

3.3

SUSTAINABILITY MANAGEMENT IN THE ENVIRONMENTAL DIMENSION

3.3.1 ENVIRONMENTAL MANAGEMENT



The Company recognizes the importance of Environmental Sustainability and is committed to conducting its business in accordance with the principles of Sustainable Development to minimize environmental impact while creating value for the economy and society. As part of this commitment, the Company operates with environmental responsibility through the following key practices :

- Energy Reduction and Greenhouse Gas Emission Control - Enhancing energy efficiency in production processes, reducing electricity and fuel consumption, and increasing the use of renewable energy sources.
- Efficient Resource Utilization - Adopting circular economy principles by minimizing raw material usage and promoting recycling.
- Waste and Hazardous Chemical Management - Reducing waste in accordance with the 3Rs principles : Reduce, Reuse, and Recycle, and minimizing hazardous chemical usage in compliance with international regulations such as RoHS and REACH.
- Sustainable Water Management - Implementing advanced technologies for high-quality wastewater treatment and promoting water recycling for reuse in production processes.
- Legal and Regulatory Compliance - Adhering to national and international environmental laws and regulations, as well as complying with environmental management standards such as ISO 14001 and ISO 50001.
- Air Pollution Control - Installing air pollution treatment systems and conducting regular air quality monitoring.
- Stakeholder Engagement - Educating and training employees on environmental responsibility awareness, collaborating with business partners to use eco-friendly materials, and developing a Green Supply Chain.



GOAL : Zero violations of environmental laws and Zero environmental complaints.



PERFORMANCE :

Indicator	Target for 2024	Performance of 2024
Number of environmental law violations	0 case	0 case
Number of environmental complaints	0 case	0 case



ISO 14001 ENVIRONMENTAL MANAGEMENT SYSTEM

The Company and its subsidiaries have implemented the ISO 14001:2015 international environmental management system within the organization and have been certified by auditors from SGS (Thailand) Limited. The certification is maintained through annual audits. Additionally, the Company has been awarded the Green Industry Level 3 (Green System) certification by the Ministry of Industry, recognizing its commitment to sustainable and environmentally responsible operations.



ENVIRONMENTAL LAW COMPLIANCE

The Company places great emphasis on adhering to environmental laws. It has compiled relevant laws, regulations, and requirements, then implements them rigorously. Additionally, the Company conducts annual assessments of its legal compliance four times per year. Beyond legal compliance, the Company also works to reduce environmental impacts and control pollution, including air pollution, wastewater, light, noise, heat, and radiation. The Company conducts air quality and wastewater quality monitoring prior to discharge as part of its annual environmental monitoring plan.

In 2024, the Company had no violations of environmental laws and did not receive any environmental complaints.



AIR POLLUTION CONTROL

The Printed Circuit Board (PCB) manufacturing industry is a high-energy and chemical-intensive industry, which can generate air pollution that impacts the environment, employee health, and surrounding communities. The Company prioritizes effective air pollution control to ensure sustainable business operations while complying with environmental laws and standards.



AIR POLLUTION MANAGEMENT APPROACHES

- Implementation of Air Pollution Reduction Technologies : Installation of a Wet Scrubber system to capture acid fumes and chemicals from production processes, and installation of an Activated Carbon Filter to absorb Volatile Organic Compounds (VOCs).
- Process Improvement for Pollution Reduction : Adoption of safer chemicals in the production process and discontinuation of lead-based surface finishing to minimize the release of toxic heavy metals.
- Air Quality Monitoring and Equipment Maintenance : Regular inspection of air quality and maintenance of air pollution control equipment according to the established plan.
- Compliance with Legal and International Standards : Adherence to national regulations and international standards for pollution control.



Air treatment system



AIR QUALITY MONITORING

The Company conducts air quality monitoring twice a year, performed by Global Environmental Management Co., Ltd., a Company specialized in environmental measurement and management, and accredited under the ISO/IEC 17025:2017 standard. The air quality is tested within the Company's factory premises.

The results of the 2024 annual air quality monitoring, as shown in the table below, indicate that the measured levels of various parameters within the factory are in compliance with the relevant air pollution control laws and regulations. These results confirm that the Company efficiently manages its environmental impact and prioritizes air quality control to prevent adverse effects on employees, the surrounding community, and the environment.

TABLE OF AIR QUALITY MONITORING RESULTS FOR 2024				
Measurement Index	Unit	Standard Value	1 st Monitoring Result	2 nd Monitoring Result
NO _x - NO ₂	ppm	200	42.4	12.5
SO _x - SO ₂	ppm	60	1.3	9.1
Volatile organic compounds (VOCs)				
■ Xylene	ppm	200	0.3	10.5
Hazardous air pollutants (HAPs)				
■ Sulfuric Acid (H ₂ SO ₄)	ppm	25	5.5	0.7
■ Copper (Cu)	mg/Nm ³	-	0.05	0.4
■ Hydrochloric acid (HCl)	mg/Nm ³	200	10.3	0.4
Particulate matter (PM)	mg/Nm ³	320	13.0	36.1
Other				
■ Carbon monoxide (CO)	ppm	690	9.7	49.5

3.3.2 GREENHOUSE GAS MANAGEMENT



Climate change is a critical issue that impacts both the environment and the livelihoods of people worldwide. Countries around the globe are becoming increasingly aware of the urgent need for cooperation to address this issue, including Thailand, which has set a goal to achieve net-zero greenhouse gas emissions by 2065. Additionally, the Company has received customer requirements to contribute to reducing greenhouse gas emissions in line with customer targets. Therefore, the Company places significant importance on responding to climate change, with strategies to reduce greenhouse gas emissions from its business operations. These strategies include enhancing production process efficiency, developing innovations and technologies to improve production processes, utilizing renewable energy, promoting stakeholder engagement, and encouraging employees to adopt energy and resource efficient behaviors.



MANAGEMENT APPROACH :

- Establish greenhouse gas (GHG) management policies and targets, and form a dedicated GHG management task force.
- Assess the risks and opportunities associated with climate change that impact the Company's business operations and define mitigation measures to address climate-related risks.
- Measure and verify greenhouse gas emissions based on international standards, including the GHG Protocol, ISO 14064, and ISO 14067.
- Develop a Decarbonization Plan aligned with the Company's GHG reduction targets and continuously refine strategies and action plans to fit the organizational context.
- Promote research and development to explore new technologies or methods for reducing GHG emissions in production processes.
- Raise awareness and provide training for employees on energy management and GHG reduction.
- Foster stakeholder engagement, particularly with business partners, to reduce GHG emissions throughout the value chain.



TARGET : Reduce greenhouse gas emissions Scope 1 & 2 by 30% by 2030, compared to the baseline year of 2022.



PERFORMANCE :

Indicator	Target for 2024	Performance of 2024
Greenhouse Gas Emissions Scope 1 & 2 Compared to the baseline year 2022	Reduced by 8%	Reduced by 10.8%



DISCLOSURE OF GREENHOUSE GAS EMISSIONS

In 2024, the Company participated in the Carbon Disclosure Project (CDP) for the third consecutive year, disclosing its greenhouse gas management data. The Company received a Climate Change Management Performance rating of "B."

Additionally, the Company has committed to setting a Net Zero target by 2050 under the Science-Based Target initiative (SBTi).



