and benefit)
<div style="background-color: #444; color: white; padding: 10px; text-align: center; width: 150px; margin-bottom: 10px;"> Internal Rate of Return (IRR) </div> <div style="font-size: 2em; color: #444; margin: 0 10px;">▶</div>	<ul style="list-style-type: none"> ▪ Annual rate (percentage) which is returned by investing in the initiative; essentially provides the yield for the investment 	<ul style="list-style-type: none"> ▪ Time horizon of business case ▪ Speed of implementation

Step 4: Build Business Case Model

In addition to the information gathered with the NPP/utility in the first three steps, building the actual business case also involves leveraging the BCMW in order to help the NPP/utility identify the areas of impact and quantify the benefits of the impact. The workbook identifies specific task-level benefits, non-labor cost centers, and KPI improvements that can be quantified and factored into the analysis or presented qualitatively to buttress the quantitative case. The BCMW determines the aggregate cost savings across the organization and across different cost drivers. The BCMW does not account for recurring and non-recurring technology costs and does not apply a financial measure or payback period

such as an NPV. Any financial measure or payback period would be done by the NPP or utilities project evaluation process.


The BCMW was developed to walk employees and NPP/utility teams through the three key impact areas of labor costs, non-labor costs, and KPIs.

Workbook Overview

The “Overview” tab requires a project title and description and prompts the user to think about the size of the site and which of the three impact areas and functional areas are affected.

Figure 7: Methodology Workbook "Overview" Tab

INL Business Case Methodology Workbook



Instructions →

Project Title →

Project →

Site Size →

Impact Area →

Impacted Functional →

Using the Methodology Workbook

1. Identify and describe below the project/technology being evaluated.
2. Identify below the type of impact the new technology may have on a site by checking the boxes next the options.
3. Identify the area of the site organization where those effects will appear.
4. Identify on the next tab, by area, which work drivers the new technology will have an effect on, and how future performance may differ.

Identifying the Project/Technology

Project Title:

Project Description:

Site Size: Number of Units Size Counts Type

Identifying the Impact Type

Check the impact or impacts below you expect deployment of the new project/technology to have on a site.

Labor Costs Non-Labor Costs Key Performance Indicators

Identifying the Impact Area

Check the impacted functional areas on a site.

<input type="checkbox"/> Design	<input type="checkbox"/> Operations	<input type="checkbox"/> Maintenance	<input type="checkbox"/> Work Management
<input type="checkbox"/> Radiation Protection	<input type="checkbox"/> Chemistry	<input type="checkbox"/> Engineering	<input type="checkbox"/> Training
<input type="checkbox"/> Performance Improvement	<input type="checkbox"/> Security and Access Authorization	<input type="checkbox"/> Procedures	<input type="checkbox"/> Corrective Action Programs
<input type="checkbox"/> Health and Safety			

Labor Costs Categories

The Labor Cost Categories tab includes:

1. Key Work Categories by functional area. At a high level, these are the areas of work in each functional area that efficiencies at the task level below will show up in
2. Estimated savings from all of the tasks that make up a work category roll up here
3. Whether or not identified savings are “harvestable”
4. Comments and qualitative benefits can also be noted, and the Total Harvestable Savings in person hours are summed at the bottom
5. Total harvestable savings for the site

Figure 8: Methodology Workbook "Labor Costs Categories" Tab

Labor Costs (Internal Labor, Overtime, Contractor Spend)		Approximate Base Organization Site Size (FTEs)							
Functional Area	Key Work Categories	Total Estimated Savings (person hrs)	Are savings harvestable? (Yes/No)	% Harvestable	Total Estimated Savings (FTEs)	1 Unit	2 Unit	3 Unit	Comments / Qualitative Benefits
Operations	OP.A. Perform Field Operations	0	Yes	100%	0.0	27	33	40	
	OP.B. Conduct Control Room Operations	0			0.0	30	40	50	
	OP.C. Support Work Management	0			0.0	5	6	11	
	OP.E. Perform Support Activities	0			0.0	5	6	10	
	OP.F. Participate in Training	0			0.0	15	19	27	
Maintenance	MA.A. Perform Maintenance Activities	0			0.0	73	123	151	
	MA.B. Support Work Management	0			0.0	4	7	9	
	MA.C. Perform Planning Activities	0			0.0	18	30	37	
	MA.D. Perform Support Activities	0			0.0	22	37	46	
	MA.E. Participate in Training	0			0.0	10	16	20	
	MA.F. Calibrate Maintenance & Test Equipment	0			0.0	2	3	4	
Work Management	WM.A. Manage Online Work	0			0.0	9	10	13	
	WM.B. Manage Outage Work	0			0.0	6	7	9	
	WM.C. Manage Risk and Safety	0			0.0	1	2	2	
	WM.D. Perform Support Activities	0			0.0	5	8	11	

Note: Costs savings in the labor category from avoided problems, for example performing fewer Root Cause Analyses due to a process improvement enabled by technology, should be accounted for in the Corrective Action Program functional area.

Labor Costs Tasks

The Labor Costs Tasks tab is used to identify the specific tasks affected by the adoption of new technology. These tasks are grouped by functional area, as well as linked to the master Task Library (Tab 4). To populate the Labor Costs Tasks tab, work in the following order:

1. Work with the NPP/utility internal team to identify which of the specific tasks will be affected by the adoption of the new technology. Indicate this by selecting "Yes" in the "Impacted?" column (column E). Filter out the "Nos" in order to focus on tasks that need review and data input
2. Again with the NPP/utility internal team, gather data on how many units of the tasks are completed on an annual basis and the rate (i.e., hours per task, 5 minutes per pre-job brief) at which they are completed
3. Using research compiled by DOE as well as insights gleaned from the NPP/utility team, identify the percentage of tasks impacted, percentages of units saved, and the percentage of time saved (definitions and examples shown below). These savings are "task specific," meaning the savings numbers entered here do not affect like tasks in other functional areas

