



ZERO CARBON

ZERO WASTE

TPI Polene Power Public Company Limited

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

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

WORLD CLIMATE ENVIRONMENT IMPROVEMENT

Clean and Green Renewable Energy



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Introduction



TPI Polene Power Public Company Limited (TPIPP) is the Renewable Energy flagship of the TPI Polene Group of companies. It produces electricity, and its asset base is comprised of waste-to-energy power plants using Municipal Solid Waste (MSW) as inputs, waste heat power plants, and a coal-fired power plant that is currently being modified to run in 100% MSW. The Company is the largest waste power disposal plant in Thailand and the ASEAN region and also holds the distinction of being the largest privately-owned waste disposal power plant globally. The Company recognizes the crucial role of the electricity sector in addressing climate change and the agenda to limit the global temperature rise to not more than 1.5 °C in accordance with the 2016 Paris Agreement. Therefore, the TPI Polene Group has identified climate management as a significant sustainability issue and has set the long-term goal of achieving Carbon Neutrality by 2043. TPIPP itself has set a target of achieving carbon neutrality by 2037. Additionally, the Company consistently discloses its operational performance and related projects to provide operational guidelines for all stakeholders.

In 2023, the TPIPP participated in the Climate Management Model Project of the Stock Exchange of Thailand, adopting the Task Force on Climate-related Financial Disclosures (TCFD) with four main components: Governance, Strategy, Risk Management, and Metrics & Targets as a framework for disclosing climate management information. This will entail disclosure of the Company's governance information regarding 1) climate-related risks and opportunities, 2) information on the actual and potential impacts of climate-related risks and opportunities on business operations, 3) details about the its financial strategy and planning, 4) approaches employed to assess and manage climate-related risks, and 5) disclosures of indicators and targets used to assess and manage climate-related risks. The initiative significantly elevates the level of disclosure to stakeholders, providing them with insights into the Company's progress in climate management operations.

In addition, TPIPP 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
Chairman

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. TPI Polene Power Public Company Limited (TPIPP) has set a goal of achieving carbon neutrality by 2037. 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.

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 electricity generation business and a low to moderate risk to the supply chain. However, they concurrently are opportunities for the

electricity generation 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 electricity generation process, as well as incorporating solar energy, wind energy, etc., into the energy production portfolio. A 100% Renewable Energy Power Plant is expected to attain REC certification. The Company employs low-carbon strategies to address 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 arising from the growth of electricity generation from renewable energy sources, which creates opportunities for the trading of Carbon Credits. This will create income opportunities for the Company. Societal demand will drive new businesses in infrastructure development and electricity charging to support the increase in electric cars. This aligns with the climate change strategy aiming towards a low-carbon society and promotes the development of Smart Grids and smart cities.

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



TIIPP's Climate Change Governance



TPIPP's Climate Change Governance

Position	Roles and Responsibilities in Climate Change Risk Management and the Implementation of Climate Change Strategies	
 Board of Directors	To approve the climate change strategy, annual operational plan, goals, and Key Performance Indicators (KPIs) related to climate change.	At least once a year
	To oversee performance in accordance with climate change goals.	At least once a year
	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
	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	To oversee 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
	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	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
	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	To incorporate climate change risks and strategies in recommending ongoing business strategies.	At least once a year
	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
	To assign tasks to those responsible for implementing the climate change strategy and risk management.	At least once a year
	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	To coordinate with internal stakeholders on climate change issues.	At least once a year
	To be responsible for reporting and disclosing climate change information to external stakeholders.	At least once a year
 TQM Department	To monitor greenhouse gas emissions, climate change risks, and operations related to low carbon projects in each operating area.	Quarterly
	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
 Power Plant Management Department	To supervise the operation of the power plant and report on greenhouse gas emissions and climate change risks at the power plant level.	Quarterly
	To be responsible for the implementation of low carbon projects and manage climate change risks in operations.	Quarterly
 Financial Management Department	To assess the financial impact of climate change risks and opportunities.	Quarterly
	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
	To integrate climate change risks and opportunities into strategic business planning.	At least once a year
	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.

Risk Management and Climate Change Strategy

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 electricity 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.



Company's Risk Management Process



1. Risk Identification

- Identify risks related to climate change under operational and legal risks.
- Identify physical and transition risks related to the business.



2. Corporate Risk Assessment

- Risks will be assessed according to the Company's risk management, taking into account climate change risks.
- Define risk identifiers for use in risk management.



