STRATEGIC ENERGY MANAGEMENT FOR INDUSTRY

Energy Assessments and Audits (EAA) Application Guide

EMISSIONS REDUCTION ALBERTA
Natural Resources Canada
Ressources naturelles Canada
Alberta

STRATEGIC ENERGY MANAGEMENT FOR INDUSTRY

The purpose of the Energy Audits and Assessments (EAA) Application Guide ("Guide") is to provide you with step-by-step guidance on how to participate in the EAA activity of the Strategic Energy Management for Industry (SEMI) Program. The Guide is intended to provide the following:

- Provide an overview of the SEMI program and the various eligible activities
- Provide detailed information on the EAA Activity including the registration process

Please contact our program support team if you have questions or would like more information:

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SEMI Program Overview

Emissions Reduction Alberta's Strategic Energy Management for Industry program (SEMI) helps eligible industrial facilities improve their energy performance by co-funding activities to implement an integrated system of practices, processes, and capital retrofits.

With funding from the Government of Alberta's Technology Innovation and Emissions Reduction (TIER) fund and Natural Resources Canada (NRCan), the objective of SEMI is to support eligible facilities to:

- Understand energy use;
- Identify methods and approaches to optimize energy use;
- Implement energy-saving capital retrofits; and
- Improve energy productivity and competitiveness.

SEMI offers financial incentives that cover up to 50% of eligible project costs for for-profit organizations and up to 100% for not-for-profits and Indigenous organizations. Additional funding caps are stated on the SEMI website. SEMI also allows in-kind contributions from the facility to offset the co-funding requirement for certain activities.

SEMI is structured around five key activities to drive energy efficiency and emissions reduction in industrial and manufacturing facilities:

1. FACILITY READINESS ASSESSMENT (FRA)

The first step in SEMI is to complete a Facility Readiness Assessment (FRA) at your facility. For-profit organizations must cover 50% of the cost; however, it is anticipated that your contributions can be provided as an in-kind contribution. In-kind contributions can include facility staff time necessary to complete any aspect of the FRA and prior energy management activities that contribute value to eligible activities. The FRA will provide you with recommendations to implement further eligible activities.

Not all recommendations are mandatory to implement for participation in SEMI.

The FRA provides a facility-wide assessment of how, where, and when energy is used in the production process. The FRA will:

- **Provide an energy assessment. The FRA will assess and analyze** all energy uses and energy management systems.
- **Identify opportunities for improvement.** The FRA will highlight immediate opportunities to enhance energy efficiency and provide an energy roadmap for the facility based on site-specific considerations.
- **Define a path forward in SEMI.** The FRA identifies the most suitable next steps of eligible SEMI activities such as further detailed studies, engaging in strategic energy management (SEM), implementing energy management information systems (EMIS), and/or initiating capital retrofits. The path forward will consider the current situation and the capabilities and capacity of your facility, including financial considerations and other constraints. Not all of the next steps identified are mandatory to implement for participation in SEMI.

2. ENERGY ASSESSMENTS AND AUDITS (EAA)

After completing the FRA, facilities may proceed with more detailed studies. These studies can include:

- **Comprehensive Energy Assessment (CEA):** This assessment thoroughly evaluates the facility's overall energy consumption, pinpointing inefficiencies and suggesting targeted energy-saving strategies. The CEA is facility-wide and provides further detailed analysis of energy-saving opportunities. The scope of a CEA may include systems that operate across the facility.
- **Computational Fluid Dynamics Studies (CFDS):** CFDS involve using advanced simulation techniques to model and analyze thermal and fluid dynamics within industrial processes. These studies help to optimize energy use by identifying areas where energy losses occur and suggesting modifications to improve energy efficiency.
- **Process Integration Studies (PIS):** This approach focuses on optimizing the interactions between different processes to reduce energy consumption. PIS analyze how energy flows through the entire facility, looking for opportunities to reuse waste energy, improve heat exchange systems, and streamline operations for better energy efficiency.

