

Feasibility Study Guide

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Document Revisions

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1.0	May 5, 2008	Initial release
1.1	January 1, 2010	Revision No., Effective date, Fax No
1.2	September 29, 2010	Rev. No., Efficiency Nova Scotia transition changes
1.3	January 5, 2011	Efficiency Nova Scotia logo, email + web site links
1.4	January 1, 2015	New Efficiency Nova Scotia logo + Replace Efficiency Nova Scotia Corporation with Efficiency Nova Scotia
1.5	May 5, 2015	ENS spelled out and other revisions, missing section

Please note: the contents of this document are to be used as a guide only. Program terms and incentive amounts are subject to change without notice.

1.0 Efficiency Nova Scotia Contact Information

If you have questions about the contents of this document or about Custom Projects, please contact Efficiency Nova Scotia using one of the following:

Phone: 1 800 428 6774

Email: cicustom@efficiencyns.ca

Internet: efficiencyns.ca/cicustom

2.0 Introduction

This guide has been written to assist with the preparation of the Feasibility Study Proposal and the Feasibility Study Report, which may be needed when requesting Incentives for Custom Projects. The purpose of the Feasibility Study is to obtain accurate estimates of the costs and savings for a Custom Project prior to entering an agreement for an Implementation Incentive. Contact Efficiency Nova Scotia if in doubt as to whether your project will need a Feasibility Study. The purpose of the Feasibility Study Proposal is to define the scope and cost of the Feasibility Study.

Note: To be eligible for a Feasibility Study Incentive, the Feasibility Study Application and Proposal must be approved by Efficiency Nova Scotia before the study is initiated.

3.0 Alternate Feasibility Studies

The customer may have completed a detailed study for a project, without funding assistance from Efficiency Nova Scotia. Efficiency Nova Scotia may accept this alternate study report as a Feasibility Study for this program, if it is still relevant and meets quality and content requirements. Although an alternate study may be considered, an Incentive will not be paid toward its cost. If an alternate study is accepted, the customer and Efficiency Nova Scotia can enter a Project Development Agreement for an Implementation Incentive.

To request consideration of an alternate study report, please contact Efficiency Nova Scotia. There is no need to provide a Feasibility Study Proposal when making this request. Efficiency Nova Scotia will use this document as a guideline when considering alternate studies and may request supplemental information be provided to meet content requirements or to support the findings of the alternate study.

4.0 Definitions

4.1. Measure

“Measure” refers to work that is intended to save electrical energy and demand by installing new, unused equipment or systems. Operational changes, such as revised schedules or reduced loading, do not qualify for assistance through this program. Additionally, the following technologies are not currently eligible for Incentives or Rebates:

- Power factor correction
- Demand-limiting technologies
- Others at Efficiency Nova Scotia’s discretion

4.2. Base Case and Energy Efficient Case

For all Measures, there will be a lower cost, less efficient option (Base Case) and a higher cost, more efficient option (Energy Efficient Case).

Where possible, the Base Case and Energy Efficient Case options should have equal output capacities when operating under identical design conditions. For example: options for a new air-cooled water chiller should have similar capacities when compared using identical water flow rates, water inlet/outlet temperatures, ambient conditions, etc.

The definitions of Base Case and Energy Efficient Case vary by Measure type, as explained below. If in doubt as to what these options should be for a particular project, please contact Efficiency Nova Scotia.

4.2.1. For Replacement of Existing Equipment

1. The existing equipment has no remaining useful life and must be replaced. The Base Case would be either repair or replacement with similar equipment (if available). If similar equipment is not available, the Base Case would be any option. The Energy Efficient Case would be a more efficient, higher cost option.
2. The existing equipment could be kept in operation, although there is at least one more efficient option available. For these Measures, the Base Case could be either to do nothing, or it could be one of the more efficient options. The Energy Efficient Case is a more efficient, higher cost option.

4.2.2. For New Equipment

Where there is no existing equipment, such as for expansions in capacity or new facilities/renovations; the Base Case is defined as the less efficient, lower cost equipment that would normally be installed in the absence of a financial Incentive. The Energy Efficient Case is defined as a more efficient, higher cost option.

