



CLIMATE-SMART INVESTMENTS

TPI Polene Public Company Limited


Task Force on Climate-Related Financial Disclosures (TCFD) 2023

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Introduction



TPI Polene Public Company Limited (“TPIPL or the Company”) is a manufacturer and distributor of cement, other construction materials and specialty polymers, as well as energy and agricultural businesses through its subsidiaries. TPIPL aims for sustainable development for its group of companies, to create balanced growth by adhering to Environmental, Social and Good Corporate Governance (ESG) criteria and has linked the environment dimension to all three segments of the operation, Circular economy, Green economy and Bio economy, which are mutually supportive - this is called Bio-Circular-Green Economy (BCG), a business model innovation that will be implemented at all stages of sustainability in the supply chain to reduce the use of natural resources. This will include the procurement of raw materials, production, sales, and transportation, and will employ reuse and recycling to reduce and minimize the use of natural resources as much as possible to reduce the impact on the environment.

The Company recognizes the important role in the cement manufacturing sector, other construction materials and specialty polymers to tackle climate change and limit global temperature rise to no more than 1.5 degrees Celsius in accordance with the Paris Agreement, which is in line with the objective of the Company and its subsidiaries to reduce the impact of climate change towards low carbon production. To this end, TPI Polene Group has made climate management a major sustainability issue and has

announced its long-term goal to achieve carbon neutrality by 2043 to demonstrate its commitment and response to the government’s international commitment that Thailand will fully step up its efforts to tackle climate issues in order for Thailand to achieve carbon neutrality by 2050. In addition, the Company has continuously disclosed its operating results and related projects as an operational guideline for all stakeholders involved.

In 2023, in order to enhance the disclosure of climate management information, the Company has adopted guidelines in accordance with the Task Force on Climate-Related Financial Disclosures (TCFD) with four main components: Governance, Strategy, Risk Management, and Metrics and Targets as a framework for disclosing climate management information. This will entail revealing the Company's governance information regarding climate-related risks and opportunities, information on the actual and potential impacts of climate-related risks and opportunities on business operations, details about the Company's financial strategy and planning, approaches employed by the Company to assess and manage climate-related risks, and the disclosure of indicators and targets used to assess and manage climate-related risks. Therefore, this initiative elevates the level of disclosure to stakeholders, providing them with insight into the Company's progress in climate management operations.

In addition, TPIPL has incorporated environmentally friendly technology factors into consideration for future investment projects, ensuring that climate management is seamlessly connected to Strategy Risk, Operational Risk, Financial Risk, Compliance Risk, and Environmental, Social and Governance Risk (ESG Risk) in an efficient manner. The Company has also developed climate change strategies to address these risks and work towards the long-term goal of reducing greenhouse gas emissions.



The Company has also conducted scenario analysis as part of its transition and physical risk assessment process. It has evaluated the potential financial impact resulting from significant risks on the Company's business operations and has developed an operational plan to articulate its commitment and guidelines for achieving carbon neutrality. Furthermore, plans for climate change and greenhouse gas reduction have been prepared in alignment with the operations of the Nationally Determined Contributions (NDCs), with the objective of controlling the global average temperature to not increase by more than 2 °C, as stipulated by the International Energy Agency (IEA).

The Company is committed to consistently improving its operations related to climate change and data disclosure in compliance with the operating framework and international standards.





Executive Summary



Mr. Prachai Leophairatana
Chief Executive Officer

TPI Polene Group has identified climate management as its significant sustainability issue and has announced a long-term goal of achieving carbon neutrality by 2043.

In 2023, the Company has managed climate change, divided into four main components: Governance, Risk Management, Strategy, and Metrics and Targets, as a framework for disclosing climate management information resulting from cement business operations, fiber cement business and Polymer business as follows:-

1. Cement Business

The risk assessment found that physical risks, such as in the case of water shortage and floods, which are classified as fundamental risks at a moderate and low level, respectively. These do not constitute a concern for the Company. This is because the Company can continually assess the situation and has measures in place to address it.

Risks related to legal factors or regulations controlling greenhouse gas emissions through mechanisms such as collecting carbon taxes, utilizing a carbon tax as a tool to prevent trade through the Carbon Border Adjustment Mechanism (CBAM), and supporting the use of electric vehicles and clean energy, etc., pose high risks to the fossil fuel cement

production business and a low to moderate risk to the supply chain. However, they concurrently are opportunities for cement business from low carbon (green) energy sources.

The Company has assessed such risks, leading to the necessity of allocating funds to adapt its technology for increased environmental friendliness. This involves utilizing waste as fuel instead of coal in the cement production process, as well as incorporating solar energy, wind energy, etc., into the energy production portfolio. Further measures include the use of heavy machinery and electric trucks, as well as reducing the proportion of clinker in the cement production, such as, manufacture of hydraulic cement as an alternative to Portland cement- type 1 and the Company employs low-carbon strategies to cope with climate change risks, enabling the achievement of long-term goals related to the reduction of greenhouse gas emissions.

In addition to the aforementioned risks, there are still opportunities to sell low carbon-cement such as hydraulic cement, etc.

2. Fiber Cement/Concrete Roof Tiles Business

Physical risk assessment includes water shortage and flooding is classified as a medium and low-level risk respectively, which the Company can assess the situation and take measures to respond to it.

3. Polymer Business

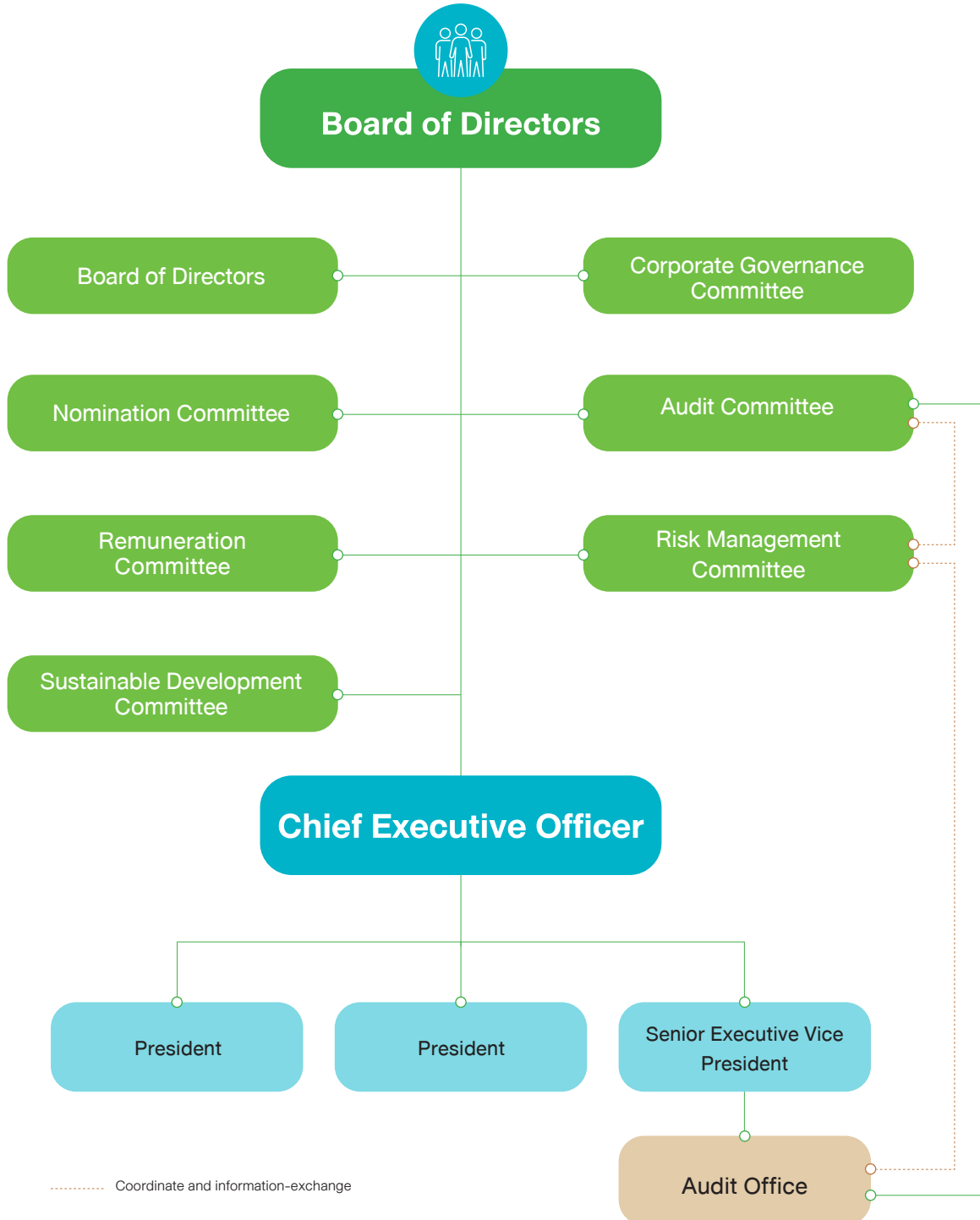
Physical risk assessment, including flooding and wildfires, is classified as a low-level risk. Water shortages and storms are considered moderate fundamental risks, and the Company will continuously assess the situation and take measures to respond to it.