4. Action Plan for Risk Mitigation

- Development of mitigation measures and plans established under the Risk Oversight Committee.
- Actions to mitigate risks and increase physical and transition opportunities are considered in determining climate change strategies.



3. Business Impact Assessment

- Assess physical and transition risks through scenario analysis and data modeling on climate change.
- Assess the quantitative financial impact that may arise from climate change risks.

TPIPP

Scenario Analysis

In 2023, TPIPP 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.

Data used in Scenario Analysis

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.

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.

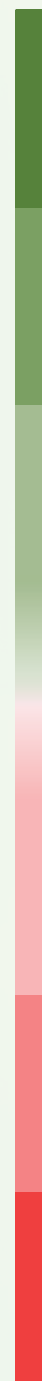
Results of Scenario Analysis on Transition and Impacts on the Company (Transition Risk and Transition Opportunity)

Factors driving the transition	Potential Impacts						Impacts on TIIPP	Supporting Measures																																
	Financial Impacts																																							
	Production of electricity from fossil fuels		Production of electricity from green energy sources		Supply Chain																																			
	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.							1. The Company has assessed the potential financial impact, which may affect it as follows: <table><thead><tr><th></th><th>2030 (medium-term)</th><th>SDS/NZE</th><th>Difference</th></tr></thead><tbody><tr><td>Transition Risk</td><td></td><td></td><td></td></tr><tr><td>Carbon Tax Cost (million THB)</td><td>148.54</td><td>285.66</td><td>137.12</td></tr><tr><td>Impact on Net Profit (%)</td><td>-3.02%</td><td>-5.445%</td><td>-2.418%</td></tr><tr><td>Opportunity</td><td></td><td></td><td></td></tr><tr><td>REC Profit (million THB)</td><td>152.80</td><td>293.84</td><td>141.04</td></tr><tr><td>Impact on Net Profit (%)</td><td>3.113%</td><td>5.601%</td><td>2.487%</td></tr><tr><td>Net Impact on Net Profit (%)</td><td>0.087%</td><td>0.156%</td><td>0.069%</td></tr></tbody></table> 2. Increasing the investment 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. 3. Increased operating costs of the Company		2030 (medium-term)	SDS/NZE	Difference	Transition Risk				Carbon Tax Cost (million THB)	148.54	285.66	137.12	Impact on Net Profit (%)	-3.02%	-5.445%	-2.418%	Opportunity				REC Profit (million THB)	152.80	293.84	141.04	Impact on Net Profit (%)	3.113%	5.601%	2.487%	Net Impact on Net Profit (%)	0.087%	0.156%	0.069%	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 electricity from renewable energy sources as a substitute for electricity generated from fossil fuels. 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. Produce electricity from 100% Renewable Energy Power plant (RE100)
	2030 (medium-term)	SDS/NZE	Difference																																					
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							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 electricity generation from fossil fuels, from the supply chain to the producers. Operating costs will increase in proportion to the amount of greenhouse gas emissions. Electricity generation from clean energy sources will enhance price competitiveness.																																	

Factors driving the transition		Potential Impacts				Impacts on TIIPP	Supporting Measures																																				
		Financial Impacts																																									
		Production of electricity from fossil fuels		Production of electricity from green energy sources		Supply Chain																																					
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2. Growth in electricity generation from renewable energy sources (opportunity), increased income due to the rising demand for electricity from renewable energy sources		The Company will have an opportunity to increase income from selling electricity from renewable energy sources as follows: <table><thead><tr><th></th><th>SDS</th><th>SDS/NZE</th><th>Difference</th></tr></thead><tbody><tr><td colspan="4">2030 (medium-term)</td></tr><tr><td>* Renewable Share electricity generation</td><td>38%</td><td>57%</td><td>19%</td></tr><tr><td>Revenue (million THB)</td><td>12,466.21</td><td>13,112.98</td><td>646.77</td></tr><tr><td>Impact on Revenue (%)</td><td>6.17%</td><td>11.68%</td><td>5.51%</td></tr><tr><td colspan="4">2050 (long-term)</td></tr><tr><td>* Renewable Share electricity generation</td><td>55%</td><td>86%</td><td>31%</td></tr><tr><td>Revenue (million THB)</td><td>34,322.89</td><td>48,998.51</td><td>14675.62</td></tr><tr><td>Impact on Revenue (%)</td><td>192.31%</td><td>317.29%</td><td>124.98%</td></tr></tbody></table>							SDS	SDS/NZE	Difference	2030 (medium-term)				* Renewable Share electricity generation	38%	57%	19%	Revenue (million THB)	12,466.21	13,112.98	646.77	Impact on Revenue (%)	6.17%	11.68%	5.51%	2050 (long-term)				* Renewable Share electricity generation	55%	86%	31%	Revenue (million THB)	34,322.89	48,998.51	14675.62	Impact on Revenue (%)	192.31%	317.29%	124.98%
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Energy demand is likely to rise, with forecasts indicating an increase in electricity generation from both fossil fuels and renewable energy sources in the short term.						Integrate the strategy of greenhouse gas emissions reduction and increase production capacity of electricity from renewable energy, including solar energy and wind energy at the national level, particularly in areas where investment is planned.																																					
Under the SDS scenario, the highest potential financial impact arises from the assumption that production capacity and renewable energy demand increase without limits, contingent on the growth in electricity demand.																																											
The Company registers a renewable energy power plant with the responsible electricity authority to issue RECs certificates.																																											