4.3. Installed Cost

The Installed Cost of a Measure is its cost to the customer, which typically includes:

- Equipment purchase and delivery costs
- Installation subcontract or labour
- Engineering
- Harmonized Sales Tax (HST), if the customer is not exempt from HST or eligible for a refund of the HST paid

4.4. Incremental Cost

Incremental Cost (\$) = Installed Cost of Energy Efficient Case (\$) - Installed Cost of Base Case (\$) - Other Incentives (\$)

Where:

Other Incentives (\$) = Total of all funding assistance that will be contributed toward the Measure by other sources.

4.5. Simple Payback

Simple Payback (years) = $\frac{\text{Incremental Cost (\$)}}{\text{Total Savings (\$/year)}}$

Where:

Total Savings (\$/year) = Total cost savings to customer, including electrical energy and demand charges as well as other benefits (such as fossil fuel, wood, water savings, O&M, repair and replacement, etc.).

5.0 General Requirements

5.1. Structure

Efficiency Nova Scotia provides example documents (MS Word .DOC) for use in preparing Feasibility Study Proposals and Feasibility Study Reports. Submissions should follow the structure of the examples.

5.2. Length

A typical Feasibility Study Proposal will be one or two pages in length. The main body of the Feasibility Study Report will be typically no longer than three pages.

5.3. Grammar and Style

The proposal and report should be grammatically correct. The language should be clear, concise and understandable by all readers.

5.4. Units

Electrical demand savings must be quoted in kiloWatts (kW) or kiloVolt Amperes (kVA), as applicable for the relevant Nova Scotia Power Inc. (NSPI) account. Electrical energy savings must be quoted in kiloWatt hours (kWh). Non-electrical benefits, such as savings in water fossil fuel consumption, must be quoted in their respective costing units.

5.5. Illustrations

Tables, charts and other diagrams should be labeled as Figure 1, Figure 2, etc. Duplication of similar information in varying forms is not generally necessary.

6.0 Measurement & Verification (M&V) of Savings

6.1. Measurement of Electrical Energy and Demand

Calculation of electrical demand (kVA) by using measured current (Amperage) and Voltage is acceptable, although the measurement of demand (kW) and energy (kWh) is preferred. If the electrical power factor is assumed, the value must be indicated.

Amperage or power measurements may be one representative value if the equipment operates under constant load. Indicate the Voltage and phase at each measurement point (e.g.: 600V, 3 phase; 120V, 1 phase, etc.). For 3 phase loads, measure the Amperage on all phases.

For equipment that runs at variable load or output, monitoring or simulation of the load profile may be required. This can be based on data from control systems, meters (if available) or Amperage loggers. Amperage loggers can be borrowed from Efficiency Nova Scotia, if required. Simulated variable load conditions should account for the changing efficiency of the equipment over its operating range of capacity. Logged data should be calibrated by comparing real time Amperage logger or control system readings against coincident measurements taken with a reliable hand held meter at the appropriate location.

6.2. International Performance Measurement & Verification Protocol

Efficiency Nova Scotia uses the International Performance Measurement & Verification Protocol, Vol. I, 2007 (IPMVP) as a guide to evaluating M&V approaches. The IPMVP is available for download from Efficiency Valuation Organization at www.evo-world.org

The protocol is used as a reference should there be uncertainty as to the M&V technique suited to a particular measure or project. Although the IPMVP describes several detailed approaches, the M&V plan for a Custom Project need not be labour-intensive and should focus on measurements and activities that are essential to verifying savings with reasonable accuracy.

In general, M&V will follow one of four typical approaches as defined in chapter 4.7 of the IPMVP and summarized below. Please contact Efficiency Nova Scotia if you are unsure which M&V approach is suited to your project.