Governance

The Company recognizes the important role of the energy sector in driving solutions to climate change and the transition to a low-carbon economy and society, the Company has integrated climate change management into its corporate structure from the Board of Directors level to the operator level.

Corporate Structure



..... Coordinate and information-exchange

TPIPL's Climate Change Governance



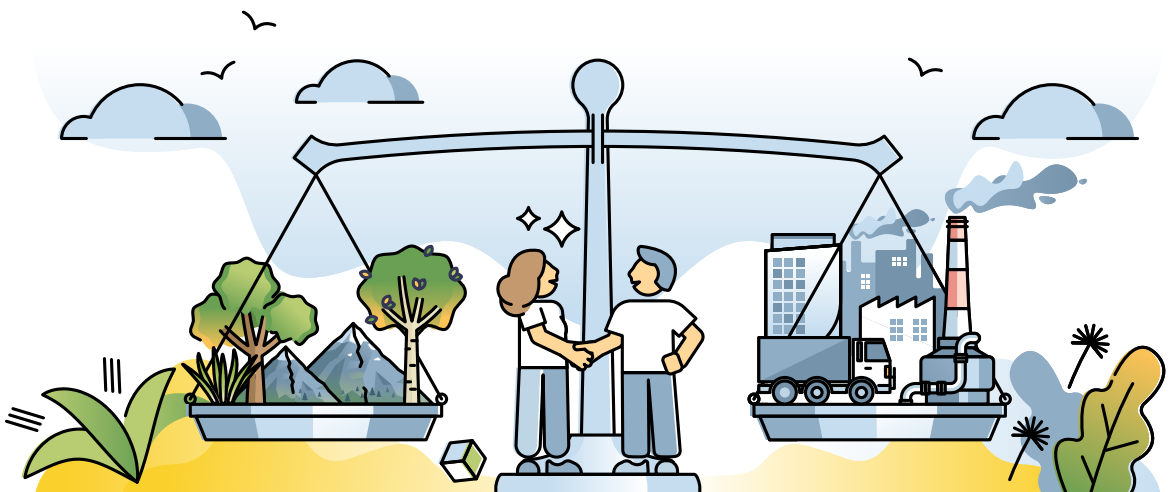


TPIPL's Climate Change Governance

Position	Roles and Responsibilities in Climate Change Risk Management and the Implementation of Climate Change Strategies	
Board of Directors	<ul style="list-style-type: none"> To approve the climate change strategy, annual operational plan, goals, and Key Performance Indicators (KPIs) related to climate change. 	At least once a year
	<ul style="list-style-type: none"> To supervise performance in accordance with climate change goals. 	At least once a year
	<ul style="list-style-type: none"> To consider investments in clean energy businesses to align with the annual budget, short-term, and long-term strategic plans. 	At least once a year
	<ul style="list-style-type: none"> To approve all strategies, operational plans, Key Performance Indicators (KPIs), and goals related to climate change to obtain approval from the Board of Directors. 	At least once a year
Sustainability Development Committee	<ul style="list-style-type: none"> To supervise the implementation of the climate change strategy and manage overall climate change risks and opportunities at the corporate level under the organization's ESG policy. 	At least once a year
	<ul style="list-style-type: none"> To approve all strategies, policies, objectives, and annual action plans related to climate change in alignment with the organization's strategic plan, to seek for approval from the Board of Directors. 	At least once a year
Risk Management Committee	<ul style="list-style-type: none"> To assess organizational risks at least once a year, including risks and opportunities related to climate change, risk mitigation plans within the risk management systems and processes proposed by the Risk Management Department. 	At least once a year
	<ul style="list-style-type: none"> To monitor performance, operational plans, Key Performance Indicators (KPIs), and goals related to climate change. 	At least once a year
Climate-related Executive Team and Risk Management Department	<ul style="list-style-type: none"> To incorporate climate change risks and strategies in recommending ongoing business strategies. 	At least once a year
	<ul style="list-style-type: none"> To approve and monitor the implementation of the climate change strategy to align with business strategies, goals, and projects, and present them to the Board of Directors. 	At least once a year
	<ul style="list-style-type: none"> To assign tasks to those responsible for implementing the climate change strategy and risk management. 	At least once a year
<ul style="list-style-type: none"> To integrate the assessment and management of climate change risks and opportunities with the organization's risk management systems and processes. 	At least once a year	

Position	Roles and Responsibilities in Climate Change Risk Management and the Implementation of Climate Change Strategies	
Climate-related Functions	<ul style="list-style-type: none"> To coordinate with internal stakeholders on climate change issues. 	At least once a year
	<ul style="list-style-type: none"> To be responsible for reporting and disclosing climate change information to external stakeholders. 	At least once a year
TQM Department	<ul style="list-style-type: none"> To monitor greenhouse gas emissions, climate change risks, and operations related to low carbon projects in each operating area. 	Quarterly
	<ul style="list-style-type: none"> To monitor the performance of the operating area at the management level and overall, and coordinate with internal stakeholders regarding physical risks and transition risks. 	Quarterly
Production Department	<ul style="list-style-type: none"> To supervise the operation of cement plant and report on greenhouse gas emissions and climate change risks at cement plant level. 	Quarterly
	<ul style="list-style-type: none"> To be responsible for the implementation of low carbon projects and manage climate change risks in operations. 	Quarterly
Financial Management Department	<ul style="list-style-type: none"> To assess the financial impact of climate change risks and opportunities. 	Quarterly
	<ul style="list-style-type: none"> To disclose information about financial risks from climate change in the Annual Registration Statement/Annual Report (Form 56-1 One Report) and Sustainability Report. 	At least once a year
	<ul style="list-style-type: none"> To integrate climate change risks and opportunities into strategic business planning. 	At least once a year
	<ul style="list-style-type: none"> To integrate climate change strategies into the overall business strategy of the Company and identify business opportunities. 	At least once a year

The Company sets Key Performance Indicators (KPIs) goals on climate change at the corporate level to drive the implementation of climate change at the executive level and within the organization. Additionally, the Company has established climate change goals as part of the Key Performance Indicators (KPIs) for executives each year. KPIs on energy management and climate change for each operating area have been determined to promote cooperation among executives and employees.