Factors driving the transition	Potential Impacts						Impacts on TIIPP	Supporting Measures	
	Financial Impacts								
	Production of electricity from fossil fuels		Production of electricity from green energy sources		Supply Chain				
	2030	2050	2030	2050	2030	2050			
3. Returns from investments in technology that emit low greenhouse gases (opportunity) are driven by the changing behavior of consumers and entrepreneurs toward the low-carbon economy trend. There is an increasing emphasis on environmentally friendly products. Consequently, the Company can create new market opportunities, such as carbon markets, REC rights trading, etc.							The Company can offset costs and investments resulting from climate change control situations with the returns on investment and the opportunities provided by such activities.	Investments and technology development, such as energy storage systems, can help reduce costs and promote the use of electricity from renewable energy sources.	Examine the feasibility of integrating low carbon technologies and explore ways to align them with the Company's current and future business strategies. Increase the carbon credits obtained from the project that produces MSW fuel from municipal solid waste. Increase investments in renewable energy power plant projects, including wind and solar. Increase the Renewable Energy Certificate (REC) yield by utilizing renewable energy for electricity generation.

High risk Moderate risk Low risk Limited Less opportunity Moderate Opportunity Very high opportunity



Transition Risk and Opportunity Implications

		STEPs	SDS/NZE	Difference
2030 (medium-term)				
Transition Risk	Carbon Tax Cost (million THB)	148.54	285.66	137.12
	Impact on Net Profit (%)	-3.027%	-5.445%	-2.418%
Opportunity	REC Profit (million THB)	152.80	293.84	141.04
	Impact on Net Profit (%)	3.113%	5.601%	2.487%
Net Impact on Net Profit (%)		0.087%	0.156%	0.069%
2050 (long-term)				
Transition Risk	Carbon Tax Cost (million THB)	-	-	0.00
	Impact on Net Profit (%)	-	-	-
Opportunity	REC Profit (million THB)	340.85	2,116.74	1,775.89
	Impact on Net Profit (%)	6.945%	40.346%	1,775.89
Net Impact on Net Profit (%)		6.945%	40.346%	33.400%

Opportunity Implications (Renewable Power)

	STEPs	SDS/NZE	Difference
2030 (medium-term)			
*Renewable Share electricity generation	38%	57%	19%
Revenue (million THB)	12,466.21	13,112.98	646.77
Impact on Revenue (%)	6.17%	11.68%	5.51%
2050 (long-term)			
*Renewable Share electricity generation	55%	86%	31%
Revenue (million THB)	34,322.89	48,998.51	14,675.62
Impact on Revenue (%)	192.31%	317.29%	124.98%

*Renewable Share electricity generation form IRENA (2020)
 GLOBAL RENEWABLES Outlook : Energy transformation
 2050