SCIENCE
BASED
TARGETS



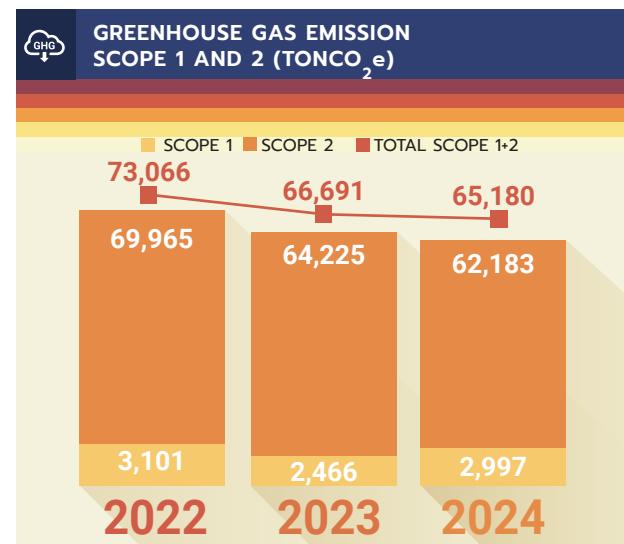
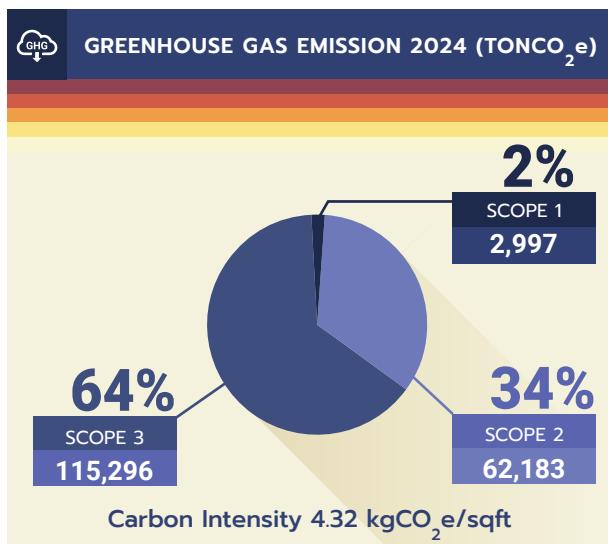
VERIFICATION OF GREENHOUSE GAS EMISSIONS DATA BY AN EXTERNAL VERIFIER

In 2024, the Company prepared a Carbon Footprint of Organization report for Scope 1 (direct emission), Scope 2 (indirect emission), and Scope 3 (other indirect emission) in accordance with the ISO 14064-1:2018 standard and the Greenhouse Gas Protocol. The Company also considered changing the baseline year from 2021 to 2022, as the production capacity was expanded in 2022, and the Company operated at full capacity, resulting in the highest level of greenhouse gas emissions. Therefore, it was deemed appropriate to designate 2022 as the baseline year. Additionally, in 2024, the Company reported Scope 3 emissions for the first time. The greenhouse gas emissions report for the period from January 1, 2024, to December 31, 2024, was verified and certified by SGS (Thailand) Co., Ltd., with certificate number TH-IE-24-500002746-001



TABLE OF THE GREENHOUSE GAS EMISSION

Greenhouse Gas Emissions	Unit	Year 2022 (baseline year)	Year 2023	Year 2024	% change compared to baseline year
Scope 1 (Direct Emissions)	tonCO ₂ e	3,101	2,466	2,997	-3.4%
Scope 2 (Indirect Emissions)	tonCO ₂ e	69,965	64,225	62,183	-11.1%
Total Scope 1 & 2	tonCO₂e	73,066	66,691	65,180	-10.8%
Scope 3 (Other Indirect Emissions)	tonCO ₂ e	-	-	115,296	-
Total Scope 1, 2 & 3	tonCO₂e	73,066	66,691	180,476	-



Based on the operational results for 2024, the Company's Scope 1 and Scope 2 greenhouse gas (GHG) emissions amounted to 65,180 tonCO₂e, representing a 10.8% reduction compared to the 2022 baseline year. This reduction was achieved through stringent production management, a transition to electricity sourced from low-carbon power producers, and the implementation of eight energy efficiency improvement projects, which collectively reduced GHG emissions by 2,610 tonCO₂e.

For Scope 3 emissions, which encompass other indirect GHG emissions, the total amounted to 115,296 tonCO₂e, accounting for 64% of the company's overall emissions across all three scopes. The highest emissions within Scope 3 originated from raw material procurement activities, contributing 88,382 tonCO₂e or 49% of total emissions. Moving forward, the company plans to set targets and develop a roadmap for reducing Scope 3 emissions in 2025.



GREENHOUSE GAS REDUCTION PLAN (DECARBONIZATION PLAN)

The Company has established a decarbonization plan aimed at achieving a 30% reduction in Scope 1 & 2 GHG emissions by 2030 compared to the 2022 baseline year. In 2024, five key strategic initiatives have been implemented to support this goal :

1

ENHANCING ENERGY EFFICIENCY IN PRODUCTION PROCESSES

The Company has continuously improved its production processes and machinery maintenance to ensure optimal performance. Additionally, production planning has been aligned with demand fluctuations amid the global economic slowdown to maximize energy efficiency.

2024 PERFORMANCE HIGHLIGHTS

- Separate Pressure Compressed Air Project : Installed pressure regulators in the air compressor system, categorizing pressure levels into high and low to optimize usage and prevent unnecessary energy consumption. This initiative reduced electricity consumption, leading to a greenhouse gas (GHG) emissions reduction of 480 tonCO₂e.
- Automatic Ball Cleaning System for Chillers : Implemented an automated ball cleaning system to continuously clean cooling system pipes, enhancing heat dissipation efficiency. This reduced electricity consumption, resulting in a GHG emissions reduction of 28 tonCO₂e.
- Cooling Tower Fan Blade Material Replacement : Upgraded fan blades to more efficient materials, contributing to a GHG emissions reduction of 34 tonCO₂e.
- Compressed Air System Leak Reduction : Identified and minimized air leaks in machinery, achieving a GHG emissions reduction of 202 tonCO₂e.
- Compressor Room Temperature Reduction : Implemented measures to lower compressor room temperature, leading to a GHG emissions reduction of 40 tonCO₂e.

Through these energy efficiency improvement initiatives, the Company successfully reduced total GHG emissions by 784 tonCO₂e in 2024.

2

INNOVATION AND TECHNOLOGY DEVELOPMENT FOR PROCESS IMPROVEMENT

The Company is committed to developing technology and innovation to streamline production processes and reduce manufacturing time by utilizing high-energy-efficiency equipment and machinery. This initiative aims to reduce electricity and fuel consumption while minimizing waste from production processes. In 2024, the Company has expanded its adoption of Laser Direct Imaging (LDI) technology to replace UV Exposure technology, installing eight additional LDI machines in the Inner & Outer Circuit Exposure and Solder Mask Exposure processes. This upgrade enhances production efficiency, reduces electricity consumption, and contributes to a GHG emission reduction of 568 tonCO₂e.

3

SELECTION OF LOW-CARBON ELECTRICITY SOURCES

As electricity is the primary energy used in the production process, the Company has a policy of sourcing electricity from low-carbon power producers with a lower greenhouse gas emission factor. In 2024, the Company increased its purchase of electricity by 30% from the independent power producer, PPTC, which generates 100% of its electricity from natural gas, replacing the electricity purchased from the Metropolitan Electricity Authority (MEA). This switch resulted in a GHG emission reduction of 1,097 tonCO₂e.

4

INCREASE IN THE USE OF RENEWABLE ENERGY

The Company has increased its installation of Solar Cell panels, with a total capacity of 576 kWp, on the roof of the Drill Center building and the roof of the parking garage. This will enable the Company to generate an additional 700 MWh of electricity annually from solar energy. In 2024, this initiative resulted in a GHG emission reduction of 161 tonCO₂e.

5

PROMOTING EFFICIENT RESOURCE USE AND BEHAVIORAL CHANGES TO IMPROVE WORK EFFICIENCY

The Company focuses on energy and fuel conservation, efficient use of resources such as paper and water, and the adoption of technologies for communication, such as online meetings and training sessions.

- The Company utilized Six Sigma and QCC tools to improve product quality and reduce waste in the production process. This resulted in a reduction of 56 tons of PCB waste.
- The Company implemented the 3R Concept (Reduce, Reuse, and Recycle) by promoting the use of reusable packaging in collaboration with partners. The reusable packaging included ABS Cores, Core Holders, Carton Boxes, and Plastic Pallets. As a result, 15,700 sets of reusable packaging were used, leading to a cost saving of 244,470 THB.



VERIFICATION OF GREENHOUSE GAS EMISSIONS DATA FOR SUBSIDIARIES BY EXTERNAL AUDITORS

The subsidiaries, namely KCE Technology Co., Ltd. (KCET) and Thai Laminates Manufacturer Co., Ltd. (TLM) have prepared their Carbon Footprint of Organization reports for 2024. These reports have been verified and certified by SGS (Thailand) Ltd. for the period from January 1, 2024, to December 31, 2024. The certification number is TH-IE-25-500002296-001 and TH-IE-24-500003305-001, respectively.