Percentage of tasks impacted – Technology impacts 100% of Operations pre-job briefs

Percentage of units saved – Technology reduces the number of Operations pre-job briefs from 100 per year to 50 per year; 50% reduction

Percentage of time saved – Technology saves Operations Shift Manager 15 minutes from a typical 60-minute pre-job brief; 25% reduction

4. Submit any Comments/Qualitative Benefits for review after the data has been compiled
5. Note any universal impacts on a task from the Task Library

Figure 9: Methodology Workbook "Labor Costs Tasks" Tab

INL Business Case Methodology Workbook


For Global A/B	Task Name / Category and Title	Impacted?	Units		Rate		% Units Saved		% Time Saved		Comments / Qualitative Benefits
			Units/Year	Rate (hrs/task)	Units/Year	Rate (hrs/task)	% Units Saved	% Time Saved			
OP.A.1	Perform Pre-Shift Operations	Yes	100	1.00	100	1	0%	0%			
OP.A.2	Conduct Pre-Shift Brief	Yes	100	1.00	100	1	0%	0%			
OP.A.3	Conduct Post-Shift Brief	Yes	100	1.00	100	1	0%	0%			
OP.A.4	Operator Action (Review status, start pumps, change systems, etc.)	Yes	100	1.00	100	1	0%	0%			
OP.A.5	Perform tests	Yes	100	1.00	100	1	0%	0%			
OP.A.6	Conduct Post-Maintenance Tests	Yes	100	1.00	100	1	0%	0%			
OP.A.7	Operator Equipment Checks	Yes	100	1.00	100	1	0%	0%			
OP.A.8	Conduct periodic determinations	Yes	100	1.00	100	1	0%	0%			
OP.A.9	Check logs	Yes	100	1.00	100	1	0%	0%			
OP.A.10	Initial/interim tests (instrumentation, jumpers, hardware maintenance)	Yes	100	1.00	100	1	0%	0%			
OP.A.11	File reports	Yes	100	1.00	100	1	0%	0%			
OP.B.1	Conduct Control Room Operations	Yes	100	1.00	100	1	0%	0%			
OP.B.2	Monitor and operate control room	Yes	100	1.00	100	1	0%	0%			
OP.B.3	Adjusting/Resetting/COA	Yes	100	1.00	100	1	0%	0%			
OP.C.1	Support Work Management	Yes	100	1.00	100	1	0%	0%			
OP.C.2	Provide input to work schedule (resources, qualifications, etc.)	Yes	100	1.00	100	1	0%	0%			
OP.C.3	Support equipment activity requests	Yes	100	1.00	100	1	0%	0%			
OP.D.1	Perform Planning Activities	Yes	100	1.00	100	1	0%	0%			
OP.D.2	File/review/adjust work packages	Yes	100	1.00	100	1	0%	0%			
OP.D.3	Check/prepare staffing schedules	Yes	100	1.00	100	1	0%	0%			
OP.D.4	Create logs	Yes	100	1.00	100	1	0%	0%			
OP.D.5	File/submit/prepare/submit	Yes	100	1.00	100	1	0%	0%			
OP.D.6	Plan work Order/Task (e.g. PM)	Yes	100	1.00	100	1	0%	0%			
OP.E.1	Perform Support Activities	Yes	100	1.00	100	1	0%	0%			
OP.E.2	Test/inspect/fix systems	Yes	100	1.00	100	1	0%	0%			
OP.E.3	Support plant in/leave/repairing/stop	Yes	100	1.00	100	1	0%	0%			
OP.E.4	Conduct observations and performance appraisals	Yes	100	1.00	100	1	0%	0%			
OP.F.1	Participate in Training	Yes	100	1.00	100	1	0%	0%			
OP.F.2	Participate in training	Yes	100	1.00	100	1	0%	0%			
OP.F.3	Provide input on training packages	Yes	100	1.00	100	1	0%	0%			

Task Library

The Task Library consists of the entire list of tasks that appear on the Labor Costs Tasks tab.

1. Labor Tasks may impact one or more functional areas
2. If upon examination of a technology it is determined that it will have a universal impact on a common task (i.e. in every instance for every functional area the impact will be the same), the percentage of units reduced or percentage of time saved can be entered on this tab
3. Appendix 1 demonstrates to steps to add new tasks to the Task Library in the workbook

Figure 10: Methodology Workbook "Task Library" Tab

INL Business Case Methodology Workbook 

	Common Tasks	Functional Area	% Units Saved	% Time Saved
1. Functional Areas	1. Hang tags for testing*	OP		
	2. Hang tags	OP		
	3. Remove tags	OP		
	4. Perform Maintenance Tests	OP		
2. Universal Impact	5. Implement/Update	OP		
	6. Reliability determinations	OP		
	8. Create labels	OP		
	9. Log entries	OP		
	10. Monitor and operate control room	OP		
	11. Activating/deactivating LCOs	OP		
	12. Support surveillance tests	OP		
	13. Review/sign off on work packages	OP		
	14. Create/manage staffing schedules	OP		
	15. Create tags	OP		
	16. Review/approve tags	OP		
	17. Plan Work Order Tasks (e.g. PMT)	OP		
	18. Test/maintain fire systems	OP		
	19. Support plant initiatives requiring SRCs	OP		
	20. Conduct observations and performance appraisals	OP		
	21. Provide input on training packages	OP		
	22. Complete Implemented Review	MA		
	23. Conduct Correct Component verification	MA		
	24. Label components	MA		
	25. Document materials entering work zone	MA		
	26. Sign in/out of clearances	MA		
	27. Obtain sign off from maintenance program owner (e.g., sign off on lifting plan from L&R program owner)	MA		
	28. Conduct field walkdown	MA		
	29. Stage work area (clean, install FME dams, etc.)	MA		
	30. Prep for shielding	MA		
	31. Stage materials for job	MA		
	32. Obtain equipment from tool room	MA		

Note: Additional tasks must be first added to the Task Library before being added to the Labor Costs Tasks tab. The Labor Costs Tasks tab uses data validation to ensure the user chooses from a drop down with set options (from the Task Library list).