Physical Risk Analysis Results and Impact on the Company

Physical Risk Projection Trends for Saraburi Province, Thailand

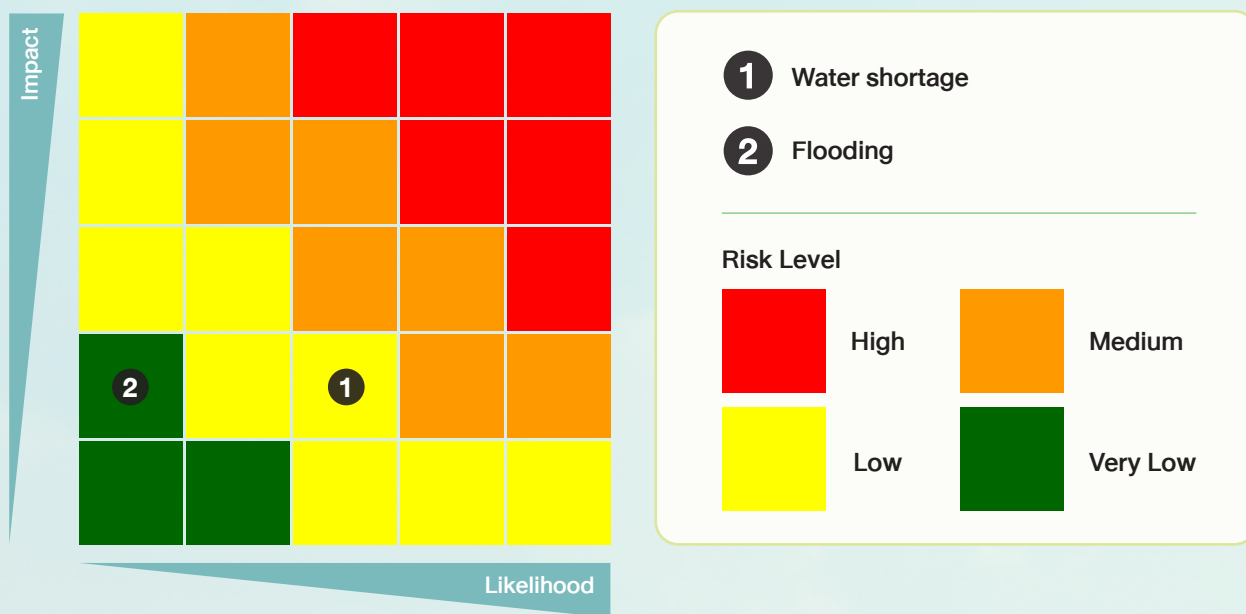
Project changes under simulated circumstances RCP 2.6 and RCP 8.5 scenarios in 2030 and 2050 (Baseline 2022)

Physical risks	Indicators	BSL	RCP 2.6		RCP 8.5	
			2573	2593	2573	2593
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 [%]	
High	Significantly high		<-1	>10%	
Mediam	Moderately increase		<-0.5	>5%	
Low	slightly increase		<0	>0%	
Not dangerous	Equivalent to normal standards		0	0%	
Disappea	slightly decrease		>0	<0%	
	Moderately decrease		>0.5	<-5%	
	Significantly decrease		>1	<-10%	

Risk Assessment

Physical risk assessment includes the power plant and MSW fuel production plant located in Thap Kwang Sub-district, Kaeng Khoi District, Saraburi Province, Thailand. The assessment utilizes Think Hazard to evaluate the baseline danger level (BSL) and the Climate Change Knowledge Portal by World Bank (CCKP) in the transformation project under the RCP 2.6 and RCP 8.5 scenarios for 2030 and 2050.