3. STRATEGIC ENERGY MANAGEMENT (SEM)

The FRA contains an initial assessment of a facility's readiness to participate in Strategic Energy Management (SEM). The assessment allows a facility to be placed within the correct SEM group training with a customized curriculum. SEM is a systematic approach to energy management that integrates energy-saving practices into the daily operations of a facility. SEM supports facilities in developing and implementing long-term energy management plans that align with their business objectives. This approach includes:

- **Setting Clear Goals**: Establishing measurable energy performance targets and creating a roadmap to achieve them.
- **Engaging Employees**: Involving employees at all levels to foster a culture of continuous improvement and energy awareness.
- **Continuous Monitoring**: Encouraging regular monitoring and reviewing of energy use to ensure that energy efficiency remains a priority and that opportunities for improvement are continually identified.

4. ENERGY MANAGEMENT INFORMATION SYSTEMS (EMIS)

The FRA contains an initial assessment of the facility's Energy Management Information Systems (EMIS). These systems are critical tools within the SEMI framework, providing facilities with the ability to collect, analyze, and manage energy data to inform operating decisions. EMIS activities include hardware and software components that support:

- **Data Collection and Monitoring**: Using sensors, meters, and software to gather real-time data on energy consumption and production levels.
- **Analysis and Optimization**: Analyzing data to identify inefficiencies, track energy consumption patterns, and optimize processes.
- **Reporting and Decision Making**: Providing insights into energy use, which helps in making informed decisions, detecting anomalies, and implementing corrective actions promptly.

5. CAPITAL RETROFITS

The FRA will provide additional insight to support capital retrofits. Capital retrofits are essential for implementing the energy-saving measures identified through the energy assessments or studies and supported by SEM and EMIS. SEMI provides co-funding to assist facilities in upgrading energy-efficient equipment, adopting advanced technologies, and making infrastructure improvements that contribute to reduced energy consumption and lower greenhouse gas (GHG) emissions. Examples of capital retrofits include:

- **Equipment Upgrades**: Installing high-efficiency electric motors with variable frequency drive controls, LED lighting, and waste heat recovery systems.
- **Renewable Energy**: Investing in renewable energy sources, such as solar panels, to reduce dependence on non-renewable energy.
- **Process Improvements**: Upgrading a facility's energy consuming processes, such as improved compressed air systems or upgraded process cooling to enhance energy efficiency.

By integrating these five activities—FRA, EAA, SEM, EMIS, and Capital Retrofits—SEMI offers a comprehensive approach to energy management. This approach enables industrial and manufacturing facilities to optimize energy use, reduce costs, and lower their environmental impact, contributing to a more sustainable and competitive industrial sector in Alberta.

Energy Assessments & Audits (EAA) Overview

The FRA conducted by ERA's Service Provider, Enerva Energy Solutions Inc., will identify the systems in your facility that can benefit from further assessment. The FRA may include optional recommendations for EAA to further analyze these systems by estimating their current energy consumption and recommend measures to reduce the energy consumption and/or GHG emissions. EAA will target systems that service the entire facility like steam systems, process heat or compressed air systems. EAA will describe the current equipment, operating conditions, proposed energy efficient alternative, the associated energy savings, and other benefits. EAA will provide a business case related to the proposed energy saving opportunities with sufficient economic analysis to support business decisions. The expected level of accuracy of the EAA is +/- 25% for energy savings and capital costs. This assessment can fall in any of the following three key categories:

COMPREHENSIVE ENERGY ASSESSMENTS (CEA):

CEA provide a detailed, facility-wide evaluation of energy consumption. They identify inefficiencies in energy use and offer targeted strategies to reduce energy waste and improve efficiency. The CEA also provide further detailed analysis of energy-saving opportunities. These assessments cover all key energy-consuming systems within the facility, including industrial processes, process equipment, and building HVAC or lighting. By highlighting opportunities for improvement, the CEA provide a roadmap for implementing energy-saving measures and optimizing overall energy performance. Based on a case-by-case basis, they may also include benchmarking against industry standards to ensure competitiveness and compliance with energy regulations.

The following elements are required for CEA:

- Energy system synopsis that describes the details of the system that is being studied, why this system was chosen and how to reduce energy use.
- CEA scope including a description of the methodologies or approaches that are used to determine the energy savings and capital costs for the capital retrofit.
- A detailed description of capital retrofit cost and installation, including proposed timelines resulted from CEA.