Measure or Project Type	Typical M&V Approach	Typical Measurement Technique(s)	
		Pre-Retrofit	Post-Retrofit
Lighting retrofits; other projects having many small and identical loads.	A: Partially Measured Retrofit Isolation	Random sampling of single measurements. Verified operating schedules and equipment counts.	Random sampling of single measurements. Verified operating schedules and equipment counts.
Variable speed drives, electric chillers, air compressors, other equipment of varying load or capacity.	B: Retrofit Isolation	Single measurement if preretrofit loading is constant. Verified operating schedule. Control system data, logger data, submeter readings, etc. for variable loads.	Control system data, logger data, submeter readings, other.
Large scale retrofit affecting multiple systems.	C: Whole Facility Performance Measurement	Historical electrical energy use and demand, from Efficiency Nova Scotia bills or meter data. May be normalized for weather and/or other influencing variables.	Electrical energy use and demand, from Efficiency Nova Scotia bills or short term measurement. May be normalized for weather and/or other influencing variables.
Projects for which no preretrofit baseline can be defined, such as new facilities, systems or expansions in capacity.	D: Calibrated Simulation	Engineering simulation of Base Case and Energy Efficient Case performance.	Measurement of equipment performance, using a suitable method. Calibration of simulated Base Case and Energy Efficient Case to verify savings.

6.3. Data Available from Efficiency Nova Scotia

With the Customer's written permission, NSPI can provide Efficiency Nova Scotia and other third parties with a billing and meter reading history for the account(s) involved in the Feasibility Study.

In some cases NSPI has historical data from the customer's meter; recorded at 5, 15 or 60-minute intervals. If available, meter data will be provided to a third party for use in the Feasibility Study or M&V efforts, after the Customer grants permission.

6.4. Eligible M&V Costs

Within reasonable limits at Efficiency Nova Scotia's discretion, equipment, engineering and labour costs related to the M&V plan are eligible for Implementation Incentives under Custom Projects.

7.0 Feasibility Study Proposal

The Feasibility Study Proposal must be attached to a Custom Project Application. An example proposal (MS Word .DOC) is available from Efficiency Nova Scotia.

Where provided, checklists are intended as a general guide only. Additional information may be needed for a given proposal.

7.1. Feasibility Study Proposal Title Page

Include a front page or section indicating the following:

- Report Title
- Customer name and facility location
- Project Name
- Name of Engineer and Engineer's employer
- Mailing address of Engineer's employer
- Phone, email and fax information (as available) for Engineer
- Date

7.2. Application/Process Description

Describe the existing system or equipment, indicating its purpose, age, typical operating hours and variations in loading. Explain why it is being considered for replacement or upgrade. If helpful, provide a basic single line process schematic showing major pieces of equipment.

Checklist:

- Purpose of existing equipment described
- Age of existing equipment provided
- Operating schedule described
- Variations in loading described
- Schematic provided (if necessary)

7.3. Electricity Saving Opportunities

Note: It is expected that some pre-feasibility evaluation, such as a Scoping Study, has been completed that indicates the potential project savings and costs justify performing a Feasibility Study.

Describe the Measure in terms of a Base Case and an Energy Efficient Case. Provide a preliminary estimate of possible electrical energy and demand savings as well as a budgetary estimate of the installed costs for each option.

Checklist:

- Approximate electrical energy savings (kWh per year) is provided
- Approximate peak demand savings (kW) is provided
- Budgetary Measure costs are provided
- Measure is technically feasible and meets the eligibility requirements

- Measure involves the installation of new, unused equipment and is not purely a change in loading or operating schedule
- New equipment is proven to save electrical energy and demand
- Equipment has proven reliability
- Proposal indicates whether the new equipment will have more, less or identical output capacity to that being replaced

7.4. Other Project Benefits

Describe any non-electric benefits (such as fossil fuel, wood, water savings, O&M, repair and replacement, etc.) that might be realized as a result of the project. If possible, provide a preliminary estimate of the associated cost savings to the customer (\$ per year).

7.5. Scope of Work

Outline the study tasks and summarize the work to be done in each task.

7.6. Schedule

Indicate the expected start and completion dates for the study. If known, provide the estimated start and completion dates for implementation of the Measure or project.

7.7. Study Team

Identify the proposed engineering consultant and/or customer employees who will conduct the study.

7.8. Test Equipment

To use the Efficiency Nova Scotia Test Equipment loan service, indicate the type(s) of equipment, the purpose for its use and the expected borrow/return dates. If required, please contact Efficiency Nova Scotia for a list of the equipment available for loan. Efficiency Nova Scotia will pay 50 per cent (up to \$2,500) toward the rental of specialized test equipment. If rental equipment will be used, include an estimate of the rental cost in this proposal.