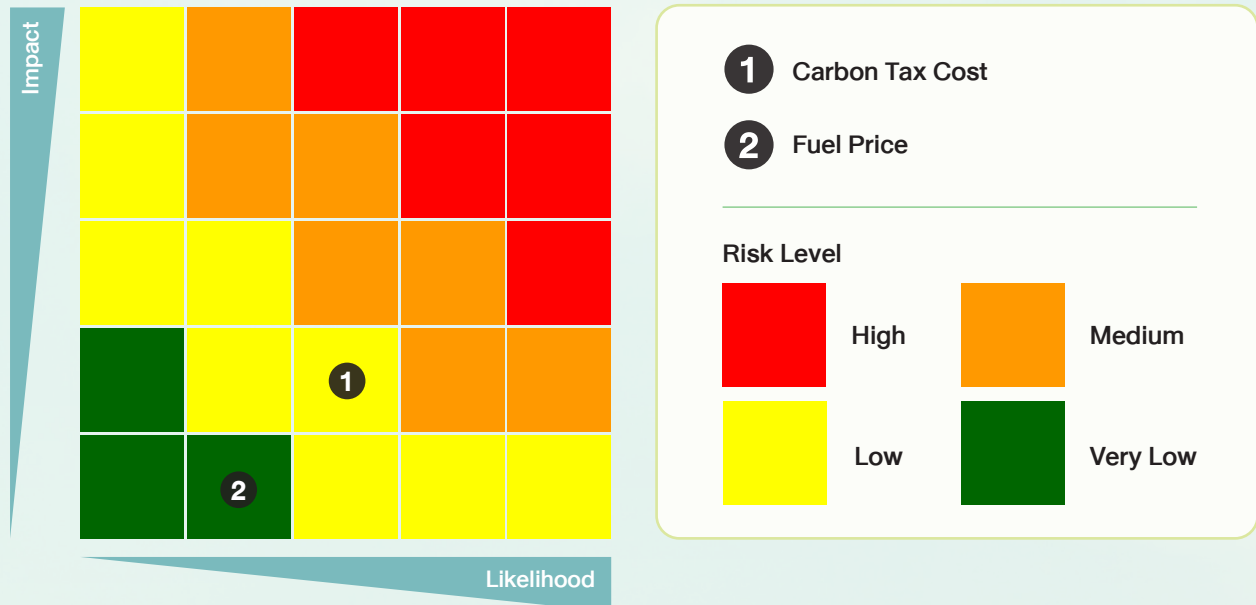


Physical Risk Prioritization from Climate Change

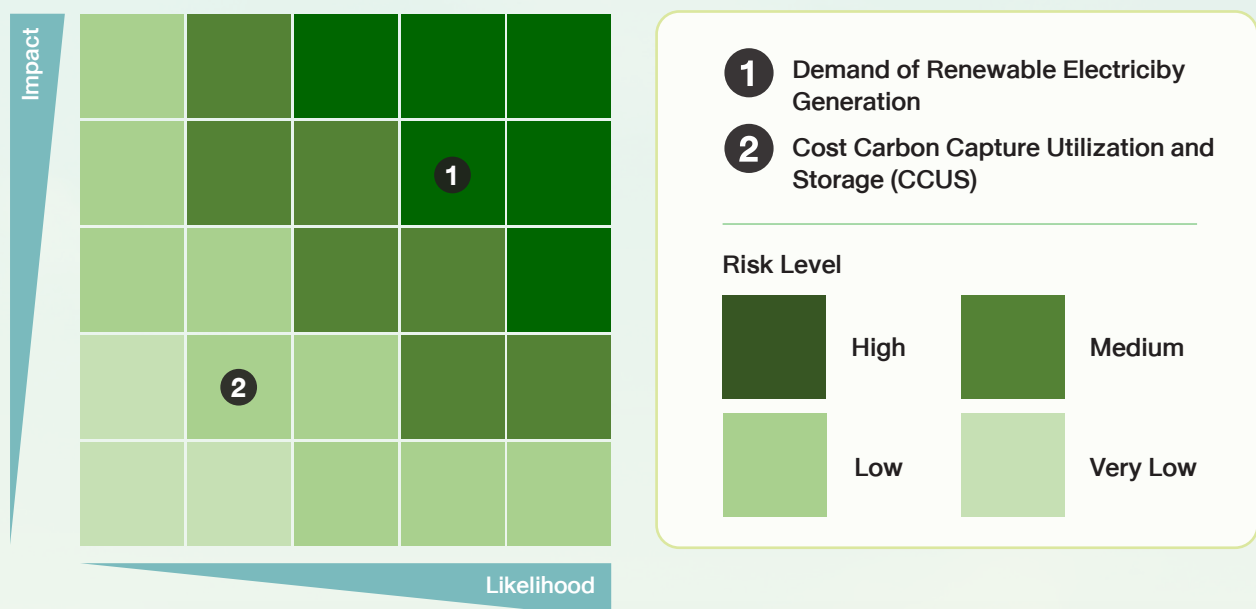
Physical Risk	Impact on Business Operations	Supporting Measures
1. Water shortage	In the production process, due to the drought crisis, when assessing danger levels in 2030 and 2050 under both RCP2.6 and RCP8.5 scenarios, a slight decrease in danger was observed. However, given the moderate baseline danger level, this could lead to potential business interruptions, affecting the operational reliability of the Company, or increased production costs due to higher water supply expenses.	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 in the power 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 electricity generation process.	1. Monitor the news and assess weather forecasts to prepare for fuel reserves delivered from customers before flooding occurs, thereby minimizing the impact on the electricity generation 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.	1. 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. 2. 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 electricity generation from renewable energy sources (Opportunity)	The Company's income increases due to the growing demand for electricity from renewable energy sources.	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.	Study Carbon Capture Utilization and Storage (CCUS) Technology. 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.



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 electricity production to reduce the occurrence of breakdowns.



Reduction of electricity production from the use of fossil fuels

Reducing the use of fossil fuels in electricity generation.



Increase in municipal solid waste collection to boost the production of waste fuel

Increasing the amount of Carbon Credits by producing MSW (Municipal solid waste) from municipal waste instead of releasing greenhouse gases from landfills.