Appendix 2 illustrates the functional area two-letter acronyms (e.g., OP = Operations)

Non-Labor Costs and Key Performance Indicator Impacts

The first part of the Non-Labor KPI tab walks the user through common non-labor online and outage costs that may be impacted by technology adoption. Identify the cost category and type, and work with the NPP/utility internal team to identify cost deltas.

Figure 11: Methodology Workbook "Non-Labor Costs" Tab

INL Business Case Methodology Workbook



Non-Labor Cost - Online							
Functional Area	Sub-Account	Detailed Cost Category	Cost Before	Cost After	Estimated Savings (\$)	Comments / Qualitative Benefits	
Operations	Contract Services	Uniform Services			\$ -		
	Material & Tools	MGT Uniforms			\$ -		
	Material & Tools	Fire Protection tools/supplies			\$ -		
	Material & Tools	New Oil Products/Greases			\$ -		
	Material & Tools	Other consumables			\$ -		
	Material & Tools	Diesel Fuel			\$ -		
	Material & Tools	Labeling Material			\$ -		
	Travel	Meeting Exp			\$ -		
	Travel	Business Travel			\$ -		
	Travel	Reimburd and Employee Recognition Expenses			\$ -		
Maintenance	Contract Services	Janitorial Services			\$ -		
	Contract Services	Facility Repairs Contract			\$ -		
	Contract Services	Facility Repairs			\$ -		
	Contract Services	Trash			\$ -		
	Contract Services	Pest Control			\$ -		
	Contract Services	Lawn care			\$ -		
	Contract Services	Snow removal			\$ -		
	Contract Services	Maintenace Mod Contractor			\$ -		
	Contract Services	Walk downs & Estimates			\$ -		
	Contract Services	Equipment Rental			\$ -		
	Contract Services	Janitorial (leased or Owned)			\$ -		
	Contract Services	Diving			\$ -		
	Contract Services	Outside Tech Rep/Vendor			\$ -		
	Contract Services	CRD Rebuilds			\$ -		
	Contract Services	SHV Rebuilds			\$ -		
	Contract Services	Rump Overhaul			\$ -		
	Contract Services	Valve Rebuilds			\$ -		
	Contract Services	Equipment & Tool Repairs			\$ -		
	Contract Services	Breaker Overhauls			\$ -		
	Contract Services	Outside Tech Rep/Vendor Support			\$ -		
Contract Services	On-Officer Support			\$ -			
Contract Services	Bevator Inspection & Repair			\$ -			
Contract Services	Oil Analysis			\$ -			
Contract Services	Oil/Diesel Fuel Analysis			\$ -			
Contract Services	Package prep			\$ -			
Material & Tools	Fire resistant uniforms			\$ -			
Material & Tools	Material Delivery			\$ -			
Material & Tools	Open & Working Stock			\$ -			
Material & Tools	Janitor/housekeeping			\$ -			
Material & Tools	Paint Supplies			\$ -			
Material & Tools	Vehicle Fuel			\$ -			
Material & Tools	Facility maintenance			\$ -			
Material & Tools	Non-Capital Tools			\$ -			
Material & Tools	Material			\$ -			
Travel	Meeting Exp			\$ -			
Travel	Business Travel			\$ -			
Travel	Reimburd and Employee Recognition Expenses			\$ -			
Project Management	Travel	Meeting Exp			\$ -		

1. Functional Areas

2. Sub Account

3. Description of Cost Category

4. Cost before, after and estimated savings

5. Comments

The Non-Labor Cost worksheet is similar for online and outage costs.

Part two of the Non-Labor KPI tab lists KPI metrics that are most likely to be affected by technology adoption. Users should do the following:

1. Identify all impacted KPIs
2. Assess the current value of impacted metrics
3. Identify likely future value after technology adoption
4. Note Comments/Qualitative Benefits

Figure 12: Methodology Workbook "Key Performance Indicator" Tab

INL Business Case Methodology Workbook



Key Performance Indicators							
#	Level 1 Level 2 Sub-Indicator	Metric measured by	Measured by (Unit/Plant)	Top Quartile Maximum Value	Current Value	Potential Value	Comments / Qualitative Benefits
1	INPO Index	#	Unit	98/100	T.Q./Max		
2	Net Generation (TWh)	#	Unit				
3	Total Industrial Safety Accident Rate (TISAR)	Rate	Plant	0.02	T.Q.		
				96.9 BWR			
4	Collective Radiation Exposure (CRE)	#	Unit	30.4 PWR	T.Q.		
5	Unit Capacity Factor - Refuel Cycle	%	Unit	95%	T.Q.		
6	Unit Forced Loss Rate - Refuel Cycle	%	Unit	0.40%	T.Q.		
7	Unit Capability Factor - Refuel Cycle	%	Unit	95.80%	T.Q.		
8	Unplanned Weighted Manual and Automatic Scrams	#	Unit	0	T.Q.		
9	Total Production Cost (O&M, Capital, and Fuel)	\$	Plant				
Level 2							
10	Equipment Reliability Index	#	Unit	98/100	T.Q./Max		
11	Reportable Environmental Events	#	Plant	0	T.Q.		
12	Reactivity Management	%	Unit	95.60%	T.Q.		
13	Total Recordable Injury Rate - Rolling 12 months	Rate	Plant	0	T.Q.		
14	Human Performance Event Rate - Rolling 12 months	Rate	Plant	0	T.Q.		
15	Operator Burdens	#	Unit				
16	Control Room Deficiencies	#	Unit				
17	Operator Work Arounds	#	Unit				
18	Corrective Critical Backlog	#	Plant	0	T.Q.		
19	Corrective Critical Non-Critical Backlog	#	Plant	<20	T.Q.		
20	Deficient Critical Backlog	#	Plant	<40	T.Q.		
21	Deficient Non-Critical Backlog	#	Plant	<140	T.Q.		
22	Personal Contamination Events (PCEs) - Online	#	Plant	<2	T.Q.		
23	Personal Contamination Events (PCEs) - Outage	#	Plant	<20	T.Q.		
24	Online schedule completion	%	Plant	>93%	T.Q.		
25	Schedule Stability	%	Plant	>93%	T.Q.		
26	Deferred PM Work Orders	#	Plant				
27	PMs Deep in Grace	#	Plant				
28	Critical PMs Deep in Grace	#	Plant				
29	Outage Milestones Missed	#	Unit	0	T.Q.		

