saveONenergy℠
PROCESS & SYSTEMS

DETAILED ENGINEERING STUDY MINIMUM REQUIREMENTS: GUIDELINES AND INTENTIONS

April 2012

ONTARIO POWER AUTHORITY

Detailed Engineering Study Minimum Requirements: Guidelines and Intentions

This document contains an overview of the minimum requirements for a Detailed Engineering Study. A Detailed Engineering Study must meet the technical, financial and economic analysis, as well as the overall quality and completeness requirements as outlined below. A number of example charts and tables have also been provided where illustration of a requirement is warranted. Additionally this document will provide further insight into those requirements, their rationale, and expectations of the Technical Reviewer.

The saveONenergy PROCESS AND SYSTEMS Initiative is a ratepayer-funded program, and as a result can be subject to extensive audits and inspection. The Technical Reviewers are required to apply significant due diligence when evaluating the Detailed Engineering Study Applications to ensure that the data, and in turn the Project Incentive, can be defended with confidence and the Incentives are applied effectively. In support of this, it is important that the approach of the study is well articulated and ample efforts are applied to ensure accuracy.

Please note:

- *The intention of this document is to provide the details required for all the possible sections. However, there may be instances where sections are not applicable to a specific Project. In those cases, please proceed to the next relevant section.*
- Capitalized terms used below have the meaning given to them in this document, or the current IPMVP Volume 1 (EVO 10000: 1:2010), as applicable.

Detailed Engineering Study Final Report Submission Requirements:

For the purposes of the program, Detailed Engineering Study Reports must provide Electricity Savings estimates to an accuracy of ±10% and Project cost estimates to ±25%. The Detailed Engineering Study Report must be prepared or reviewed by, and signed (with drawings stamped) by an independent (not an employee of the applicant) registered professional engineer licensed to practice in Ontario (the "**Engineer**").

Participants should prepare a Detailed Engineering Study Report submission package containing:

- One original (bound and drawings) of the Detailed Engineering Study report in the case of a Project, or one original (bound and drawings) for each Detailed Engineering Study report in the case of a Portfolio, in either case signed by the Engineer,
- One hard copy of each Detailed Engineering Study report (bound and drawings), and
- One electronic copy of the Detailed Engineering Study Report, in Portable Document Format (PDF)

Form and Content

Please note:

Commentary has not been provided for the Executive Summary section since it is a reproduction of information presented in the body of the report. The Executive Summary should highlight the key details of the Project and provide enough of a framework for the technical reviewers to understand the supporting information that follows.

1.0 Executive Summary

1.1. Facility name and location

1.2. Dates of study start and completion

1.3. A brief background and description of the industrial System(s) studied

1.4. A brief description of recommended Measures with estimates of:

1.4.1 Annualized Electricity Savings

1.4.2 Annual average electricity demand reduction

1.4.3 Project Benefits that contribute to cost-effectiveness of the Project

1.4.4 Any costs directly related to the Project which are not included in Eligible Costs and for which the Participant is requesting the LDC to approve the addition of such cost to Eligible Costs

1.4.5 Simple Payback for each recommended Measure and for the aggregate of all recommended Measures based on total Eligible Costs excluding Incentives or Third Party Contributions

1.4.6 Project Payback for each recommended Measure and for the aggregate of all recommended Measures

1.4.7 Estimated Project Incentive

1.5. Author of report with acknowledgement of key personnel involved including titles

1.6. Acknowledgement of Facility personnel involved in the study with titles

Detailed Engineering Study Minimum Requirements: Guidelines and Intentions

Please note:

The following Form is an example of a potential Executive Summary for submission with a Detailed Engineering Study. Some of the information below is duplicated in the Application Form and you are not limited to this format. As mentioned above, the Executive Summary should highlight the key details of the Project and provide enough of a framework for the technical reviewers to understand the supporting information that follows.

General	
Participant:	
Facility Name:	
Brief Description of Project or study:	
Contact Name:	
Phone:	
Email:	

Consultant's Information	
Company Name:	
Contact Name:	
Phone:	
Fax:	
Email:	

Measure Summary					
Measure #	***1***	***2***	***3***	***4***	***5***
System Description:					
Measure Description:					
Annualized Electricity Savings (MWh):					

Average Demand Reduction (MW):					
Other Net Benefits and Cost Savings ($/yr):					
Project Cost ($):					
Simple Payback without Incentive (yrs):					

Project Summary	
Recommended Project Description:	
Measures included:	
Annualized Electricity Savings (MWh):	
Average Demand Reduction (MW):	
Other Net Benefits and Cost Savings ($/yr):	
Project Cost ($):	
Simple Payback without Incentive (yrs):	
Project Payback with Incentive (yrs):	

2.0 Base Case

2.1 Description of each Industrial System studied:

Guidelines	***Intentions***
Describe the System's purpose and known operating information, including maintenance issues.	*Section 2.1 is intended to give the Technical Reviewer an understanding of the purpose and operation of the Industrial System and, potentially, the process that it is a part of.* *An effective description should allow the Technical Reviewer to visualize the Industrial System in operation, without seeing it in person, in order to properly assess the impact of proposed changes per the Measures identified later in the report.* *Process flow diagrams, pictures and other diagrams and drawings are useful for achieving this objective.*

