SURVEY REPORT

Assessment of compliance with regulations on Energy Management and Energy Consumption Benchmarking in industrial enterprises (DE3, Outputs 1, 2, 3)

(final)

Submitted to: **Vietnam - Denmark Partnership Programme period 2020 – 2025**

Prepared by: **Green Development Centre**



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Disclaimer

The content of this report reflects the views of the authors, who are responsible for the accuracy and integrity of the information presented herein. The opinions expressed in this report are solely those of the authors and do not represent the views of the Viet Nam – Denmark Energy Partnership Programme or the Ministry of Industry and Trade.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

Acronyms	Meaning
DEEP3	Energy Partnership Programme between Viet Nam and Denmark 2020 - 2025
MOIT	Ministry of Industry and Trade
EESD	EE and Sustainable Development Department
DOIT	Department of Industry and Trade
NDC	Nationally determined contribution
IE	Industrial enterprise
EE	Energy efficiency
EA	Energy Audit
EEM	Energy efficiency measure
EMS	Energy management
Benchmarking	Energy consumption benchmarking
SEC	Specific energy consumption
RE	Renewable energy
DEU	Designated energy user
Near-DEU	Near-designated energy user

SUMMARY OF THE REPORT

This report is the result of research conducted from April to December 2024. Its purpose is to evaluate the compliance of industrial enterprises with Vietnam's regulations on energy management (EMS) and Energy consumption benchmarking (Benchmarking); assess the level of implementation, analyze the impact of current regulations on enterprises; and propose recommendations to improve the existing legal framework.

The methodology employed in this study is primarily quantitative research combined with qualitative research methods. Information and data collection and analysis tools include synthesizing and analyzing available documents, conducting online surveys using enterprise questionnaires, direct interviews with enterprises and representatives of state management agencies, and stakeholder consultation workshops.

1. Compliance with energy management regulations

The EMS requirements that energy users must implement are stipulated in Law No. 50/2010/QH12 on Economical and Efficient Use of Energy, specifically detailed in Decree No. 21/2011/ND-CP providing guidelines and measures for implementing the Law, and circulars issued by the Ministry of Industry and Trade (MOIT)[1].

To evaluate compliance with EMS regulations among industrial enterprises, the research team of GreenDC developed a list of activities that enterprises must perform under current regulations, collected information on actual implementation status, and compared these activities to identify the percentage of enterprises that have complied or not complied with EMS. The team also assessed the level of EMS achievement, difficulties encountered during implementation, and reasons for non-compliance.

A total of 750 enterprises were selected based on various criteria, ensuring representation in terms of size, industry, and geographic location, to receive the online survey on EMS compliance. The survey yielded 371 valid responses, including 340 from designated energy users (DEU)[2] and 31 from near - designated energy users (near-DEU)[3] enterprises across the three regions of North, Central, and South Vietnam. Specially below:

[1] Circular No. 39/2011/TT-BCT regulates the training and certification of energy management and energy auditors; Circular No. 25/2020/TT-BCT regulates the planning and reporting of the implementation of energy-saving and efficient use plans; and the implementation of energy audits

[2] DEU is an industrial production facility with a total annual energy consumption equivalent to 1,000 TOE or more, as stipulated in Decree No. 21/2011/ND-CP detailing and providing measures for the implementation of the Law on Economical and Efficient Use of Energy

[3] near-DEU) is an energy-consuming facility with an annual energy consumption ranging from 600 TOE (or 3.6 million kWh) to less than 1,000 TOE (6.2 million kWh)

[4]

Compliance level and impact of EMS:

The results from the online surveys of 340 DEUs indicate that all (100%) of these enterprises have implemented have carried out activities related to EMS. However, the level of compliance varies and remains inconsistent. Specifically, if we add up the number of enterprises that fully comply and partially comply with the 6 groups of EMS criteria as required, there are 100% of enterprises. However, about 67% of the enterprises only comply with some of the EMS requirements and have not met some of the other requirements. In addition, most enterprises focus maninly on meeting basic mandatory requirements, such as developing policies - plans, establishing organizational structures, and reporting. Activities related to investment in energy efficiency measures (EEMs) are still limited. (*see figure 1*)[5]

[4] Purple colour indicates the sector that have both DEU and near-DEU

[5] **Full compliance:** Meeting all requirements of the category.

Partial compliance: At least one requirement has not been fulfilled.

Non-compliance: None of the requirements have been implemented, or they have been implemented but assessed as not meeting the requirements

The survey results also indicate that although the extent of EMS implementation varies among enterprises, adopting EMS models has positively impacted on DEUs in improving energy efficiency (EE). Up to 91% of enterprises surveyed believe EMS is beneficial, with 43% rating it as help "a lot " and 48% as help "quite a lot" in identifying EE opportunities, implementing EEMs, and reducing production costs. Notably, a considerable proportion (70%) of near-DEUs (is not required to comply with regulations on energy management) have also adopted some EMS-related activities.

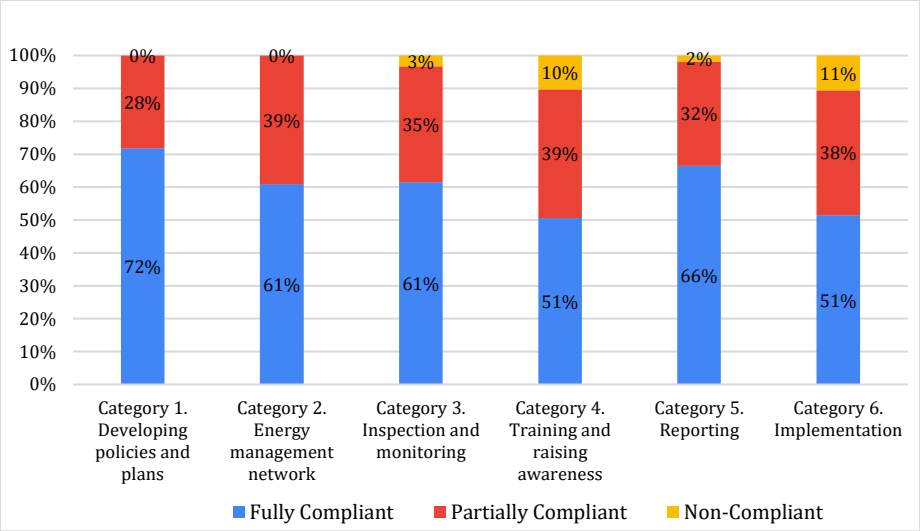

Figure 1. Compliance requirements divided into categorys

Challenges:

Besides these achievements, EMS implementation faces **challenges** for both enterprises that are required to comply, and state management agencies, particularly at the local level. Specifically:

For enterprises:

The main challenges that enterprise encounter include:

(1) Enterprises lack financial resources to invest in activities that promote EE, EMS.

(2) Lack of EMS human resources; Limited capacity of Energy Managers due to insufficient expertise and skills, as they typically receive only one-time training with little or no opportunity to participate in advanced training or updates on EE, EMS knowledge and skills.

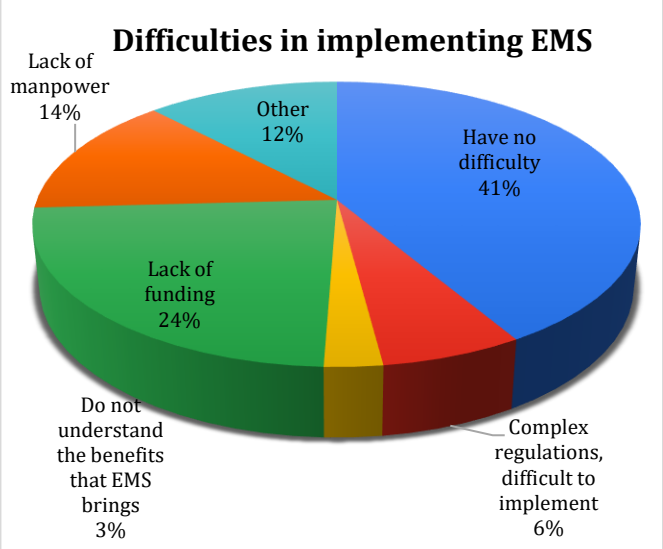

Figure 2. Difficulties in implementing EMS

(3) Enterprises' awareness of EMS is still insufficient, especially regarding the benefits that EMS brings.

In addition to the difficulties mentioned above, the survey also revealed several other factors affecting the implementation of EMS, such as unstable production conditions of enterprises, lack of strict inspection and supervision by state authorities, and overlapping regulations.

For provincial-level state management agencies - Departments of Industry and Trade (DOIT):

(1) Personnel are assigned multiple roles and lack expertise in EE/EMS.

(2) Limited on-site inspection and supervision at enterprises due to a shortage of personnel and the need to comply with regulations on enterprise inspection and auditing.

(3) Few or no investment support, communication, or capacity-building training activities on EMS for enterprises within the jurisdiction due to a lack of guidelines on utilizing state budget funds for EE.

Recommendations:

To promote effective EMS implementation in enterprises, relevant state agencies should research and consider the following solutions:

(1) ***Strengthen communication to raise awareness of EMS for enterprises, combined with applying mechanisms to encourage enterprises to comply:*** Accordingly, there is a need to strengthen communication campaigns to raise awareness of the benefits of EMS for enterprises. It is necessary to apply incentive mechanisms to encourage DEUs to implement standardized EMS models; encourage near-DEUs to apply EMS models to enhance EE. The incentives include financial incentives such as concessional loans, loan guarantees, tax exemptions, and reductions… for enterprises investing in technology and EEMs of enterprises; reward enterprises that perform well in EEMs and EMS.

(2) ***Strengthen training and development of EMS personnel through providing basic, in-depth, and periodic training courses to update knowledge and skills in EMS.*** Accordingly, allocate funding from the state budget and establish mechanisms to mobilize socialized resources to enhance training activities for energy management experts and energy managers in enterprises. Along with that, consider revising or supplementing legal regulations related to EMS capacity-building training activities for energy managers in energy-consuming enterprises; including regulations on mandatory retraining or advanced training for energy managers in enterprises.

(3) ***Enhancing provincial-level capacity in inspecting compliance with EMS regulations in DEUs*** through activities such as capacity-building training for DOIT officials; developing a list of minimum compliance requirements that DEUs must fulfill or a guidance document for local authorities on EMS compliance inspection and monitoring. Consider issuing guidelines on the use of budget support for EE; establish a focal point to connect experts, training organizations, and enterprises; Review and adjust reporting regulations in the form of enhancing the application of digital technology.

(4) ***Strengthen inspection, supervision, and strictly enforce of penalties for non-compliance with EMS regulations in enterprises, especially at the local level***

2. Compliance with Benchmarking Regulations

As of now, MOIT has issued seven circulars stipulating Benchmarking for seven industries[6]: chemicals, plastics, beer and beverage, steel, paper, and seafood processing, sugarcane. This study focuses on evaluating benchmarking compliance in five sectors: beer and beverage, steel, paper, and seafood processing, sugarcane.

The evaluation method involves comparing enterprises's actual specific energy consumption (SEC) with prescribed benchmarks; assessing their planning and implementation of EEMs to meet benchmarks; and reviewing their annual benchmarking compliance reports.

A total of 300 industrial enterprises (IEs) from the five selected sectors were invited to participate in the online survey regarding compliance with Benchmarking regulations. The survey received 153 valid responses. Based on the analysis of the online survey results, the research team selected 30 enterprises for direct on-site surveys to verify data, assess methods of data collection and calculation of SEC, and identify challenges and suggestions from enterprises for better compliance with Benchmarking regulations.

Compliance and impact status:

About the benchmarking achievement rate, survey results indicate that by 2023, the ***average*** proportion of enterprises meeting the Benchmarking requirements across five industrial sectors will be approximately 75%. The specific figures for each sector are as follows:

[6] This includes: Circular No. 02/2014/TT-BCT, which stipulates energy-saving and efficiency measures for industrial sectors; Circular No. 19/2016/TT-BCT, which sets energy consumption benchmarks for the beer and soft drink production industry; Circular No. 20/2016/TT-BCT, which establishes energy consumption benchmarks for the steel industry; Circular No. 38/2016/TT-BCT, which defines energy consumption benchmarks for the plastic industry; Circular No. 24/2017/TT-BCT, which sets energy consumption benchmarks for the paper production industry; Circular No. 52/2018/TT-BCT, which defines energy consumption benchmarks for the seafood processing industry; Circular No. 39/2019/TT-BCT, which establishes energy consumption benchmarks for the sugarcane production industry

Total responses	**Responses by every sector**	**Average:** 75% comply with Benchmarking
153 responses	52 enterprises - steel	77% comply with Benchmarking
	34 enterprises - beer and beverage	63% comply with Benchmarking
	30 enterprise - paper	69% comply with Benchmarking
	24 enterprises - seafood processing	91% comply with Benchmarking
	15 DN enterprises - canesugar	87% comply with Benchmarking

With such a proportion of enterprises achieving Benchmarking by 2023a certain percentage of enterprises have yet to meet specific energy consumption (SEC) requirements, even though the regulations have been in effect for many years. Some deadlines for mandatory compliance with Benchmarking have already passed (since 2020), while others are approaching (2025). However, compared to the compliance rate with the energy consumption benchmarking at the time the benchmarks were established, there has been a positive trend. For example, in the beer and beverage industry, the compliance rate increased from 43% in 2016 (when the Circular was issued) to 63% in 2023. Similarly, in the pulp and paper industry, it rose from 60% in 2017 to 69% in 2023.

The proportion of enterprises meeting the benchmarking varies across sectors. The beer and beverage industry and the paper industry have a lower percentage of enterprises achieving the Benchmarking compared to other industries. Additionally, the survey indicates that within the five industries, some enterprises have actual SEC significantly lower than the benchmark, while others have actual SEC much higher than the benchmark. (For example, see the steel industry in *Figure 3*). Specifically:

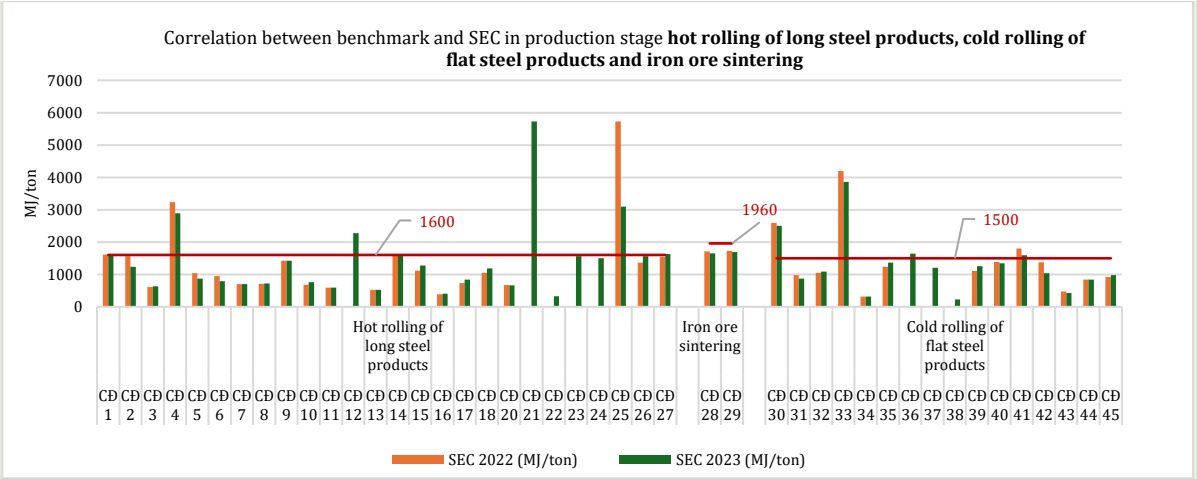

Figure 3. SEC compared to the Benchmarking of enterprises in the steel industry has many differences.

Regarding reporting, 93% of the surveyed enterprises have complied with the annual reporting requirements. However, 7% have not submitted reports to the regulatory authorities as required. The reasons include lack of awareness, lack of notification from authorities, or the perception that reporting was unnecessary due to no significant changes.

Regarding the implementation of EEMs, enterprises across all five surveyed industries have recognized the importance of EE and implemented various measures to meet the Benchmarking requirements. The measures taken by enterprises include management measures, technical improvements, and technological upgrades. However, ***the majority of implemented measures are management-related, simple, easy to execute, low-cost, and offer quick payback periods***. More complex measures, such as upgrading or replacing production lines and adopting new technologies that require significant investment, have been less frequently implemented.

Impact assessment of the regulations shows that ***the mandatory compliance with Benchmarking requirements has driven enterprises to adopt various EE to meet the prescribeds***. In practice, enterprises subject to these requirements have implemented activities related to EE more structured and comprehensive EEMs compared to others. Additionally, the number of enterprises achieving benchmarking in the following year is higher than the previous year (2023 is higher than 2022 and previous years). serves as further evidence that these regulations have positively influenced not only awareness but also concrete actions and investment in EE among enterprises.

Challenges:

Compliance with Benchmarking regulations is mandatory for enterprises, non-compliance with minimum benchmarks can result in penalties, including taxes on excess energy consumption. However, the survey shows that many non-compliant enterprises face significant challenges, making it difficult to meet Benchmarking requirements in the

short term. Key challenges identified, the most common **challenges** faced by enterprises include: *(1) Technology lines and production equipment are old; (2) Difficulty in determining which measures to take to meet the requirements; (3) Challenges in investment capital; (4) Lack of knowledge and capacity to develop and implement energy efficiency projects ...* (*figure 4*):

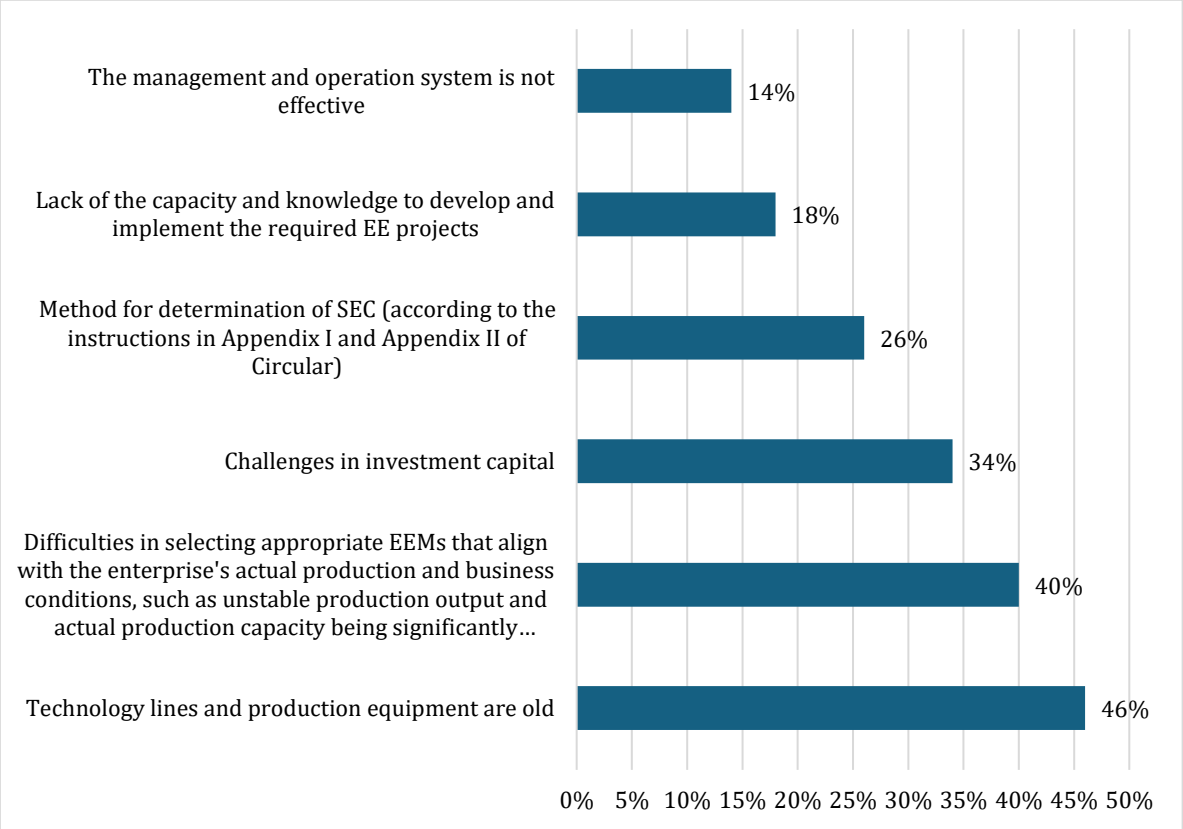

Figure 4. Proportion of enterprises facing difficulties in implementing energy consumption benchmarking

In addition to the difficulties mentioned above, enterprises also face other challenges such as complex and lengthy investment project approval procedures (for state-owned enterprises); lack of information or insufficient consultation on their EE potential; enterprise leaders not clearly recognizing the direct benefits of EEMs; and state management agencies not enforcing sufficiently strong measures to encourage enterprise compliance.

Recommendation:

To promote compliance with Benchmarking among enterprises, the research team recommends that MOIT and relevant sectors consider the following recommendations:

(1) Implement special support policies about financial for enterprises that have not yet met Benchmarking requirements, especially those facing difficulties due to outdated production technology and lack of financial resources for technological improvements and EEMs implementation. Policies include providing

preferential loans, loan guarantees, tax exemptions, etc. for investments in technology EEMs of enterprises.

(2) Strengthen technical support for enterprises, including organizing specialized training courses for enterprises on how to identify EEMs and new measures and technologies, provide instructions on calculating EEMs, and prepare loan applications for EE projects; Enhancing communication and guidance for enterprises regarding Benchmarking regulations;

(3) Developing an online tool to support Benchmarking calculations, along with a SEC assessment tool that:

a) Is tailored to different enterprise types;

b) Accounts for all relevant factors to ensure standardization;

c) Allows enterprises to assess their SEC and compare deviations from Benchmarking;

d) Clearly identifies the approved data sources used for SEC calculations, ensuring consistency across the industry;

e) Helps enterprises understand which factors have the most significant impact on SEC, thereby identifying key areas for improvement.

(4) Reviewing and revising current Benchmarking regulations suitable for reality production of IE, including:

a) Reevaluating Benchmarking regulations in industries with significant SEC variations that cannot be solely explained by EE improvements, such as beer and beverages, steel, and paper industries;

b) Studying the possibility of narrowing the capacity-based classification for Benchmarking in the beer and beverages industry and the paper industry;

c) Reassessing equivalent product conversion factors for the beer and beverages industry;

d) Reviewing regulations on product quality differentiation within the paper industry;

(5) Consider cases where enterprises fail to meet Benchmarking due to reasons unrelated to EE to prevent penalties in cases where high SEC is caused by other factors (e.g., operating below designed capacity, actual production output lower than designed capacity due to market instability, or high product quality requirements).

1. GENERAL INFORMATION

1.1. Context

In the past two decades, in the context of the global energy transition, countries around the world have focused on developing renewable energy (RE), promoting EEs and enhancing EE use.

In Vietnam, to ensure energy security and electricity supply security, many legal documents have been developed and promulgated to promote and enhance the use of energy economically and efficiently. Specifically, the Law on Economical and Efficient Use of Energy (Law No. 50/2010/QH12); Decree 21/2011/ND-CP dated March 29, 2011 detailing and implementing the Law on Economical and Efficient Use of Energy; Decree 134/2013/ND-CP dated October 17, 2013 regulating administrative sanctions in the fields of electricity, hydropower dam safety, Economical and Efficient Use of Energy; Decree 17/2022/ND-CP dated January 31, 2022 amending and supplementing several articles of the decrees regulating administrative sanctions for violations in the fields of chemicals and industrial explosives; electricity, hydropower dam safety, EE use; commercial activities, production, trade of counterfeit and prohibited goods and protection of consumer rights; oil and gas activities, petroleum and gas trading. From 2014 to 2019, the MOIT issued Circulars regulating Benchmarking for 7 industries including: chemical production, beer and beverage production, steel, plastics, paper production, seafood processing and sugarcane production.

By 2023, there will be 3,491 DEU nationwide, including 2,864 industrial production facilities[7]. . All of these facilities, according to the provisions of the Law on Economical and Efficient Use of Energy, must develop an EMS model. In addition, enterprises in the 7 industrial sectors i.e. chemical production, beer and beverage production, steel, plastics, paper production, seafood processing, and sugarcane production must also comply with regulations on Benchmarking.

Currently, the Government is requesting MOIT implement the task to amend the Law on Economical and Efficient Use of Energy. To ensure the maximum effectiveness of the amended regulations, it is important to understand how the current regulations are implemented and the level of compliance by IEs.

This study is part of the Vietnam - Denmark Partnership Programme period 2020 – 2025 (DEPP3). The DEPP3 aims to support Vietnam in implementing its commitment to reduce greenhouse gas (GHG) emissions under the Paris Agreement while developing a low-carbon energy roadmap in line with the NDC (Nationally Determined Contribution) targets by 2025.

[7] Decision 1011/QD-TTg on the List of DEU in 2023

1.2. Objectives and implementation time

1.2.1. Objectives

The objectives of the activity are to:

- Assess compliance with current regulations on EMS and benchmarking.
- Identify the main reasons for any levels of non-compliance.
- Evaluate how and to what extent EMS is being implemented in IE beyond minimum compliance.
- Analyze the impact of EMS and benchmarking regulations on the behavior of enterprises regarding EE improvements.
- Provide recommendations to enhance the regulatory framework for promoting EE.

1.2.2. Implementation time

The duration to implement the task is from April to December 2024.

1.3. Subject for surveying and samples for surveying and assessment

1.3.1. For energy management

The subjects selected for the survey and assessment of compliance with regulations on EMS include representatives of the following groups:

- ***DEUs:***

Industrial production enterprises (IE) in the list of DEU are the main targets to be selected for the survey and assessment of compliance with regulations on EMS. According to the provisions of Decree 21/2011/ND-CP of the Government, IEs with a total energy consumption in one year converted to one thousand tons of oil equivalent (1000 TOE) or more are DEUs. Based on this criterion, by 2021, there will be 2,596 IEs all over the country that are DEUs.[8]

The number of DEU, which are required to implement the EMS as stipulated, is significant (2,596 DEU). Conducting a survey of all these enterprises is neither feasible within the available study resources nor necessary if a representative sample is selected. Therefore, the consultants established criteria for sample selection to ensure representation and sufficient reliability for conducting surveys through online questionnaires and direct interviews. The main criteria for selecting enterprises to assess compliance with EMS regulations include: *(1) Representing different industrial sectors; (2) From various geographical regions (North, Central, and South); (3) Having different levels of energy consumption; (4) Representing different types of enterprise ownership.*

[8] Decision 1480/QD-TTg on the List of DEU in 2021

- ***Near DEUs:***

In addition to DEU, some industrial energy users with energy consumption close to the DEU threshold (600–1,000 TOE) were also selected for the survey to evaluate compliance. This group of enterprises is "encouraged" to implement the requirements specified in the regulations. Thus, the consultants will assess the level of interest and EMS implementation status within this group. Furthermore, the study will explore whether expanding the scope of mandatory EMS group (for example, with the group of near-DEUs) is feasible and what factors need attention.

- ***State management agencies and consulting units:***

In addition to IE, representatives of some provincial-level agencies, such as the DOIT, Industrial Promotion Centers, consulting units, and energy service companies were also selected for interviews. The aim is to clarify the advantages and challenges in guiding, urging, monitoring, and supporting enterprises to comply with EMS regulations at the local level.

1.3.2. For Benchmarking

The surveyed targets for assessing compliance with Benchmarking regulations include representatives from the following groups:

- ***Industrial Enterprises***

The surveyed enterprises for evaluating compliance with Benchmarking regulations in this study are DEUs in five sectors: *(1) Beer and beverage production; (2) Steel production; (3) Pulp and paper production; (4) Seafood processing; (5) Cane sugar production*. These enterprises are regulated under various Circulars, as summarized in *Table 1* below:

Table 1. Mandatory compliance with Benchmarking

No	Circular	Entities targets to Benchmarking
1	Circular No. 19/2016/TT-BCT for **Beer and Beverage** Industry	- Beer: scales (: >100 million liters; 20-100 million liters; and < 20 million liters - Soft drinks: carbonated/non-carbonated
2	Circular No. 20/2016/TT-BCT on Benchmarking in the **Steel Industry**	Production process: - Sintering of iron ore - Iron making by blast furnace - Steelmaking (1) converter furnace (blowing furnace), (2) electric arc furnace, (3) induction furnace - Steel rolling.

No	Circular	Entities targets to Benchmarking
3	Circular No. 24/2017/TT-BCT on setting Benchmarking in the **pulp and paper industry**	Products by output (tonne/year) - Packaging paper: > 50,000; 10,000 - 50,000; < 10,000 - Tissue Paper: 10,000 - 50,000; < 10,000 - Printing, writing paper and photocopying paper: >50,000; 10,000 - 50,000
4	Circular No. 52/2018/TT-BCT, Benchmarking in fishery processing, applicable to industrial processing of **catfish and shrimp products**	Produce over 300 tons/year of products: - Shrimp - Catfish
5	Circular No. 39/2019/TT-BCT on Benchmarking of **cane sugar production**	3 outputs: 1000 – 3000 tons/day; 3000 – 6000 tons/day; 6000 tons/day

The number of enterprises subject to compliance across these industries is significant, making a full survey infeasible. Therefore, consultants have developed criteria to select a sample of enterprises for the survey (50% of DEUs in each sector). The selected enterprises were chosen based on the following criteria: *(1) Different levels of energy consumption*: Priority is given to DEUs, also including representatives of non-DEUs; *(2) Representation of different product categories, technologies, and production processes within each industrial sector*; *(3) Geographic diversity, ensuring that enterprises* from the northern, central, and southern regions were included in the survey for each sector.

- ***State agencies and consulting units***

In addition to enterprises, consultants also conducted interviews with representatives of provincial state agencies, specifically the DOIT. This agency is responsible for directing, managing, and supervising compliance with EE regulations. The purpose was to understand the current implementation status, as well as the advantages and challenges faced by provincial management agencies in enforcing benchmarking regulations among enterprises in their respective provinces.

1.4. Implementation methodology

The methodology for this assessment combines qualitative and quantitative research methods. Key sources of information include: *(1) Review of available documents; (2) Online surveys using questionnaires for enterprises; (3) On-site surveys at enterprises; (4) Interviews with representatives of provincial state agencies.*

In summary, the methodology is outlined in *Figure 5* below:

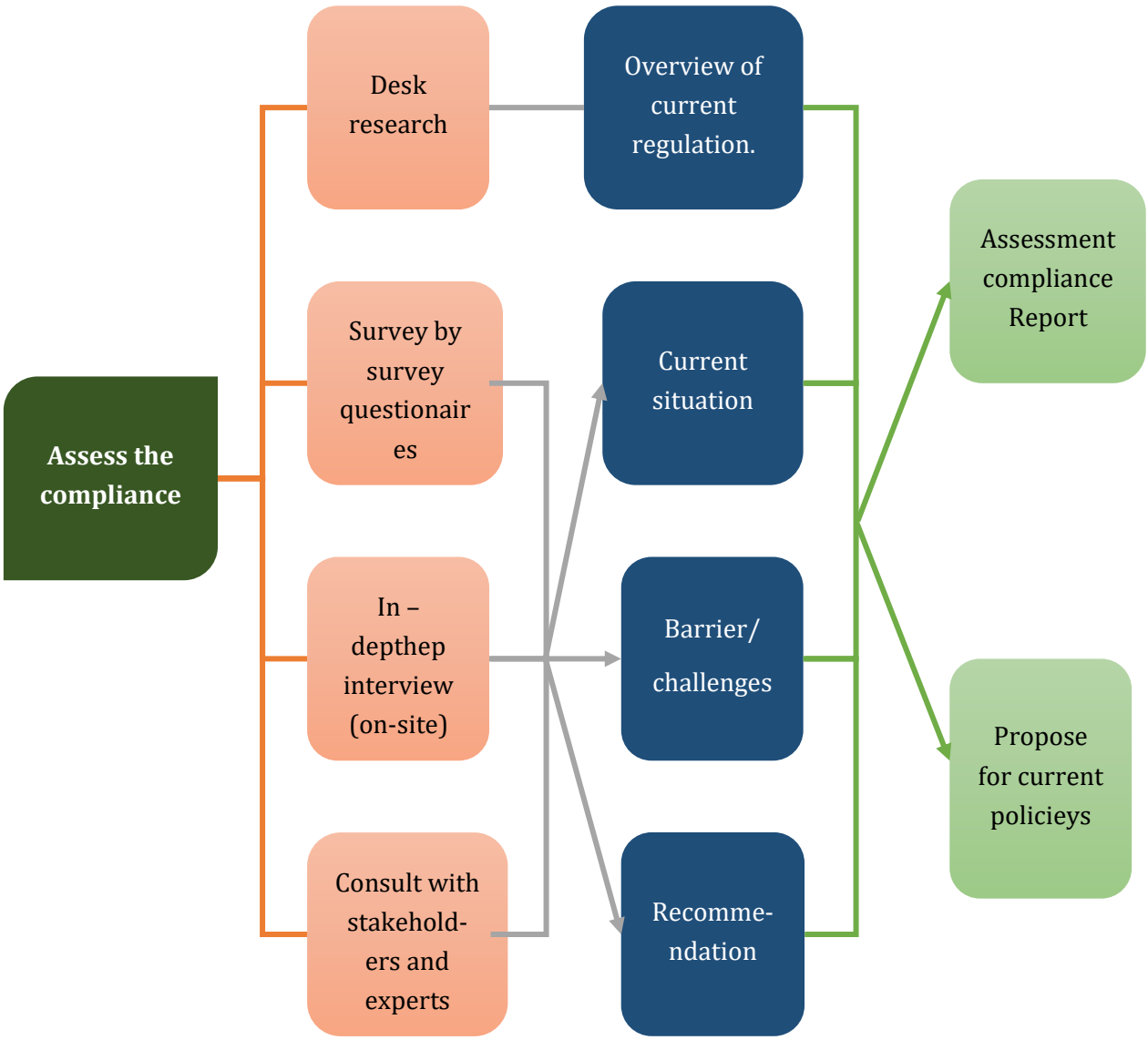

Figure 5. Research method

1.4.1. Research documents

The consultant has collected and researched the documents and legal documents from various sources, such as the Ministry of Information and Communications, General Statistics Office, DOITs, projects, research reports published on websites of ministries, branches, domestic and international organizations, etc.

The main contents of the document research focused on clarifying:

- Current legal framework and practical activities on EMS and Benchmarking Vietnam;
- International experience on EMS regulations related to Vietnam such as ISO 50001, ISO 50005;
- Ineffective factors in the current legal framework on EMS and Benchmarking in Vietnam;

- Determine the number of enterprises and classify enterprises according to different criteria to select for online survey as well as direct survey at the enterprise.

1.4.2. Online survey using survey questionnaire

The objective of the online survey is to reach a large enough number of enterprises to collect information on the current status of compliance with regulations on EMS and Benchmarking; the advantages and difficulties of enterprises when implementing regulations on EMS and Benchmarking; suggestions and recommendations from enterprises to remove barriers and difficulties in implementing regulations on EMS and Benchmarking.

The online survey was conducted through a pre-designed and formatted Google form questionnaire. The link to the questionnaire was sent to selected enterprises via official dispatch, letter and email.

1.4.3. Direct interview with enterprises

The purpose of direct interviews with enterprises is to collect detailed and in-depth information to assess in detail the compliance with regulations on EMS and Benchmarking; assess the impacts of policies on enterprises' behavior to implement EMS; analyze difficulties and collect recommendations from enterprises to improve legal regulations related to EMS and Benchmarking.

Enterprises selected for direct interviewed are based on the results of the collected Survey Forms (*refer annex III and IV*), based on the following criteria:

- Enterprises properly implement regulations on EMS and Benchmarking;
- Enterprises have implemented regulations on EMS and Benchmarking but not completely;
- Enterprises have not implemented regulations on EMS and Benchmarking;
- Enterprises representing different geographical regions: North, Central, South.

Interviewees at the enterprise include: EMS managers, technical staff, and enterprise leaders.

There were 30 enterprises selected for interviews, belonging to the industries of Beer and soft drinks, steel, paper, seafood processing, cane sugar, wood processing, brick and ceramic production.

1.4.4. Interview with management agencies and consulting units

The consultant conducted interviews with representatives of the EMS Department of 06 DOITs; 06 consulting units in the field of EE. The purpose is to understand the current management and supervision status and the difficulties that management agencies as well

as enterprises in the province and city encounter in the process of implementing regulations on EMS and Benchmarking.

1.5. Limitations of the Report

To conduct this study, the method used for collecting quantitative information was an online survey questionnaire. Accordingly, the questions and response options were provided in the questionnaire, and enterprises selected their answers based on these predefined options. The survey targeted enterprises that were intentionally selected based on various criteria to ensure representation in terms of size, industry, geographic region, and ownership type.

The number of enterprises chosen for the survey was twice the number of responses expected. However, with online responses, some enterprises did not fully complete the questionnaire or provide conflicting information. Additionally, nearly 50% of the enterprises selected did not respond to the questionnaire, which could lead to the risk that the responding enterprises might be those performing better.

The consultants made efforts to address the gaps by rechecking the responses of each survey form; incomplete or inappropriate information that could not be verified was discarded. The consultants also cross-checked the results with the annual reports of the Departments of Industry and Trade in five provinces and cities. Additionally, they conducted direct interviews with enterprises, including both well-performing and poorly performing enterprises (based on the survey forms collected). The process of reviewing the reports from the five provinces and cities and conducting direct interviews with enterprises revealed some discrepancies compared to the survey responses; however, these were minor, and overall, the survey responses were deemed reliable.

2. ASSESSMENT OF COMPLIANCE WITH ENERGY MANAGEMENT REGULATIONS

2.1. Energy management compliance requirements

2.1.1. Compliance Requirements for Energy Management

EMS requirements that enterprises must fulfill according to current regulations are specifically outlined in the following documents: *(1) Law No. 50/2010/QH12 dated June 17, 2010,* Law on Efficient and Effective Use of Energy *(2) Decree No. 21/2011/ND-CP dated March 29, 2011,* detailing and providing measures for implementing the Law on Efficient and Effective Use of Energy, *(3) Decree No. 134/2013/ND-CP dated October 17, 2013,* on administrative penalties in the fields of electricity, hydropower dam safety, and EE, *(4) Decree No. 17/2022/ND-CP dated January 31, 2022,* amending and supplementing provisions of decrees on administrative penalties in the fields of chemicals and industrial explosives; electricity, hydropower dam safety, EE; trade activities, production, sale of counterfeit and banned goods, and consumer protection; petroleum activities, petroleum and gas business, *(5) Circular No. 25/2020/TT-BCT dated September 29, 2020,* on planning, reporting on EE plans, and conducting energy audits.

The EMS specific compliance requirements are summarized in *Table 2* below:

Table 2. List of EMS requirements under current regulations

No	Request	Regulation
1	DEUs are responsible for implementing the EMS model as guided by competent state authorities.	Article 32 - Law on Efficient and Effective Use of Energy
2	Publicly announce objectives and policies on efficient and effective use of energy at the facility.	Article 8 - Decree No. 21/2011/ND-CP
3	Develop annual and five-year plans for EE at the facility; formulate and implement EE measures (EEMs) according to the established objectives, policies, and plans.	Article 8 - Decree No. 21/2011/ND-CP
4	Have an EMS network and personnel meeting the criteria specified in Clause 1, Article 35 of the Law on Efficient and Effective Use of Energy.	Article 8 - Decree No. 21/2011/ND-CP

No	Request	Regulation
4.1	*"The energy manager at the DEU must have a college degree or higher in energy or a related technical field for DEUs in industrial production, construction projects, and service activities; and a technical vocational certificate or higher for DEUs in agricultural production and transportation."*	*Clause 1, Article 35 of the Law on Economical and Efficient Use of Energy*
4.2.	*The energy manager must have an EMS certificate issued by a competent authority.*	*Clause 1, Article 35 of the Law on Economical and Efficient Use of Energy*
5	Regularly monitor and track the energy consumption needs of vehicles and equipment across the entire production line, as well as the installation, renovation, and repair of energy-consuming equipment at the facility	Article 8 - Decree No. 21/2011/ND-CP
6	Implement the energy audit; propose and select management and technological measures to ensure EE	Article 8 - Decree No. 21/2011/ND-CP
7	Regularly organize training and workshops for employees on EE	Article 8 - Decree No. 21/2011/ND-CP
8	There is a reward and penalty system to promote EE activities at the facility	Article 8 - Decree No. 21/2011/ND-CP
9	Before January 15 of year N, energy-consuming establishments specified in Points a and b, Clause 1, Article 4 are responsible for submitting reports to the DOIT on energy consumption for year N-1, as stipulated in Form 1.1	Article 5, Circular 25/2020/TT-BCT
10	Before April 30th of each year, the establishment must develop a plan for the current year (Year N) and report the implementation of the plan for the previous year (Year N-1) regarding EE at the establishment, and register with the local DOIT on the website http://dataenergy.vn	Article 7, Circular 25/2020/TT-BCT
11	The plan for year N and the report on the implementation of the plan for year N-1 regarding EE at the facility must	Article 7, Circular 25/2020/TT-BCT

No	Request	Regulation
	include the contents specified in Forms 1.2 to 1.8, Appendix I, issued with this Circular. The facility shall choose one of the forms that is appropriate to its business sector to develop the plan for year N and report on the implementation of the plan for year N-1.	
12	Before April 30th of the first year of each 5-year planning cycle, the facility is responsible for developing the EE plan for the next 5 years and reporting on the implementation of the previous 5-year plan, sending it to the local DOIT via the website http://dataenergy.vn	Article 8, Circular 25/2020/TT-BCT
13	The facility must apply the EMS model according to the requirements specified in Article 8 of Decree No. 21/2011/ND-CP dated March 29, 2011, of the Government, which provides detailed regulations and enforcement measures for the Law on Economical and Efficient Use of Energy, and report to the local DOIT in the annual energy use plan report on the website http://dataenergy.vn	Article 11, Circular 25/2020/TT-BCT

In addition to the mandatory requirements that enterprises must comply with as outlined in the above documents, the General Department of Standards, Metrology, and Quality, under the Ministry of Science and Technology, published the National Standard TCVN ISO 50001:2019 on **Energy Management Systems** in 2019. The purpose of this standard is to help organizations establish the necessary systems and processes to continuously improve energy performance, energy use, and energy consumption. This standard is not mandatory, however, if an enterprise meets the requirements outlined in the standard and is evaluated and certified, it can be considered to have achieved the highest level of EMS.

2.1.2. Criteria and methods for evaluating energy management compliance

The criteria for evaluating an industrial enterprise's compliance with EMS regulations are based on the activities that the enterprise is required to carry out according to current regulations, as summarized in *Table 2*. In addition, reference can be made to ***TCVN ISO 50001:2019; ISO 50005 and the EMS Matrix*** tool to assess the levels of EMS implementation by IEs, alongside the minimum compliance levels according to current regulations of the Government and relevant state management agencies. Accordingly, the

criteria for assessing the compliance of enterprises with energy management are summarized in *Table 3* below :

Table 3. List of criteria for evaluating EMS compliance of enterprises

No	Evaluation Criteria
I	**Requirements for developing policies and plans**
1	Developing and issuing policies about EE for enterprises.
1.1	*Announcing goals and policies about EE*
1.2	*Clearly define the responsibilities of teams and individuals involved in implementing the EE plan*
2	Developing annual and five-year plans for EE
II	**Requirements for the organizational structure for EE**
3	Having an EMS network with operational rules, functions, responsibilities, and specific authority for each member
4	Having an energy manager
4.1	*The energy manager has an EMS certificate issued by the MOIT*
III	**Requirements for inspection and monitoring**
5	Inspecting and monitoring the energy consumption needs of vehicles and equipment on the entire production line
6	Inspecting and monitoring fluctuations in energy consumption related to the installation, upgrading, and repair of equipment
7	Conducting reviews and evaluations of the implementation of EE plans and solutions
IV	**Requirements for training and raising awareness**
8	Organizing communication and training for employees on EE
9	Applying reward and penalty policies to promote energy-efficient practices
V	**Reporting requirements**
10	Submit the annual plan and report on the implementation of the EE plan for the facility to the DOIT by April 30th each year.