COMPUTATIONAL FLUID DYNAMICS STUDIES (CFDS):

CFDS use advanced simulation tools to model and analyze the behaviour of fluids, thermal dynamics, and chemical processes within industrial processes. These studies provide in-depth insights into energy losses, inefficiencies, and areas of excessive fluid friction. The modelling in CFDS enables facilities to visualize how energy is used or lost within their operations and identify opportunities to optimize heat transfer mechanisms and fluid dynamics. Modifications based on the analysis of CFDS can result in improved energy efficiency, reduced equipment wear, and enhanced process performance.

The following elements are required for Computational Fluid Dynamics Studies:

- Energy system diagrams;
- Process simulations;
- Energy and mass balance analysis;
- Consideration of uncertainties in the analysis;
- A detailed description of capital retrofits recommended by CFDS including cost and installation, and proposed timelines.

PROCESS INTEGRATION STUDIES (PIS):

This approach focuses on optimizing the interaction between different processes within the facility to reduce overall energy consumption. PIS examine how energy flows through the facility, looking for approaches to capture and reuse waste energy (such as heat recovery systems), improve heat exchange arrangements, and streamline operations. By maximizing the interaction between different processes, facilities can achieve significant energy savings and enhance operational efficiency. Process integration may involve restructuring energy flows, improving thermal management, and adopting more efficient control strategies.

The following elements are required for Process Integration Studies:

- Energy system diagrams;
- Thermodynamical modeling including energy and mass balance;
- Process simulations;
- Consideration of uncertainties in the analysis;
- A detailed description of capital retrofits recommended by PI studies including cost and installation, and proposed timelines.

You will need to submit an application to receive funding to conduct an EAA in your facility or hire an Eligible Contractor to conduct the EAA at your facility. If you choose to utilize an internal resource, the EAA report must be reviewed and signed by a Professional Engineer (P.Eng.). The EAA report will offer a detailed assessment of the energy use within the facility, identifying inefficiencies and opportunities for improvement. It will include an analysis of current energy consumption patterns, potential energy-saving measures, and recommendations for implementing cost-effective solutions. The report will also provide an energy performance baseline(s) to ensure accurate tracking of energy savings over time. Additionally, the EAA report will outline a roadmap for capital investment opportunities and operational adjustments to enhance energy efficiency and reduce GHG emissions.

Eligibility Requirements

1. ELIGIBLE PARTICIPANTS

An eligible participant must meet the two following eligibility requirements:

1. Operates a business—whether as a corporation, non-profit, co-operative, sole proprietorship, partnership, government or public entity, or Indigenous-owned* organization—by owning or leasing at least one Eligible Facility.

*To be considered Indigenous owned, your organization must meet the following criteria:

- *Be a sole proprietorship, limited company, cooperative, partnership, or not-for-profit organization in which Indigenous peoples own and control at least 51% of the enterprise.*

2. Is not insolvent.

2. ELIGIBLE FACILITIES

To be an eligible facility, a facility must meet all the following requirements:

1. The facility is located in Alberta.
2. The facility has been in operation for at least one year with fixed equipment and energy consumption information.
3. You own or lease the facility. For a leased facility, you have obtained permission from your landlord to undertake the key activities.
4. The facility belongs to one of the following North American Industry Classification System (NAICS) economic sectors[1]:

- **Agriculture, Forestry, Fishing, and Hunting (NAICS 11)**
  - Crop Production
  - Animal Production and Aquaculture
  - Forestry and Logging
  - Fishing, Hunting, and Trapping
  - Support Activities for Agriculture and Forestry
- **Mining, Oil, and Gas (NAICS 21)**
  - Oil and Gas Extraction
  - Mining (except Oil and Gas)
  - Support Activities for Mining
- **Utilities (NAICS 22)**
  - Electric Power Generation, Transmission, and Distribution
  - Natural Gas Distribution
  - Water, Sewage, and Other Systems
- **Construction (NAICS 23)**
  - Construction of Buildings
  - Heavy and Civil Engineering Construction
  - Specialty Trade Contractors
- **Manufacturing (NAICS 31-33)**
  - Food Manufacturing
  - Beverage and Tobacco Product Manufacturing
  - Textile Mills
  - Textile Product Mills
  - Apparel Manufacturing
  - Leather and Allied Product Manufacturing
  - Wood Product Manufacturing
  - Paper Manufacturing
  - Printing and Related Support Activities
  - Petroleum and Coal Products Manufacturing
  - Chemical Manufacturing
  - Plastics and Rubber Products Manufacturing
  - Nonmetallic Mineral Product Manufacturing
  - Primary Metal Manufacturing
  - Fabricated Metal Product Manufacturing
  - Machinery Manufacturing
  - Computer and Electronic Product Manufacturing

