Sustainable Canadian Agricultural Partnership

Agricultural Stewardship Initiative
Detailed Energy Audit (Level 2) – Minimum Requirements

A Detailed Energy Audit (Level 2) is a comprehensive examination of an operation's current energy consumption (baseline) and aims at identifying opportunities to improve energy use efficiency and reduce related costs. The baseline assessment involves a walkthrough of the farm operation and review of utility bills to evaluate energy use that considers all major activities and components of the operation.

The primary goal of an energy audit is to provide a detailed analysis of the energy consumption patterns and inefficiencies within an operation and helps identify areas where energy is wasted and provides recommendations for potential energy-saving measures. The audit includes estimated financial savings associated with the specific energy saving recommendations and can also estimate payback periods associated with specific investments. A Detailed Energy Audit (Level 2) differs from a Basic Energy Use Assessment (Level 1) in its complexity, level of data collection, and level of analysis and recommendations.

The Detailed Energy Audit (Level 2) must be conducted by a qualified third-party consultant/engineer/energy auditor.

Components of a Detailed Energy Audit (Level 2) must include but are not limited to:

Description of Farm Operation:

- A detailed description of the farm operation, its primary commodities and size of operation (e.g., number of livestock, number of acres/hectares farmed, etc.)
- A detailed description of all the buildings being considered in the energy assessment, which includes building use, type of building construction, size, insulation type, details of the heating, cooling and ventilation systems, and major equipment (fans, pumps, lighting, etc.).
- Annual production metrics of the primary commodities (e.g., hL of milk produced, number of livestock sold or live weight sold, weight of crop sold per cycle).
- Clear objectives for the audit are outlined (e.g., identify energy-saving opportunities, prioritize improvements (short- and long-term), considerations for reduced fossil fuel use for GHG reductions, etc.)

Data Collection:

- Clearly identifies the relevant data considered for establishing the current baseline energy use at the farm operation;
    - Review of at least 12 months of utility bills to quantify current consumption of electricity, natural gas, diesel, propane and other energy sources;
    - Includes walkthrough of whole farm operation looking for energy sources and technologies, buildings infrastructure, ventilation, energy-consuming devices, machinery and appliances;
    - Include measured data wherever possible, which can include sub-metering or spot measurements (e.g., power logging, flow measurements), operating schedules and actual run times, equipment performance testing, fuel efficiency calculations and seasonal load analysis.

- Clearly identifies data considered for quantifying potential energy savings and efficiencies (e.g., current baseline energy use, breakdown of baseline energy use for the major activities and components of the operation, building plans, direct electrical and thermal energy monitoring, thermal imaging, utility retrofit programs, supplier/manufacturer specifications, etc.)

Analysis:

- All assumptions are clearly stated and rationalised;
- Baseline energy use conditions are established for the major activities at the farm operation, and energy consumption patterns are assessed;
- Key Performance Indicators (KPIs) are reported for all major activities and all calculations and assumptions are described. KPIs can include energy use per production unit (e.g., kWh per volume of milk produced, kWh per weight of crop, kWh per live weight of livestock), energy use per building area, and energy use per head of livestock or per unit of crop.
- Areas for energy-use improvements are identified for the major activities and components of the farm operation (e.g., lighting, heating, refrigeration/cooling, ventilation, building infrastructure, drying, etc.), including specific equipment replacements, upgrades, or modifications;
- Potential energy savings and cost savings are calculated for identified areas of energy-use improvements;
- Estimated payback periods associated with specific investments may also be considered.

Recommendations:

- Energy audit outlines actionable recommendations for the various components of the farm operation for reducing energy use and improving energy efficiency;
- Recommendations are prioritized by those that have the most benefit, by short- and long-term goals, or by cost-effectiveness.

Supporting Documentation:

- Includes technical documents that were used for the audit analysis and evaluations;
- The actual documents, references and website links of technical information used to estimate energy savings and costs can be appended to the final energy audit report.

A final Detailed Energy Audit (Level 2) report must be submitted to the farm owner/operator at the completion of the energy audit. A walkthrough of the final report should also be presented to the farm owner/operator to ensure there is a full understanding of the energy audit and its findings.

For Reference

- A Type 2 Audit - American National Standard and American Society of Agricultural and Biological Engineers (ANSI/ASABE S612) - Performing On-farm Energy Audits is considered an equivalent-type of energy audit.

- Note: A successfully completed Detailed Energy Audit (Level 2) under this project category may support an applicant to meet the eligibility requirement for a future (separate) application to the **Larger-Scale Energy Efficiency Improvements** project category.

Reference documents to assist with outlining the components of a detailed energy audit:

- American National Standard and American Society of Agricultural and Biological Engineers (ANSI/ASABE S612) - Performing On-farm Energy Audits: Type 2 Audit.
- American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE): Level 2 Energy Survey and Analysis.
- Best Management Practices On-farm Energy: A Primer - https://bmpbooks.com/publications/on-farm-energy-a-primer/.
- United States Department of Agriculture (USDA) Agricultural Energy Assessment (CEMA 228) - this assessment conforms to the ANSI/ASABE S612 Performing On-farm Energy Type 2 Audit.