TABLE OF THE GREENHOUSE GAS EMISSION OF SUBSIDIARIES						
Greenhouse Gas Emissions	Unit	KCET		TLM		
		Year 2023	Year 2024	Year 2023	Year 2024	
Scope 1 (Direct Emissions)	tonCO ₂ e	1,705	1,775	3,232	2,774	
Scope 2 (Indirect Emissions)	tonCO ₂ e	42,391	33,304	2,999	2,610	
Total Scope 1 and 2	tonCO ₂ e	44,096	35,079	6,231	5,384	
Scope 3 (Other Indirect Emissions)	tonCO ₂ e	-	179,598	-	-	
Total Scope 1, 2, and 3	tonCO ₂ e	44,096	214,677	6,231	-	



GREENHOUSE GAS REDUCTION PROJECTS OF SUBSIDIARIES IN 2024

- **KCET** has installed five Laser Direct Imaging (LDI) machines in the Inner and Outer Imaging processes. This initiative has led to a reduction in energy consumption by 190 MWh, resulting in a GHG emission reduction of 87 tonCO₂e. KCET plans to transition all UV exposure technology to LDI by 2025.
- **TLM** replaced its Chilling Water Supply Pump motor with a high-efficiency motor, upgrading from IE2 to IE4. This change has reduced electricity consumption by 11,738 kWh, and reduced GHG emissions by 5 tonCO₂e.
- **TLM** also upgraded five Cooling Tower motors from IE2 to IE4, reducing electricity consumption by 8,827 kWh, and reducing GHG emissions by 5 tonCO₂e.
- **TLM** replaced the 110 kW & 37 kW screw air compressors with high-efficiency motors, upgrading from IE2 to IE5. This change has resulted in a reduction in electricity consumption of 144 MWh, and a GHG emission reduction of 66 tonCO₂e.



PRODUCT CARBON FOOTPRINT

The assessment of Product Carbon Footprint (PCF) is of significant importance in the present as it helps reduce environmental impacts by measuring and controlling greenhouse gas emissions at every stage of the production process. Additionally, it fosters consumer confidence by demonstrating the organization's commitment to environmental responsibility. This initiative contributes to long-term cost reductions by minimizing energy and resource consumption. Organizations are also better prepared to comply with

stricter environmental regulations in global markets, enhancing their competitiveness and building a positive brand image. Furthermore, it stimulates environmentally friendly innovations, reduces business risks associated with climate change impacts, and responds to the increasing demand from environmentally conscious consumers today.

In 2024, the Company conducted a Product Carbon Footprint assessment in accordance with the ISO 14067:2018 standard and received certification from the Greenhouse Gas Management Organization (Public Organization). The scope of the assessment was based on the Cradle-to-Gate or B2B approach. The certified product is a High-Density Interconnect (HDI) Printed Circuit Board (PCB) with six layers, and it includes key raw materials used in the production of PCBs: Laminate and Prepreg from the subsidiary (TLM), each certified as one product. These products will serve as a model for the development of the Product Carbon Footprint calculation program for all products of the Company and its subsidiaries. The Company plans to complete the development of the Product Carbon Footprint calculation program by 2025.

The carbon footprint of the HDI PCB 6 layers is 2.04 kgCO₂e, the carbon footprint of the 0.003" Laminate is 504 gCO₂e, and the carbon footprint of the Prepreg 2116 is 151 gCO₂e. The certification for these products is shown in the attached image.



3.3.3 ENERGY MANAGEMENT



Energy management is a critical factor that impacts the economy, society, and the environment, especially when energy resources are limited and their demands are increasing. Efficient energy management allows organizations to effectively tackle these challenges in a sustainable manner. The Company prioritizes on energy management to reduce energy losses during production and usage, mitigate risks arising from energy issues, and prepare to respond changes in energy pricing and related environmental regulations. Additionally, it aims to reduce greenhouse gas emissions and support sustainable development goals.



MANAGEMENT APPROACH :

- Establish energy management policies and strategies to ensure the highest efficiency in energy usage.
- Implement energy management practices based on the ISO 50001.
- Conduct energy audits by analyzing current energy usage and identifying areas for improvement to reduce energy consumption.
- Plan energy consumption by setting energy goals and developing an action plan for achieving those goals.
- Implement and optimize energy usage by improving production processes for higher energy efficiency and adopting high-efficiency technologies to save energy.
- Monitor and evaluate performance by tracking operational outcomes and measuring progress against set targets, adjusting strategies if targets are not met.
- Maintain, inspect, repair, and improve equipment to ensure it operates with maximum efficiency.
- Invest in renewable energy technologies, such as solar, wind, and biomass energy.
- Promote training for employees to enhance understanding and raise awareness about energy management and the use of efficient technologies, encouraging their involvement in reducing energy consumption.



GOAL :

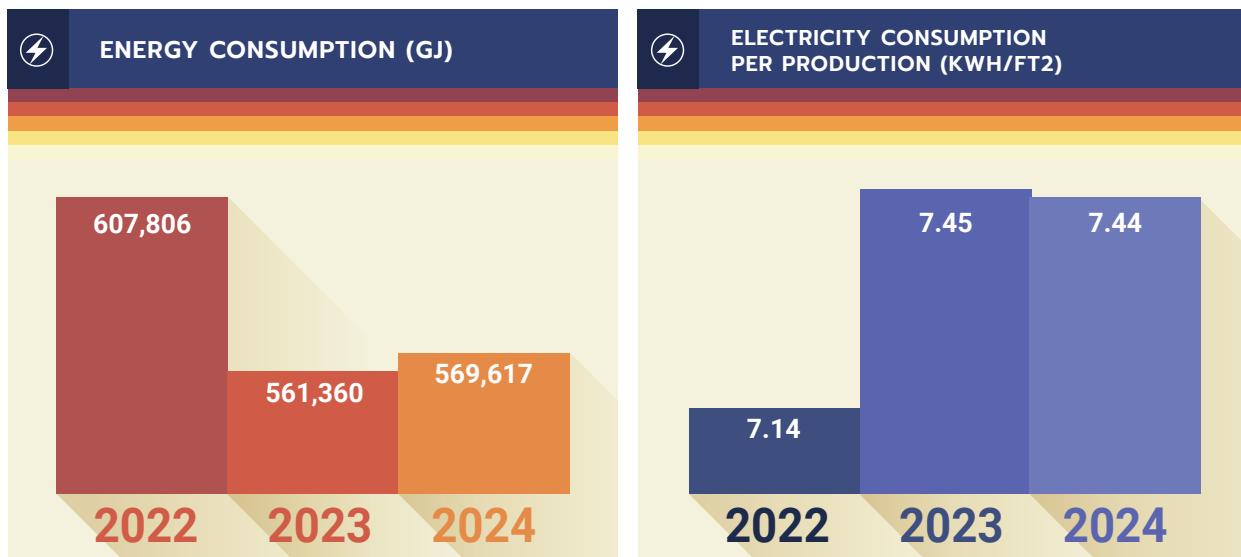
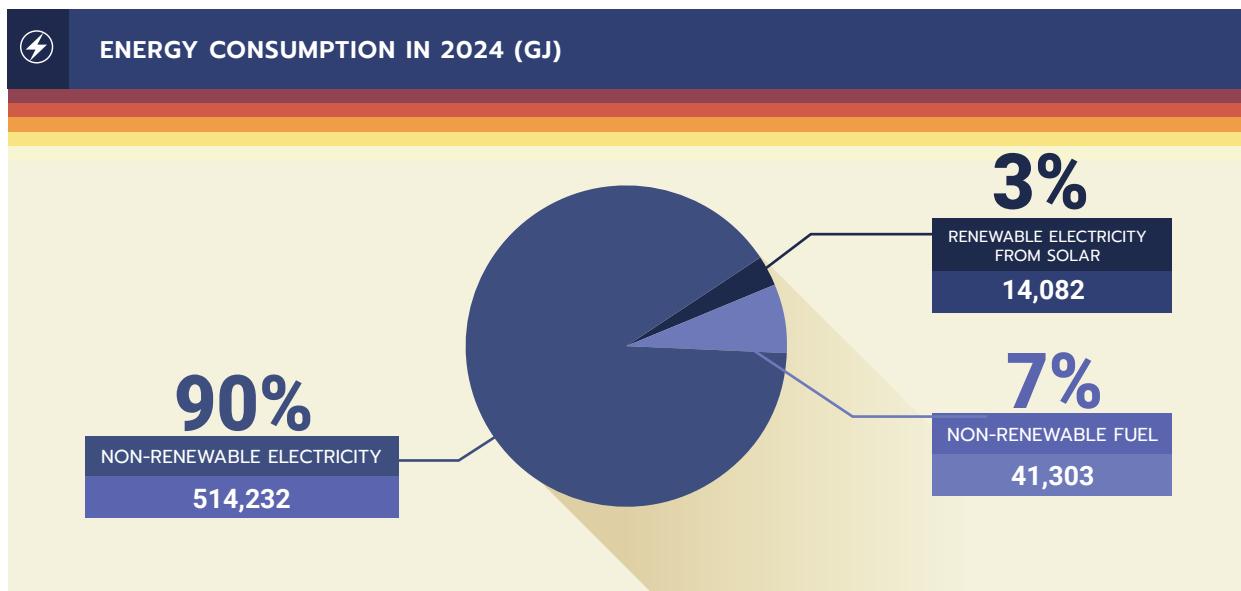
- Reduce electricity consumption per production unit by 10% by 2030 compared to the baseline year 2022.
- Increase the proportion of renewable energy usage to 50% by 2030.