1. Impacted KPIs

2. Reference Info

4. Potential Future Value

3. Current Value

5. Comments

Reference

The Reference tab in the BCMW contains reference material about the approximate sizes of functional area staffing in differently sized nuclear plants. This reference material is intended to assist staff with determining size of impact since O&M costs are largely driven by labor/headcount.

Figure 13: Reference Organization Size

Unit Size Selected:	Number of Units		
2	Single	Double	Triple
Operations	120	200	250
Maintenance	140	250	320
Work Management	20	30	35
Radiation Protection	40	65	75
Chemistry	22	30	40
Engineering	120	160	200
Training	35	45	55
Performance Improvement	10	12	12
Security & Access Authorization	220	250	260
Procedures	12	12	12
Corrective Action Program	10	10	10

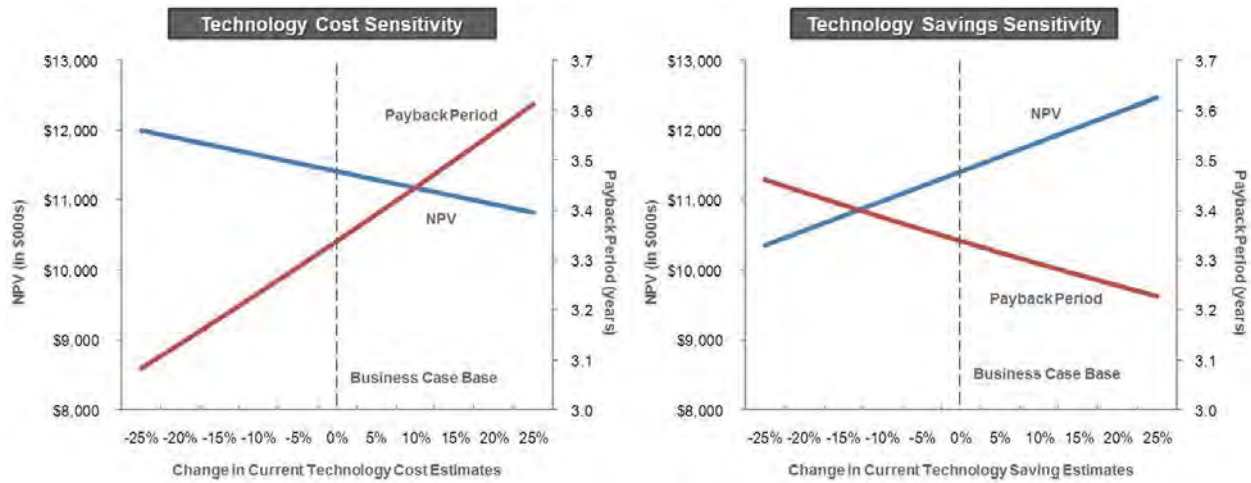
Step 5: Perform Input/Variable Sensitivity Analysis

Work with the NPP/utility to identify those variables or assumptions they are most concerned about in order to identify “what if” scenarios to perform. Likely candidates for sensitivity analysis could include:

- Least degree of current confidence (we just don’t know if cost assumptions are accurate)
- Greatest amount of NPP/utility leadership focus (certain variables, like improving outage scheduling)
- Variables with high volatility (e.g., technology implementation costs)
- Biggest potential to affect business case outcome (some variables have significantly higher impact on business case outcome and should be highlighted and understood)

Beyond providing the range of reasonable results, sensitivities also provide leadership with insight into what levers to pull to pursue certain financial goals.

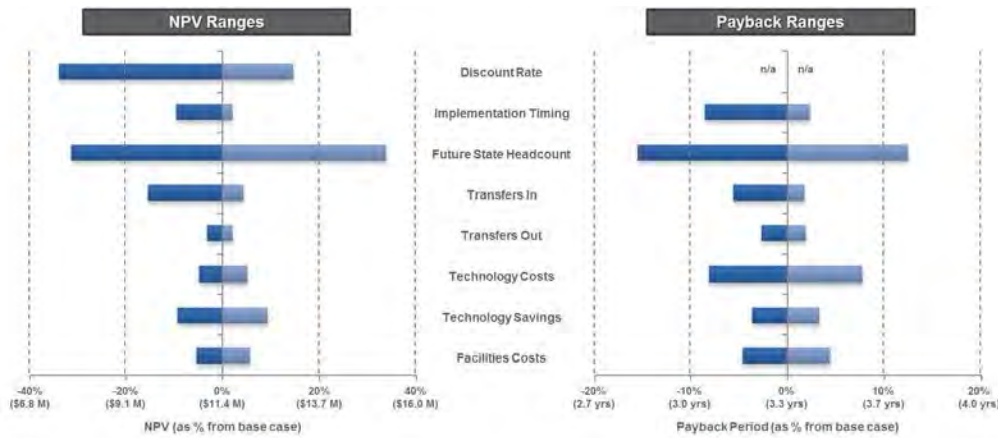
Figure 14: Sensitivity Analysis Graph 1



- Example suggests that technology costs and savings can be adjusted to achieve different financial goals
 - If business is under pressure to break even on cash quickly, focusing on cost will provide greater impact on payback period
 - If business is under pressure to prove long-term value of initiative, focusing on savings will provide greater impact on overall NPV

By depicting the impact of key NPP/utility sensitivities, the project team can instill comfort in the outcome even if the precise details of implementation are not yet finalized.