2.1.1 Type of System and areas of plant/process served

Guidelines	***Intentions***
Identify the type of System (e.g. pumping System, compressed air, etc.), the specific technology type (e.g. centrifugal pump, helical screw compressor, etc.). If applicable, the area of the plant or process served (e.g. boiler feedwater, instrument air, etc.) and any other relevant attributes (e.g. closed loop/no static head, regenerative desiccant dryers for low dew point, etc.).	*This section sets the expectation for the technical content of the report so that the Technical Reviewer can ensure that the appropriate resources are assigned to the review.*

2.1.2 Explanation of why this Industrial System was chosen for study

Guidelines	***Intentions***
Provide explanation of why the identification of significant Electricity Savings was anticipated (e.g. opportunity identified during a site visit, vendor/manufacturer information, publication of a retrofit Project conducted on similar System at another facility or in a journal, paper, at a conference, etc.) and/or any reason for the selection of this System other than Electricity Savings. Also, provide any available information regarding the likelihood of the identified Measures being implemented (e.g. management support, dissatisfaction with current status of the System, etc.).	*This section provides the Technical Reviewer with context on why the System is being investigated.* *The explanation should have been covered in the study Application proposal and can be reused here, if sufficient in detail.* *In the case where the study results do not meet the expectations for Electricity Savings proposed at the time of Application, the Technical Reviewer will look to this section for an explanation of why greater savings were originally expected and what assumptions were made that may not have proven valid.* *This section also provides the Technical Reviewer with advance notice to expect analysis of non-energy benefits in sections 2.1.8, 2.1.9 or 2.1.10 of the report if they are identified here as a reason that the System was selected for study. Likewise, if the age of the System is a motivator for the study, the Technical Reviewer will look for more analysis of the remaining life of the System in section 2.1.11.*

2.1.3 Process flow diagram, indicating Measurement Boundary, and how the Industrial System interacts with the remaining plant

Guidelines	*Intentions*
Attach process flow diagrams in the Appendix or paste directly into this section. Indicate the Measurement Boundary and provide an explanation of System interactions including the influences on process rate and energy intensity (e.g. is it a de-bottlenecking Project). Indicate temporary and permanent measurement points utilized during data collection for the study.	*These diagrams assist the Technical Reviewer with the visualization of the System, as mentioned previously.* *The Measurement Boundary is essential for determining if changes to this System will have any "Interactive Effects" (i.e. a reduction of energy in the target System is partially or wholly offset by an increase in energy somewhere else in the process).*

2.1.4 Relevant electrical single line diagrams

Guidelines	*Intentions*
Attach single line diagrams in the Appendix or paste directly into this section.	*These diagrams assist the Technical Reviewer with the visualization of the System, as mentioned above, and they also provide useful information for potential Measurement and Verification (M&V) Plans.*

2.1.5 Process and instrumentation drawings (P&ID)

Guidelines	*Intentions*
Attach P&IDs in the Appendix or paste directly into this section. Indicate temporary and permanent measurement points utilized during data collection for the study.	*These diagrams assist the Technical Reviewer with the visualization of the System, as mentioned above, and they also provide useful information for potential M&V Plans.*

2.1.6 Equipment data sheets or existing equipment efficiency

Guidelines	***Intentions***
Provide original and updated equipment data sheets, if available. Otherwise provide a table of the known equipment data from facility information, nameplate data and manufacturer's data.	*The Technical Reviewer relies heavily on this information to verify the base case baseline calculations and to conduct independent reviews of System consumption.* *Please provide the most up-to-date information as this will contribute to the accuracy of the analysis.*

Example:
(This table not intended to be comprehensive, exhaustive or exclusive. All pertinent information that will assist the Technical Reviewer in verifying the base case baseline should be included.)

Name	**Manufactured/ Installed**	**Age**	**Capacity**	**Power (nameplate)**	**Manufacturer**	**Mfr Model Number**	**Type**	**Efficiency (measured or design)**

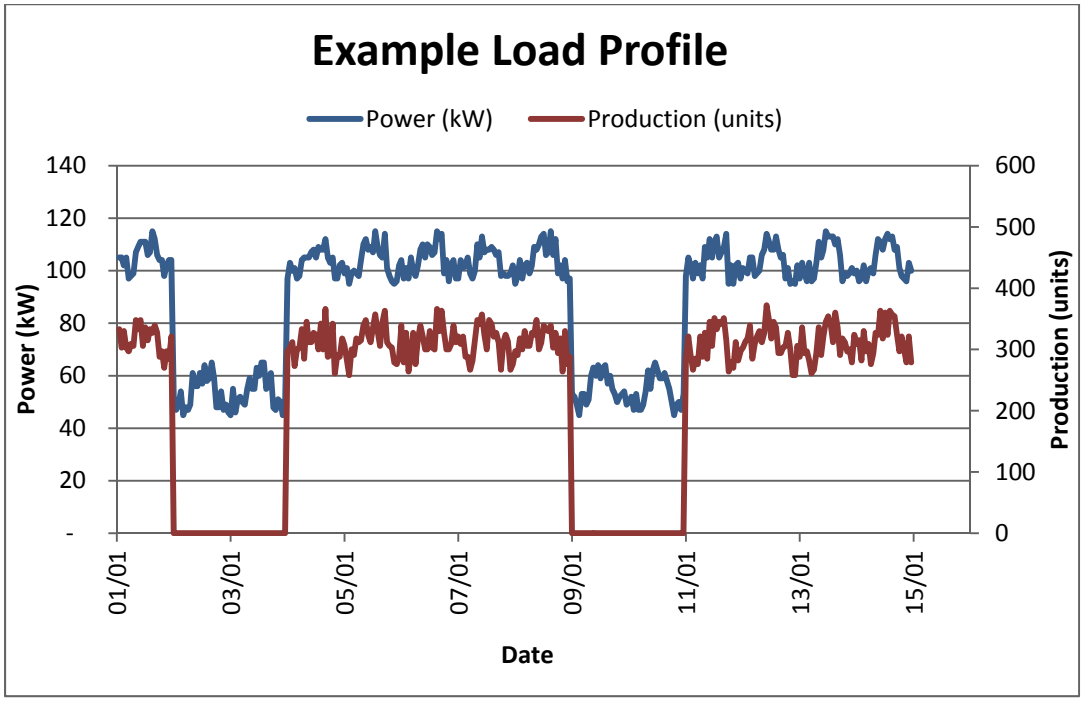
2.1.7 Preliminary base case baseline (subject to review and acceptance by the Technical Reviewer during baseline data collection)