11	Submit the five-year plan and the report on the implementation of the five-year EE plan to the DOIT by April 30th of the first year of each five-year planning cycle.
12	Submit the annual energy consumption report to the DOIT by January 15th each year.
VI	**Requirements for implementation**
13	Conduct an energy audit every three years
14	Implement specific measures and investment projects to promote EE.

According to Table 3 above, the evaluation criteria will be divided

- Category I. Requirements for developing policies and plans: including criteria 1, 2,
- Category II. Requirements for the organizational structure for EE: including criteria 3, 4
- Category III. Requirements for inspection and monitoring: including criteria 5, 6, and 7;
- Category IV. Requirements for training and raising awareness: including criteria 8 and 9;
- Category V. Requirements for reporting: including criteria 10, 11, 12;
- Category VI. Requirements for implementation: including criteria 13 and 14.

The method for assessing the minimum level of compliance with current regulations involves comparing the activities performed by enterprises (as gathered from online survey forms and in-depth interviews) against the activities that enterprises are required to perform under current regulations (yes or no). Additionally, for the activities already carried out by enterprises, further evaluation is conducted to determine the levels achieved, the reasons for unperformed activities, and the level of compliance attained by the enterprises.

Each requirement group will be evaluated according to the following levels:

- **Fully Compliant: All requirements** of the group are met.
- **Partially Compliant: At least one requirement** has not been fulfilled.
- **Non-Compliant: No requirements** have been fulfilled, or actions have been taken but are assessed as not meeting the requirements.

2.2. General Information about the enterprise responding to the survey

The survey results received responses from 340 DEUs and 31 near-DEUs. The common characteristics of the enterprises that responded to the survey are as follows (*figure 6*):

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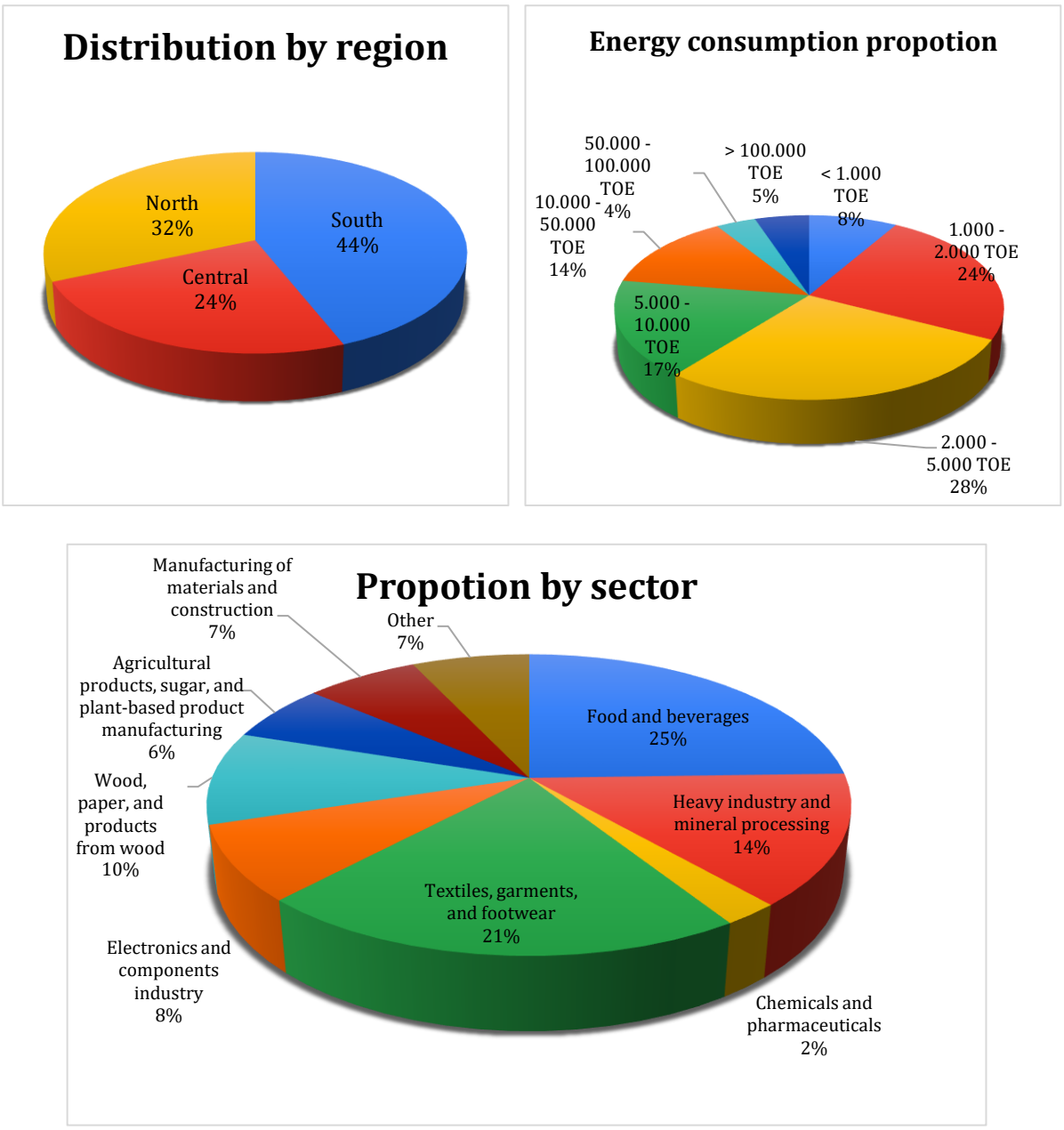

Figure 6. General Information about the enterprises surveyed on EMS.

From the figure above, it can be seen that the enterprises responding to the survey are represented from different geographical areas, have different scales of energy consumption and come from many different manufacturing industries.

2.3. Current status and level of compliance

2.3.1. General assessment

All surveyed DEUs (100%) have implemented activities related to energy management; however, the level of compliance varies, and implementation remains inconsistent with a lack of professionalism. When combining the number of enterprises

that are fully compliant and partially compliant with the six required criteria groups, 100% of the enterprises have engaged in energy management activities.

However, when assessed from the perspective of full compliance, about two-thirds of the enterprises have only complied with some of the energy management requirements and have not met other necessary criteria. The implementation of the energy management model in most enterprises is primarily at the "compliance" and "basic" levels, meaning that they prioritize tasks that are mandatory under regulations, which are administrative in nature. Many enterprises have not yet fully developed the energy management model in a professional and systematic manner, and the number of enterprises certified for meeting energy management standards ISO 50001 remains very low. The compliance rate of the groups is shown in *Figure 4* below:

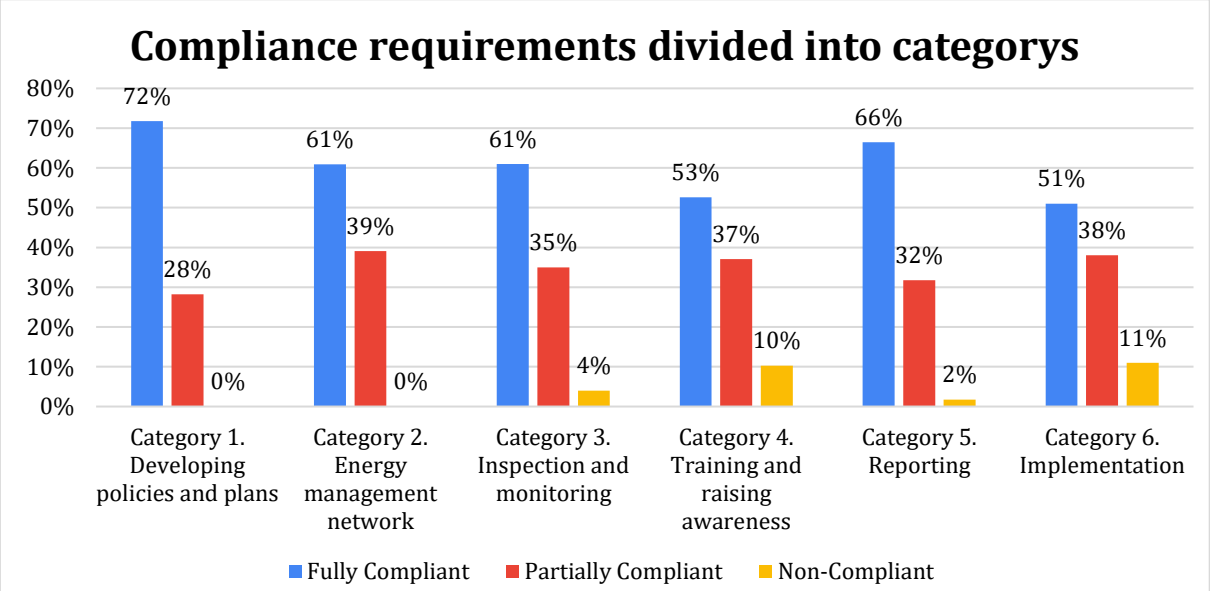

Figure 7. Groups of EMS compliance requirement categories (%)

Category 1. Developing and issuing policies and plans:

This category consists of two key criteria: *(1) Developing and issuing policies on EE; and (2) Formulating annual and five-year plans for EE*. This category has the **highest compliance** rate among the six categorys, in terms of both full and partial compliance. However, 28% of enterprises have not met at least one of these two criteria.

Survey findings indicate that while policies are issued, some enterprises have not set clear and specific EE targets. Some enterprises develop and announce EE targets merely to comply, without considering the actual needs or conditions of the enterprises. Most enterprises 's annual EE plans focus on management measures and low-cost, simple measures that are easy to implement. Measures requiring large investments, high technical expertise, or impacting production and enterprises operations are generally included in the five-year plans.

Category 2. Energy Management Network:

This category includes two main criteria: *(1) Establishing an energy management network with clearly defined regulations, roles, responsibilities, and authorities for each member; and (2) Assigning an energy manager*. Survey results (as presented in *Figure 7*) show that 39% of enterprises have not met at least one of these two criteria.

Notably, among those with an energy management officer, 14% in total DEU surveyed have individuals who are not trained in energy management and have not been certified. The survey also reveals that energy management officers often take on multiple roles within the company, and their positions frequently change. Additionally, most of them do not receive updates on EE information or knowledge.

- ***Category 3. Monitoring and Supervision Requirements:***

This category includes three assessment criteria: *(1) Monitoring energy consumption of equipment and systems across the entire production line; (2) Tracking energy consumption fluctuations due to new installations, modifications, or equipment repairs; and (3) Reviewing and evaluating the implementation of EE plans and measures*. Survey results show that 35% of enterprises have not met all three criteria, while 4% have not met any of them.

The survey results show that ***monitoring and supervision are mostly carried out manually, with very few enterprises having software systems to track and monitor energy consumption.*** Evaluation of plan implementation is mainly conducted through regular meetings, often combined with other topics, and very few enterprises hold specialized meetings for EE matters.

- ***Category 4. Training and awareness requirements category:***

This category includes two assessment criteria: *(1) Conducting awareness campaigns and training for employees on EE; and (2) Implementing reward and penalty policies to encourage EE practices*. While considered relatively easy to implement, this category ranks fifth in terms of compliance among the six categorys. Additionally, 10% of enterprises have not met either of the two criteria.

Direct survey results show that the main form of communication used by enterprises is direct communication through production staff and energy management officers. The content mainly focuses on disseminating the company's regulations and requirements regarding EE practices. Very few enterprises organize training sessions related to EE for their employees.

- ***Category 5. Implementation of EEM and investments:***

This category consists of three criteria: *(1) Submitting annual EE plans and reports on EE implementation to the Department of Industry and Trade (DOIT) by April 30 each year; (2) Submitting five-year EE plans and reports on their implementation to DOIT by April 30 of the first year of each five-year planning cycle; and (3) Reporting annual energy consumption*

to DOIT by January 15 each year. This category is primarily related to administrative compliance.

Survey results show compliance rates of: 88% for submitting annual energy consumption reports by January 15; 83% for submitting annual EE plans and implementation reports by April 30; 79% for submitting five-year EE plans and implementation reports by April 30 of the first year of the planning cycle.

- ***Category 6. Reporting requirements:***

This category includes two assessment criteria: *(1) Conducting energy audits every three years; and (2) Implementing specific EE measures or investment projects*.

Survey results show that 84% of enterprises conduct energy audits every three years, while 60% have implemented specific EEMs or investment projects. This category has the lowest compliance rate among the six categorys.

On-site surveys reveal that most enterprises implement management-based and auxiliary equipment-related solutions that require low investment and offer quick payback periods. High-cost EEMs, those requiring direct intervention in production technology, or new investments are rarely undertaken.

2.3.2. Current status of implementing specific requirements

The current status of implementing specific requirements is summarized in *Table 4* below:

Table 4. Summary of survey results by compliance requirement groups

No	Compliance Requirement	DEU (%)	
		Implemented	Not implemented
I	**Requirements for developing policies and plans**		
1	Developing and issuing policies about EE for enterprises.[9]	88	12
1.1	*Announce objectives and policies on EE*	*93*	*7*
1.2	*Clearly specify responsibilities for organizations and individuals involved in implementing EE plans.*	*88*	*12*

[9] For criteria 1.1 and 1.2, the percentage is determined based on the number of enterprises that have ***implemented*** criterion 1. For example, if criterion 1 has been ***implemented*** by **298** enterprises out of 340 surveyed DEUs (88%), then criterion 1.2 has been ***implemented*** by **280** enterprises out of the 298 that ***implemented*** criterion 1 (97%). The same approach applies to other percentages

No	Compliance Requirement	DEU (%)	
		Implemented	Not implemented
2	Develop annual and five-year plans on EE	89	11
II	**Requirements for the organizational structure for EE.**		
3	There is an EMS network with operational regulations, functions, responsibilities, and specific authority for each member.	74	26
4	Having the energy manager.	88	12
4.1	*Energy managers of enterprises hold EMS certificates issued by MOIT*[10]	*85*	*15*
III	**Requirements for inspection and monitoring**		
5	Inspecting and monitoring the energy consumption needs of vehicles and equipment across the entire production line.	87	13
6	Monitoring and tracking fluctuations of energy consumption related to new installations, upgrades, and equipment repairs.	71	29
7	Conducting reviews and assessments of the implementation of EE plans and measures.	95	45
IV	**Requirements for awareness-raising training**		
8	Organize awareness campaigns and training for workers on EE.	81	19
9	Implement reward and penalty policies to promote EE activities.	67	33
V	**Reporting requirements**		
10	Submit an annual energy consumption report to the DOIT before January 15 each year	88	12

[10] The percentage is determined based on the number of enterprises that have implemented criterion 4, following the same approach as for criteria 1, 1.1, and 1.2.

No	Compliance Requirement	DEU (%)	
		Implemented	Not implemented
11	Submit the 5-year plan and the report on the implementation of the 5-year plan for EE to DOIT before April	83	17
12	Submit the five-year plan and the five-year plan implementation report on EE to the DOIT before April 30 of the first year of each five-year planning cycle	79	21
VI	**Implementation requirements**		
13	Conduct energy audits once every 3 years.	84	16
14	Implement EEMs.	57	43

a. Category 1: Policy Development and Planning Requirements

This category has the highest compliance rate among the six categorys in terms of both full and partial compliance. However, 28% of enterprises have not met at least one of the two criteria. Specifically

- ***Announce EE goals & policies***

88% of enterprises have developed and issued policies EE. Among them, 82% of enterprises, based on the total number of DEUs responding to the survey, have published objectives and policies on the EE, with top management approving EE targets (annually or per product) in alignment with the enterprise's strategic direction and context. Additionally, 78% of the total DEUs responding to the survey have explicitly defined responsibilities for collectives and individuals involved in implementing EE tasks and objectives.

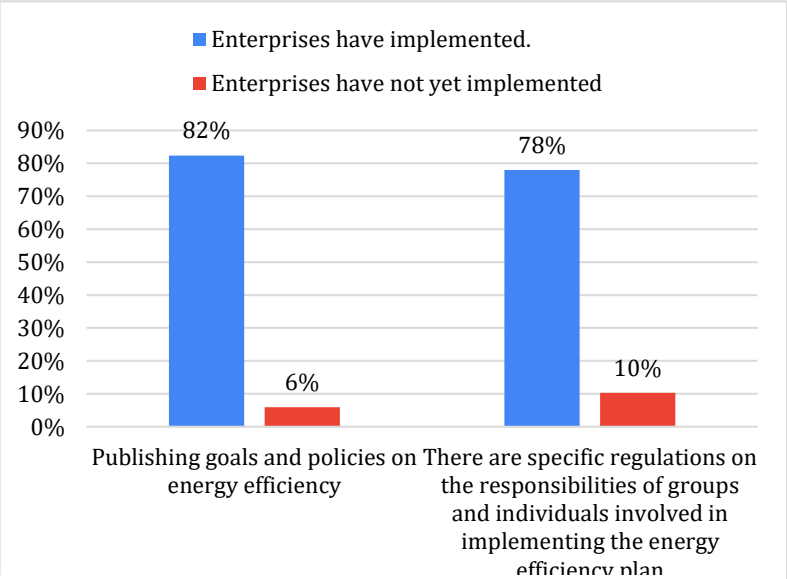

Figure 8. The percentage of enterprises complying with regulations on announcing EE objectives & policies

The prominent EE policies of enterprises are focused on reducing energy consumption in production, lowering energy costs, and are typically quantified through the energy targets

to be achieved. The most common approach adopted by the majority of enterprises is ***setting EEs targets***. Enterprises encourage the implementation of measures to save energy, ensuring a reduction in annual energy consumption or for specific products.

The survey results also show that, although there have been policies in place, the setting of EE goals in some enterprises is not specific or clear. The evaluation from the DOIT and the analysis of the policies issued by the enterprises shows that there is still a large number of enterprises have ***developed and announced goals that are more for compliance purposes***, primarily to report to government authorities, without having feasible plans to achieve these goals.

Develop annual and 5-year EE plans

The proportion of enterprises developing annual and five-year plans for EE is relatively high, accounting for 89% of the DEU surveyed enterprises. ***Annual plans are primarily self-developed by the enterprises, often integrated with their overall production and business plans***. Five-year plans are largely based on the results of energy audits, thus they are mostly developed concurrently with energy audits and with support from energy audit consulting units.

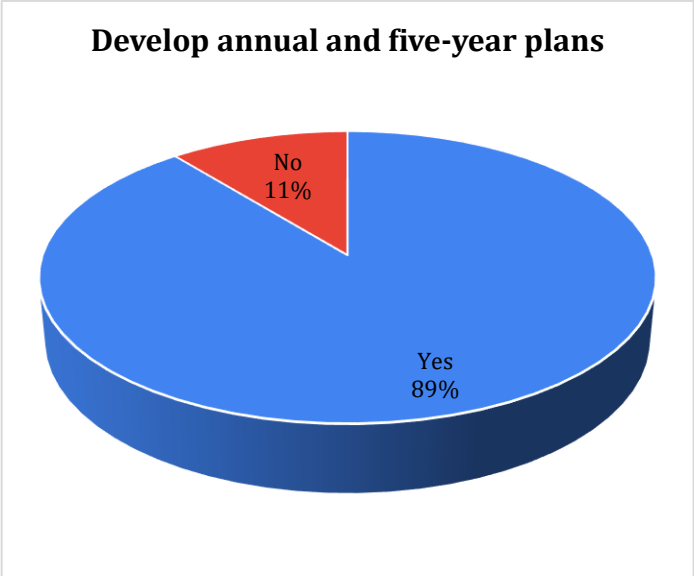

Figure 9. Proportion of enterprises developing annual and five-year EE plans

An assessment of the actual plans reveals that ***most annual plans primarily focus on management measures, low-cost measures, and simple, easily implementable measures***. Measures requiring significant funding, advanced expertise, or those impacting production and business activities are mostly included in the five-year plans. However, the majority of both annual and five-year EE plans of enterprises lack clear assignment of responsibilities to departments or individuals within the organization.

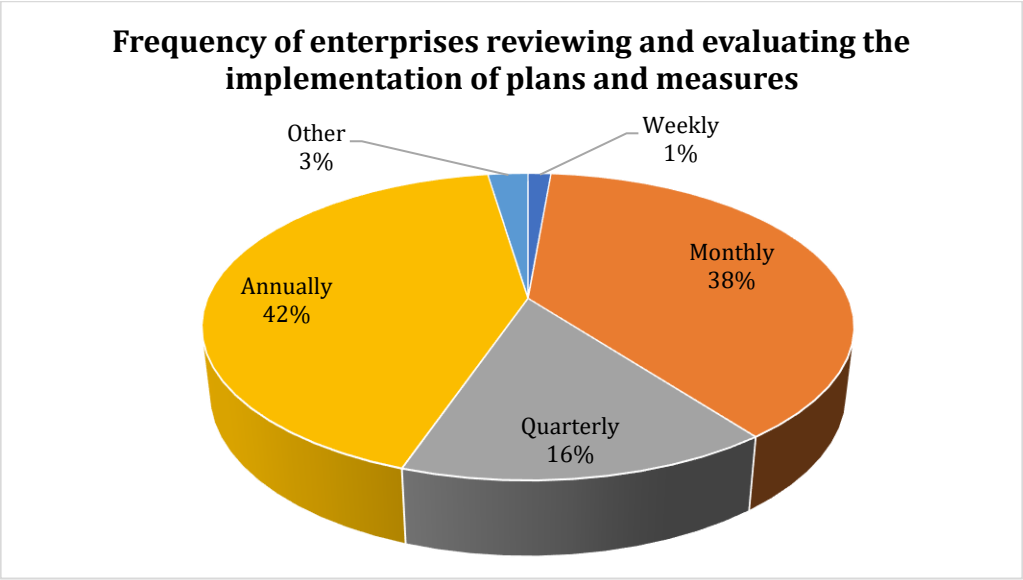

Figure 10. Proportion of enterprises reviewing and assessing the implementation of EE plans and measures periodically

b. Category 2. Energy management network

Energy management network

74% of surveyed enterprises reported having an EMS board or an EMS network (*figure 11*). Among them, 59% have established an EMS board formed by the enterprise's highest leadership. Some enterprises ***do not establish a dedicated EMS board but instead integrate EMS tasks with other departments or teams,*** such as environment, technical, ISO teams.

In enterprises with an EMS board or network, the participants typically include representatives from the enterprise's leadership (director or deputy director), heads of relevant departments (technical, materials, administration), and production managers or supervisors. ***Direct surveys at some enterprises show that those with an EMS board or network and direct leadership involvement tend to implement EEMs effectively***. Energy usage data is managed and assessed daily or monthly, particularly with clearly defined objectives and specific implementation plans.

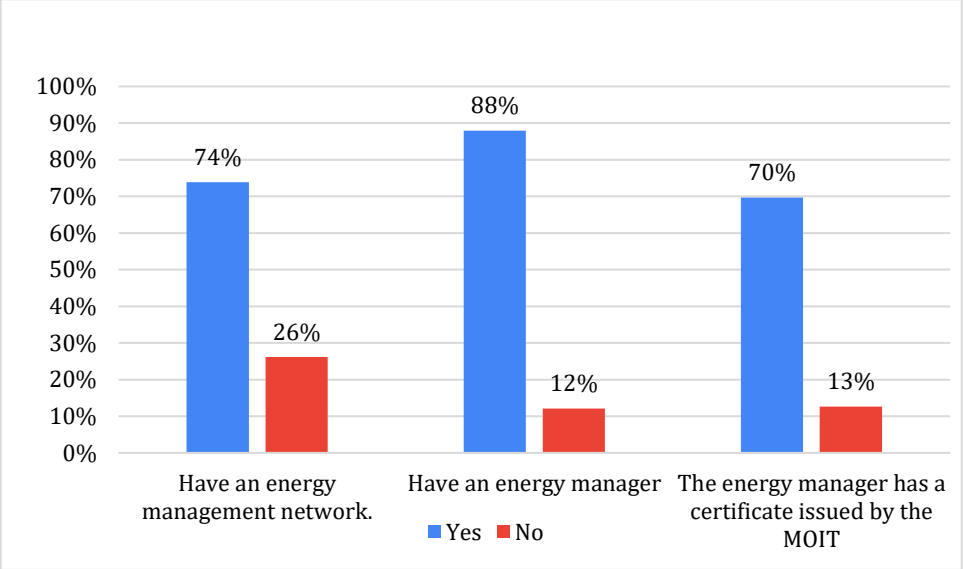

Figure 11. Proportion of enterprises with an EMS network and energy managers

Energy manager

The proportion of enterprises with energy managers account for 88% of the total enterprises surveyed. Among these, 74% of of the total DEUs responding to the survey have energy managers hold EMS certificates issued by MOIT (*figure 11)*. In practice, ***energy managers who have been certified in EMS meet the requirements for EMS in enterprises***. Enterprises with trained and certified energy managers are equipped with the knowledge and skills to develop and implement energy plans, effectively meeting the need to improve their operational efficiency.

However, among enterprises with energy managers, 14% of the total DEUs responding to the survey (figure 11) have energy managers who have not received training in EMS and have not been certified in EMS, while the law requires energy managers to have a diploma of at least associate degree level and must hold an EMS certificate issued by the competent authority. On-site surveys at enterprises indicate that energy managers often have ***multiple other responsibilities and typically spend only 1 to 2 days per month on EE-related tasks***, mainly for data compilation and reporting. The position of energy manager also tends to change frequently, either due to a transfer to another position within the enterprise or leaving for another company.

According to the EE Law, energy managers have quite important responsibilities. They are tasked with assisting the head of the enterprise in carrying out the following duties: *(1) Developing annual and five-year plans for EE; (2) Organizing a network to manage energy usage activities and applying an EMS model; (3) Implementing EEMs according to approved objectives and plans; (4) Inspecting and evaluating the implementation of EEMs; (5) Monitoring energy consumption needs of equipment and the entire production line, tracking changes in energy demand related to new installations, renovations, and repairs of energy-consuming equipment; submitting periodic reports as required; (6) Organizing communication, training, and education activities on energy usage*. With such numerous

tasks, it is essential for energy managers to be properly trained, tested, and certified to perform their duties effectively. However, 12% of enterprises still do not have an energy manager, and among those that do, 14% have not yet provided training or certification as required by the law. This remains a significant issue that needs attention.

c. Category 3. Inspection and monitoring

95% of enterprises report that they monitor energy consumption needs of equipment and the entire production line; 87%% monitoring and control of energy consumption of equipment and the entire production line; 71% track fluctuations in energy demand related to new installations, renovations, and repairs of equipment. Monitoring and supervision are ***mostly done manually*** by compiling report data from relevant departments, divisions, and units, ***with very few enterprises using software systems to track and monitor energy consumption***. The survey process showed that to provide data related to energy usage and implemented EEMs, most enterprises require coordination among various departments to ensure comprehensive data collection

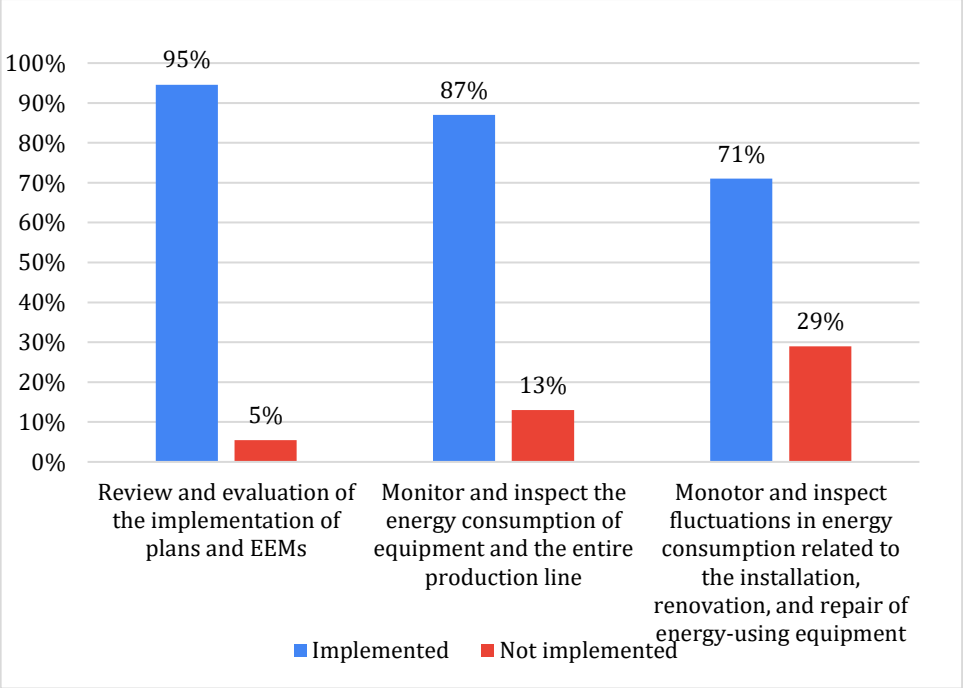

Figure 12. Status of energy consumption inspection and monitoring in enterprises

95% of enterprises conduct inspections and evaluations of the implementation of EE plans and measures. Among them, 41% review and evaluate the annual plan, 38% do so monthly, 16% quarterly, and only 2% of enterprises conduct evaluations weekly. ***Inspections and evaluations are primarily conducted through meetings*** between enterprise leadership and the leaders of relevant departments, often combined with other topics. The survey noted that very few enterprises hold meetings specifically on EE.

d. Category 4. Communication and Training

The primary communication method used by enterprises is direct communication through production managers and EMS personnel. The content mainly focuses on disseminating company regulations and requirements regarding EE. Very few enterprises organize training sessions on EE-related topics for their employees.

Organizing awareness campaigns and training on EE for employees

82% of enterprises have organized communication efforts to raise awareness among workers about EE. However, direct surveys show that the primary form of communication used by enterprises is direct communication through production staff and EMS officers. ***The content mainly focuses on spreading the company's regulations and requirements regarding EE, as well as the reward and penalty mechanisms related to EE performance***.

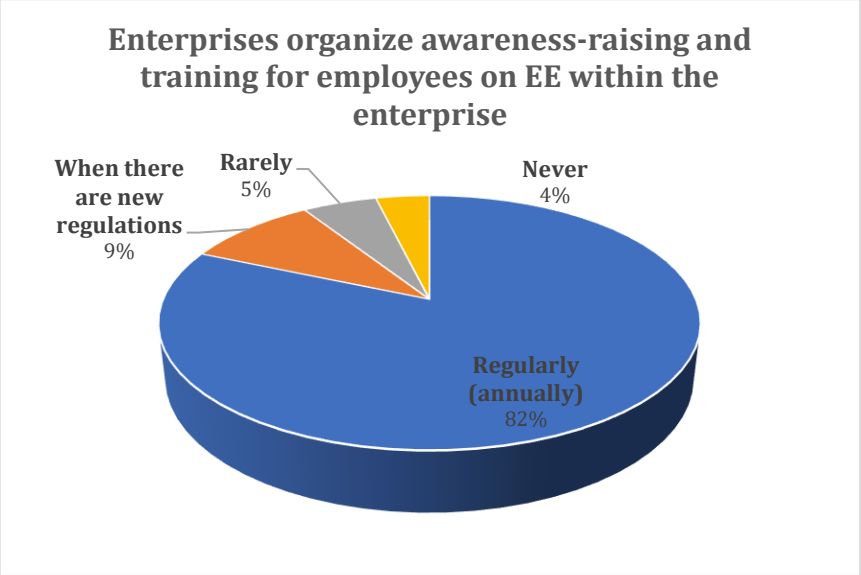

Figure 13. Level of Communication about EE in Enterprises

Very few enterprises organize training sessions on EE-related topics for their employees. Those that do primarily conduct training due to corporate policies or compliance with buyer requirements, often integrating it with other topics such as environmental protection, greenhouse gas emission reduction, and cleaner production. Participants in these training sessions are mainly leaders of specialized departments

On reward and penalty policies to promote EE activities:

70% of enterprises have implemented reward/penalty policies related to EE in production. Among them, 18% apply the rewards/penalties annually, while 9% do so occasionally, 43% have implemented reward and penalty policies. The rewards are ***usually monetary and are given to organizations or individuals who propose EE initiatives or achieve energy usage levels below the company's allocated benchmark*** (mostly assessed annually).

e. Category 5. Report

Annual and Five-Year Plan Implementation Report

According to regulations, DEUs are required to submit the following to the DOIT: *(1) An annual plan and a report on the implementation of the annual EE plan by April 30 each year; and (2) A five-year plan and a report on the implementation of the five-year EE plan by April 30 of the first year of each five-year planning cycle*. The survey shows that 83% of enterprises submit their annual EE plan and implementation report by April 30 each year, and 79% submit their five-year plan and implementation report. However, 17% of enterprises have not submitted their annual plan and implementation report, and 21% have not submitted their five-year plan and implementation report as required.

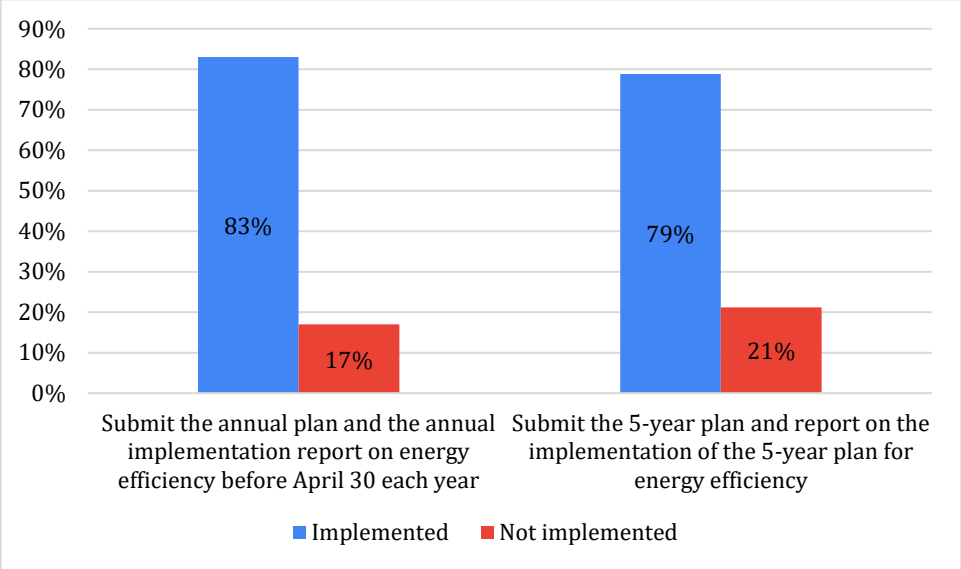

Figure 14. Proportion of Enterprises Submitting Annual and Five-Year Plan and Implementation Reports

The evaluation of the practicality of the plans shows that most enterprises consider the activities outlined in the ***annual plans to be feasible and have chosen to implement them. The five-year plan is relatively long, so in reality, many activities may not be implemented*** due to dependence on various factors, such as production conditions, factory layout, and technological advancements.

Annual Energy Consumption Report:

The annual energy consumption report is a requirement not only for DEUs but also for near DEUs. This type of report is submitted online through the website managed by MOIT. The percentage of enterprises submitting the annual energy consumption report to the DOIT before January 15 each year is 88%

Energy audit report

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84% of DEUs have conducted energy audits in accordance with the required three-year cycle***. All enterprises that have completed energy audits hired external consulting units to carry out the audits***. Among these, 94% of enterprises that conducted energy audits submitted their reports to the DOIT after completion. In most cases, ***the consulting unit submits the report*** on behalf of the enterprise, with very few instances requiring resubmission as per the request of the receiving agency.

Currently, most enterprises ***focus on increasing product output rather than using EE***. Knowledge of EE and experience in identifying EE opportunities remain relatively limited for many enterprises. Meanwhile, the energy audit consulting market shows various segments for energy audit reports. In addition, interviews with enterprises revealed that the solutions (proposed in the energy audit reports) implemented by enterprises ***mainly focus on management solutions that are easy to implement, require low investment costs, and have minimal impact on production line***s. No enterprise has implemented all the measures proposed by consultants, with the highest implementation rate being around ***50-70% of the total proposed measures***.

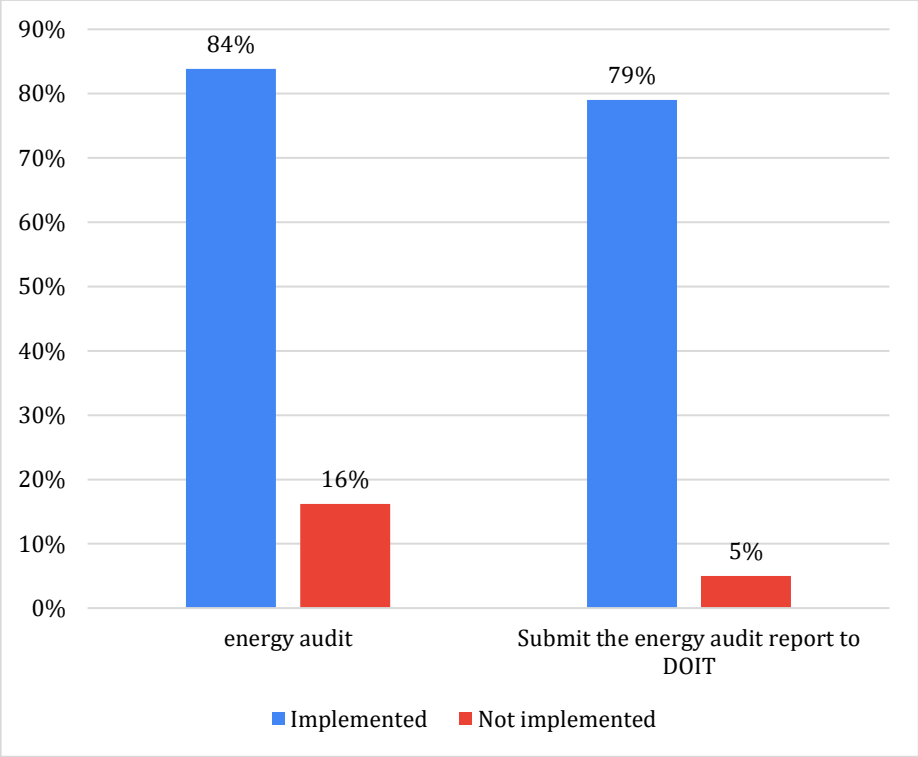


Figure 15. Proportion of enterprises that have and have not conducted energy audits

16% of DEUs have not yet conducted energy audits. It is a matter of concern as regulations require all energy-intensive enterprises to carry out this activity.

Insights from practical observations reveal that the main reasons for failing to submit the reports are: *(1) the enterprise is unaware of the obligation to carry out this task, (2) changes in the EMS personnel (such as resignation or transfer to another position), resulting in no one handling the task, (3) forgetting to complete the task, and (4) the lack of reminders from the government agency (DOIT)*.

Surveys conducted at enterprises and various localities show that most provinces and cities send official letters annually to the enterprises subject to reporting requirements to request and remind them to comply. For some enterprises with a designated point of contact (usually the EMS officer), DOIT staff call or send text messages directly to remind and prompt compliance. However, most enterprises only act upon receiving an official letter from the DOIT or a phone call or text message from DOIT staff. ***Many enterprises report that if they do not receive an official letter from the DOIT***, they assume they do not need to take action.

f. Category 6. Implementing

The solutions implemented by enterprises are mostly management-related or involve auxiliary equipment, which require low investment costs and offer a quick payback period. EEMs that require high investment costs, direct intervention in production technology, or new capital investments are rarely adopted by enterprises

Investment in implementing EE measures

The measures implemented include both management and technical measures.

64% of enterprises have implemented new management processes to improve EE in operations and maintenance, while 61% have undertaken specific investment projects for EE. Survey findings indicate that ***most measures chosen by enterprises focus on management and auxiliary equipment-related measures that are low-cost, have a quick payback period, and provide measurable EE improvements monthly or quarterly***. Examples include lighting upgrades, installing inverters for motors, optimizing steam systems, refrigeration systems, and compressed air systems. EEMs requiring high investment costs, direct intervention in production technology lines, or new investments are less prioritized by enterprises due to financial constraints and lengthy investment procedures

2.4. Impact of the Energy Management System

Although the implementation of the EMS varies across different levels, this activity is assessed to have positive impacts on enterprises in managing energy use and improving EE in production.

The results show that up to 91% of enterprises surveyed believe that EMS is beneficial for the enterprise, with 43% of enterprises rating the EMS system as help "a lot" and 48% rating it as help "quite quite a lot" in identifying EE opportunities, implementing EEMs, and reducing production costs. For enterprises in sectors subject to Benchmarking regulations, the application of the EMS model has enabled better compliance with regulations, contributed to reducing energy consumption, and met the required energy consumption levels as stipulated.

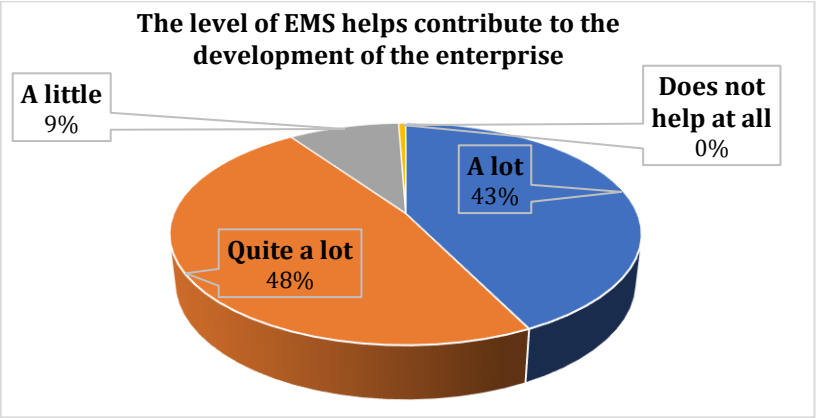


Figure 16. Assessment of the benefits of EMS

Survey results also indicate that a high percentage of DEUs are interested in and planning to implement the EMS model according to ISO 50001, reaching 67% of the total DEU response survey, in which some enterprises, although not certified for ISO 50001, have been implementing energy management systems in accordance with this standard.

Another aspect is that, ***although not required to implement EMS a relatively high percentage of near DEUs also apply the EMS model***. Direct interviews with enterprises show that they are very interested in EE and see it as a natural need. Therefore, even though they are not obligated to implement EM, through training sessions, seminars organized by MOIT, DOIT, projects, consulting units in which enterprises participate, and through mass media, they have proactively developed and implemented EM activities aimed at reducing energy use in production. The survey results from 31 near DEUs are summarized in *Table 5* below:

Table 5. Implementation of EMS activities in Near-DEUs

No	Compliance Requirement	Near-DEU (%)	
		Implemented	Not implemented
I	**Policy and Plan Development**		
1	Develop and issue the enterprise's EE and conservation policy[11]	74	26
1.1	Announce objectives and policies for EE	*100*	*0*
1.2	Have clear regulations specifying responsibilities for groups and individuals involved in implementing EE plans	*91*	*9*

[11] Similar to footnote 8 and footnote 9

No	Compliance Requirement	Near-DEU (%)	
		Implemented	Not implemented
2	Develop annual and five-year EE plans	68	32
II	**Organizational Structure for EE**		
3	Have an EMS network with regulations, functions, responsibilities, and specific powers for each member	58	42
4	Have an energy manager	71	29
4.1.	The enterprise's energy manager has an EMS certification issued by the MOIT[12]	*55*	*45*
III	**Inspection and Supervision**		
5	Inspect and monitor energy consumption needs of equipment and devices across the entire production line	94	6
6	Monitor energy consumption fluctuations related to new installations, upgrades, and equipment repairs	74	26
7	Conduct reviews and assessments of the implementation of EE plans and measures	90	10
IV	**Awareness-raising Training**		
8	Organize awareness-raising and training for employees on EE	81	19
9	Apply reward and penalty policies to promote EE activities	65	35
V	**Reporting**		
11	Submit annual energy consumption reports to DOIT by January 15 each year	68	32
VI	**Implementation**		
12	Implement EEMs	55	45

[12] Similar to footnote 8 and footnote 9

2.5. Difficulties and obstacles in implementing energy management regulations

Alongside the achievements, the implementation of the EMS model still faces challenges for both enterprises and state management agencies, particularly local government authorities.

2.5.1. For industrial enterprises

As analyzed above, the most significant challenge in complying with EMS regulations is ***the substantial variation in compliance levels among the surveyed enterprises***. While some enterprises have established and implemented a structured and professional EMS model following ISO 50001, a large proportion of enterprises have only met the basic mandatory requirements. Additionally, some enterprises implement compliance in a superficial or perfunctory manner.

Moreover, a review of the DEU survey results indicates that enterprises are also facing several difficulties and challenges in complying with the EMS.