Climate Change Risk Management

Management of climate change risks and opportunities

The Company has identified the management of risks and opportunities related to climate change as one of its main corporate goals. This involves the identification of important issues, as well as the assessment and management of risks and opportunities associated with climate change, following the steps outlined in the “Risk Management Manual.” In the Construction Materials Sector, it is a common practice to consider climate-related risks as part of operational risks (e.g., water shortages caused by severe climate impact) and legal risks (e.g., carbon taxes). Therefore, the Company has tasked the Sustainability Development Committee and the Risk Management Committee, both of which fall under the Board of Directors, with the responsibility of regulating climate change. Additionally, specific key performance indicators (KPIs) have been outlined at the organizational level to measure performance towards climate change targets. This approach ensures that solutions to climate change problems are pursued with a serious and concrete commitment. It requires relevant departments to collaboratively integrate the organization’s risk assessment criteria for evaluating and monitoring climate-related risks and opportunities to meet the set goals. Additionally, the Company has established risk Key Performance Indicators (KPIs), comprising leading KPIs and risk management KPIs. It actively encourages employees to incorporate these

risk-related KPIs into their operations, offers monitoring and evaluation, and provides regular reports to the Board of Directors and sub-committees.

The Company has also implemented an integrated enterprise risk management approach based on the criteria of the Committee of Sponsoring Organizations of the Treadway Commission - Enterprise Risk Management (COSO-ERM). This approach focuses on fostering a culture that facilitates the integration of strategic planning and operational results into risk management. It recognizes the importance of including climate risks as part of the Company’s routine risk assessment process.

According to the Company’s risk management policy, the Risk Management Department is responsible for monitoring, evaluating, and reporting on the performance of risk management operations in various areas, including the organizational climate, to the Risk Management Committee. The Risk Management Committee will then devise plans and operations to mitigate risks based on the risk level and the probability of impact on the organization’s income loss, business operation disruption, and reputation of the organization.

Company's Risk Management Process



Scenario Analysis

In 2023, TPIPL has broadened its focus to assess climate change risks and opportunities comprehensively. This expansion aims to identify, assess, and manage potential impacts more efficiently by reviewing and categorizing climate change risks in each relevant scenario. This encompasses both risks and opportunities in transition and significant physical properties. The Company has collected and summarized information assessing the risks of climate change as follows:-

Timeframe:

- **Short-term:** 1-4 years
- **Mid-term:** 5-10 years, showing results for the year 2030 in assessing impacts and prioritizing operations to mitigate those impacts.
- **Long-term:** more than 10 years, showing results for the year 2050 to align with the TPIPP Group's goal of carbon neutrality.

Scope:

- The transition risk assessment covers all of the Company's operations, while the physical risk assessment covers all operational areas of business, considering the impacts of climate change on TPI Group's business operations in three areas: fossil fuel production, renewable energy production, and the supply chain.
- The impacts of climate change are assessed, covering three business operation areas: electricity generation from fossil fuels, electricity generation from green energy sources, and the supply chain.
- The impact on business operations and the value chain is assessed.

Data used in Scenario Analysis

Physical Scenario:

- **Baseline:** Historical data of Saraburi area
- **IPCC RCP 2.6:** The scenario is employed to evaluate physical phenomena under the assumption that the transition to a low-carbon society is in place and that the goals of the Paris Agreement are achieved, resulting in a change in the global average temperature of 1.6°C in 2050.
- **IPCC RCP 8.5:** The scenario is employed to evaluate physical phenomena under the assumption that the world's situation is at its worst, resulting in a change in the global average temperature of 4.3°C in 2050.

Transition Scenario:

- **Stated Policies Scenario (STEPS):** The scenario assumes that the governments of all countries around the world can uphold their commitments to address the climate change issue and achieve net-zero greenhouse gas emissions within a specified timeframe. The global temperature is projected to increase by approximately 2.6°C by 2100 in this scenario.
- **Net Zero Emission 2050 Scenario (NZE 2050):** The scenario assumes that the goals of the Paris Agreement are successfully achieved. This includes limiting the global temperature rise to no more than 2°C, reaching net-zero global greenhouse gas emissions by 2050, and ensuring that global surface temperatures do not rise more than 1.5°C by 2100.



Results of Scenario Analysis on Transition and Impacts on the Company (Construction Materials Sector)

Factors driving the transition	Potential Impacts						Impacts on TIPL	Supporting Measures	
	Production of cement from fossil fuels		Production of cement from green energy sources		Supply Chain				Financial Impacts
	2030	2050	2030	2050	2030	2050			
1. Laws or regulations aiming to control greenhouse gas emissions through various mechanisms, such as implementing carbon taxes, carbon taxes as a tool to regulate trade via the Carbon Border Adjustment Mechanism (CBAM), supporting the promotion of electric vehicles and clean energy, etc.							<p>In cases where a country enforces stricter policies and laws to control greenhouse gas emissions, carbon tax measures have been implemented. These measures impact businesses involved in cement production from fossil fuels, from the supply chain to the producers.</p> <p>There is a financial risk impact on climate-related penalties, leading to increased costs and use of the investment proceeds in enhancing machine performance for transitioning to environmentally friendly technology, thereby reducing reliance on fossil fuels. This involves the adoption of alternative fuels and a shift towards utilizing alternative energy sources in lieu of traditional fossil fuels. Operating expenses will increase in proportion to the amount of greenhouse gas emissions.</p> <p>Operating costs will increase in proportion to the amount of greenhouse gas emissions.</p> <p>Use of power imp generation from gas clean energy sources will enhance price competitiveness.</p>	<p>Monitor policies and laws to control the amount of greenhouse gas emissions within the country and in designated trading partners' territories. Additionally, focus on producing cement from renewable energy sources as a substitute for cement generated from fossil fuels.</p> <p>Assess the organization's greenhouse gas emissions to comply with policies and laws regulating emissions within the country and in the territories of trading partners, both currently determined and anticipated in the future. Operate in accordance with the carbon neutrality strategy to decrease emissions and mitigate potential impacts associated with greenhouse gas emissions.</p> <p>Power utilization from 100% Renewable Energy Power plant (RE100)</p>	

Factors driving the transition	Potential Impacts						Impacts on TPIPL	Supporting Measures	
	Production of cement from fossil fuels		Production of cement from green energy sources		Supply Chain				Financial Impacts
	2030	2050	2030	2050	2030	2050			
<p>2. Return on investment in low-emission technologies and adoption of CCUS carbon sequestration technology (opportunity) due to changing consumers and entrepreneurs' behavior in low-carbon economies by paying more attention to eco-friendly products. As a result, the Company can create new market opportunities, such as selling low-carbon cement, etc.</p>							<p>Investment and development in technologies such as energy storage systems can help reduce costs and promote the use of electricity from renewable sources.</p>	<p>Study the feasibility of low-carbon technologies and how to adapt to be in accordance with the Company's business strategy at present and in the future</p>	
							<p>The Company will have an opportunity to increase income from selling low-carbon cement.</p>	<p>Adopt CCUS carbon sequestration technology to reduce greenhouse gas emissions, resulting in lower COP of the products and lower CFO values.</p>	
								<p>Increase investment in machinery modification projects to reduce environmental impacts in reducing greenhouse gas emissions in cement production and distribution by using heavy equipment that uses electricity (EV equipment) in replacement of fossil fuels.</p>	
								<p>Reduce the proportion of clinker in cement and hydraulic cement production instead of producing Portland cement type 1.</p>	