7.9. Study Cost

Provide the maximum estimated cost for the study including a breakdown of consulting fees, in-house engineering (if no consultant is used), disbursements and HST as applicable.

END OF FEASIBILITY STUDY PROPOSAL OUTLINE

8.0 Feasibility Study Report Outline

The Feasibility Study Report and all appendices should be provided to Efficiency Nova Scotia by email. Delivery of hard copies or facsimiles are also acceptable. A sample Feasibility Study Report (MS Word .DOC) is available from Efficiency Nova Scotia. Where provided below, checklists are intended as a general guide only. Additional information may be needed for a given report.

8.1. Feasibility Study Title Page or Title Block

Include a front page or section indicating the following.

- Report Title
- Customer name and facility location
- Project Name
- Name of Engineer and Engineer's employer
- Mailing address of Engineer's employer
- Phone, email and fax information (as available) for Engineer
- Date

8.2. Project Information

Describe the customer, the location and the facility/business type. Summarize the project, typically in one or two sentences. Describe the customer's maximum simple payback or minimum internal rate of return (hurdle rate) that justifies investment in energy saving projects.

Although not necessary, the Feasibility Study Report can suggest a level of financial incentive from Efficiency Nova Scotia that would enable the project to proceed. Explain why an incentive (if any) is needed for this project. The incentive offered (if any) will be determined by Efficiency Nova Scotia.

Checklist:

- Identifies customer, location, facility/business
- Briefly describes project
- Identifies customer's required simple payback or hurdle rate for energy conservation projects
- Explains why this project could not proceed without an incentive from Efficiency Nova Scotia. For example:
 - The investment of incremental costs does not meet the needed hurdle rate or simple payback;
 - The efficient equipment costs more than was budgeted and the project must proceed;
 - Others as applicable
- Confirms the amount of incentive funding obtained (or being sought) from other sources to be applied to the Measures
- Optionally, the report suggests an amount of incentive being requested from Efficiency Nova Scotia

8.3. Measure Descriptions

Describe each Measure or group of measures in the following format. Multiple measures may be grouped if they involve similar equipment and would be implemented as a package (such as lighting upgrade for an entire facility).

8.3.1. Existing Conditions

Note: This section does not apply for new construction or expansion projects where no equipment yet exists.

Describe the equipment or system that is being upgraded or replaced. Describe input or output capacities if helpful, although detailed data may be included in Appendix B. If necessary, include one or more single line process schematics in the report body or in Appendix B.

Checklist:

- Report describes the existing system(s) or equipment as currently installed
- Report estimates the remaining useful life of the equipment to be replaced, explaining how the estimate was made
- Report identifies output capacities of existing equipment
- Report describes the typical operating conditions (operating hours per week, month or year, variations in loading; etc.)

8.3.2. Recommendation

Describe the equipment considered for the Measure. Describe each of the Base and Energy Efficient Cases. Quote input or output capacities if helpful, although detailed data may be included in Appendix B. If necessary, include one or more single line process schematics in the report body or in Appendix B, showing the Base and Energy Efficient Cases.

Checklist:

- Measure is technically feasible and meets Program eligibility requirements
- Measure involves the installation of new, unused equipment and is not purely a change in loading or operating schedule
- Equipment is proven to save electrical energy and demand
- Equipment has proven reliability
- Report estimates useful life of new equipment, explaining how the estimate was made
- Report indicates whether the new equipment will have more, less or identical output capacity to that being replaced

8.3.3. Savings and Cost Estimates

Note: Efficiency Nova Scotia reserves the right to reduce the total Implementation Incentive paid if the verified actual total project savings (kWh electrical energy per year) is less than 85% of the values stated in the Project Development Agreement.

Summarize the costs and benefits of the Measure. Briefly explain how the savings and costs were determined (e.g. engineering calculations, manufacturer's equipment performance datasheets, etc), referencing Appendix B as needed.