[1] Sectors may also include those that are engaged in energy consuming processes, and that involve the physical or chemical transformation of materials or substances into new products. Products may be finished (ready to use or consume) or semi-finished (raw material). Related activities include assembling component parts, blending materials, and finishing products.

- Electrical Equipment, Appliance, and Component Manufacturing
- Transportation Equipment Manufacturing
- Furniture and Related Product Manufacturing
- Miscellaneous Manufacturing

▷ **Transportation (NAICS 48)**

- Air Transportation
- Rail Transportation
- Water Transportation
- Truck Transportation
- Transit and Ground Passenger Transportation
- Pipeline Transportation
- Scenic and Sightseeing Transportation
- Support Activities for Transportation

▷ **Services and Waste Management (NAICS 56)**

- Waste Collection
- Waste Treatment and Disposal
- Remediation and Other Waste Management Services

3. ELIGIBLE CONTRACTORS

Eligible Contractors are companies approved or certified by the SEMI program to perform certain types of work, such as energy studies, energy efficiency upgrades, or renewable energy installations under the SEMI program.

4. ELIGIBLE ENERGY ASSESSMENTS & AUDITS

1. The EAA must be conducted by an Eligible Contractor or a facility's internal resources under a Professional Engineer's supervision and approval.
2. The engineering proposal must include an uncertainty analysis that describes any uncertainty in the ability to realize the estimated outcomes.
3. The EAA must adopt a holistic approach to assessing energy use and identifying energy-saving measures. Its primary objective is to inform an energy management savings strategy tailored to the specific needs and maturity level of energy management within an industrial facility. The EAA should also address operational savings opportunities related to peak management, load shifting, downtime energy waste reduction, and efficiency optimization. Energy savings estimates must be grounded in a thorough analysis of energy data, site investigations, and plant observations, while considering the organization's capacity to implement these energy insights.

EAA Application Process

The EAA registration process is easy and secure. Please complete the registration form on the SEMI online portal ("Portal") at portal.semiprogram.ca. The process flow below outlines the main steps for the EAA.

STEP 1
SUBMIT AN EAA APPLICATION

STEP 2
APPLICATION REVIEW BY ERA'S SERVICE PROVIDER

STEP 3
CONFIRM EAA SCOPE AND BUDGET, SIGN TERMS AND CONDITIONS

STEP 4
CONDUCT EAA AS PER THE STUDY SCOPE

STEP 5
SUBMIT THE POST-ACTIVITY DELIVERABLES

STEP 6
SUBMIT INVOICES AND RECEIVE INCENTIVE

STEP 1: SUBMIT AN EAA APPLICATION

Tips: Your Eligible Contractor can submit the EAA application on your behalf.

- Use the SEMI Portal to submit your EAA application. The application should be supported by following documents:
  - The facility's utility bills for last 12 months.
  - Details of any energy savings/GHG reduction measures implemented at the facility after the FRA was conducted (if applicable).
  - Details of participation in any other eligible activities in SEMI (if applying simultaneously).
  - An EAA proposal that describes:
    - The scope of the assessment.
    - A brief description of systems to be studied and the expected energy savings measures to be identified.
    - Data to be collected (type of data and its duration) and the methodology used to create a facility/system baseline.
    - Overview of the engineering calculations to be performed to estimate the energy consumption of existing systems and energy/GHG savings.
    - An estimate of expected electrical and thermal energy savings, GHG reductions and associated project costs, and the accuracy of these estimates that the assessment will provide.
    - Estimate of EAA costs, with costs apportioned to the activities identified in the previous bullet point.
    - Itemized costs for in-kind contributions, if any. These contributions may include the facility's internal resources, such as staff time, equipment, or other non-cash inputs that contribute to the successful completion of the assessment.
    - Assessment schedule including start and end date of the assessment and important milestones.
    - Resumes of personnel involved in assessment that highlights their experience relevant to the assessment.
  - If you are hiring an Eligible Contractor, provide a list of similar assessments performed by the consultants for other similar businesses.
  - Submit the necessary documentation for review by ERA's Service Provider. Any missing information will delay approval of your submission. Contact ERA's Service Provider for any questions.