Guidelines	***Intentions***
The base case baseline development methodology is typically requested in the form of a baseline methodology that details the instrumentation to be used, the data to be collected, including duration and accuracy, and the process for converting the measured data into an annual baseline. For details on the baseline methodology submission, see the Baseline Methodology Guideline. The baseline methodology is typically submitted after the study funding agreement is in place and before any data analysis begins (ideally a data collection sample is available). The baseline methodology information should be repeated here and the following sections will present the results of carrying out the baseline methodology. If a baseline methodology was not completed, for whatever reason (e.g. DES completed internally to accompany a Project Incentive Application), the data collection and base case baseline development methodology must still align to the Baseline Methodology Guideline and be retroactively summarized here. While the base case baseline may extend beyond the period of the study in preparation of a Project Incentive Application, the baseline for study purposes is limited to what is economically reasonable. Ideally, the study should recommend the ideal duration of the baseline (pre-metering) period.	*If the Participant applies for a Project Incentive based on the results of the study, the baseline period (i.e. pre-metering) may be extended to increase confidence (for M&V), but it is likely that the Incentive contract will be based on the results of the study.* *If this is the situation, the base case baseline will be used to establish the standard from which all Electricity Savings and thus Project Incentives are calculated.* *As saveONenergy PROCESS AND SYSTEMS is a ratepayer program, the approach and accuracy of this section is essential. The Technical Reviewer is required to apply significant due diligence when evaluating the data in order to ensure that the baseline and in turn the Project Incentive can be defended with confidence.*

2.1.7.1 Annual electrical energy consumption

Guidelines	***Intentions***
Provide a description of the methodology employed and sample calculations used to calculate the annual electricity consumption. Include details on the instrumentation used for data measurement, or reference the baseline methodology, if appropriate. Provide a chart, if useful in depicting the consumption of the System, and each of its components, over the course of a year, or the relevant measurement period. If available, it is useful to present the plant, process, or System production on the same chart – whichever is most relevant. If the baseline is an extrapolation of data from an abbreviated measurement period (e.g. two weeks), explain a methodology for correlating the measured data to a data log of one of the process variables (e.g. amps, flow, etc.), or provide the assumptions and justification if a simpler approach was taken. In either case, it is strongly recommended to include at least a sample calculation. The chosen monitoring period must be statistically valid for building an annual model.	*It's important for the Technical Reviewer to be able to understand how the estimate was arrived at, so that issues such as abnormal or irregular production/consumption can be considered and not overlooked – whether they occur during or after the baseline measurement period. Simply providing the annual electrical consumption of the System will not suffice.* *Additionally, if a System has a varying load with distinct operating modes/load levels, a chart can illustrate these points, which can be used to simplify the analysis.*

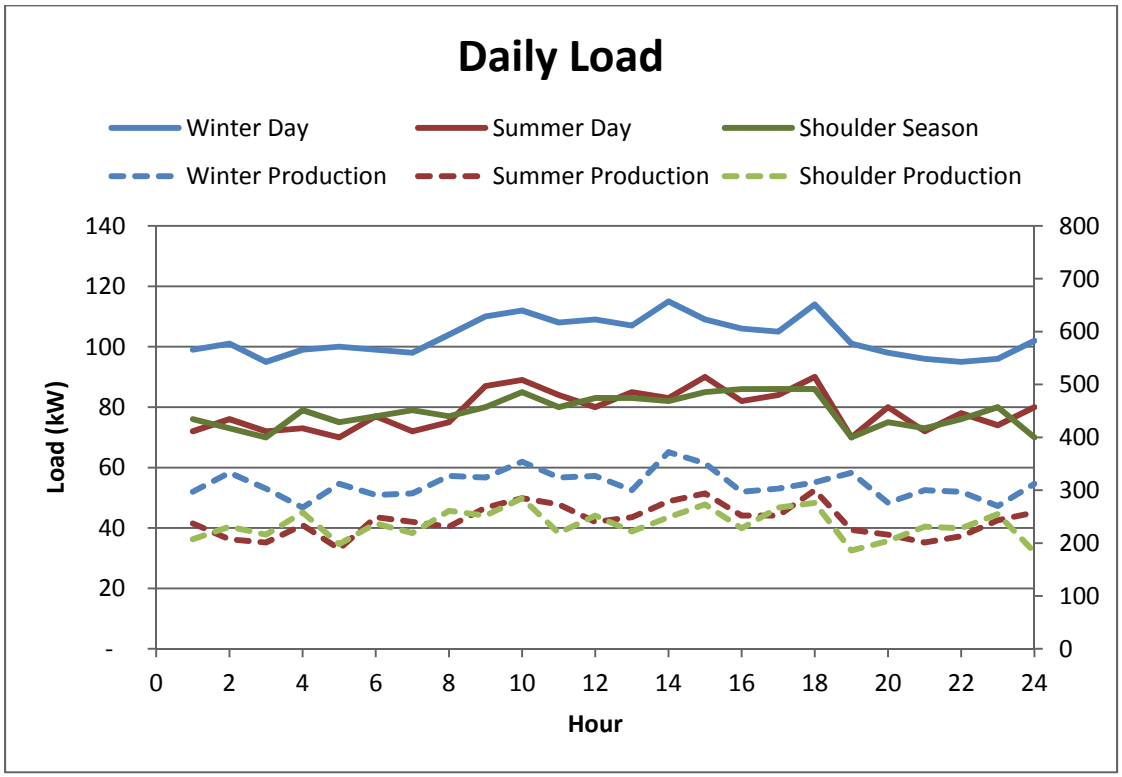
Example:



