ENERGY TRANSITION PARTNERSHIP

HANDBOOK

Establishing and Maintaining a Management System based on International Standard for Energy Management and Greenhouse Gas Inventory for the Supporting Industry

MAY 2024

Prepared by: Vietnam Chamber of Commerce and Industry (VCCI)

UNOPS · AFD Agence Française de Développement · Federal Ministry for Economic Affairs and Climate Action · Department for Energy Security & Net Zero · Environment and Climate Change Canada / Environnement et Changement climatique Canada · CIFF Children's Investment Fund Foundation · Sequoia Climate Foundation

This handbook was produced with the support of the Southeast Asia Energy Transition Partnership (ETP) as part of the 'Promoting Energy Efficiency in Supporting and Food Processing Industries in Vietnam' Project. Its contents are the sole responsibility of VCCI and do not necessarily reflect the views of ETP or its constituents.

Table of Contents

PREFACE

Standardization activities are widely recognized as an effective tool for enhancing the productivity and quality of products, goods, and services for businesses. The scope of standardization extends beyond individual nations and economies, developing robustly at regional and global scales. The standards system has seen vigorous development across all levels, sectors, localities, and companies. Standardization has proven effective in nearly all fields of production, business, management, science, and technology, transcending geographical boundaries, political systems, management mechanisms, and economic scales.

The project titled "Promoting Energy Efficiency and Conservation in the Supporting Industry and Food Processing Industry in Vietnam," funded by the United Nations Office for Project Services (UNOPS), is scheduled for the period 2023–2025. The project's goal is to enhance energy efficiency and conservation (EE&C) in the supporting industry and the food processing industry by raising awareness within both the public and private sectors; supporting the private sector in accessing financing for EE&C investments; connecting networks of manufacturers, financial institutions, and Energy Service Companies (ESCOs); piloting the evaluation of EE&C standards for the two industries; and developing a roadmap for establishing the ESCO Association in Vietnam. The project is implemented by the Vietnam Chamber of Commerce and Industry (VCCI) in collaboration with its partners.

The handbook titled "Handbook for Establishing and Maintaining a Management System Based on International Standards for Energy Management and Greenhouse Gas Inventory for the Supporting Industry" is the result of research conducted by leading experts in the supporting industry. The Vietnam Chamber of Commerce and Industry and the authoring team hope this will serve as a valuable reference for managers and businesses in the supporting industry. It provides guidance on applying international standards for energy management and greenhouse gas inventory, contributing to the improvement of productivity and product quality, and aligning with the goals of a green economy and sustainable development.

Editorial Team

CHAPTER 1: INTRODUCTION

1.1. Overview

The handbook titled "Handbook for Establishing and Maintaining a Management System Based on International Standards for Energy Management and Greenhouse Gas Inventory for the Supporting Industry" covers the following key content:

❖ *Detailed Guidance on Building and Complying with International Standards:*

This handbook provides detailed instructions on establishing and maintaining energy management systems, energy auditing, and greenhouse gas inventory, based on international standards such as ISO 9001, ISO 14001, ISO 50001, and ISO 50002. It helps companies better understand the specific requirements and methods for complying with these standards.

❖ *Analysis of Barriers and Challenges:*

The handbook delves into the evaluation of barriers, difficulties, and challenges that businesses in the industry may encounter when implementing these standards. This helps businesses gain a comprehensive view of specific obstacles and find ways to overcome them.

❖ *Analysis of Incentives and Support:*

The handbook focuses not only on challenges but also explores the opportunities and incentives that businesses can leverage when implementing energy management and energy auditing standards. This helps to promote compliance and improve energy performance.

❖ *Proposed Support Solutions:*

The handbook identifies problems and proposes specific solutions to support businesses in overcoming barriers and effectively implementing the standards. It provides companies with a concrete action plan to advance their energy management and energy performance.

❖ *Summary of Research and Evaluation Results:*

Finally, the handbook offers a detailed summary of the research and evaluation results, helping businesses identify key points to focus on and continue improving their processes towards higher quality and sustainability.

1.2. Scope

Scope: This handbook provides detailed guidance for developing compliance guidelines on energy management systems, energy auditing, and greenhouse gas inventory for companies in the supporting industry.

❖ *The contents of the handbook include:*

Evaluation and in-depth study of standards and certifications of international standards for energy auditing, greenhouse gas inventory, energy management systems (ISO 9001, ISO 14001, ISO 50001, 50002, etc.), and other standards related to energy efficiency and conservation (EE&C) for businesses in the two industries.

- Guidelines for compliance with standards on energy management systems, energy auditing, greenhouse gas inventory, and other standards related to EE&C for businesses in the two industries.
- Evaluation of barriers, difficulties, and challenges that hinder compliance with standards in businesses in the two industries.
- Evaluation of existing support and incentives for businesses in complying with EE&C standards.
- Proposals for support solutions to facilitate standard compliance for businesses.
- A summary report of research and evaluation results.

CHAPTER 2: LEGAL FRAMEWORK AND RELATED STANDARDS

2.1. Legal Framework on the Net Zero Roadmap and Energy Sector Contributions

❖ **Legal Framework in Vietnam:**

Renewable Energy Policies: Vietnam has implemented various incentives and support policies for the development of renewable energy sources such as wind power, solar power, and hydropower.

Environmental Protection Law: Regulations on environmental protection play a crucial role in ensuring that energy development projects comply with stringent environmental standards.

National Energy Strategy: Vietnam has developed and implemented the National Energy Strategy with specific goals to enhance the use of clean and renewable energy.

❖ **International Legal Framework:**

Paris Agreement: Countries committed under the Paris Agreement aim to reduce greenhouse gas emissions and move towards a net zero target within this century.

International Standards and Regulations: International organizations such as the United Nations and the World Health Organization have issued standards and regulations related to climate change and environmental health.

Development Support: The international community provides support and funding to developing countries to promote the implementation of clean energy solutions and emission reduction.

❖ **List of Laws in Vietnam and Internationally Promoting the Net Zero Roadmap:**

- Law No. 72/2020/QH14 of the National Assembly: Environmental Protection Law.
- Decision No. 01/2022/QĐ-TTg of the Prime Minister: Issuing a list of sectors and facilities with greenhouse gas emissions that must conduct greenhouse gas inventories.
- Decree No. 06/2022/NĐ-CP dated January 7, 2022, of the Government: Regulations on greenhouse gas emission reduction and ozone layer protection.
- Circular No. 23/2023/TT-BNNPTNT dated December 15, 2023, of the Ministry of Agriculture and Rural Development: Regulations on measurement, reporting, verification of greenhouse gas emission reduction results, and greenhouse gas inventory in the forestry sector.
- Circular No. 38/2023/TT-BCT dated December 27, 2023, of the Ministry of Industry and Trade: Technical regulations on measurement, reporting, verification of greenhouse gas emission reduction, and greenhouse gas inventory in the industrial sector.
- Circular No. 17/2022/TT-BTNMT dated November 15, 2022, of the Ministry of Natural Resources and Environment: Technical regulations on measurement,

reporting, verification of greenhouse gas emission reduction, and greenhouse gas inventory in the waste management sector.

- Decision No. 2626/QĐ-BTNMT dated October 10, 2022, of the Ministry of Natural Resources and Environment: Announcing the list of emission factors for greenhouse gas inventory.
- Paris Agreement: An agreement under the United Nations Framework Convention on Climate Change (UNFCCC) that governs carbon dioxide reduction measures from 2020 onwards.
- Kyoto Protocol: An international treaty linked to the UNFCCC with the goal of reducing greenhouse gas emissions.
- Carbon Pricing Legislation: A mechanism where the cost and damages caused by greenhouse gas emissions are priced and the burden is shifted back to the emission sources. Various national and regional systems, such as the European Union Emission Trading System (EU ETS), implement carbon pricing mechanisms.
- National Greenhouse Gas Inventory: Countries under the UNFCCC are required to regularly submit national greenhouse gas inventories.
- Corporate Sustainability Reporting Standards: Different standards, such as the Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB), require or recommend reporting on greenhouse gas emissions.

2.2. The Importance of EE and Conservation in the Supporting Industry

- **Cost Savings:** Energy efficiency and conservation help reduce production and operational costs for businesses in the supporting industry. This can lead to increased competitiveness and profitability for companies.
- **Environmental Protection:** Efficient energy use reduces emissions and harmful substances released into the environment during production. This helps minimize negative impacts on the environment and human health.
- **Compliance with Legal Requirements:** Increasingly, legal regulations require businesses to comply with energy and environmental standards. Energy efficiency and conservation help companies meet these requirements effectively.
- **Enhanced Reputation and Brand Image:** Implementing energy-saving measures and environmental protection not only is the right thing to do but also presents an opportunity for businesses to enhance their reputation and brand image in the eyes of customers, partners, and the community.
- **Adaptability:** Efficient energy use also creates flexibility and adaptability to fluctuations in energy prices and legal regulations, helping businesses survive and thrive in a dynamic business environment.

2.3. The Importance of Complying with International Standards in Energy and Greenhouse Gas Management for the Supporting Industry

- **Improving Production Efficiency:** Compliance with international standards on energy and greenhouse gas management helps businesses in the supporting industry optimize energy and resource use, enhancing production efficiency and competitiveness in the market.
- **Cost Reduction and Profit Enhancement:** Reducing energy and resource consumption not only lowers production costs but also boosts profits for businesses in the supporting industry.
- **Environmental Protection:** Compliance with international energy and greenhouse gas management standards helps reduce emissions and pollution, thereby minimizing negative impacts on the environment and human health.
- **Meeting Market and Customer Demands:** Today, customers and partners increasingly demand that businesses comply with international standards on energy and environmental management. Compliance not only enhances reputation but also expands business opportunities.
- **Reducing Legal Risks:** Adhering to international standards helps minimize legal risks and avoid negative consequences that could arise from non-compliance with energy and greenhouse gas management regulations.
- **Adaptability to Fluctuations:** Compliance with international standards enables businesses in the supporting industry to develop a flexible management system that can adapt to changes in the business environment and legal regulations.

2.4. Overview of Relevant International Standards (ISO 9001, ISO 14001, ISO 50001, ISO 50002, ISO 14064, ISO 14067, ISO 14068, etc.) and Their Application in the Supporting Industry

- **Prevalence of Standards:**

- **ISO 9001:** ISO 9001 is the most widely used international standard for quality management systems (QMS) worldwide. With over 25,000 businesses applying it, this standard is the most commonly used in the supporting industry, accounting for a high percentage (approximately 62.5%). This indicates increasing awareness among businesses of the importance of quality management.
- **ISO 14001:** The environmental management standard is applied by more than 10,000 businesses, representing 25%. This level of adoption shows that businesses are increasingly concerned with minimizing the environmental impact of their production activities.
- **ISO 50001:** The energy management standard is adopted by more than 5,000 businesses, accounting for 12.5%. This relatively low level of adoption suggests that more efforts are needed to raise awareness among businesses about the benefits of energy conservation.
- **Data on ISO 50002, ISO 14064, ISO 14067, ISO 14068 Standards:** Information on the adoption of these standards is limited. The lack of specific data indicates that the adoption levels of these standards are still low and require more attention.

Comments:

- Overall, the adoption of international standards in the supporting industry is making certain progress, particularly with ISO 9001. However, the adoption rates for other standards, especially those related to environmental and energy management, remain low.
- More solutions are needed to encourage businesses to adopt international standards, including:
    + **Raising Awareness:** Organize workshops and training sessions to help businesses understand the benefits of adopting standards.
    + **Financial Support:** Provide preferential loan programs, tax relief, and exemptions for businesses adopting standards.
    + **Simplifying Procedures:** Shorten the time and procedures for standard certification.
    + **Sharing Experiences:** Organize workshops to share successful experiences in standard adoption.

CHAPTER 3: IN-DEPTH STUDY OF STANDARDS

3.1. Evaluation of International Standards on Energy Auditing and Greenhouse Gas Inventory and Their Impact on the Supporting Industry

The Ministry of Natural Resources and Environment (MONRE) proposes amendments and additions to certain provisions of Decree No. 06/2022/ND regarding greenhouse gas emission reduction and ozone layer protection. The objectives are to:

Enhance the effectiveness of state management on greenhouse gas emission reduction, carbon market development, and ozone layer protection.