After you click the submit button, you will receive an acknowledgement e-mail stating that your application has been submitted and is under review.

STEP 2: APPLICATION REVIEW BY ERA'S SERVICE PROVIDER

- ERA's Service Provider will review the submitted documents to assess:
  - The reasonableness of the study scope.
  - Methodology used to establish the baseline energy consumption and energy savings/GHG reduction estimate.
  - Reasonableness of EAA costs and timeline.
  - Energy savings/GHG reduction and retrofit cost estimate stated in the application.

ERA's Service Provider may reach out to you to request any additional information required to complete the review.

- Once ERA's Service Provider has completed the review, you will be notified of the successful completion of the review. The e-mail will include an estimate of the eligible incentive, and a date by which you are expected to complete the EAA.

STEP 3: CONFIRM EAA SCOPE AND BUDGET, SIGN TERMS AND CONDITIONS

- The approval e-mail from ERA's Service Provider will include a link to the SEMI EAA Terms & Conditions document.
- The document contains the Terms & Conditions for EAA, with the following fields populated by the ERA's Service Provider:
  - Schedule A – EAA Scope & Estimated Savings.
  - Schedule B – Projected Eligible Expenditure.
  - Schedule C – Co-Funding Details.
- Review, sign, and date the document, and then upload the completed document on the portal.

STEP 4: CONDUCT EAA AS PER THE STUDY SCOPE

After signing the Terms & Conditions document, participants can proceed with the EAA as per the approved scope and work plan. If the Eligible Contractor or your Professional Engineer recommends a change to the EAA scope during the study, a change request must be submitted and approved before continuing.

Tips: Your Eligible Contractor can submit the EAA scope change request on your behalf.

STEP 5: SUBMIT THE POST-ACTIVITY DELIVERABLES

- Submit the draft EAA report via the SEMI online portal.
- ERA's Service Provider will review the draft report and will request any clarification if required.
- After you provide the requested information, ERA's Service Provider will recommend changes to be made to the draft EAA report if required.
- Revise the EAA report to incorporate ERA's Service Provider's comments and submit the final EAA report.
- ERA's Service Provider will review the final EAA report to confirm that:
  - The report aligns with the study proposal submitted by the Eligible Contractor.
  - The report content and recommendations are in line with the proposed study costs.
  - The report provides a reasonable estimate of energy/GHG savings.
  - The recommendations provided by the report (project costs & payback) are in line with program requirements.
- When the review is complete, the technical reviewer will issue a report outlining:
  - The independent review methodology.
  - Whether the energy/GHG savings estimate provided by the report matches the ERA's Service Provider's estimate.
  - Recommendations including next steps.

Tip: Your Eligible Contractor can submit post-activity deliverables on your behalf.

STEP 6: SUBMIT INVOICES AND RECEIVE INCENTIVE

- Once ERA's Service Provider has determined that the EAA study report conforms to the program requirements, you will be required to submit invoices for eligible costs.
- List out all the EAA cost items.
- Submit the worksheet in the SEMI online portal along with supporting invoices, details on in-kind contributions and their supporting documents, and incentive invoice.
- You will receive an automated e-mail upon successful submission of the invoices and completed worksheet. Once ERA's Service Provider has reviewed the invoices, you will get an automated e-mail to provide your banking details.
- Provide your banking details including a copy of void cheque. You will be notified confirming the successful submission.
- ERA's Service Provider will review your payment request. If the payment details you entered matches the information on your void cheque, payment will be processed within four weeks. You can track the progress of your payment by visiting the portal.

Once the post-activity application and supporting documentation have been reviewed and approved, the energy assessment incentive will be issued (up to $50,000 for each facility). Payment will be issued via electronic funds transfer.

Tips: Your Eligible Contractor can submit required information on your behalf.

ELIGIBLE ACTIVITES & INCENTIVES