2.1.7.2 Daily and seasonal electrical load profile

Guidelines	***Intentions***
For Systems that have a varying load (by season, over the course of a day, etc.), provide a description and explanation of these variances. Depict the different load profiles in charts and quantify the different load levels.	*The information from this section plays two important roles.* *If a System has a typical daily load profile, it can be used to help identify an appropriate measure to reduce the electricity consumption and may identify opportunities to reduce demand or electricity consumption during high-load hours.* *Also, if the daily (or other appropriate interval) load profile varies by season, this depiction can help identify where savings may be achieved during on-peak, off-peak, or shoulder seasons.*

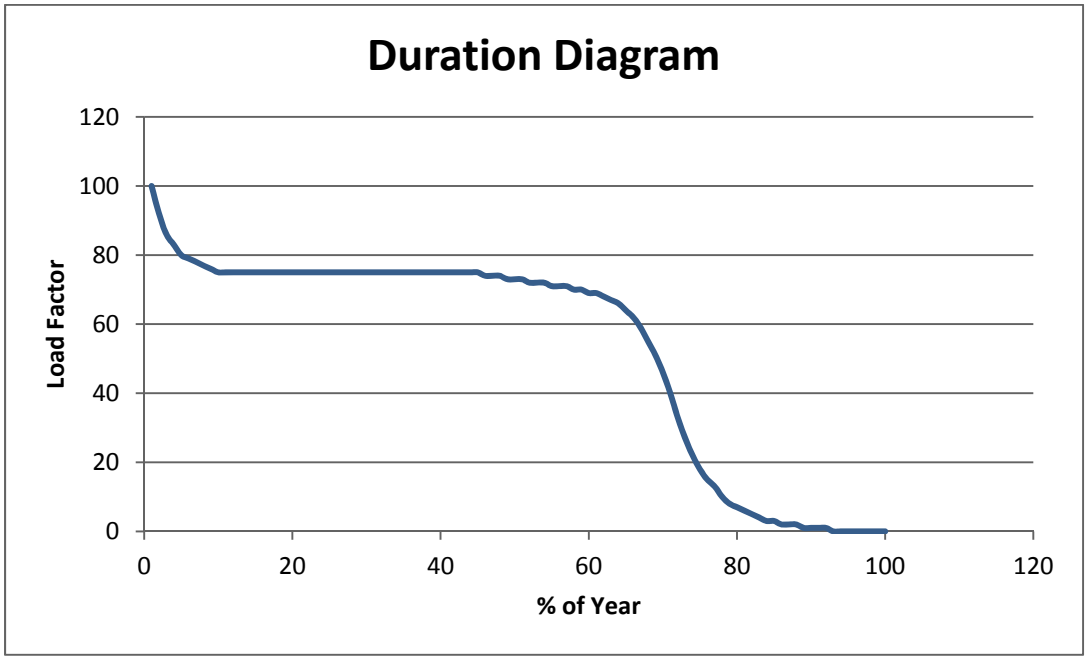
Example:



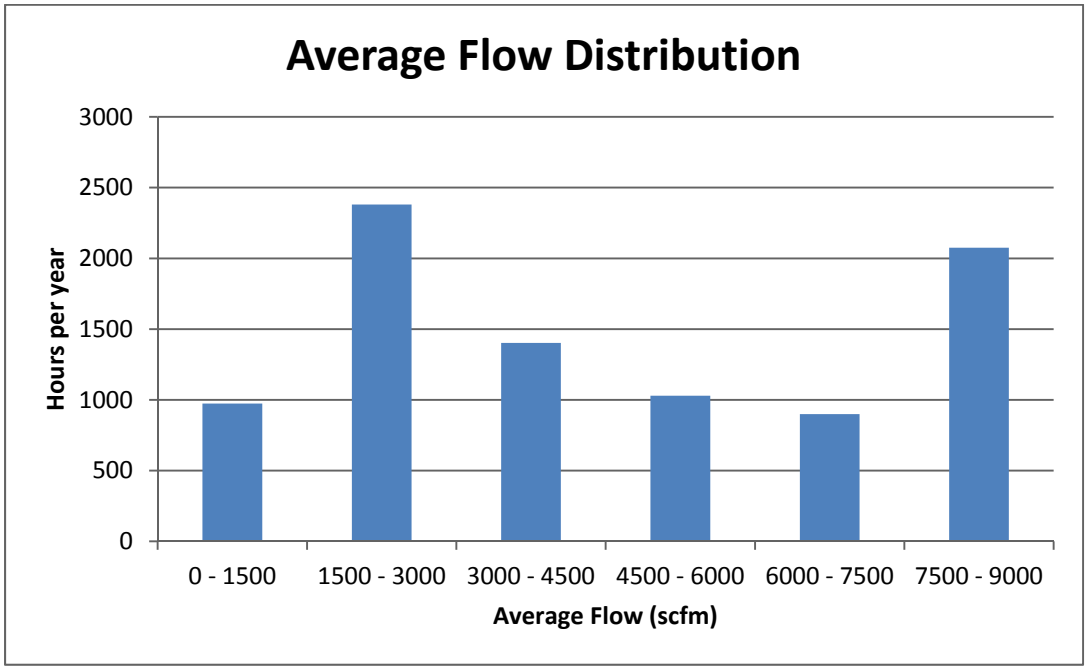
2.1.7.3 Load duration curve or table indicating annual hours of operation at significant capacity points