The most common difficulties and challenges faced by enterprises include a lack of funding for energy management (affecting 24% of enterprises), followed by insufficient personnel for energy management (14%), complex and challenging regulations for implementing the energy management model (6%), lack of understanding of the benefits of energy management (3%), and other reasons (12%). Details are illustrated in *Figure 17* below:

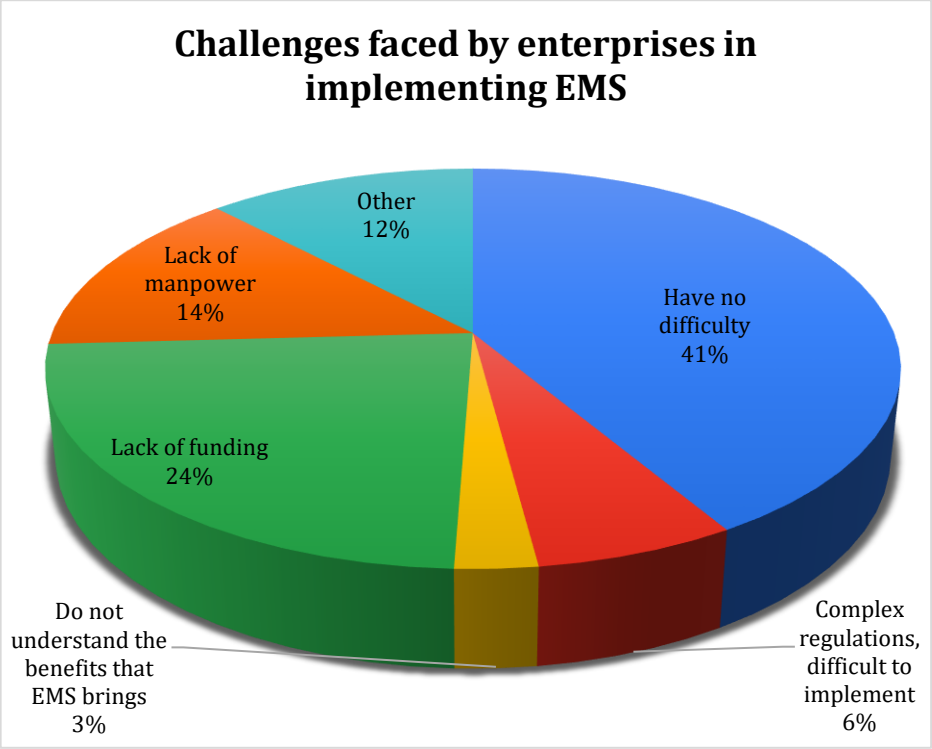


Figure 17. Challenges faced by enterprises in implementing energy management

(1) ***Regarding the lack of funding:*** To effectively implement EMS, in addition to activities related to policy development, human resource allocation, it is necessary to invest in EEMs, upgrading/renewing EE technology, production lines, measuring equipment, communication, and capacity-building training; as well as consulting fees. ***These costs can be substantial for many enterprises***, especially those in sectors impacted by the COVID-19 pandemic in recent years, medium and small-sized enterprises, and those with older and outdated technology or production lines that need to be replaced. Although current legal documents provide ***mechanisms and policies for tax incentives and interest rate reductions for EE projects***, ***the procedures are still complex***. As a result, most enterprises with a need for such support are unable to access loans or benefit from tax incentives.

(2) ***Regarding the lack of personnel:*** The energy manager is often the technical officer of the enterprise who is given additional responsibilities for EMS, so the time allocated for this task is limited. A survey of enterprises shows that EMS tasks are mostly handled in ***1 to 2 days each month***. Since energy managers are part-time or semi-professional, they face difficulties in carrying out their full responsibilities related to EMS. In addition, many enterprises experience frequent ***changes in energy management personnel, which disrupts continuity and the proper*** implementation of legal requirements. Many enterprises either have energy managers who have not been properly trained or do not have an energy manager at all, resulting in a ***lack of expertise and skills to effectively implement energy management systems*** according to regulations. This gap in qualified personnel hinders the successful execution of EE practices.

(3) ***Regarding the complexity and difficulty of regulations:*** Although there are specific guidelines and the MOIT organizes several training sessions annually to assist enterprises with energy management, some enterprises still find the current regulations to be complex and difficult to implement. Specific issues raised include the criteria for energy managers, which are perceived as challenging or unclear for businesses to meet. These complexities hinder the effective implementation of energy management systems as required by regulations. Enterprises believe that they are required to submit numerous reports, which often overlap. Currently, enterprises must submit two reports annually: *(1) the energy consumption report for the year to the DOIT before January 15th, and (2) the annual plan and report on the implementation of the EE plan before April 30th*. Additionally, the deadline for submitting the annual energy consumption report before January 15th is challenging for enterprises because, ***near the Lunar New Year, enterpriseses have to carry out many tasks***.

(4) ***Regarding awareness:*** In practice, some enterprises ***do not fully understand the benefits of energy management.*** As a result, they have not yet taken steps to promote the implementation of this task. Additionally, ***some enterprises are***

unaware of the regulations related to energy management, and do not realize that they are required to implement energy management, nor do they know how to carry out energy management activities.

2.5.2. For the provincial-level state management agencies

For provincial-level regulatory agencies (specifically the DOIT), they face the following challenges:

(1) Limited personnel and lack of expertise: This makes it difficult to inspect and supervise all enterprises. A practical survey shows that the ***personnel in charge of EE*** at the DOIT in provinces and cities ***are not many, often handling multiple tasks, and lack specialized expertise in EE***. On average, each department has only 2-3 staff members responsible for EE, but these individuals also take on other duties, which prevents them from fully focusing on EE tasks. Additionally, the staff responsible for EE lack in-depth professional knowledge in this field, which ***makes it difficult for them to effectively assess the quality of reports submitted by enterprises***, especially those related to technology, EEMs, and SEC.

(2) The financial mechanism for utilizing public funding for EE lacks clear guidance, resulting in local authorities being unable to allocate budgets for EE activities. In practice, over the past years, most provinces have not implemented support activities for enterprises in EE, including EMS. ***Due to the absence of specific and clear regulations on the financial mechanism, provinces have not allocated funding*** to carry out activities such as awareness campaigns, training, and guidance to help enterprises comply with EE regulations.

(3) The lack of a management mechanism and connection with energy managers makes it difficult for the DOIT to connect with enterprises. Currently, the training and certification of EMS are managed ***by the MOIT***. Each year, EMS training courses are ***primarily held in major cities*** like Hanoi and Ho Chi Minh City. These courses mainly focus on providing certification for EMS staff***. Provincial authorities are not delegated the responsibility for this task***, so they do not organize specialized training courses on EMS, and they also cannot manage the pool of certified energy managers and the capacity of the energy management team.

(4) The statistics are insufficient for the number of DEUs because only electricity usage data is available, and there is no comprehensive data on other energy sources used by enterprises. Current regulations require DEUs to have an energy management system. However, in practice, ***some DOIT are unable to accurately determine the number of enterprises in their area or the energy consumption levels of these businesses***. As a result, when compiling a list of DEUs, most DOITs rely only on electricity supply units from EVN (Vietnam Electricity) and industrial zones, ***which means they only track electricity-consuming businesses***. For

enterprises that use other energy sources such as gasoline, oil, gas, coal, or RE, the DOIT does not have, or lacks, the information to compile the data. Consequently, there may be enterprises with high energy consumption that are not included on the list and, therefore, are not subject to compliance with energy management regulations.

2.6. Recommendation

From the current situation as analyzed above, it is recommended that the MOIT and relevant departments consider the following contents:

Table 6. Recommendation related to EMS regulation

Key Findings	Recommendations	Impact	Feasibility
Significant variation in compliance levels	- MOIT establishes minimum compliance control requirements for DOITs. - Strengthen the responsibility of local authorities in monitoring enterprise compliance. - Enhance inspections, audits, and enforcement of penalties for non-compliance.	- Creates strong legal incentives for enterprises to comply with EMS regulations; however, DOITs need sufficient personnel for supervision, inspection, and audits.	Medium (as DOITs face challenges in human resources).
Lack of skills and expertise at the enterprise level	- Provide additional resources for training on EMS under ISO 50001 and capacity building through the VNEEP3 program. - Establish a network linking experts, training organizations, and enterprises. - Review, amend, or supplement relevant legal provisions related to capacity-building training, including initial training, knowledge updates, advanced training, etc., for EE consultants, training institutions, and energy managers at enterprises. - Increase local training and workshops on EMS.	- Broadens awareness of EMS regulations among enterprises. - Enhances professional knowledge for relevant stakeholders to strengthen enterprise capabilities. - Facilitates mutual support among organizations/enterprises at the local level.	High (existing infrastructure, networks, and resources are available).

Lack of motivation to invest in EMS	- Develop and issue Vietnamese standards for EMS aligned with international standards (ISO 50002, ISO 50003, ISO 50004, ISO 50005). - Establish incentive policies for enterprises adopting EMS standards (e.g., preferential access to concessional energy efficiency financing, priority participation in capacity-building programs).	- Facilitates enterprise and organizational implementation of EMS. - Provides financial incentives and favorable conditions for enterprises to implement and fully comply with EMS regulations.	Medium – High (requires time for developing, issuing, and implementing regulations).
Limited financial resources to promote EMS	- Increase the VNEEP3 program budget for training and awareness campaigns. - MOIT provides detailed guidance on provincial expenditure norms for promoting EE through VNEEP3. - Clarify and detail the implementation of incentives for EE activities (Article 41 of the Law 50).	- Creates favorable legal conditions for local authorities to allocate funds for EE activities. - Enables enterprises to access concessional financing for EMS investment.	Medium – High (requires time for developing and issuing related regulations).
Reporting requirements need review and updates	- Streamline and consolidate reports to minimize duplication and reduce the burden on enterprises (e.g., merging the energy use report and the annual planning report). - Introduce an online reporting system.	- Simplifies reporting requirements and submission processes, making compliance easier for enterprises. - Enhances government agencies' ability to collect, manage, and store reports efficiently.	High.

	- Extend the annual reporting deadline from January 15 to March 15 to avoid the period before the Lunar New Year.		
Lack of support mechanisms for technological innovation and EE investment projects	- Support enterprises in connecting with providers of advanced technologies and high-quality EEMs through workshops, exhibitions, and national industry networking programs. - Establish preferential mechanisms for installing energy monitoring systems or energy efficiency equipment. - Assist and guide enterprises in developing investment reports and feasibility studies for EE projects. - Simplify administrative procedures.	- Enhances enterprise understanding of EE benefits. - Strengthens investment motivation through pilot project demonstrations and systematic energy management.	High.
Segmented EE consulting market	- Strengthen regulations and frameworks to ensure the quality of EE consulting services. - Improve coordination of energy efficiency service quality and quantity to meet enterprise needs. - Develop, issue, and actively promote the energy services market.	- Increases EE investment effectiveness and improves EMS application in enterprises. - Assists government agencies in training and communicating EE practices to enterprises. - Enhances competition, leading to improved EE service quality.	Medium (the market is not yet well-developed, and regulatory mechanisms are unclear or insufficient).

Expansion of EMS implementation scope	- Study the expansion of EMS implementation to include near-designated energy users (DEUs), accompanied by supportive policies. - Supplement energy management regulations for corporate groups and conglomerates, as many subsidiaries currently fall outside mandatory EMS requirements but voluntarily implement energy efficiency measures based on corporate policies.	- Creates favorable legal conditions for local authorities to allocate funds for EE initiatives. - Enables enterprises to access concessional financial resources for EMS investment.	Medium – High (requires time to develop and issue relevant regulations).

3. ASSESSMENT OF COMPLIANCE WITH BENCHMARKING REGULATIONS

3.1. Compliance requirements for Benchmarking in industrial sectors

As of now, the MOIT has developed and issued seven Circulars regulating benchmarking for ***seven industrial sectors***: chemicals, plastics, beer and beverages, seafood processing, sugar, steel manufacturing, and paper and pulp production. within the scope of this study, ***only collect information and compliance evaluations of five sectors***: beer and beverages, seafood processing, sugar, steel manufacturing, and paper and pulp production. The compliance requirements related to benchmarking for these five sectors are summarized in *Table 7* below:

Table 7. Summary of Benchmarking regulations for industrial sectors

Sector	Benchmarking	Other Relevant Requirements
Beer and beverage	According to Article 5 of Circular 19/2016/TT-BCT, Benchmarkings for the beer and beverage sector from 2021 to the end of 2025 are as follows: 1. Beer - Production scale above 100 million liters: 129 MJ/hl - Production scale from 20 to 100 million liters: 196 MJ/hl - Production scale below 20 million liters: 286 MJ/hl 2. Beverage - Carbonated or both carbonated and non-carbonated products: 52 MJ/hl - Non-carbonated products: 107 MJ/hl	A plan must be prepared to comply with the benchmarks stated in Article 5 of Circular 19/2016/TT-BCT. Local DOIT (DOITs) must be reported to annually by January 15 regarding the implementation status of benchmarks.
Steel	According to Clause 2, Article 5 of Circular 20/2016/TT-BCT, benchmarks for the steel industry	A plan must be prepared to comply with the benchmarks stated in Article 5 of Circular 20/2016/TT-BCT.

Sector	Benchmarking	Other Relevant Requirements
	from 2021 to the end of 2025 are as follows: - Iron ore sintering: 1,960 MJ/ton - Cast iron production (blast furnace): 12,400 MJ/ton - Steel billet production (basic oxygen furnace- BOF): 100 MJ/ton - Steel billet production (electric arc furnace- EAF): 2,500 MJ/ton - Steel billet production (induction furnace): 2,500 MJ/ton - Hot rolling of long steel: 1,600 MJ/ton - Cold rolling of steel sheets: 1,500 MJ/ton	DOITs must be reported to annually by January 15 regarding the implementation status of benchmarks.
Paper	According to Article 5 of Circular 52/2018/TT-BCT, Benchmarkings for the paper and pulp industry from 2021 to the end of 2025 are as follows: *1. Packaging Paper:* - Production scale > 50,000 tons/year: 6,713 MJ/ton - Production scale 10,000 – 50,000 tons/year: 6,744 MJ/ton - Production scale < 10,000 tons/year: 5,482 MJ/ton *2. Tissue Paper* - Production scale 10,000 – 50,000 tons/year: 14,572 MJ/ton	A plan must be prepared to comply with the benchmarks outlined in Article 6 of Circular 24/2017/TT-BCT. DOITs must be reported to annually by January 15 regarding the implementation status of benchmarks.

Sector	Benchmarking	Other Relevant Requirements
	- Production scale < 10,000 tons/year: 13,169 MJ/ton *3. Printing, Writing, and Photocopy Paper* - Production scale > 50,000 tons/year: 13,639 MJ/ton - Production scale 10,000 – 50,000 tons/year: 9,455 MJ/ton	
Seafood processing	According to Article 6 of Circular 24/2017/TT-BCT, benchmarks for the seafood processing sector up to the end of 2025 are as follows: - Industrial processing of catfish products: 1,050 kWh/ton of equivalent product - Industrial processing of shrimp products: 2,050 kWh/ton of equivalent product	Facilities exceeding the SEC benchmark must develop and implement an EE improvement plan to meet the benchmarks stated in Article 5 of Circular 52/2018/TT-BCT. DOITs must be reported to annually by January 15 regarding the status of benchmark implementation. Facilities with SEC higher than the benchmarks must also report their EE improvement plans, including proposed EEMs and implementation plans, in accordance with Clause 1, Article 6 of Circular 52/2018/TT-BCT.
Sugarcane	According to Article 6 of Circular 39/2019/TT-BCT, Benchmarkings for the sugarcane industry up to the end of 2025 are as follows: - Scale from 1,000 to 3,000 tons of sugarcane/day: 30,000 MJ/ton of equivalent product - Scale from 3,000 to 6,000 tons of sugarcane/day: 23,000 MJ/ton of equivalent product - Scale above 6,000 tons of sugarcane/day: 19,000	Facilities with SEC higher than the benchmarks must develop and implement measures to improve EE to comply with the benchmarks stated in Article 5 of Circular 39/2019/TT-BCT. Facilities must report annually by August 15 regarding the status of benchmark implementation for the period from August 1 of the previous year to July 31 of the current year. Within 12 months of Circular 39/2019/TT-BCT taking effect, sugarcane production facilities not meeting the benchmarks must prepare a plan to improve EE and ensure

Sector	Benchmarking	Other Relevant Requirements
	MJ/ton of equivalent product	compliance with the benchmarks specified in the Circular, reporting to the local DOIT.

3.2. Methods of information collection and compliance assessment

3.2.1. Survey enterprises by online survey questionnaire.

The enterprise survey questionnaire is designed and conducted online to collect data and information about: type of manufactured product, the plant's designed capacity, the production scale of the enterprise; the energy consumption of the enterprise, the actual benchmarking achieved compared to the benchmarking; the difficulties and barriers in complying with regulations; and the suggestions and recommendations (if any) from the enterprise to better comply with benchmarking regulations.

Enterprises selected for the online survey are those in industries required to comply with benchmarking regulations, including: beer and beverage production, steel production, cane sugar production, seafood processing, and paper and pulp production.

Due to the large number of enterprises in each industry, it is not feasible to survey the entire group. Therefore, 300 enterprises were selected to send the survey forms based on the following criteria:

- Having different energy consumption levels (DEUs and near-DEUs);
- Having products belong to subject that implement different benchmarking regulations;
- Belonging to different geographical regions (North, Central, South).

As a result, 150 responses were received from enterprises, including 14 near-DEUs (9%) and 136 DEUs (91%). Among these, there are 34 enterprises in beer and beverage production, 52 in steel production, 27 in paper and pulp production, 22 in seafood processing (shrimp and pangasius), and 15 in cane sugar production. The preliminary information on the surveyed enterprises is summarized in *Table 7* below:

Table 8. Enterprises responding to the online survey categorized by geographic region and Energy consumption

Sectors	Total	Regions			Energy consumption	
		North	Central	South	Non DEUs	DEUs
Beer and beverage production	34	13	13	8	7	27
Steel production	52	21	6	25	2	50

Paper and pulp production	27	11	4	12	2	25
Seafood processing	25	0	5	17	4	21
Sugarcane production	15	3	10	2	0	15
Total	**150**	**48**	**38**	**64**	**14**	**136**

3.2.2. On-site surveys at enterprises

The direct survey at enterprises aims to verify data on energy consumption for the most recent years, the methods of collecting information on energy usage, and the calculation methods for the enterprise's benchmarking. It also assesses the actual benchmarking achieved by the enterprise compared to benchmarking, explore difficulties and recommendation from the enterprise, and gathers lessons learned from the enterprise's practical implementation.

The list of enterprises selected for direct surveys is based on the responses to the online survey forms. For each industry, enterprises were chosen for direct surveys based on the following criteria:

- Effectively implement with the benchmarking regulations (achieving or below the benchmarking standards, applying multiple measures.);
- Do not comply with the benchmarking regulations (not achieving the standards, applying few or no EEMs, not reporting as required, etc.);
- Having different product groups;
- Belonging to different geographical areas (North, Central, South):

A total of 30 enterprises were selected for the direct survey, including 25 DEUs and 5 non-DEUs. The specific numbers for each industry are summarized in *Table 9* below:

Table 9. Enterprises conducted On-site interviews categorized by geographic region

Sectors	Total	Regions		
		North	Central	South
Beer and beverage production	8	3	4	1
Steel production	5	2	1	2
Paper and pulp production	7	2	2	3
Seafood processing	5	0	3	2
Sugarcane production	5	1	2	2

Sectors	Total	Regions		
		North	Central	South
Total	**30**	**8**	**12**	**10**

3.2.3. Interviews with representatives of state agencies

The interviews with representatives of government agencies aim to understand the overall situation regarding the implementation of benchmarking regulations by enterprises in the province. The goal is to identify the advantages and challenges in managing and guiding enterprises to comply with the regulations, address any issues or obstacles that need to be resolved both in terms of regulations and practical implementation, and learn from successful and unsuccessful models of implementation.

Interviews were conducted with 5 government regulatory agencies (DOIT of provinces/cities).

3.2.4. Methodology for assessing compliance with benchmarking

The method for evaluating compliance with benchmarking regulations includes the following: *(1) Compare the enterprise's actual (SEC) with the benchmarking According to current regulation (2) Evaluate the plan and actual organization of implementation enterprise's EEMs to meet the benchmarking regulations (3) Evaluate the enterprise's reporting on benchmarking implementation*.

3.3. Overall assessment of compliance levels among enterprises in 5 industrial sectors

3.3.1. Compliance with benchmarking regulations

Among the surveyed enterprises, a proportion has not yet met the prescribed SEC. Accordingly, percentage of enterprises get benchmarking under the avarage regulation in the five industrial sectors (Beer and beverages, Paper and pulp, Seafood processing, Textiles, Steel) in 2022 was 70%, increasing to 75% in 2023. This indicates that, as of 2023, around 25% of enterprises in these sectors have not met the prescribed SEC standards (*see illustration in Figure 18*). This percentage is noteworthy, considering that the regulations have been in place for several years, and many products subject to mandatory benchmarking have already passed the prescribed time limits (2020) or approaching mandatory compliance deadline (2025). This also raises the risk that these enterprises may ***face penalties*** for non-compliance with benchmarking, ***including the disallowance of energy costs exceeding the benchmarking as valid expenses*** (in fact, some enterprises have already been subjected to such penalties).

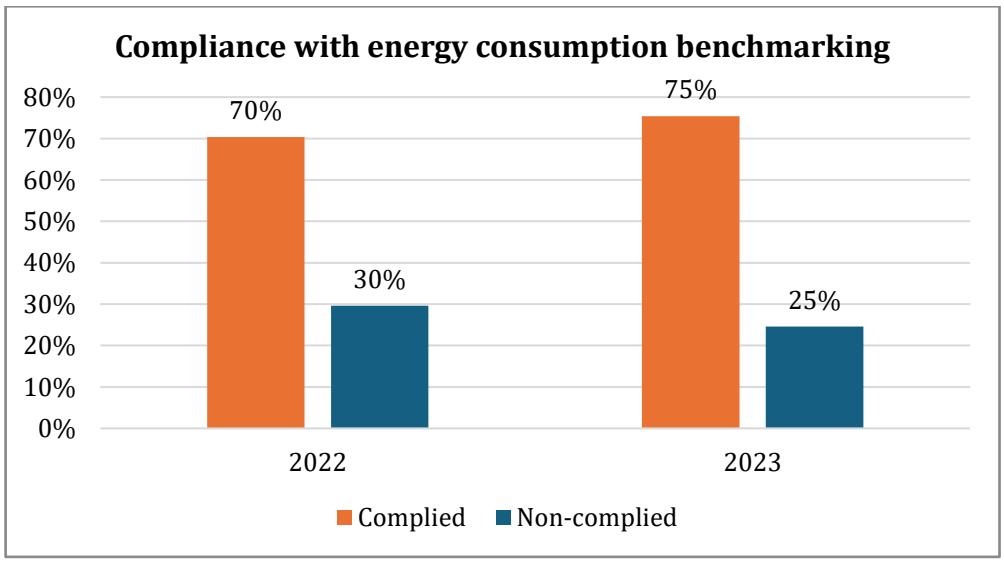


Figure 18. Chart of the proportion of enterprises meeting and not meeting the benchmarks

In the five industrial sector the percentage of surveyed enterprises not meeting the prescribed benchmarking standards varies. In 2023, the beer and beverage industry has a rate of SEC non-compliance of 37%, the paper and pulp industry is 31%, the steel industry it is 23%, the cane sugar industry it is 13%, and the seafood processing industry it is 9% *(see details in Figure 19).* This rate may not fully reflect the actual situation of each industry, as nearly 50% of the selected enterprises did not respond to the survey and the data used for evaluation is based on the declaration of the enterprise. However, ***it highlights the need for a differentiated approach across industries and ensure that Industrial sector with a higher percentage of enterprises not meeting SEC should be received greater attention and support***.

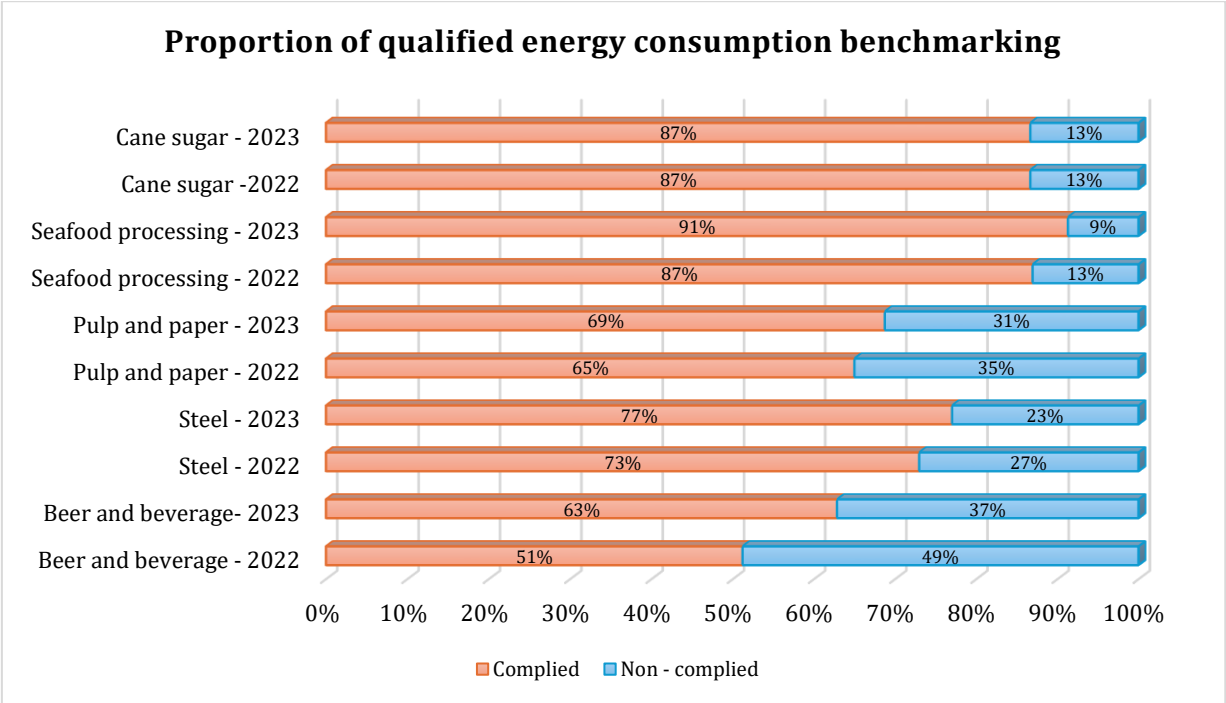


Figure 19. Proportion of enterprises complying with benchmarking in 2022 and 2023

There is a difference in SEC between enterprises. Although the number of enterprises with SEC is much different from the prescribed norm, this difference is recorded in all 5 industries. Specifically, when looking at the production scale of the enterprises, comparing the minimum and maximum values of energy consumption and the corresponding benchmarking values in industries as follow: In the Beer and Beverages industry, some enterprises have a real SEC that is only about 50% of the benchmarking, while others have a real SEC nearly three times the benchmarking. In the Steel industry, some enterprises have a real SEC that is only about 15% of the benchmarking, while others have a real SEC nearly 3.5 times the benchmarking. Similarly, in the Paper industry, some enterprises have a real SEC that is only about 15% of the benchmarking, while others have a real SEC nearly 2.5 times the benchmarking. In the Seafood and Cane sugar industries, some enterprises have a real SEC that is about 35% of the benchmarking, while others still have SECs higher than the benchmarking. (*See figure 20 - 24 below*). This indicates that improving SEC in certain enterprises remains a challenge, and more efforts and decisive measures are needed from both enterprises and regulatory authorities at all levels.

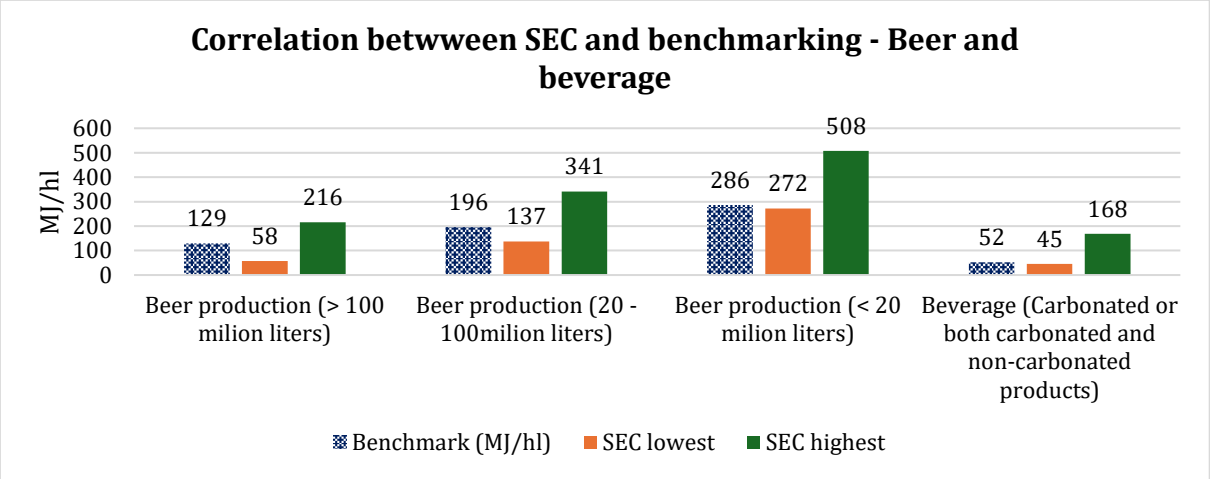


Figure 20. Correlation between the SEC of beer and beverage manufacturing enterprises and Benchmarking

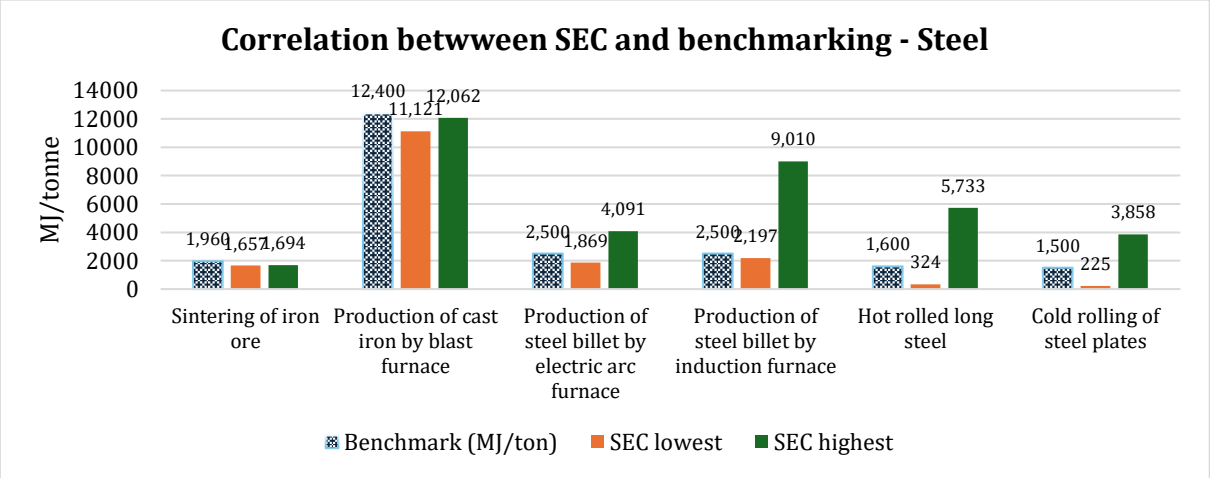


Figure 21. Correlation between the SEC of steel manufacturing enterprises and Benchmarking

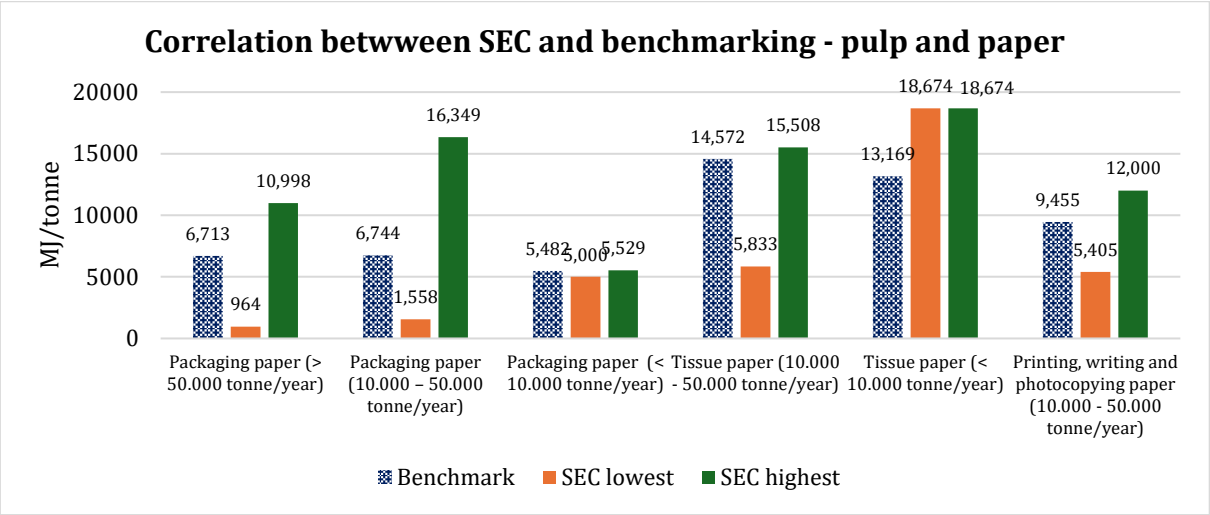


Figure 22. Correlation between the SEC of paper and pulp manufacturing enterprises and Benchmarking

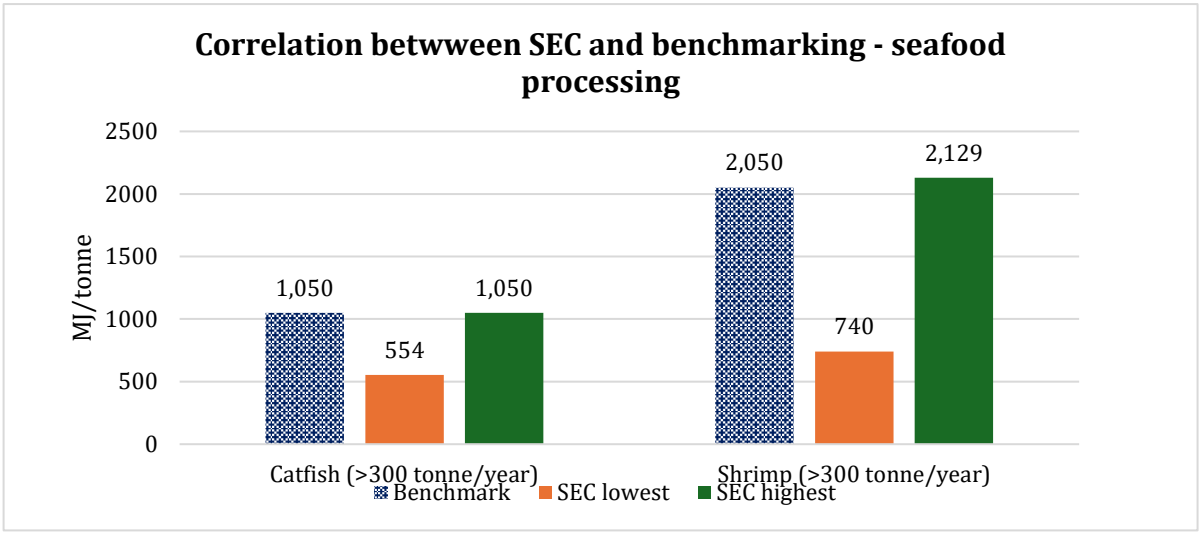


Figure 23. Correlation between the SEC of seafood processing enterprises and Benchmarking

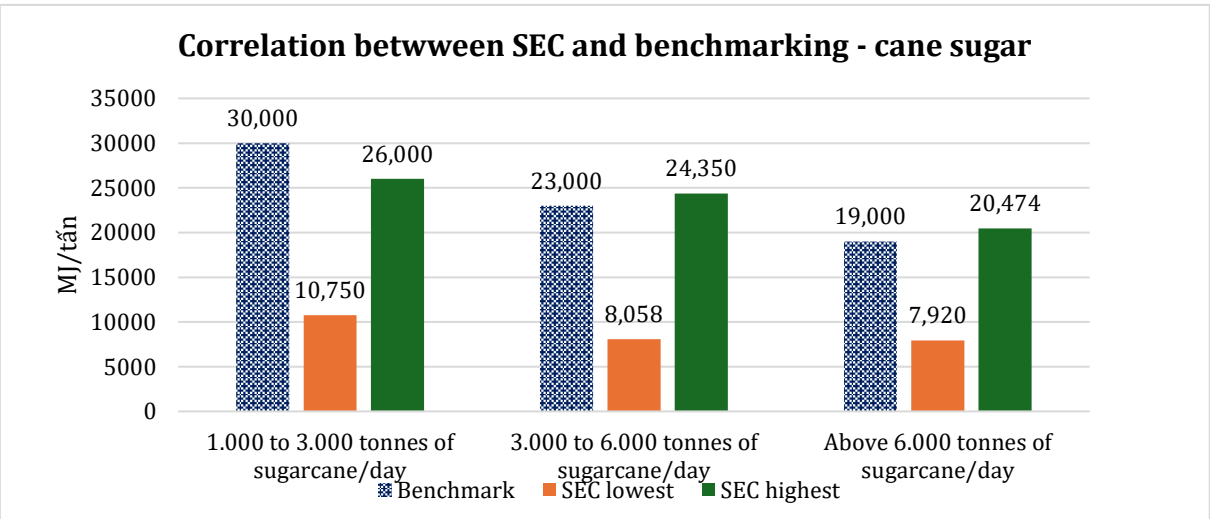


Figure 24. Correlation between the SEC of sugarcane manufacturing enterprises and Benchmarking

The percentage of enterprises meeting the Benchmarking has increased compared to the time of benchmark issuance: Compared to the time when the Circulars on Benchmarking were issued (between 2016 and 2019), by 2023 ***the percentage of enterprises meeting the Benchmarking has improved positively***. Two specific examples are as follows:

- ***For the beer and beverage industry***

A total of **40 beer and beverage enterprises** were preliminarily assessed and audited to develop the Benchmarking under Circular No. 19/2016/TT-BCT. When comparing the SEC of these 40 enterprises with the Benchmarking for the period up to 2020, **43% met the Benchmarking**; for the period up to 2025, the rate was **23%**. According to the 2023 compliance survey of **34 beer and beverage enterprises**, the percentage meeting the Benchmarking increased to approximately **63%**.

- ***For the pulp and paper industry***

Similarly, **37 enterprises** were preliminarily audited to develop the Benchmarking under Circular No. 24/2017/TT-BCT. At that time, the percentage of enterprises **meeting the Benchmarking** for the periods up to 2020 and 2025 was **60% and 32%**, respectively. Based on the 2023 compliance survey of **27 pulp and paper enterprises**, the percentage **meeting the Benchmarking** had increased to **69%**.

3.3.2. Compliance with the reporting requirements for benchmarking

The results from the survey show that 139 out of 150 (93%) surveyed enterprises have implemeted with the annual reporting requirements as stipulated. However, 7% of the surveyed enterprises have not reported to the management authorities as required. The reasons for this, according to feedback from the enterprises, ***are mainly due to a lack of awareness of the reporting requirement, no notification from the management authority, or the absence of any changes, so no report was submitted***. Among the five industries, the beverage and soft drink sector had the highest compliance rate at 97%, followed by the paper and pulp industry at 96%, the steel industry at 92%, and the sugarcane industry at 87%. The seafood processing industry had the lowest compliance rate, with only 86% of enterprises reporting as required.

Table 10. Number of enterprises complying with the reporting requirements for benchmarking

No	Industry sectors	Number of enterprise			
		Report		No report	
		Quantity	(%)	Quantity	(%)
1	Beer & beverage	33	97	1	3

No	Industry sectors	Number of enterprise			
		Report		No report	
		Quantity	(%)	Quantity	(%)
2	Steel	48	92	4	8
3	Paper & Pulp	26	96	1	4
4	Seafood processing	19	86	3	14
5	Sugarcane	13	87	2	13
	Total	***139***	***93***	***11***	***7***

The results indicate ***that 7% of the surveyed enterprises have not complied with the reporting requirement are concern, as regulations mandate that all enterprises subject to regulations on mandatory benchmarking must submit annual reports.***

Note : Actual compliance rate for benchmarking reports might be lower due to: *(1) Nearly 50% of the selected enterprises for the survey did not respond; (2) Local management authorities (DOIT)are unable to track and manage enterprises that are non – DEUs.*

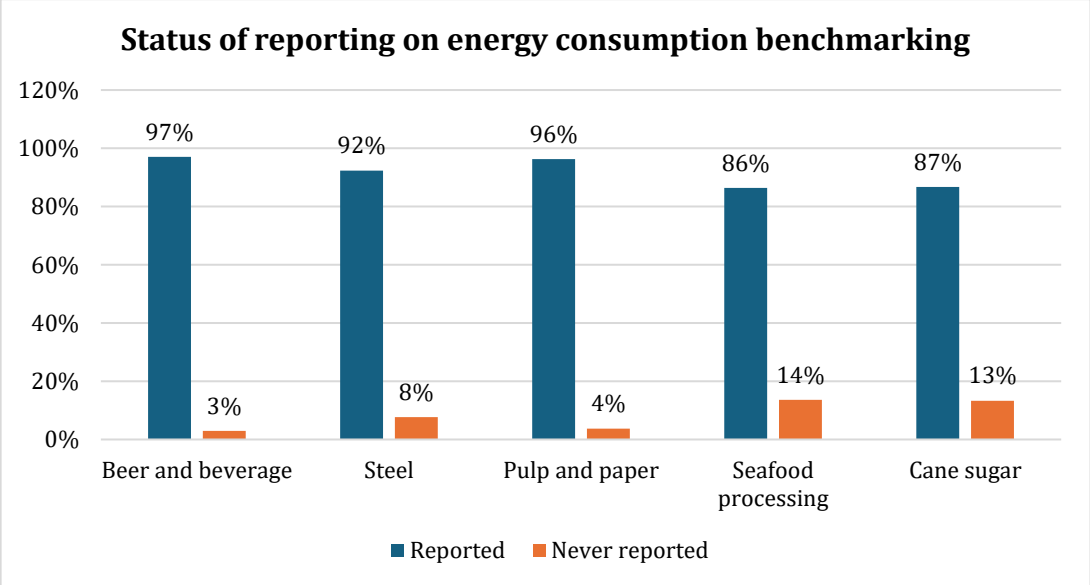


Figure 25. Annual reporting compliance rate by industry

3.3.3. Development and implementation of EE measures

All surveyed enterprises from the five industries have recognized the need to implement various measures for EE to meet the requirements for benchmarking. These measures include management, technical, and technological measures. ***However, most of the measures implemented by enterprises are related to management, simple measures,***

easy to implement, low cost, and quick payback. Fewer enterprises have implemented measures such as upgrading or replacing production lines, technology conversion, or other solutions requiring significant investment. The details of the measures implemented by each industry are presented in the section on the detailed assessment of compliance by each industry.

3.3.4. The impact of current regulations on benchmarking to the behavior of industrial enterprises to improve EE

As of 2023, the regulations on benchmarking for industries have been in effect and implemented for 5 to 8 years. During this period, most enterprises have carried out various activities and applied different measures to meet the benchmarking as required.

The issuance of these benchmarking has also pushed enterprises to implement EE measures. This provides a legal basis, as enterprises failing to meet the energy consumption standards will not only have to pay more for energy usage but will also incur higher taxes. According to Article 4, Clause 2.3 of Circular 96/2015/TT-BTC[13] and Article 14, Clause 1 of Circular 219/2013/TT-BTC, for raw materials, fuels, energy, goods, etc., used for production and business, if they are subject to the state's defined loss (consumption) standards, enterprises can only account for and deduct VAT on the part of materials, fuel, energy, or goods lost within the set benchmarks. Any loss exceeding the defined benchmarking cannot be accounted for as an expense or deducted as input VAT.