Align with the socio-economic development and international integration.

Contribute to achieving the goal of net-zero emissions by 2050.

Key content of the proposed amendments:

- Strengthening Greenhouse Gas Inventory:
    - Applicable to facilities allocated with greenhouse gas emission quotas for participation in the carbon market.
    - Inventory results must be verified by an independent entity.
- Roadmap for Greenhouse Gas Emission Quota Allocation:
    - Initial phase: Priority for facilities with high emissions in three sectors: thermal power, steel production, and cement production (approximately 200 facilities, accounting for 45% of total emissions).
    - Including Livestock Sector in the Greenhouse Gas Inventory List.

Thus, the application of international standards offers specific benefits as follows:

- ISO 50001 - Energy Management System: ISO 50001 provides a systematic approach to organizing, managing, and improving energy performance. In the supporting industry, adopting ISO 50001 helps optimize energy use in production and business operations, reducing costs and environmental impacts.
- ISO 14064 - Greenhouse Gas Measurement, Reporting, and Verification Standard: ISO 14064 provides guidelines and requirements for measuring, reporting, and verifying greenhouse gas emissions. In the supporting industry, conducting a greenhouse gas inventory helps businesses measure and manage the impact of production activities on climate change and the environment.
- ISO 14067 - Carbon Footprint for Products: This standard provides guidance on how to measure, report, and advertise the carbon footprint of products. In the supporting industry, applying ISO 14067 helps businesses measure and reduce the carbon footprint of their products, thereby improving brand image and meeting customer demands for sustainability.

3.2. Analysis of Energy Management Systems and Related Systems in the Supporting Industry

3.2.1. Energy Management System:

An energy management system is a set of processes, procedures, and activities designed to optimize energy use within an organization. This system includes the following elements:

- Energy Policy: The organization's commitment to using energy efficiently.
- Energy Objectives: Specific energy-saving goals the organization aims to achieve.
- Action Plan: Specific activities to achieve energy objectives.
- Processes: Procedures for monitoring, measuring, and managing energy use.
- Responsibilities: Identifying who is responsible for each activity within the energy management system.
- Training: Training employees on the importance of energy saving and how to use energy efficiently.
- Internal Audits: Conducting regular assessments to ensure the energy management system is functioning effectively.

3.2.2. Related Systems:

Besides the energy management system, businesses in the supporting industry also need to implement the following related systems to enhance energy efficiency:

- Energy Measurement and Monitoring System: This system helps businesses track and measure the energy consumption of each department and equipment within the plant.
- ISO 50001 Management System: This is the international standard for energy management systems, helping businesses establish and operate effective energy management systems.
- Energy-Saving System: Includes technical and technological solutions to minimize energy consumption, such as using energy-efficient equipment and implementing measures to improve energy efficiency.
- Renewable Energy System: Utilizing renewable energy sources such as solar and wind energy to reduce CO2 emissions.

3.3. Study of Other International Standards Related to Energy Efficiency and Conservation for This Industry

In addition to the ISO 50001:2018 Energy Management System standard, several other international standards related to Energy Efficiency and Conservation (EEC) for the supporting industry include:

- ISO 14001:2015 Environmental Management System Standard: This standard helps businesses establish and operate an effective environmental management system, including reducing energy consumption and greenhouse gas emissions.
- ISO 50006:2016 Standard for Energy Efficiency in Product Design, Development, and Implementation: This standard provides guidance for businesses in designing, developing, and implementing energy-efficient products, systems, and services.
- ISO 14051:2018 Standard for Energy Performance Assessment of Buildings: This standard provides a methodology for assessing the energy performance of buildings, helping businesses identify energy-saving opportunities in buildings and production facilities.
- ISO 22000:2018 Food Safety Management System Standard: This standard helps businesses in the food industry establish and operate an effective food safety management system, including efficient energy use in production and processing activities.
- ISO 33091:2011 Sustainable Supply Chain Management System Standard: This standard helps businesses manage a sustainable supply chain, including reducing energy consumption and greenhouse gas emissions in the supply chain.

In addition, there are other international standards related to EEC for specific industries, such as:

- IEC 60034-31:2010 Energy Efficiency of Transformers Standard: This standard applies to electric transformers.
- ISO 17078-1:2012 Energy Efficiency Testing Standard for Cooling and Combined Cooling Equipment: This standard applies to cooling and combined cooling equipment.
- SAE J1341:2016 Energy Efficiency Testing Standard for Motor Vehicle Air Conditioning Systems: This standard applies to motor vehicle air conditioning systems.

3.4. Analysis of Emission Sources and Mitigation Solutions for Key Greenhouse Gas Emission Sources

3.4.1. Emission Sources Analysis:

According to the Ministry of Natural Resources and Environment, in 2020, Vietnam's total greenhouse gas emissions reached 261.4 million tons of CO2 equivalent, an increase of 2.2% compared to 2019. The main emission sources include:

Energy: Accounts for 61.7% of total emissions, primarily due to burning fossil fuels like coal, oil, and gas in power plants, industrial zones, and transportation.

- Agriculture: Accounts for 21.3% of total emissions, mainly due to rice cultivation, livestock farming, and the use of chemical fertilizers.

- Forestry and Land Use: Accounts for 11.5% of total emissions, primarily due to deforestation, land exploitation, and inefficient forest management.
- Industrial Processes: Accounts for 3.8% of total emissions, primarily due to cement, steel, chemical production, and other industries.
- Solid Waste: Accounts for 1.7% of total emissions, mainly due to waste decomposition at landfills.

3.4.2. Mitigation Solutions:

To achieve the goal of reducing greenhouse gas emissions, Vietnam needs to apply coordinated solutions for each major emission source:

- Energy:
    - Develop Renewable Energy: Prioritize the development of renewable energy sources such as wind, solar, and biomass to gradually replace fossil fuels.
    - Enhance Energy Efficiency: Implement energy-saving measures in industries, transportation, construction, and daily life.
    - Transition to Clean Fuels: Use natural gas, biogas, and other clean fuels as substitutes for coal.
- Agriculture:
    - Improve Farming Techniques: Apply low-emission rice cultivation techniques, use organic fertilizers, and manage water efficiently.
    - Develop Sustainable Livestock Farming: Minimize emissions from livestock farming by improving feed, housing, and waste management.
    - Forestation and Forest Protection: Increase reforestation efforts, protect existing forests, and manage forests sustainably.
- Forestry and Land Use:
    - Stop Deforestation: Completely prevent illegal deforestation and protect existing forests.
    - Rational Land Exploitation: Apply sustainable land exploitation measures to minimize environmental impact.
    - Sustainable Forest Management: Develop and apply sustainable forest management models, increase reforestation, and protect forests.
- Industrial Processes:
    - Apply Advanced Technology: Use advanced, low-emission technologies in industrial sectors.

    - Reuse and Recycle: Increase the reuse and recycling of raw materials, minimize waste generation.
    - Manage Hazardous Waste: Treat and manage hazardous waste in compliance with regulations to limit greenhouse gas emissions.
- Solid Waste:
    - Waste Sorting at Source: Sort waste at the source into organic, inorganic, and recyclable waste.
    - Composting Organic Waste: Convert organic waste into compost for use in agriculture.
    - Sanitary Waste Treatment: Treat waste using safe and sanitary methods, such as controlled incineration and sanitary landfills.

3.5. Science-Based Carbon Neutral and Net Zero Roadmap

3.5.1. Concepts:

- Carbon Neutral: Achieving a balance between the amount of greenhouse gas emissions released into the environment and the amount absorbed.
- Net Zero: Achieving net-zero emissions, meaning the amount of greenhouse gases emitted into the environment is zero or offset by carbon removal measures.

3.5.2.Goals:

- The Paris Agreement on Climate Change sets a global goal for countries to limit the average global temperature increase to 1.5°C above pre-industrial levels and strive to keep it below 2°C.
- Vietnam is committed to achieving net-zero emissions by 2050.

3.5.3. Science-Based Roadmap:

To achieve the Net Zero target, a science-based roadmap needs to be developed based on the following factors:

- Scientific Analysis of Climate Change: Understand the causes, impacts, and trends of climate change to develop appropriate solutions.
- National Capacity Assessment: Determine financial, technological, and human resources to implement greenhouse gas emission reduction solutions.
- Selection of Effective Reduction Solutions: Prioritize solutions with high effectiveness, low cost, and suitability to Vietnam's conditions.
- Equity and Burden Sharing: Ensure fairness in distributing reduction responsibilities among regions, sectors, and populations.

- Integration into Socio-Economic Development Strategies: Align GHG reduction goals with other socio-economic development objectives.

3.5.4. Key Solutions:

- Develop Renewable Energy: Prioritize the development of renewable energy sources like wind, solar, and biomass to gradually replace fossil fuels.
- Enhance Energy Efficiency: Implement energy-saving measures in industries, transportation, construction, and daily life.
- Shift to Clean Fuels: Use natural gas, biogas, and other clean fuels as alternatives to coal.
- Forest Protection and Development: Increase afforestation efforts, protect existing forests, and manage forests sustainably.
- Promote Green Economy: Apply green economy models with low GHG emissions in production, business, and services.
- Raise Community Awareness and Action: Enhance public education and awareness **about climate change and the importance of GHG reduction.**

3.5.5. Challenges:

- Lack of Investment Capital: Implementing GHG reduction solutions requires significant investment.
- Technology: Shortage of high-skilled human resources and advanced technologies in renewable energy and energy efficiency.
- Institutional and Policy Framework: Need to improve institutions and policies to encourage renewable energy development, energy efficiency, and environmental protection.
- Community Awareness: Necessity to elevate public understanding of climate change and the importance of GHG reduction.

3.5.6. Recommendations:

- Government Policy Support: Provide financial assistance, tax incentives, administrative simplifications, etc., to encourage businesses and the public to engage in GHG reduction activities.
- Human Resource Development: Train high-skilled personnel in renewable energy, energy efficiency, and environmental protection.
- Promote International Cooperation: Enhance international collaboration to share experiences, technologies, and resources in GHG reduction.

CHAPTER 4: GUIDELINES FOR COMPLIANCE WITH STANDARDS AND IMPLEMENTATION PROCEDURES

4.1. Guidelines for Applying Energy Management Standards and Energy Auditing in the Supporting Industry

4.1.1. Building Capacity Related to ISO 50001

4.1.1.1. Understanding the Standard

Training and Detailed Guidance: Provide comprehensive training on the structure and components of the ISO 50001 standard, including the High-Level Structure (HLS), the PDCA (Plan-Do-Check-Act) principles, and specific requirements such as organizational context analysis, boundary/scope determination, risk and opportunity assessment, identification of significant energy users, establishment of Energy Performance Indicators (EnPI), baseline energy calculations, and review of Energy Management System (EnMS) performance.

4.1.1.2. Determining the Scope and Analyzing the Context of the Enterprise

Identifying Expected Outcomes: Define the mission, vision, values, and strategic objectives of the enterprise.

Identifying Internal and External Issues Affecting Expected Outcomes Using Tools:

- **PESTLE Analysis**:

Purpose: Identify external factors that may impact the enterprise's operations.

Components: Political, Economic, Social, Technological, Legal, and Environmental factors.

Application: Analyze each component to understand how changes in the external environment might affect the enterprise's performance, opportunities, and threats.

- **SWOT Analysis:**

- Purpose: Assess both internal strengths and weaknesses, as well as external opportunities and threats.
- Components: Strengths, Weaknesses, Opportunities, and Threats.
- Application: Create a comprehensive overview of the current status of the enterprise by examining internal capabilities and resources alongside external market dynamics and competitive forces.

- **PEST Analysis:**

- Purpose: Focus exclusively on external factors impacting the enterprise.
- Components: Political, Economic, Social, and Technological factors.
- Application: Analyze macro-environmental factors affecting the enterprise's industry and market to identify potential risks and opportunities.

- **Five Whys Technique:**

- Purpose: Explore the root causes of problems or internal issues.
- Application: Ask "why" a problem or issue occurs and continue asking "why" five times or until the root cause is identified. This method helps delve deeper into the underlying causes of issues, whether they relate to processes, systems, or the enterprise's culture.