Guidelines	***Intentions***
Identify the typical operating points for the System, or the significant capacity points and the duration of time at each point per year. This can be depicted in a duration curve, or in a table quantifying annual hours at the significant capacity points, as depicted by the figures below.	*This section builds on the previous by combining total hours per year with the load points for the System.* *This provides the basis for the accumulation of Electricity Savings potential at each distinct operating point if the load/supply were reduced to optimally match the process demand.*

Example:


Duration Diagram
120
100
80
60
40
20
0
Load Factor
0
20
40
60
80
100
120
% of Year

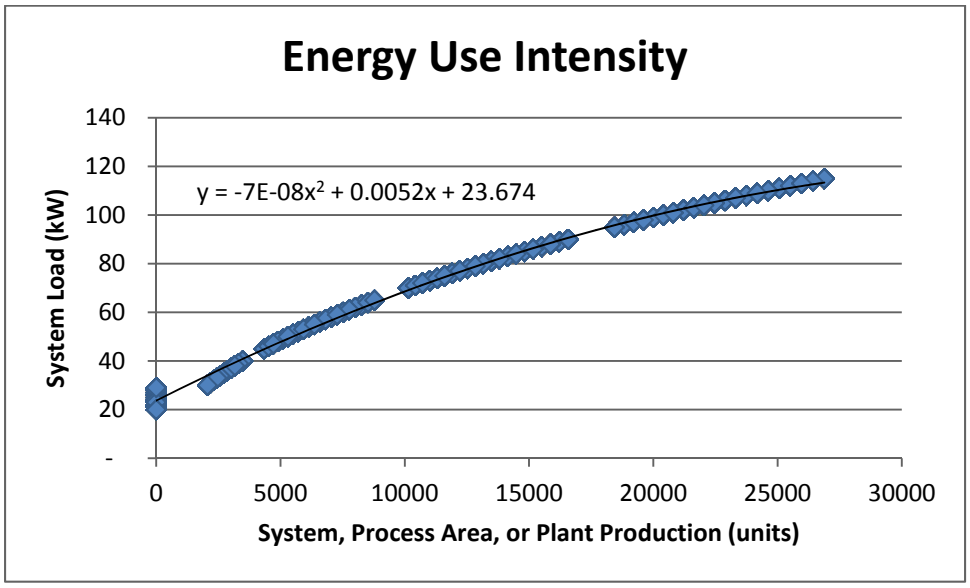
Or:


Average Flow Distribution
3000
2500
2000
1500
1000
500
0
Hours per year
0 - 1500
1500 - 3000
3000 - 4500
4500 - 6000
6000 - 7500
7500 - 9000
Average Flow (scfm)

2.1.7.4 Production and throughput as it relates to the electricity consumption of the Industrial System

Guidelines	***Intentions***
Explain the dependency of the Systems energy consumption to its production and throughput. Depict the relationship in an energy intensity diagram (production/throughput vs. consumption) and normalize the relationship by calculating the trend line of best fit (i.e. regression analysis). If the System has more than one operating mode, it is better to represent this with multiple curves. If the System has a fixed base load, ensure this is depicted in the diagram (i.e. a y-intercept above zero). Also, similar to section 2.1.3., if the Project presents a de-bottlenecking possibility, provide commentary and analysis results in this section.	*This relationship is useful for demonstrating a Systems ability to match load to demand and identifying where Electricity Savings potential exist (i.e. flat section of the curve).* *It can also be useful for determining adjustments to the baseline, if necessary, due to production changes or other disturbances. This information is required as a part of the study review, so that these adjustments can be made during the Incentive Application process, or later during M&V.*

Example:



2.1.8 Operating and maintenance costs for the Industrial System

Guidelines	***Intentions***
Provide analysis of data from facility CMMS (computerized maintenance management System) or other available information. Comment on whether the maintenance costs are high, low or consistent with comparable Systems (preferably at the same site) and explain any variances from expected. If the target System consumes fossil fuels or other forms of energy other than electricity, the consumption and costs of those fuels should be captured here, or (especially if significant) included above in the Preliminary base case baseline with the section titles and scope expanded from specifically electricity to include all forms of energy consumption.	*Operating and maintenance costs can be a significant driver for the Project. Just as the energy baseline will be used as the standard to calculate the Electricity Savings, the current operating and maintenance costs are used to determine the net impact to operating and maintenance costs, which may factor into an Incentive calculation under the heading of "other benefits".*