The ***mandatory compliance with benchmarking has also driven enterprises to implement various measures*** to improve EE and meet the required standards. It is evident that enterprises subject to benchmarking ***have applied more structured and organized measures compared to others***. Additionally, the higher number of enterprises meeting the Benchmarking in 2023 compared to 2022 serves as evidence that the benchmarking regulations have had a strong impact, not only on awareness but also on the actions and investments made by enterprises in EE

3.3.5. Difficulties and challenges in implementing benchmarking regulations

Surveys show that there are still some difficulties and obstacles faced by enterprises in 5 sectors in the process of complying with regulations on Benchmarking. The difficulties, ranked from highest to lowest percentage of enterprises experiencing them, are as follows: Outdated technology and production equipment (46%); Difficulties in choosing EEMs suitable for the actual production conditions and development direction of the enterprise (40%); Difficulty/ have no access to the investment capital required (34%); Unclear methods for calculating Benchmarking (26%); Lack of knowledge and awareness to develop and implement EE projects (18%); Inefficient management and operation systems (14%). See *Figure 26*.

[13] LuatVietNam.net - Amending some corporate income tax policies from 2015. Link: https://luatvietnam.net/vn/sua-doi-them-mot-so-chinh-sach-thue-tndn-tu-2015--vbpl69497.html

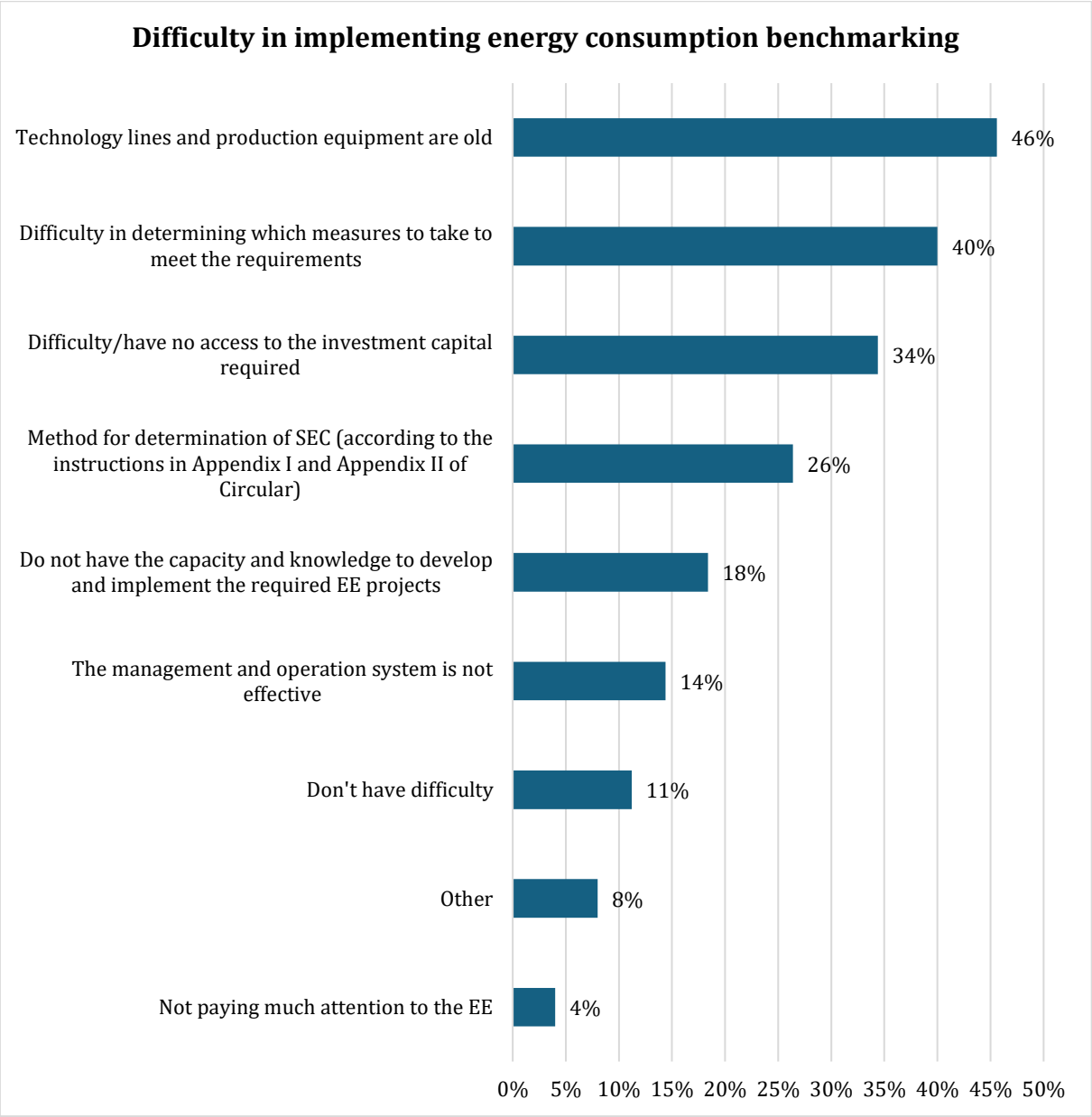


Figure 26. Chart of the percentage of enterprises facing difficulties and barriers in implementing benchmarking regulations

- ***Difficulties related to outdated and non-integrated production line technology and equipment:***

The highest percentage of ***enterprises facing difficulties is outdated, non-synchronous technology and production equipment, which is also the most challenging and slowest issue for enterprises to address***. For those enterprises facing this difficulty, most of IEs state that in order to meet Benchmarking, they must change the technology of the entire production line, not just individual components or certain parts. According to these enterprises, this is very difficult because it requires a large investment, a long-term plan, and depends on the stability of the market. ***Additionally, there needs to be a mechanism that allows enterprises to invest in and transition their technology (especially for state-owned enterprises)***.

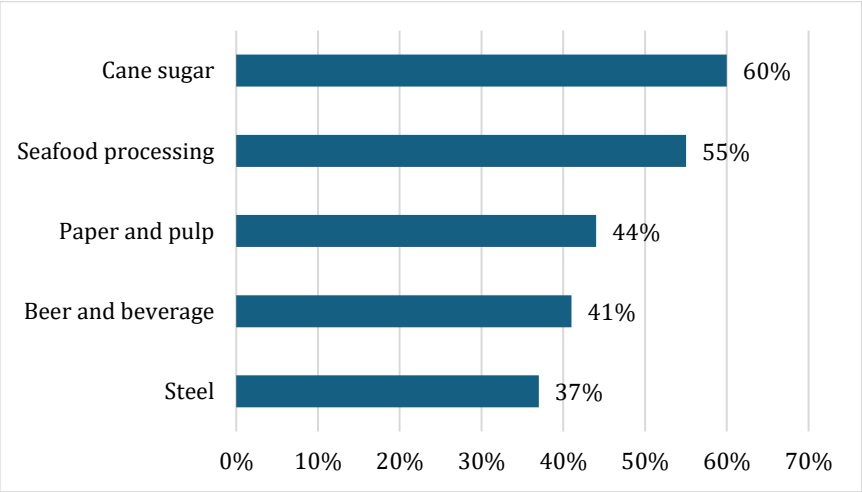


Figure 27. Proportion of difficulties related to outdated and non-integrated production line technology and equipment

- ***Difficulties in selecting appropriate EEMs to meet needs:***

Another difficulty that a high percentage of IEs encounter is the difficulty in choosing suitable EEMs that meet their needs. In fact, potential EEMs are introduced in the Circulars for enterprises to refer to. However, when selecting measures, enterprises often face difficulties because they depend on the actual production situation and the enterprise's development plans. Moreover, since these Circulars were issued 5 to 8 years ago, nowadays, ***the EEMs have been updated, and the technology and equipment in the production processes of factories have changed***. Therefore, when selecting measures, enterprises need to choose ***newer, more specialized measures*** to achieve EE goals.

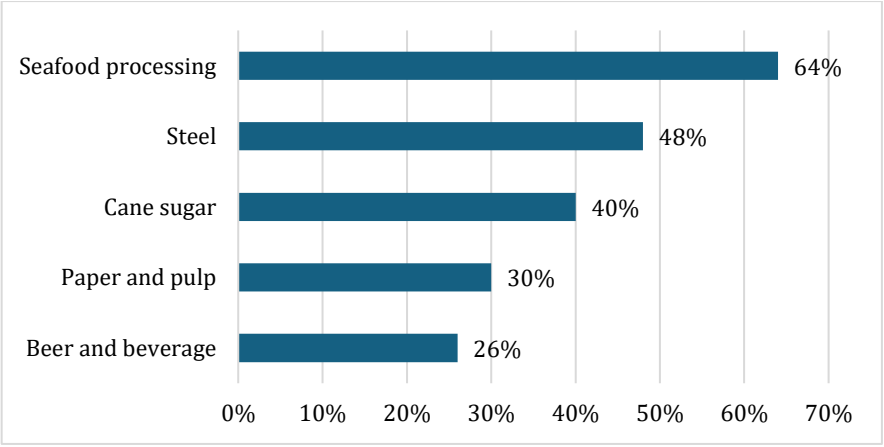


Figure 28. Proportion of difficulties in selecting appropriate EEMs to meet needs

- ***Difficulties in accessing investment capital:***

As many as 34% of enterprises reported the difficulties in arranging and accessing investment capital for EEMs. Although current regulations offer many incentives for EE projects, however enterprises find it very difficult to access loan sources, especially those with favorable interest rates. ***The main factors contributing to these difficulties include stringent loan procedures and conditions, the need for a viable plan, and the***

requirement for complete documentation. Some EE projects, which have long payback periods, are considered high-risk and lack guaranteed investment returns. Additionally, upgrading production lines or installing modern equipment, which requires significant capital, are key reasons why enterprises struggle to access funding sources.

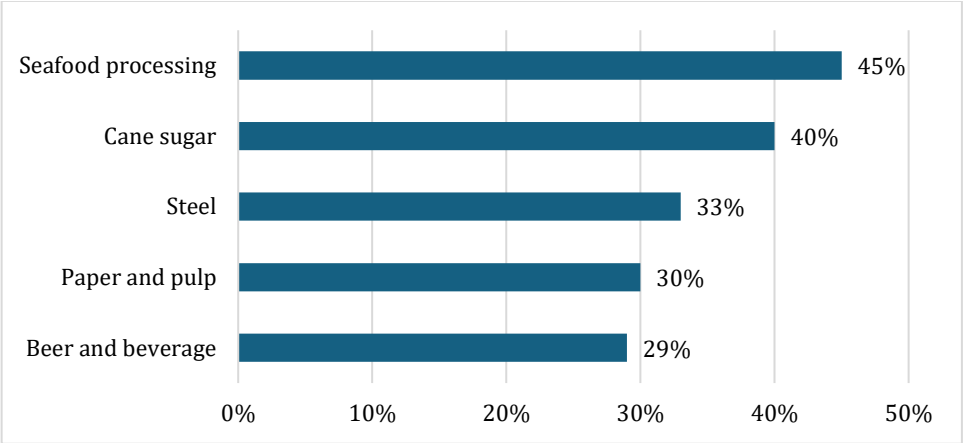


Figure 29. Proportion of difficulties in accessing investment capital

Difficulties in calculating SEC:

Another difficulty that is worth paying attention to is calculating SEC. In fact, it has been found that 26% of enterprises have difficulty calculating SEC or have calculated incorrectly. ***The reason is that enterprises are not sure about the correct understanding of the regulations and instructions on: production scope for calculating SEC, factors, fuel conversion factors*** (such as conversion factors for certain fuels purchased from external suppliers, which currently have no regulation), and ***whether to use the designed or actual production capacity...*** In addition, many factories are not fully equipped with measuring meters, data recording is not synchronized, and frequent changes in EMS staff or a lack of knowledge about how to calculate benchmarks, which are also causes of difficulty in calculating the correct SEC.

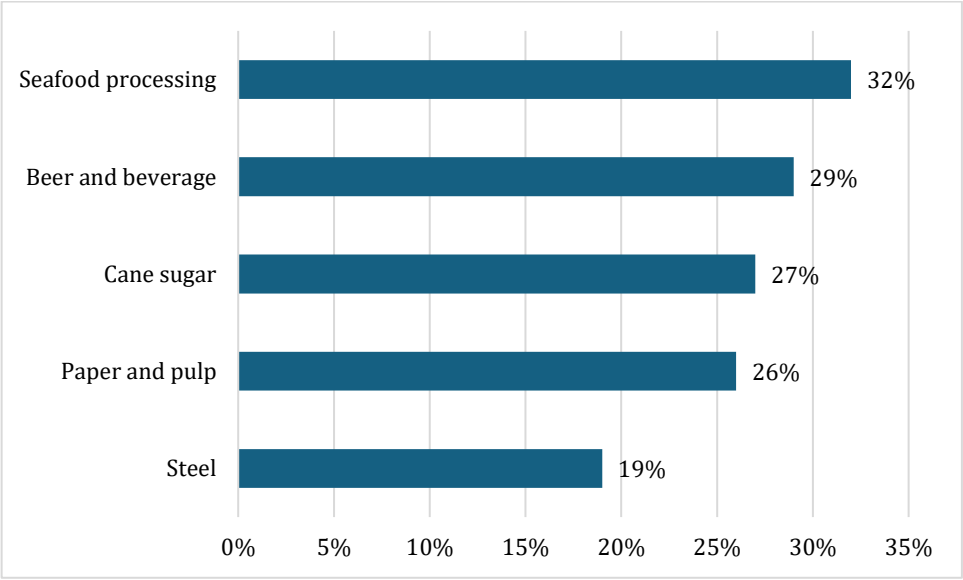


Figure 30. Proportion of difficulties in calculating SEC

- ***Lack of knowledge and awareness to develop and implement EE projects:***

There is 18% of enterprises reported that they lack the knowledge and capacity to develop and implement EE projects.

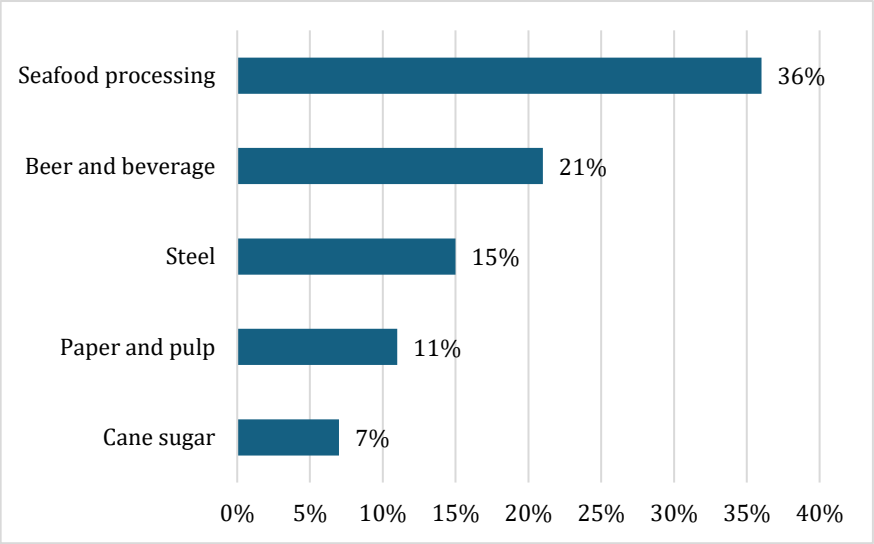


Figure 31. Proportion of lack of knowledge and awareness to develop and implement EE projects

- ***Ineffective management and operation systems in enterprises:***

There is 14% of enterprises reported that ineffective management and operations create difficulties in complying with the benchmarking. The operational staff lacks awareness in managing equipment to ensure EE. ***Many enterprises have not invested in measuring instruments or automated monitoring systems***, and energy consumption data is often incomplete or inconsistent, etc.

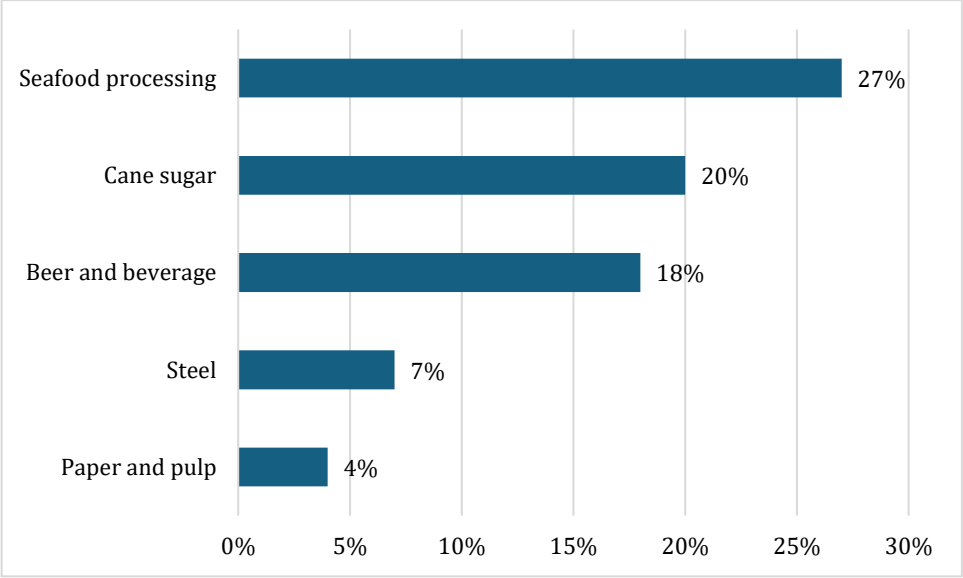


Figure 32. Proportion of ineffective management and operation systems in enterprises

- ***Lack of focus on EE***

Another challenge affecting compliance with benchmarking is that enterprises have not paid much attention to EE. This lack of focus is due to (*(1) difficulties in production, (2) Leadership focuses only on increasing the enterprise's output and revenue, (3) Energy costs often account for a small proportion of the total costs of the enterprise, etc*.

- ***Difficulties related to current regulations***

In the current regulations, there are still some provisions that enterprises have reported as being inappropriate, unclear, or lacking. Specifically: *(1) There is no distinction in Benchmarking based on actual production capacity instead of designed production capacity for the beer and beverage industry; (2) The conversion indexes of equivalent products between beer products are not reasonable,* for example: the conversion coefficient of canned beer to bottled beer, because the current production process of these two products is similar.*); (3) Lack of regulations for specific types of products and different product qualities (paper industry); (4) The method for calculating energy when using raw sugar or cane sugar as raw material is unclear (cane sugar industry); (5) The scope of Benchmarking calculations for enterprises is unclear; (6) Lack of energy conversion factors for thermal energy types*.

- ***Other difficulties***

In addition to these challenges, enterprises also face other obstacles, such as: lack of information or inadequate consulting on EE potential, not recognizing the direct benefits of EEMs; EEMs that are advised having long payback periods, which requires enterprises to carefully consider before making an investment; regulatory bodies not exerting enough pressure or creating sufficient incentives for enterprises to take action.

3.3.6. Recommendations for solutions to improve regulations and promote compliance with regulations on Benchmarking

From the current status of compliance by IEs as well as the existing issues presented above, it is clear that it is necessary to consider amending and improving certain regulations on benchmarking. At the same time, it is important to implement activities to increase the compliance rate of manufacturing IEs with regulations on benchmarking. The MOIT and relevant ministries and sectors are recommended to consider the following solutions:

Table 11. Recommendations to improve the compliance of benchmarking requirements

Findings	Recommendations	Impact of the recommendations	Feasibility
(1) There is still a percentage of enterprises surveyed that do not meet Benchmarking. ***(2)*** There is also a percentage of enterprises surveyed that have not implemented the annual reporting system as required.	- Strengthen communication and guidance for enterprises regarding regulations on Benchmarking. - Enhance inspection and supervision efforts and enforce penalties for non-compliance with Benchmarking regulations in enterprises.	- Increase the percentage of enterprises meeting Benchmarking. - In cases where enterprises do not meet the benchmarks, they must have a plan to implement EEMs. Ensure that 100% of enterprises comply with Benchmarking regulations.	***Advantages:*** There is a legal basis for implementation; available resources can be utilized. ***Difficulties:*** Appropriate allocation of resources is required; regular implementation is necessary.
(3) Enterprises that do not meet Benchmarking due to outdated technology and equipment, but do not make the transition because of a lack of mechanisms, insufficient investment	- There should be policies that provide special attention and support (such as technical assistance, loans with preferential interest rates, and simplified procedures) for enterprises that do not meet Benchmarking, especially those facing difficulties due to outdated production processes/technologies	Help enterprises develop sufficient technical and financial capabilities to implement EE projects, reduce SEC, thereby increasing the percentage of enterprises meeting Benchmarking.	***Advantages:*** There are EE supporting programs both domestically and internationally. ***Difficulties:*** Current EE programs mainly provide technical support to enterprises, not much financial assistance. The ESCO model has not yet developed.

Findings	Recommendations	Impact of the recommendations	Feasibility
capital, and an unstable market.	and a lack of financial resources for technology improvement. - There should also be policies to strengthen the financial market for investing in EE projects (ESCO).		
(4) There is a significant disparity in the Benchmarking achieved between enterprises ***(5)*** Enterprises have not achieved benchmark due to lack of knowledge and awareness to develop and implement EE projects.	- Provide technical support to IEs that are not meeting the benchmark, helping to examine in detail the opportunities for EE. This should go beyond the usual energy audits. - Strengthen the organization of in-depth training courses for IEs on EE, RE, new and advanced solutions/technologies to help saving energy, combine sharing cases study of implementing activities related to EE along with detailed guidance documents for IEs to refer to and implement.	Help IEs improve their ability to recognize the potential of EE in their factories, thereby developing appropriate EE projects.	***Advantages:*** Training programs on EE are available. ***Disadvantages:*** Requires experts in each production field to participate in program development and direct participate in training, in order to go deeper into production processes/technology.
(6) Enterprises have difficulty in calculating the benchmark according to	- There are instructions on how to calculate the benchmark according to	Help IEs easily, conveniently, consistently and limit errors in the process of calculating SEC.	***Advantages:*** The policy of digitalizing data is being promoted in both management agencies and enterprises.

Findings	Recommendations	Impact of the recommendations	Feasibility
regulations. Some enterprises do not know how to calculate the benchmark or calculate it incorrectly.	regulations in a more detailed, specific and effective way. - Develop tools to support the calculation of benchmarks and prepare report on the implementation of benchmark and submit online. - Consider building a digital project in managing SEC data.	Help MOIT have a comprehensive and accurate database of SEC to build a more suitable benchmark.	***Difficulties:*** Resources are needed for implementation: experts (specialized in production, energy management, IT), finance, testing and calibration time.
(7) Some regulations are not suitable, do not provide specific instructions or do not have regulations.	- Research and classify benchmark according to actual production capacity scale instead of according to designed production scale (for the Beer and Beverage industry) - Review equivalent product conversion factors, for example: conversion coefficient of canned beer to bottled beer because the current production process of these two products is similar (consider and supplement to Circular No. 19/2016/TT-BCT)	Help MOIT better understand the process of implementing regulations on benchmarking in enterprises, the difficulties of enterprises, and the points of regulations that are not completely reasonable, in order to provide appropriate support for enterprises, as well as reasonable adjustments to regulations.	***Advantages:*** Most enterprises are interested in implementing EE and benchmarking. Enterprises are willing to receive and share information about the implementation of EE with management agencies. **Difficulties:** It is necessary to have a process of direct and regular communication with enterprises to be able to understand their situation.

Findings	Recommendations	Impact of the recommendations	Feasibility
	- Consider supplementing regulations on each specific product type, different product quality (paper industry). - Clarify how to calculate energy in the case of using raw sugar or cane sugar as raw materials (cane sugar industry) - Clearly define the scope of calculating benchmark for enterprises - Consider supplementing energy conversion coefficients for thermal energy types		

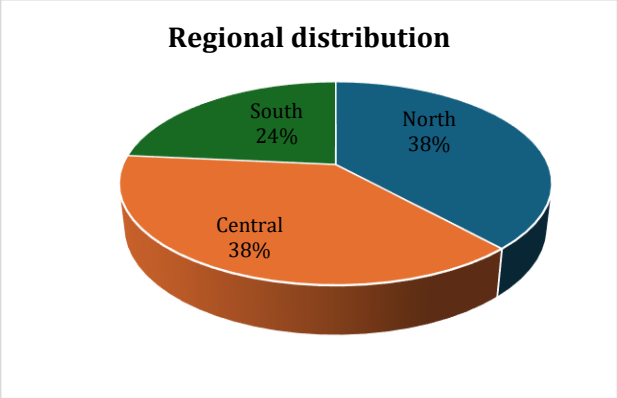
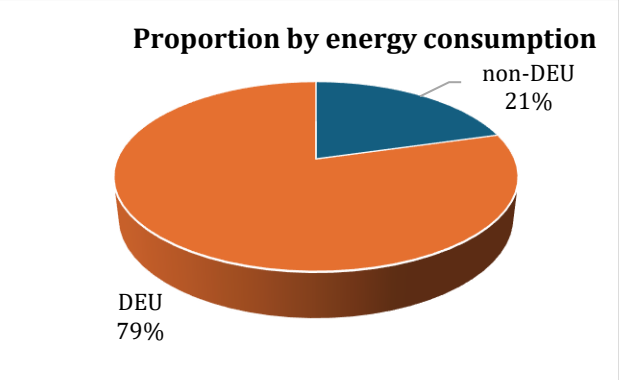
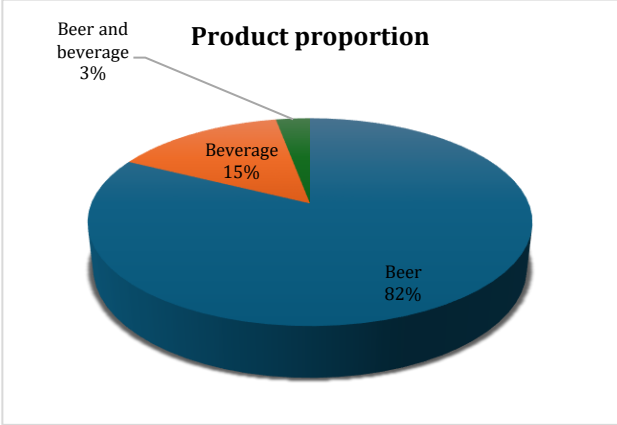
3.4. Detailed evaluation of compliance by industry

3.4.1. Beer and Beverage production

a. Information about the surveyed enterprises

A total of 34 enterprises in the beer and beverage production industry participated in the survey. These enterprises were selected to ensure they represent various geographical areas, levels of energy consumption, and product proportions. For specific details, please refer to the illustration in *table 12* below:

Table 12. Proportion of the surveyed enterprises in beer and beverage production

Region	*Quantity*	*Chart proportion of the surveyed enterprises in beer and beverage production*
North	13	
Centre	13	
South	8	
Proportion of the energy comsumption	***Quantity***	
Under DEUs	7	
DEUs	27	
Proportion of the production	***Quantity***	
Beer	28	
Beverage	5	
Beer & Beverage	1	

b. Compliance with Benchmarking

Among the 34 beer and beverage production enterprises, the level of compliance with benchmarking by production scale is summarized in the table below:

Table 13. Summary of enterprises complying with Benchmarking in the beer and beverage industry

Production	Total	2022		2023	
		Complied	Not complied	Complied	Not complied
Beer Production (> 100 million liters)	2	1	1	1	1
Beer Production (20 - 100 million liters)	19	9	10	12	7
Beer Production (< 20 million liters)	8	6	2	6	2
Beverage Production (Carbonated or both Types)	6	2	4	3	3
Non-carbonated Beverage Production	-	-	-	-	-
Total	**35**	**18**	**17**	**22**	**13**

Compliance with benchmarking is well implemented in breweries with production scales of less than 20 million liters. Among the two large-scale breweries (producing over 100 million liters), one enterprise meets the benchmark, while the other does not. Similarly, out of the six beverage production enterprises, three meet the benchmark, and three do not.

Comparing 2022 and 2023, it is evident that the number of breweries and beverage production enterprises meeting the benchmarking has increased, from 18 enterprises to 22, representing a 22% increase. This increase is primarily seen in breweries with production scales between 20 and 100 million liters and beverage production enterprises.

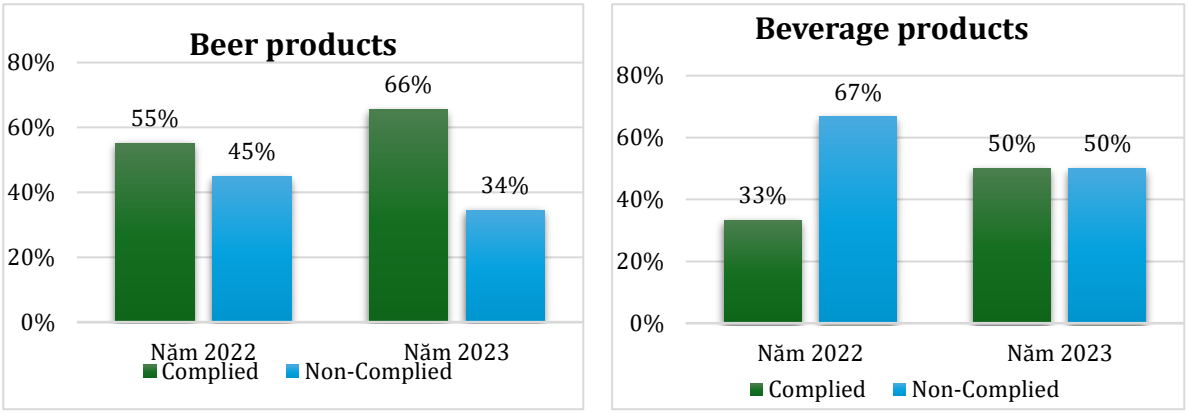
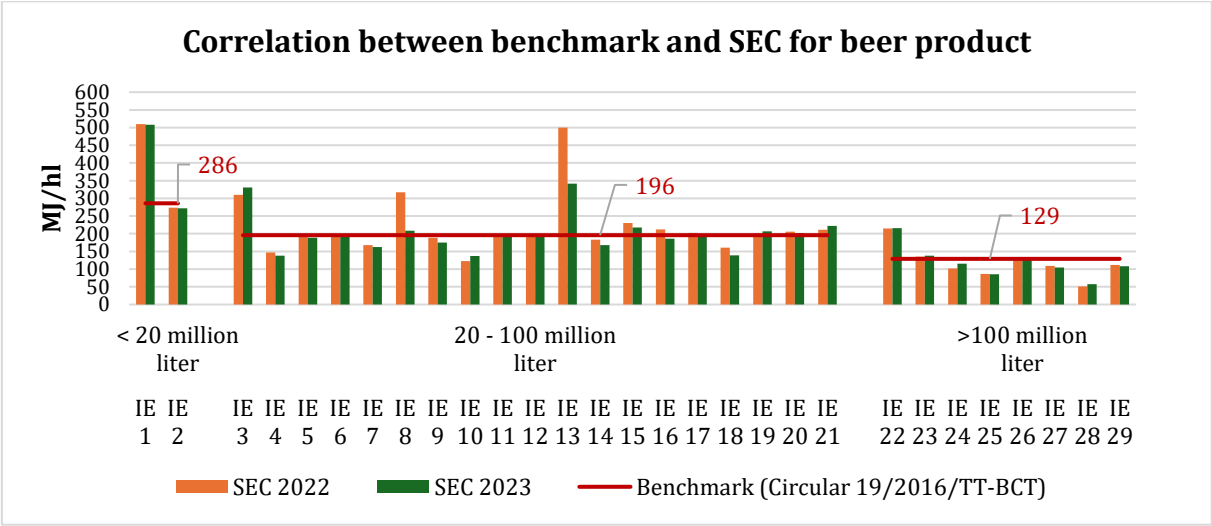


Figure 33. Chart of compliance rate of beer and beverage industry with benchmarking

When comparing companies by production scale, the minimum and maximum values of energy consumption levels are compared with the corresponding Benchmarking values, which are summarized in the *figure 34* below. Some companies have an actual SEC much lower than the benchmarking (only about 50% of the benchmarking), while other companies have an actual SEC much higher than the benchmarking (almost 3 times the benchmarking).



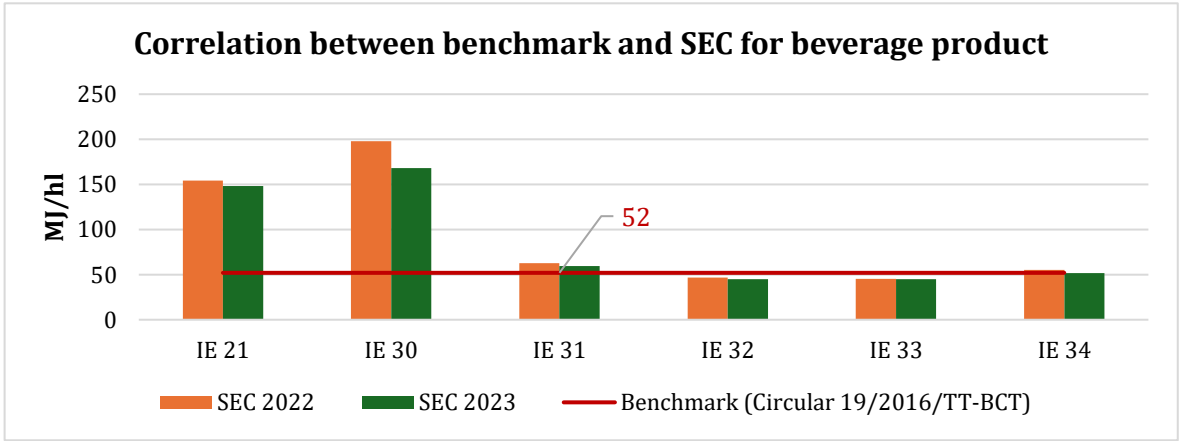


Figure 34. Correlation between benchmarking and SEC levels in the surveyed beer & beverage manufacturing enterprises

c. Compliance with Benchmarking reporting regulations

Most of enterprises comply with the reporting requirements regarding the implementation of the Benchmarking (97% report annually and always on time). However, there are still some enterpriese that do not comply with the reporting requirement (3% have never reported, with reasons such as not knowing there was a requirement to report or not knowing how to report).

Table 14. Number of enterprises complying and not complying with reporting on benchmarking implementation - beer and beverage industry

Compliance with reporting	Quatity	%
Reported annually and always on time	33	97%
Never reported	1	3%

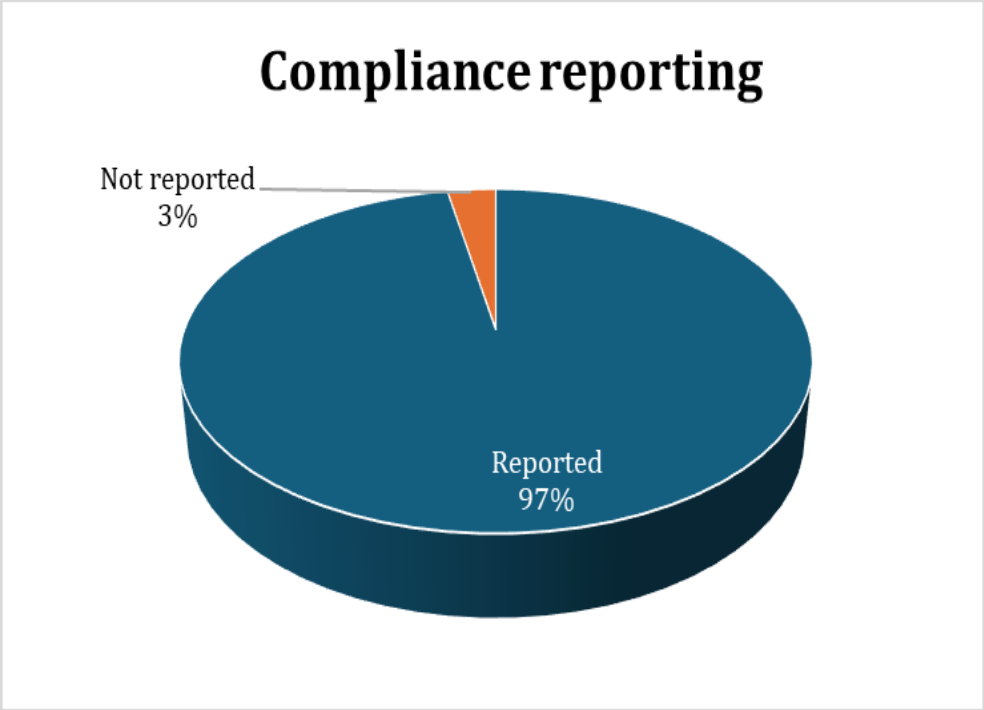


Figure 35. Percentage chart of enterprises complying and not complying with reporting on benchmarking implementation - beer and beverage industry

d. EE activities and measures implemented

- ***Management measure***

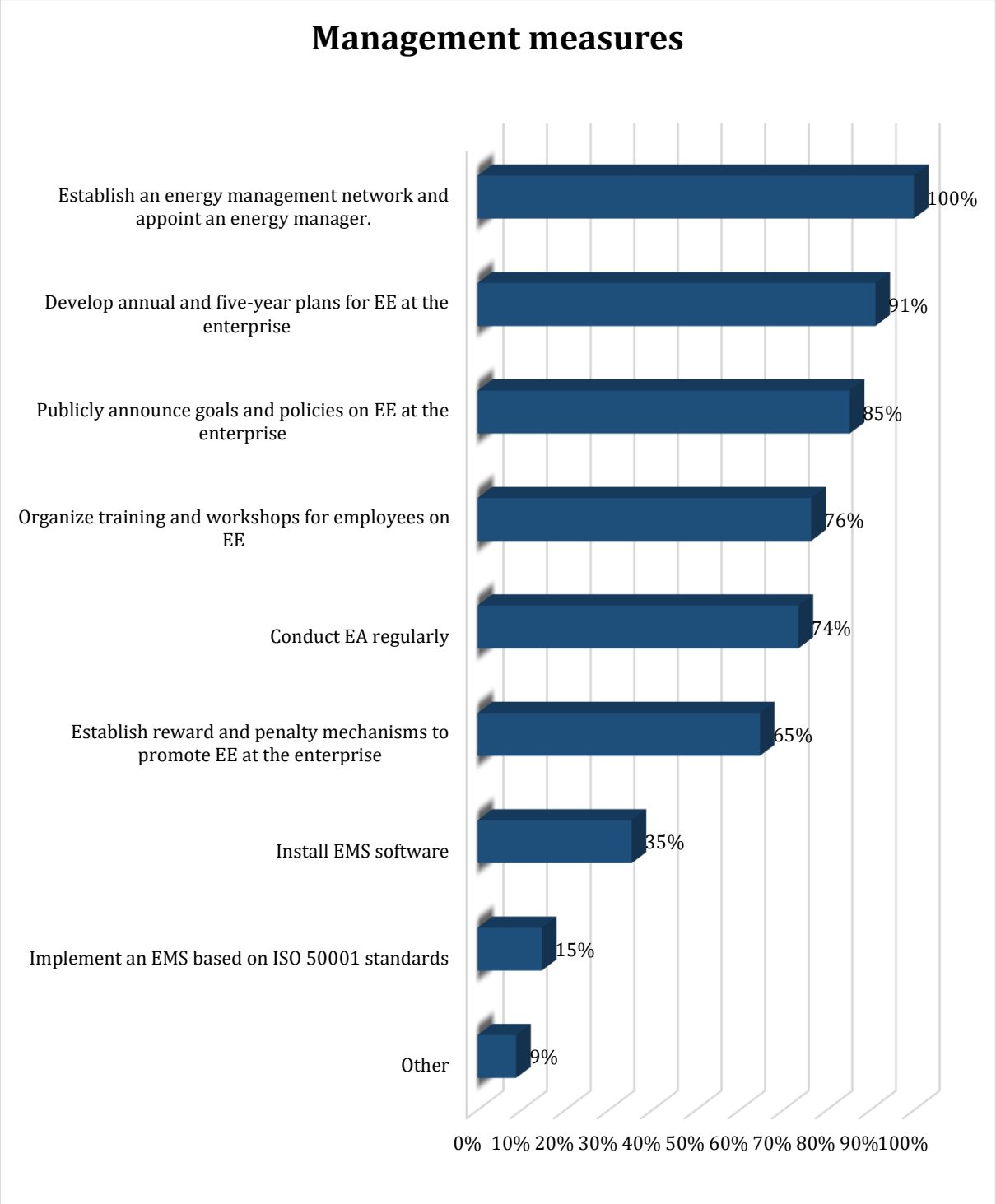


Figure 36. Percentage chart of enterprises implementing management measures for EE - Beer and Beverage Industry

Technological measures:

Overall, enterprises in the beer production sector have implemented EEMs quite well. In contrast, enterprises in the beverage production sector have not performed as well. This is one of the reasons why the compliance rate with the Benchmarking (66%) is higher for beer production enterprises compared to beverage production enterprises (50%).