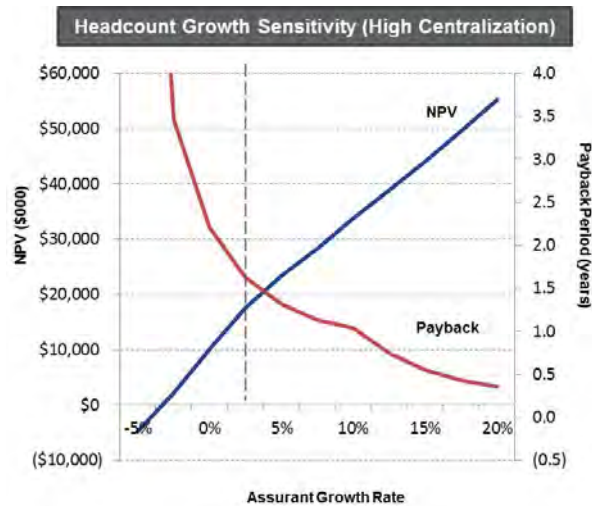
Figure 15: Sensitivity Analysis Graph 2



- Sensitivities provide “guardrails” on outcome
- Figure above identifies those variables that will have largest impact, and therefore will require most of the attention and focus during implementation

Sensitivities can highlight to leadership variables that may be out of their direct control but can still have a major impact on business case results.

Figure 16: Sensitivity Analysis Graph 3

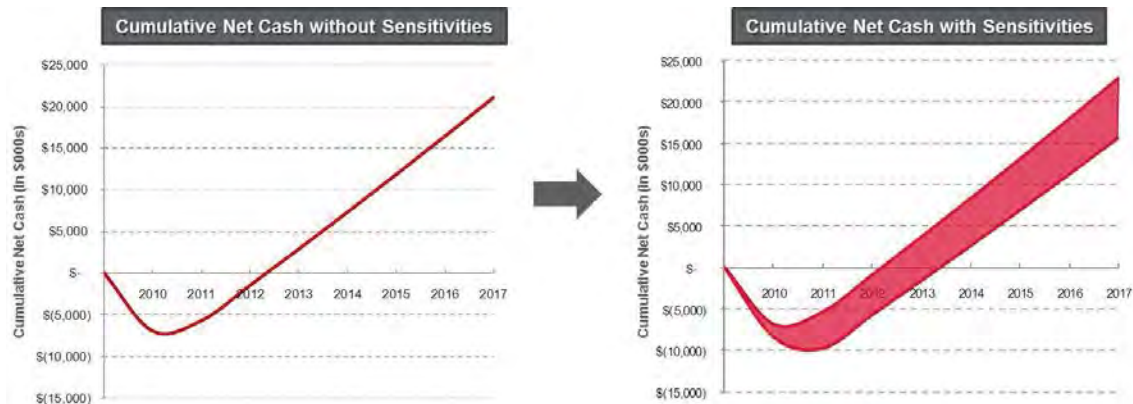


- The model is sensitive to growth rate estimates with NPV ranging from (\$5) million to \$55 million based on the range of possible growth rates shown here
- Payback ranges from never to 0.4 years depending on the assumed growth rate

Step 6: Present Business Case Ranges

By sharing a business case with ranges, we are able to convey the theoretical exercise inherent in the process and ensure NPP/utility leadership can make an informed, thoughtful decision based on possible outcomes.

Figure 17: Sensitivity Analysis Ranges



- It is easier to disagree and dispute a single dollar-value result and much harder to dispute a range
 - Enough assumptions are made that won't all result as predicted in the business case
- Sensitivities ensure ranges can be calculated and reviewed to understand the largest areas of risk and gauge what it would take for the business case to no longer be appealing
- Intent is not to give the appearance that all the variables have been figured out
 - Sensitivities help convey that there can still be areas of change

Framing the Case for the Nuclear Utility Executive

Managing costs are crucial for nuclear plant profitability, and in many markets that may now even mean economic survival for a nuclear plant. While technology adoption comes with costs and a learning curve for any organization, the technology improvements proposed by the II&C Pathway for NPP operations represent the best option available for controlling rising costs, reducing cumulative burdens, minimizing human errors, and improving plant systems.

Building the business case for a new technology or suite of technologies as proposed above will result in a clear and concise financial analysis of the impact of adoption. Key elements to the trustworthiness of the analysis will be that it provides:

- Direct line of sight to the functional areas and specific task-level improvements resulting from adoption (e.g. verifying worker qualifications electronically)
- Common language and practices from the utility business case methodology
- Sensitivity analyses

NPP/utility executives will be looking to the business case to answer critical questions about the costs and benefits of adopting a new technology. Examples of questions to prepare for include:

- What functional areas are affected?
- What processes are improved?
- In what labor cost categories do I see savings? (e.g., overtime)
- In what non-labor cost categories do I see savings?
- Are the savings truly harvestable?
- When will these savings be realized?
- In what performance indicators do I improve?