PERFORMANCE :

Indicator	Target for 2024	Performance of 2024
Total electricity consumption per production unit (kWh/sqft)	7.00	7.44
% Change of electricity consumption per production unit, compared to the baseline year 2022	Decrease by 2.5%	Increase by 4%
Proportion of renewable energy usage	5%	2.7%

⚡ TABLE OF ENERGY CONSUMPTION WITHIN THE ORGANIZATION			
Electricity and Fuel	Year 2022	Year 2023	Year 2024
Non-renewable electricity consumption (kWh)			
■ Independent Power Producers	94,324,128	87,633,608	109,036,752
■ Metropolitan Electricity Authority (MEA)	57,332,000	53,059,192	33,805,504
Renewable energy consumption from Solar Roof (kWh)	3,674,187	3,952,757	3,911,626
Total Electricity Consumption (kWh)	155,330,315	144,645,557	146,753,882
Total Electricity Consumption (GJ)	559,189	520,724	528,314
% of Electricity from Renewable Sources	2.4%	2.7%	2.7%
Electricity Cost Savings from Renewable Energy (Million Baht)	13.5	14.5	14.4
Electricity Consumption per Production Unit (kWh/sqft)	7.14	7.45	7.44
Non-Renewable Fuel Consumption			
■ Natural Gas (SCF)	43,092,119	35,655,116	36,326,455
■ Diesel (Litre)	55,075	57,457	53,177
■ Gasoline/Ethanol (Litre)	1,988	1,439	4,264
Total Non-Renewable Fuel Consumption (GJ)	48,617	40,636	41,303
Renewable Fuel Consumption (GJ)	-	-	-
Total Fuel Consumption (GJ)	48,617	40,636	41,303
Total Energy Consumption (GJ)	607,806	561,360	569,617



From operations in 2024, the total energy consumption was 569,517 gigajoules, with 93% derived from electricity usage and 7% from non-renewable fuels, including natural gas and diesel/gasohol. The electricity consumption per unit of production was 7.44 kWh per square foot, which represents a 4% increase compared to the baseline year of 2022. This increase was due to a 10% rise in the production of High Density Interconnect (HDI) PCBs in 2024 compared to 2023, which involved more complex circuit designs, leading to higher electricity and fuel usage. Additionally, the Company continued to be affected by the global economic slowdown, which resulted in not operating at full production capacity. Some production processes still required electricity for cooling and/or heating systems to support machinery and chemicals, as well as the warehouse. However, the Company has managed production efficiently, planning to halt certain machines or operations at specific times to reduce energy consumption as much as possible, along with implementing energy-saving projects in both production processes and infrastructure systems.

Regarding renewable energy use, in 2024, the Company produced 3,912 MWh of electricity from its Solar Roof, accounting for 2.7% of total electricity consumption, which resulted in an electricity cost saving of 14.4 million baht. In 2024, the Company has installed an additional 576 kWp Solar Cell system on the rooftops of the Drill center building and garages, bringing the total installed solar capacity to 3.5 MWp.



ENERGY MANAGEMENT PROJECTS FOR 2024 :

LASER DIRECT IMAGING (LDI) PROJECT

The Company has implemented a new technology project to replace UV Exposure technology with Laser Direct Imaging (LDI) technology for Inner Layer & Outer Layer Imaging and Solder Mask Exposure processes. A total of 8 machines have been installed to enhance operational efficiency, reduce waste, and lower energy consumption. This transition has resulted in a reduction of electricity consumption by 1,303 MWh, cost savings of THB 5.9 million, and a reduction of GHG emissions by 568 tonCO₂ e.



PRESSURE COMPRESSED AIR HIGH - LOW PROJECT



The Company has implemented the installation of a pressure regulator to separate the compressed air system into two levels : High Pressure and Low Pressure. This optimization ensures appropriate usage and prevents unnecessary energy consumption. As a result, one air compressor (500 Hp, 373 kW) has been decommissioned, leading to a reduction in electricity consumption by 174 MWh, cost savings of THB 0.8 million, and a reduction in GHG emissions by 480 tonCO₂ e.

SOLAR ROOF PHASE 4 PROJECT

The Company has implemented the Solar Roof Phase 4 project with a capacity of 576 kWp to generate electricity for the Drill Center building and parking area. This initiative aims to increase the share of renewable energy usage. The system generates 180 MWh of electricity, resulting in cost savings of 0.8 million THB and a GHG emission reduction by 161 tonCO₂ e.



AUTOMATIC BALL CLEANING FOR CHILLER SYSTEM PROJECT :

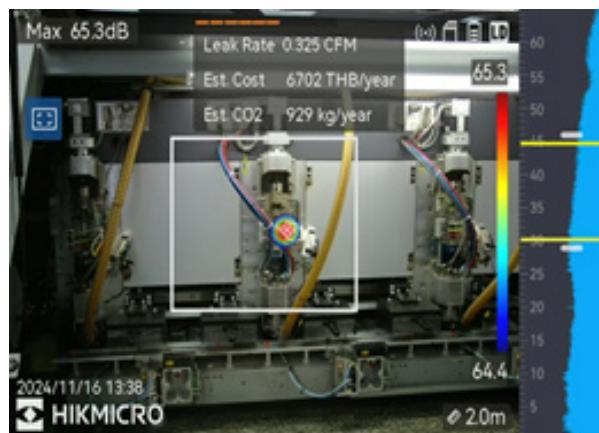
The Company has installed an Automatic Ball Cleaning system for two chillers. This system continuously circulates cleaning balls to keep condenser tubes clean, thereby enhancing cooling efficiency. As a result, it extends the lifespan of the chillers, reduces maintenance costs, and eliminates the need for chemical cleaning, making it safe for both the environment and users. This initiative has led to a reduction in electricity consumption by 63 MWh, cost savings of 0.3 million THB, and a GHG emission reduction of 28 tonCO₂e.



OTHER PROJECTS

- Replacement of Cooling Tower Fan Blades with Fiberglass-Reinforced Plastic (FRP) materials.
- Reduction of air leaks from machinery within the building.
- Reduction of ambient temperature in the compressed air room.

Projects collectively contribute to electricity reduction by 573 MWh, saving 2.6 million THB in electricity costs and reducing GHG emissions by 276 tonCO₂e.