Physical Risk Map and Opportunities from Physical Scenario Analysis

Physical Risk Projection Trends for Saraburi Province, Thailand

Project changes under simulated circumstances RCP 2.6 and RCP 8.5 scenarios in 2030 and 2050 (Baseline 2022)

Physical risks	Indicators	BSL		RCP 2.6		RCP 8.5	
		2030	2050	2030	2050	2030	2050
Water scarcity	Change in water stress [Drought Index]			0.31	0.34	-0.1	0.04
Flooding from overflowing banks	Change in 5-Day Cumulative Precipitation [%]			2.15%	7.73%	4.20%	9.66%

Basic hazard level	hazard levels Prediction	Water scarcity		Flooding from overflowing banks	
		Change in water stress [Drought Index]	Change in 5-Day Cumulative Precipitation [%]	Change in water stress [Drought Index]	Change in 5-Day Cumulative Precipitation [%]
High	Significantly high	<-1	>10%		
Medium	Moderately increase	<-0.5	>5%		
Low	slightly increase	<0	>0%		
Not dangerous	Equivalent to normal standards	0	0%		
Disappear	slightly decrease	>0	<0%		
	Moderately decrease	>0.5	<-5%		
	Significantly decrease	>1	<-10%		

Risk Assessment

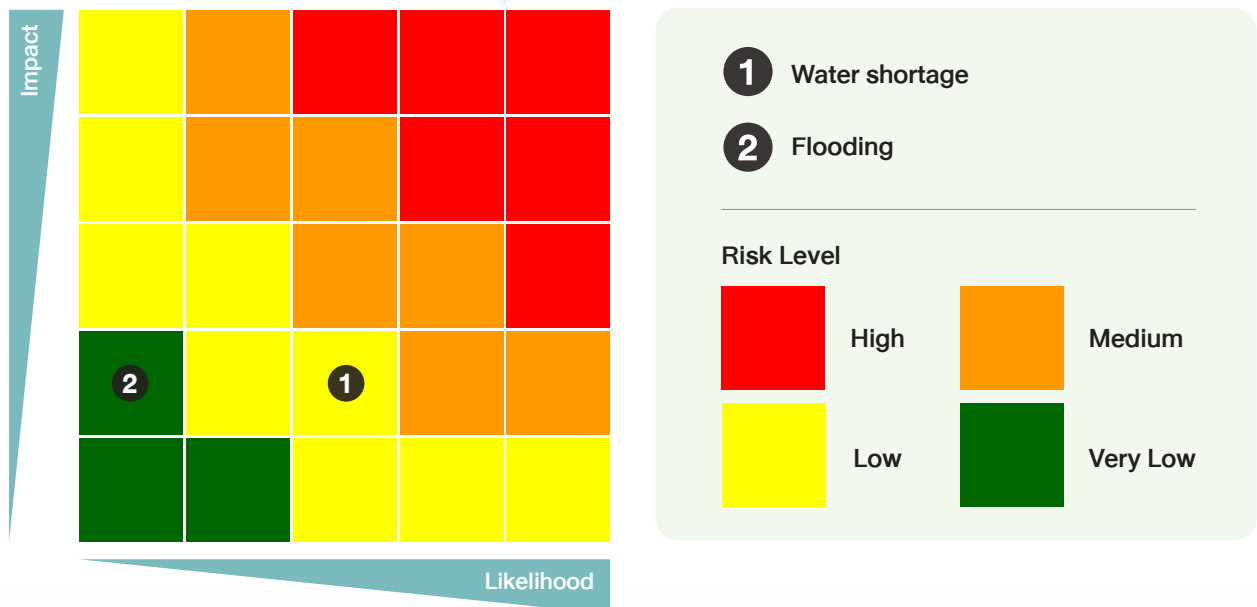
Physical risk assessment is divided into 3 areas:

1. Cement Plant, Mortar Plant and Lightweight Concrete Plant, Saraburi province
2. CRT/FCB Plants, Saraburi
3. Polymer Plant, Rayong province

1. Physical Risk Assessment – Cement Plant, Mortar Plant and Lightweight Concrete Plant

The factory area is located in Thap Kwang Subdistrict, Kaeng Khoi District, Saraburi province, based on using of ThinkHazard Tools to assess basic hazard baseline (BSL) and using of CCKP (Climate Change Knowledge Portal by the World Bank) in transition projects under RCP 2.6 and RCP 8.5 scenarios in 2030 and 2050.