Appendix 1: How to Add Labor Tasks

Open Labor Costs Tasks worksheet in the workbook

INL Business Case Methodology Workbook



Labor Costs (Base Labor, Overtime, Contractor Spend)				Impact				General				Comments / Qualitative Benefits
Functional Area	Key Work Categories and Tasks	Impacted?	How Many Items Completed? (Units)	How Quick to Complete? (Hrs/Unit)	How Many Items Completed? (Units)	How Quick to Complete? (Hrs/Unit)	% Units Saved	% Tasks Impacted (Efficiency)	% Time Saved	% Units Saved	% Time Saved	
Operations	OP.A. Perform Field Operations											
	OP.A.141. Conduct Pre-Job Brief	No	100.00	1.00	100	1				0%	0%	
	OP.A.135. Conduct rounds/surveillance of equipment	No			0	0				0%	0%	
	OP.A.1. Operator actions (stroke valves, start pumps, realign systems, etc.)*	No			0	0				0%	0%	
	OP.A.2. Lift tags for testing*	No			0	0				0%	0%	
	OP.A.3. Hang tags	No			0	0				0%	0%	
	OP.A.4. Remove tags	No			0	0				0%	0%	
	OP.A.5. Conduct Post-Maintenance Tests	No			0	0				0%	0%	
	OP.A.6. Operate Equipment/Systems	No			0	0				0%	0%	
	OP.A.7. Conduct operability determinations	No			0	0				0%	0%	
	OP.A.8. Create labels	No			0	0				0%	0%	
	OP.A.145. Install/remove temp mods (instrumentation, jumpers) for testing/maintenance*	No			0	0				0%	0%	
	OP.A.149. Fire watches*	No			0	0				0%	0%	
	OP.A.9. Log entries	No			0	0				0%	0%	
	OP.B. Conduct Control Room Operations											
	OP.B.10. Monitor and operate control room	No			0	0				0%	0%	
	OP.B.11. Activating/deactivating LCOs	No			0	0				0%	0%	
	OP.C. Support Work Management											
	OP.C.137. Provide input to work schedules (resources, shifts, feedback, etc.)	No			0	0				0%	0%	
	OP.C.138. Support emergent activity requests	No			0	0				0%	0%	
	OP.D. Perform Planning Activities											
OP.D.13. Review/sign off on work packages	No			0	0				0%	0%		
OP.D.14. Create/manage staffing schedules	No			0	0				0%	0%		
OP.D.15. Create tags	No			0	0				0%	0%		
OP.D.16. Review/Approve tags	No			0	0				0%	0%		
OP.D.17. Plan Work Order Tasks (e.g. PMT)	No			0	0				0%	0%		
OP.E. Perform Support Activities												
OP.E.18. Train/mentor fire systems	No			0	0				0%	0%		
OP.E.19. Support plant initiatives requiring SNOs	No			0	0				0%	0%		
OP.E.20. Conduct observations and performance appraisals	No			0	0				0%	0%		
OP.F. Participate in Training												
OP.F.21. Participate in training	No			0	0				0%	0%		
OP.F.21. Provide input on training packages	No			0	0				0%	0%		

Identify which key work category (bold header) that you want to insert the new labor cost task under

Labor Costs (Base Labor, Overtime, Contractor Spend)				Impact				General				Comments / Qualitative Benefits
Functional Area	Key Work Categories and Tasks	Impacted?	How Many Items Completed? (Units)	How Quick to Complete? (Hrs/Unit)	How Many Items Completed? (Units)	How Quick to Complete? (Hrs/Unit)	% Units Saved	% Tasks Impacted (Efficiency)	% Time Saved	% Units Saved	% Time Saved	
Operations	OP.A. Perform Field Operations											
	OP.A.141. Conduct Pre-Job Brief	No	100.00	1.00	100	1				0%	0%	
	OP.A.135. Conduct rounds/surveillance of equipment	No			0	0				0%	0%	
	OP.A.1. Operator actions (stroke valves, start pumps, realign systems, etc.)*	No			0	0				0%	0%	
	OP.A.2. Lift tags for testing*	No			0	0				0%	0%	
	OP.A.3. Hang tags	No			0	0				0%	0%	
	OP.A.4. Remove tags	No			0	0				0%	0%	
	OP.A.5. Conduct Post-Maintenance Tests	No			0	0				0%	0%	
	OP.A.6. Operate Equipment/Systems	No			0	0				0%	0%	
	OP.A.7. Conduct operability determinations	No			0	0				0%	0%	
	OP.A.8. Create labels	No			0	0				0%	0%	
	OP.A.145. Install/remove temp mods (instrumentation, jumpers) for testing/maintenance*	No			0	0				0%	0%	
	OP.A.149. Fire watches*	No			0	0				0%	0%	
	OP.A.9. Log entries	No			0	0				0%	0%	
	OP.B. Conduct Control Room Operations											
	OP.B.10. Monitor and operate control room	No			0	0				0%	0%	
	OP.B.11. Activating/deactivating LCOs	No			0	0				0%	0%	

Insert labor cost task here

Insert a new row (click Alt key, then "I" key, then "r" key)

Functional Area	Key Work Categories and Tasks	Impacted?	Impact				General			Estimated Savings (person hrs)	Comments / Qualitative Benefits
			How Many Items Completed? (Units)	How Quick to Complete? (Hrs/Unit)	How Many Items Completed? (Units)	How Quick to Complete? (Hrs/Unit)	% Units Saved	% Tasks Impacted (Efficiency)	% Time Saved		
Operations	Perform Field Operations										
	OP.A.141. Conduct Pre-Job Brief	No	100.00	1.00	100	1		0%	0%		
	OP.A.135. Conduct rounds/surveillance of equipment	No			0	0		0%	0%		
	OP.A.1. Operator actions (stroke valves, start pumps, realign systems, etc.)*	No			0	0		0%	0%		
	OP.A.2. Lift tags for testing*	No			0	0		0%	0%		
	OP.A.3. Hang tags	No			0	0		0%	0%		
	OP.A.4. Remove tags	No			0	0		0%	0%		
	OP.A.5. Conduct Post-Maintenance Tests	No			0	0		0%	0%		
	OP.A.6. Operate Equipment/Systems	No			0	0		0%	0%		
	OP.A.7. Conduct operability determinations	No			0	0		0%	0%		
	OP.A.8. Create labels	No			0	0		0%	0%		
	OP.A.145. Install/remove temp mods (instrumentation, jumpers) for testing/maintenance*	No			0	0		0%	0%		
	OP.A.149. Fire watches*	No			0	0		0%	0%		
	OP.A.9. Log entries	No			0	0		0%	0%		
	Conduct Control Room Operations										
	OP.B.10. Monitor and operate control room	No			0	0		0%	0%		
	OP.B.11. Activating/deactivating LCOs	No			0	0		0%	0%		
	Support Work Management										
	OP.C.137. Provide input to work schedule (resources, qualis, feedback, etc.)	No			0	0		0%	0%		