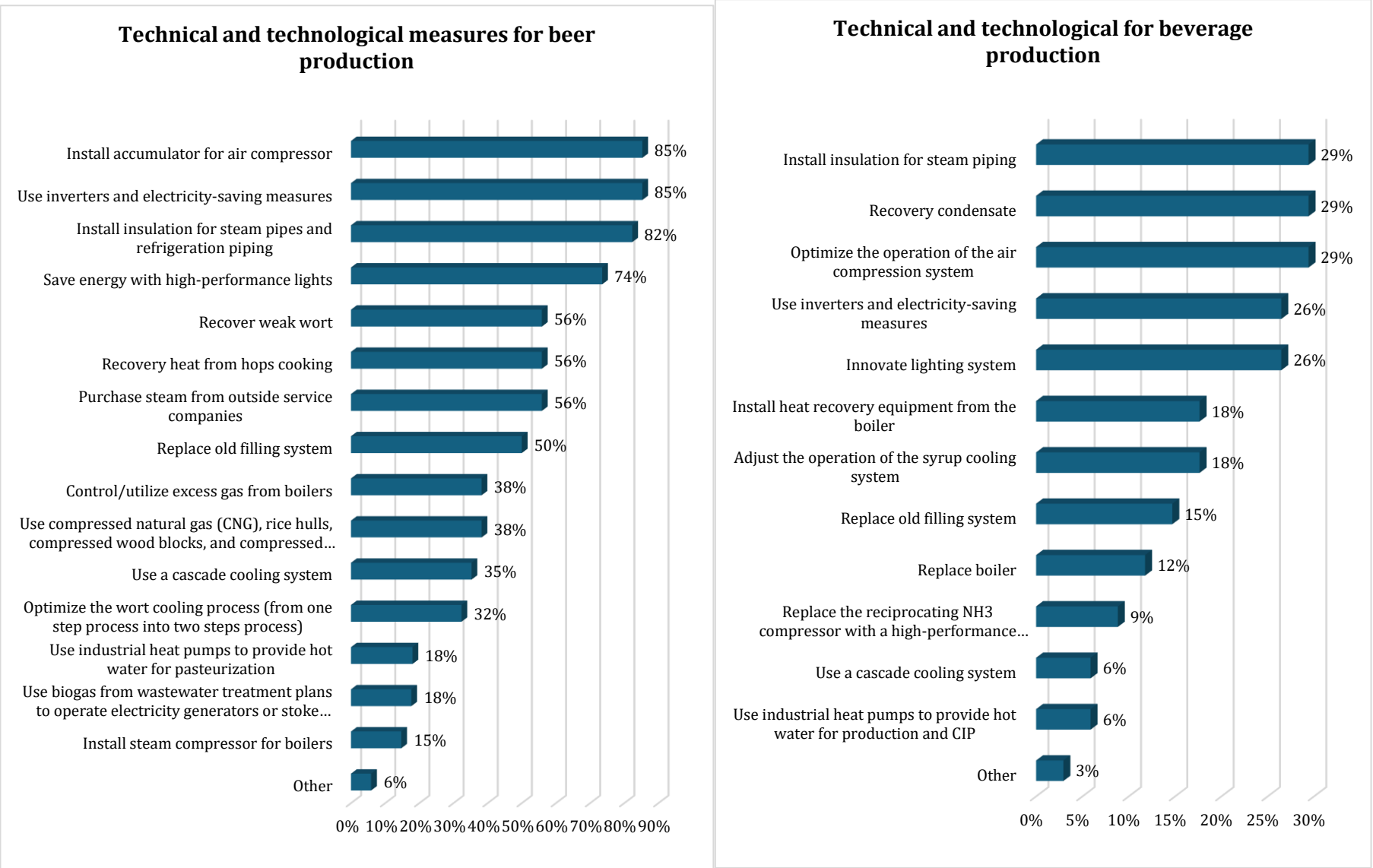


Figure 37. Percentage of enterprises implementing EEMs in the beer and beverage industry

e. Challenges and barriers in Implementing benchmarking regulations

The difficulties and barriers encountered by beer and beverage enterprises in implementing the benchmarking regulations are summarized in the following *figure 38*:

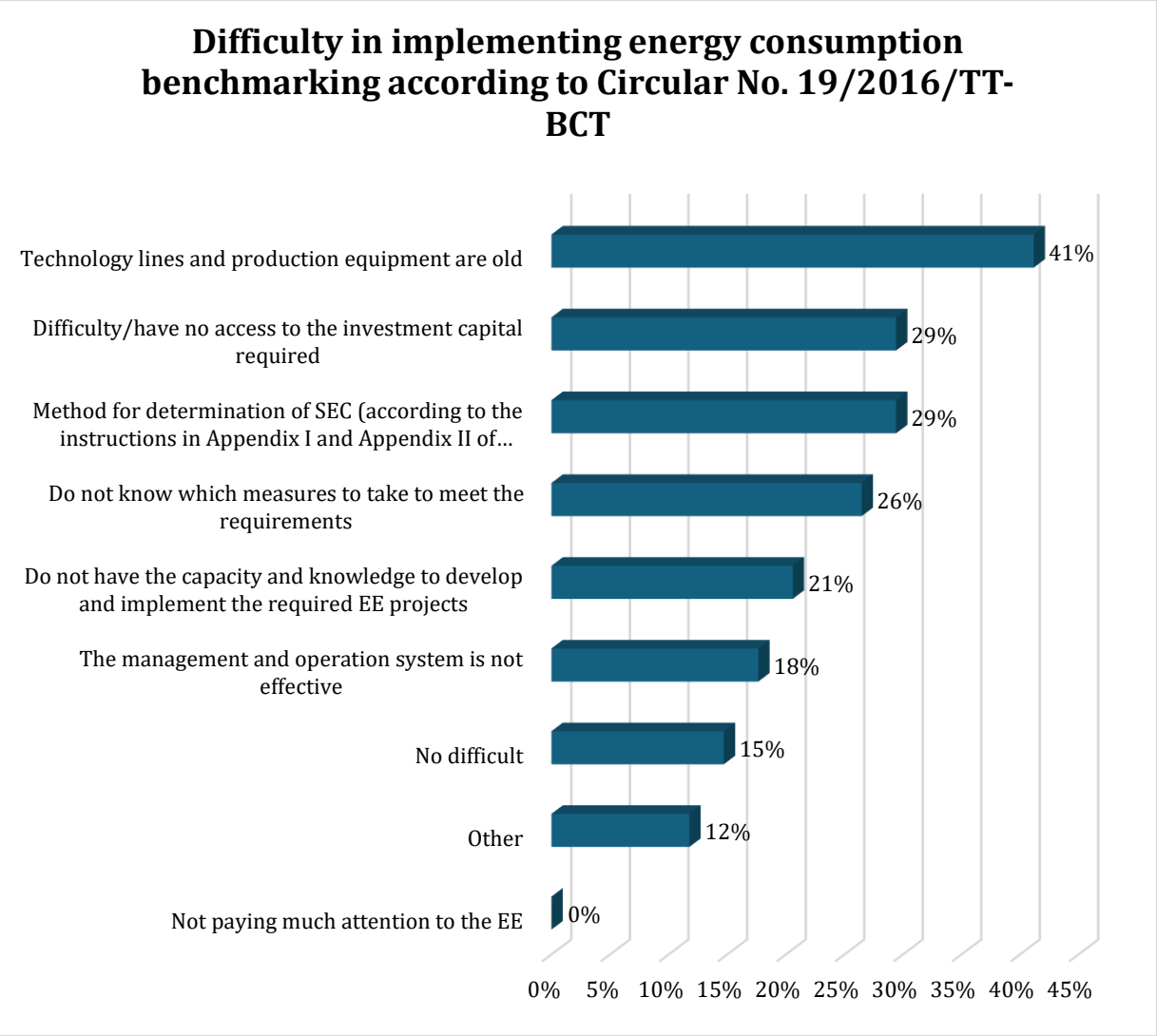


Figure 38.. Percentage of enterprises cacing difficulties and barriers in implementing Benchmarking regulations - beer and beverage industry

The challenges and barriers faced by many enterprises in complying with Benchmarking regulations, ranked from most to least common, include: outdated production technology and equipment (41%); difficulty accessing investment capital (29%); issues with SEC calculation methods (29%); challenges in selecting suitable EE solutions to meet specific needs (26%); lack of knowledge and awareness to develop and implement EE projects (21%); and ineffective management and operation systems (18%).

Difficulties related to SEC calculation methods focus on several aspects: unclear boundaries for production areas; ambiguity in assessing energy consumption benchmarks based on designed or actual capacity; the need for more granular benchmarks; unreasonable conversion factors for canned beer, bottled beer, and draft beer products; beverage product classifications not aligned with industry standards; the

absence of definitions for products such as bottled water with and without recovery, filtered water, and purified water; and incomplete fuel conversion factors.

f. Proposals from beer and beverage enterprises

The proposals from beer and beverage enterprises focus on two main issues: support on the legal front and adjustments to the benchmarking regulations.

Regarding support from government regulatory agencies, most enterprises wish to receive assistance in areas such as:

- Timely dissemination of legal regulations and sharing practical experiences with enterprises to know and implement, share practical experiences of well-performing businesses for reference
- Mechanisms to support access to capital, and consulting services to help enterprises implement EE projects
- Organizing training sessions to enhance enterprises' capacity in management measures, technological measures, and the ability to develop EE projects in the beer and beverage industry

Regarding the Benchmarking, many enterprises have proposed reconsidering certain aspects of the current regulations. The proposals mainly focus on the following issues:

- Allowing the use of enterprises' existing SEC calculation methods for reporting
- Classificating the benchmarking based on actual production capacity rather than design capacity
- Further breaking down production scale categories
- Reconsidering the product equivalency conversion factors

Some notable proposals include:

- Classificating benchmarking based on actual production capacity rather than design capacity. This is because some factories may have large design capacities but produce lower actual output, leading to higher energy losses. According to Circular 19/2016/TT-BCT, the benchmarking for beer production between 2020 and 2025 is benchmark = 196 (MJ/hl) for an annual production of 20-100 million liters. For production between 80-100 million liters per year, the benchmark is met, but for lower production volumes, the SEC increases. Therefore, it's proposed to adjust the SEC based on actual production volumes to provide more accurate benchmarks, especially for volumes exceeding 100 million liters.
- Consider adjusting the conversion factor between canned beer and bottled beer, as the production processes for both are currently similar.
- Consider clearly defining the production areas within beer factories for calculating energy consumption. Some factories purchase treated water or outsource

wastewater treatment, while others handle these processes themselves, resulting in varying energy usage.

- The production ratio between carbonated and non-carbonated beverages affects benchmarking. Therefore, it is proposed to establish a ratio specific to each enterprise to ensure optimal production while also complying with the law.
- Currently, the classification of products in the beverage industry (e.g., carbonated, non-carbonated, and bottled drinking water) does not align with industry standards. Additionally, the regulations include categories for bottled water with and without recycling, which leads to inflated production volumes compared to actual output. Therefore, it is necessary to define appropriate product classifications based on the leading beverage enterprises in the market.

3.4.2. Steel production

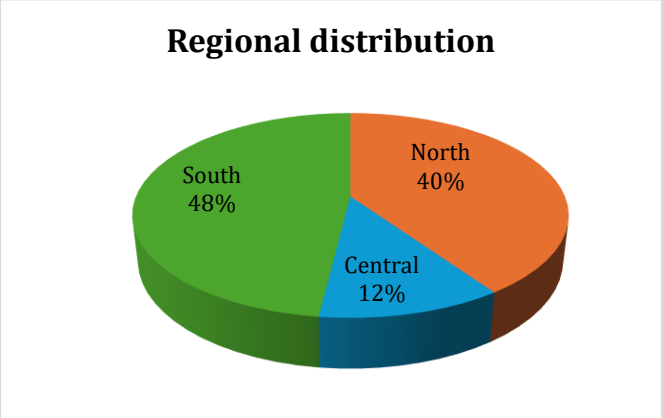
a. Information about the surveyed enterprises

Among the 52 enterprises responding to the survey, there are:

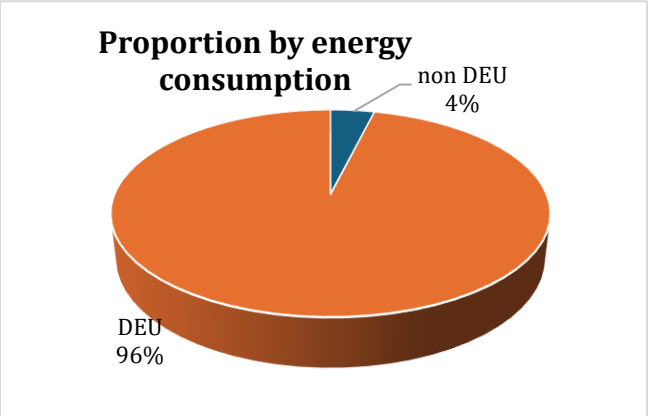
- 2 enterprises involved in sintering iron ore,
- 2 enterprises producing pig iron using blast furnaces,
- 9 enterprises producing steel billets using electric arc furnaces,
- 19 enterprises producing steel billets using induction furnaces,
- 27 enterprises engaged in hot rolling of long steel products, and
- 16 enterprises engaged in cold rolling of flat steel products.

On the other hand, there are 31 enterprises with only 1 production stage, 18 enterprises with 2 production stages and 3 enterprises with 3 production stages.

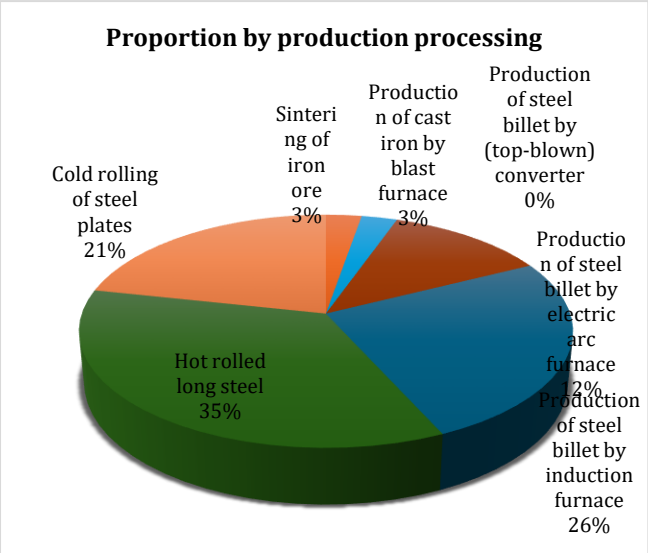
Table 15. Proportion of surveyed steel industry enterprises

Proportion by Region	Number of Enterprises	Proportion of surveyed steel industry enterprises
North	21	
Central	6	
South	25	

Proportion by Energy Consumption Level	Number of Enterprises
Below the DEUs	2
DEUs	50



Proportion by Production Stage	Number of Enterprises
Iron ore sintering	2
Cast iron production using blast furnaces	2
Steel billet production using converter furnaces	-
Steel billet production using electric arc furnaces	9
Steel billet production using induction furnaces	19
Hot rolling of long steel products	27
Cold rolling of flat steel products	16



b. Compliance with Benchmarking

Among the 52 surveyed enterprises, with a total of 75 production stages, 55 stages (representing 73%) met or exceeded the Benchmarking in 2022, while 20 stages (27%) did not meet the benchmarking. In 2023, the number of stages meeting the benchmarking increased to 58 (77%), with 17 stages (23%) still not meeting the benchmarking. In 2023, approximately 65% of enterprises reduced their SEC compared to 2022.

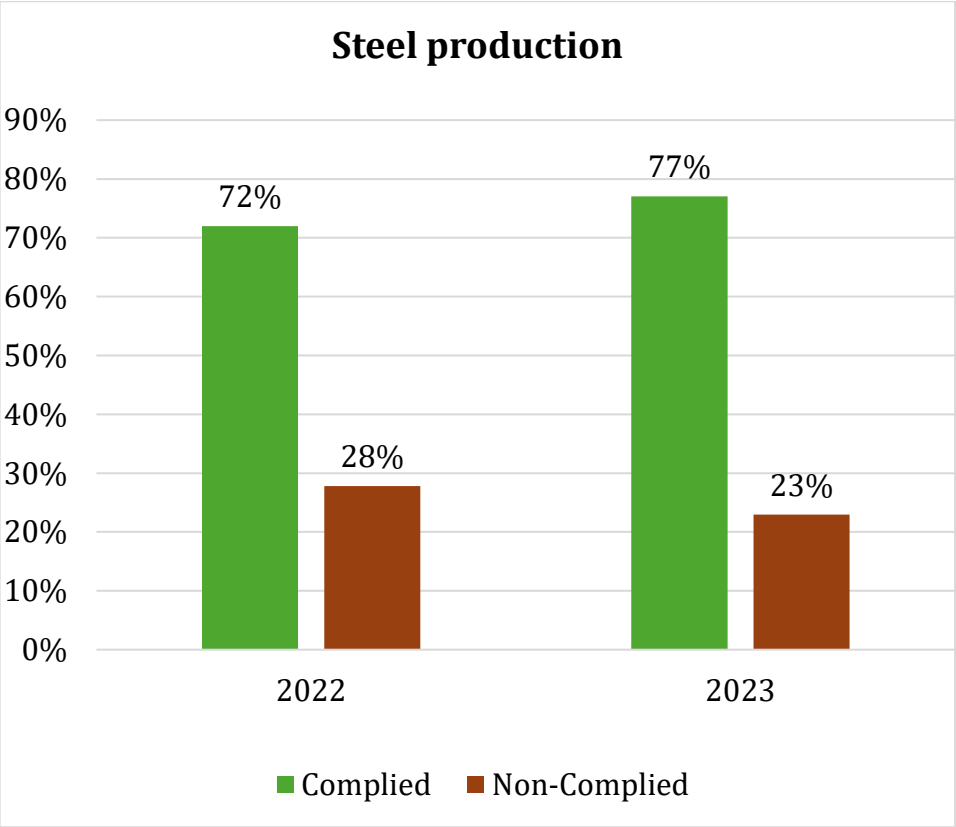


Figure 39. Chart showing the percentage of Enterprises Meeting and not meeting benchmarking in the Steel Manufacturing Sector

The highest compliance rates are observed in the sintering of iron ore, blast furnace iron production, and hot rolling of long steel processes. Key challenges primarily arise in the processes of steel billet production using electric arc furnaces/induction furnaces and cold rolling of steel sheets.

Table 16. Summary of enterprises complying with benchmarking in the Steel Manufacturing Sector

Production Stage	Number of stages	2022		2023	
		Complied	Not complied	Complied	Not complied
Iron ore sintering	2	2	0	2	0
Cast iron production using blast furnaces	2	2	0	2	0
Steel billet production using converter furnaces	0	0	0	0	0
Steel billet production using electric arc furnaces	9	6	3	7	2

Production Stage	Number of stages	2022		2023	
		Complied	Not complied	Complied	Not complied
teel billet production using induction furnaces	19	11	8	13	6
Hot rolling of long steel products	27	22	5	22	5
Cold rolling of flat steel products	16	12	4	12	4
Total	**75**	**55**	**20**	**58**	**17**
%		**73%**	**27%**	**77%**	**23%**

There are enterprises whose actual SEC is significantly lower than the benchmarking value (only about 15% of the benchmarking value), while some enterprises have an actual SEC that is significantly higher than the benchmarking value (nearly 3.5 times the benchmarking value).

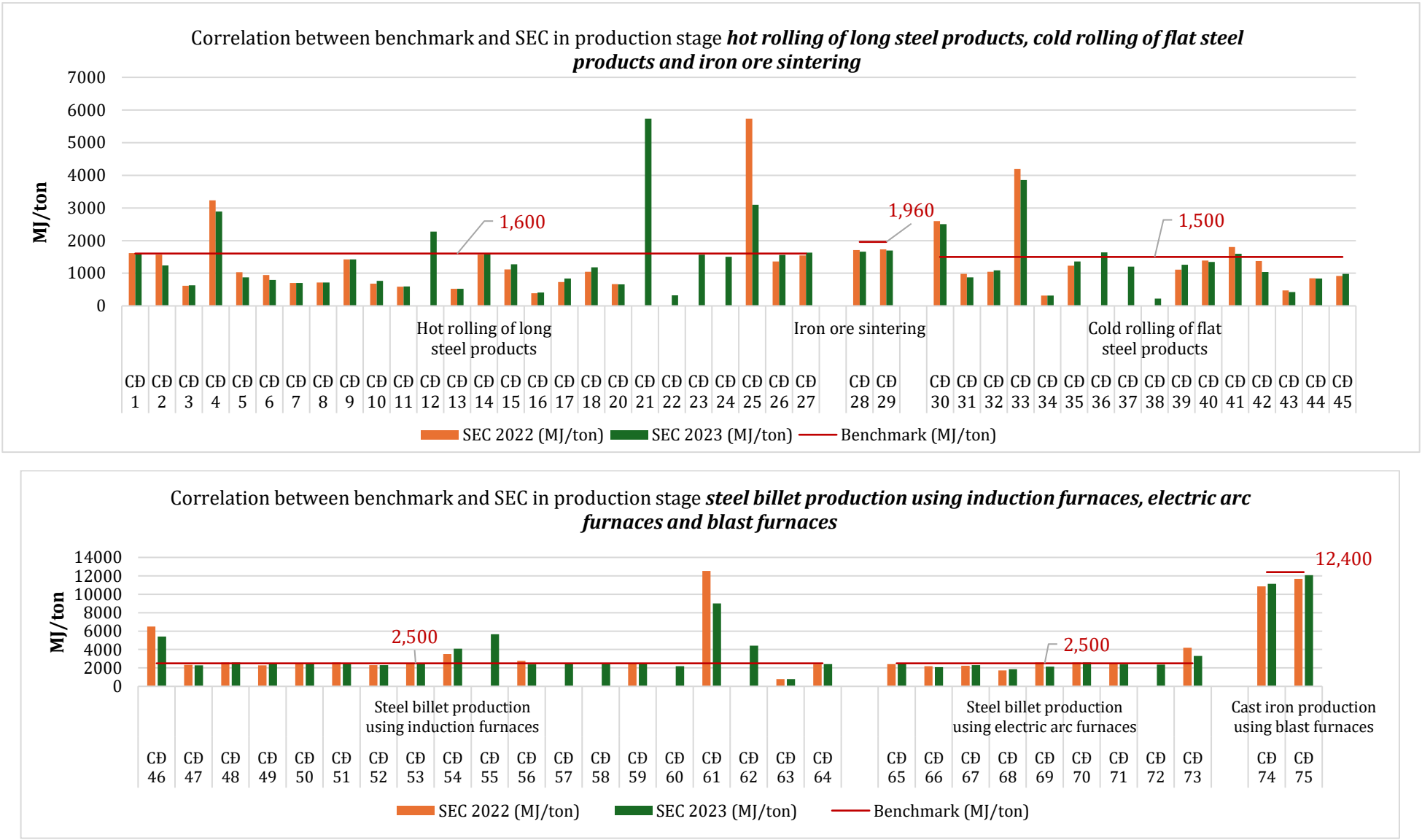


Figure 40. Correlation between benchmarking and SEC in surveyed steel enterprises

c. Compliance with Benchmarking reporting regulations

Most enterprises comply with the reporting requirements for benchmarking (92% submit annual reports on time as per regulations). However, a small proportion of enterprises (8%) have not complied with the reporting requirements, citing reasons such as lack of awareness of the regulations and insufficient knowledge on how to prepare the reports.

Table 17. Number of enterprises complying with and not complying with reporting requirements for benchmarking - Steel Manufacturing Sector

Reporting Compliance	Number of Enterprises	Percentage %
Submitted annual reports and always on time as required	48	92%
Never submitted repor	4	8%

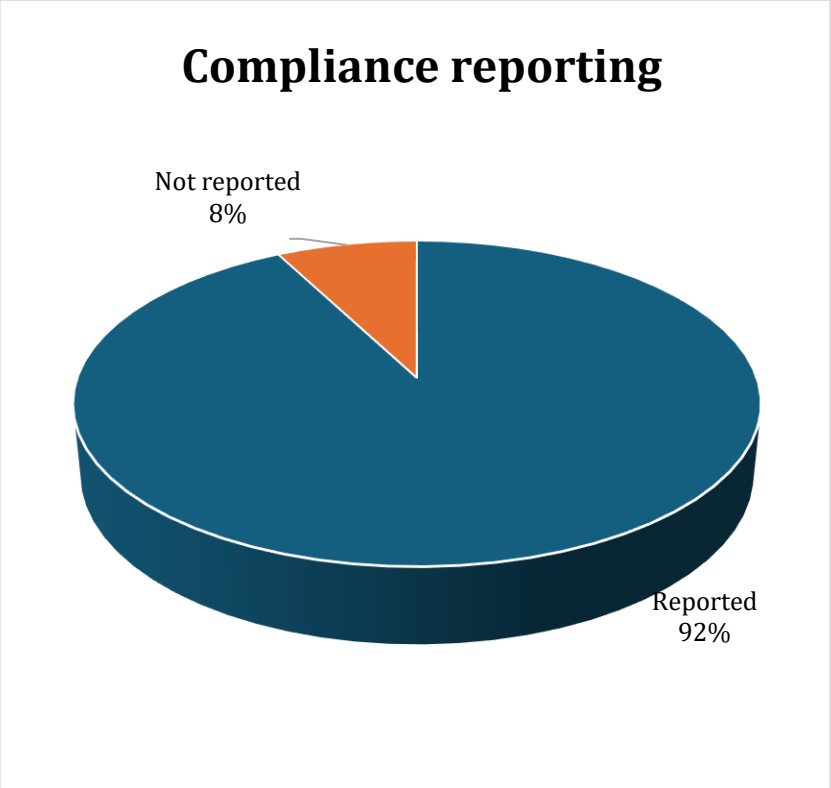


Figure 41. Percentage of Enterprises Complying and Not Complying with Reporting Requirements for benchmarking in the Steel Production Sector

d. EE activities and measures implemented

- ***Management measures***

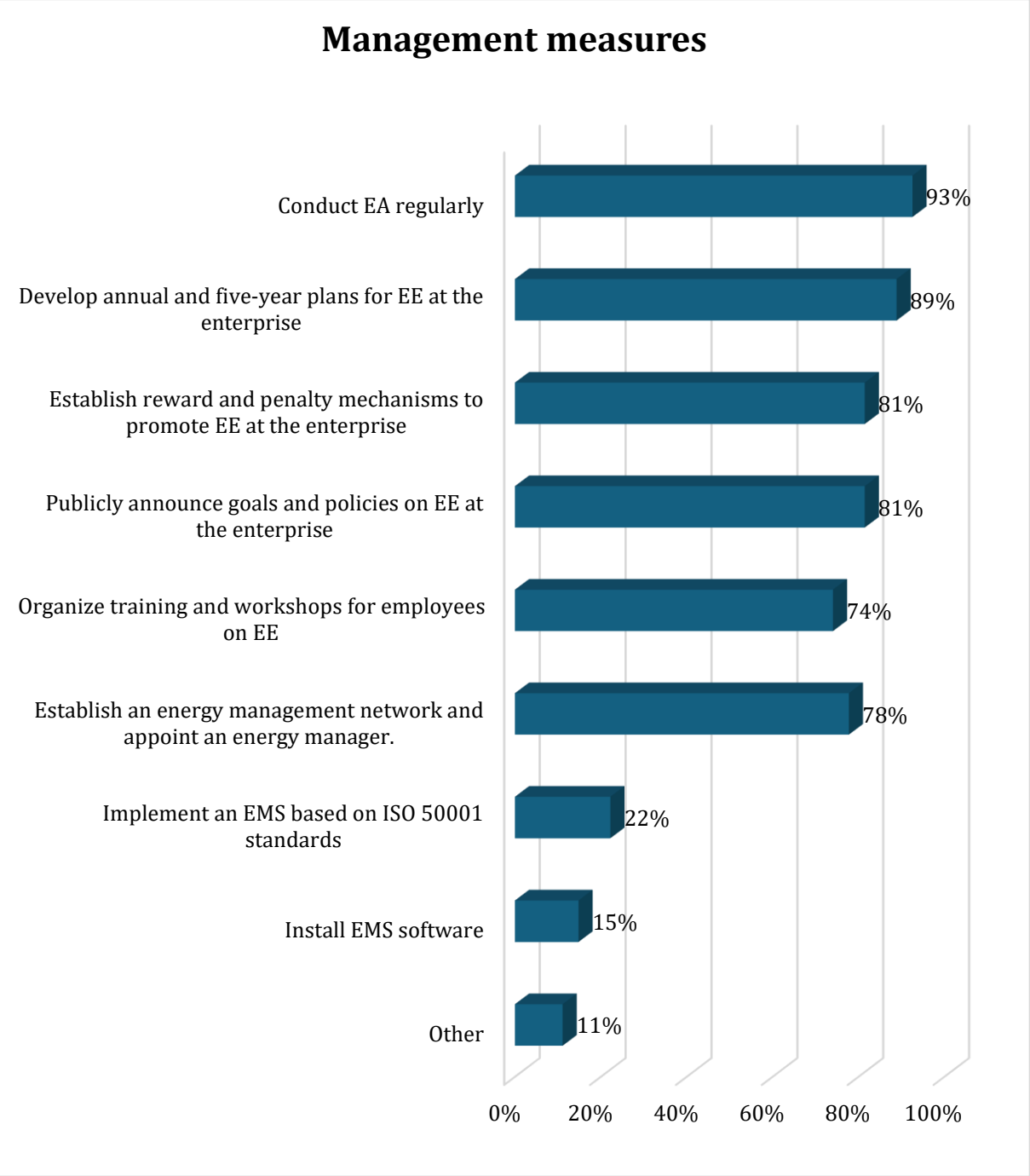


Figure 42. Percentage of Enterprises Implementing Management Measures for EE in the Steel Production Sector

Technological and technical measures

Overall, the implementation of EEMs in steel production enterprises is relatively positive. Notably, in the sintering process, a considerable number of EEMs have been adopted. Specifically, measures such as energy recovery (from converter gas, blast furnace top gas pressure, and blast furnace gas) have been implemented across all surveyed enterprises. In addition to these, enterprises have also incorporated various other EEMs.

However, in the cold rolling of steel sheets, the adoption of EEMs is significantly limited, with relatively low implementation rates.

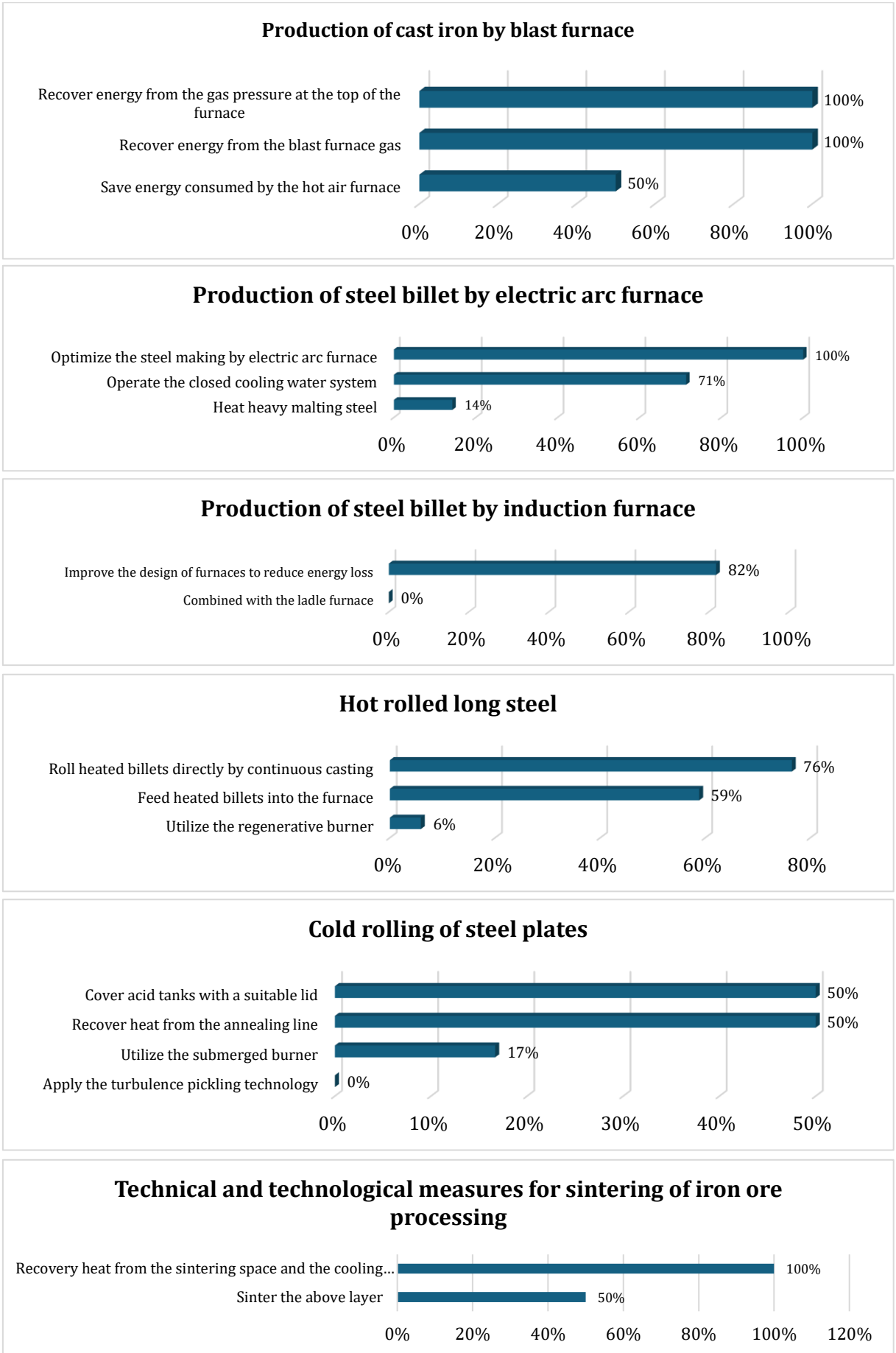


Figure 43. Percentage of Enterprises Implementing Technical EEMs in the Steel Production Sector

e. Challenges and barriers in implementing benchmarking regulations

Steel production enterprises face several challenges and barriers in adhering to benchmarking regulations, including:

- Difficulty in selecting suitable EEMs that meet operational demands (43%).
- Outdated production technology and equipment (35%).
- Challenges or inability to access investment capital (26%).
- Lack of knowledge and awareness to develop and implement EE projects (17%).
- Issues with the methodology for calculating SEC (17%).
- Inefficient management and operational systems (4%).

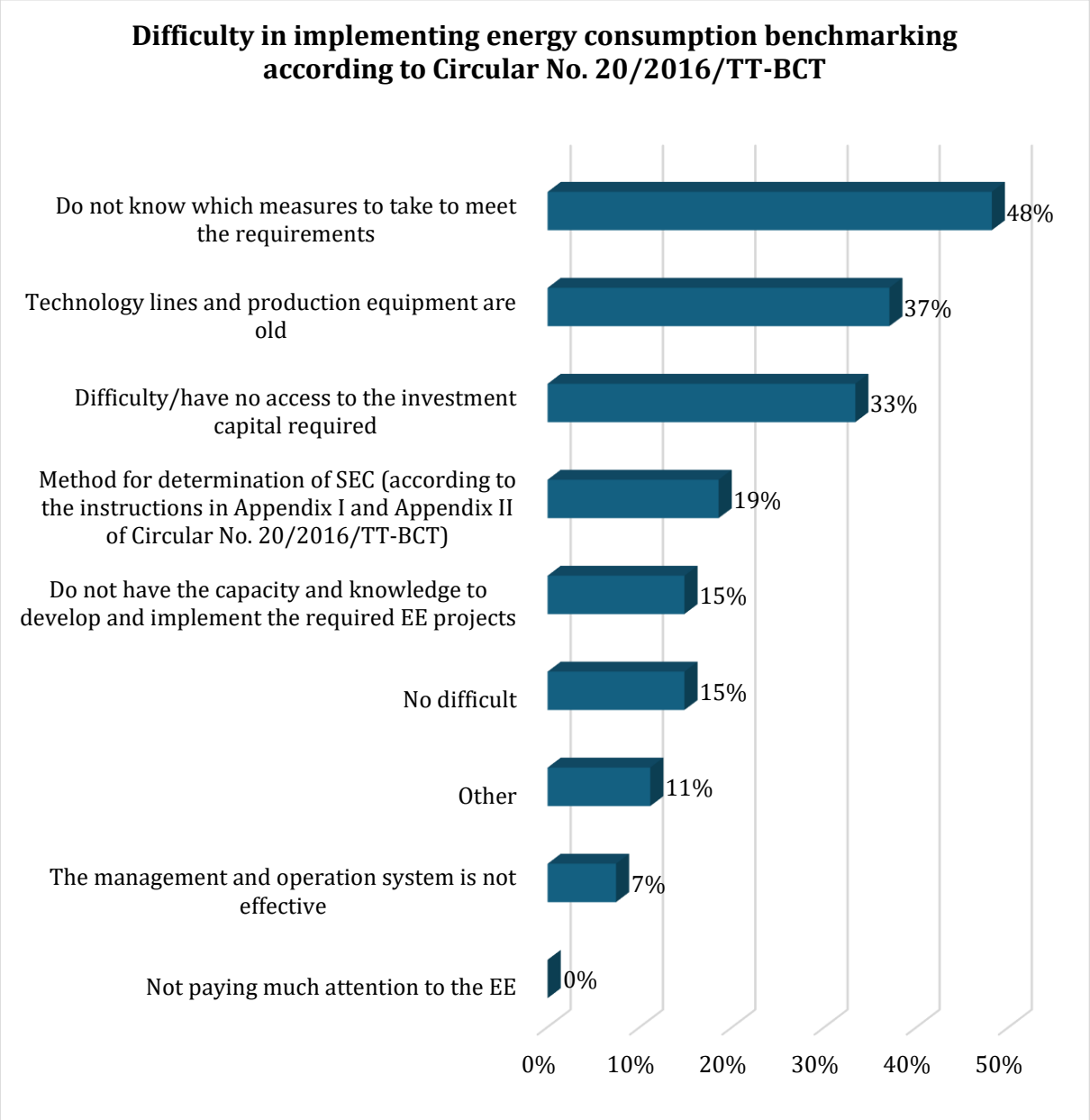


Figure 44. Percentage of Enterprises Facing Challenges and Barriers in Implementing benchmarking regulations in the Steel Production Sector

f. Proposals from steel production enterprises

Support from regulatory authorities, Most enterprises express a desire for support from government authorities in the following areas:

- Timely dissemination of legal regulations, practical measures, and data regarding benchmarking.
- Financial support and assistance in accessing funding sources.
- Capacity-building training.
- Access to advanced technological measures.
- Advisory services for implementing EE projects.

For proposals regarding benchmarking, many suggestions for changes focus on the following aspects:

- Adding and detailing benchmarks for specific production processes.
- Considering specific cases for production lines with unique characteristics.
- Early publication of draft updates to benchmarking to allow enterprises to adjust their operations in advance.

Specific proposals include:

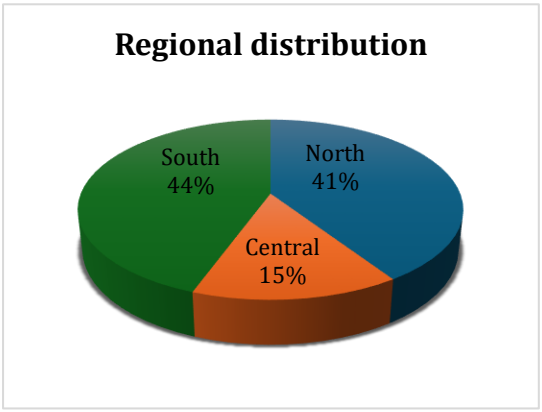
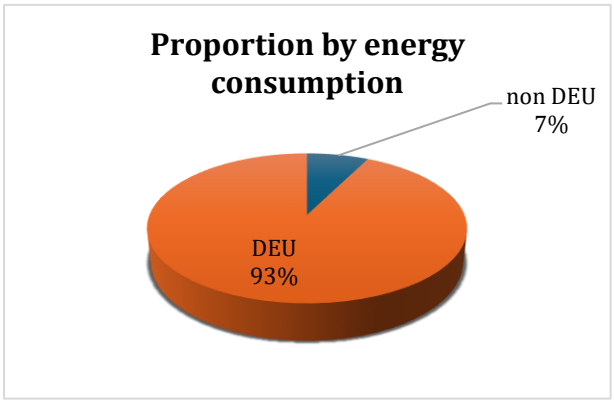
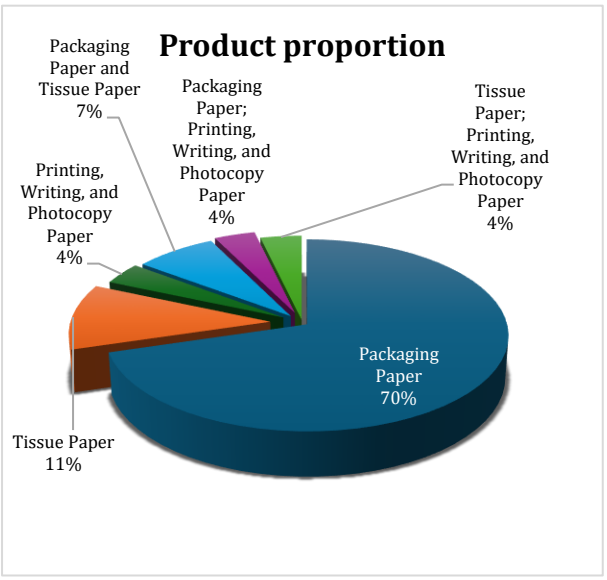
- Inclusion of hot-rolled steel plate production lines in the benchmarking system.
- Providing detailed benchmarks for individual production stages. For example, in the hot-rolled long steel production stage, specific benchmarks should be set for bar, wire rod, structural steel, etc.
- Avoiding separate evaluations of steelmaking and rolling processes for enterprises using continuous casting and rolling technology. Instead, evaluate the total SEC of both processes, as continuous hot rolling technology requires higher SEC in steelmaking to ensure billets are hot enough for rolling. However, the total SEC for both processes is significantly lower compared to rolling cold billets.
- Currently, Circular No. 20/2016/TT-BCT only defines SEC benchmarks for the steel industry until the end of 2025. Enterprises require draft updates for post-2025 benchmarks to develop appropriate plans and comply with future requirements.

3.4.3. Paper and Pulp Production

a. Information on surveyed enterprises

The survey team conducted a survey of 27 enterprises in the paper production sector with the following general information:

Table 18. Proportion of IEs in the paper amd pulp production sector surveyed

Proportion by Region	***Number of Enterprises***	***Proportion of IEs in the paper amd pulp production sector surveyed***
North	11	
Central	4	
South	12	
Proportion by Energy Consumption Level	***Number of Enterprises***	
Non- DEUs	2	
DEUs	25	
Proportion by Product Type	***Number of Enterprises***	
Packaging Paper	19	
Tissue Paper	3	
Printing, Writing, and Photocopy Paper	1	
Packaging Paper and Tissue Paper	2	
Packaging Paper; Printing, Writing, and Photocopy Paper	1	
Tissue Paper; Printing, Writing, and Photocopy Paper	1	

b. Compliance with benchmarking

The survey results show that in 2023, 22 product types (66%) in paper production met the benchmarking while 10 product types (31%) did not comply.

Table 19. Number of enterprises meeting and not meeting the benchmarking in the paper and pulp sector

Product Type	Scale (tons/year)	Total	2022		2023	
			Complied	Not complied	Complied	Not complied
Packaging Paper	> 50.000	13	9	3	10	3
	10.000 – 50.000	7	4	3	3	4
	< 10.000	2	0	2	2	0
Tissue Paper	10.000 - 50.000	6	5	1	5	1
	< 10.000	1	0	1	0	1
Printing, Writing, and Photocopy Paper	> 50.000	-	-	-	-	-
	10.000 - 50.000	3	2	1	2	1
Total		***32***	***20***	***11***	***22***	***10***
%			***65%***	***35%***	***69%***	***31%***

There has been a slight increase (around 4%) in the proportion of enterprises meeting the benchmarking between 2022 and 2023, reflecting efforts to improve EE in the paper industry. Notably, packaging paper showed significant improvement in the number of enterprises meeting the benchmarking, while tissue paper and printing, writing, and photocopy paper maintained steady compliance rates over the years. Small enterprises (especially those with low production capacity) still face challenges in meeting the benchmarking.

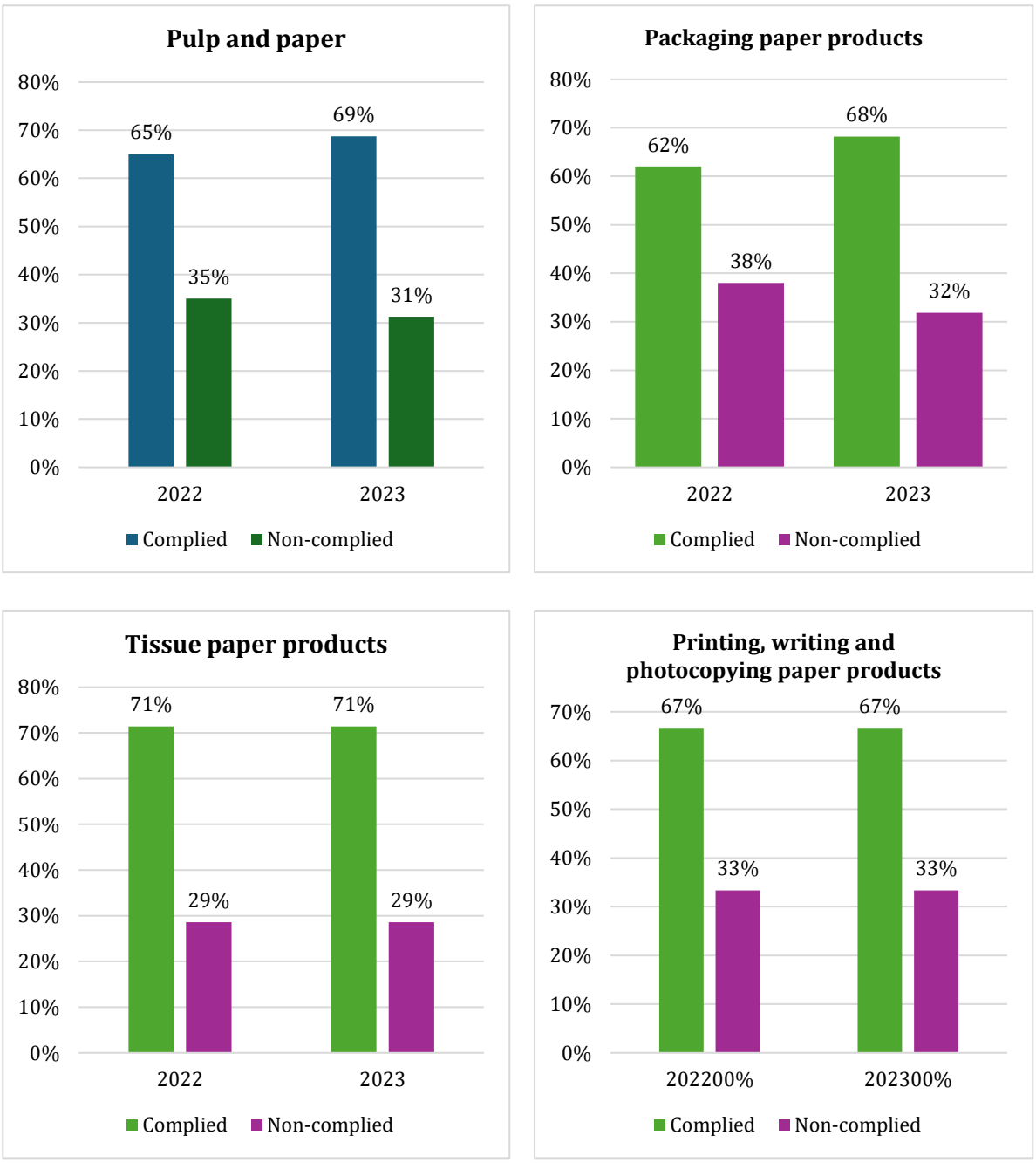


Figure 45. Percentage of enterprises meeting and not meeting benchmarking - Paper Manufacturing Industry

Some enterprises have actual SEC values significantly lower than the benchmarking (only about 15% of the benchmark), while others have SEC values significantly higher (nearly 2.5 times the benchmark).