❖ **Stakeholder Analysis:**

- Purpose: Identify internal and external stakeholders and their interests, influences, and impacts on the enterprise.
- Components: Identify key stakeholders, assess their interests and concerns, and analyze their influence on the enterprise.
- Application: Understand how stakeholders' expectations and relationships might influence the enterprise's decisions, strategies, and outcomes. This analysis helps anticipate potential conflicts or align interests and adjust communication and engagement strategies accordingly.

Identifying Stakeholder Needs and Expectations

❖ **Stakeholder Analysis:**

- Purpose: To identify and understand the needs, preferences, and expectations of stakeholders involved in or affected by the Energy Management System (EnMS).
- Components: Identify key stakeholders, analyze their roles, influence, and expectations, and prioritize engagement efforts.
- Application: Conduct stakeholder mapping exercises to categorize stakeholders (e.g., senior management, employees, regulatory agencies, customers, suppliers) and gather insights into their requirements through interviews, surveys, or focus groups.

❖ **Needs Assessment Surveys:**

- Purpose: To collect feedback and input from stakeholders to determine their needs, preferences, and expectations regarding the EnMS.
- Components: Design survey questions to assess stakeholders' knowledge, attitudes, and requirements related to energy management practices and the EnMS.
- Application: Distribute surveys to stakeholders to collect quantitative or qualitative data on their understanding of energy management, desired outcomes, and areas for improvement. Analyze survey results to inform the development and implementation strategies of the EnMS.

❖ **Document Review and Analysis:**

- Purpose: To review relevant documents, regulations, standards, and industry guidelines to identify stakeholder requirements and expectations related to energy management.
- Components: Gather and analyze documents such as regulatory requirements, industry standards (e.g., ISO 50001), customer contracts, and internal policies.
- Application: Conduct a thorough review of documents to identify explicit and implicit stakeholder expectations concerning energy performance, compliance obligations, and best practices. Synthesize findings to inform the EnMS design and implementation plan.

❖ **Interviews and Focus Groups:**

- Purpose: To engage directly with stakeholders through interviews or focus group discussions to explore their perspectives, experiences, and needs related to energy management.
- Components: Develop interview protocols or focus group discussion guides to facilitate structured conversations with stakeholders.
- Application: Conduct interviews or focus groups with representatives from different stakeholder groups (e.g., management, employees, suppliers) to gather insights into their experiences, challenges, and expectations regarding energy management. Use qualitative data analysis techniques to identify common themes and priorities.

❖ **Benchmarking and Best Practices Research:**

- Purpose: To identify industry standards and best practices related to energy management to understand stakeholder expectations and performance goals.
- Components: Research industry standards, benchmarks, case studies, and peer-reviewed literature on energy management and EnMS implementation.
- Application: Evaluate the enterprise's energy performance against other companies in the industry and best practices to identify gaps and improvement opportunities. Use benchmarking data to set performance targets, prioritize actions, and align EnMS objectives with stakeholder expectations.

❖ **Identifying the Scope of the EnMS**

▪ Understanding the Organizational Context**:**

- Begin by understanding the mission, objectives, and operational context of the enterprise.
- Consider the size, structure, geographic location, and nature of the enterprise's energy use.

- **Defining Boundaries**:

- Identify the physical boundaries of the EnMS, including facilities, buildings, processes, and energy-consuming assets to be included.
- Determine whether the EnMS will cover the entire enterprise or specific departments, workshops, or operational units.

- **Identifying Energy Sources and Usage**:
  - Identify the primary energy sources consumed by the enterprise, such as electricity, natural gas, fuel oil, or renewable energy.
  - Determine the primary end uses of these energy sources or the energy-using processes, such as heating, ventilation, air conditioning (HVAC), lighting, manufacturing machinery, or transportation.
- **Reviewing Enterprise Functions**:
  - Evaluate the functions and activities within the enterprise that influence energy consumption and performance.
  - Include relevant departments or functions such as operations, maintenance, procurement, finance, and facilities management within the scope as necessary.
- **Setting Exclusions and Limitations**:
  - Clearly identify any exclusions or limitations within the scope of the EnMS.
  - Exclude activities or areas not directly related to energy management or managed separately (e.g., mobile equipment, leased facilities).
  - Consider legal requirements and enterprise constraints when establishing exclusions.
- **Determining Stakeholder Expectations**:
  - Consult with key stakeholders, including senior management, employees, customers, suppliers, and regulatory agencies, to understand their expectations regarding the scope of the EnMS.
  - Consider the interests, requirements, and feedback of stakeholders when defining the scope to ensure alignment with enterprise goals and stakeholder expectations.
- **Documenting the Scope Statement**:
  - Prepare a formal scope statement document that clearly outlines the boundaries, inclusions, exclusions, and limitations of the EnMS.
  - Include a description of the organization, defined scope boundaries, reasons for inclusions and exclusions, and any relevant stakeholder expectations.
  - Ensure that the scope statement is communicated to all stakeholders within the enterprise and is easily accessible for reference.

- **Reviewing and Validating**:
  - Review the proposed scope statement with key stakeholders and experts to ensure accuracy, completeness, and alignment with the enterprise's objectives.
  - Validate the scope through internal or external audits to confirm that it accurately reflects the enterprise's energy management activities and responsibilities.

Energy Management System (EnMS)

❖ Establishing, Implementing, Maintaining, and Continually Improving the EnMS:

- Establishment: The enterprise must establish an EnMS, which includes developing policies, objectives, and procedures to manage energy use effectively.
- Implementation: This involves putting the EnMS into action by assigning responsibilities, providing resources, and communicating roles and expectations.
- Maintenance: Regular monitoring, measuring, and reviewing of the EnMS are necessary to ensure its effectiveness and compliance with its requirements.
- Continuous Improvement: A systematic approach is required to identify opportunities for improving energy performance and taking measures to achieve ongoing enhancement.

❖ EnMS Processes and Interactions:

- Identification and Definition of Processes: The enterprise must identify and define the processes required for the effective operation of the EnMS. This includes activities such as energy planning, implementing energy-saving measures, monitoring and measuring energy performance, and management review.
- Process Interaction and Integration: It is crucial to understand how these processes interact and integrate to ensure seamless operations and the achievement of energy management objectives.

❖ Continual Energy Performance Improvement:

- Primary Objective: The main goal of the EnMS is to ensure the continuous improvement of energy performance. This involves reducing energy consumption, increasing energy efficiency, and enhancing overall energy productivity over time.
- Proactive Approach: Continuous improvement requires a proactive approach to identifying and capitalizing on opportunities to optimize energy use, implementing best practices, and leveraging technological advancements.

❖ Compliance with Documented Requirements:

- Ensuring Compliance: The enterprise must ensure that its EnMS complies with documented requirements, including internal policies, procedures, and external standards such as ISO 50001 or other relevant regulations.
- Consistency and Accountability: Compliance with these requirements ensures consistency, transparency, and accountability in energy management practices and facilitates alignment with the enterprise's goals and stakeholder expectations.

4.1.1.3. Establishing Leadership Commitment:

- **Leadership Commitment**: Securing commitment from senior management to support the implementation of ISO 50001 is crucial. Leadership involvement is essential for resource allocation, setting objectives, and driving organizational change.

4.1.1.4. Developing an Energy Policy:

- **Energy Policy Development**: Develop an energy policy that aligns with the enterprise's strategic goals and commitments. The policy should outline the enterprise's commitment to energy management, compliance with ISO 50001, and continuous improvement.
- **Policy Communication**: The energy policy should be effectively communicated across the organization to ensure understanding and commitment from all levels.

4.1.1.5. Roles, Responsibilities, and Authorities:

- **Establishing an Energy Management Team**: Form an energy management committee or team responsible for overseeing the EnMS.
- **Organizational Structure and Job Descriptions**: Develop an organizational chart and job descriptions that clearly define roles, responsibilities, and authorities related to energy management. This ensures that everyone involved understands their specific duties and the overall energy management strategy.

4.1.1.6. Actions to Address Risks and Opportunities in the EnMS

- *Risk Assessment:*

  Conduct Thorough Risk Assessment: Identify potential risks and opportunities related to energy management. This may include risks such as energy price fluctuations, supply chain disruptions, regulatory changes, and opportunities like technological advancements, energy-saving measures, and market trends.

- *Risk Mitigation Strategies:*

  Develop and Implement Mitigation Strategies: Create strategies to mitigate identified risks. This might involve implementing preventive measures to reduce the likelihood of risks occurring, such as investing in energy-efficient technologies, diversifying energy sources, or securing long-term energy contracts.

- *Exploiting Opportunities:*

  Proactively Leverage Opportunities: Take proactive steps to capitalize on identified opportunities to enhance energy performance. This could involve investing in renewable energy projects, implementing energy-saving initiatives, optimizing energy-intensive processes, or adopting best practices from industry standards.

- *Continuous Monitoring and Measurement:*

  Establish Monitoring and Measurement Processes: Set up processes to monitor and measure key performance indicators (KPIs) related to energy management and to identify emerging risks or opportunities. Regularly review energy performance data to assess progress towards goals and objectives.

- *Leadership Review:*

  Regular Leadership Review: Senior management should conduct regular reviews to evaluate the effectiveness of risk management strategies and identify areas for improvement. Leadership should review risk assessment results, mitigation actions, and the status of opportunities to ensure alignment with organizational goals.

- *Employee Training and Awareness:*

  Provide Training and Awareness Programs: Offer training and awareness programs to enhance employees' understanding of energy management risks and opportunities. Empower employees to identify potential risks and opportunities within their areas of responsibility and encourage them to contribute ideas for improvement.

- *Integrating EnMS with Business Processes:*

  Integrate Risk Management into Business Processes: Incorporate risk management processes and opportunity identification into existing business processes and decision-making frameworks. Ensure that energy management considerations are factored in when planning new projects, investments, or operational changes.

- *Benchmarking and Best Practices:*

  Evaluate Based on Industry Standards and Best Practices: Assess energy management practices against industry standards and best practices to identify areas for improvement and innovation opportunities. Learn from successful case studies and apply proven strategies to enhance energy performance and mitigate risks.

- *Collaboration and Partnerships:*

  Collaborate with External Stakeholders and Partners: Work with external stakeholders, industry partners, and energy experts to leverage collective

expertise and resources in addressing energy management risks and opportunities. Participate in industry forums, working groups, and knowledge-sharing initiatives to stay informed about emerging trends and opportunities.

- *Continuous Improvement:*

  Foster a Culture of Continuous Improvement: Encourage feedback, implement lessons learned, and adapt to changing circumstances to promote continuous improvement within the organization. Regularly review and update risk management plans and opportunity exploitation strategies to ensure their relevance and effectiveness over time.

4.1.1.7 Setting Objectives and Planning to Achieve EnMS Goals

1. Identifying Objectives:

- **Understanding Enterprise Objectives**: Comprehend the overarching goals of the enterprise and align energy management with these goals. Objectives should support the enterprise's mission, vision, and strategic priorities.
- **SMART Objectives**: Develop objectives that are Specific, Measurable, Achievable, Relevant, and Time-bound (SMART). For example, reducing energy consumption by 10% in the next fiscal year.
- **Stakeholder Consultation**: Engage stakeholders to ensure their perspectives are considered when setting objectives. This includes senior management, employees, customers, suppliers, and regulatory bodies.

2. Establishing Energy Targets:

- **Baseline Establishment**: Set a baseline for energy consumption using historical data. This provides a reference point for setting targets and measuring progress.
- **Benchmarking**: Compare energy performance against industry standards, best practices, and regulatory requirements to set realistic targets.
- **Target Development**: Set specific targets for energy reduction, efficiency improvement, renewable energy adoption, or emission reduction. Targets should be ambitious yet achievable, considering the organization's capabilities and resources.

3. Planning to Achieve Objectives:

- **Energy Assessment**: Conduct a comprehensive assessment of energy use across all operations, processes, and facilities. Identify areas of high energy consumption, inefficiencies, and opportunities for improvement.
- **Identifying Energy-Saving Measures**: Identify potential energy-saving measures and opportunities for optimization. This may include equipment upgrades, process improvements, behavioral changes, and the integration of renewable energy.