Go to Task Library worksheet; insert a new row for the task you want to add

Common Tasks	Functional Area	% Units Saved	% Time Saved
1 Operator actions (stroke valves, start pumps, realign systems, etc.)*	OP		
2 Lift tags for testing*	OP		
3 Hang tags	OP		
4 Remove tags	OP		
5 Conduct Post-Maintenance Tests	OP		
6 Operate Equipment/Systems	OP		
7 Conduct operability determinations	OP		
8 Create labels	OP		
9 Log entries	OP		
10 Monitor and operate control room	OP		
11 Activating/deactivating LCOs	OP		
12 Support surveillance tests	OP		
13 Review/sign off on work packages	OP		
14 Create/manage staffing schedules	OP		
15 Create tags	OP		
16 Review/approve tags	OP		
17 Plan Work Order Tasks (e.g. PMT)	OP		
18 Test/maintain fire systems	OP		
19 Support plant initiatives requiring SROs	OP		
20 Conduct observations and performance appraisals	OP		
21 Provide input on training packages	OP		
22 Complete Implemented Review	MA		
23 Conduct Correct Component verification	MA		
24 Label components	MA		
25 Document materials entering work zone	MA		
26 Sign in/out of clearances	MA		
Obtain sign off from maintenance program owner (e.g., sign off on lifing plan from			

In column B, enter the new tasks

In column C, enter the two letter code for the functional area the task impacts. Shown in red font below

	A	B	C	D	E	F	G
		Common Tasks	Functional Area	% Units Saved	% Time Saved		
1		Operator actions (stroke valves, start pumps, realign systems, etc.)*	OP				
2		Lift tags for testing*	OP				
3		Hang tags	OP				
4		Remove tags	OP				
5		Conduct Post-Maintenance Tests	OP				
6		Operate Equipment/Systems	OP				
7		Conduct operability determinations	OP				
8		Create labels	OP				
9		Log entries	OP				
10		Monitor and operate control room	OP				
11		Activating/deactivating LCOs	OP				
12		Support surveillance tests	OP				
13		Checking Qualifications	OP				
14		Review/sign off on work packages	OP				
15		Create/manage staffing schedules	OP				
16		Create tags	OP				
17		Review/approve tags	OP				
18		Plan Work Order Tasks (e.g. PMT)	OP				
19		Test/maintain fire systems	OP				
20		Support plant initiatives requiring SROs	OP				
21		Conduct observations and performance appraisals	OP				
22		Provide input on training packages	OP				
23		Complete Implemented Review	MA				
24		Conduct Correct Component verification	MA				
25		Label components	MA				
26		Document materials entering work zone	MA				
27		Sign in/out of clearances	MA				
28		Obtain sign off from maintenance program owner (e.g., sign off on lifing plan from					

Note: "*" ind

Renumber the numbers in column A

A	B	C	D	E	F	G
	Common Tasks	Functional Area	% Units Saved	% Time Saved		
1	Operator actions (stroke valves, start pumps, realign systems, etc.)*	OP				Note: "*"
2	Lift tags for testing*	OP				
3	Hang tags	OP				
4	Remove tags	OP				
5	Conduct Post-Maintenance Tests	OP				
6	Operate Equipment/Systems	OP				
7	Conduct operability determinations	OP				
8	Create labels	OP				
9	Log entries	OP				
10	Monitor and operate control room	OP				
11	Activating/deactivating LCOs	OP				
12	Support surveillance tests	OP				
13	Checking Qualifications	OP				
14	Review/sign off on work packages	OP				
15	Create/manage staffing schedules	OP				
16	Create tags	OP				
17	Review/approve tags	OP				
18	Plan Work Order Tasks (e.g. PMT)	OP				
19	Test/maintain fire systems	OP				
20	Support plant initiatives requiring SROs	OP				
21	Conduct observations and performance appraisals	OP				
22	Provide input on training packages	OP				
23	Complete Implemented Review	MA				
24	Conduct Correct Component verification	MA				
25	Label components	MA				
26	Document materials entering work zone	MA				
27	Sign in/out of clearances	MA				
28	Obtain sign off from maintenance program owner (e.g. sign off on lifting plan from...					

Go to the column B in the “Labor_Cost_Tasks” worksheet and the row above the newly inserted row. Copy the cell down by hitting “Ctrl” + “c”; then go to the blank row; hit “Ctrl” + “v”

Functional Area	Key Work Categories and Tasks	Impacted?	Impact				General				Estimated Savings (person hrs)	Comments / Qualitative Benefits	
			Before	After	Before	After	% Units Saved	% Tasks Impacted (Efficiency)	% Time Saved	% Units Saved			% Time Saved
			How Many Items Completed? (Units)	How Quick to Complete? (Hrs/Unit)	How Many Items Completed? (Units)	How Quick to Complete? (Hrs/Unit)							
Operations	OP.A. Perform Field Operations												
	OP.A.141. Conduct Pre-Job Brief	No	100.00	1.00	100	1				0%	0%		
	OP.A.135. Conduct rounds/surveillance of equipment	No			0	0							
	OP.A.1. Operator actions (stroke valves, start pumps, realign systems, etc.)*	No			0	0				0%	0%		
	OP.A.2. Lift tags for testing*	No			0	0				0%	0%		
	OP.A.3. Hang tags	No			0	0				0%	0%		
	OP.A.4. Remove tags	No			0	0				0%	0%		
	OP.A.5. Conduct Post-Maintenance Tests	No			0	0				0%	0%		
	OP.A.6. Operate Equipment/Systems	No			0	0				0%	0%		
	OP.A.7. Conduct operability determinations	No			0	0				0%	0%		
	OP.A.8. Create labels	No			0	0				0%	0%		
	OP.A.145. Install/remove temp mods (instrumentation, jumpers) for testing/maintenance*	No			0	0				0%	0%		
	OP.A.149. Fire watches*	No			0	0				0%	0%		
	OP.A.9. Log entries	No			0	0				0%	0%		
	OP.B. Conduct Control Room Operations												
	OP.B.10. Monitor and operate control room	No			0	0				0%	0%		
	OP.B.11. Activating/deactivating LCOs	No			0	0				0%	0%		
	OP.C. Support Work Management												
	OP.C.137. Provide input to work schedule (resources, quals, feedback, etc.)	No			0	0				0%	0%		