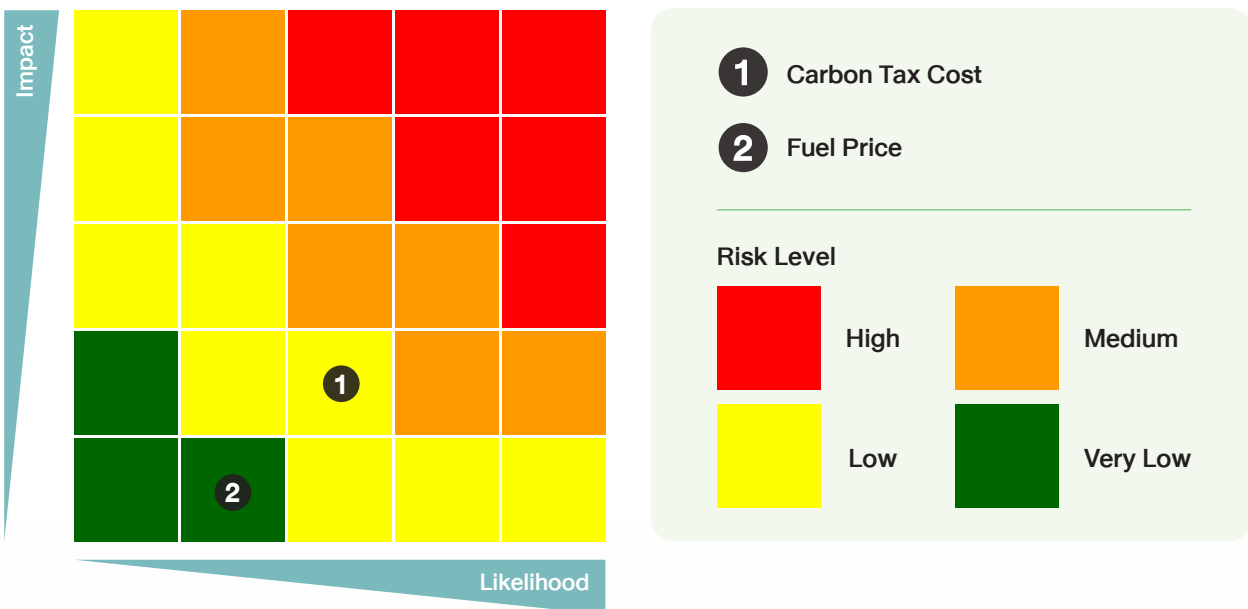
Physical Risk Prioritization



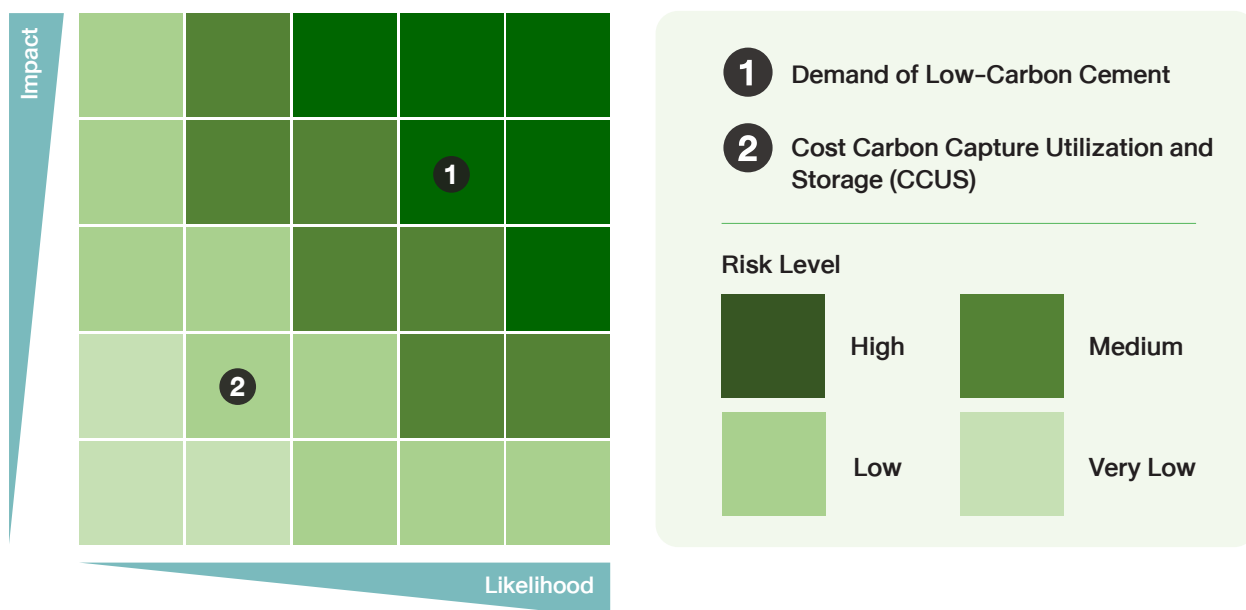
Physical Risk	Impact on Business Operations	Supporting Measures
1. Water shortage	In production process, due to the drought crisis, when assessing danger levels in 2030 and 2050 under both RCP2.6 and RCP8.5 scenarios, a slight decrease in danger was observed. However, given the moderate baseline danger level, this could lead to potential business interruptions, affecting the operational reliability of the Company, or increased production costs due to higher water supply expenses.	<ol style="list-style-type: none"> 1. Continuously monitor the news and assess the drought situation to align with the reserved water levels. 2. Regularly measure the water level in the factory's reservoir to assess its adequacy for use. 3. Enhance water use efficiency in the production process by recycling water and refraining from releasing used water. 4. The Company assessed water stress at cement plant area using Program AQUEDUCT and identified it in the Medium-High range (20-40%). According to the definition, this doesn't qualify as being in an area with significant water stress.
2. Flooding	In both RCP2.6 and RCP8.5 scenarios, the danger levels in 2030 and 2050 will increase insignificantly for the Company. However, given the low baseline danger level, there is a possibility of delays in fuel delivery by suppliers to the Company, which could impact the cement production process.	Monitor the news and assess weather forecasts to prepare for fuel reserves delivered from customers before flooding occurs, thereby minimizing the impact on the cement production process.

Impacts potentially caused by risks and opportunities related to climate change in various areas are as follows:-

Transition Risk Prioritization



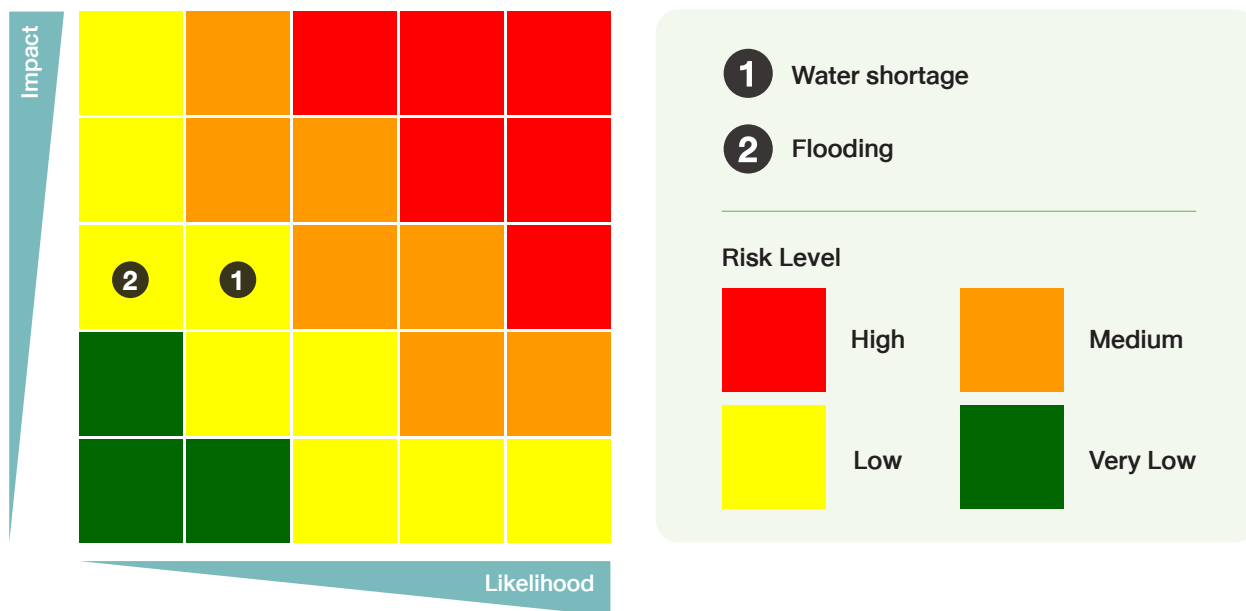
Transition Opportunity Prioritization



Opportunities and risks from climate change	Impacts	Supporting Measures
1. Carbon Tax Price (Risk)	The Company's operating expenses will increase in proportion to the amount of greenhouse gas emissions.	<ol style="list-style-type: none"> Evaluate the organization's greenhouse gas emissions to ensure consistency with policies and laws regulating emissions within the country and in the territories of trading partners, both those currently determined and those anticipated in the future. The Company establishes strategies to advance the Bio-Circular Green Economy (BCG) in order to define the scope of applying circular economy principles in its operations and to raise awareness among personnel regarding limited resources.
2. Fuel Prices (Risk)	The Company's operating expenses will increase due to higher fuel prices.	The Company formulates strategies to utilize waste fuel as a substitute for fossil fuels, aiming to lower production costs and mitigate greenhouse gas emissions (Scope 3) associated with fuel transportation.
3. Growth in low- carbon cement production from renewable energy sources (Opportunity)	The Company's income increases due to the growing demand for low-carbon cement.	The Company establishes plans and strategies for climate management, aiming to invest in clean technologies such as renewable energy projects and initiatives to reduce fossil fuel usage.
4. Application of Carbon Capture Utilization and Storage (CCUS) Technology (Opportunity)	The investment in such technology remains expensive.	<p>Study Carbon Capture Utilization and Storage (CCUS) Technology.</p> <p>The Company formulates its innovation strategies to respond to the needs of its stakeholders, with a focus on enhancing efficiency in the production process and augmenting product values. Additionally, it incorporates the use of Carbon Capture Utilization and Storage (CCUS) technology to decrease greenhouse gas emissions, leading to a reduction in the CFP value of the products and the CFO value when the investment in such technology becomes cost-effective.</p>