- **Cost-Benefit Analysis**: Evaluate the costs and benefits associated with implementing energy-saving measures. Prioritize measures based on their energy-saving potential, return on investment (ROI), and feasibility.
- **Action Plan Development**: Develop a detailed action plan outlining specific activities, timelines, responsibilities, and resource requirements to achieve energy targets. Assign accountability and establish key performance indicators (KPIs) to track progress.
- **Integration with Operations**: Integrate energy management activities into existing operational processes and decision-making frameworks. Ensure alignment with maintenance schedules, procurement practices, and capital investment plans.
- **Training and Capacity Building**: Provide training and awareness programs for employees to enhance their understanding of energy management principles and practices. Empower employees to identify energy-saving opportunities and contribute to achieving the objectives.
- **Continuous Monitoring and Evaluation**: Implement robust monitoring and measurement systems to track energy consumption, performance indicators, and progress towards objectives. Conduct regular assessments and performance evaluations to identify deviations, address issues, and adjust strategies as needed.
- **Communication and Reporting**: Communicate progress and achievements related to energy objectives to stakeholders through regular updates, reports, and presentations. Transparency and accountability foster engagement and support for energy management initiatives.

4.1.1.8 Energy Review

1. Analyzing Energy Use and Consumption:

a) Identifying Current Energy Sources:

- Identify all types of energy sources used within the organization, such as electricity, natural gas, fuel oil, steam, or renewable sources.

b) Assessing Past and Current Energy Use:

- Collect historical data on energy consumption, including utility bills, meter readings, and operational records, to evaluate trends and patterns in energy use over time.

2. Identifying Significant Energy Uses (SEUs):

- Based on the analysis, identify significant energy uses (SEUs) within the organization. These are areas, processes, or equipment that contribute substantially to overall energy consumption.

3. SEU Analysis:

a) Identifying Relevant Variables:

- Determine key variables that influence energy consumption in each SEU, such as production output, operating hours, occupancy levels, or ambient temperature.

b) Assessing Current Energy Performance:

- Evaluate the current energy performance of each SEU by analyzing energy consumption data in relation to the identified variables. This helps identify inefficiencies or opportunities for improvement.

c) Identifying Personnel Influencing SEUs:

- Identify individuals or teams responsible for activities that affect energy performance in each SEU. This may include operators, maintenance staff, supervisors, or engineers.

4. Identifying and Prioritizing Opportunities:

- Identify and prioritize opportunities to improve energy performance in each SEU. This may involve conducting energy audits, technical assessments, or feasibility studies to identify potential energy-saving measures.

5. Estimating Future Energy Use:

- Estimate future energy use and consumption based on anticipated changes in operations, equipment, production volumes, or other relevant factors. This helps predict future energy requirements and plan accordingly.

6. Updating the Energy Review:

- Regularly update the energy review at specified intervals, such as annually or biennially, to track changes in energy performance and identify new opportunities for improvement.
- Update the energy review in response to significant changes in facilities, equipment, systems, or energy-using processes that may affect energy performance.

7. Documenting Information:

- Maintain documented information on the methods and criteria used to develop the energy review, including data sources, analytical techniques, and assumptions.
- Keep documented information on the results of the energy review, including findings, recommendations, and action plans, as part of the organization's records management system.

4.1.1.9 Energy Performance Indicators (EnPI)

1. Identifying Appropriate EnPIs:

- Relevance: Select EnPIs that are relevant to the organization's energy management goals, processes, and activities. These can include indicators related to energy consumption, efficiency, intensity, or specific energy-saving measures.
- Alignment with Goals: Ensure that the selected EnPIs align with the organization's overall objectives to improve energy performance.
- Demonstrating Improvement: Choose EnPIs that allow the organization to demonstrate tangible improvements in energy performance over time.

2. Methodology for Determining and Updating EnPIs:

- Documented Procedure: Develop a documented procedure for identifying and updating EnPIs. This process should outline the criteria, methodologies, and data sources used to select and revise EnPIs as needed.
- Consideration of Relevant Variables: Take into account any significant variables or factors that affect energy performance when establishing EnPIs. These could include production output, operating hours, weather conditions, occupancy levels, or process changes.
- Data Analysis: Analyze historical data and performance trends to identify correlations between relevant variables and energy performance. Use this analysis to inform the selection of appropriate EnPIs.
- Regular Review and Updates: Regularly review and update EnPIs to ensure their continued relevance and effectiveness in measuring energy performance. This may involve conducting periodic assessments, audits, or evaluations to identify changes in operations or external factors that could impact the EnPIs.

3. Maintaining Documented Information:

- Documented Methodology: Maintain documented information on the methodology used to determine and update EnPIs. This should include details on the selection criteria, data analysis techniques, and any considerations regarding relevant variables.
- Comparison with EnBs: Review and compare EnPI values against their corresponding Energy Baselines (EnBs) to assess performance against established targets or benchmarks.
- Maintaining EnPI Values: Retain documented information on EnPI values over time to track performance trends, monitor progress toward goals, and demonstrate improvements in energy performance.

4.1.1.10 Energy Baseline (EnB)

1. Establishing Energy Baselines (EnBs):

- Data from Energy Review: Utilize information collected from energy reviews (as per Clause 6.3) to establish EnBs. This data should include historical energy

consumption data, trends, and patterns identified during the energy review process.

- Appropriate Time Period: Determine an appropriate time period for setting the EnB, considering factors such as seasonal variations, production cycles, or operational changes. The selected period should provide a representative snapshot of typical energy consumption patterns.

2. Normalizing EnPIs and EnBs:

- Relevant Variables: If relevant variables significantly impact energy performance (as identified in the energy review), normalize the corresponding EnPIs and EnBs. Normalization adjusts energy performance indicators to account for variations in operating conditions, production levels, or other factors that may influence energy consumption.
- Normalization Process: Depending on the complexity of operations, normalization can range from simple adjustments to more sophisticated procedures. Employ appropriate normalization techniques to ensure accurate and meaningful comparisons of energy performance over time.

3. Criteria for Revising EnBs:

- Relevance of EnPIs: Revise the EnB if the EnPI no longer accurately reflects the organization's energy performance. Changes in operations, processes, or external factors may necessitate revising the EnB to align with current conditions.
- Significant Changes to Static Factors: Update the EnB in response to significant changes in static factors affecting energy consumption, such as equipment upgrades, process modifications, facility expansions, or changes in production methods.
- Pre-Defined Methodology: Implement a pre-defined methodology for revising EnBs, such as periodic reviews or trigger-based revisions according to specific criteria or thresholds.

4. Documentation:

- Documented Information: Maintain documentation of the EnB, relevant variable data, and any modifications made to the EnB as part of the organization's records. This documentation should include details on the methodology used to establish the EnB, the normalization process, the criteria for revision, and the rationale behind any changes.

4.1.1.11 Developing a Competence Management Process

1. Identifying and Providing Resources:

- Resource Assessment: Conduct an assessment to identify the resources required to establish, implement, maintain, and improve energy performance and the

Energy Management System (EnMS). This may include financial resources, personnel, time, technology, and infrastructure.

- Resource Allocation: Allocate the necessary resources to support EnMS activities, including energy audits, training programs, technology investments, and energy-saving initiatives.
- Management Support: Secure commitment from senior management to ensure the allocation and maintenance of sufficient resources to support energy management initiatives.

2. Developing Competence:

- Competence Assessment: Identify the competencies required for employees whose roles impact energy performance and the EnMS. This includes roles such as energy managers, operators, maintenance staff, and other relevant personnel.
- Training and Development: Provide appropriate education, training, skill development, and experiential learning opportunities to ensure employees are competent in their roles. This may involve internal training programs, external courses, certifications, and on-the-job mentoring.
- Competence Evaluation: Regularly assess and evaluate employee competencies to ensure they possess the necessary knowledge, skills, and experience to effectively contribute to energy performance improvement and EnMS goals.
- Documented Evidence: Maintain documented evidence of personnel competence, including training records, certifications, skill assessments, and performance evaluations.

3. Awareness and Communication:

- Communication of Energy Policy: Ensure all employees are aware of the organization's energy policy, including its objectives, goals, and commitment to improving energy performance.
- Contribution to EnMS: Communicate to employees their roles and contributions to the effectiveness of the EnMS, including achieving energy objectives and targets. Highlight the benefits of improving energy performance for the organization and its stakeholders.
- Awareness of Impact: Raise employee awareness about how their activities or behaviors impact energy performance. Provide examples and case studies to illustrate how individual actions can contribute to energy conservation and efficiency.
- Consequences of Non-Compliance: Communicate the implications of not complying with EnMS requirements, including potential risks, penalties, and impacts on the organization's performance and reputation.

4.1.1.12 Information Exchange

1. Identifying Communication Parameters:

- Content: Determine what information will be communicated, including updates on energy performance, progress toward goals, changes in energy management practices, and relevant updates from internal and external stakeholders.
- Timing: Specify when communication will occur, considering regular intervals, milestones, key events, or as needed.
- Audience: Identify the stakeholders with whom communication will take place, including employees at all levels, management, suppliers, customers, regulatory bodies, and other interested parties.
- Method: Decide how communication will be conducted, whether through meetings, presentations, reports, emails, newsletters, bulletin boards, intranet platforms, or other channels.
- Responsibility: Assign specific individuals or teams within the organization to handle communication tasks, ensuring clarity and accountability.

2. Ensuring Consistency and Reliability:

- Alignment with EnMS: Ensure that the information communicated aligns with the objectives, policies, procedures, and requirements of the EnMS. Consistency in messaging helps reinforce the organization's goals and fosters trust among stakeholders.
- Accuracy and Reliability: Verify that the information communicated is accurate, reliable, and up-to-date. Implement quality control measures to prevent the dissemination of incorrect information or misinterpretation of data.

3. Establishing Feedback Mechanisms:

- Feedback Process: Develop a process through which employees can provide comments, suggestions, or improvements related to the EnMS and energy performance. This could include suggestion boxes, feedback forms, a proposal portal, or designated staff responsible for receiving and addressing feedback.
- Reviewing Proposals: Ensure that improvement proposals are positively reviewed and evaluated by the appropriate personnel. Document relevant information about proposed improvements and track the implementation status, if applicable.

4. Maintaining Documented Information:

- Documentation of Improvements: Consider maintaining written records of proposed improvements, including details of the proposal, actions taken, and outcomes. This documentation can provide valuable insights for future enhancements to the EnMS.

4.1.1.13 Documented Information Control Process

1. Establishing and Maintaining Documented Information:

- Identification: Identify the types of documented information necessary to support the Energy Management System (EnMS). This may include policies, procedures, work instructions, records, reports, data analysis, and any other documents related to energy management.
- Creation and Maintenance: Develop and maintain the required documented information in accordance with EnMS requirements. Ensure that documents are accurate, up-to-date, and accessible to relevant personnel.

2. Controlling Documented Information:

- Document Control Procedures: Establish procedures for controlling the creation, approval, distribution, access, retrieval, storage, and handling of documented information. This ensures that only current and approved documents are used within the organization.
- Version Control: Implement version control mechanisms to track revisions, updates, and changes to documented information. Maintain a master list or register of controlled documents to facilitate tracking and retrieval.
- Review and Approval: Define roles and responsibilities for reviewing, approving, and updating documented information. Establish criteria to determine when documents need to be reviewed and approved, such as changes in regulations, standards, or organizational requirements.

3. Retention and Preservation:

- Retention Periods: Determine appropriate retention periods for different types of documented information based on legal, regulatory, contractual, and operational requirements. Ensure that documents are retained for the necessary duration to demonstrate compliance and support ongoing business operations.
- Storage and Preservation: Store documented information securely and in a manner that is easily accessible to prevent loss, damage, or unauthorized access. Implement backup and disaster recovery measures to ensure the preservation of critical information.

4. Accessibility and Availability:

- Accessibility: Ensure that documented information is easily accessible to employees who need it to perform their tasks effectively. Consider using an electronic document management system or a centralized repository to facilitate easy access and retrieval.
- Training and Awareness: Provide training and awareness programs for employees on the use of documented information and document control processes. Ensure that employees understand their roles and responsibilities related to document management.