Go to the column D in the “Labor_Cost_Tasks” worksheet pick the new labor task from the drop down menu

Functional Area	Key Work Categories and Tasks	Impacted?	Impact				General				Estimated Savings (person hrs)	Comments / Qualitative Benefits	
			Before	After	Before	After	% Units Saved	% Tasks Impacted (Efficiency)	% Time Saved	% Units Saved			% Time Saved
			How Many Items Completed? (Units)	How Quick to Complete? (Hrs/Unit)	How Many Items Completed? (Units)	How Quick to Complete? (Hrs/Unit)							
Operations	OP.A. Perform Field Operations												
	OP.A.143. Conduct Pre-Job Brief	No	100.00	1.00	100	1				0%	0%		
	OP.A.137. Conduct rounds/surveillance of equipment	No			0	0							
	OP.A.1. Operator actions (stroke valves, start pumps, realign systems, etc.)*	No			0	0				0%	0%		
	OP.A.2. Lift tags for testing*	No			0	0				0%	0%		
	OP.A.3. Hang tags	No			0	0				0%	0%		
	OP.A.13. Checking Qualifications												
	OP.A.4. Remove tags	No			0	0				0%	0%		
	OP.A.5. Conduct Post-Maintenance Tests	No			0	0				0%	0%		
	OP.A.6. Operate Equipment/Systems	No			0	0				0%	0%		
	OP.A.7. Conduct operability determinations	No			0	0				0%	0%		
	OP.A.8. Create labels	No			0	0				0%	0%		
	OP.A.147. Install/remove temp mods (instrumentation, jumpers) for testing/maintenance*	No			0	0				0%	0%		
	OP.A.151. Fire watches*	No			0	0				0%	0%		
	OP.A.9. Log entries	No			0	0				0%	0%		
	OP.B. Conduct Control Room Operations												
	OP.B.10. Monitor and operate control room	No			0	0				0%	0%		
	OP.B.11. Activating/deactivating LCOs	No			0	0				0%	0%		
	OP.C. Support Work Management												
	OP.C.139. Provide input to work schedule (resources, quals, feedback, etc.)	No			0	0				0%	0%		
	OP.C.140. Support emergent activity requests	No			0	0				0%	0%		

Go to the row above the newly inserted row and copy the cells from columns E to P into the newly inserted row

	Key Work Categories and Tasks	Impacted?	Impact				General				Estimated Savings (person hrs)	Comments / Qualitative Benefits	
			Before How Many Items Completed? (Units)	Before How Quick to Complete? (Hrs/Unit)	After How Many Items Completed? (Units)	After How Quick to Complete? (Hrs/Unit)	% Units Saved	% Tasks Impacted (Efficiency)	% Time Saved	% Units Saved			% Time Saved
5	OP.A. Perform Field Operations												
6	OP.A.143. Conduct Pre-Job Brief	No	100.00	1.00	100	1				0%	0%		
7	OP.A.137. Conduct rounds/surveillance of equipment	No			0	0				0%	0%		
8	OP.A.1. Operator actions (stroke valves, start pumps, realign systems, etc.)*	No			0	0				0%	0%		
9	OP.A.2. Lift tags for testing*	No			0	0				0%	0%		
10	OP.A.3. Hang tags	No			0	0				0%	0%		
11	OP.A.13. Checking Qualifications	No			0	0				0%	0%		
12	OP.A.4. Remove tags	No			0	0				0%	0%		
13	OP.A.5. Conduct Post-Maintenance Tests	No			0	0				0%	0%		
14	OP.A.6. Operate Equipment/Systems	No			0	0				0%	0%		
15	OP.A.7. Conduct operability determinations	No			0	0				0%	0%		
16	OP.A.8. Create labels	No			0	0				0%	0%		
17	OP.A.147. Install/remove temp mods (instrumentation, jumpers) for testing/maintenance*	No			0	0				0%	0%		
18	OP.A.151. Fire watches*	No			0	0				0%	0%		
19	OP.A.9. Log entries	No			0	0				0%	0%		
20													
21	OP.B. Conduct Control Room Operations												
22	OP.B.10. Monitor and operate control room	No			0	0				0%	0%		
23	OP.B.11. Activating/deactivating LCOS	No			0	0				0%	0%		
24													
25	OP.C. Support Work Management												
26	OP.C.139. Provide input to work schedule (resources, quals, feedback, etc.)	No			0	0				0%	0%		
27	OP.C.140. Support emergent activity requests	No			0	0				0%	0%		

You have now successfully inserted a new labor task and the worksheet will maintain the formulas and remain dynamic. **Never enter a new labor task at the start or the end of a key work category otherwise the formulas on the roll up worksheet “Labor_Cost_Categories” will not calculate properly.**

Appendix 2: Functional Area Acronyms for Labor Cost Tab

CA	Corrective Action Program
CY	Chemistry
EN	Engineering
EP	Emergency Preparedness/Planning
MA	Maintenance
OP	Operations
OU	Outage
PI	Performance Improvement
PR	Projects/Project Management
RP	Radiation Protection/Health Physics
SY	Security/Access Authorization
TR	Training
WM	Work Management