2. Physical Risk Assessment – FCB/ CRT Plants

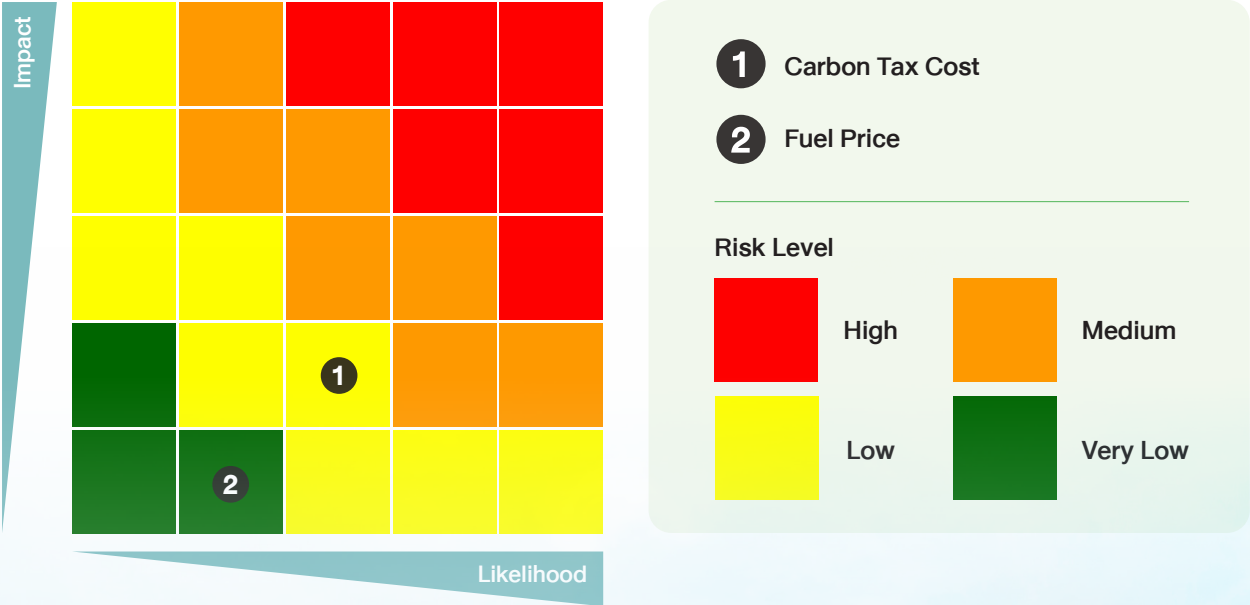
FCB/ CRT Plants area is located in Ban Kaeng Subdistrict, Chalerm Phra Kiat District, Saraburi Province. Thailand, based on using of ThinkHazard Tools to assess basic hazard baseline (BSL) and using of CCKP (Climate Change Knowledge Portal by the World Bank) in transition projects under RCP 2.6 and RCP 8.5 scenarios in 2030 and 2043.



Physical Risk	Impact on Business Operations	Supporting Measures
1. Water Scarcity	In the production process, due to the drought crisis, when assessing danger levels in 2030 and 2050 under both RCP2.6 and RCP8.5 scenarios, a slight decrease in danger was observed. However, given the moderate baseline danger level. Therefore, it may affect the tire production line that requires steam from the power plant in the process, or increased production costs due to higher water supply expenses.	<ol style="list-style-type: none"> Continuously monitor the news and assess the drought situation to align with the reserved water levels. Regularly measure the water level in the factory's reservoir to assess its adequacy for use. Enhance water use efficiency in the production process by recycling water and refraining from releasing used water. The Company assessed water stress at FCB/ CRT plant area using Program AQUEDUCT and identified it in the Medium-High range (20-40%). According to the definition, this doesn't qualify as being in an area with significant water stress.
2. Flooding	In both RCP2.6 and RCP8.5 scenarios, the danger levels in 2030 and 2050 will increase insignificantly for the Company. However, given the low baseline danger level, there is a possibility of delays in raw material delivery by suppliers to the Company, which could impact the cement production process.	Monitor the news and assess weather forecasts to prepare for fuel reserves delivered from customers before flooding occurs, thereby minimizing the impact on cement production process.

Impacts potentially caused by risks and opportunities related to climate change in various areas are as follows:-

Transition Risk Prioritization




3. Physical Risk Assessment – LDPE/ EVA Plants

Factory area is located in Amphur Muang, Rayong province. Thailand, based on using of ThinkHazard Tools to assess basic hazard baseline (BSL)

Physical Risk	Opportunity Implications	Potential Impacts	Severity		Risk
			Severity level	Information for consideration	
Overflow, Flooding of cities and coasts	High (At least once in the next 10 years)	Heavy, frequent, and more intense rains	Low	<ol style="list-style-type: none"> The plant is located in IRPC Industrial Zone, never encountering flooding problems. IRPC has a drainage system and there are clarifiers that can adequately handle rainwater in the area. At IRPC's Coordination Committee meeting, situations that may have an impact are reported regularly. 	Low
Storm	High >20% in the next 10 years	Damage caused by wind loads, heavy rain and flooding, hazard levels of which may increase as a result of the climate change (El Niño, La Niña)	Moderate	<ol style="list-style-type: none"> The plant is located away from the coast and there are factories located around it, thus reducing the impact of direct wind loads. The plant is located in IRPC Industrial District, never encountering windstorm problems. IRPC has a drainage system and there are clarifiers that can adequately handle rainwater in the area. At IRPC's Coordination Committee meeting, situations that may have an impact are reported regularly 	Moderate
Forest fire	High >50% in the next 10 years	Forest fire damage	Low	<ol style="list-style-type: none"> The plant is located within IRPC Industrial Zone, on the coastal side and there are no forest areas nearby. The plant and operating zones have firefighting equipment, firefighting system and there are fire crews. 24-hour on-site operation. Rayong province has a provincial emergency plan to respond to forest fires incident to work with government agencies and related agencies as working groups. 	Low
Water scarcity	High <1% in the next 10 years	Hazard levels of which may increase as a result of the climate change (El Niño, La Niña)	Moderate	<ol style="list-style-type: none"> Water consumption (from water allocation) in the Eastern Basin tends to increase especially in the agricultural sector, which is the group that receives water allocation for the top priority before allocating it to the industrial sector. The use of new technologies in production process should consider systems with more efficient use of water. At the IRPC District Coordination Committee meeting, the situation that may affect the area was reported. At IRPC's Coordination Committee meeting, situations that may have an impact are reported regularly. 	Moderate


Strategies on Climate Change

The above risk assessment leads to the development of climate change strategies, serving as guidelines for mitigating the impacts of climate change issues and supporting the Company's adaptation efforts. The strategies on climate change aim to reduce greenhouse gases and consist of six main areas, as follows:-




Increase in production efficiency (greenhouse gas emission reduction)

Applying TPM (Total Productive Maintenance) system in cement production to reduce the occurrence of breakdowns.




Increase the proportion of electricity usage generated from clean energy

Increase the use of electricity generated from clean energy and reduce the use of electricity generated from fossil fuels.



Increase the proportion of alternative fuels in cement production process

Increase the use of MSW and reduce the use of fossil fuels in cement production.




Increase in investments in cement production from renewable energy

Increase the proportion of hydraulic cement production to replace Portland cement and increase the use of alternative raw material to replace clinker.