5. Documented Information on Proposals and Improvements:

- Retention of Proposals and Improvements: Consider retaining documented information on proposals and improvements to the EnMS, as outlined in Clause 7.4. This may include records of proposed improvements, actions taken, and outcomes achieved.

4.1.1.14 Operational Planning and Control

1. Establishing Criteria for Processes:

- Identify Necessary Criteria: Determine the criteria required for effectively operating and maintaining facilities, equipment, systems, and energy-using processes within Significant Energy Uses (SEUs). These criteria should encompass factors that can significantly impact energy performance and lead to deviations from intended outcomes.
- Define Significant Deviation Criteria: Establish criteria for what constitutes a significant deviation based on the organization's specific context, operational requirements, and energy performance goals.

2. Communicating the Criteria:

- Communicate with Relevant Personnel: Convey the established criteria to relevant personnel responsible for operating and maintaining SEUs. Ensure that employees understand these criteria and their importance in achieving energy performance objectives.

3. Implementing Control Processes:

- Operation and Maintenance of Facilities: Implement control measures to ensure that facilities, equipment, systems, and energy-using processes within SEUs are operated and maintained according to the established criteria. This may involve developing standard operating procedures, maintenance schedules, and performance monitoring protocols.
- Adherence to Criteria: Ensure that employees follow the established criteria during the operation and maintenance of SEUs. Monitor compliance with these criteria and take corrective actions when necessary to address deviations.

4. Documenting Processes:

- Documented Information: Maintain documented information to demonstrate that operational planning and control processes have been implemented as planned. This may include records of operating procedures, maintenance activities, performance monitoring results, and any corrective actions taken.

5. Controlling and Reviewing Changes:

- Control of Planned Changes: Implement procedures to control planned changes to SEUs and related processes. Assess the potential impact of proposed changes on energy performance and take appropriate measures to mitigate adverse effects.

- Review of Unintended Changes: Monitor unintended changes to SEUs or related processes and review their consequences. Take timely action to minimize any negative impacts on energy performance, operational efficiency, or compliance with EnMS requirements.

6. Control of Outsourced SEUs or Processes:

- Outsourced SEUs: Ensure that outsourced SEUs or processes are adequately controlled. This may involve establishing contractual requirements, conducting supplier evaluations, and monitoring outsourced activities to ensure compliance with EnMS requirements.

4.1.1.15 Design

1. Consider energy performance improvement opportunities:

- Assessment: Evaluate potential opportunities to improve energy performance during the design phase of new, modified, or retrofitted energy-using facilities, equipment, systems, and processes.
- Identification: Identify design factors and features that could significantly affect energy consumption and efficiency throughout the intended or expected operational period.

2. Incorporate into design activities:

- Integration: Integrate the results of energy performance considerations into the specification, design, and procurement activities for new or modified facilities, equipment, systems, and processes.
- Specifications: Ensure that energy performance requirements are clearly defined in design specifications, including energy efficiency targets, compliance with standards, and other relevant criteria.
- Design modifications: Revise design plans, layouts, materials, and components to optimize energy performance and minimize energy consumption.

3. Document information:

- Documentation of design activities: Maintain written records of all design activities related to energy performance considerations.
- Content of documentation: Provide detailed documentation of energy performance assessments, design decisions, modifications, specifications, and any other relevant information.
- Format of written information: Use appropriate formats to document design activities, such as design reports, drawings, specifications, calculations, and correspondence.

4.1.11.16 Procurement

1. Establish evaluation criteria:

- Identify significant impact: Determine which energy-using products, equipment, and services are expected to have a significant impact on the organization's energy performance throughout their intended or expected operational period.
- Define criteria: Establish criteria to evaluate the energy performance over the life cycle of procured items. Consider factors such as energy efficiency, life cycle cost, reliability, environmental impact, and compliance with relevant standards or regulations.

2. Incorporate energy performance criteria in procurement:

- Communicate with suppliers: Inform suppliers that energy performance is one of the evaluation criteria for procurement. Clearly communicate the organization's expectations regarding energy efficiency and other related factors.
- Evaluation process: Develop a structured process to evaluate the energy performance of products, equipment, and services during procurement. Include criteria related to energy efficiency, energy consumption, and other relevant performance indicators.

3. Develop specifications:

- Energy performance specifications: Define and communicate specifications to ensure the energy performance of procured equipment and services. Specify requirements for energy efficiency, performance standards, and any other relevant criteria.
- Energy procurement: Define and communicate specifications for procuring energy, such as electricity, natural gas, or other fuels. Consider factors such as price, reliability, sustainability, and environmental impact.

4. Documentation and Communication:

- Documentation of criteria and specifications: Maintain written records of energy performance evaluation criteria and specifications for procured items. Ensure that stakeholders have access to this information.
- Communicate with suppliers: Clearly and accurately communicate energy performance requirements and specifications to suppliers. Facilitate dialogue with suppliers to address any questions or concerns related to energy performance criteria.

4*.1.1.17 Monitoring, Measurement, Analysis, and Evaluation of Energy Performance and EnMS*

1. Identify monitoring and measurement needs:

- Identify key characteristics: Determine what needs to be monitored and measured regarding energy performance and EnMS. This includes key characteristics such as:
- Effectiveness of action plans in achieving energy goals and objectives.

- Energy Performance Indicators (EnPIs).
- Significant Energy Uses (SEUs).
- Actual energy consumption versus expected consumption.
- Minimum requirements: Ensure that, at a minimum, these key characteristics are monitored and measured to evaluate energy performance and EnMS effectiveness.

2. Methods for monitoring, measurement, analysis, and evaluation:
   - Establish methods: Identify methods for monitoring, measuring, analyzing, and evaluating to ensure valid results. This may involve using measurement and monitoring systems, data analysis tools, performance indicators, and other appropriate techniques.
   - Verify results: Confirm the accuracy and reliability of monitoring and measurement methods to ensure results are trustworthy and suitable for decision-making.
3. Timing of monitoring and measurement:
   - Scheduled intervals: Determine when monitoring and measurement activities will take place. This may include regular intervals, operational cycles, project milestones, or as needed to collect relevant data.
   - Timeliness: Ensure that monitoring and measurement activities are conducted in a timely manner to provide up-to-date information on energy performance and EnMS effectiveness.
4. Analyze and evaluate results:
   - Regular assessment: Analyze and evaluate results from monitoring and measurement activities to assess energy performance and EnMS effectiveness. This may involve comparing actual performance against targets, identifying trends, performing root cause analysis, and finding opportunities for improvement.
   - Scheduled evaluation: Determine when monitoring and measurement results will be analyzed and evaluated. This could align with management review meetings, performance evaluations, or other scheduled intervals.
5. Investigate and respond to deviations:
   - Significant deviations: Investigate and respond promptly to significant deviations in energy performance. This may involve identifying the causes of deviations, implementing corrective actions, and monitoring the effectiveness of these actions.
   - Document results: Retain written records of investigation results and responses to significant deviations as part of the organization's record-keeping process.
6. Evaluate compliance with legal and other requirements:

- Scheduled intervals: Evaluate compliance with legal and other requirements related to energy performance, energy use, energy consumption, and EnMS at planned intervals.
- Compliance documentation: Retain written records of compliance evaluation results and any actions taken to address non-compliance.

4.1.1.18 Internal Audit

Plan and conduct internal audits:

- Establish Audit Program: Plan, establish, implement, and maintain an audit program outlining the frequency, methodology, responsibilities, planning requirements, and reporting procedures for internal audits. Consider the importance of relevant processes and the results of previous audits.
- Define audit criteria and scope: Identify audit criteria and scope for each audit, ensuring they align with organizational requirements for EnMS, energy policy, goals, energy objectives, and relevant standards.
- Select auditors: Choose competent, impartial, and objective auditors to perform the audits. Ensure auditors have the necessary skills, knowledge, and training to assess EnMS effectiveness.
- Conduct audits: Perform audits according to the established audit program, maintaining objectivity and impartiality throughout the process. Use appropriate assessment methods and techniques to gather relevant evidence and evaluate EnMS implementation and effectiveness.
- Report audit results: Report internal audit results to relevant management within the organization. Communicate findings, observations, and any non-conformities identified during the assessment.
- Implement appropriate actions: Take appropriate actions based on internal audit results. This may include implementing corrective actions to address non-conformities, improving EnMS processes, and promoting continuous improvement.
- Retain written information: Maintain written records as evidence of audit program implementation and internal audit results. This documentation should include audit plans, audit reports, corrective action records, and any other relevant information.

4.1.1.19 Management Review

1. Plan and Conduct Management Review:
    - Scheduled Intervals: Schedule management reviews of the EnMS at planned intervals, ensuring they occur regularly and align with the organization's operational and strategic cycles.

- Top Management Involvement: Ensure that top management participates in the review process to provide leadership, oversight, and direction for the EnMS.
- Agenda and Documentation: Develop an agenda for the management review covering all relevant aspects of EnMS performance and effectiveness. Prepare documentation, including reports and data, to facilitate informed decision-making during the review.

2. Review Key Factors:

- Status of Previous Actions: Review the status of actions identified in previous management reviews to ensure timely resolution and follow-up.
- Changes in External and Internal Issues: Assess changes in external and internal issues, including risks and opportunities, that may impact the EnMS and energy performance.
- EnMS Performance Information: Evaluate information on EnMS performance, including non-conformity trends, corrective actions, monitoring and measurement results, audit results, and compliance evaluation outcomes.
- Opportunities for Continuous Improvement: Identify opportunities for continuous improvement, including enhancements in capabilities, energy policy, integration with business processes, resource allocation, and communication.
- Energy Performance Input: Review input factors related to energy performance, such as progress towards energy goals and objectives, energy performance trends based on monitoring and measurement results, and the status of action plans.

3. Output and Decisions:

- Decisions for Continuous Improvement: Make decisions related to opportunities for continuous improvement and changes to the EnMS based on the review results. This may include updating energy policies, goals, objectives, action plans, resource allocation, and improving capabilities, awareness, and communication.

4. Documentation and Records:

- Written Information: Retain written records as evidence of the management review results. This documentation should include meeting minutes, reports, decisions made, action plans, and any other relevant records.

4.1.1.20 Non-Conformity Control

1. Respond to Non-Conformity**:**
   - Immediate Action: When a non-conformity is identified, respond promptly to address and control it. Ensure that any immediate consequences of the non-conformity are effectively managed to prevent further impact.
2. Assess the Need for Corrective Action:

- Review and Analysis: Review the non-conformity and conduct a thorough analysis to determine its causes. Identify any underlying issues or system faults contributing to the non-conformity.
- Identify Similar Non-Conformities: Determine whether similar non-conformities exist or are likely to occur elsewhere in the EnMS.

3. Implement Corrective Action:
   - Action Plan: Develop and implement appropriate corrective actions to address the root causes of the non-conformity. Ensure that corrective actions are tailored to effectively eliminate the identified causes and prevent recurrence.
4. Evaluate the Effectiveness of Corrective Actions:
   - Monitor and Assess: Monitor and evaluate the effectiveness of the corrective actions taken to ensure they have addressed the root causes and prevented recurrence of the non-conformity.
   - Feedback Loop: Establish a feedback loop to review the results of corrective actions and verify their effectiveness in resolving the non-conformity.
5. Make Changes to the EnMS:
   - Continuous Improvement: If necessary, make changes to the EnMS to prevent similar non-conformities in the future. This may involve updating procedures, training programs, or other aspects of the EnMS to address systemic issues.
6. Document Information:
   - Record Non-Conformities and Corrective Actions: Maintain written records detailing the nature of the identified non-conformity and the subsequent actions taken to address it.
   - Results of Corrective Actions: Document the results of any corrective actions implemented, including the effectiveness of the actions in resolving the non-conformity and preventing recurrence.