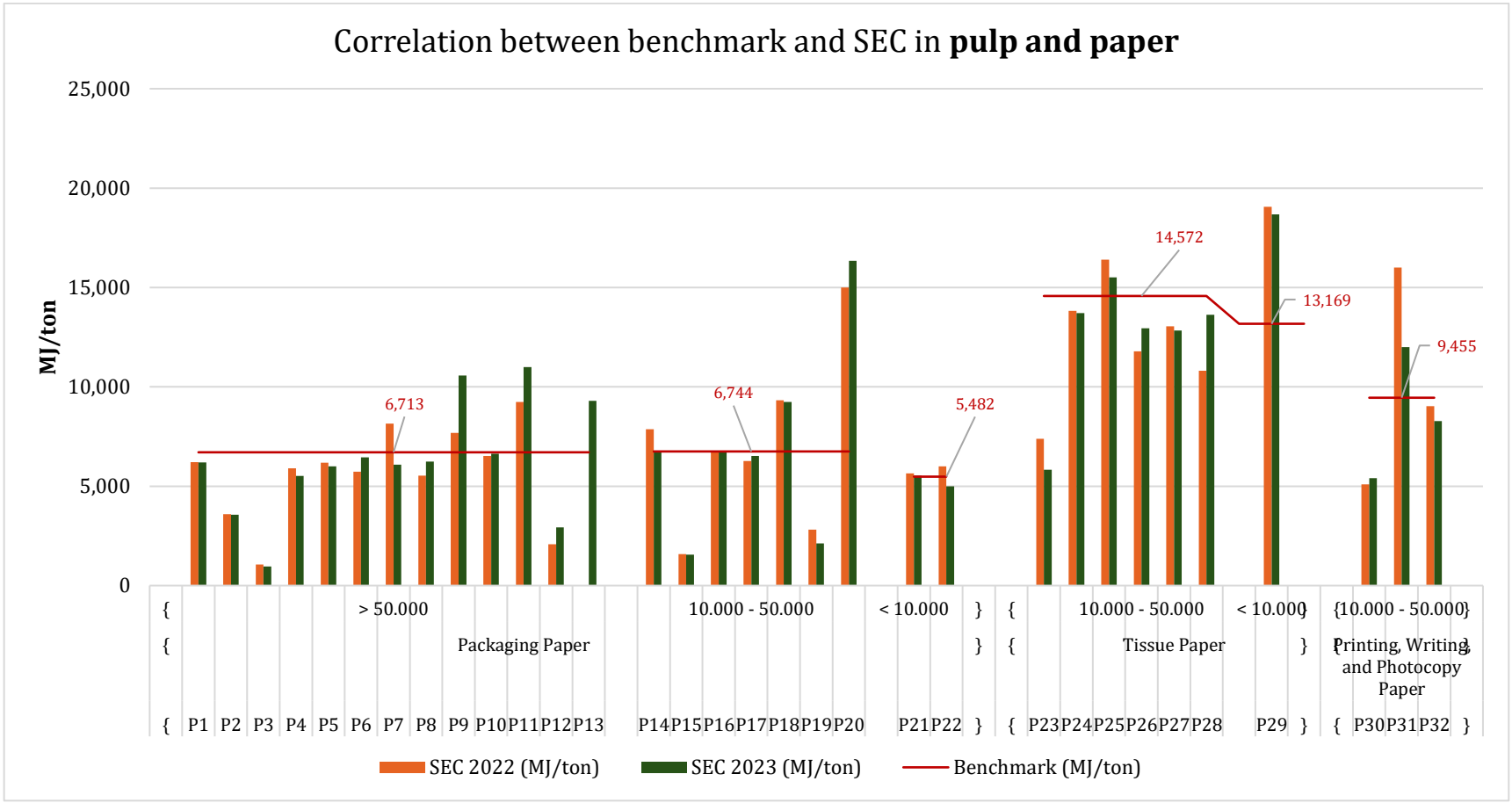


Figure 46. Correlation between benchmarking and SEC levels in surveyed paper and pulp enterprises

There is a considerable gap between the benchmarking and the actual SEC of various product groups (e.g., the 10,000-50,000 tons/year production capacity group in the packaging paper sector, where the highest SEC is many times higher than the benchmarking). This highlights the need for many enterprises to further improve their EMS practices.

In general, smaller enterprises (<10,000 tons/year) tend to have significantly higher energy consumption compared to the benchmarking. Meanwhile, larger enterprises (>50,000 tons/year), particularly in the packaging paper sector, show high potential for improving EE. However, there remains significant variation in performance among these enterprises.

c. Compliance with Benchmarking reporting regulations

Table 20. Number of enterprises complying and not complying with reporting requirements on benchmarking - Paper Manufacturing Industry

Compliance with Reporting	Number of Enterprises	Percentage %
Submit annual reports and always meet deadlines	26	96%
Have never submitted reports	1	4%

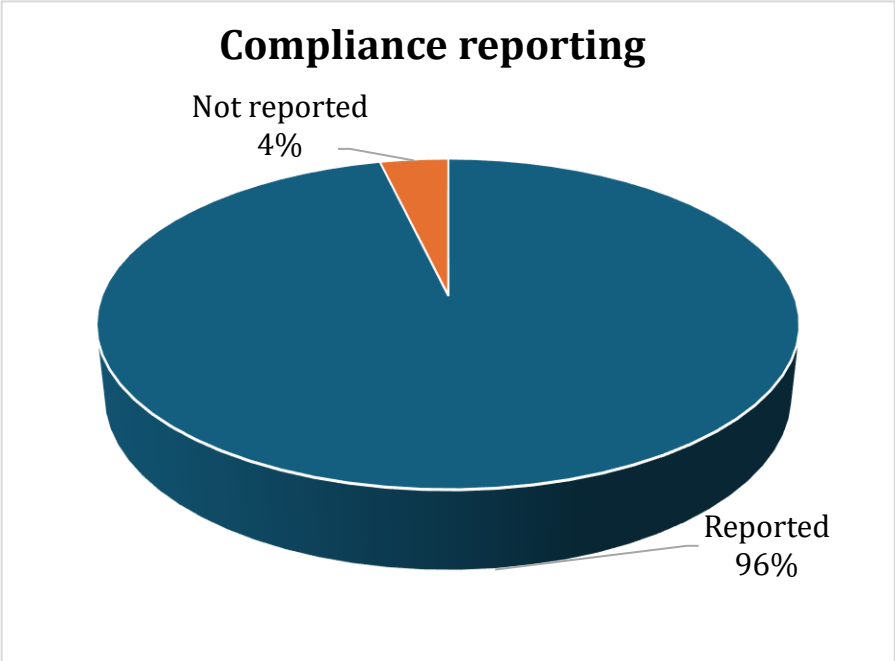


Figure 47. Percentage of Enterprises Complying and Not Complying with Reporting Requirements on Benchmarking - Paper Manufacturing Industry

d. EE activities and measures implemented

- ***Management measures***

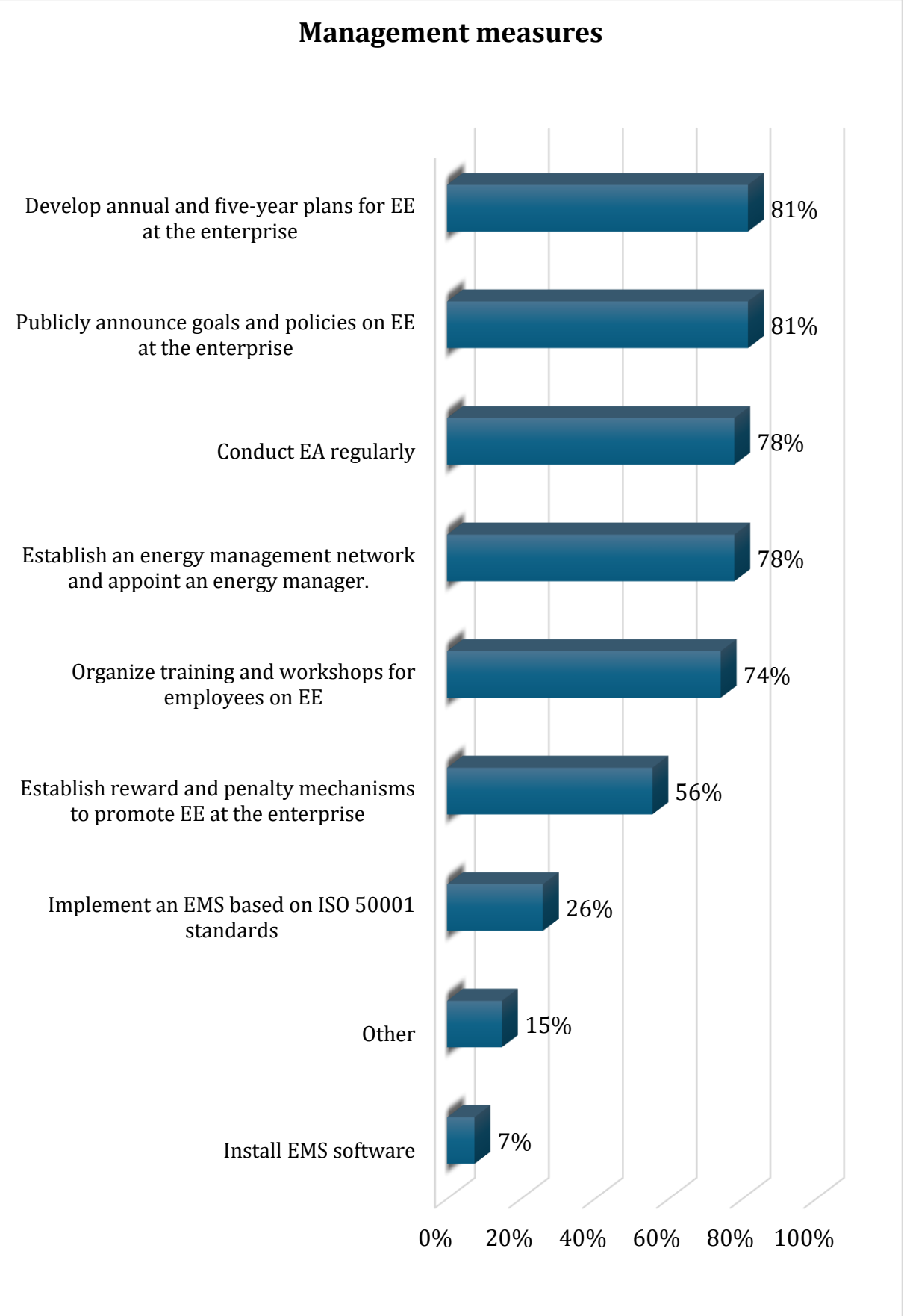


Figure 48. Percentage of Enterprises Implementing Management measures in EE- Paper Manufacturing Industry

- ***Implementation of Technical and Technological measures***

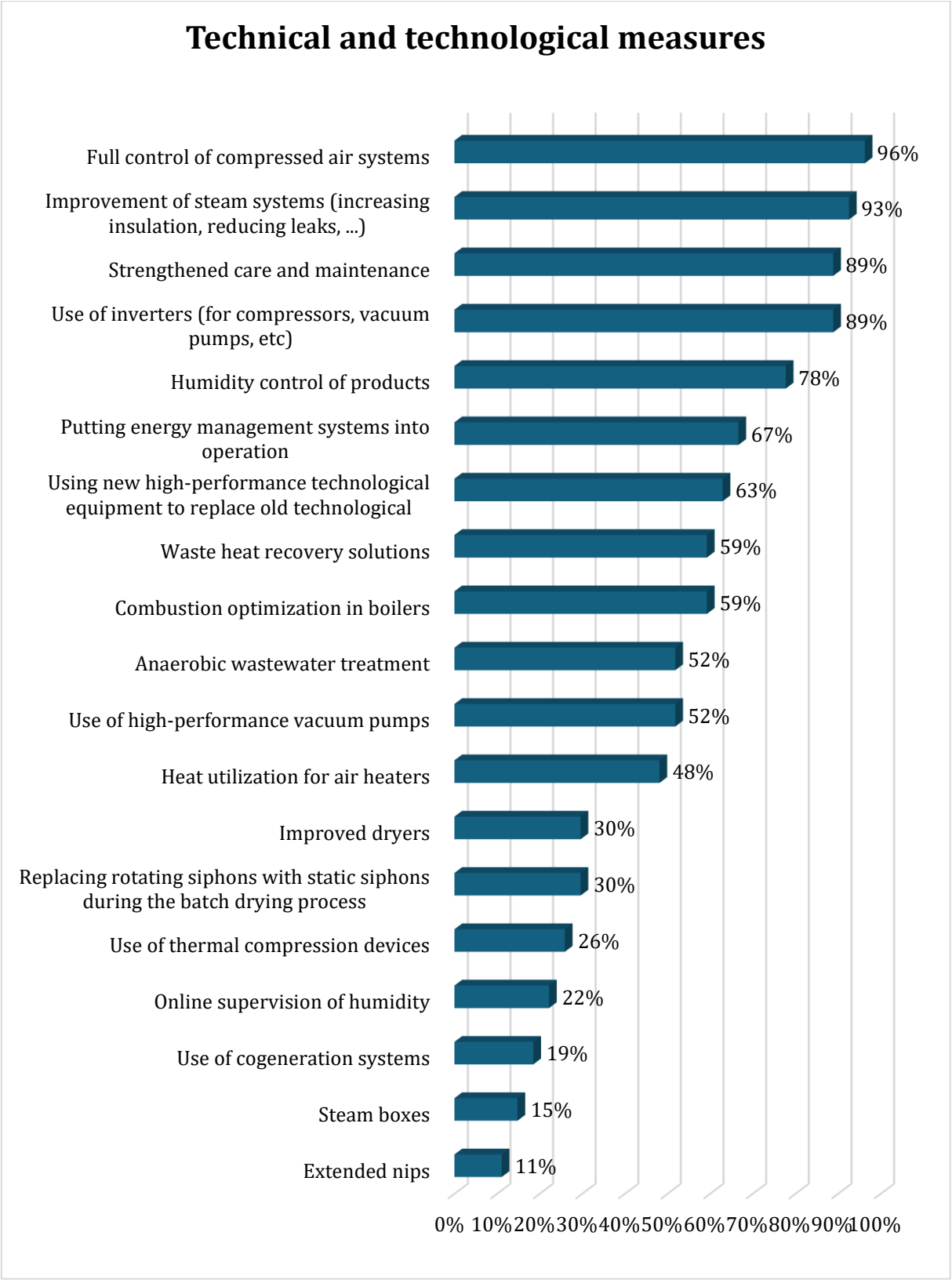


Figure 49.. Percentage of Enterprises Implementation of Technical and Technological measures in EE- Paper Manufacturing Industry

In general, EEMs (including those suggested in Circular No. 24/2017/TT-BCT) have been implemented by paper manufacturing enterprises. Many technical measures have been adopted by over 80% of enterprises. However, there is still a proportion of enterprises in the paper industry that cannot meet the benchmarking despite efforts to apply these

measures. This highlights the need to investigate the reasons behind the inability of some enterprises to meet benchmarking, which should be considered when revising the content of upcoming regulations.

e. Challenges and barriers in mplementing benchmarking regulations

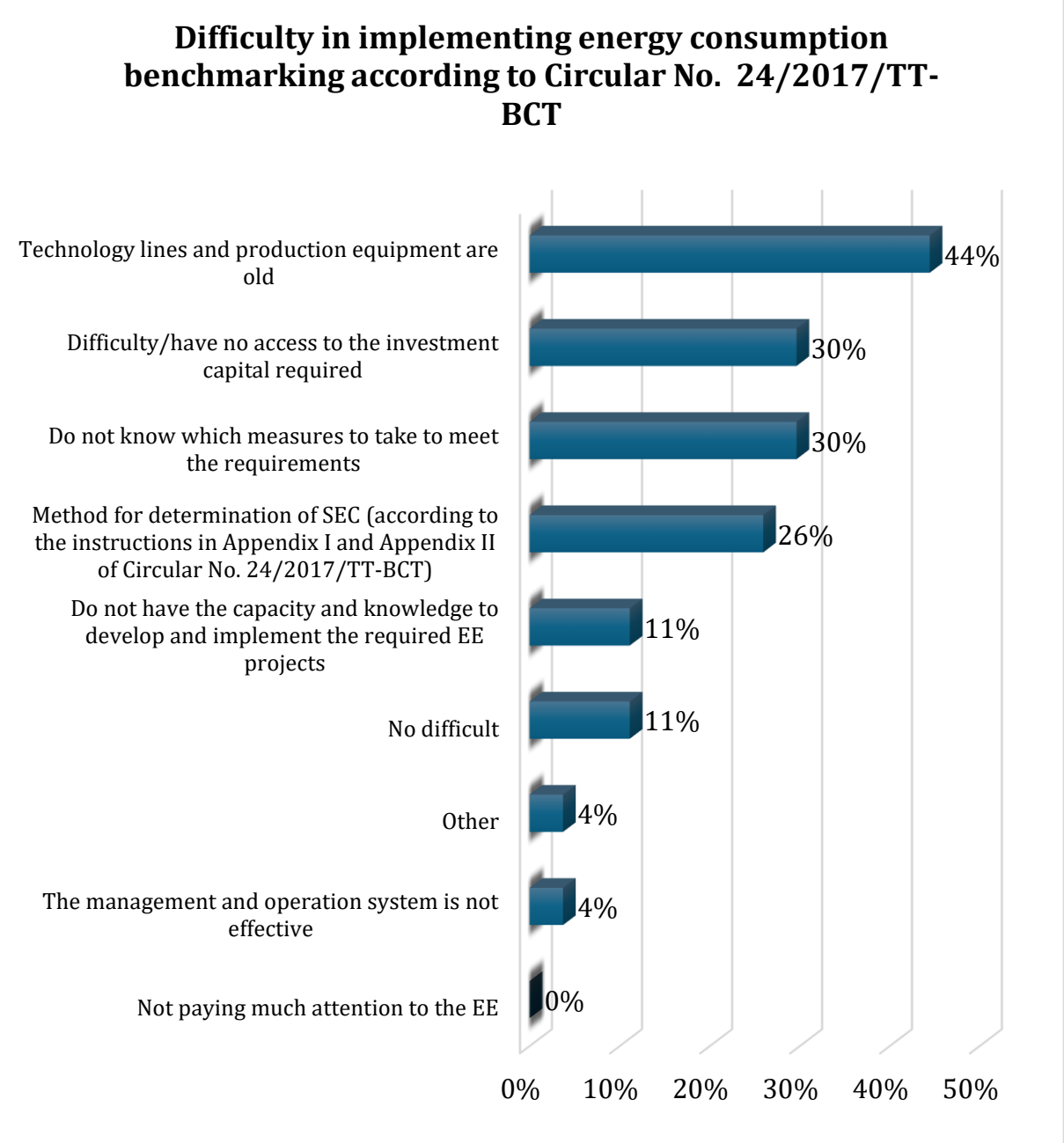


Figure 50.. Percentage of Enterprises Facing Challenges and Barriers in Implementing Benchmarking Regulations - Paper Manufacturing Industry

Enterprises face several challenges and barriers when implementing benchmarking regulations, including:

- Outdated Technology: 44% of enterprises reported that their production lines are outdated, significantly affecting their ability to EE.

- Difficulties in Choosing measures**:** 30% of enterprises struggle to identify appropriate EEMs, and another 30% face difficulties in accessing investment capital.
- Complex Calculation Methods**:** 26% of enterprises find the method for calculating SEC too complex, indicating a need for simplification to make it more practical.
- Training and Awareness**:** Although only 11% of enterprises lack knowledge about EEMs, this issue still requires attention through dedicated training programs.

f. Proposals from paper and pulp enterprises

Most enterprises expressed the desire for support in the following areas: specific guidance on calculating SEC in alignment with actual production practices, financial assistance for conducting energy audits, capacity-building training, access to new technological measures, simplification of administrative procedures, and specific support policies for enterprises.

Regarding benchmarking, enterprises called on state management agencies to clarify and simplify regulations, as current guidelines remain overly generalized and do not account for the unique characteristics of each enterprise, making compliance challenging. Many enterprises also noted that the current benchmarks do not accurately reflect production realities, especially for specialized products or self-sufficient energy processes. Therefore, they proposed adjustments to make the benchmarks more practical. Some enterprises also emphasized the need for access to new technological measures, along with the simplification of administrative procedures and the implementation of specific support policies to encourage compliance with energy regulations in practice.

Key proposals include:

- Detailed SEC Calculation Guidance: Enterprises requested specific guidance tailored to their production characteristics rather than generic instructions in existing circulars, ensuring accurate SEC calculations.
- Enterprises face challenges choosing between environmentally friendly measures (e.g., using biomass for boilers) and meeting SEC regulations. For instance, using coal might result in lower SEC but is less environmentally friendly. Enterprises seek guidance from regulators to strike the right balance.
- Separate Benchmarks for specialized products: For high-quality products requiring specific attributes (e.g., burst strength, edge compression). Through the management process according to the ISO 50001:2018 energy system, the enterprises have realized that these products consume more energy than regular products..
- Conversion Factors for Specific Products: Testliner paper manufacturers proposed adding a production conversion factor similar to that for Sizing Medium paper.

Although Testliner involves a sizing (gluing) process as sizing medium and consumes similar or higher energy, it currently lacks a conversion factor.

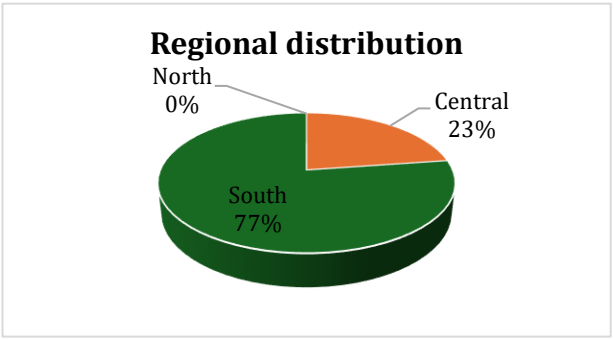
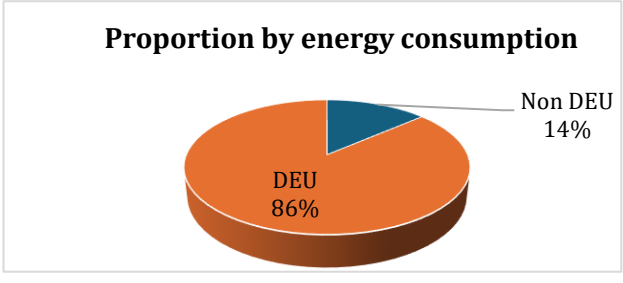
- Enterprises recommended clearer regulations regarding fuel moisture content when calculating energy use, as this impacts energy consumption. They also suggested applying benchmarking based on installed production line capacity rather than actual production output.
- Enterprises proposed mechanisms for sharing experiences and best practices within the paper industry to collectively improve EE.
- Plants with internal self-sufficient power systems suggested adjusting benchmarking to align with their energy production and consumption practices, enhancing their operational efficiency.
- Many enterprises emphasized that current benchmarking fail to represent actual production conditions, particularly for specialized products and self-sufficient energy setups. They called for adjustments to better align benchmarking with real-world scenarios.

3.4.4. Food processing: shrimp and catfish

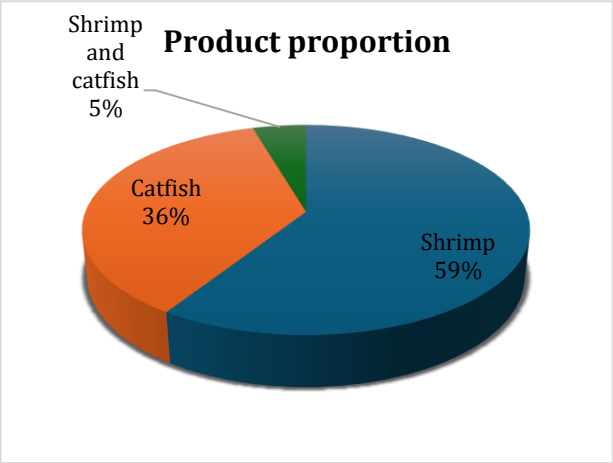
a. Information about surveyed Enterprises

The survey team conducted a survey of 22 enterprises in the seafood processing industry (catfish and shrimp) with the following general information:

Table 21. The proportion of IEs in the seafood processing industry (catfish and shrimp) was surveyed

Proportion by region	***No. of IE***	***Proportion chart of seafood processing enterprises (catfish and shrimp) was surveyed***
North	0	
Central Region	5	
Southern	17	
Proportion by Benchmarking	***No. of IE***	
Non-DEU	3	
DEU	19	

Proportion by manufactured products	*No. of IE*
Shrimp	8
Catfish	13
Shrimp and Catfish	1

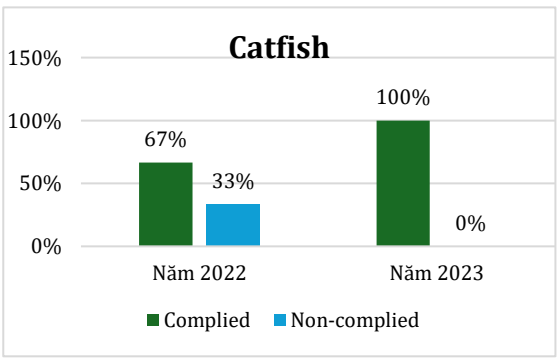


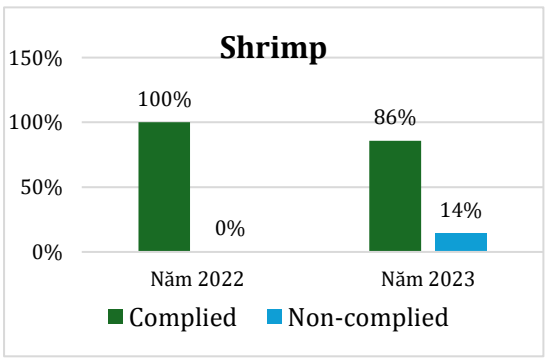
b. Level of compliance with Benchmarking

There are 22 IEs was surveyed, of which, 13 IEs process shrimp, 8 IEs process catfish, and 1 IE process both shrimp and catfish.

Product	Scale (tons/year)	Total	2022		2023	
			Complied	Not complied	Complied	Not complied
Cá da trơn	>300	9	6	3	9	0
	%		67%	33%	100%	0%
Tôm	>300	14	14	0	12	2
	%	9	100%	0%	86%	14%

Most seafood processing enterprises (catfish and shrimp) achieve the Benchmarking. Of which, nearly 100% of catfish processing enterprises and 86% of shrimp processing enterprises achieve this Benchmarking. In 2023, about 44% of catfish processing enterprises and 57% of shrimp processing enterprises reduced SEC compared to 2022.





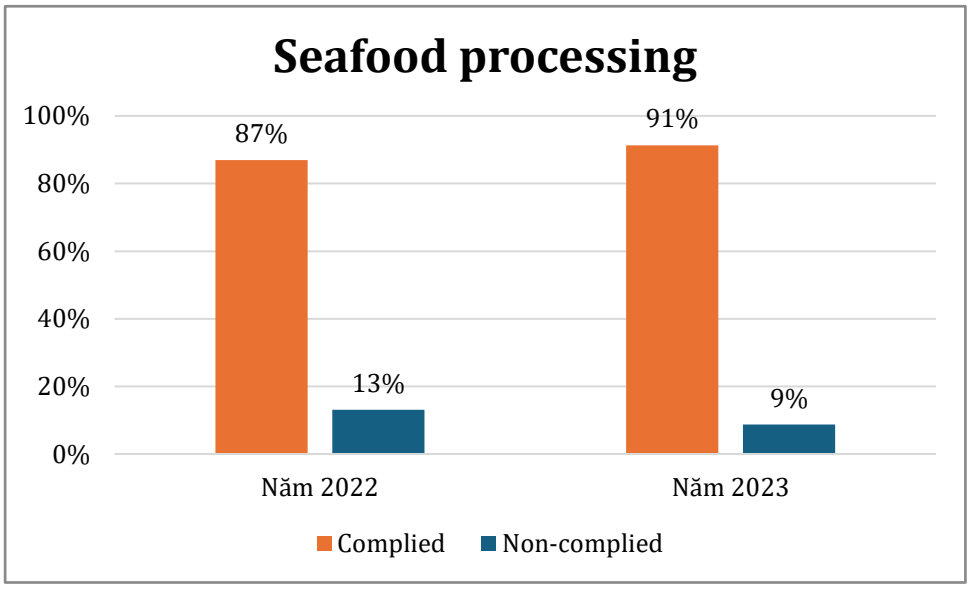


Figure 51. Chart of percentage of IEs achieving and not achieving the Benchmarking - seafood processing industry (shrimp and catfish)

There are enterprises whose actual SEC is much lower than the benchmark (only about 35% of the benchmarking).

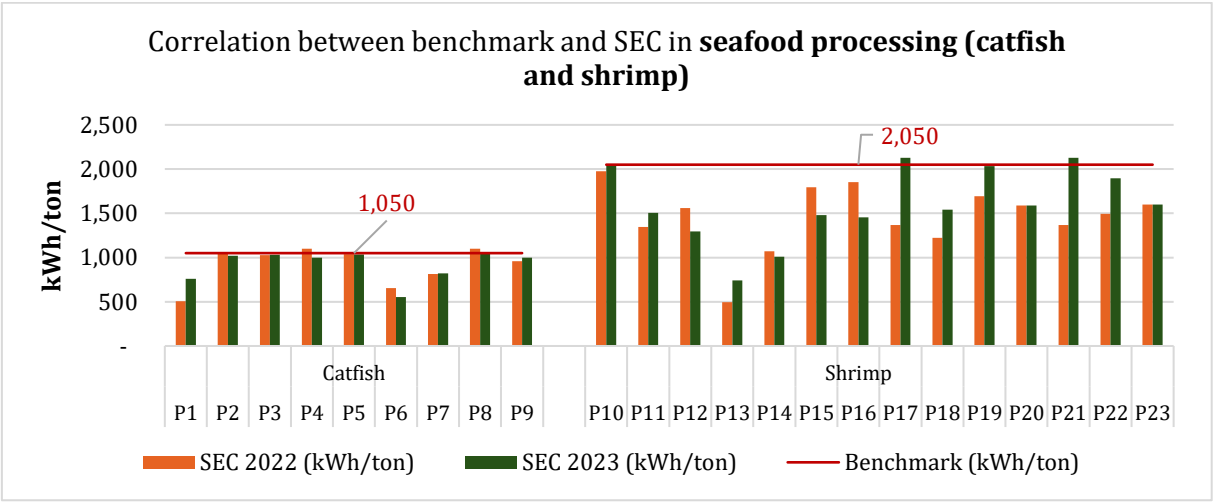


Figure 52. Correlation between Benchmarking and SEC levels in seafood processing enterprises

c. Compliance with Benchmarking reporting regulations.

Table 22. Number of enterprises complying and not complying with regulation on reporting the implementation of Benchmarking - seafood processing industry (shrimp and catfish)

Compliance with reporting implementation	No. of IE	Percentage (%)
Performed annual reporting and always on time as required.	19	86%
Never reported	3	14%

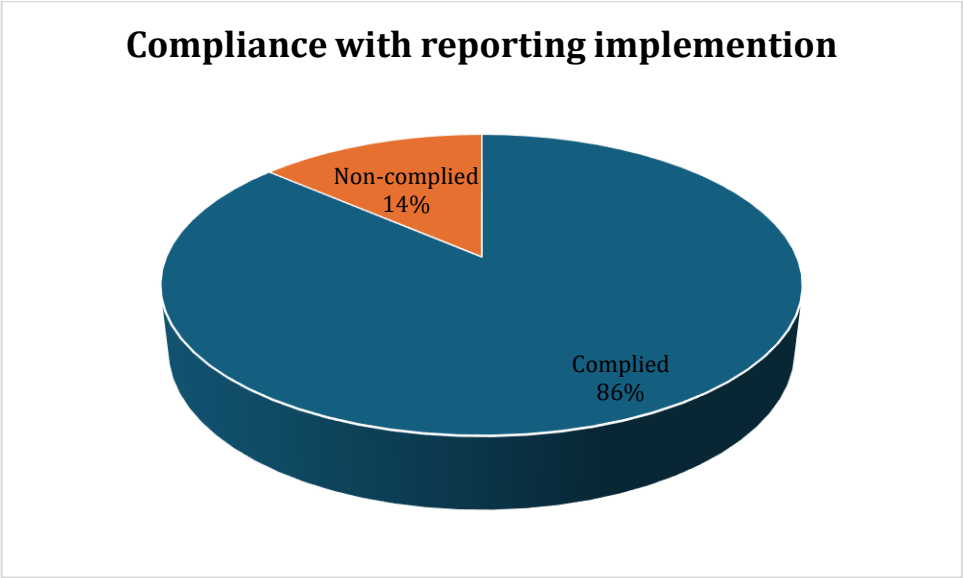


Figure 53. Chart of percentage of enterprises complying and not complying with regulation on reporting the implementation of Benchmarking - seafood processing industry (shrimp and catfish)

d. EE activities and measures implemented

Implement management measures

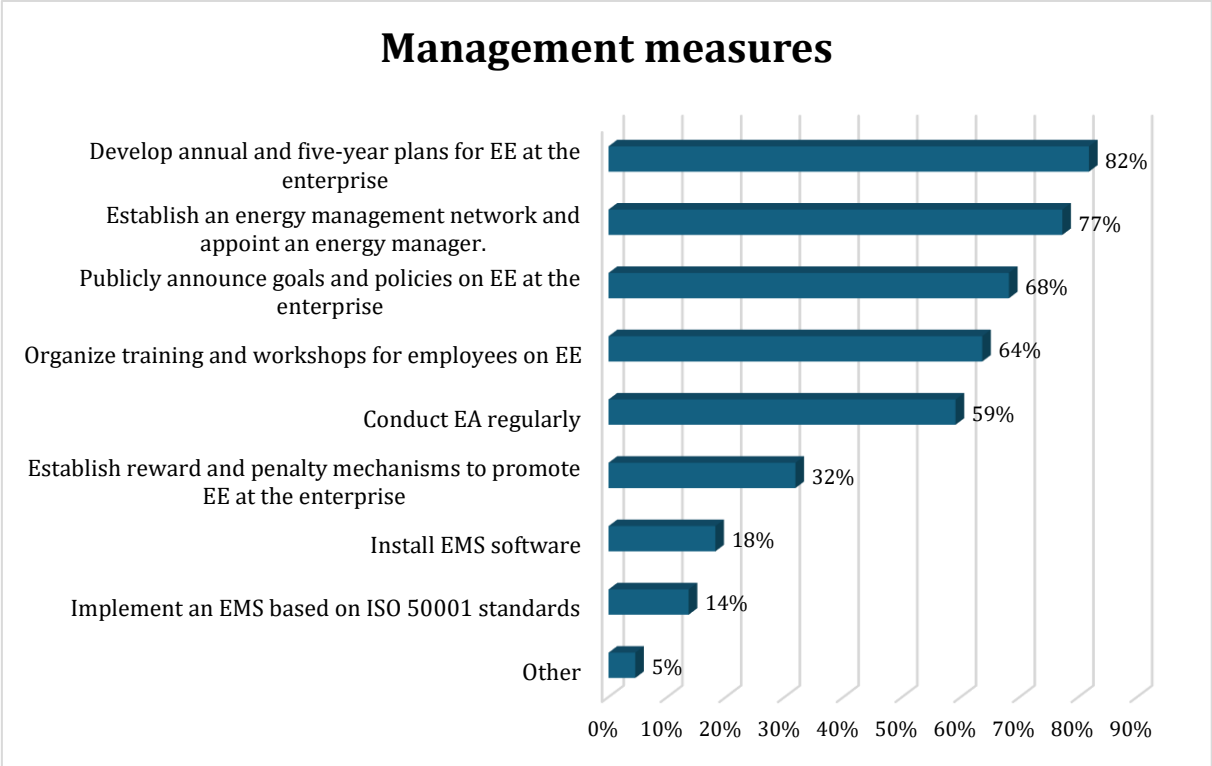


Figure 54. Chart of percentage of enterprises implementing measures on management of EE - seafood processing industry (shrimp and catfish)

Apply technical measures on EE

In general, the implementation of EEMs by enterprises is relatively good. This also explains why the percentage of enterprises in the industry achieving Benchmarking is quite high.

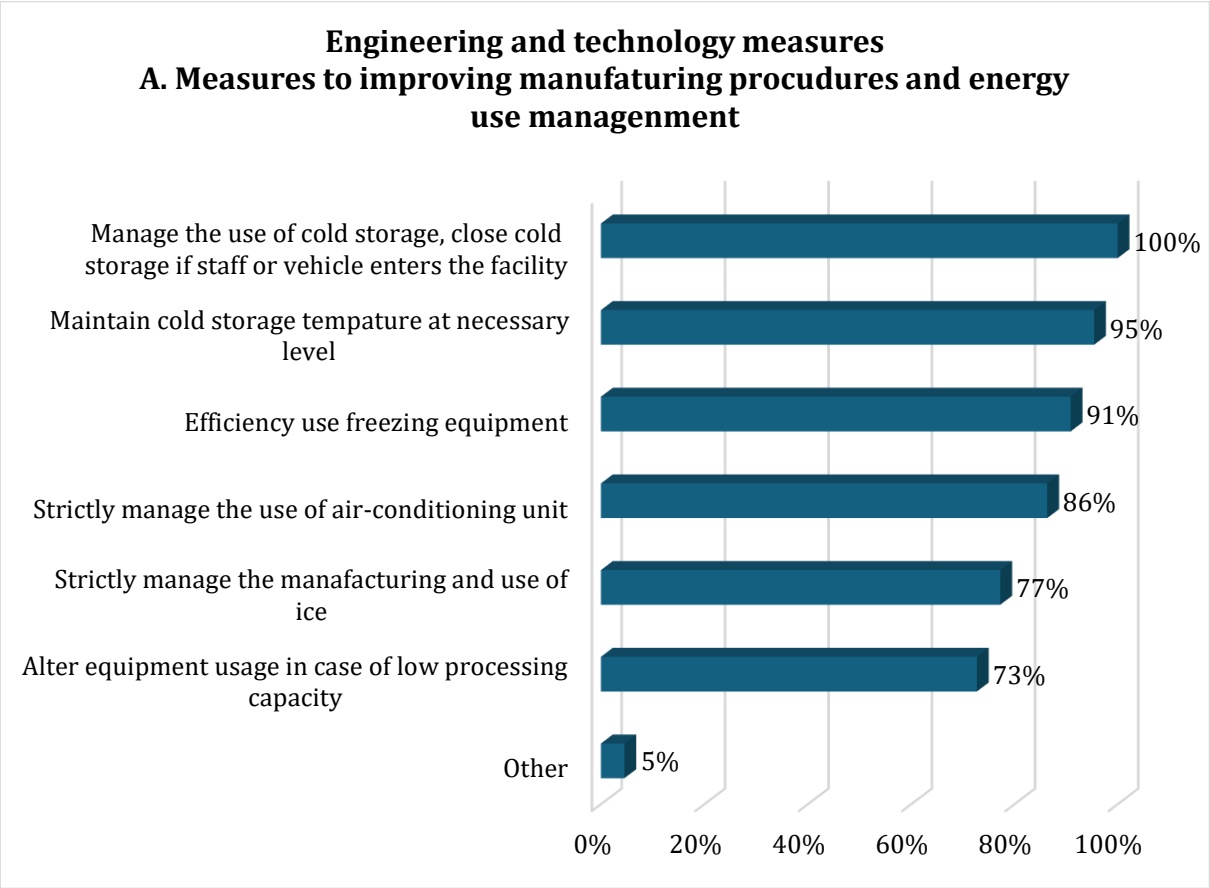


Figure 55. Chart of percentage of enterprises implementing engineering and technology measures - Measures to improving manufaturing procedures and energy use management

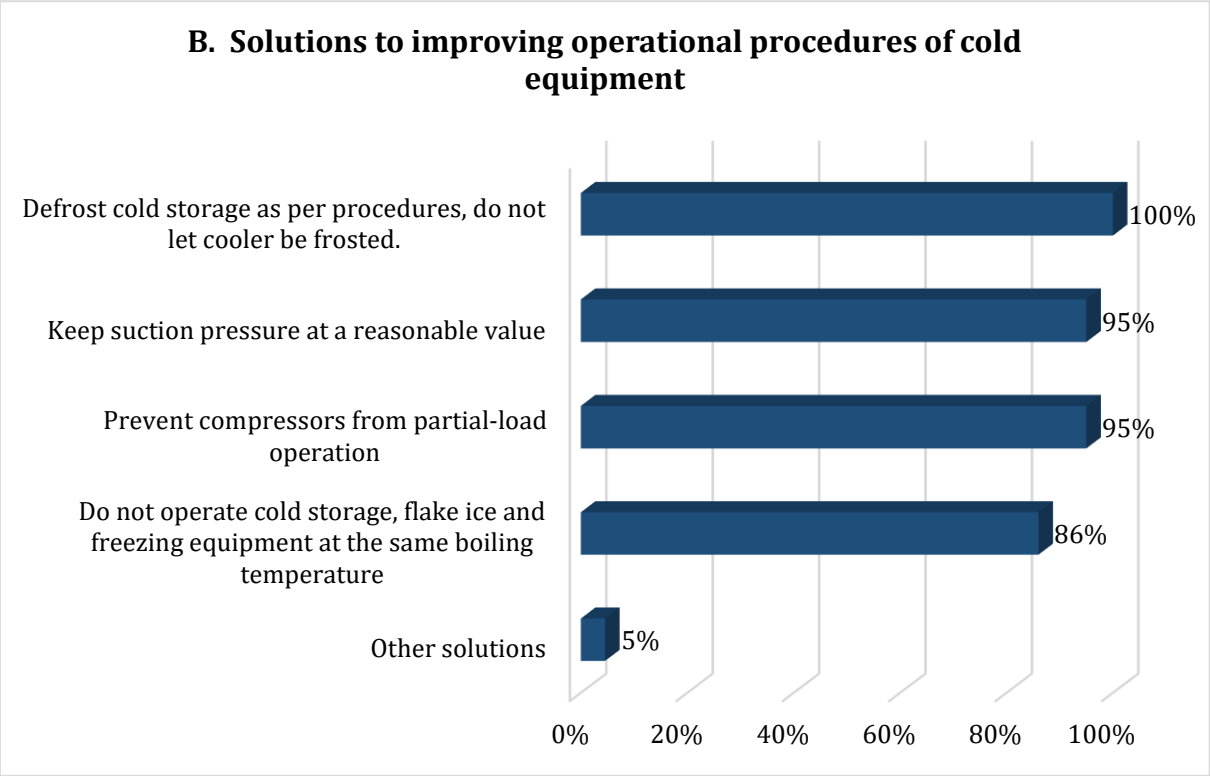


Figure 56. Chart of percentage of enterprises implementing engineering and technology measures - Measures to improving operational procedures of cold equipment