2.1.9 Product quality from the existing Industrial System

Guidelines	***Intentions***
This could be the end-product produced by the facility if the target System has a direct impact on its quality, or it could be the specific characteristics of the target System (e.g. temperature, dew-point, pressure, cleanliness, etc.).	*Product quality can be a significant driver for the Project. Just as the energy baseline will be used as the standard to calculate the Electricity Savings, the existing product quality is used to determine the net impact to product quality, which may factor into Incentive calculation under the heading of "other benefits".*

2.1.10 Reliability of the existing Industrial System

Guidelines	***Intentions***
Provide a summary of unplanned shutdowns or other reliability related shutdowns of the target System and quantify the impacts of the down-time in lost production, cost, or another metric.	*System reliability can be a significant driver for the Project. Just as the energy baseline will be used as the standard to calculate the Electricity Savings, the existing System reliability is used to determine the net impact to reliability, which may factor into an Incentive calculation under the heading of "other benefits" or costs.*

2.1.11 Age of the Industrial System or major System components and analysis of remaining life

Guidelines	***Intentions***
Age could be provided with equipment data above, but if not done above, translate the age into operating hours or another value that can be compared to published or empirical values for typical equipment life. Provide commentary on the remaining equipment life based on plant and equipment conditions.	*This information is used to assess when upgrade or replacement of the System or components would occur due to necessity in absence of the saveONenergy PROCESS AND SYSTEMS Initiative.* *Only the incremental costs and Electricity Savings are allowable for the contract period, which exceeds the life of the existing equipment. If the existing equipment life is expected to be beyond the contract term, that must be clearly stated and justified.*

2.1.12 Standard commercially available replacement equipment cost and energy use (least cost new equipment that meets the System requirements)

Guidelines	***Intentions***
If the study is considering specific equipment, or the System has one or more major pieces of equipment that can be replaced with like-for-like, then provide the least cost and typically least efficient option (e.g. high-efficiency motor versus premium-efficiency motor).	*This information is used in a situation where the proposed Project is seeking to replace equipment or a System at the end of its life with a high efficiency/energy saving option relative to the existing equipment and what is the standard commercially available option.* *Or in connection with section 2.1.11 when the remaining life of the target System is less than the proposed Project term (10 years for Project Incentives, 5 years for Micro-Projects).* *Similar to section 2.1.11 above, the information is used to calculate or review the incremental costs and Electricity Savings for the higher efficiency option.* *Additionally, the information is used to ensure that the proposed equipment selection is more efficient than the standard commercially available equipment.*

2.2 Measured electrical, process, and operating data collected during the Detailed Engineering Study provided in MS Excel spreadsheet format

Guidelines	***Intentions***
Electronic/soft copy only is preferable.	*This data is essential for the Technical Reviewer to perform due diligence on the calculations/results provided in the report, as well as generate an independent review of base case baseline calculations when necessary.*

2.3 The most recent electric utility bills received for a single billing period for the service entrance of the location of the studied System

Guidelines	***Intentions***
Electricity bills are verification of the electricity rates stated on the Application form.	*Bill savings, based on electricity rate, is an important factor in determining the Incentive payable.*

3.0 Measure Analysis

Analyse all reasonable electricity conservation Measures that could be applicable to each Industrial System studied. Complete the technical, financial, and economic information requirements listed below for each Measure analyzed.

3.1 Technical

3.1.1 Technical description of each identified Measure

Guidelines	***Intentions***
Identify how and where the System is wasting electricity and what Measure(s) can be implemented to reduce the electricity being wasted. Explain the mechanism employed by the Measure(s) that will reduce the electricity consumption of the System (i.e. the basic principle of how Electricity Savings will be achieved). Provide a description of the new equipment, modifications to the existing equipment or process, or other changes that are required for each Measure. Provide all reasonable alternatives and additional Measures, indicating whether each is mutually exclusive or independent.	*This information introduces the Technical Reviewer to the Measure(s) that are being considered for analysis and should enable an understanding of how each Measure proposes to achieve Electricity Savings.* *It is an opportunity for the Technical Reviewer to determine if any other alternatives should have been considered, or for the report to address and rationalize why other known alternatives have not been considered.*

3.1.2 Methodology and calculations used to arrive at electricity and demand savings estimates for each Measure

Guidelines	***Intentions***
Outline the steps taken to calculate the estimated Electricity Savings from each Measure, making sure to take account of the known operation of the target System or the process demand of the System, and provide sample calculations. The two approaches are: 1. Calculate the post-retrofit consumption of the System and net that from the baseline to get the Electricity Savings, or 2. Directly calculate the estimated Electricity Savings from the baseline consumption. For the demand savings, consider the hours of operation of the System and the load variation over the course of a typical day and different seasons to develop a table of demand savings at various times of the day and/or year, or a demand savings profile (i.e. chart).	*This information allows the Technical Reviewer to follow the logic applied in the Measure analysis process by the engineer responsible and assess if all of the appropriate steps were taken, significant influences and variables were accounted for and assumptions made were reasonable.* *The methodology should allow the Technical Reviewer to recreate the analysis and arrive at the same results.*