4.1.1.21 Continuous Improvement

1. Establish a Culture of Improvement:
   - Leadership Support: Ensure that top management actively promotes a culture of continuous improvement within the organization, emphasizing the importance of enhancing the EnMS and achieving energy performance improvement.
   - Employee Involvement: Encourage employee involvement and participation in identifying improvement opportunities and implementing changes to the EnMS.
2. Set Improvement Objectives:

- Establish SMART Goals: Set specific, measurable, achievable, relevant, and time-bound (SMART) objectives to improve the relevance, adequacy, and effectiveness of the EnMS.
- Enhance Energy Performance: Identify objectives related to improving energy performance, such as reducing energy consumption, increasing energy efficiency, or optimizing energy use.

3. Monitor and Measure:
   - Monitor Performance: Continuously monitor and measure energy performance indicators (EnPIs) and other relevant metrics to assess the effectiveness of the EnMS and progress towards improvement objectives.
   - Data Analysis: Analyze monitoring and measurement data to identify trends, patterns, and areas for improvement.
4. Identify Improvement Opportunities:
   - Root Cause Analysis: Conduct root cause analysis to identify underlying issues, inefficiencies, or opportunities for improvement within the EnMS.
   - Feedback Mechanisms: Establish feedback mechanisms, such as suggestion systems, employee surveys, and internal audits, to gather input from employees and stakeholders on potential improvement opportunities.
5. Implement Improvement Actions:
   - Action Plan Development: Develop action plans to address identified improvement opportunities, outlining specific steps, responsibilities, timelines, and resource requirements.
   - Cross-Functional Collaboration: Promote collaboration between departments and functions to effectively implement improvement actions.
6. Review and Evaluate Improvement Progress:
   - Management Review: Include the review of improvement progress and outcomes as part of the management review process.
   - Performance Evaluation: Regularly assess the effectiveness of improvement actions and their impact on energy performance and EnMS effectiveness.
7. Continuous Learning and Adaptation:
   - Knowledge Sharing: Encourage knowledge sharing and learning from both successes and failures to foster continuous improvement.
   - Adapt to Changes: Maintain flexibility and adapt to changes in the internal and external context, adjusting improvement efforts as needed to address evolving challenges and opportunities.

4.1.2 Building Capacity Related to ISO 14064

4.1.2.1 Defining Organizational Boundaries

Step 1: Identify Organizational Boundaries

- Identify Facilities: Identify all facilities owned or controlled by your organization. Consider all greenhouse gas (GHG) emission sources and sinks associated with these facilities.
- Set Boundaries: Decide whether your organizational boundaries will include all these facilities or only specific ones based on operational or financial control.

Step 2: Choose a Consolidation Approach

- Control Approach: Choose this method if your organization has direct operational or financial control over the facilities. You will account for all GHG emissions and removals from these facilities.
- Equity Share Approach: Choose this method if you only want to account for GHG emissions and removals proportional to your share in each facility.

Step 3: Document and Apply the Chosen Approach

- Documentation: Ensure that you document which consolidation approach is used for each facility, especially if facilities are controlled by multiple organizations.
- Consistency: Maintain consistent application of the chosen approach throughout the reporting period to align with the intended use of the GHG inventory.

4.1.2.2. Reporting Boundaries

Step 1: Establish Reporting Boundaries

- Define Boundaries: Record the scope of the organization's operations to determine which facilities, activities, and GHG sources are included in the GHG inventory.
- Identify Direct and Indirect Emissions: Identify all direct emissions sources (from owned or controlled sources) and indirect emissions (from sources not owned or controlled by the organization).

Step 2: Quantify Direct Greenhouse Gas Emissions and Removals

- Quantify Emissions: Measure the direct emissions of GHGs such as CO2, CH4, N2O, NF3, SF6, and other fluorinated gases. Use appropriate conversion factors to report these in metric tons of CO2 equivalent (CO2e).
- Account for GHG Removals: Identify and quantify any GHG removal activities within the organization (e.g., carbon sequestration).

Step 3: Calculate Indirect Greenhouse Gas Emissions

- Document Process: Establish and document the methodology for determining significant indirect emissions based on predefined criteria.

- Evaluate Emissions: Assess the significance of indirect emissions using criteria such as emission intensity, source/sink impact, and data accuracy.
- Report Significant Emissions: Quantify and report all significant indirect emissions. Justify any exclusions of significant emissions from the report.

Step 4: Categorize Greenhouse Gas Emissions

- Identify Categories: Separate greenhouse gas emissions into different direct and indirect categories:
  + Direct GHG Emissions and Removals
  + Indirect GHG Emissions from Purchased Energy, Transportation, Products Used by the Organization, Products from the Organization, and Other Sources
- Further Breakdown: If necessary, further break down these categories into more detailed subcategories as documented in the guidance (Appendix B).

Step 5: Record and Justify Exclusions

- Exclusion Criteria: Develop criteria to exclude insignificant indirect emissions, ensuring they do not overlook significant environmental impacts or statutory compliance.
- Regular Review of Criteria: Periodically review and update the criteria for significance to adapt to changes in operations, technology, or regulations.

4.1.2.3 Identification of Sources and Sinks

Step 1: Identify and Record Greenhouse Gas Sources and Sinks

- Establish Reporting Boundaries: Clearly define the scope and boundaries of the GHG inventory. This should include all activities, facilities, and operations over which the organization has control or influence.
- Identify Sources and Sinks: Identify all potential GHG emission sources (e.g., fossil fuel combustion, chemical reactions) and sinks (e.g., forests, carbon capture processes) within these boundaries.

Step 2: Classify Sources and Sinks

- Use Specified Categories: Classify each identified source and sink according to the categories specified in section 5.2.4 of the ISO 14064-1:2018 standard. This may include direct emissions from activities, indirect emissions from purchased electricity, etc.
- Document Process: Ensure each source and sink is thoroughly recorded, including how it was identified and classified.

Step 3: Quantify Greenhouse Gas Removals

- Identify Removal Mechanisms: Where applicable, identify and record any processes or systems that function as GHG sinks contributing to the removal of GHGs from the atmosphere.
- Align with Categories: Ensure these removals are classified according to the same framework used for sources.

Step 4: Exclude Irrelevant Sources and Sinks

- Justify Exclusions: Identify and document the rationale for why certain GHG sources or sinks are deemed irrelevant for inclusion in your GHG inventory. Relevance criteria may include emission size, potential impact, control or influence over emissions, and materiality thresholds.
- Align Exclusions with Reporting Needs: Ensure exclusions are aligned with the organization's GHG reporting goals and stakeholder expectations.

4.1.2.4 Selection of Calculation Methods & GHG Quantification

Step 1: Select a Quantification Method

- Choose Methodology: Select a quantification method that ensures accuracy, consistency, and repeatability. Consider technical feasibility and cost-effectiveness.
- Document Approach: Explain and document the chosen quantification method and any changes over time.

Step 2: Select and Collect Data

- Identify Data Sources: Gather primary data (site-specific measurements) and secondary data (e.g., industry averages) for each greenhouse gas source and sink.
- Characterize Data: Identify and record the characteristics of each data source, ensuring they align with the identified direct and indirect emissions categories.

Step 3: Develop or Select Greenhouse Gas Quantification Models

- Choose or Develop Models: Select or develop models to convert raw data into greenhouse gas emissions or removals, considering relevant physical and chemical processes.
- Justify Model Selection: Document how the model accurately represents emissions/removals, its limitations, uncertainties, repeatability, acceptability, and recognition.
- Ensure Consistency: Verify that the model is appropriate for the intended use of the GHG data.

Step 4: Calculate Greenhouse Gas Emissions and Removals

- Calculate Emissions/Removals: Apply the chosen quantification model to calculate greenhouse gas emissions and removals for all identified sources and sinks.

- Use Accurate Conversion Factors: Convert all GHG emissions and removals to metric tons of CO2 equivalent (CO2e) using appropriate Global Warming Potential (GWP) values provided by the latest IPCC guidelines.
- Document Calculation Timeframe: Clearly record the timeframe over which emissions and removals are calculated.

4.1.2.5 Base Year

Step 1: Select and Establish a Base Year

- Choose Base Year: Select a historical year with reliable and comprehensive data on greenhouse gas emissions and removals. This year should represent your organization's activities.
- Quantify GHG Data: Calculate the GHG emissions and removals for the selected base year using data that accurately reflects your current reporting boundaries. This may be based on one year's data or a rolling average if your operations are highly volatile or seasonal.
- Document Selection: Clearly document why this year was chosen as the base year, considering factors such as data availability and consistency with historical operations.
- Develop Inventory: Create a detailed GHG inventory for the base year, aligned with the quantification methods and methodologies you have selected.

Step 2: Review Base Year GHG Inventory

- Establish Review Procedures: Set up procedures to review and potentially recalculate base year emissions when significant changes occur that could affect the base year's representativeness.
- Identify Recalculation Triggers:
  + **Structural Changes:** Changes in the organizational structure, such as mergers or acquisitions, that significantly alter GHG emissions or removals.
  + **Methodological Changes:** Significant updates in calculation methods or emission factors that affect the accuracy of base year data.
  + **Error Corrections:** Discovery of errors or cumulative mistakes in the base year data that are significant enough to impact reported emissions.
- Document Adjustments: Any recalculations or adjustments to base year data must be thoroughly documented and justified in subsequent GHG inventories.

Step 3: Adjust Base Year as Necessary

- Justify Changes: If you need to change the base year for any identified reasons, provide a clear rationale for this decision to maintain transparency and reliability in your reporting.

- Update GHG Inventory: Reflect any changes to the base year in all future GHG reports to ensure consistency and comparability over time.

Step 4: Maintain Documentation and Transparency

- Record Keeping: Maintain comprehensive records of all data and methodologies used to calculate the base year, as well as any changes made during subsequent reviews.
- Ensure Accessibility: Ensure that documentation is accessible for verification purposes and for stakeholders requesting information about your GHG reporting practices.

Step 5: Regularly Review Base Year Integrity

- Periodic Evaluation: Regularly review the relevance and accuracy of the base year as part of your ongoing GHG management strategy. This ensures that your GHG inventory remains a reliable standard for measuring progress towards greenhouse gas reduction targets.

4.1.2.6 Greenhouse Gas Mitigation Initiatives

Step 1: Plan and Implement Greenhouse Gas Emission Reduction Initiatives

- Identify Opportunities: Assess areas where greenhouse gas emissions can be reduced or removed, such as energy efficiency, waste reduction, and alternative fuels.
- Initiative Planning: Develop specific projects or changes aimed at reducing greenhouse gas emissions or enhancing removals. Consider feasibility and potential impact.

Step 2: Quantify Impact

- Quantify Emission Reductions: Calculate the reduction in greenhouse gas emissions or improvements in removal resulting from each initiative. Use appropriate metrics and methods to measure changes.
- Document Changes: Ensure that all calculations and methods used to quantify impacts are thoroughly documented.

Step 3: Document Greenhouse Gas Emission Reduction Initiatives

- Describe Initiatives: Detail each greenhouse gas emission reduction initiative, including scope, objectives, and expected outcomes.
- Define Spatial and Temporal Boundaries: Identify the geographic scope and time frame covered by each initiative.
- Explain Classification: Determine whether initiatives affect direct or indirect emissions or removals and document this classification.

Step 4: Report Greenhouse Gas Emission Reductions Separately

- Report Separately: In your greenhouse gas inventory, report the impact of mitigation initiatives separately from other emission data to highlight the effectiveness of these initiatives.
- Provide Transparency: Provide clear and transparent information on how reductions were achieved, including any assumptions or external factors influencing the outcomes.

Step 5: Set Greenhouse Gas Emission Reduction Targets

- Set Targets: Establish clear targets for reducing greenhouse gas emissions, specifying the time frame, type of target (absolute or intensity-based), and which emissions are included.
- Consider Context: Align targets with climate science, reduction potential, and relevant international and national contexts.
- Document Criteria: Record the rationale for setting these targets, including any industry commitments or cross-sectoral effects.

Step 6: Monitor and Evaluate

- Continuous Monitoring: Regularly monitor the progress of greenhouse gas emission reduction initiatives against the established targets.
- Evaluate Effectiveness: Periodically evaluate the initiatives to determine their effectiveness and make adjustments as necessary to improve outcomes.