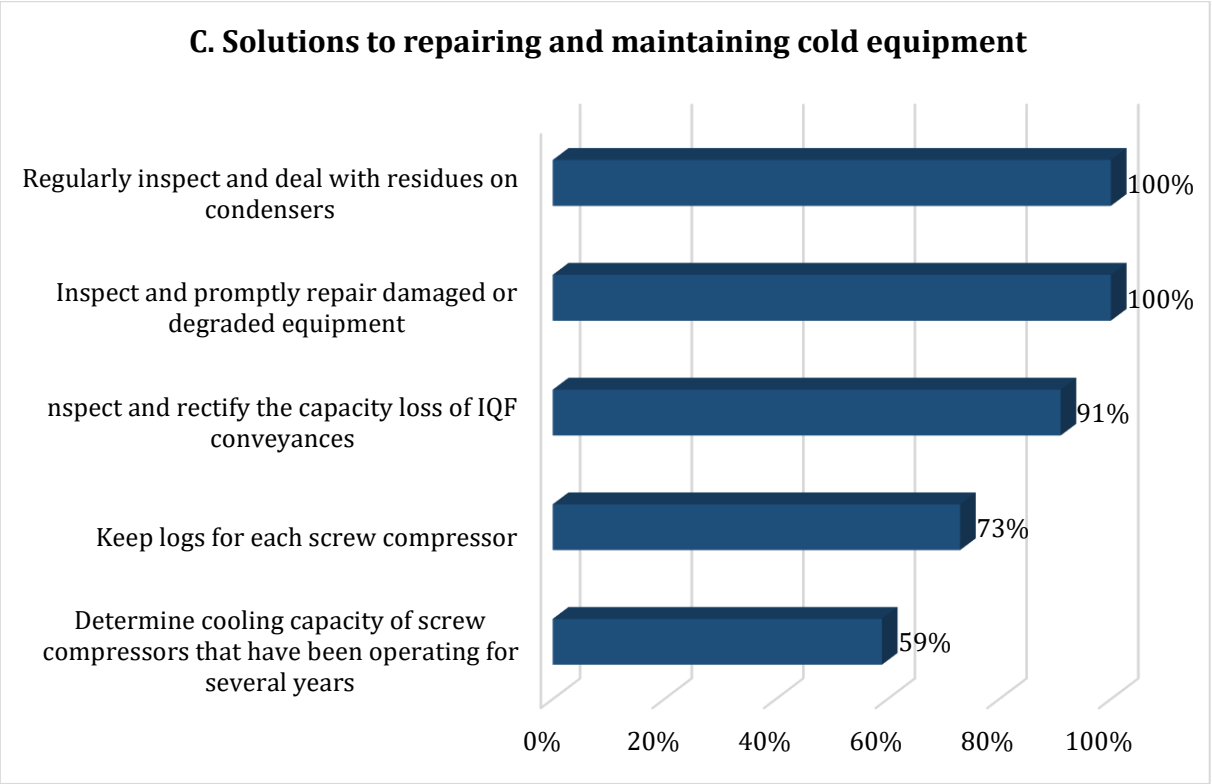


Figure 57. Chart of percentage of enterprises implementing engineering and technology measures - Measures to repairing and maintaining cold equipment

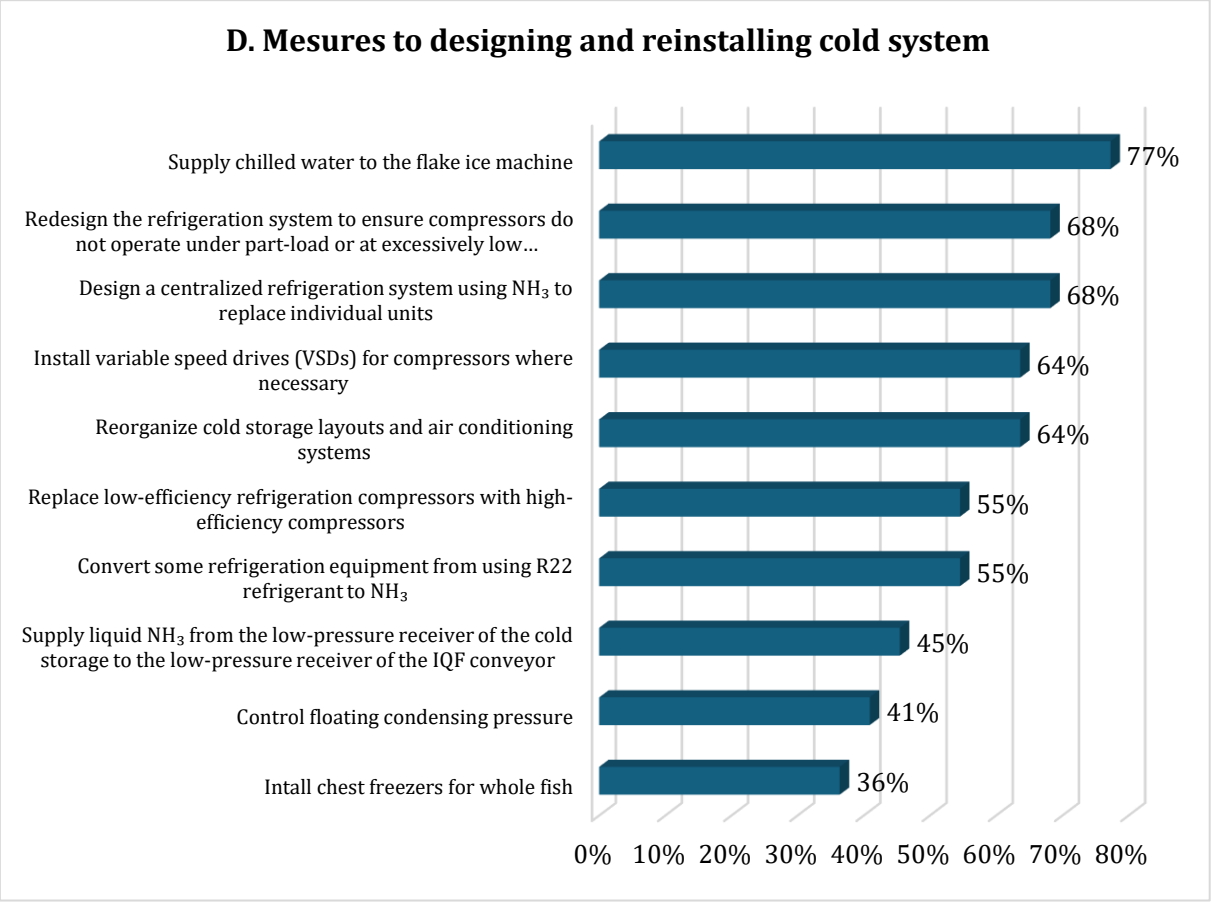


Figure 58. Chart of percentage of enterprises implementing engineering and technology measures - Group of measures to designingand reinstalling cold system

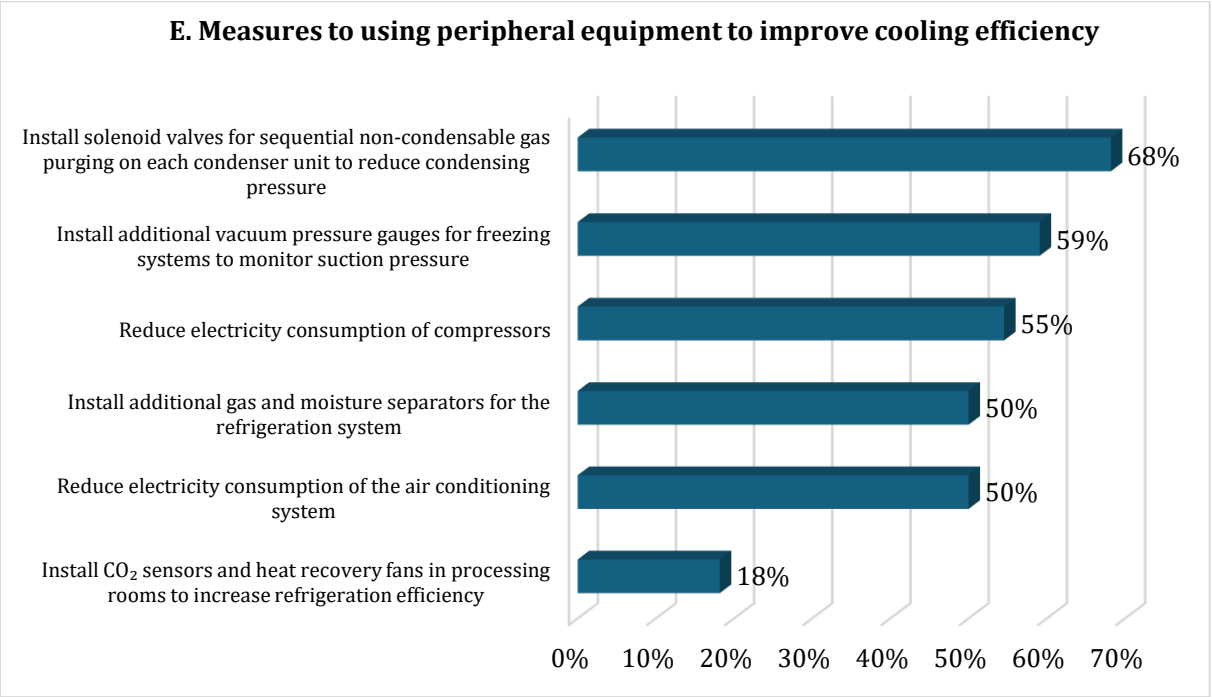


Figure 59. Chart of percentage of enterprises implementing engineering and technology measures - - Measures to using peripheral equipment to improve cooling efficiency

e. Challenges and barriers in Implementing benchmarking regulations

Survey results on difficulties and barriers in the implementation of regulations on Benchmarking:

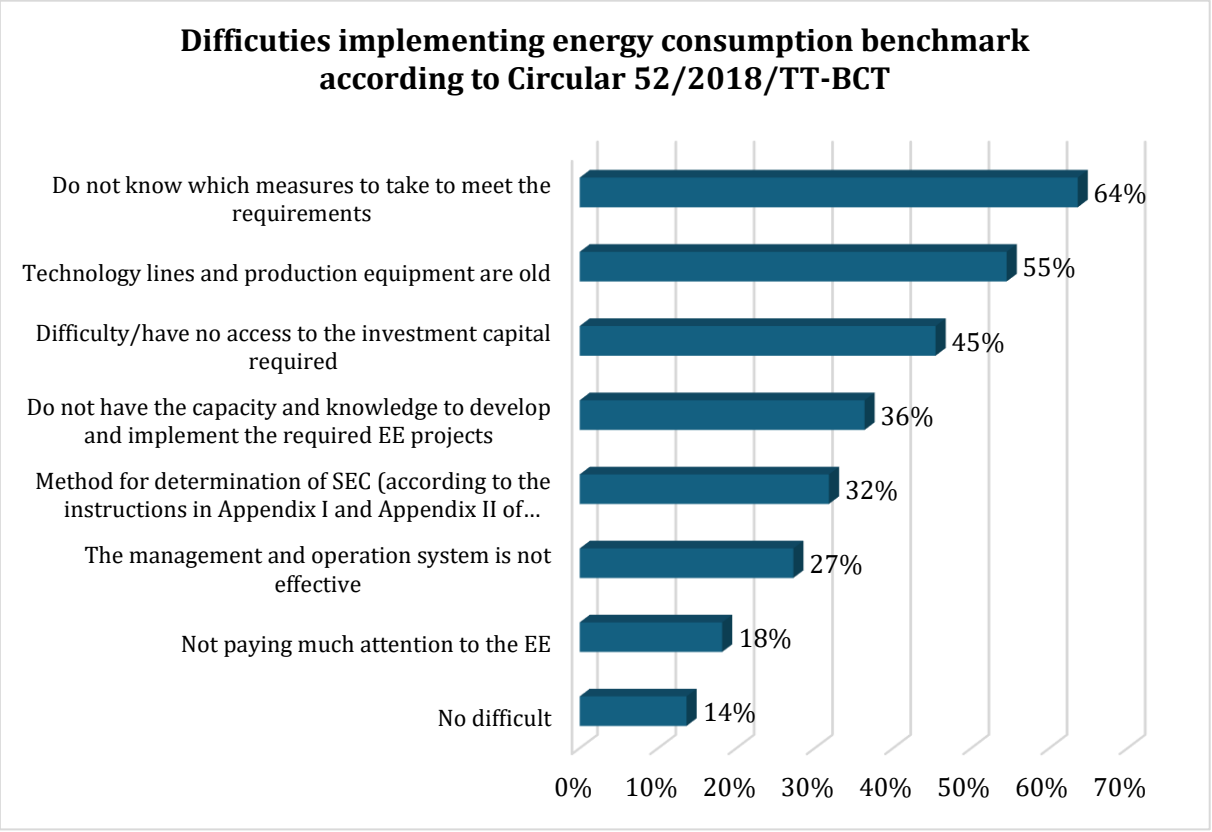


Figure 60. Chart of percentage of enterprises encountering difficulties and barriers in the process of implementing regulations on Benchmarking - seafood processing industry (shrimp and catfish)

Difficulties and barriers in the process of implementing regulations on Benchmarking that many enterprises encounter include: Difficulty in choosing suitable EEMs to meet the demand (64%); Old production lines and equipment (55%); Difficulty/inability in accessing investment capital (45%); Lack of knowledge and awareness to develop and implement EE projects (36%); SEC calculation method (32%); Ineffective management and operation systems (27%).

f. Proposal of seafood processing enterprises

Most IEs want to receive support in aspects such as:

- Regular consultation sessions on EMS and new efficient measures.
- Organizing training courses on EE, helping to access capital to improve machinery and equipment.
- Supporting in awareness raising and training: Organizing training programs and raising awareness for IEs about the benefits of EE and how to implement it.
- Providing financial and technical support to help IEs invest in EE technology and improve production efficiency. Applying incentive policies such as tax reduction, financial support or other incentives for IEs that meet EE standards.

Regarding the Benchmarking, although most enterprises have achieved the Benchmarking, however, they also proposed to consider to change some regulations, focusing on some contents such as: redefining the Benchmarking between pre-processed products and high-end products to have different Benchmarking; simplifying procedures to submit report on Benchmarking; changing the deadline for submitting report on Benchmarking to 1st of February of the following year.

Survey results of proposals from IEs about regulations on Benchmarking:

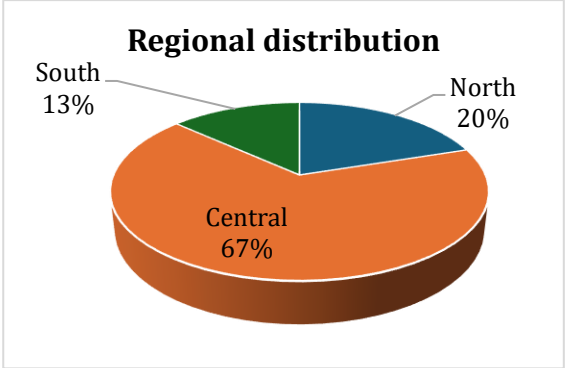
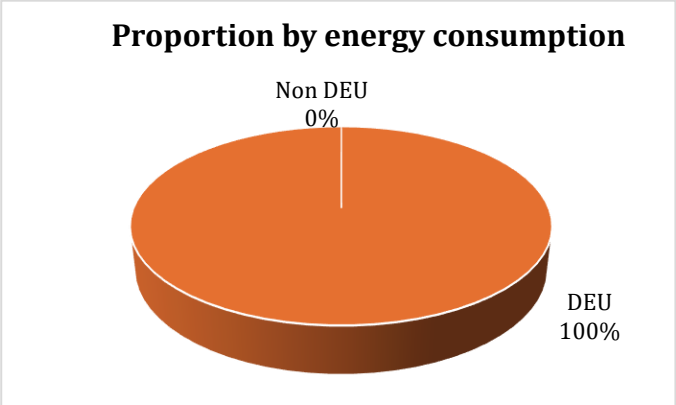
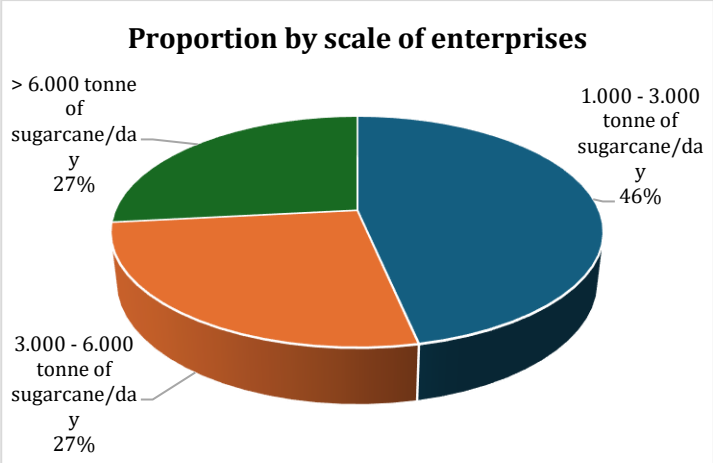
- Proposing to consider redefining the Benchmarking between pre-processed products and high-end products to have different consumption benchmark.
- Proposing to consider for tempura shrimp products, low productivity, so they should have their own benchmark.
- Proposing to consider simplifying administrative procedures: Enterprises wish to reduce complicated administrative procedures related to reporting and compliance with regulations on energy consumption.
- Propose to consider extending the deadline for submitting the report on Benchmarking to the end of January of the following year.

3.4.5. Cane sugar production

a. Information about surveyed enterprises

The survey team conducted a survey of 15enterprises in the cane sugar industry with the following general information:

Table 23. The proportion of IEs in the cane ssugar industry was surveyed

Proportion by region	***No. of IE***	***Proportion chart of cane sugar production enterprises was surveyed***
North	3	
Central Region	10	
Southern	2	
Proportion by energy consumption level	***No. of IE***	
Non-DEU	0	
DEU	15	
Proportion by Benchmarking	***No. of IE***	
1.000 - 3.000 tonne of sugarcane/day	7	
3.000 - 6.000 tonne of sugarcane/day	4	
Above 6.000 tonne of sugarcane/day	4	

b. Level of compliance with Benchmarking

There are 15 IEs was surveyed, of which, 7 IEs have a have a production scale of 1,000 - 3,000 tons of sugarcane/day, 4 IEs have a production scale of 3,000 - 6,000 tons of sugarcane/day, and 4 IEs have a production scale of over 6,000 tons of sugarcane/day.

Most enterprises achieve the benchmark. About 87% of enterprises achieve the Benchmarking and 13% of enterprises do not achieve. In 2023, about 67% of enterprises reduce SEC compared to 2022.

Table 24. No. of IEs achieve and not achieve the Benchmarking *– in cane sugar production industry*

Production facility's scale	No. of IE	2022		2023	
		Complied	Non-complied	Complied	Non-complied
1.000 - 3.000 tonne of sugarcane/day	7	7	0	7	0
3.000 - 6.000 tonne of sugarcane/day	4	3	1	3	1
Above 6.000 tonne of sugarcane/day	4	3	1	3	1
Total	***15***	***13***	***2***	***13***	***2***
%		87%	13%	87%	13%

There are enterprises whose actual SEC is much lower than the benchmark (only about 35% of the benchmark).

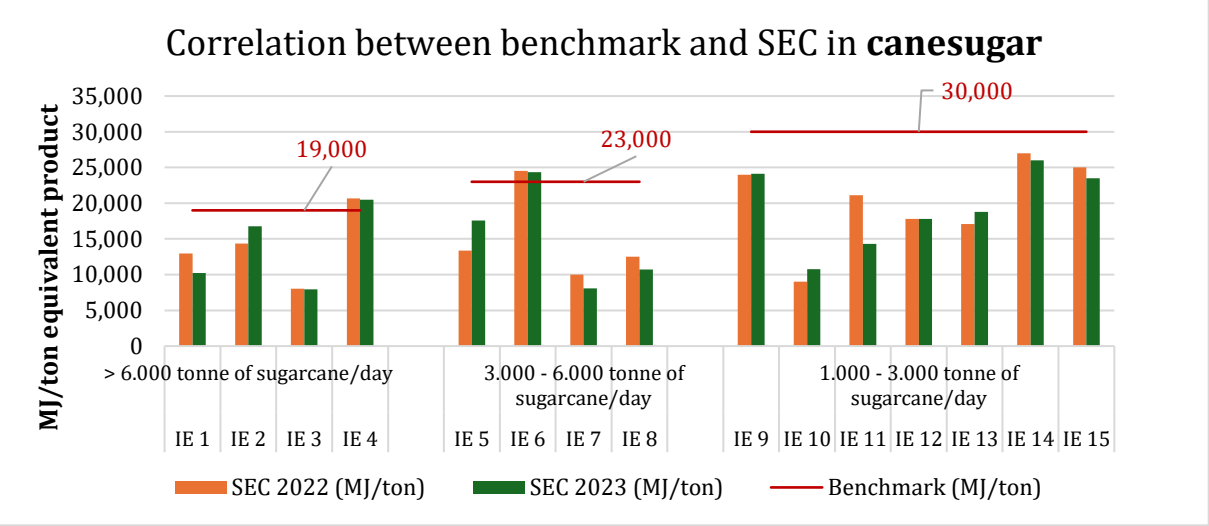


Figure 61. Correlation between Benchmarking and SEC in sugarcane production enterprises

c. Compliance with Benchmarking reporting regulations

Table 25. Number of enterprises complying and not complying with regulations on reporting the implementation of Benchmarking *- cane sugar production*

Compliance with reporting implementation	No. of IE	Percentage (%)
Performed annual reporting and always on time as required.	13	87%
Never reported	3	13%

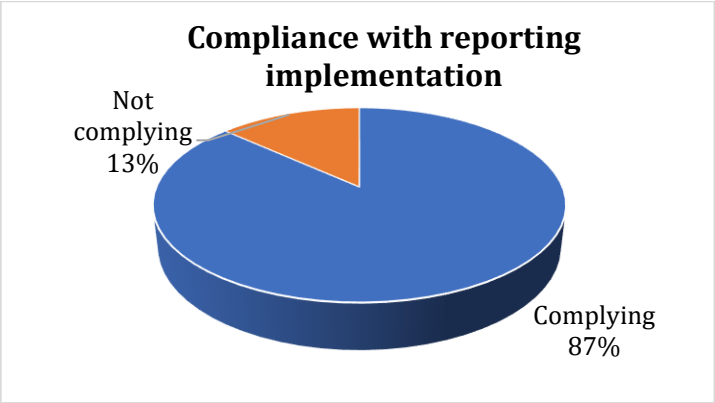


Figure 62. Chart of percentage of enterprises complying and not complying with reporting on the implementation of Benchmarking *– cane sugar production industry*

d. EE activities and measures implemented

Management Measures

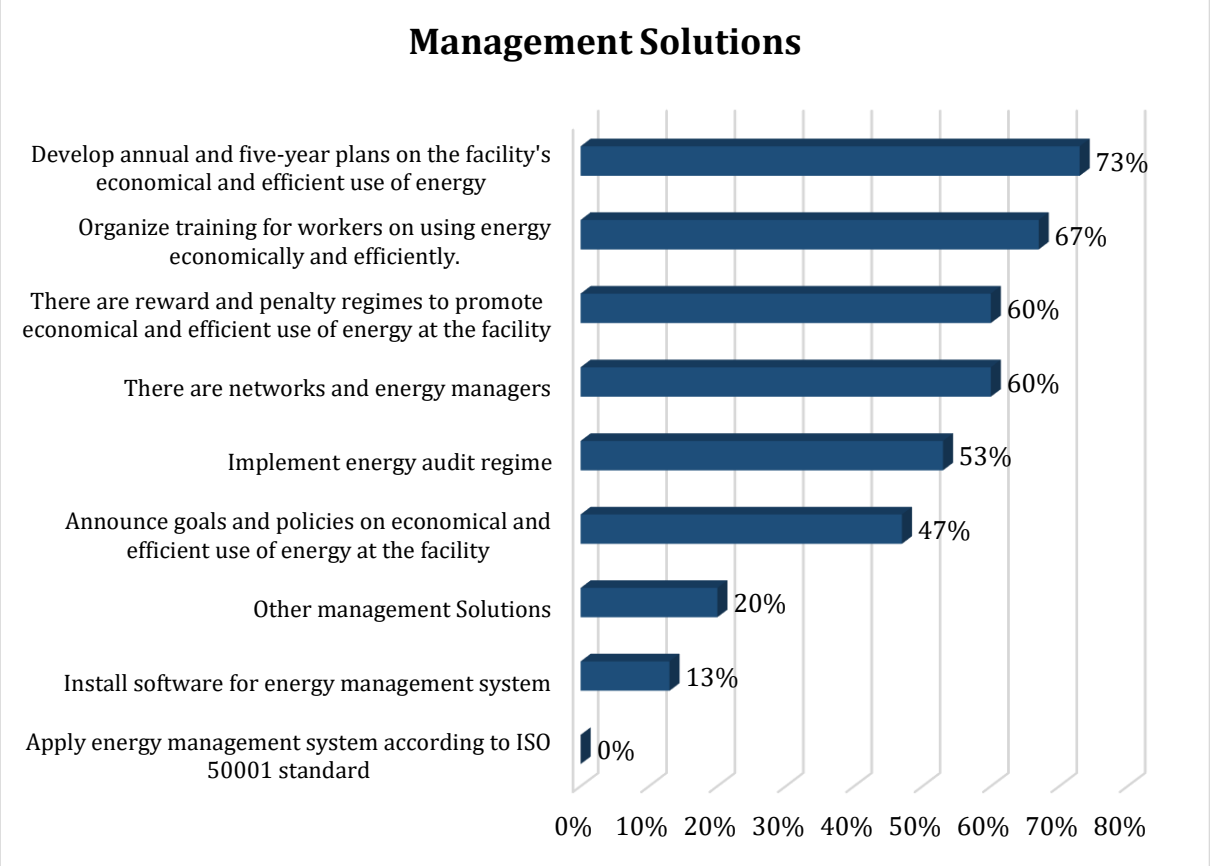
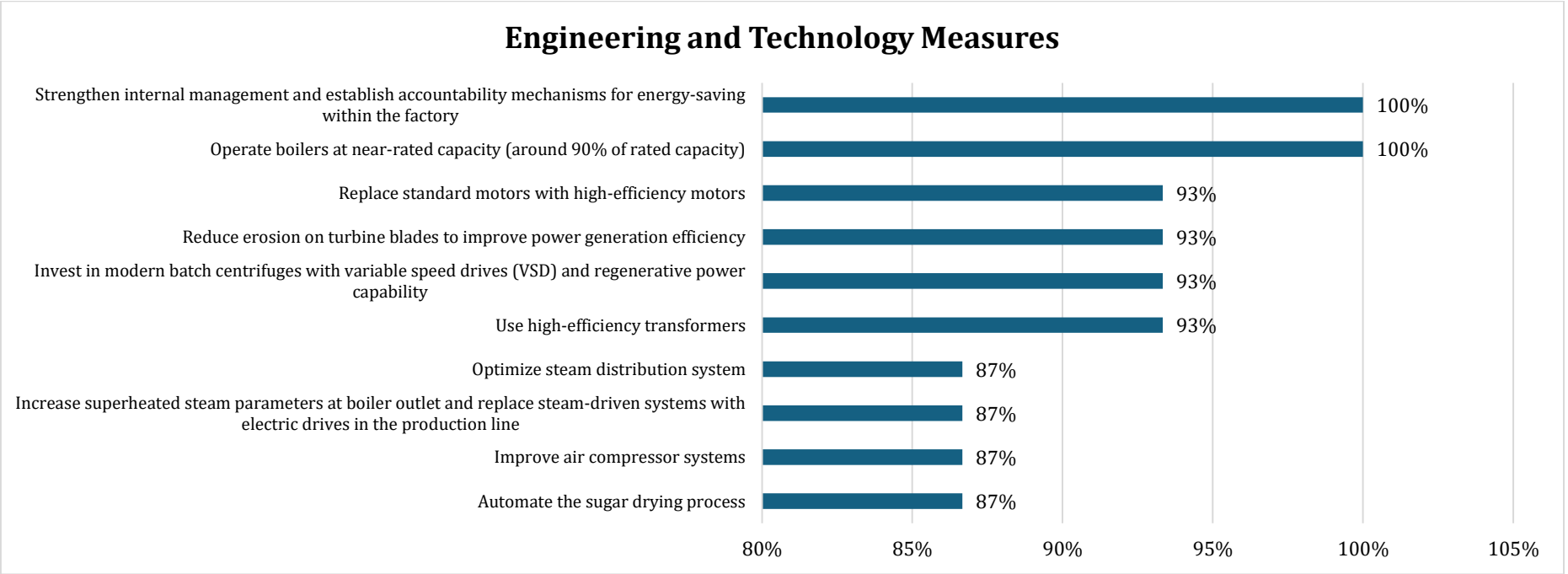
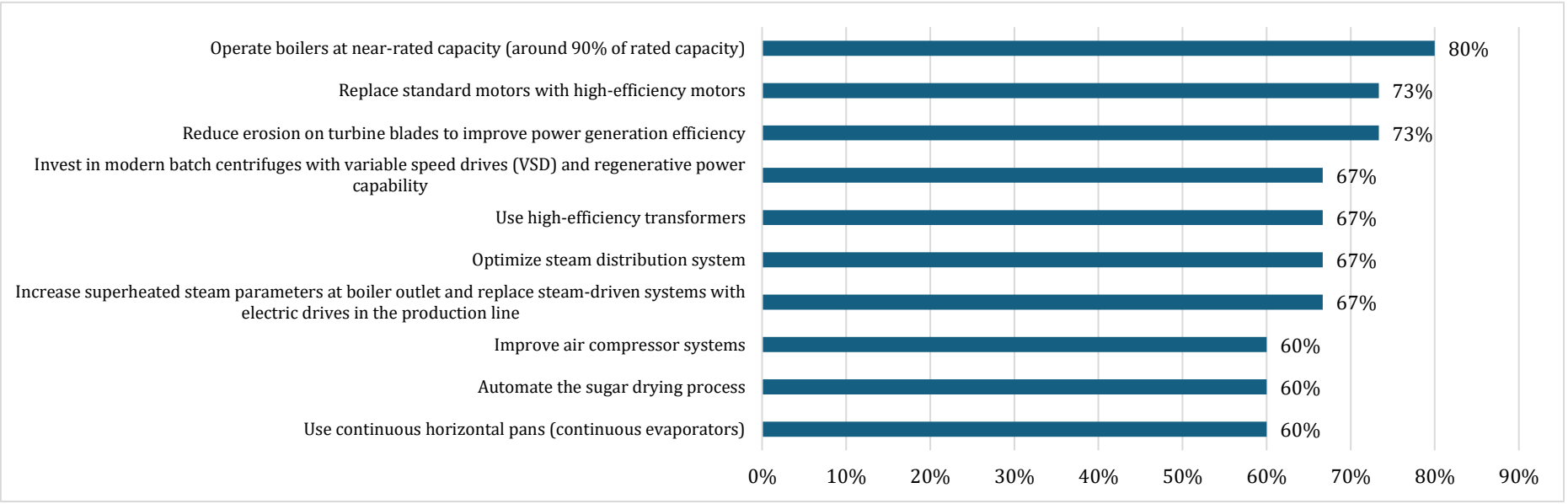


Figure 63. Chart of percentage of enterprises implementing measures on EE management - cane sugar production industry

Applying EE technical measures in paper and pulp production

In general, the implementation of EEMs by enterprises is relatively good. However, in the group of management measures, some enterprises have not performed well. 100% of surveyed enterprises are DEU, but the rate of enterprises implementing energy audit is only 53%, the rate of enterprises installing software for EMS system is only 13%.


Engineering and Technology Measures
Strengthen internal management and establish accountability mechanisms for energy-saving within the factory
100%
Operate boilers at near-rated capacity (around 90% of rated capacity)
100%
Replace standard motors with high-efficiency motors
93%
Reduce erosion on turbine blades to improve power generation efficiency
93%
Invest in modern batch centrifuges with variable speed drives (VSD) and regenerative power capability
93%
Use high-efficiency transformers
93%
Optimize steam distribution system
87%
Increase superheated steam parameters at boiler outlet and replace steam-driven systems with electric drives in the production line
87%
Improve air compressor systems
87%
Automate the sugar drying process
87%
80%
85%
90%
95%
100%
105%


Operate boilers at near-rated capacity (around 90% of rated capacity)
80%
Replace standard motors with high-efficiency motors
73%
Reduce erosion on turbine blades to improve power generation efficiency
73%
Invest in modern batch centrifuges with variable speed drives (VSD) and regenerative power capability
67%
Use high-efficiency transformers
67%
Optimize steam distribution system
67%
Increase superheated steam parameters at boiler outlet and replace steam-driven systems with electric drives in the production line
67%
Improve air compressor systems
60%
Automate the sugar drying process
60%
Use continuous horizontal pans (continuous evaporators)
60%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%

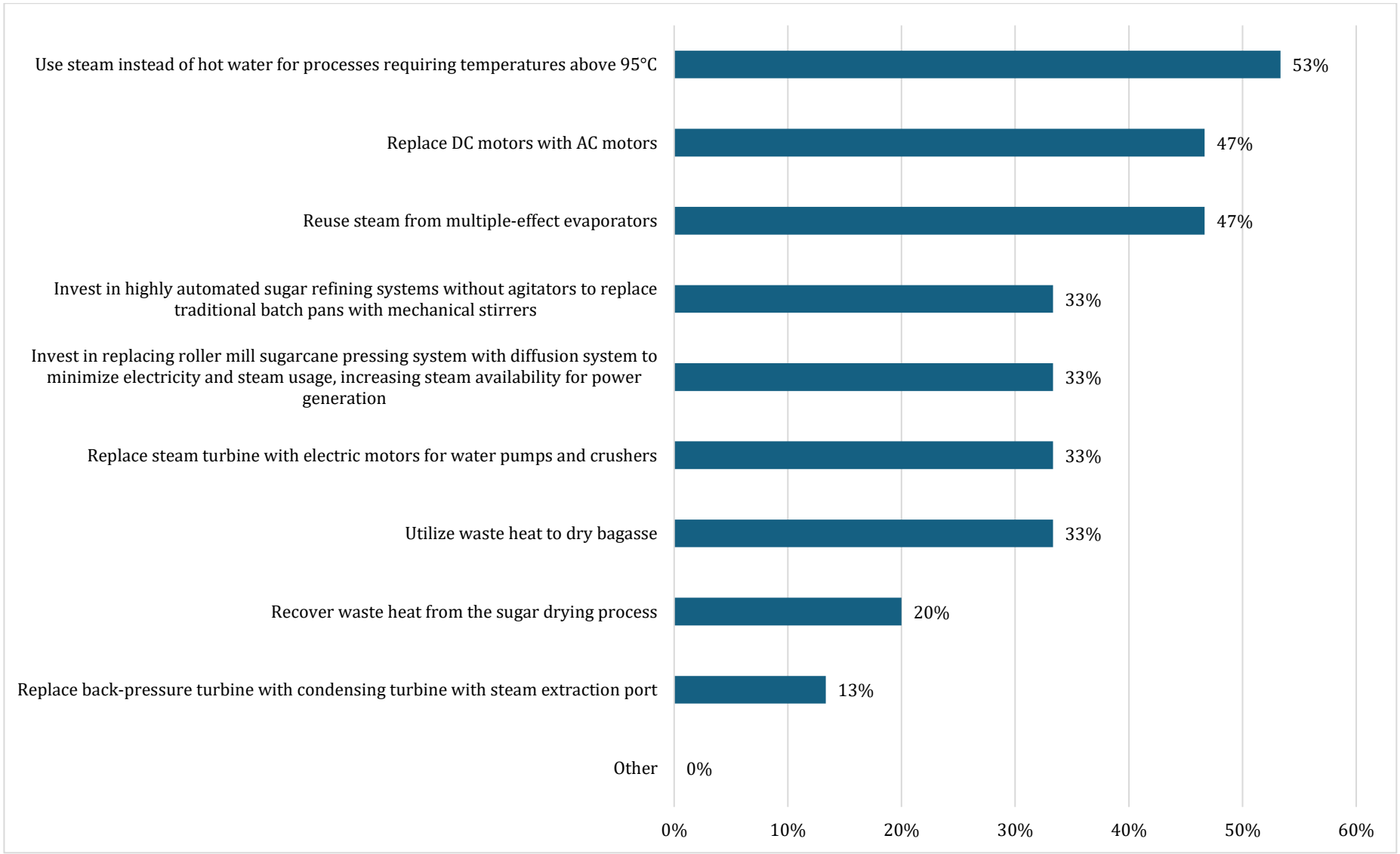


Figure 64. Percentage of enterprises implementing engineering and technology measures - cane sugar production industry

e. Difficulties and barriers in the implementation of regulations on Benchmarking

Survey results on difficulties and barriers in the implementation of regulations on Benchmarking:

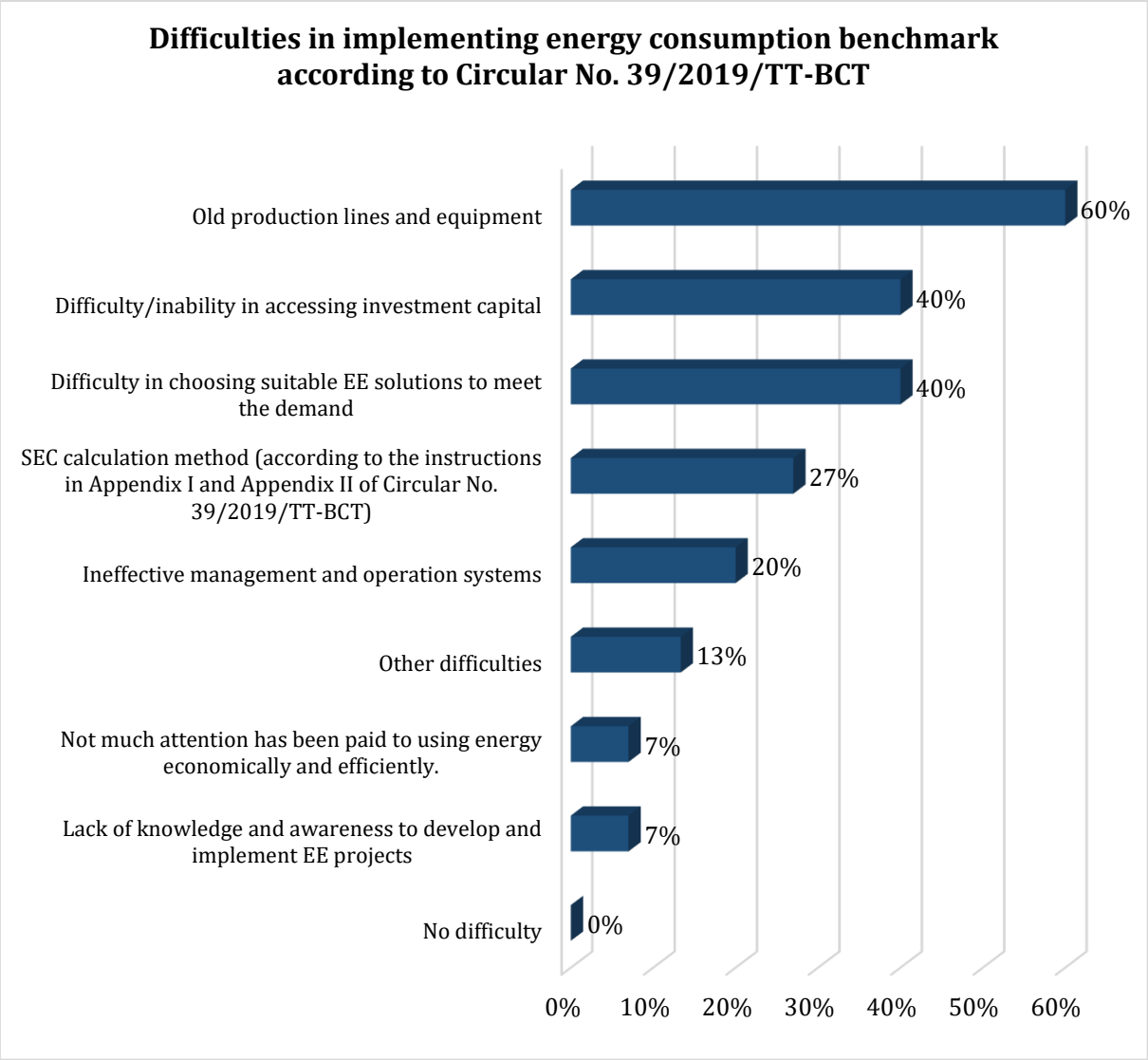


Figure 65. Chart of percentage of enterprises facing difficulties and barriers in the process of implementing regulations on Benchmarking – cane sugar production industry

Difficulties and barriers in the process of implementing regulations on Benchmarking that many enterprises encounter include: Old production lines and equipment (60%); Difficulty/inability in accessing investment capital (40%); Difficulty in choosing suitable EEMs to meet the demand (40%); SEC calculation method (27%); Ineffective management and operation systems (20%), not much interested in economical and efficient use of energy (7%); Lack of knowledge and awareness to develop and implement EE projects (7%)

f. Proposals from cane sugar production enterprise

Recommendations from IEs focus on two main issues: legal support and adjusting regulations on Benchmarking.

Regarding supports from state management agencies, most enterprises wish to receive support in aspects such as: more specific instructions on how to calculate SEC; support for enterprises in capital/access to capital sources; support for training to improve the capacity of economical and efficient use of energy for enterprises; support for enterprises in accessing advanced technology measures; consulting support for enterprises in implementing EE projects; support to accelerate the development of new energy sources, RE, etc.

Regarding the Benchmarking, recommendations for consideration of changes focus on several contents such as: Supplementing and detailing the benchmark for production stages; considering applying the benchmark based on actual production capacity instead of the designed capacity scale.

- For sugar factories, in order to keep up with the Benchmarking according to Circular 39/2019/BCT, it is necessary to mobilize more power generation to minimize grid power consumption and increase grid power output. To do this, it is necessary to increase the amount of additional biomass fuel from tree bark, wood by-products to burn in the furnace along with the bagasse of the cane sugar production process. The current bagasse electricity purchase price from sugar factories is 7.03 USD Cent/KWh, which is low, not stimulating sugar factories to invest in equipment and buy more biomass fuel in addition to bagasse to burn in the boiler to generate electricity, increasing grid power output. Propose to adjust the grid power purchase price to be equal to the RE purchase price of 8.47 USD Cent/KWh.
- Enterprises want to be supported with legal procedures to install additional rooftop solar power systems in factories to reduce grid power.
- Propose to consider issuing a more specific Benchmarking for the sugar industry.
- Propose to consider applying consumption benchmark based on actual production capacity or taking into account the percentage of actual capacity compared to design instead of only applying according to design capacity scale.

3.4.6. Assessing the impact of current regulations on Benchmarking on the behavior of industrial enterprises to improve energy efficiency

As of 2023, the regulations on Benchmarking of the sectors have been in effect and implemented for 5 to 8 years. During that time, most enterprises have implemented many activities and applied many different measures to meet the Benchmarking as prescribed.

The issuance of Benchmarkings also encourages enterprises to implement EE. This will be the legal basis for enterprises that do not meet the consumption benchmark to not only pay more for energy used but also pay more for taxes. According to the provisions of Point 2.3, Article 4 of Circular 96/2015/TT-BTC and Clause 1, Article 14 of Circular 219/2013/TT-BTC, for raw materials, fuels, energy, goods... used for production and

business, if they are of the type that the State has prescribed the loss rate (consumption), the enterprise is only allowed to account for and deduct VAT on the portion of raw materials, fuels, energy, and goods lost within the benchmark. The portion of raw materials, fuels, energy, and goods lost beyond the benchmark cannot be accounted for as costs and cannot be deducted from input tax.

3.5. Conclusion and recommendations

3.5.1. Conclusion

The number of enterprises complying with Benchmarking in 2022 - 2023 increased from 74% in 2022 to 77% in 2023. This shows that enterprises have focused on optimal energy use measures to minimize input costs as well as comply with state regulations. By industry, cane sugar and seafood processing enterprises have the highest percentage of compliance with Benchmarking, from 87% - 91%. In contrast, enterprises producing paper, steel, beer and soft drinks have a lower percentage of compliance with Benchmarking (from 63% - 77%).

The survey results also show that a significant proportion of enterprises have not achieved the required Benchmarking, including 37% in the beer and beverage industry, 31% in the paper and pulp industry, 23% in the steel industry, 13% in the cane sugar industry, and 9% in the seafood processing industry. This shows that improving SEC in an enterprise department is still a challenge, requiring more efforts and drastic measures from both enterprises and state management agencies at all levels.

The major difficulties and barriers identified that need to be addressed and overcome include: Old production lines and equipment; Difficulty in choosing suitable EEMs; SEC calculation method; Difficulty/inability in accessing investment capital; Lack of knowledge and awareness to develop and implement EE projects; Ineffective management and operation systems; Insufficient inspection and supervision; Lack of support activities...