Increase in investments in electricity production from renewable energy

Increase in electricity production from renewable energy, including energy from MSW (Municipal solid waste) fuel, solar energy, and wind energy.



Increase in forest planting areas

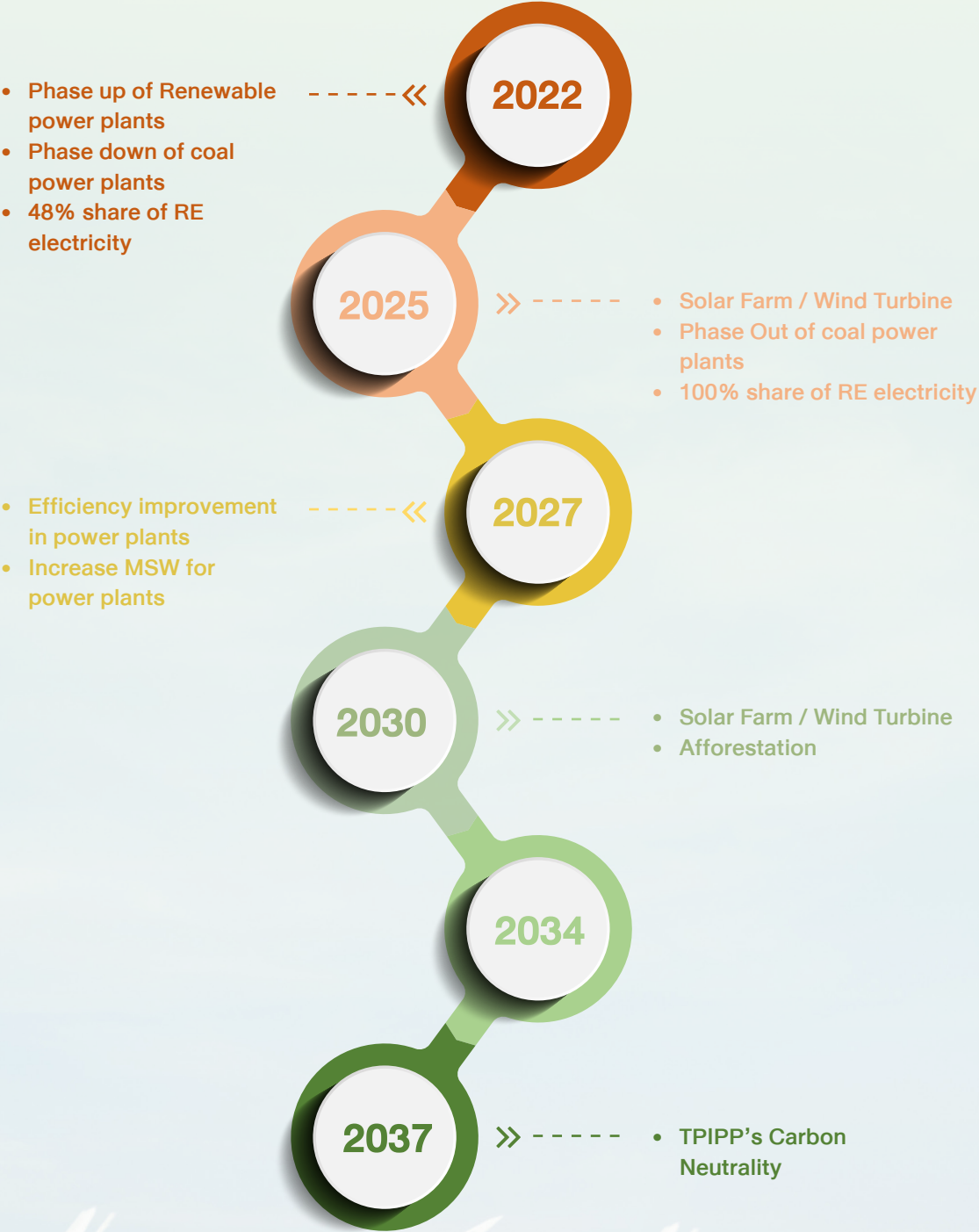
Increase in forest planting areas to absorb greenhouse gases in the atmosphere



Carbon offset and trading

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

TPIPP’s GHG Reduction Strategies



Indicators and Targets

Climate-related indicators

Greenhouse Gas Emissions Data

	Unit	2021	2022	2023*
Scope 1 (Direct)	TonCO ₂ e	3,201,398.15	2,477,534.70	1,718,995.06
Scope 2 (Indirect)	TonCO ₂ e	410.09	588.79	12,365.10
Scope 3	TonCO ₂ e	139,897.22	120,150.62	127,487.14
Total	TonCO₂e	3,341,705.46	2,598,274.12	1,858,847.29