Step 7: Communicate and Engage

- Stakeholder Engagement: Communicate goals, progress, and achievements with stakeholders, including employees, customers, and regulatory bodies.
- Public Reporting: Include detailed information on greenhouse gas emission reduction initiatives and targets in public sustainability reports to enhance organizational transparency and accountability.

4.1.2.7 Greenhouse Gas Quality Management

Step 1: Manage Greenhouse Gas Information

- Establish Procedures: Develop and document procedures to manage GHG information ensuring alignment with the principles and purposes of the greenhouse gas inventory.
- Check Consistency: Perform regular checks to verify the accuracy and completeness of the greenhouse gas inventory.
- Handle Errors: Establish mechanisms to identify and address any errors and omissions promptly.

- Documentation: Ensure all greenhouse gas inventory records are fully documented, including the methodologies and Global Warming Potential (GWP) used.
- Assign Responsibilities: Identify and document the roles and responsibilities of personnel involved in the greenhouse gas inventory process.
- Training Programs: Identify training needs for the greenhouse gas inventory team and implement relevant training programs.

Step 2: Record Retention and Documentation

- Document Retention Policy: Establish a document retention policy that specifies the duration for retaining different types of records.
- Verification Readiness: Maintain documentation in a manner ready for verification, ensuring all data and calculations can be audited.

Step 3: Evaluate Uncertainty

- Identify Uncertainty: Identify uncertainties related to each methodology and quantification model used in the greenhouse gas inventory.
- Evaluation Method: Conduct uncertainty assessments using appropriate quantitative or qualitative methods. If quantitative estimation is not feasible, justify the use of qualitative assessments.
- ISO/IEC Guidelines: Apply the principles and methods of ISO/IEC 98-3 guidelines to structure the uncertainty assessment.

Step 4: Continuous Improvement

- Periodic Review: Regularly review greenhouse gas information management processes to identify areas for improvement.
- Update Procedures: Update procedures based on new information, technological changes, or feedback from greenhouse gas inventory audits.
- Internal Audits: Schedule periodic internal audits and technical reviews to ensure the integrity and continuous improvement of the GHG inventory management system.

Step 5: Integration and Reporting

- Integration with Company Policies: Integrate greenhouse gas inventory quality management processes with broader company environmental policies and practices.
- Reporting: Include a summary of greenhouse gas inventory quality management practices and any significant findings from uncertainty assessments in environmental reports or disclosures.

4.1.2.8 Finalizing the Greenhouse Gas Inventory Report

Step 1: General Preparation

- Purpose and Objectives: Define the purpose and objectives of the GHG report in relation to your organization's GHG policies, strategies, or programs.
- Identify Users: Identify intended internal and external users of the report and greenhouse gas inventory.
- Reporting Frequency: Decide on the frequency of GHG reporting (e.g., annually, biennially).

Step 2: GHG Reporting Planning

- Document the Plan: Clearly document the planning process including the structure, format, and data to be included in the report.
- Responsibilities: Assign and document responsibilities for preparing and compiling the report.
- Dissemination Policy: Establish a policy on how the report will be provided and methods of dissemination.

Step 3: Report Content

- Organizational Description: Provide a detailed description of the reporting organization.
- Boundary Documentation: Clearly document organizational and reporting boundaries.
- Emission Quantification: Quantify and report direct and indirect greenhouse gas emissions for the reporting period.
- Biogenic CO2: Describe how biogenic CO2 emissions and removals are handled and quantified.
- Historical Data: Include information on the historical base year and any changes to the base year or other historical GHG data.
- Changes in Quantification Methods: Explain any changes to quantification methods or emission factors used since the previous reporting period.
- Impact of Uncertainty: Describe the impact of uncertainty on the accuracy of GHG data and provide a detailed assessment of uncertainties.

Step 4: Optional and Recommended Information

- GHG Policies and Strategies: Optionally describe the organization's greenhouse gas emission reduction policies, strategies, or programs.
- GHG Reduction Initiatives: Detail any greenhouse gas reduction or removal initiatives and their impacts.
- Carbon Credits and Offsets: If applicable, report on greenhouse gas emission reduction and removal projects that have been purchased or developed. Clearly

disclose the GHG program under which the credits were generated and ensure they are reported separately from direct or indirect emissions.

Step 5: Verification and Assurance

- Independent Verification: If the GHG report has been verified by a third party, include the verification statement and the level of assurance achieved.
- Transparency: Justify any confidential data withheld from the GHG report and ensure full, consistent, accurate, relevant, and transparent reporting.

Step 6: Publication and Distribution

- Publish the Report: Provide the GHG report to the intended users as planned.
- Stakeholder Engagement: Engage with stakeholders to discuss the findings of the report and any related actions or decisions based on the report.

Step 7: Continuous Improvement

- Review and Update: Regularly review and update the GHG reporting process based on feedback, organizational or operational changes, and any new requirements or standards.

4.2. Standard Compliance Procedures and Implementation in Industry Enterprises

4.2.1. General Requirements

- Define Overall Objective: Identify the main objective of integrating the two standards, which is to reduce energy consumption and effectively manage greenhouse gas emissions.
- Develop Policy: Develop an overarching policy that meets the requirements of both ISO 50001 for energy management and ISO 14064-1 for greenhouse gas measurement and reporting.
- Boundary and Scope: Clearly define the boundaries and scope of application for both standards within the organization, ensuring clarity and consistency.

4.2.2. Planning and Ensuring Compliance

- Action Plan: Develop a detailed action plan that includes specific objectives, required resources, and a timeline for implementing both standards.
- Assign Responsibilities: Clearly identify who is responsible for each aspect of the standard, from energy management to monitoring and reporting emissions.
- System Integration: Integrate energy and greenhouse gas emission measurement and monitoring systems into a unified management system to optimize data collection and processing.

4.2.3. Monitoring & Auditing

- Ongoing Monitoring: Regularly monitor energy performance and GHG emissions to assess progress towards the set objectives.

- Internal Audits: Conduct periodic internal audits to verify compliance with the requirements of ISO 50001 and ISO 14064-1.
- Periodic Reporting: Prepare periodic reports on energy performance and emissions, including an evaluation of the effectiveness of the implemented measures.

4.2.4. Action & Improvement

- Data Analysis: Use data collected from monitoring activities to analyze trends and identify improvement opportunities.
- Implement Improvements: Apply improvement measures based on the analysis results to increase energy efficiency and reduce GHG emissions.
- Update Policies and Objectives: Adjust policies and objectives based on evaluation and improvements to reflect the organization's sustainable development goals.

4.3. Detailed Guidelines on Greenhouse Gas Inventory and Related Standards for Supporting Industries

Step 1: Planning

- Define Scope: Clearly define the scope of GHG emissions to be included in the report. This includes direct emissions (Scope 1), indirect emissions from energy (Scope 2), and other indirect emissions (Scope 3).
- Set Objectives: Establish specific objectives for the inventory to guide data collection and reporting processes.

Step 2: Data Collection

- Collect Emission Data: Gather data on energy consumption, fuel usage, and other activities related to GHG emissions.
- Choose Calculation Method: Use widely accepted methods such as emission factors from the GHG Protocol or specific guidelines from ISO 14064-1.

Step 3: Emission Calculation

- Apply Formulas: Use calculation formulas based on energy consumption data and the corresponding emission factors.
- Calculate Climate Change Emissions: Include CO2 and other greenhouse gases like CH4 and N2O.

Step 4: Reporting and Verification

- Draft Report: Prepare a detailed report on GHG emissions according to the chosen standards.
- Audit and Verification: Conduct internal audits or third-party verification to ensure the accuracy and transparency of the report.

Step 5: Improvement and Action

- Analyze Report: Evaluate the results and identify opportunities for improvement to reduce future GHG emissions.
- Implement Emission Reduction Measures: Apply new technologies, improve energy efficiency, and implement other emission reduction programs.

4.4 Greenhouse Gas Emission Reduction Initiatives and Effectiveness Evaluation

An initiative to reduce greenhouse gas emissions may include the following measures:

1. Improving Energy Efficiency: Promote the use of energy-saving technologies and renewable energy sources such as solar and wind power.
2. Encouraging the Use of Green Transportation: Incentivize the use of electric vehicles, hybrid vehicles, or public transportation instead of personal vehicles.
3. Transitioning from Traditional to Sustainable Agriculture: Reduce the use of chemical fertilizers and pesticides, promote organic farming methods, and enhance forest management.
4. Waste Management and Recycling: Strengthen waste management, promote recycling, and reuse to minimize the amount of waste released into the environment.
5. Promoting a Culture of Sustainable Consumption: Encourage people to consume less, choose products with minimal packaging, and focus on long-term maintenance.

To evaluate the effectiveness of these measures, the following steps should be taken:

1. Data Collection: Gather data on emissions levels before and after the implementation of emission reduction measures.
2. Data Analysis: Use analytical tools to assess changes in emissions levels and compare them with the set goals.
3. Financial Evaluation: Assess the costs and benefits of implementing emission reduction measures, including initial and maintenance costs.
4. Social and Environmental Evaluation: Consider the social and environmental impacts of emission reduction measures, including effects on human health and biodiversity.
5. Feasibility and Sustainability Evaluation: Determine the long-term feasibility and sustainability of emission reduction measures.

CHAPTER 5: EVALUATION OF BARRIERS AND CHALLENGES

5.1 Identifying Barriers and Difficulties in Compliance with Standards for the Supporting Industry

Implementing ISO 50001 and ISO 14064-1:2018 standards brings numerous benefits to businesses in the supporting industry, including:

1. Energy Savings and Cost Reduction: The energy management system according to ISO 50001 helps businesses identify and implement effective energy-saving measures, thereby reducing operating costs.
2. Reduction of Greenhouse Gas Emissions and Environmental Protection: Inventorying and reporting greenhouse gases according to ISO 14064-1:2018 helps businesses track emissions, identify major emission sources, and implement mitigation measures, contributing to environmental protection.
3. Enhancing Image and Reputation: Compliance with international energy and environmental standards helps businesses enhance their image and reputation, attracting potential customers and investors.
4. Improving Competitiveness: Effective energy and environmental management is a crucial factor in increasing the competitiveness of businesses in a market increasingly focused on sustainable development.

However, the application of these standards also faces some barriers and difficulties, particularly for businesses in the supporting industry:

1. Lack of Awareness and Knowledge:
   - Many businesses do not fully recognize the importance of energy and environmental management or the benefits of applying ISO 50001 and ISO 14064-1:2018 standards.
   - Businesses lack knowledge and skills in energy management systems, greenhouse gas inventory, and reporting.
2. Financial Difficulties:
   - The cost of implementing and maintaining energy and environmental management systems can be high, especially for small and medium-sized enterprises.
   - Businesses face challenges in raising capital to invest in energy-saving solutions and greenhouse gas reduction.
3. Human Resource Shortage:
   - Businesses lack skilled personnel in energy and environmental fields to implement and operate management systems.
   - Difficulty in attracting and retaining talent in these fields.

4. Cultural Barriers:
    - Changing the corporate culture to focus on energy savings and environmental protection can be challenging, especially in large and long-established businesses.
    - Lack of commitment and support from company leadership can make it difficult to implement management systems.
5. Process and Procedure Challenges:
    - Internal processes and procedures may not align with the requirements of ISO 50001 and ISO 14064-1:2018 standards.
    - Businesses need to adjust and update processes and procedures to meet the standards' requirements.
6. Lack of External Support:
    - Businesses face difficulties in finding reputable consultants, trainers, and certification organizations to support the implementation and application of standards.
    - Government and NGO support policies for businesses in applying standards are limited.

5.2 Analysis of Challenges and Proposed Solutions

No.	Challenges	Solutions
1	**Lack of Awareness and Knowledge**	- Organize workshops and training sessions to raise awareness about the benefits of applying standards. - Share success stories from other businesses. - Develop educational materials, videos, and articles to disseminate knowledge.
2	**Financial Difficulties**	- Government policies should support financial assistance: tax reductions, subsidies, and loan support. - Non-governmental organizations and support funds should have financial assistance programs.
3	**Human Resource Shortage**	- Universities and colleges should train specialized human resources in energy and environmental fields. - Organize training courses on energy management systems and greenhouse gas inventories. - Companies should develop internal training programs for their staff.