3.1.3 Identification and specification of any software tools used in the analysis

Guidelines	***Intentions***
Disclose any software tools that were used, how they were used (i.e. what analysis was performed), list the inputs and outputs of the analysis, and identify reporting limitations, if any, resulting from the use of the software.	*This section should demonstrate an appropriate use of software (if applicable) to increase the efficiency of analysis and/or the accuracy of results.* *If the Technical Reviewer has access to the same software or a similar product, the information could be used to re-create the analysis, or the appropriate files could be submitted and reviewed.* *It is recommended that the study demonstrate sufficient diligence in verifying the accuracy of the software results and provide the Technical Reviewer with enough information to allow for a review – identification of the reporting limitations may assist in identifying alternative review methods.*

3.1.4 Results of analysis including uncertainty ranges and assumptions for operating conditions for the life of the Measure:

3.1.4.1 Annual electrical Electricity Savings

3.1.4.2 Monthly average electrical demand reduction

3.1.4.3 Daily electrical demand reduction profile by season

Guidelines	***Intentions***
Provide the Measure analysis results in an organized manner, typically a table, including uncertainty ranges calculated via appropriate statistical analysis. Express the uncertainty with associated confidence as per the guidelines of IPMVP. Organize the Measures such that any relationships of dependency or mutually exclusivity are clearly indicated. Describe the operating condition assumptions for the total System and for each Measure that are inherent to the Electricity Savings estimates for the first year and the remainder of the Project life.	*The Electricity Savings and demand reduction estimates are the focal point of the study and its review.* *As saveONenergy PROCESS AND SYSTEMS Initiative is a ratepayer program, the Technical Reviewer is required to apply significant due diligence when evaluating the results and the steps leading up to their calculation. The Technical Reviewer will conduct a review of the material provided and/or will conduct a thorough independent analysis.*

3.1.5 Analysis of "Interactive Effects" between Systems and Measures i.e. a reduction in electricity use in one area may cause an increase in electricity use in another

Guidelines	***Intentions***
With reference to the Measurement Boundary identified in section 2.1.3, describe the methodology employed by the study to measure and analyze the Interactive Effects and provide the steps taken to calculate the estimated energy impact from the process changes imposed by each Measure, with sample calculations. The impact to the Electricity Savings should be captured in the values presented above.	*This section should demonstrate to the Technical Reviewer that the full impact of the changes proposed to the target System has been considered.*

3.1.6 Quantification of "other benefits" with dollar savings estimates that may result from implementation of each Measure. Methodology must be shown. Examples are:

3.1.6.1 Changes in fossil fuel consumption,

3.1.6.2 Changes in product quality or productivity, or

3.1.6.3 Changes in operating & maintenance costs.

Guidelines	***Intentions***
Sections 2.1.8, 2.1.9 and 2.1.10 above, should have identified if the proposed Project is primary or jointly driven by non-electrical Electricity Savings benefits and, if so, developed a baseline for the appropriate metric. This section should explain why the "other benefits" (or "other costs") are expected, how they are achieved/incurred, describe the methodology employed by the study to measure and analyze the "other benefits" (or "other costs") and provide the steps taken to calculate the estimated impact from the process changes imposed by each Measure, with sample calculations. The results should be provided in the respective units of the benefit received (or cost incurred) and in terms of dollars.	*This information could be used by the Technical Reviewer to determine the eligibility of the Project or to determine whether it could impact the Incentive calculation.* *This information also impacts the Project Payback and, if developed properly, can help influence the Participant's decision to move forward with the Project.*

3.1.7 Description of measurement techniques that would aid in ongoing evaluation of Electricity Savings for each Measure

Guidelines	***Intentions***
This section should identify any (permanent) instrumentation that would need to be installed in order to develop a more robust (8,760 hour) baseline, if necessary, and perform M&V consistent with the IPMVP. If a Measure is operational in nature and would not qualify for a Project Incentive due to a lack of capital costs, then this section should identify measuring and monitoring techniques and equipment that would enable the Participant to continue to achieve a reduction in electricity consumption, rather than reverting to the former operating practice.	*This information is useful to the Technical Reviewer in the event that the Participant does pursue a Project Incentive by providing a starting point for the M&V Plan.* *In the case of an operational Measure, this information helps to inform what persistence of Electricity Savings is possible from the Measure.*

3.2 Economic & Financial

3.2.1 Itemized implementation costs of each Measure including:

3.2.1.1 Detailed design and engineering,

3.2.1.2 Project management,

3.2.1.3 Equipment,

3.2.1.4 Installation labour,

3.2.1.5 Demolition,

3.2.1.6 Scrap value recovery, and

3.2.1.7 Commissioning.

Guidelines	***Intentions***
For the labour costs (detailed design and engineering, Project management, installation labour, demolition and commissioning) include estimated labour rates and hours per task to at least one sub-level of the major headings provided above. For the equipment and other potential capital costs, provide estimates from quotes or another bottom-up approach. Also include any expected rental equipment costs. Attach copies of the quotes provided by different vendors and/or contractors contacted. Complete cost estimates for each Measure and indicate where there are any potential cost savings with the combination of Measures.	*The estimated implementation costs are nearly as vital to the Technical Review as the Electricity Savings and demand reduction estimates.* *As saveONenergy PROCESS AND SYSTEMS Initiative is a ratepayer program, the Technical Reviewer needs to be satisfied with the reasonableness of the total estimate and each itemized cost and/or reach a similar total and sub-totals through independent cost estimation.*