3.5.2. Recommendations

a. Recommendations to State management agencies

To increase the rate of manufacturing enterprises complying with regulations on energy benchmark, the consultant proposes the following measures:

- Continue to promote propaganda and guidance for enterprises on regulations on Benchmarking; at the same time, strengthen inspection, examination and enforcement of sanctions for non-compliance with regulations on applying EMS systems at enterprises.
- Organize specialized training courses for enterprises on Benchmarking, new and advanced measures/technologies in EE, along with detailed guidance documents for enterprises to refer to and implement.

- Develop online SEC calculation support tools, helping businesses to be convenient, consistent and limit errors in the calculation process. At the same time, build a database on SEC based on reports according to the regulations of IE, thereby providing information back to IE and serving as a basis for adjusting energy benchmark accordingly.
- Review the recommendations of IEs to consider amending and supplementing the regulations on Benchmarking such as: simplifying the procedures for reporting on RE implementation; regulations for cases where factories are self-sufficient in energy, classifying benchmarks according to actual production capacity instead of according to designed production scale; dividing production scale into smaller levels; reviewing equivalent product conversion indexes, etc.

b. Recommendations for enterprise

Compliance with benchmarking regulations is mandatory for enterprises to adhere to the law. Furthermore, these regulations act as external drivers to continuously improve production efficiency, particularly in energy use. Based on this, the consulting unit provides the following recommendations:

- Enterprises must excel in reporting on benchmarking as required: 100% compliance in reporting must be achieved, ensuring that all data submitted is objective, complete, and accurate.
- In addition to support from State management agencies in helping enterprises comply with benchmarking regulations, enterprises must proactively and actively ensure compliance: Stay up-to-date with information on benchmarking regulations; Continuously improve the capacity of operational management teams, particularly in economical and efficient energy use; Actively identify and implement suitable EE solutions tailored to their operations…

APPENDIX

Appendix I. Content of online interview questions on energy management

PART I. GENERAL INFORMATION

1. Name of IE: .....

2. Address: .....

3. Sector: .....

4. Total energy consumption in 2023 of IE (TOE): .....

5. Respondent's full name: .....

6. Tel:..... Email:.....

7. Position/Department: .....

PART 2. ACTIVITIES IMPLEMENTED

Which of the following activities has your enterprise implemented? (đánh x vào lựa chọn phù hợp)

8. Develop and promulgate policies on economical and efficient use of energy by enterprises?

☐ Yes ☐ No

If yes,

- Elaborating and announcement of objectives and policies on economical and efficient use of energy in your enterprises?

☐ Yes ☐ No

- Definition of responsibilities of each, collective and person to implement plans on economical and efficient use of energy?

☐ Yes ☐ No

9. Elaborating annual and five-year plans on economical and efficient use of energy?

☐ Yes ☐ No

10. Report the annual energy consumption status to the Department of Industry and Trade before January 15 each year?

☐ Yes ☐ No

11. Submit to the DOIT the annual plan and the report on the implementation of the annual plan for economical and efficient energy use (before April 30 each year)

☐ Yes ☐ No

12. Submit to the Department of Industry and Trade the five-year plan and the report on the implementation of the five-year plan for economical and efficient energy use (before the first April 30 of every 5 years)

☐ Yes ☐ No

13. Establish an energy management team with specific functions, responsibilities, and authority for each member?

☐ Yes ☐ No

14. Appointed an energy manager?

☐ Yes ☐ No

- If yes, Does the energy manager have an energy management certification issued by MOIT?

☐ Yes ☐ No

- Does the enterprise's management regularly receive and review data on energy consumption?

☐ Monthly

☐ Annually

☐ Never

☐ Other

15. Does the enterprise conduct energy audit every three years?

☐ Yes ☐ No

- Will the energy audit report be sent to the DOIT within 30 days after the energy audit is carried out?

☐ Yes ☐ No

16. Does the enterprise training and retraining in economical and efficient use of energy for employees?

☐ Regularly (annually) ☐ When new regulations are issued

☐ Rarely ☐ Never

17. Does the enterprise have an adoption of reward and discipline regimes to promote economical and efficient use of energy in your establishments?

☐ Has reward and discipline policies

☐ Implements annually

☐ Occasionally

☐ Has not implemented

☐ Other (please specify):.....

18. Has the enterprise adopted an energy management system (EnMS) according to ISO 50001 standards?

☐ Certified

☐ Developing

☐ Not implemented

☐ Unaware of ISO 50001

☐ Other (please specify):.....

If not implemented, does the enterprise plan to adopt it in the near future?

☐ Yes ☐ No

If no, please specify the reason:

.....

.....

.....

19. Does the enterprise review and evaluate the implementation of plans and solutions for economical and efficient energy use?

☐ Yes ☐ No

If yes, how often:

☐ Monthly

☐ Quarterly

☐ Annually

☐ Other

- Does the enterprise take actions to address factors affecting energy consumption?

☐ Yes ☐ No

- When non-conformities occur (non-compliance with legal requirements, other requirements, or failure to meet standards or increased energy consumption compared to the energy baseline), does the enterprise assess the causes and propose corrective actions to prevent recurrence or occurrence elsewhere?

☐ Yes ☐ No

20. Does the enterprise face any difficulties in complying with energy management regulations?

☐ No difficulties

☐ Complex regulations, difficult to implement

☐ Unclear benefits of energy management

☐ Lack of funding

☐ Lack of personnel

☐ Other (please specify):.....

21. Which of the following activities has the enterprise carried out:

☐ Monitoring energy consumption demands of equipment and entire production lines;

☐ Monitoring changes in energy consumption demands related to the installation, renovation, or repair of energy-using equipment;

☐ Inspecting and evaluating the implementation of energy-saving and efficient use measures

☐ Implement new and energy saving procedures (operation and maintenance)

☐ Implement specific investment projects support save energy

22. How does the top management of the enterprise promote continuous improvement of energy performance and the EnMS through the following activities?

☐ Establishing energy policies and energy goals that are consistent with the strategic direction and context of the organization

☐ Approving and implementing energy-saving plans

☐ Ensuring the availability of necessary resources for the EnMS

☐ Ensuring the establishment of an energy management team

☐ Ensuring that energy performance indicators appropriately reflect energy performance results

23. To which extent do you find energy management to be useful to the development of your enterprise?

☐ Very much

☐ Some

☐ Only little

☐ Not at all

24. What proposals does the enterprise have for future adjustments (if any) to energy management regulations for industrial enterprises?

Appendix II. Content of online interview questions on Benchmarking

II.1. Beer and beverage

PART I. GENERAL INFORMATION

Question 1. Information about the IE (Industrial Enterprise)

- Name of enterprise: .....

- Address: .....

Question 2. Information about the respondent

Full name of interviewee: .....

Position/Department: .....

Tel: ..... Email: .....

Question 3. Type of product and production scale of the IE

No	*Name of product*	*Unit*	*Output according to design*	*Output in 2023*
1				
2				
3				
4				
5				
6				
7				

Question 4. Enterprise energy consumption

Energy type	*Consumption in 2023*	*Unit*	*Purpose*
Electricity (from the grid)		kWh	
Electricity from solar rooftop system		kWh	
Coal		Tonne	

FO oil		Tonne	
Diezen oil		Tonne	
Gasoline		Tonne	
Gas		M^3	
Coke		Tonne	
Coalgas		M^3	
Steam purchased outside		Tonne	
Biomass		Tonne	
Other			

PART II. IMPLEMENTING REGULATIONS ON ENERGY CONSUMPTION BENCHMARKING

Question 5. Before January 15 every year, does IE **report the implementation of energy consumption benchmarking** to the DOIT according to the provisions in Appendix VI of Circular No. 19/2016/TT-BCT?

☐ IE has never reported;

☐ IE make annual reports and always on time;

☐ Other (please specify):.....

In case the enterprise has not reported, please provide the reason?

☐ Don't know if there is a reporting requirement;

☐ Don't know how to make a report;

☐ IE has just operated;

☐ Other (please specify):.....

Question 6. How does the **actual SEC of the IE** compare to **the energy consumption benchmarking** according to Circular No. 19/2016/TT-BCT?

NO	***Industry***		***Benchmark (MJ/hl)***	***Actua SEC 2022 (MJ/hl)***	***Actua SEC 2023 (MJ/hl)***
		Output (million liters)			
1	Beer	> 100	129	.....	.....

		20 - 100	196	.....	.....
		< 20	286	.....	.....
		Type of production			
2	Beverage	Carbonated or both carbonated and non-carbonated products	52	.....	.....
		No gas	107	.....	.....

Question 7. In recent times, which of the following solutions has the IE **implemented** to reduce SEC? (type x in implemented solutions)

7.1. Management solutions:

☐ Establishment of Energy Management Board;

☐ Set annual energy efficiency goals and plans;

☐ Installation of PMS energy management equipment system;

☐ Installation of SCADA production data collection and monitoring control system;

☐ Apply energy management system according to ISO 50001 standard;

☐ Other (please specify):.....

7.2. Technical and technological solutions

A. For beer production:

☐ Install insulation for steam pipes and refrigeration piping;

☐ Purchase steam from outside service companies;

☐ Save energy with high-performance lights;

☐ Use inverters and electricity saving measures;

☐ Optimize the wort cooling process (from one step process into two steps process);

☐ Use stratified cooling system;

☐ Use compressed natural gas (CNG), rice hulls, compressed wood blocks, and compressed rice hulls as fuel for boilers in place of DO ;

☐ Use industrial heat pumps to provide hot water for pasteurization;

☐ Recovery heat from hops cooking;

☐ Control/utilize excess gas from boilers;

☐ Install steam compressor for boilers;

☐ Recover weak wort;

☐ Use biogas from wastewater treatment plans to operate electricity generators or stoke boilers;

☐ Install accumulator for air compressor;

☐ Replace old filling system;

☐ Other (please specify):.....

B. For beverage production:

☐ Adjust the operation of the syrup cooling system;

☐ Install heat recovery equipment from the boiler;

☐ Optimize operation of air compression system;

☐ Replace old filling system;

☐ Replace boiler;

☐ Innovate lighting system;

☐ Recovery condensate ;

☐ Install insulation for steam piping;

☐ Use inverters and electricity saving measures;

☐ Use industrial heat pumps to provide hot water for production and CIP;

☐ Use stratified cooling system;

☐ Replace reciprocating ammonia compressor with a high-performance screw compressor;

☐ Other (please specify):.....

Question 8. Does your IE have difficulty in implementing energy consumption benchmarking according to Circular No. 19/2016/TT-BCT?

☐ Method for determination of **SEC** (according to the instructions in Appendix I and Appendix II of Circular No. 19/2016/TT-BCT)?

☐ Technology lines and production equipment are old;

☐ The management and operation system is not effective;

☐ Not paying much attention to the economical and efficient use of energy;

☐ Do not have capacity and knowledge to develop and implement the required EE projects;

☐ Do not know which measures to take in order to meet the requirements;

☐ Have no access to the investment capital required;

☐ Other (please specify):.....

Sentence 9. What support would you want to request from the government to help comply with the regulation?

.....

.....

.....

Question 10. What suggestions, and adjustments enterprises to the Regulation on energy consumption benchmarking in the beer and beverage manufacturing industry?

.....

.....

.....

II.2. Steel

PART I. GENERAL INFORMATION

Question 1. Information about the IE (Industrial Enterprise)

- Name of enterprise: .....

- Address: .....

Question 2. Information about the respondent

Full name of interviewee: .....

Position/Department: .....

Tel: ..... Email: .....

Question 3. Type of product and production scale of the IE

No	*Name of product*	*Unit*	*Output according to design*	*Output in 2023*
1				
2				
3				
4				
5				
6				
7				

Question 4. Enterprise energy consumption

Energy type	*Consumption in 2023*	*Unit*	*Purpose*
Electricity (from the grid)		kWh	

Electricity from solar rooftop system		kWh	
Coal		Tonne	
FO oil		Tonne	
Diezen oil		Tonne	
Gasoline		Tonne	
Gas		M^3	
Coke		Tonne	
Coalgas		M^3	
Steam purchased outside		Tonne	
Biomass		Tonne	
Other			

PART II. IMPLEMENTING REGULATIONS ON ENERGY CONSUMPTION BENCHMARKING

Question 5. Before January 15 every year, does IE **report the implementation of energy consumption benchmarking** to the DOT according to the provisions in Appendix III of Circular No. 20/2016/TT-BCT?

☐ IE has never reported;

☐ IE make annual reports and always on time;

☐ Other (please specify):.....

In case the enterprise has not reported, please provide the reason?

Don't know if there is a reporting requirement;

☐ Don't know how to make a report;

☐ IE has just operated;

☐ Other (please specify):.....

Question 6. How does the actual specific energy consumption of the IE get compare with the **energy consumption benchmarking** according to Circular No. /2016/TT-BCT?

No	***Producing process***	***Unit***	***Benchmark***	***Actual SEC of IE 2022***	***Actual SEC of IE 2023***
1	Sintering of iron ore	MJ/tonne	1.960	.....	.....

2	Production of cast iron by blast furnace	MJ/tonne	12.400	.....	.....
3	Production of steel billet by (top -blown) converter	MJ/tonne	100	.....	.....
4	Production of steel billet by electric arc furnace	MJ/tonne	2.500	.....	.....
5	Production of steel billet by induction furnace	MJ/tonne	2.500	.....	.....
6	Hot rolled long steel	MJ/tonne	1.600	.....	.....
7	Cold rolling of steel plates	MJ/tonne	1.500	.....	.....

Question 7. In recent times, which of the following solutions has the IE **implemented** to reduce SEC? (type x in implemented solutions)

7.1. Management solutions:

☐ Establishment of Energy Management Board;

☐ Set annual energy efficiency goals and plans;

☐ Installation of PMS energy management equipment system;

☐ Installation of SCADA production data collection and monitoring control system;

☐ Apply energy management system according to ISO 50001 standard;

☐ Other (pleasespecify):.....

7.2. Technical and technological solutions

A. Sintering of iron ore

☐ Recovery heat from sintering space and the cooling space;

☐ Sinter the above layer;

☐ Other (please specify):.....

B. ***Cast iron production:***

☐ Recover energy from the blast furnace gas;

☐ Recover energy from the gas pressure at the top of the furnace;

☐ Save energy consumed by the hot air furnace;

☐ Other (pleasespecify):.....

C. Steel making by convertẻr

☐ Recover energy from the converter gas;

☐ Sampling and online analysis of samples;

☐ Other (pleasespecify):.....

D. Steel making by electric arc furnace:

☐ Optimize the steel making by electric arc furnace;

☐ Heat heavy malting steel;

☐ Operate the closed cooling water system;

☐ Other (please specify):.....

E. Steel making by induction furnace:

☐ Improve the design of furnaces to reduce energy loss;

☐ Combined with the ladle furnace;

☐ Other (please specify):.....

F. Hot rolling

☐ Feed heated billets into the furnace;

☐ Roll heated billets derectly by continuous casting;

☐ Utilize the regenerative burner;

☐ Other (please specify):.....

G. Cold rolling:

☐ Recover heat from the annealing line;

☐ Apply the turbulence pickling technology;

☐ Utilize the submerged burner;

☐ Cover acid tanks with a suitable lid

☐ Other (please specify):.....

Question 8. Does your IE have difficulty in implementing energy consumption benchmarking according to Circular No. 20/2016/TT-BCT?

☐ Method for determination of **SEC** (according to the instructions in Appendix I and Appendix II of Circular No. 20/2016/TT-BCT)?

☐ Technology lines and production equipment are old;

☐ The management and operation system is not effective;

☐ Not paying much attention to the economical and efficient use of energy;

☐ Do not have capacity and knowledge to develop and implement the required EE projects;

☐ Do not know which measures to take in order to meet the requirements;

☐ Have no access to the investment capital required;

☐ Other (please specify):.....

Sentence 9. What support would you want to request from the government to help comply with the regulation?

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Question 10. What suggestions, and adjustments enterprises to the Regulation on energy consumption benchmarking in the steel industry?

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II.3. Pulp and paper

PART I. GENERAL INFORMATION

Sentence 1. Information about the Industrial Enterprise (IE)

- Name of IE: .....

- Address: .....

Sentence 2. Information about the respondent

Full name of respondent (or interviewee): .....

Position/Department: .....

Tel: ..... Email: .....

Sentence 3. Type of product and production scale of the IE

No.	*Name of Product*	*Unit of measure*	*Output as design*	*Output in 2023*
1				
2				
3				
4				
5				

Sentence 4. Energy consumption level of the IE

Kind of Energy	*Consumption amount in 2023*	*Unit of Measure*	*Purpose of using*
Electricity (from the grid)		kWh	

Electricity from solar rooftop system		kWh	
Coal		Tonne	
Fuel oil (FO)		Tonne	
Diezel oil (DO)		Tonne	
Gasoline		Tonne	
Gas		Tonne	
Coke		Tonne	
Coal gas		M^3	
Steam purchased outside		Tonne	
Biomass		Tonne	
Other			

PART II. IMPLEMENTATION OF REGULATIONS ON ENERGY EFICIENCY BENCHMARK

Sentence 5. Before January 15th of each year, does the IE prepare ***Annual Report on conformance to energy efficiency benchmarks*** and submit to the Local Department of Industry and Trade as prescribed in Appendix IV of Circular No. 24/2017/TT-BCT?

☐ IE has never reported;

☐ IE prepared annual reports and always on time;

☐ Other (Please specify):.....

If the IE has not reported, please provide the reason?

☐ Don't know if there is a reporting requirement;

☐ Don't know how to make a report;

☐ Enterprise has just operated;

☐ Other (Please specify):.....

Sentence 6. How is the ***actual energy consumption of the IE*** rate compare to the ***Energy Efficiency Benchmark*** according to Circular No. 24/2017/TT-BCT?

No.	***Product Description***	***Output (tonne/year)***	***Benchmark (MJ/tonne)***	***Actual energy consumption of the IE in 2022 (MJ/tonne)***	***Actual energy consumption of the IE in 2023 (MJ/tonne)***

1	Packaging paper	> 50.000	6.713	.....	.....
		10.000 - 50.000	6.744	.....	.....
		< 10.000	5.482	.....	.....
2	Tissue paper	10.000 - 50.000 (having higher quality than those products of which output is < 10.000)	14.572	.....	.....
		< 10.000	13.169	.....	.....
3	Printing, writing and photocopying paper	> 50.000 (produced by running the composite manufacturing system)	13.639	.....	.....
		10.000 - 50.000 (produced by running the paper pulp production line, except the recycled paper processing system)	9.455	.....	.....

Sentence 7. In recent times, which of the following solutions ***implemented*** by IE to reduce SEC? (type x in implemented solutions)

7.1. Management solutions:

☐ Establish Energy Management Board;

☐ Set annual energy saving goals and plans;

☐ Install PMS energy management equipment system;

☐ Installation of SCADA production data collection and monitoring control system;

☐ Apply energy management system according to ISO 50001 standard;

☐ Other (Please specify):.....

7.2.. Engineering technological solutions:

☐ Humidity control of products;

☐ Online supervision of humidity;

☐ Use of inverters (for compressors, vacuum pumps, etc);

☐ Improvement of steam systems (increasing insulation, reducing leaks, ...);

☐ Use of high-performance vacuum pumps;

☐ Use of thermal compression devices;

☐ Full control of compressed air systems;

☐ Use of cogeneration systems;

☐ Combustion optimization in boilers;

☐ Heat utilization for air heaters;

☐ Using new high-performance technological equipment to replace old technological equipment in the production process;

☐ Replacing rotating siphons with static siphons during the batch drying process;

☐ Extended nips;

☐ Steam boxes;

☐ Anaerobic wastewater treatment;

☐ Improved dryers;

☐ Strengthened care and maintenance;

☐ Putting energy management systems into operation;

☐ Waste heat recovery solutions;

☐ Other (Please specify):.....

Question 8. Does your IE have difficulty in implementing energy consumption benchmarking according to Circular No. 24/2017/TT-BCT?

☐ Method for determination of **SEC** (according to the instructions in Appendix I and Appendix II of Circular No. 24/2017/TT-BCT)?

☐ Technology lines and production equipment are old;

☐ The management and operation system is not effective;

☐ Not paying much attention to the economical and efficient use of energy;

☐ Do not have capacity and knowledge to develop and implement the required EE projects;

☐ Do not know which measures to take in order to meet the requirements;

☐ Have no access to the investment capital required;

☐ Other (please specify):.....

Sentence 9. What support would you want to request from the government to help comply with the regulation?

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Sentence 10. What suggestions, and adjustments enterprises to the Regulation on energy consumption benchmark in paper production?

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II.4. Seafood processing (shrimp and catfish)

PART I. GENERAL INFORMATION

Sentence 1. Information about the Industrial Enterprise (IE)

- Name of IE: .....

- Address: .....

Sentence 2. Information about the respondent

Full name of respondent (or interviewee): .....

Position/Department: .....

Tel: ..... Email: .....

Sentence 3. Type of product and production scale of the IE

No.	***Name of Product***	***Unit of measure***	***Output as design***	***Output in 2023***
1				
2				
3				
4				
5				

Sentence 4. Energy consumption level of the IE

Kind of Energy	***Consumption amount in 2023***	***Unit of Measure***	***Purpose of using***
Electricity (from the grid)		kWh	
Electricity from solar rooftop system		kWh	
Coal		Tonne	
Fuel oil (FO)		Tonne	

Diezel oil (DO)		Tonne	
Gasoline		Tonne	
Gas		Tonne	
Coke		Tonne	
Coal gas		M^3	
Steam purchased outside		Tonne	
Biomass		Tonne	
Other			

PART II. IMPLEMENTATION OF REGULATIONS ON ENERGY EFICIENCY BENCHMARK

Sentence 5. Before January 15th of each year, does the IE prepare ***Annual Report on conformance to energy efficiency benchmarks*** and submit to the Local Department of Industry and Trade as prescribed in Appendix IV of Circular No. 52/2018/TT-BCT?

☐ IE has never reported;

☐ IE prepared annual reports and always on time;

☐ Other (Please specify):.....

If the IE has not reported, please provide the reason?

☐ Don't know if there is a reporting requirement;

☐ Don't know how to make a report;

☐ Enterprise has just operated;

☐ Other (Please specify):.....

Sentence 6. How is the ***actual energy consumption of the IE*** rate compare to the ***Energy Efficiency Benchmark*** according to Circular No. No. 52/2018/TT-BCT?

TT	***Product type (industrial processing)***	***Output (tonne/year)***	***Benchmark (MJ/tonne)***	***Actual energy consumption of the IE in 2022 (MJ/tonne)***	***Actual energy consumption of the IE in 2023 (MJ/tonne)***
1	Catfish	>300	1.050	.....	.....
2	Shrimp	>300	2.050	.....	.....

Sentence 7. In recent times, which of the following solutions ***implemented*** by IE to reduce SEC? (type x in implemented solutions)

7.1. Management solutions:

☐ Establish Energy Management Board;

☐ Set annual energy saving goals and plans;

☐ Install PMS energy management equipment system;

☐ Installation of SCADA production data collection and monitoring control system;

☐ Apply energy management system according to ISO 50001 standard;

☐ Other (Please specify):.....

7.2. Engineering technological solutions:

A. Solutions to improving manufacturing procedures and energy use management

☐ Restrict the use of no-loaded or partially loaded IQF. If partially loaded IQF is required, it is necessary to adopt solutions to adjusting refrigeration system capacity;

☐ Efficiently use freezing equipment;

☐ Strictly manage the manufacturing and use of ice;

☐ Manage the use of cold storage, close cold storage if no staff or vehicle enters the facility;

☐ Maintain cold storage temperature at necessary level;

☐ Strictly manage the use of air-conditioning unit;

☐ Alter equipment usage in case of low processing capacity;

☐ Other (Please specify):.....

B. Solutions to improving operational procedures of cold equipment :

☐ Prevent compressors from partial-load operation;

☐ Do not operate cold storage, flake ice and freezing equipment at the same boiling temperature;

☐ Keep suction pressure at a reasonable value;

☐ Defrost cold storage as per procedures, do not let cooler be frosted.

☐ Other (Please specify):.....

C. Solutions to repairing and maintaining cold equipment:

☐ Inspect and rectify the capacity loss of IQF conveyances;

☐ Determine cooling capacity of screw compressors that have been operating for several years;

☐ Keep logs for each screw compressor;

☐ Inspect and promptly repair damaged or degraded equipment;

☐ Regularly inspect and deal with residues on condensers.

D. Solutions to designing and reinstalling cold system:

☐ Design central cooling system that utilizes NH3 instead of individual equipment;

☐ Redesign cooling system so as to prevent compressors from operating at a partially loaded state and low boiling temperature;

☐ Plan all cold storage and air-conditioning systems again;

☐ Supply flake ice machines with cold water;

☐ Transfer liquefied NH3 from low-pressure container of cold storage to low-pressure container of IQF lines;

☐ Convert several cooling equipment that utilizes R22 to NH3;

☐ Replace compressors with low cooling capacity with those with higher cooling capacity;

☐ Install chest freezers for whole fish;

☐ Control floating head pressure;

☐ Install inverters for compressors when necessary;

☐ Other design, installation, and investment solutions (Please specify)

.....

E. Solutions to using peripheral equipment to improve cooling efficiency:

☐ Install additional vacuum gauges for freezing equipment to monitor suction pressure;

☐ Install CO2 sensors and heat recovery ventilators in processing room in order to improve cooling capacity and ☐ reduce amount of electricity required for air-conditioning system;

☐ Install additional auto-purgers to reduce condensation pressure, and ☐ reduce amount of electricity used by compressors

☐ Install additional gas and water separator for cooling system.

☐ Other (Please specify):.....

Question 8. Does your IE have difficulty in implementing energy consumption benchmarking according to Circular No. 52/2018/TT-BCT?

☐ Method for determination of **SEC** (according to the instructions in Appendix I and Appendix II of Circular No. 52/2018/TT-BCT)?

☐ Technology lines and production equipment are old;

☐ The management and operation system is not effective;

☐ Not paying much attention to the economical and efficient use of energy;

☐ Do not have capacity and knowledge to develop and implement the required EE projects;

☐ Do not know which measures to take in order to meet the requirements;

☐ Have no access to the investment capital required;

☐ Other (please specify):.....

Sentence 9. What support would you want to request from the government to help comply with the regulation?

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Sentence 10. What suggestions, and adjustments enterprises to the Regulation on energy consumption benchmark in seafood processing?

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II.5. Cane sugar

PART I. GENERAL INFORMATION

Sentence 1. Information about the Industrial Enterprise (IE)

- Name of IE: .....

- Address: .....

Sentence 2. Information about the respondent

Full name of respondent (or interviewee): .....

Position/Department: .....

Tel: ..... Email: .....

Sentence 3. Type of product and production scale of the IE

No.	*Name of Product*	*Unit of measure*	*Output as design*	*Output in 2023*
1				
2				
3				
4				
5				

Sentence 4. Energy consumption level of the IE

Kind of Energy	*Consumption amount in 2023*	*Unit of Measure*	*Purpose of using*
Electricity (from the grid)		kWh	

Electricity from solar rooftop system		kWh	
Coal		Tonne	
Fuel oil (FO)		Tonne	
Diezel oil (DO)		Tonne	
Gasoline		Tonne	
Gas		Tonne	
Coke		Tonne	
Coal gas		M^3	
Steam purchased outside		Tonne	
Biomass		Tonne	
Other			

PART II. IMPLEMENTATION OF REGULATIONS ON ENERGY EFICIENCY BENCHMARK

Sentence 5. Before August 15th of each year, does the IE prepare ***Annual Report on conformance to energy efficiency benchmarks*** and submit to the Local Department of Industry and Trade as prescribed in Appendix IV of Circular No. 39/2019/TT-BCT?

☐ IE has never reported;

☐ IE prepared annual reports and always on time;

☐ Other (Please specify):.....

If the IE has not reported, please provide the reason?

☐ Don't know if there is a reporting requirement;

☐ Don't know how to make a report;

☐ Enterprise has just operated;

☐ Other (Please specify):.....

Sentence 6. How is the ***actual energy consumption of the IE*** rate compare to the ***Energy Efficiency Benchmark*** according to Circular No. No. 39/2019/TT-BCT?

No.	***Production facility's scale***	***Unit***	***Benchmark***	***Actual energy consumption of the IE in 2022 (MJ/tonne)***	***Actual energy consumption of the IE in 2023 (MJ/tonne)***
1	1.000 to 3.000 tonne of sugarcane/day	MJ/tonne of product equivalent	30.000	.....	.....

2	3.000 to 6.000 tonne of sugarcane/day	MJ/tonne of product equivalent	23.000	.....	.....
3	Above 6.000 tonne of sugarcane/day	MJ/tonne of product equivalent	19.000	.....	.....

Sentence 7. In recent times, which of the following solutions ***implemented*** by IE to reduce SEC? (type x in implemented solutions)

7.1. Management solutions:

☐ Establish Energy Management Board;

☐ Set annual energy saving goals and plans;

☐ Install PMS energy management equipment system;

☐ Installation of SCADA production data collection and monitoring control system;

☐ Apply energy management system according to ISO 50001 standard;

☐ Other (Please specify):.....

7.2. Engineering technological solutions:

☐ Enhance internal management; formulate mechanisms for mandating energy efficiency responsibilities in production facilities.

☐ Optimize combustion process in boilers by experimenting and adjusting boilers.

☐ Utilize the resulting heat to dry sugarcane bagasse.

☐ Ensure effective operation of energy-saving equipment in boilers.

☐ Comply with periodic maintenance procedures of boilers and insulation layers around boilers.

☐ Operate boilers at close to 90% of their rated capacity).

☐ Increase superheated steam parameters and replace steam-based transmission system with
electric motors in production lines.

☐ Reduce corrosion of turbines to help increase electricity generation efficiency.

☐ Replace back pressure turbines with condensing turbine with steam extraction points.

☐ Optimize steam distribution system.

☐ Optimize technology process in evaporation of sugarcane juice.

☐ Prepare evaporating equipment with design suitable for saving saturated steam.

☐ Recirculate condensate water.

☐ Increase Brix content prior to processing.

☐ Reuse steam from multiple effect evaporators.

☐ Use continuous horizontal tube digester.

☐ Recover waste heat produced from sugar drying process.

☐ Automate sugar drying process.

☐ Use steam instead of hot water if temperature above 950C is needed.

☐ Improve air compressors.

☐ Replace DC motors with AC motors.

☐ Use high-efficiency transformers.

☐ Replace regular motors with high-efficiency motors.

☐ Install power inverters for motors.

☐ Replace steam turbines with electrical motors for water pumps and crushers.

☐ Install high-efficiency lighting system.

☐ Invest in replacing sugarcane milling system with diffusion system in order to minimize the use of electricity and steam for pressing system and increase steam used for electricity generation.

☐ Invest in modern inverter-driven regenerative batch centrifuges.

☐ Invest in modernized sugar refining systems to replace conventional methods which utilize mixing blades.

☐ Other (Please specify):.....

Question 8. Does your IE have difficulty in implementing energy consumption benchmarking according to Circular No. 39/2019/TT-BCT?

☐ Method for determination of **SEC** (according to the instructions in Appendix I and Appendix II of Circular No. 39/2019/TT-BCT)?

☐ Technology lines and production equipment are old;

☐ The management and operation system is not effective;

☐ Not paying much attention to the economical and efficient use of energy;

☐ Do not have capacity and knowledge to develop and implement the required EE projects;

☐ Do not know which measures to take in order to meet the requirements;

☐ Have no access to the investment capital required;

☐ Other (please specify):.....

Sentence 9. What support would you want to request from the government to help comply with the regulation?

.....

.....

.....

Sentence 10. What suggestions, and adjustments enterprises to the Regulation on energy consumption benchmark in cane sugar production**?**

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Apendix III. Content of in-depth interview questions on energy management

III.1. Industrial enterprise

Question 1. Briefly introduce your company.

Question 2. Has your enterprise established and documented an energy management system (EMS) as required by the law?

- If yes, what are the specific contents? Please provide the main points of the policies and documents.
- If not, please explain why.

Question 3. Does the enterprise's top management ensure that the energy management policies and regulations are implemented?

- If yes, to what extent? (For example: Is this policy considered an important part of the enterprise's overall management strategy? Is it committed to and included in the enterprise's action plan by senior leadership, such as the CEO?)
- If not, please explain why.

Question 4. Is the enterprise's energy policy regularly updated and adjusted according to the current situation?

- If yes, how frequently is it updated?
- If not, please explain why.

Question 5. Has the enterprise established an EMS committee with specific operational regulations, functions, responsibilities, and powers for each member?

- If yes, please provide the document. Do the members of the EMS committee have direct relationships with other key departments of the enterprise? Has the EMS committee developed energy efficiency indicators (EnPIs) and identified significant energy users (SEUs)?
- If not, please explain why.

Question 6. Are the activities related to EMS in the enterprise linked with other departments?

- If yes, how are these links and collaborations managed?
- If not, please explain why.

Question 7. Are the enterprise's energy management officers trained and certified in EMS?

- If not, please explain why.

Question 8. Does the enterprise have a system in place for measuring, monitoring, and storing reports on energy usage activities?

- If yes, what does this system include (measurement devices, management software, periodic reports, etc.)?
- If not, please explain why.

Question 9. Does the enterprise set annual energy efficiency (EE) targets for departments/enterprise to strive to achieve?

- If yes, what is the method for setting EE targets in the enterprise's operations?
- If not, please explain why.

Question 10. Does the enterprise conduct training activities related to the EMS?

- If not, please explain why.

Question 11. Does the enterprise conduct internal communication or promotion about energy efficiency and the EMS?

- If yes, how is it done? (What channels are used to inform all employees about energy issues? Marketing, promoting, raising awareness about EMS, and sharing successful energy management practices within the enterprise and between companies.) How frequently is this done?
- If not, please explain why.

Question 12. What energy efficiency measures (EEM) has your enterprise implemented in recent years?

- If implemented, what are the specific measures? What is the level of investment and the ability to mobilize investment capital for EE projects at the enterprise?
- If not, please explain why.

Question 13. Does your enterprise plan to implement any EEM in the future?

- If yes, what are they? Does the enterprise have criteria for selecting EEM to implement?
- If not, why not?

Question 14. Does your enterprise face any difficulties in complying with energy management regulations?

- If yes, what are these difficulties?
- Does your enterprise need any support from government agencies to improve compliance with these regulations?

Question 15. What are your enterprise’s suggestions regarding the current energy management regulations?

Appendix IV. Content of in-depth interview questionnaire on Benchmarking

IV.1. Beer and beverage

Question 1. Information about your enterprise:

Please briefly introduce your enterprise: field of activity, scale, types of products, energy usage, etc

Question 2. Before January 15th each year, does your enterprise ***report the status of energy consumption benchmark*** to the Department of Industry and Trade (DOIT) as required?

- If yes, since which year? Has this been done regularly every year?
- If not, what is the reason?

Question 3. Has your enterprise encountered any difficulties in ***determining specific energy consumption (SEC)*** according to the guidelines in Appendix I and Appendix II of Circular No. 19/2016/TT-BCT?

- If yes, what specific difficulties?
- Does your enterprise require any support in determining SEC?

Question 4. When comparing your enterprise's actual SEC in 2022 and 2023 with the energy consumption benchmark stipulated in Circular No. 19/2016/TT-BCT, were these benchmarks met?

- If not, what was the reason?

Question 6. Are the energy consumption benchmarks as stipulated in Circular No. 19/2016/TT-BCT suitable for your enterprise?

- If not, what is the reason?

Question 7. What measures has your enterprise ***implemented*** to reduce SEC?

- Provide details of the measures, the year of implementation, and the results achieved.
- In the measures already implemented, were energy efficiency measure (EEM) proposed in Appendix III and Appendix IV of Circular No. 19/2016/TT-BCT referenced?
- If EEM have not been implemented, what is the reason?
- Did your enterprise encounter any difficulties in implementing measures to reduce SEC, and if so, what were they?

Question 8. Does your enterprise have plans to implement EEM in the future to reduce SEC?

- If yes, please specify?
- If not, please provide the reason?

Question 9. Does your enterprise have any suggestions for adjustments (if any) in the future regarding the regulations on energy consumption benchmark in the beer and beverage production?

IV.2. Steel

Question 1. Information about your enterprise:

Please briefly introduce your enterprise: field of activity, scale, types of products, energy usage, etc

Question 2. Before January 15th each year, does your enterprise ***report the status of energy consumption benchmark*** to the DOIT as required?

- If yes, since which year? Has this been done regularly every year?
- If not, what is the reason?

Question 3. Has your enterprise encountered any difficulties in ***determining SEC*** according to the guidelines in Appendix I and Appendix II of Circular No. 20/2016/TT-BCT?

- If yes, what specific difficulties?
- Does your enterprise require any support in determining SEC?

Question 4. When comparing your enterprise's actual SEC in 2022 and 2023 with the energy consumption benchmark stipulated in Circular No. 20/2016/TT-BCT, were these benchmarks met?

- If not, what was the reason?

Question 6. Are the energy consumption benchmarks as stipulated in Circular No. 20/2016/TT-BCT suitable for your enterprise?

- If not, what is the reason?

Question 7. What measures has your enterprise ***implemented*** to reduce SEC?

- Provide details of the measures, the year of implementation, and the results achieved.
- In the measures already implemented, were EEM proposed in Appendix III and Appendix IV of Circular No. 20/2016/TT-BCT referenced?
- If EEM have not been implemented, what is the reason?
- Did your enterprise encounter any difficulties in implementing measures to reduce SEC, and if so, what were they?

Question 8. Does your enterprise have plans to implement EEM in the future to reduce SEC?

- If yes, please specify?
- If not, please provide the reason?

Question 9. Does your enterprise have any suggestions for adjustments (if any) in the future regarding the regulations on energy consumption benchmark in the steel industry?

IV.3. Pulp and paper

Question 1. Information about your enterprise:

Please briefly introduce your enterprise: field of activity, scale, types of products, energy usage, etc

Question 2. Before January 15th each year, does your enterprise ***report the status of energy consumption benchmark*** to the DOIT as required?

- If yes, since which year? Has this been done regularly every year?
- If not, what is the reason?

Question 3. Has your enterprise encountered any difficulties in ***determining SEC*** according to the guidelines in Appendix I and Appendix II of Circular No. 24/2017/TT-BCT?

- If yes, what specific difficulties?
- Does your enterprise require any support in determining SEC?

Question 4. When comparing your enterprise's actual SEC in 2022 and 2023 with the energy consumption benchmark stipulated in Circular No. 24/2017/TT-BCT, were these benchmarks met?

- If not, what was the reason?

Question 6. Are the energy consumption benchmarks as stipulated in Circular No. 24/2017/TT-BCT suitable for your enterprise?

- If not, what is the reason?

Question 7. What measures has your enterprise ***implemented*** to reduce SEC?

- Provide details of the measures, the year of implementation, and the results achieved.
- In the measures already implemented, were EEM proposed in Appendix III and Appendix IV of Circular No. 24/2017/TT-BCT referenced?
- If EEM have not been implemented, what is the reason?
- Did your enterprise encounter any difficulties in implementing measures to reduce SEC, and if so, what were they?

Question 8. Does your enterprise have plans to implement EEM in the future to reduce SEC?

- If yes, please specify?
- If not, please provide the reason?

Question 9. Does your enterprise have any suggestions for adjustments (if any) in the future regarding the regulations on energy consumption benchmark in the pulp and paper industry?

IV.4. Seafood processing (shrimp and catfish)

Question 1. Information about your enterprise:

Please briefly introduce your enterprise: field of activity, scale, types of products, energy usage, etc

Question 2. Before January 15th each year, does your enterprise ***report the status of energy consumption benchmark*** to the DOIT as required?

- If yes, since which year? Has this been done regularly every year?
- If not, what is the reason?

Question 3. Has your enterprise encountered any difficulties in ***determining SEC*** according to the guidelines in Appendix I and Appendix II of Circular No. 52/2018/TT-BCT?

- If yes, what specific difficulties?
- Does your enterprise require any support in determining SEC?

Question 4. When comparing your enterprise's actual SEC in 2022 and 2023 with the energy consumption benchmark stipulated in Circular No. 52/2018/TT-BCT, were these benchmarks met?

- If not, what was the reason?

Question 6. Are the energy consumption benchmarks as stipulated in Circular No. 52/2018/TT-BCT suitable for your enterprise?

- If not, what is the reason?

Question 7. What measures has your enterprise ***implemented*** to reduce SEC?

- Provide details of the measures, the year of implementation, and the results achieved.
- In the measures already implemented, were EEM proposed in Appendix III and Appendix IV of Circular No. 52/2018/TT-BCT referenced?
- If EEM have not been implemented, what is the reason?
- Did your enterprise encounter any difficulties in implementing measures to reduce SEC, and if so, what were they?

Question 8. Does your enterprise have plans to implement EEM in the future to reduce SEC?

- If yes, please specify?
- If not, please provide the reason?

Question 9. Does your enterprise have any suggestions for adjustments (if any) in the future regarding the regulations on energy consumption benchmark in the in seafood processing, applicable to industrial processing of catfish and shrimp product?

IV.5. Cane sugar

Question 1. Information about your enterprise:

Please briefly introduce your enterprise: field of activity, scale, types of products, energy usage, etc

Question 2. Before August 15th each year, does your enterprise ***report the status of energy consumption benchmark*** to the DOIT as required?

- If yes, since which year? Has this been done regularly every year?
- If not, what is the reason?

Question 3. Has your enterprise encountered any difficulties in ***determining SEC*** according to the guidelines in Appendix I and Appendix II of Circular No. 39/2019/TT-BCT?

- If yes, what specific difficulties?
- Does your enterprise require any support in determining SEC?

Question 4. When comparing your enterprise's actual SEC in 2022 and 2023 with the energy consumption benchmark stipulated in Circular No. 39/2019/TT-BCT, were these benchmarks met?

- If not, what was the reason?

Question 6. Are the energy consumption benchmarks as stipulated in Circular No. 39/2019/TT-BCT suitable for your enterprise?

- If not, what is the reason?

Question 7. What measures has your enterprise ***implemented*** to reduce SEC?

- Provide details of the measures, the year of implementation, and the results achieved.
- In the measures already implemented, were EEM proposed in Appendix III and Appendix IV of Circular No. 39/2019/TT-BCT referenced?
- If EEM have not been implemented, what is the reason?
- Did your enterprise encounter any difficulties in implementing measures to reduce SEC, and if so, what were they?

Question 8. Does your enterprise have plans to implement EEM in the future to reduce SEC?

- If yes, please specify?
- If not, please provide the reason?

Question 9. Does your enterprise have any suggestions for adjustments (if any) in the future regarding the regulations on energy consumption benchmark in the in cane sugar production?

Appendix V. State management agencies

A. On implementing energy management regulations

Question 1. Provide a brief overview of the implementation status of energy management regulations by enterprises in the your province.

Question 2. What are the advantages and difficulties your unit faces in guiding and inspecting the implementation of energy management regulations by enterprises?

- Advantages
- Difficulties

Question 3. How does your unit assess the current level of compliance with energy management regulations by enterprises in your province?

Question 4. For enterprises that comply WELL with energy management regulations, what are the main reasons? Which group of enterprises do they belong to?

Question 5. For enterprises that DO NOT COMPLY OR POORLY comply with energy management regulations, what are the main reasons? Which group of enterprises do they belong to?

Question 6. What actions has your unit taken in cases where enterprises do not comply with regulations?

Question 7. What measures has your unit implemented to promote and enhance compliance with energy management regulations by enterprises?

Question 8. In your opinion, are the current energy management regulations for enterprises reasonable?

Question 9. What adjustments do you propose for the current energy management regulations?

B. On Compliance with energy consumption benchmarking:

Question 1. Provide a brief overview of the implementation status of energy consumption benchmarking by enterprises in your province.

Question 2. What are the advantages and difficulties your unit faces in guiding and inspecting the implementation of energy consumption benchmarking?

Question 3. How does your unit assess the current level of compliance with energy consumption benchmarking by enterprises in your province?

Question 4. In your opinion, for enterprises that comply WELL with energy consumption benchmarking, what are the main reasons? Which group of enterprises? Which industry?

Question 5. In your opinion, for enterprises that DO NOT COMPLY OR POORLY comply with energy consumption benchmarking, what are the main reasons? Which group of enterprises? Which industry?

Question 6. What actions has your unit taken in cases where enterprises do not comply with energy consumption benchmarking?

Question 7. What measures has your unit implemented to promote and enhance compliance with legal requirements on energy consumption benchmarking by enterprises?

Question 8. In your opinion, are the current energy consumption benchmarking for enterprises reasonable? (Specify by industry)

Question 9. What adjustments do you propose for the current energy consumption benchmarking? (Specify by industry)