Increase in forest planting areas

Increase in forest planting areas to absorb greenhouse gases in the atmosphere

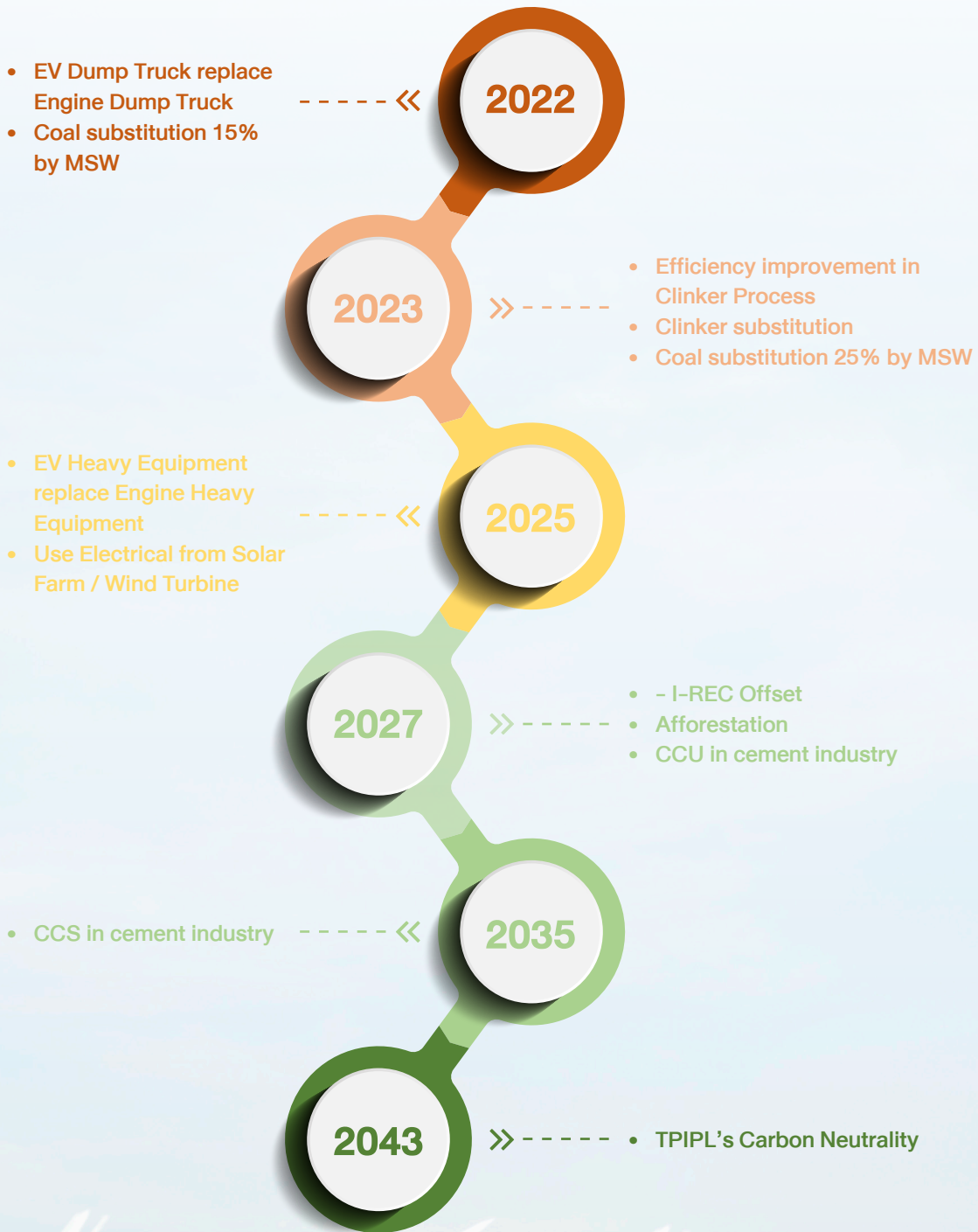


Carbon offset and trading

Applying for Renewable Energy Certificate (REC) / Purchasing carbon credits



TPIPL's (Cement) GHG Reduction Strategies



Metrics and Targets

Climate-related Metrics (Cement Business)

Greenhouse Gas Emissions Data

	Unit	2021	2022	2023*
Scope 1 (Direct)	TonCO ₂ e	7,561,509.47	8,092,914.00	7,057,200.69
Scope 2 (Indirect)	TonCO ₂ e	1,193,594.53	1,206,472.00	1,118,946.25
Scope 3	TonCO ₂ e	220,068.07	223,463.15	383,756.27
Total	TonCO₂e	8,975,172.07	9,522,849.15	8,559,903.20
Concentration of greenhouse gas emissions per unit (per ton of output)		1.0456	1.0112	0.9663

Remarks * Carbon footprint is verified by BSI Group (Thailand) Company Limited ("BSI") as per ISO14064-1 : 2018 and CFO-TGO

Note:

- Global Warming Potential (GWP) is calculated, based on Thailand Greenhouse Gas Management Organization (TGO) standards.
- Gases included in the calculation of greenhouse gas emissions (scope 1, 2 and 3) include CO₂, CH₄, N₂O, HFCs and SF₆.

Scope 3 Emissions

GHG Emissions Data	Unit	2564	2565	2566
Category 1: Purchased goods and services	tCO ₂ e	43.62	40.24	42.51
Category 3: Fuel- and energy-related activities (not included in Scopes 1 or 2)	tCO ₂ e	144,995.90	154,695.07	139,526.70
Category 4: Upstream transport and distribution	tCO ₂ e	75,028.55	68,727.84	33,412.50
Category 5: Waste generated	tCO ₂ e	N/A	N/A	N/A
Category 6: Business travel	tCO ₂ e	N/A	N/A	N/A
Category 7: Employee commuting	tCO ₂ e	N/A	N/A	4.45
Category 9: Downstream transport and distribution	tCO ₂ e	N/A	N/A	210,770.11
Category 11: Use of sold products	tCO ₂ e	N/A	N/A	N/A
Category 12: End-of-life treatment of sold products	tCO ₂ e	N/A	N/A	N/A
Total Scope 3 GHG emissions	tCO₂e	220,068.07	223,463.15	383,756.27

Table: GHG emission intensity of Cement plants

	Unit	2021	2022	2023
Greenhouse Gas GHG (1)*	TonCO ₂ e	8,975,172.07	9,522,849.15	8,559,903.20
Non greenhouse gases pollution (2)**	Ton	5,669	9,457	3,761
Power generating unit (3)	MWh	8,583,753	9,417,186	8,858,875
Proportion (1)/(3)	TonCO ₂ / MWh	1.0456	1.0112	0.9663
Proportion (2)/(3)	Ton / MWh	0.00066	0.00100	0.00042

Note: * Calculated according to “Requirements for Calculating and Reporting Carbon Footprint of Organizations” by Thailand Greenhouse Gas Management Organization (TGO), 5th Edition, January 2021

** Non-greenhouse gases include SO₂ and NO₂.

Climate-related Metrics (Polymer Business)

Greenhouse Gas Emissions Data

	Unit	2021	2022	2023
Scope 1 (Direct)	TonCO ₂ e	4,008.35	3,942.92	6,575.86
Scope 2 (Indirect)	TonCO ₂ e	106,534.70	103,577.43	101,299.00
Scope 3	TonCO ₂ e	306,384.66	304,938.38	273,827.40
Total	TonCO₂e	416,927.70	412,458.73	381,702.26
Concentration of greenhouse gas emissions per unit (per ton)		2.5739	2.6850	2.6492

Note:

- Global Warming Potential (GWP) is calculated, based on Thailand Greenhouse Gas Management Organization (TGO) standards.
- Gases included in the calculation of greenhouse gas emissions (scope 1, 2 and 3) include CO₂, CH₄, N₂O, HFCs and SF₆.