Checklist for Measure Savings and Cost Estimates (report body):

- General description of methodology for determining Measure savings and costs
- Electricity cost savings stated in \$ per year
- Other Benefits stated in \$ per year
- Incremental Cost stated

Checklist for Measure Savings Estimates (Appendix B, hard copy or electronic form)

- Savings estimates are quantified separately for each Measure
- Assumptions are clearly indicated and supporting data are provided
- Calculations are documented to explain the methodology used
- Calculation results are clearly labeled
- Units are indicated as appropriate
- For performance estimates based on simulations using propriety software: the name and version of the software, the inputs, a description of the algorithms used and the outputs are provided
- Variations in equipment loading (hourly, daily, weekly, seasonal, etc.) are accounted for
- The interaction of the Measure with other Measures or systems is accounted for
- Degradation of equipment efficiency (if any) over its useful life is accounted for
- Other project benefits (non-electricity related cost savings) are accounted for and savings calculations are provided

Checklist for Measure Cost Estimates (Appendix B, hard copy or electronic form)

- Cost estimates and Simple Payback are quantified separately for each Measure
- Copies of contractor and supplier quotations are provided
- Quotations are broken down by equipment, installation, engineering and HST
- Quotations indicate equipment sizes, model numbers, quantities and associated costs for each item
- Costs do not include contingencies, warranty plans or spare parts
- HST registration number is indicated on quotations that include HST
- When installation or engineering costs are based on the use of customer staff, report indicates the estimated number of hours and the hourly labour cost inclusive of overhead

Checklist for Other Benefits

The report should consider other benefits to the customer, such as:

- Reduced consumption of non-electric energy
- Reduced water, sewer or solid waste disposal charges
- Reduced emissions charges
- Reduced maintenance
- Increased reliability
- Increased productivity
- Reduced waste
- Reduced raw material
- Others as applicable

8.4. Measurement and Verification (M&V) Plan

Describe how the electrical energy and demand savings will be measured and verified. Use the following checklist as a guide. Include an estimate of M&V related costs.

Checklist:

- Clear description of how the electrical energy and demand savings will be verified
- Where possible, plan includes pre-retrofit and post-retrofit performance measurements
- Simulation, when required, will use accepted engineering practices
- Verified savings will be based on actual measurements (not nameplate data)
- Measurements will be taken during a period of typical equipment operation and loading
- Test instrumentation is described
- Measurement points are indicated or described

- Duration of testing is indicated
- Labour and engineering and equipment costs (as related to M&V) are identified
- Equipment rental costs and/or equipment that must be borrowed from Efficiency Nova Scotia are indicated

8.5. Implementation Schedule

The main body of the report should indicate the expected start and completion dates for the project or if preferred, for each Measure. For projects having an implementation time exceeding 90 days, Appendix B should include a Gantt chart indicating start date, substantial tasks, milestones and completion date.

8.6. Financing

Indicate whether the customer wishes to apply for Efficiency Nova Scotia on-bill financing of eligible costs. The maximum amount that may be financed for each project will be established by Efficiency Nova Scotia. Indicate the desired repayment period in months (maximum 24). When the customer requests a Project Development Agreement, Efficiency Nova Scotia will verify their eligibility for financing.

8.7. Appendix A

Appendix A contains the Feasibility Study Data Sheet provided by Efficiency Nova Scotia (MS Excel .XLS). If the study recommends implementing more than one Measure, use Appendix A to indicate the totals for all Measures recommended by the study. Savings and costs must be broken down by Measure in the main body of the report or in Appendix B.

8.8. Appendix B

Appendix B contains the calculations, data and other information supporting the report recommendations. Hard copies and/or electronic copies of Appendix B contents may be provided. For data and calculations: MS Excel (XLS)-compatible format is required. Scanned copies of quotations and other supporting documents may be provided in Acrobat (.PDF) format. Electronic data must be submitted on compact disc or DVD. Label the disc with the title and date shown on the report cover. Provide one copy the disc(s) for each hard copy of the report.

If convenient and permitted by the customer, include digital photos of existing equipment, equipment nameplates, etc. Photos can be provided in hardcopy and/or electronic format as desired.

If Appendix B contains multiple sections, provide a table of contents as the first page. Examples of information that may appear in Appendix B include:

- Calculations of costs and savings
- Single line schematics
- Manufacturer's equipment performance data sheets
- Cost quotations
- Other information as necessary to support the conclusions of the report
- Describe contents of any enclosed disc(s). Examples could include:
 - Electronic copies of any of the above
 - Large data files (spreadsheets, data logger output)
 - Digital photos
 - Referenced documents, etc.