Energy transition accelerator

Opportunity assessment guidelines

EECA
TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

Background

The Energy Transition Accelerator (ETA) programme helps medium to large energy-related emitters make technically and economically viable decisions and investments that support their energy transition pathway to a low carbon future.

ETA Opportunities Assessments look at the assets, processes, and strategies across a whole business to identity and present options and pathways.

Objectives

The objective of document is to assist service providers to complete EECA's ETA assessment for organisations.

These guidelines set the minimum quality and content standards expected and have been written for use with stationary energy.

Stationary energy can be defined as: energy consumed by fixed installations such as buildings, industrial facilities, and machinery. This includes energy used for lighting, heating, cooling, and powering various appliances and equipment within these stationary structures.

Note:

ETA guidelines have been developed to assist businesses with their decarbonisation journey and could be used to develop an emissions plan for a resource consent application. There are however specific requirements for an emissions plan accompanying a resource consent application.

EECA has developed a non-statutory Emissions Plan Guidance Document that is useful for consent applicants developing emissions plans, but we recommend applicants meet with the relevant regional council to discuss consent requirements, prior to making a submission.

EECA provides no guarantee that an emissions plan developed using an ETA decarbonisation pathway will result in a successful resource consent application.

Role of registered service providers

1. **Assessing the viability of a customer site for an Energy Audit project by conducting an Energy Performance Assessment, which includes:**

    1.1. Assessment of energy use and target processes to ensure the business operations are of a type and sufficient scale to warrant an ETA project; and

    1.2. Determining the scope boundary of the Opportunity Assessment project.

    1.3. Determine if the business site(s) is subject to consent requirements under the National Direction GHG.

2. **Providing cost quotations to the customers which include:**

    2.1. A list of the Energy Audit project milestones (actions/deliverables to be achieved) including the ongoing measurement and verification of energy savings.

    2.2. The expected timeframe for achieving each milestone; and

    2.3. The anticipated costs of:

        2.3.1. The equipment and materials, if any, to be supplied by the service provider.

        2.3.2. Labour for carrying out Energy Audit project and each of the Energy Audit project milestones (including a break-down by hours and hourly rates).

        2.3.3. Any other services (if relevant) for the ETA project.

3. **Agreeing and warranting that:**

    3.1. The price for each product and service covered by the cost quotation will be the lesser of:

        3.1.1 Its standard retail price.

        3.1.2 The best price then offered by the registered service provider to any other customer for each such product and service.

        3.1.3. The best price reasonably available in the market for each such product and service

3.2. Its personnel or combination of personnel within a project team (including subcontractors):

3.2.1. Are suitably qualified and experienced in the necessary engineering disciplines required to complete the assessment.

3.2.2. High level of technical, analytical, and practical skills and experience in relevant business sectors and industrial processes.

3.2.3. Significant proven expertise in identifying energy usage issues in an organisation, including working on complex systems with a range of fuel types and technologies.

3.2.4. Proven ability to provide robust and actionable options analysis, pragmatic solutions, advice and planning to enable clients to identify technically and economically viable investments for their businesses.

3.2.5. Experience in using relevant tools and indicators where appropriate such as process integration (pinch analysis), marginal abatement cost curves (MACC), levelised cost of energy (LCOE) calculations.

3.2.6 Proven ability to support identified options with robust capital and operating cost estimates, ideally by providing evidence of projects built delivering to estimates/ business case outcomes.

3.2.7 Proven ability to focus on short-term initiatives but equally on medium and long-term planning.

3.2.8 Demonstrates the ability to apply an innovative perspective and to support a move from standard practices to this wider, strategic perspective.

Services undertaken by registered service providers

1. Engagement

1.1 Establishing willingness to engage in implementing the strategic pathway from the final assessment.

1.2 The goal of this phase is to draw the organisation into the value proposition through meetings with corporate management, based on detailed analysis of their organisation priorities and strategic objectives (unless completed by a EECA Regional Manager).

1.3 The identification and assessment of fossil fuel emissions and energy use, categorised by type of fuel, are conducted at both the organisation level and site-by-site level.

1.4 A strategic assessment of consenting and organisation requirements at both the organisation level and site-by-site level.

1.5 Senior management engagement plan and meetings – three-way meeting to understand the intention of an ETA emissions plan assessment, i.e. purely for consenting purposes or genuine intention to reduce stationary emission.

1.6 Cost confidence levels required for implementation to be clearly agreed before agreeing to the scope level and cost estimate (Cost confidence level need to be minimum +/- 30% or higher, i.e. +/- 20, +/- 10% etc). A cost confidence level of + 50%, -30% is not acceptable.

1.7 Signing of a collaboration document to share data and commit time for an ETA emissions plan assessment through to funding signs off.

2. Evaluating the opportunity and developing an emission plan.

2.1 This provides an opportunity to test the relationship, the context, the potential for action, assess data availability and set expectations.

2.2 In practice, this is also where the rationale to convince corporate-level management that transition should be a strategic priority should be included, at least to the point where they are willing to engage in the process of carbon accounting and investigate abatement opportunities.