3.2.2 Simple Payback for each Measure without Incentives or any third party contributions

Guidelines	***Intentions***
Calculate the Simple Payback for each of the proposed Measures from the electricity cost savings, other benefits, and implementation cost estimates. Include estimates of all known other benefits (e.g. fuel savings) and costs including operations and maintenance (O&M) savings or costs.	*The Participant will likely use Simple Payback as an initial indicator of Project priority.*

3.2.3 Project Payback with Incentives

Guidelines	***Intentions***
Determine the Project Payback for each proposed Measure. Project Payback is the Eligible Costs minus Incentives and other contributions divided by the net annual dollar benefits.	*Project Payback more accurately reflects the real payback period after Incentives. Comparing to Simple Payback, the Participant can easily see the value of the saveONenergy PROCESS AND SYSTEMS Program Incentives.*

4.0 Recommendations

4.1 Provide recommendations by Measure and at the Project level:

4.1.1 Discussion of recommended and non-recommended Measures using results of technical and economic analysis

Guidelines	***Intentions***
Explain the rationale for recommending or not recommending each studied Measure using the results of the technical and economic analysis and any other influences that impact the decision (especially if the recommendation is contrary to the technical and economic analysis).	*The recommendations should come to a logical conclusion based on the business case developed in the previous sections.*

4.1.2 Simple Payback for each recommended Measure and for the aggregate of all recommended Measures based on total Eligible Costs with no Incentives or Third Party Contributions

Guidelines	***Intentions***
Tabulate results of all recommended Measures using Simple Payback calculated in 3.2.2.This table may be combined with section 4.1.3below.	*Provides the Participant a quick reference of the recommended Measures and the estimated total Simple Payback.*

4.1.3 Project Payback for each recommended Measure and for the aggregate of all recommended Measures

Guidelines	*Intentions*
Tabulate results of all recommended Measures using Simple Payback calculated in 3.2.3.This table may be combined with section 4.1.2above.	*Provides the Participant a quick reference of the recommended Measures and the estimated total Project Payback after Incentives.*

4.1.4 Discussion of expected lifetime of recommended Measures with a description of any special maintenance practices required to realize continued savings

Guidelines	*Intentions*
Provide evidence that the expected lifetime of the Measures recommended for Project Incentive Application will meet the requirements of a minimum of 10 years in the case of a Project, or 5 years in the case of a Micro-Project. Additionally, if the lifetime of any of the recommended Measures is expected to significantly exceed 10 years, provide evidence and an estimate of the total expected lifetime.	*This information is necessary in order to determine if a Project is eligible for a Project Incentive and it is also useful in the overall evaluation of a Project applying for Incentive if its lifetime exceeds 10 years.*

4.1.5 Discussion of risks associated with performance of recommended Measures

Guidelines	*Intentions*
Identify and discuss any performance risks, in terms of achieving the estimated Electricity Savings, with the recommended Measures. This could include technology risks as well as operational risks of the facility or specific process/System.	*This information will be considered by the Technical Reviewer who will add mitigation strategies for the identified risks as part of the Project Incentive Review.*

5.0 Implementation Action Plan

5.1 Detailed technical description for implementation of each recommended Measure:

5.1.1 Specifications suitable for procurement of bids for the Project construction and commissioning. Include sample manufacturers data sheets if applicable

Guidelines	***Intentions***
Provide a list of actions (in the form of a specification) that summarize what is needed to move the Project to the next step. Describe what detailed engineering is required and what major equipment is needed. Include relevant preliminary sketches of single lines, layouts, process flows, specifications and data sheets.	*This describes the next steps in sufficient detail to allow the Participant to obtain quotes for the detailed engineering, or the package of engineering, procurement and construction. The intention is to make the flow of work seamless for the Participant, requiring only their expenditure approval.*

5.1.2 List of existing equipment to be de-commissioned

Guidelines	***Intentions***
In addition to a list of the equipment to be de-commissioned, identify and discuss any major shutdowns that would be required to decommission the existing the equipment.	*This information should provide the Participant with an outline of the internal work to be done in preparation of implementation the recommended Measures.*

5.1.3 Proposed operating parameters including mode and sequence of operation and programming of process control Systems

Guidelines	*Intentions*
Provide target values for System variables and the corresponding mode settings, sequence of operations, or programming scripts for the equipment to be installed.	*This information should provide the Participant with an outline of the operation method or programming that needs to be implemented in order to achieve the estimated Electricity Savings once the Measure is installed.* *The information is also useful for sourcing the most suitable equipment types and models.*

5.2 Provide a schedule for implementation:

5.2.1 Overall time to complete Project broken down by major tasks and time required for each

Guidelines	*Intentions*
Start the schedule from the date of Incentive agreement. Present the schedule in a Gantt chart, or equivalent project management format. Make the Project task/sub-task identification consistent with the sub-level cost titles to the extent that is possible.	*This information will be used by the Technical Reviewer to develop a schedule of Milestones to include in the Incentive Agreement if the proposed Project is submitted and accepted for a Project Incentive.*

5.2.2

5.2.3 Detail any known timeline risks and critical tasks

Guidelines	*Intentions*
Identify and describe any known risks that might delay the implementation of the Measures, paying special attention to those critical tasks that prevent work in all areas from progressing until the issue is resolved (e.g. extended shutdown required to install equipment or lengthy processing time to obtain permits).	*This information will be considered by the Technical Reviewer who will add mitigation strategies for the identified risks as part of the Project Incentive Review.*