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

Scope 3 Emissions

GHG Emissions Data	Unit	2021	2022	2023
Category 1: Purchased goods and services	tCO ₂ e	2.74	2.74	823.78
Category 3: Fuel-and energy-related activities (not included in Scopes 1 or 2)	tCO ₂ e	55.38	66.83	72,440.87
Category 4: Upstream transport and distribution	tCO ₂ e	139,839.10	120,081.05	53,939.58
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	N/A
Category 9: Downstream transport and distribution	tCO ₂ e	N/A	N/A	282.91
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	139,897.22	120,150.62	127,487.14



Table : Emission levels of sulfur dioxide (SO₂) and nitrogen oxides (NO₂) of the Company compared with World Bank's Emissions Standards and requirements under Thailand' legal regulations

Unit: mg/m³ normal

	Sulfur dioxide (SO ₂)	Nitrogen oxides (NO ₂)
TPIPP	30.0	120.0
World Bank's Emissions Standards	< 230.0	< 510.0
Requirements under Thailand' legal regulations	< 320.0	< 350.0

Table: GHG emission intensity of power plants

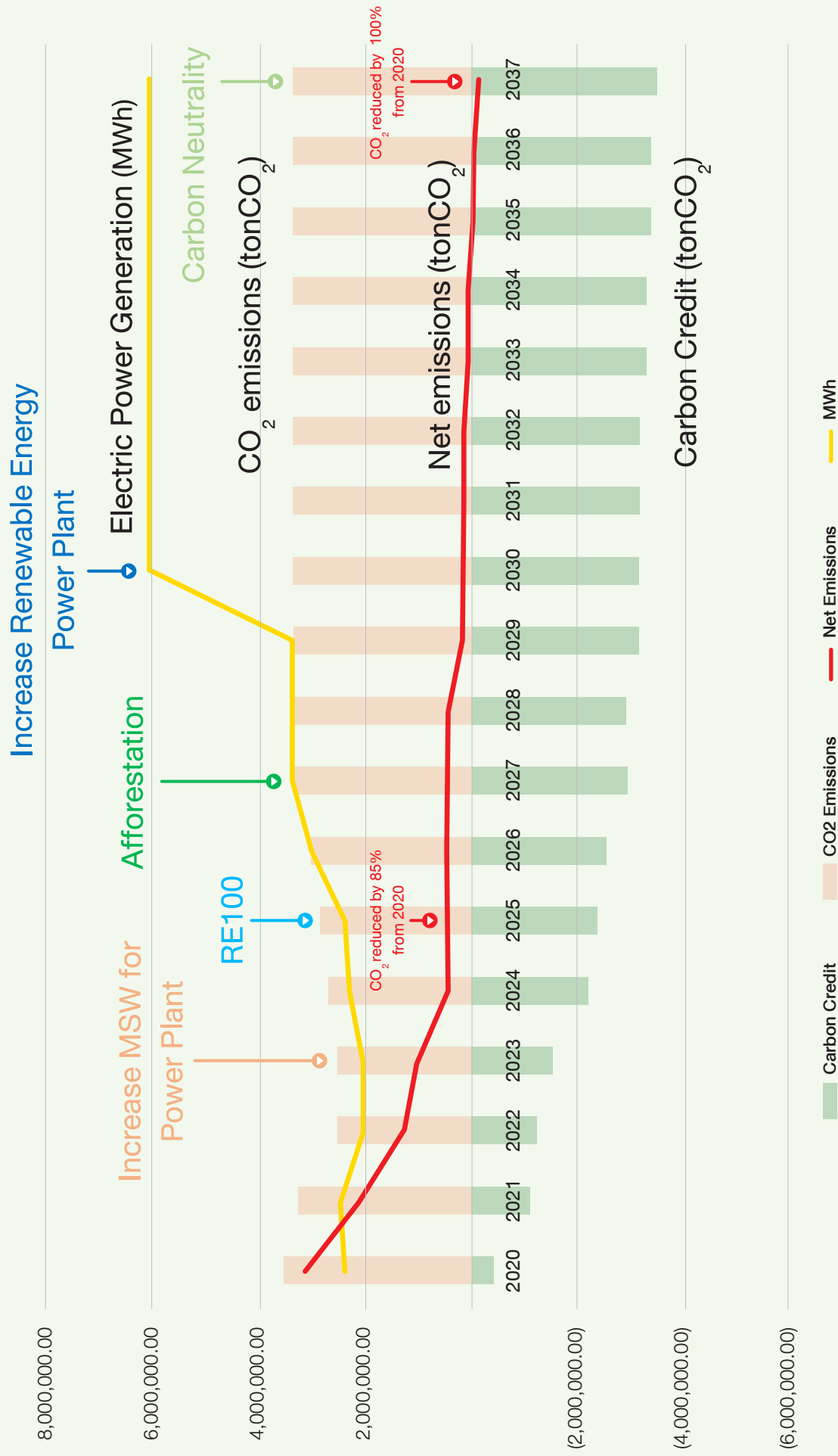
Activity	Unit	2021	2022	2023
Greenhouse Gas GHG (1)	TonCO ₂ e	3,341,705.46	2,598,274.12	1,858,847.29
Non greenhouse gases pollution (2)	Ton	3,700	3,300	1,966
Power generating unit (3)	MWh	2,455,585.01	2,054,617.07	2,239,827.73
Proportion (1)/(3)	TonCO ₂ / MWh	1.5044	1.2646	0.8299
Proportion (2)/(3)	Ton / MWh	0.001507	0.001606	0.000878