ENERGY MANAGEMENT OF SUBSIDIARIES :

The Company has a policy requiring its subsidiaries to manage energy in accordance with the energy management system based on the ISO 50001 standard, including the use of renewable energy. The performance of the subsidiaries in 2024 is as follows :

TABLE OF ENERGY CONSUMPTION WITHIN THE ORGANIZATION OF SUBSIDIARIES						
Energy Consumption	KCET		TLM		CTP&CTCC	
	Year 2023	Year 2024	Year 2023	Year 2024	Year 2023	Year 2024
Electricity Consumption from Non-Renewable Energy (kWh)						
■ Private Power Producer	69,200,307	85,883,443	6,819,011	6,259,897	3,879,705	2,942,274
■ Metropolitan Electricity Authority	-	-	25,145	20,057	-	-
Electricity Consumption from Renewable Energy (Solar Roof) (kWh)	3,383,576	3,266,816	-	-	-	-
Total Electricity Consumption (kWh)	72,583,883	89,150,258	6,844,156	6,279,954	3,879,705	2,942,274
Total Electricity Consumption (GJ)	261,302	320,941	24,639	22,608	13,967	10,592
% of Electricity from Renewable Sources	4.7%	3.7%	-	-	-	-
Electricity Cost Savings from Renewable Energy (Million Baht)	12.5	12.0	-	-	-	-
Fuel Consumption from Non-Renewable Energy						
■ Natural Gas (SCF)	-	-	41,928,190	46,940,127	-	-
■ Diesel Fuel (Litre)	227,533	178,400	16,325	17,608	16,397	13,424
■ Gasoline/Ethanol Gasoline (Litre)	9,620	4,943	2,509	2,261	15.00	1,027
■ Liquefied Petroleum Gas (kg)	221,755	231,265	9,045	7,695	33,168	35,495
■ Compressed Natural Gas (Litre)	-	-	3,106	2,862	-	-
Total Fuel Consumption from Non-Renewable Energy (GJ)	18,472	17,040	46,518	51,909	2,100	2,136
Fuel Consumption from Renewable Energy (GJ)	-	-	-	-	-	-
Total Fuel Consumption (GJ)	18,472	17,040	46,518	51,909	2,100	2,136
Total Energy Consumption (GJ)	279,774	337,981	71,157	74,517	16,067	12,728



ENERGY MANAGEMENT PROJECTS OF SUBSIDIARIES IN 2024



KCE TECHNOLOGY (KCET) :

- **Inverter Installation for AHU Drill Plant 2 (18 kW)** : KCET has installed an 18 kW inverter for the Air Handling Unit (AHU) at Drill Plant 2 to regulate airflow and control humidity levels. This improvement enhances energy efficiency, resulting in a reduction in electricity consumption by 0.96 MWh, cost savings of 0.3 million THB, and a GHG emission reduction of 44 tonCO₂e.
- **Laser Direct Imaging (LDI) Technology Replacement Project** : KCET has installed five Laser Direct Imaging (LDI) machines for the Inner and Outer Imaging processes. This upgrade has resulted in a reduction in electricity consumption by 190 MWh, cost savings of 0.85 million THB, and a GHG emission reduction of 87 tonCO₂e. Additionally, the Company plans to fully replace UV Exposure technology with LDI by 2025.
- **Standby Mode Shutdown for FAC and M/C on Holidays** : KCET has implemented a project to shut down standby machinery and utility systems during holidays by deactivating excess equipment and optimizing the operation of utility systems to match actual demand. This initiative has resulted in energy savings of 1,800 MWh, cost savings of 6.5 million THB, and a GHG emission reduction of 818 tonCO₂e.



THAI LAMINATES MANUFACTURER (TLM) :

- **Improvement of Hot Press Efficiency** : TLM has improved the efficiency of the hot press machine by enhancing the thermal insulation, resulting in a reduction in natural gas consumption by 33 MMBTU. Additionally, solar-powered street lighting has been installed around the factory, leading to a reduction in electricity consumption by 8,800 kWh. These initiatives have resulted in combined savings of 51,000 THB in natural gas and electricity costs and a GHG emission reduction of 6 tonCO₂e.
- **Installation of High-Efficiency Air Compressor 110 kW VSD, IE5 Motor** : TLM has achieved a reduction in electricity consumption by 72 MWh, resulting in cost savings of THB 288,000. This has also led to a GHG emission reduction of 33 tonCO₂e.
- **High-efficiency IE4 motors** : TLM has replaced existing motors with high-efficiency IE4 motors for the Chiller water supply pump, cooling tower, and screw air compressor, upgrading from IE2 motors. This transition has resulted in a reduction in electricity consumption by 164 MWh, cost savings of 0.6 million THB, and a GHG emission reduction of 75 tonCO₂e.

3.3.4 WATER MANAGEMENT



The Company prioritizes sustainable water management and has established ongoing actions to reduce the risks and impacts of water scarcity. The printed circuit board (PCB) manufacturing process is one that requires large amounts of water, including in stages such as washing, plating, and cleaning of circuit boards. Therefore, effective water management is a critical factor in reducing costs, minimizing environmental impact, and ensuring long-term sustainability.



MANAGEMENT APPROACH :

- **Efficient Water Usage Planning :** Water usage is analyzed at each stage of the production process to identify and reduce areas of water wastage.
- **Water Recycling System :** Wastewater is treated and then introduced into the recycling system using Ion-Exchange filtration technology. The treated water is then reused in the production process. Additionally, wastewater is treated using high-resolution filtration technologies such as Microfiltration and Reverse Osmosis before being reused in cooling systems, air treatment systems, and sanitary systems.
- **Reducing Water Consumption :** The Company employs technologies that help minimize the amount of water required in the production process.
- **Building a Water Conservation Culture within the Organization :** Employees are educated on the importance of efficient water use and are encouraged to inspect for leaks or unnecessary water usage.
- **Proper Wastewater Treatment :** The Company utilizes the Metal Precipitation wastewater treatment system, which can separate heavy metals and hazardous chemicals. Additionally, a biological wastewater treatment system is used before the water is discharged back into the industrial park.
- **Compliance with Standards and Regulations :** The Company adheres to laws and regulations regarding water usage and wastewater discharge, as well as the ISO 14001 standard. Wastewater discharge is regularly monitored to ensure it meets the required quality standards before being released back into the industrial park.



GOAL :

Reduce water consumption per production unit by 10% by 2030 compared to the baseline year 2022.



PERFORMANCE:

Indicator	Target for 2024	Performance of 2024
Water consumption per production unit (m ³ /sqft)	0.086	0.092
% Change in water consumption per production unit compared to baseline year 2022	Decreased by 2.5%	Increased by 4.5%



MANAGEMENT OF ORGANIZATION'S CIRCULAR WATER RESOURCES

The Company is located in the Lat Krabang Industrial Estate, where the estate sources its water supply from the Metropolitan Waterworks Authority (MWA) to provide tap water services to businesses within the estate. The Company primarily uses tap water in its production processes, utilizing microfiltration and reverse osmosis technologies to improve water quality before it is used in production. Water used in production undergoes treatment through chemical and biological wastewater treatment systems. A portion of the treated water is directed to the water recycling system, utilizing ion exchange technology to reclaim water for reuse in various applications, such as cooling systems, air treatment systems, and sanitation systems. Treated wastewater is discharged into the industrial estate's wastewater treatment system before being released into external water sources, ensuring compliance with environmental standards. A water management flowchart illustrating this process is provided in the accompanying diagram.