2.2.1 Site visit for discussion, data collection

2.2.2 Sprint session involving EECA Market Engagement team (where applicable) and ETA service provider / client representatives.

2.2.3 Opportunity Assessment Report outlining opportunities

2.2.4 Basis for a go/no-go decision for EECA and for the Organisation (Criteria TBC – case by case)

2.2.5 Formal agreement on ETA partnership (set foundations, additions, review, tenure; with schedules to document specific projects and cost-sharing).

3. Energy efficiency and heat recovery to reduce demand:

3.1 Identify and assess key thermal energy efficiency opportunities.

3.2 T°C available and required.

3.3 Composite curve and gross feasibility assessment.

3.4 Heat recovery and energy efficiency potential.

4. Substitution:

4.1 Available resources (including biomass and waste streams).

4.2 Substitution options with gross feasibility assessment.

4.3 Cost estimates.

4.4 Benefits.

4.5 Levelised cost of energy.

5. Asset management schedule:

5.1 Major maintenance.

5.2 Asset replacement.

5.3 End of energy contract.

6. Detailed analysis and target setting

6.1 Building the detailed inputs for the ETA Emission Plan.

6.2 This is where most of the detailed analysis will be done, with the objective of generating technically and economically robust information to form the basis for decision-making at a higher level.

6.3 Further site visits for discussion and data collection

6.4 Evaluation of any previous energy audit, feasibility study, fleet audits and optimisation reviews etc

6.5 Opportunities Assessment Report and pinch analysis

6.6 Emissions inventories reported and verified

6.7 MAC curves.

6.8 Opportunities Assessment Report including possible ETA Emission pathways.

7. Planning, implementation and review

A time-based view of options and possible energy transition pathways.

7.1 This phase supports the Organisation to translate an Opportunities Assessment Report into a specific time-based plan to enable them to advance along their own energy transition pathway and achieve their emissions reduction targets.

7.2 Every possible emission reduction opportunity needs to be implemented.

7.3 Engagement with senior management will guide consideration of targets, public commitments and the mechanisms for building these into strategic organisation processes.

7.3.1 Provision and guidance on use of planning tools and templates

7.4 Development of an ETA Emission Pathway Plan (Organisation-led/ EECA Market Engagement team/ Service Provider List).

7.5 Ongoing support to review their ETA over time (EECA Market Engagement team) - if applicable

Report structure

A completed ETA emissions plan should have these critical elements in the report:

1. **Executive Summary:**

    1.1. While the ETA emission plan is a technical and strategic report, the executive summary should use language and a pitch targeted at senior management and decision makers.

    1.2. Clearly link to the achievement of their strategic Organisation drivers.

    1.3. Summarise key findings and recommended next step.

2. **Process understanding:**

Conduct a detailed analysis of the production or manufacturing process to understand the specific conditions (Temperature/flow rate/volume/ composition/moisture level) of the products being processed.

    2.1 This includes examining the state of raw materials at the beginning of the process and how they change throughout each step.

    2.2 For example, with milk note the temperature, flow rate, and composition of incoming materials. It arrives at 7°C, flowing at a rate of 100 kg/h, with a solid content of 15%.

3. **Process flow diagram:**

Develop a comprehensive process flow diagram that outlines each step of the production process in detail.

    3.1 Include all sub-processes and variations to ensure a thorough understanding of the entire process chain.

    3.2 This diagram should provide a visual representation of how materials flow through the system from start to finish.

4. **Site asset register:**

Compile a detailed register of all assets at the production site, including equipment, machinery, and infrastructure.

    4.1 Document the performance conditions of each asset, such as operating parameters and capacities.

    4.2 Include records of past maintenance activities, planned maintenance schedules, and any historical data on asset performance.

4.3 Note any timelines for replacement (asset life based on operating conditions and asset replacement strategy) or major maintenance tasks to ensure the ongoing reliability and efficiency of the production facility.

4.4 Performance benchmarking can be developed at this stage to compare against best practices.

4.5 Site and equipment related consent expiry/extension dates to be captured as part of the site asset register.

5. Mass and energy balance:

Develop a comprehensive Mass and Energy Balance for the production and utility process.

5.1 Calculate the energy requirements for each step of the process, considering factors such as material inputs, chemical reactions, and heat transfer.

5.2 Ensure that the balance accounts for both mass and energy flows throughout the system.

5.3 Use theoretical calculations rather than relying solely on current metering data to understand the underlying energy dynamics of the process.

6. Thermal system optimisation and efficiency opportunities:

Conduct a comprehensive assessment of the thermal system, analysing its components and operation to identify areas where energy may be lost or wasted.

6.1 Determine potential areas of energy loss, including inefficient equipment that consumes more energy than necessary.

6.2 Identify leaks in the system that result in heat loss and examine insulation levels to identify areas with inadequate or degraded insulation.

7. Heat recovery opportunities:

7.1 Identify potential opportunities for high level heat recovery within the production process to improve overall energy efficiency.

7.2 Look for areas where heat is currently being wasted or underutilised and explore strategies for capturing and reusing this energy.