Climate Change Goals

Strategy	Performance in 2023	Goals in 2025	Goals in 2043
 1. To establish the proportion of fuel for electricity generation	- Total production capacity is 440 megawatts. - Proportion of fossil fuels is 34.09%. - Proportion of renewable energy is 65.91%.	- Total production capacity is 505 megawatts. - Proportion of fossil fuels is 0 %. - Proportion of renewable energy is 100%	- Total production capacity is 2,205 megawatts. - Proportion of fossil fuels is 0 %. - Proportion of renewable energy is 100%
 2. To reduce the amount of greenhouse gases	- The amount of greenhouse gas emissions is reduced by 1,753,518.03 tCO₂e accounting for 48.54% % compared to the base year of 2020. - The amount of greenhouse gases per unit of electricity generated is decreased by 44.84 % compared to the base year of 2020.	- The amount of greenhouse gas emissions is reduced by 2,686,344.08 tCO₂e, accounting for 74.36% compared to the base year of 2020. - The amount of greenhouse gases per unit of electricity generated is decreased by 85.23% compared to the base year of 2020.	- The amount of greenhouse gas emissions is reduced by 3,612,365.32 tCO₂e, accounting for 100% compared to the base year of 2020. - The amount of greenhouse gases per unit of electricity generated is decreased by 100% compared to the base year of 2020.
 3. To increase the collection of landfill waste for MSW (Refuse-Derived Fuel) production	Collecting 2.77 mill. tons of landfill waste to produce MSW fuel.	Collecting 4.80 mill.tons of landfill waste per year to produce MSW fuel.	Collecting at least 5.44 mill.tons of landfill waste per year to produce MSW fuel.
 4. To increase greenhouse gas storage by planting forests and applying CCUS	The amount of greenhouse gas stored is 1,554,722 tCO₂e.	The amount of greenhouse gas stored is 2,423,994.00 tCO₂e.	The amount of greenhouse gas stored is 3,546,758.00 tCO₂e.
 5. To apply for Renewable Energy Certificate (REC)	To apply for Renewable Energy Certificate (REC) for 1,448,191.774 RECs.	To apply for Renewable Energy Certificate (REC) for 1,400,000 RECs/year	To apply for Renewable Energy Certificate (REC) for 1,600,000 RECs/year.
 6. To disclose information	- Sustainability Report according to GRI Standard 56-1 One Report	- Sustainability Report according to GRI Standard 56-1 One Report - Participating in the sustainability assessment of organization both domestically and internationally	- Sustainability Report according to GRI Standard or as related 56-1 One Report - Carbon Disclosure Project (CDP) - Participating in the sustainability assessment of organization both domestically and internationally

TPIPP's 2037 Carbon Neutrality Pathway





บริษัท ทีพีโอ โพลีน เพาเวอร์ จำกัด (มหาชน)
TPI POLENE POWER Public Company Limited

26/56 ถนนจันทน์ตัดใหม่ แขวงทุ่งมหาเมฆ เขตสาทร กรุงเทพฯ 10120
26/56 Chan Tat Mai Rd., Thungmahamek, Sathorn, Bangkok 10120



0-2285-5090, 0-2213-1039



0-2678-7068



webmasters@tpipolenepower.co.th



<http://www.tpipolenepower.co.th>



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