WATER MANAGEMENT DIAGRAM

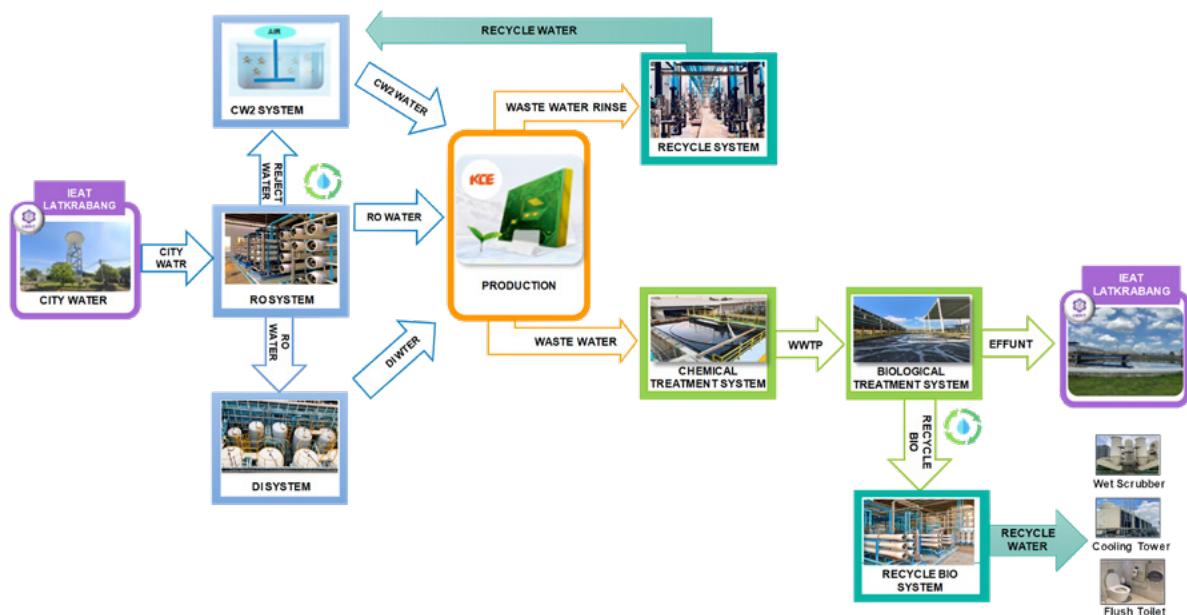


TABLE OF THE WATER CONSUMPTION			
Item	Year 2022	Year 2023	Year 2024
Water consumption (m ³)	2,611,591	2,334,287	2,404,520
Water discharged (m ³)	2,089,246	1,867,430	1,923,803
% of water discharged	80%	80%	80%
Water Recycled (m ³)	895,880	861,777	868,803
% of water recycled from production process	45%	45%	41 %
Water consumption per production unit (m ³ /sqft)	0.088	0.089	0.092



WATER RESOURCES INFORMATION 2024

RECYCLED WATER



WATER CONSUMPTION



RECYCLED WATER



DISCHARGED WATER

41%

2.40

million m³

0.87

million m³

1.92

million m³

According to the 2024 performance results, the total tap water consumption amounted to 2.4 million cubic meters, with the water usage per production unit rising to 0.092 cubic meters per square foot. This increase is attributed to the higher production of HDI products, which involve more complex production processes and require more water compared to standard multilayer products. The Company also faced the impact of the global economic slowdown, resulting in less-than-full production capacity. However, water usage remained necessary for cleaning machinery as part of the regular maintenance cycle to maintain production quality.

As for the recycling of water used in the production process, the Company successfully achieved its target of over 40%, with a recycling rate of 41% of the total water used in production. The amount of treated wastewater amounted to 1.92 million cubic meters, which is 80% of the volume, in compliance with legal requirements.



WATER EFFICIENCY IMPROVEMENT PROJECTS FOR 2024

3Rs

The Company prioritizes efficient water management and reducing dependence on external water sources by enhancing internal water usage efficiency based on the 3Rs principle.



WATER REDUCE

Implementing High-Efficiency Technologies and Innovations to Reduce Water Usage

- The system is equipped with a timer that halts the operation of machinery when there is no input board fed into the machine within the specified time. This causes the machinery to stop, and the water supply system is also halted.
- machinery is equipped with a cascade water recycling system.



WATER REUSE

Improving Water Efficiency

- The rejected RO water is reused for washing in the production process that requires high hardness water for cleaning, thus reducing the need for chemicals to adjust the water hardness for washing purposes.



WATER RECYCLE

Reusing Treated Water with Advanced Technology

- The water used for cleaning the electronic circuit boards is passed through a water recycling system and reused in the production process.
- The treated wastewater is passed through a water recycling system and reused for cleaning and flushing toilets, cooling towers, and wet scrubber air treatment systems.



WATER DISCHARGE MANAGEMENT

The wastewater generated from the chemicals used in the production process and the water resulting from the cleaning of PCBs, cooling systems, air treatment systems, and washing in restrooms and kitchens will be collected in a holding tank before entering the Metal Precipitation wastewater treatment system and the biological wastewater treatment system.



MANAGEMENT OF WATER DISCHARGE

There is a system in place that is capable of treating wastewater appropriately and utilizes technology that allows for the reuse of treated wastewater.



ESTABLISHING WATER DISCHARGE QUALITY STANDARDS

Ensure that the quality of water discharge complies with the legal standards set by applicable regulations.



MONITOR AND MEASURE THE QUALITY OF WATER DISCHARGE.

Verify the quality of water before discharge in accordance with regulatory requirements to ensure proper wastewater management in compliance with legal standards.



REPORT AND MONITOR THE QUALITY OF WATER DISCHARGE.

After monitoring the quality of water discharge, the results must be reported and continuously tracked.



QUALITY OF WATER DISCHARGED

The Company conducts water discharge quality monitoring four times per year through Chem Lab Services (Thailand) Co., Ltd., a certified private laboratory (Registration No. W-094), accredited under ISO/IEC 17025:2017. Additionally, the Company undergoes regulatory water discharge monitoring by the Lat Krabang Industrial Estate Authority, which collects effluent samples for analysis once per month, as required by law. The water discharge quality assessment for the year 2024 (B.E. 2567) confirmed that the treated effluent complied with all legal requirements. There were no complaints or fines related to water discharge quality compliance.

TABLE OF QUALITY MONITORING RESULTS OF WATER DISCHARGE IN 2024						
Parameter	Unit	Maximum Limit	Wastewater Quality Monitoring Results			
			1 st Test	2 nd Test	3 rd Test	4 th Test
BOD	mg/L	20	3	4	4	11
COD	mg/L	120	62	103	65	83
Copper	mg/L	2	0.79	0.18	0.77	0.64
Nickel	mg/L	1	0.1	0	0.2	0.11
TDS	mg/L	3,000	1,940	1,970	1,745	2,000
pH	-	5.5 - 9	8.09	8.06	8.01	7.68
External Analyst	ChemLab Services (Thailand) Co., Ltd					

WATER MANAGEMENT OF SUBSIDIARIES

The subsidiaries have a water management system based on the 3Rs principles, with water usage varying according to the nature of the industry, as shown below :

Item	KCET		TLM		CTP&CTCC	
	Year 2023	Year 2024	Year 2023	Year 2024	Year 2023	Year 2024
Municipal Water Usage (m ³)	1,669,608	1,713,660	30,116	31,789	35,316	26,177
Discharged Wastewater (m ³)	1,335,686	1,370,926	24,093	25,431	28,253	20,942
% of Wastewater Discharged	80%	80%	80%	80%	80%	80%

3.3.5 WASTE MANAGEMENT



Currently, the global volume of waste continues to increase, particularly driven by industrial growth, urban expansion, and changes in consumer behavior. In the PCB manufacturing industry, which involves the use of various chemicals, metals, and materials, the Company emphasizes the importance of efficient waste management to mitigate environmental impacts, including water, soil, and air pollution. This approach also helps to reduce resource depletion, lower waste disposal costs, and promote the recycling and reuse of materials.

MANAGEMENT APPROACH :

- Environmental management in accordance with the ISO 14001:2015 standard, environmental policies, and relevant laws.
- Source Reduction of waste by improving production processes or machinery to increase efficiency, thereby reducing raw material loss. This includes designing products and processes to reduce raw material usage or selecting materials with minimal environmental impact.
- Application of Circular Economy concepts and the 3Rs principles :

Reduce Minimize the use of unnecessary resources and enhance production processes to improve efficiency. Analyze the sources and causes of waste generation to develop plans for reducing waste volumes.

Reuse Promote the use of materials or products that can be reused to extend their lifecycle.

Recycle Promote the recycling of waste to transform it into new resources that can be utilized.

- Develop procedures for managing and disposing of various types of waste.
- Segregate waste to ensure proper disposal or treatment using appropriate and correct methods.
- Select, inspect, and monitor waste disposal/treatment facilities that meet standards and are properly authorized by government authorities.
- Promote employee awareness regarding waste reduction, waste segregation, and proper disposal practices.