8. Pinch methodology:

Apply Pinch methodology to analyse the thermal energy requirements of the production process in detail.

8.1 Develop composite curves and grand composite curves to visualise the distribution of thermal energy within the system.

8.2 Identify the Pinch temperature. Use this analysis to guide the design of heat exchanger networks and other heat recovery strategies.

8.3 Identify thermal requirements below and above 100°C separately.

9. Heat exchanger network design:

Design detailed heat exchanger networks to optimise the transfer of thermal energy within the production process.

9.1 Use the insights from the Pinch analysis to determine the most effective placement and configuration of heat exchangers.

9.2 Estimate the costs associated with implementing the proposed heat exchanger network to inform decision-making and budgeting.

10. Alternative technology scan

10.1 Conduct a comprehensive scan of alternative technologies that could potentially improve the efficiency of the production process.

10.2 Look for innovative solutions and emerging technologies that offer advantages over traditional methods.

10.3 Consider both thermal and non-thermal processing technologies, focusing on options that can enhance energy efficiency, reduce waste, and improve product quality.

10.4 Revise heat recovery opportunities and strategies to align with the optimised process flow.

10.5 Evaluate the feasibility and potential benefits of adopting these alternative technologies within the existing production framework.

11. Integration and revision:

11.1 Integrate the selected alternative technologies into the process flow diagram and revise the Mass and Energy Balance, heat recovery opportunities, and other analyses accordingly.

11.2 Ensure that the updated process flow diagram accurately reflects any changes to the production process resulting from the integration of new technologies.

11.3 Update the Mass and Energy Balance to account for the energy requirements and potential savings associated with the adopted technologies.

11.4 Revise heat recovery opportunities and strategies to align with the optimised process flow.

12. In-process intermediate heat requirements:

12.1 Conduct a focused scan for technologies that can supply intermediate heat requirements in a more efficient manner.

12.2 Identify specific areas within the production process where intermediate heat is needed and explore alternative solutions that offer improved energy efficiency. For example, consider replacing traditional thermal vapor recompression (TVR) systems with more efficient mechanical vapor recompression (MVR) technology.

12.3 Evaluate the feasibility and potential benefits of implementing these alternative solutions to optimise energy usage and reduce costs.

13. Heat pump and renewable technologies:

13.1 Explore the potential use of heat pumps to supply the required heat load for thermal processes operating below 1000°C.

13.2 Investigate the feasibility of installing heat pump systems to extract heat from low-temperature sources and elevate it to the desired process temperature.

13.3 Analyse alternative renewable technologies, such as electric or biomass options, to meet the remaining thermal load requirements. Consider factors such as availability, cost, and environmental impact when evaluating these renewable energy options.

14. Cost analysis and engagement:

14.1 Conduct a detailed cost analysis of the proposed process optimisations, including the integration of alternative technologies, heat recovery strategies, and renewable energy solutions.

14.2 Estimate the capital costs, operating expenses, and potential savings associated with each optimisation measure.

14.4 Engage with relevant stakeholders, including local electricity distribution organisations and regulatory authorities, to discuss infrastructure requirements and potential incentives for implementing energy-efficient solutions.

14.5 Ensure that the cost estimates are aligned with the predetermined confidence levels and budget constraints established during the planning process.

15. Demand profiles:

15.1 Develop and analyse current site demand profiles for both electrical and thermal energy consumption.

15.2 Monitor changes in demand profiles throughout the process flow to understand the impact of each optimisation measure on energy usage and peak demand.

15.3 Consider the implications of these changes for electricity charges and other operational costs.

15.4 Use this information to fine-tune the optimisation strategies and ensure that they align with the overall goals of the production facility.

16. MAC curves development:

16.1 Develop Marginal Abatement Cost (MAC) curves to assess the cost-effectiveness of various emission reduction measures.

16.2 These curves plot the cost per unit of emissions reduced for different mitigation options, providing valuable insights into the most economically viable strategies for achieving emission targets.

16.3 Please note, MAC curves are to be discounted MAC curves.

17. ETA Emission Pathway:

17.1 Design an ETA Emission Pathway that outlines the steps and milestones required to transition to a more sustainable energy system.

17.2 Include timelines, key performance indicators, and a phased implementation plan to achieve the transition.

17.3 This pathway should detail the adoption of renewable energy sources for stationery applications.

17.4 Agree investment opportunities and financing mechanisms to mobilise the capital needed for implementing mitigation measures and transitioning to a low-carbon energy system

17.5 Explore options such as public-private partnerships, green bonds, and climate finance mechanisms.

17.6 Establish robust monitoring, reporting, and evaluation mechanisms to track progress towards emission reduction goals and assess the effectiveness of mitigation measures

17.7 Regularly update MAC curves and revise the ETA Emission pathway based on new data, emerging technologies, asset priorities and evolving strategy.

18. Report identified opportunities with estimated cost/energy/carbon benefits

18.1 Once implemented, the measured outcomes is to be provided to the customer.

18.2 Where a project has received EECA co-funding the report will be provided to EECA.