No.	Challenges	Solutions
4	**Corporate Culture Barriers**	- Company leadership should commit and demonstrate exemplary roles. - Integrate energy and environmental management into the company's development strategy. - Encourage initiatives and new ideas for energy saving and environmental protection.
5	**Process and Procedure Challenges**	- Review and adjust internal processes and procedures to meet the standard requirements. - Apply information technology for effective system management. - Consult experts to help build and apply the standards.
6	**Lack of Support**	- The government should establish a support system: providing information, consulting, and connecting businesses with service providers. - Non-governmental organizations and support funds should have programs to help businesses apply standards. - Encourage businesses to share experiences with other companies.

CHAPTER 6: SUPPORTS AND INCENTIVES FOR ENTERPRISES

6.1 Overview of Current Supports and Incentives for the Supporting Industry Sector

The incentive policies for projects producing supporting industrial products listed in the priority development category are outlined in Article 12 of Decree 111/2015/ND-CP. These incentives are divided into two parts: general incentives and specific incentives for small and medium-sized enterprises (SMEs).

General Incentives: These include tax, credit, and environmental protection incentives.

- Corporate Income Tax:
  - + Enterprises with projects producing supporting industrial products that have not yet enjoyed corporate income tax incentives are entitled to corporate income tax incentives for projects producing supporting industrial products from the tax period in which the competent authority grants the certificate of incentives for supporting industrial product manufacturing.
  - + Enterprises with projects producing supporting industrial products that have fully utilized corporate income tax incentives under other preferential conditions are entitled to corporate income tax incentives under the conditions of the supporting industrial product manufacturing project for the remaining period from the tax period in which the competent authority grants the certificate of incentives for supporting industrial product manufacturing.
  - + The time for incentives is determined by subtracting the number of years of tax exemption, tax reduction, and preferential tax rate already enjoyed under other preferential conditions from the duration of corporate income tax incentives under the conditions of the supporting industrial product manufacturing project.
- Import Tax:
  - + Exemption from import tax on goods imported to create fixed assets, as prescribed by the Law on Export and Import Duties and its guiding documents.
- Value Added Tax (VAT):
  - + Revenue from supporting industrial products listed in the priority development category is eligible for VAT declaration on a monthly or yearly basis or quarterly provisional declaration. The Ministry of Finance provides detailed guidance on this point.
- Credit:
  - + Projects producing supporting industrial products listed in the priority development category are eligible for loans with investment credit interest rates from state investment credit sources. They can also obtain short-term

loans in Vietnamese dong from credit institutions or foreign bank branches at the lending interest rate cap set by the State Bank of Vietnam.

- Environmental Protection:
  + Projects producing supporting industrial products listed in the priority development category are eligible for preferential loans from the Vietnam Environmental Protection Fund for pollution treatment and environmental protection components of the project.
- Incentives for SMEs: In addition to the general incentives, SMEs producing supporting industrial products listed in the priority development category also enjoy the following incentives:
- Investment Credit:

  SMEs can borrow up to 70% of investment capital from credit institutions, based on guarantees from credit guarantee organizations for SMEs, provided they meet the following conditions:
  + The total value of mortgaged assets at the credit institution must be at least 15% of the loan value, after deducting the value of mortgaged assets for other loans.
  + They must have at least 20% of their own capital involved in the investment project, after deducting the own capital arranged for other projects.
  + At the time of the guarantee request, they must not have any overdue obligations to the state budget or bad debts at credit institutions or other economic organizations.
- Land and Water Surface Rent:
  + SMEs are eligible for land and water surface rent exemption or reduction as prescribed by land laws. For projects of special nature or large scale that bring significant socio-economic benefits and require higher support than stipulated, the Ministry of Finance, in coordination with the Ministry of Planning and Investment, will submit to the Prime Minister for a decision based on the proposal of the provincial People's Committee where the land is located.
- Investment Incentives Based on Location:
  + Investment projects for supporting industrial products listed in the priority development category, located in areas with difficult or especially difficult socio-economic conditions, are eligible for additional investment incentives based on location, in addition to the general incentives.

According to Decree 57/2021/ND-CP:

- Eligible Entities:

    + Enterprises with new investment projects or expansion projects producing products listed in the priority supporting industrial product category, implemented before January 1, 2015.
    + Projects must meet the conditions of supporting industrial product manufacturing projects as stipulated in Law No. 71/2014/QH13.
- Incentive Conditions:
    + Projects that have not fully utilized corporate income tax incentives under other preferential conditions.
    + Projects must be granted a certificate of incentives for supporting industrial product manufacturing.
- Forms of Incentives:
    + Corporate income tax exemption for a certain period.
    + 50% reduction in corporate income tax payable for a certain period.
- Incentive Duration:
    + Depends on the type of project (new investment, expansion) and the location of the project.
- Additional Notes:
    + Detailed information on the conditions, forms, and duration of specific incentives for each type of project is outlined in Decree 57/2021/ND-CP and its guiding documents.
    + Enterprises must thoroughly research the relevant legal regulations to ensure they meet the conditions for tax incentives.
    + New investment projects in industrial parks are eligible for corporate income tax incentives as prescribed in Decree 57/2021/ND-CP and its guiding documents.
    + New investment projects in areas with difficult socio-economic conditions are eligible for corporate income tax incentives as prescribed in Decree 57/2021/ND-CP and its guiding documents.

6.2. Analysis of the Effectiveness of Support and Incentive Policies

Decrees 111/2015/ND-CP and 57/2021/ND-CP have introduced numerous support and incentive policies for the supporting industry (SI) sector to promote its development. However, the effectiveness of these policies needs to be assessed to make necessary adjustments.

Successes:

- Attracting Investment:

    + Tax, credit, land, and other incentives have successfully attracted many investors to the SI sector, contributing to increased production and product diversification.

- Enhancing Competitiveness:
    + Supporting enterprises in the SI sector with technology, workforce training, and other areas has enhanced their competitiveness, enabling them to meet the growing demands of the market.
- Job Creation:
    + The development of the SI sector has generated numerous jobs, helping to address unemployment and increase income for workers.
- Encouraging Linkages:
    + Support policies have encouraged SI enterprises to connect and form value chains, improving production efficiency.

Challenges:

- Bureaucratic Procedures:
    + Accessing support policies remains challenging due to cumbersome and complex administrative procedures.
- Lack of Information:
    + Enterprises often lack information about support policies, leading to inefficient use of available incentives.
- Limited Resources:
    + Resources for support programs are limited and do not meet the needs of enterprises.
- Regional Disparities:
    + The effectiveness of policy implementation is uneven across regions, leading to disparities in the development of the SI sector.

6.3. Proposed New Support Measures and Policy Improvements for the Supporting Industry

The supporting industry plays a crucial role in the production value chain, contributing to socio-economic development. However, the sector faces numerous challenges, particularly in achieving sustainable development and applying international standards like ISO 50001 and ISO 14064-1:2018.

Current Situation:

- Lack of Awareness:

    + Enterprises lack awareness of the importance of sustainable development and the application of ISO standards.

- Financial Constraints:
    + Financial difficulties hinder investment in sustainable development activities and standard implementation.
- Shortage of Skilled Workforce:
    + There is a shortage of specialized human resources in sustainable development and energy management.
- Complex Administrative Procedures:
    + The process of obtaining ISO certification is hampered by cumbersome and complex administrative procedures.
- Lack of Information and Support:
    + Enterprises lack sufficient information and support from relevant authorities.

Proposed New Support Measures and Policy Improvements:

1. Enhancing Awareness:
    - Organize workshops and training sessions to raise awareness among enterprises about the benefits of sustainable development and ISO standards implementation.
    - Develop instructional materials, videos, and articles to disseminate knowledge about sustainable development and ISO standards.
2. Financial Support:
    - Provide preferential interest rate loan programs for enterprises investing in sustainable development activities and ISO standard implementation.
    - Implement tax reduction and exemption policies for enterprises that adopt ISO standards.
    - Support enterprises in participating in international fairs and exhibitions to promote products and services that adhere to ISO standards.
3. Workforce Training Support:
    - Support the training of specialized human resources in sustainable development and energy management for enterprises.
    - Develop online training programs to ensure easy access for enterprises.
4. Improving Administrative Procedures:
    - Review and simplify administrative procedures for obtaining ISO certification.
    - Implement a "one-stop-shop" mechanism for administrative procedures.
5. Enhancing Information and Support:

- Provide comprehensive information on support policies and ISO standards on government websites.
- Establish support centers to assist enterprises in applying ISO standards.

CHAPTER 7: PROPOSED SOLUTIONS AND CONCLUSION

7.1. Summary of Support Solutions for Compliance with Standards in the Supporting Industry

1. Training and Awareness Enhancement:
   - Provide training programs and consulting on industry standards.
   - Organize workshops, training sessions, and information-sharing events to raise awareness about regulations and standard requirements.
2. Financial Support:
   - Offer financial support and incentives to SMEs to improve infrastructure and production processes to meet standards.
3. Technical Support:
   - Provide consulting services and technical support to help businesses understand and apply standards effectively.
   - Support the implementation of new technologies and equipment to meet standards and improve product quality.
4. Collaboration and Networking:
   - Create networks for cooperation between businesses, organizations, and government agencies to share experiences and resources.
   - Develop industry communities through collaboration with industry organizations and alliances.
5. Legal Support:
   - Provide information and legal support related to compliance with industry standards.
   - Assist businesses in understanding and implementing legal regulations and standards.
6. Evaluation and Testing:
   - Promote quality evaluation and testing to ensure compliance with industry standards.
   - Develop standards and testing processes and offer certification services to businesses.
7. Incentives and Rewards for Compliance:
   - Establish incentive and reward programs for businesses complying with industry standards.
   - Enhance oversight and corporate social responsibility in compliance with standards.

7.2. Specific Proposals and Implementation for Businesses in the Industry

1. Training and Awareness Enhancement:
    - Design and implement training programs focused on ISO 50001 and ISO 14064-1:2018, emphasizing understanding, implementation, and benefits of compliance.
    - Organize regular workshops, training sessions, and information-sharing events with experts and successful businesses in standard implementation.
2. Financial Support:
    - Identify available financial resources from government, non-profit organizations, or banks to support businesses in applying standards.
    - Provide financial support through loans or training scholarships for employees.
3. Technical Support:
    - Offer consulting services from experts on implementing and executing standards.
    - Assist businesses in evaluating needs for new technology and equipment to meet standards.
4. Collaboration and Networking:
    - Build cooperation networks among businesses, government organizations, and non-profits to share experiences and resources.
    - Promote collaboration with industry alliances and organizations to develop the supporting industry community.
5. Legal Support:
    - Provide information and legal advice on requirements and regulations related to industry standards.
    - Support businesses in understanding and complying with legal regulations and standards, including procedural aspects.
6. Evaluation and Testing:
    - Develop standards and quality testing processes that align with industry requirements.
    - Offer testing and certification services to ensure compliance and product quality.
7. Incentives and Rewards for Compliance:
    - Create incentive and reward programs for businesses complying with industry standards, such as tax reductions or prestigious awards.
    - Enhance monitoring and corporate social responsibility by requiring public reporting on compliance progress.

7.3. Conclusion and Final Observations

- The support and incentive policies outlined in Decrees 111/2015/ND-CP and 57/2021/ND-CP play a crucial role in promoting the sustainable development of the supporting industry. These policies, including tax, credit, technical, and legal support, provide businesses with the motivation to invest in improving infrastructure, production processes, and compliance with international standards like ISO 50001 and ISO 14064-1:2018.
- However, the success of these policies relies on effective implementation and management by businesses. Achieving maximum effectiveness requires strong commitment from leadership and staff, as well as robust support from the government, organizations, and the industry community.
- Regular assessment and monitoring are essential to ensure that these policies are implemented effectively and fairly. Transparency and corporate social responsibility from businesses are crucial to ensure compliance with standards and contribute to a healthy and sustainable business environment.
- In summary, promoting compliance with international standards like ISO 50001 and ISO 14064-1:2018 in the supporting industry not only benefits businesses but also contributes to the sustainable development of the economy and societal environment.