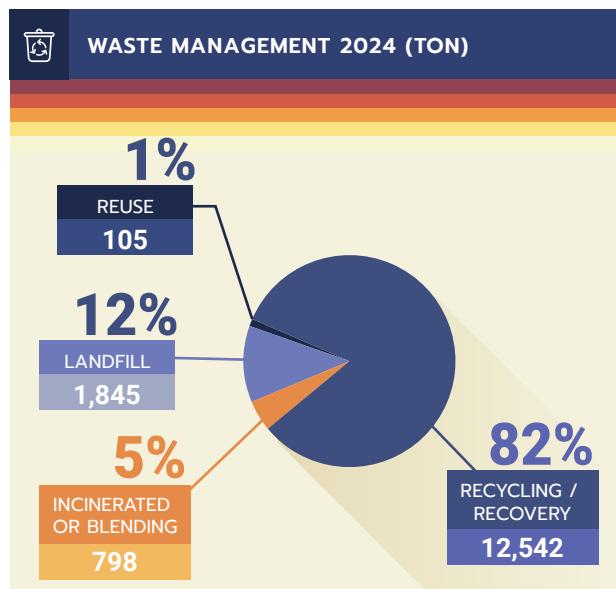
GOAL :

Reduce waste generated per production unit 10% by 2030 compared to the baseline year 2022.

PERFORMANCE :

Indicator	Target for 2024	Performance of 2024
Waste generated per production unit (kg./sqft)	0.78	0.81
% Change Waste Intensity, compared to baseline year 2022	Decreased by 2.5%	Constant

TABLE OF WASTE GENERATED AND DISPOSAL METHOD			
Waste Generated and Disposal Method	Year 2022	Year 2023	Year 2024
Total Waste Generated (tons)	20,948	16,762	15,289
■ Hazardous Waste	13,614	10,161	10,815
■ Non-Hazardous Waste	7,334	6,601	4,474
Waste generated per production unit (kg/sqft)	0.81	0.77	0.81
Total Waste diverted from Disposal (tons)	16,986	13,318	12,647
Hazardous Waste	12,332	9,140	9,801
■ Reuse	221	216	105
■ Recycling / Recovery	12,111	8,924	9,696
Non-Hazardous Waste			
■ Recycling / Recovery	4,655	4,177	2,846
Total Waste Directed to Disposal (tons)	3,962	3,444	2,643
Hazardous Waste	1,283	1,020	1,014
■ Incineration or Blending	1,038	844	798
■ Landfill	244	177	216
Hazardous Waste			
■ Landfill	2,679	2,424	1,628



In 2024, the Company generated a total of 15,289 tons of waste, of which 83% was recycled or reused, while only 17% was directly disposed of. Among the disposed waste, 12% was sent to landfill, including used drill underlay sheets, biological sludge, and general waste. The Company is committed to applying the 3Rs principle (Reduce, Reuse, Recycle) and embracing a circular economy approach. Additionally, it continues to conduct research on recyclable and biodegradable materials as substitutes to further reduce landfill waste.

The waste intensity per production unit stood at 0.81 kg per square foot, remaining stable compared to the 2022 baseline year but showing a 4% increase from 2023. This increase was primarily due to a 10% growth in High-Density Interconnect (HDI) production, which requires higher raw material and auxiliary material consumption compared to standard multilayer production due to its complexity. However, the Company has implemented process improvements, including the adoption of Laser Direct Imaging (LDI) technology, which has helped reduce waste generated in the Inner Layer production process. Additionally, the Company continues to enforce resource efficiency measures across all operations and actively promotes employee engagement initiatives to reduce office waste and enhance waste segregation for recycling, minimizing waste directed to disposal.



WASTE MANAGEMENT INITIATIVES IN 2024 :

The Company has implemented a program that encourages employee participation in waste management by applying the 3Rs (Reduce, Reuse, Recycle) concept to manage office waste. This supports the efficient use of resources, creates a positive environmental impact, and helps reduce waste within the office.

“ZERO WASTE OFFICE” CAMPAIGN

Employees are encouraged to use both sides of paper, which is then segregated and sent to an external facility for recycling.



“CALENDARS REUSE” CAMPAIGN

The Company collects old desk calendars annually and donates them to be transformed into Braille materials for the visually impaired.



“REUSABLE BAG DONATION” CAMPAIGN

This initiative encourages the use of reusable bags to reduce the consumption of new plastic or paper bags, helping to decrease plastic waste generated from single-use bags. It also helps reduce costs by allowing employees to donate reusable bags at designated collection points for their colleagues to reuse.



“KCE TOGETHER IN TURNING WASTE INTO MERIT” PROJECT

The Company provides employees the opportunity to participate in environmental and social activities by segregating plastic waste and donating 10,400 clean plastic bottles to Wat Jak Daeng, Samut Prakan Province. The temple uses these bottles to recycle plastic waste and transform it into new, useful products such as monk robes, funeral cloths, cloth bags, tote bags, hats, and more.



CAMPAIGN ACTIVITIES FOR EFFICIENT RESOURCE USAGE AND WASTE SEGREGATION

The Company organized an informational board to educate employees and hosted a “Waste Sorting Game” to promote knowledge and awareness of proper waste segregation. Employees had fun participating in a game that challenged their skills in sorting different types of waste, such as recyclables, hazardous waste, and general waste. This initiative helps improve environmental management within the factory and fosters a sustainable workplace culture that is mindful of the environment.



WASTE MANAGEMENT OF SUBSIDIARIES

The Company has a policy that requires subsidiaries to manage waste according to the nature of their industries, applying the 3Rs approach and circular economy principles. In 2024, the waste quantities were as follows :



TABLE OF WASTE GENERATED OF SUBSIDIARIES

Waste Generated and Disposal Method	KCET		TLM		CTP&CTCC	
	Year 2023	Year 2024	Year 2023	Year 2024	Year 2023	Year 2024
Total Waste Generated (tons)	12,027	10,872	1,256	953	82	5,445
■ Hazardous Waste	8,974	7,918	187	206	82	4,365
■ Non-Hazardous Waste	3,053	2,954	1,069	746	-	1,080
Total Waste diverted from Disposal (tons)	11,641	10,383	1,177	885	-	-
Hazardous Waste	8,588	7,536	148	180	-	-
■ Reuse	-	135	-	-	-	-
■ Recycling / Recovery	8,588	7,401	148	180	-	-
Non-Hazardous Waste	3,053	2,846	1,029	705	-	-
■ Recycling / Recovery	3,053	2,846	1,029	705	-	-
Total Waste Directed to Disposal (tons)	386	489	79	68	82	5,445
Hazardous Waste	386	381	40	26	82	4,365
■ Incineration or Blending	4	323	39	25	82	61
■ Landfill	382	58	0.55	0.50	-	4,305
Non-Hazardous Waste	-	108	39	42	-	1,080
■ Incineration or Blending	-	-	39	42	-	-
■ Landfill	-	108	-	-	-	1,080



WASTE MANAGEMENT INITIATIVES OF SUBSIDIARIES :

PROMOTING RESOURCE MANAGEMENT FOR SUSTAINABLE CIRCULAR ECONOMY PROJECT



Thai Laminate Manufacturer Co., Ltd. has participated in the Sustainable Circular Economy Resource Management Project, a collaborative initiative between the Industrial Estate Authority of Thailand (IEAT) and the Federation of Thai Industries (FTI). TLM has been selected as one of the pilot industrial facilities within an industrial estate with high potential for developing waste and material management under the Circular Model. As part of this initiative, an assessment of waste and unused materials was conducted to explore opportunities for resource

efficiency and circular utilization. The analysis identified that copper foil scraps can be upcycled into decorative art materials, adding value while supporting sustainable waste management.

VALUE ENHANCEMENT OF LAMINATE EDGE SCRAP PROJECT

Through the QCC activities conducted by employees in the laminate production process, an opportunity was identified to enhance the value of laminate edge scraps generated during the sheet-cutting process to meet customer specifications. Previously, these edge scraps were simply weighed and sold as waste. The team proposed a method to cut unbalanced edges by 2.5 inches and 5.5 inches, enabling the scraps to be sold as dummy-sized sheets at a 46% higher price per kilogram compared to the original scrap value.