Scope 3 Emissions

GHG Emissions Data	Unit	2021	2022	2023
Category 1: Purchased goods and services	tCO ₂ e	304,235.36	303,137.36	272,035.46
Category 3: Fuel- and energy-related activities (not included in Scopes 1 or 2)	tCO ₂ e	N/A	N/A	N/A
Category 4: Upstream transport and distribution	tCO ₂ e	552.41	322.52	437.07
Category 5: Waste generated	tCO ₂ e	N/A	N/A	N/A
Category 6: Business travel	tCO ₂ e	276.96	302.52	206.14
Category 7: Employee commuting	tCO ₂ e	N/A	N/A	N/A
Category 9: Downstream transport and distribution	tCO ₂ e	1,319.92	1,175.99	1,148.73

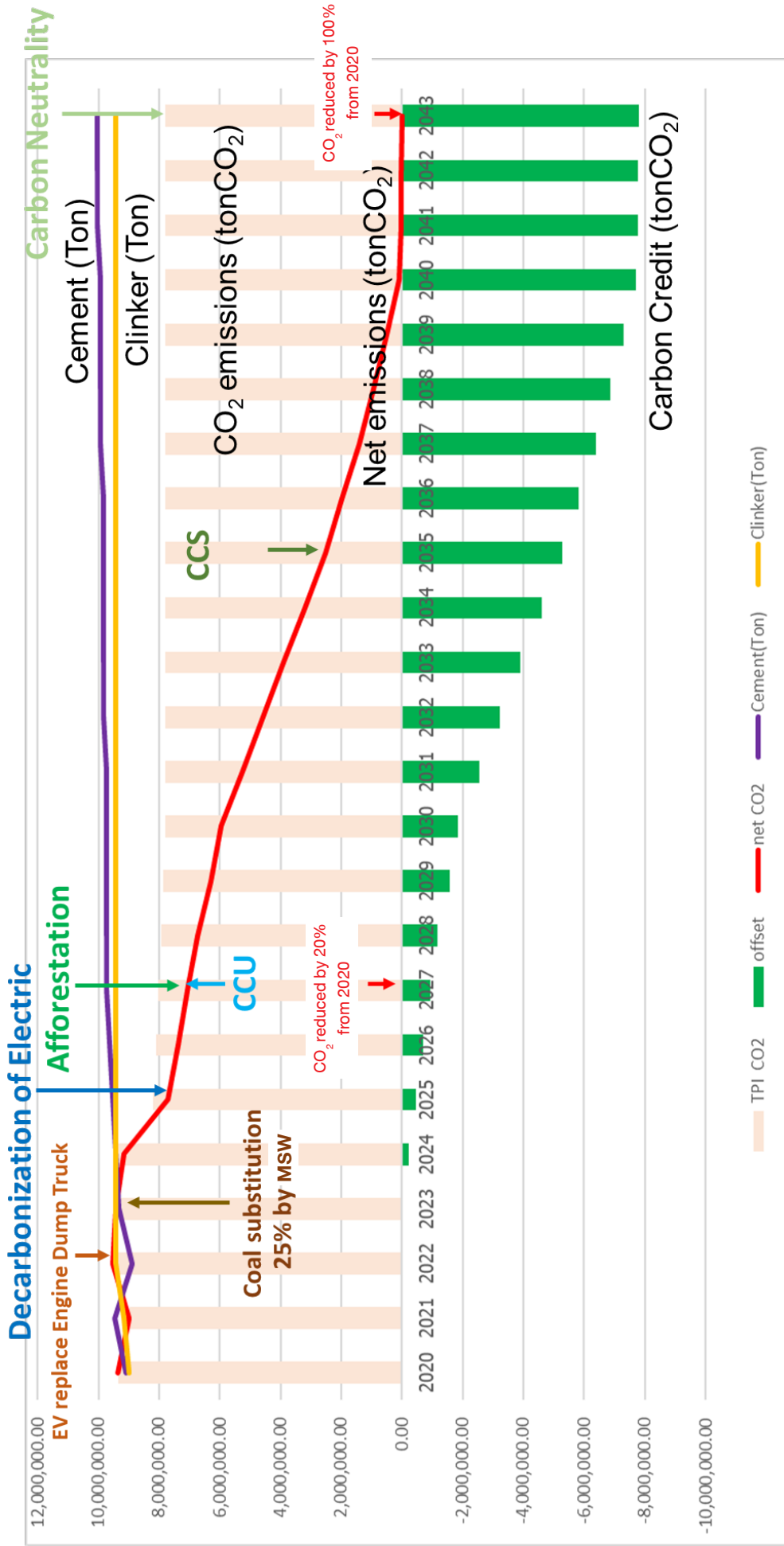
GHG Emissions Data	Unit	2021	2022	2023
Category 11: Use of sold products	tCO ₂ e	N/A	N/A	N/A
Category 12: End-of-life treatment of sold products	tCO ₂ e	N/A	N/A	N/A
Total Scope 3 GHG emissions	tCO₂e	306,384.66	304,938.38	273,827.40

Climate Change Goals

Strategy	Performance in 2023	Goals in 2027	Goals in 2043
1. To establish the proportion of clean electricity usage	<ul style="list-style-type: none"> Electricity generated from renewable energy = 2.36% 	<ul style="list-style-type: none"> To use electricity generated from 100% renewable energy. 	<ul style="list-style-type: none"> To use electricity generated from 100% renewable energy.
2. To Determine the proportion of fuel used in cement production	<ul style="list-style-type: none"> Proportion of fossil fuel = 85.91% Proportion of renewable fuel = 14.09 % 	<ul style="list-style-type: none"> Proportion of fossil fuel = 75% Proportion of renewable fuel = 25% 	<ul style="list-style-type: none"> Proportion of fossil fuel = 75% Proportion of renewable fuel = 25%
3. To reduce the amount of greenhouse gases	<ul style="list-style-type: none"> Greenhouse gases for the amount of 8,559,903.20 tCO₂e The amount of greenhouse gas per ton of cement decreased by 6.88% compared to the base year of 2020. 	<ul style="list-style-type: none"> Greenhouse gases amount of 7,476,814.64 tCO₂e The amount of greenhouse gas per ton of cement decreased by 20% compared with the base year of 2020. 	<ul style="list-style-type: none"> Greenhouse gas content = 0 tCO₂e (carbon neutrality)
4. Manufacture of hydraulic cement to replace Portland cement	<ul style="list-style-type: none"> Proportion of hydraulic cement = 53.53% Proportion of Portland cement = 46.47% 	<ul style="list-style-type: none"> Proportion of hydraulic cement = 70% Proportion of Portland cement = 30% 	<ul style="list-style-type: none"> Proportion of hydraulic cement = 100% (in 2040) Proportion of Portland cement = 0%
5. To increase greenhouse gas storage by planting forests and applying CCUS	<ul style="list-style-type: none"> The amount of greenhouse gas stored = 0 tCO₂e 	<ul style="list-style-type: none"> The amount of greenhouse gas stored is 429,864.65 tCO₂e 	<ul style="list-style-type: none"> The amount of greenhouse gas stored is 7,070,513.12 tCO₂e
6. To disclose information	<ul style="list-style-type: none"> Sustainability Report according to GRI Standards 56-1 One Report 	<ul style="list-style-type: none"> Sustainability Report according to GRI Standard 56-1 One Report Participating in the sustainability assessment of organization both domestically and internationally 	<ul style="list-style-type: none"> Sustainability Report according to GRI Standard or other related standards 56-1 One Report Carbon Disclosure Project (CDP) Participating in the sustainability assessment of organization both domestically and internationally

TPIPL's (Cement) 2043 Carbon Neutrality Pathway

TPIPL's (Cement) 2043 Carbon Neutrality Pathway





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