"WASTE SEPARATION AND RECYCLED" PROJECT

Thai Laminate Manufacturer Co., Ltd. has encouraged employees to actively participate in waste segregation and the collection of recyclable waste for donation through a recycling-based merit-making initiative at Wat Thong, Charansanitwong 46, Bangkok. In 2024, TLM successfully segregated 1,203 kilograms of recyclable waste from the cafeteria and contributed it to the recycling donation campaign as part of its commitment to waste management and community engagement.



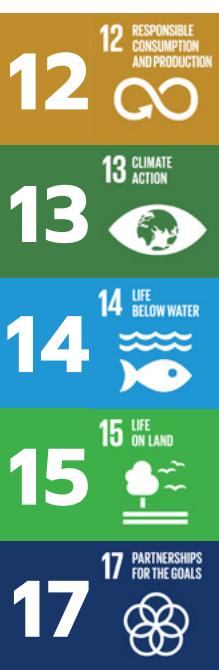
RECOVERY AND REUSE OF CHEMICALS FROM PCB PRODUCTION PROCESS

Chemtronics Products Co., Ltd. (CTP) has implemented a recovery process for chemicals used in the PCB production process. CTP extracts copper and tin from these chemicals and converts them into copper sulfate and tin oxide products. Copper sulfate is used in animal feed factories, fisheries, and agricultural fertilizers. It is certified under the FAMI-QS standard, which is a quality and safety certification system for the production of feed additives and pre-mixtures within the European Union. Tin oxide is used as a raw material for products related to tin.



Copper Sulfate Pentahydrate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$)

3.3.6 PRODUCT RESPONSIBILITY



Sustainability and Environmental Protection have become crucial issues in both business and society today, particularly in terms of the utilization of limited natural resources that are at risk of depletion, including raw materials and energy. The Company, therefore, put a higher value on the development and improvement of products and production processes regarding to a green environment. This can help reduce the environmental impacts, such as reducing the use of hazardous chemicals, lowering greenhouse gas emissions, managing resources efficiently, and applying eco-design principles. For example, using recyclable materials, selecting renewable energy sources, or reducing waste in production can help create a sustainable production environment and mitigate environmental risks.



MANAGEMENT APPROACH :

- Eco-design : Focuses on the long-term environmental impact by using resources efficiently, selecting recyclable, biodegradable materials, and reducing the use of hazardous chemicals.
- Environmentally Friendly Production Processes : Developing production processes that use energy and water-saving technologies, and implementing waste management systems that enable waste segregation and recycling or safe disposal according to environmental standards.
- Sustainable Materials : Using materials sourced from sustainable origins, such as those certified by trusted organizations, including recycled materials or sustainably managed resources.
- Promoting Circular Economy Principles : Encouraging the adoption of circular economy concepts within operations.
- Sustainable Procurement Policy : Establishing procurement policies that prioritize environmental friendliness and responsible sourcing of raw materials.
- Awareness and Training : Raising awareness and providing training for employees to consider environmental impact in all organizational processes.



PRODUCT RESPONSIBILITY PROJECTS

1

ECO-DESIGN

- Design for Minimal Waste : The design focuses on minimizing waste by optimizing the use of laminate sheets to generate the least amount of scrap while maximizing the capacity of each production process. Laminate sheets are ordered from manufacturers that provide sheets in the sizes specified by the design.
- Designing Production Processes to Reduce Material Usage : The Company adopts Laser Direct Imaging (LDI) technology as a replacement for UV Exposure. This reduces the use of artwork film and chemicals typically required to create circuit lines on artwork film.

2**EFFICIENT RAW MATERIAL MANAGEMENT**

The Group uses a wide range of raw materials for the manufacturing of printed circuit boards (PCBs). The primary raw materials used include Copper, Laminate, Prepreg, and various Chemicals. The Group utilizes a MRP (Material Requirements Planning) system to plan raw material requirements and monitor the consumption of materials per unit of production regularly, ensuring efficient use of raw materials.

TABLE OF RAW MATERIAL CONSUMPTION		
Items	Year 2024	Type of Raw Materials
Renewable Raw Materials (tons)	1,714	Paper Packaging, Wooden Pallets
Non-Renewable Raw Materials (tons)	64,989	Copper, Laminate, Prepreg, Chemicals
Total Raw Material Usage (tons)	66,703	
Recycled Materials (tons)	4,159	Copper Foil, Copper Balls, Paper Packaging
% Recycled Materials	6.2%	

3**USE OF ENVIRONMENTALLY FRIENDLY RAW MATERIALS**

The Company focuses on using resources efficiently to enhance sustainability in production and reduce environmental impacts. This includes minimizing the use of finite or scarce natural resources. The Company adopts Circular Economy principles in its procurement processes and raw material management.

■ **Select to use Recycled Raw Materials**

The selection of recycled raw materials plays a vital role in creating a sustainable Circular Economy in the long term. The Company continuously supports and promotes the use of recycled materials, allowing an increase in the proportion of recycled materials used. In 2024, the Company utilized copper anode balls made from 20% recycled copper, which helped reduce the need for virgin materials from copper ore mining by 224 tons per year.

Recycled Raw Materials	Year 2022	Year 2023	Year 2024
Copper Foil Produced from Recycled Copper Wire (tons)	2,305	3,439	3,039
% Copper Foil Produced from Recycled Copper Wire (%)	85%	100%	92%
Reduction of Virgin Material from Copper Mining / Year (tons)	2,305	3,439	3,039

ADDITIONAL RECYCLED RAW MATERIALS IN 2024	
Recycled Raw Materials	Year 2024
Copper Anode Balls produced from recycled copper (tons)	1,120
% Copper Anode Balls produced from 20% recycled copper (%)	100%
Reduction of virgin material from copper mining per year (tons)	224

■ Selection of Raw Materials Safe for Consumers and the Environment

The Company has policies and practices in place to prevent contamination by toxic substances in raw materials and products, which could affect consumers and the environment. This includes compliance with regulations and international standards for the control of hazardous substances, such as REACH (Registration, Evaluation, Authorization, and Restriction of Chemicals), RoHS (Restriction of Hazardous Substances), PFAS (Per- and Polyfluoroalkyl Substances), and other customer-specific requirements such as SVHC, GADSL, IMDS, ELV, WEEEs, TSCA, and POP. The Company requires suppliers of "chemicals/chemicals products" to report chemical substances in their products through a Chemical Substances Declaration every two years or when there are changes in information or requirements.

For PCB products, the Company sends samples of all surface finishes (including tin, gold, silver, and organic substances) for contamination analysis in compliance with RoHS requirements on an annual basis. In 2024, the results were certified by SGS (Thailand), and the test results showed "Not Detected" or no prohibited substances as per the regulations. Additionally, the Company mandates that suppliers submit annual reports of contaminant analysis in accordance with RoHS requirements.

4 USE OF CIRCULAR PACKAGING

■ Support for Circular Packaging Usage

The Company has created shared value with its partners based on Circular Economy principles by utilizing circular packaging. In addition to the ongoing use of second-hand Euro pallets, in 2024, the Company expanded the use of circular packaging with two domestic partners.

Circular packaging for prepreg raw materials includes second-hand wooden pallets, paper cores, cardboard boxes, and paper cushioning, and for Dry Film raw materials, circular packaging includes plastic cores, core cushions, cardboard boxes, and plastic pallets, with a total value of 2.3 million THB.



Conflict Mineral Reporting Template (CMRT) and Extended Mineral Reporting Template (EMRT) Conflict Minerals refer to minerals that are mined and produced in regions experiencing political conflicts or violence, which negatively impact human rights, such as child labor, forced labor, and financing armed groups in war zones or areas of conflict. The trade in these minerals often exacerbates violence in the affected regions. The minerals classified as Conflict Minerals, or 3TG, include Gold, Tin, Tantalum, and Tungsten, and are extended to include Cobalt and Mica.

The Company uses Gold and Tin as surface finishes for PCB products and ensures that these materials are sourced from conflict-free mineral sources, not linked to violence or human rights violations, in compliance with the Dodd-Frank Act Section 1502 and relevant international standards. Suppliers are required to provide annual reports to the Company using the Conflict Mineral Reporting Template (CMRT) and Extended Mineral Reporting Template (EMRT).

