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Bangchak's Climate Strategy

TCFD Recommended Disclosures

Bangchak as a TCFD Supporter





 Bangchak has become a TCFD Supporter since July 2021 to demonstrate a commitment to building a more resilient financial system and safeguarding against climate risk through better disclosures.

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Bangchak Corporation Public Company Limited		×				
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Company 🔹	Sector	Industry	Location	Region	Date
Bangchak Corporation Public Company Limited BCP	Energy	Oil, Gas & Consumable Fuels	Thailand	Asia Pacific	July 2021

The TCFD Recommended Disclosures



Governance	Strategy	Risk Management	Metrics and Targets
Disclose the organization's governance around climate-related risks and opportunities.	Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.	Disclose how the organization identifies, assesses, and manages climate-related risks.	Disclose the metrics and targets used to assess and manage relevant climate- related risks and opportunities where such information is material.
Governance recommended disclosures	Strategy recommended disclosures	Risk Management recommended disclosure	Metrics & Targets recommended disclosures
a) Describe the board's oversight of climate related risks and opportunities.	a) Describe the climate related risks and opportunities the organization has identified over the short, medium, and long term.	a) Describe the organization's processes for identifying and assessing climate-related risks.	a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.
 b) Describe management's role in assessing and managing climate related risks and opportunities 	 b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning. 	 b) Describe the organization's processes for managing climate related risks. 	b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks
	c) Describe the resilience of the organization's strategy, taking into consideration different climate related scenarios, including a 2°C or lower scenario.	c) Describe how processes for identifying, assessing, and managing climate related risks are integrated into the organization's overall risk management.	c) Describe the targets used by the organization to manage climate related risks and opportunities and performance against targets.

Governance



Bangchak Sustainability Structure



Bangchak's Carbon Footprint of the Refinery

In 2021, Bangchak Refinery participated in Carbon Footprint for
Organization (CFO) Project managed by Thailand Greenhouse
Gas Management Organization (TGO) to conduct and report on
2020 scope 1, 2 & 3 GHG emissions inventory in accordance with
the TGO Guideline of the CFO Standard
Source:

http://thaicarbonlabel.tgo.or.th/index.php?lang=EN&mod=YiNKbllXNXBlbUYwYVc5dVqyRndjSE

Please scan the QR code below for

more information of Bangchak's CFO

p2ZG1Gcw



Certificate Number: **TGO CEO EY21-084** THAILAND GREENHOUSE GAS องค์กร MANAGEMENT ORGANIZATIO anizatior (Public Organization) TGO CERTIFICATE Awarded to Bangchak Corporation Public Company Limited Company address verified: 210 Soi Sukhumwit 64, Sukhumvit Road, Phra Khanong Tai, Phra Khanong, Bangkok 10260 Thailand Greenhouse Gas Management Organization certifies that the quantity of Greenhouse Gas of the above organization has been verified by Lloyd's Register International (Thailand) Limited and found to be in accordance with the requirements of the standard detailed below. Standard

TCFD

TGO Guidance of the Carbon Footprint for Organization

Verification Period: [01/01/2020 - 31/12/2020] Total Greenhouse Gas Emission (Scope 1&2): 899,290 ton CO2eq/year

Direct GHG emissions Energy Indirect GHG emissions Other Indirect GHG emissions 894,015 tonnes of CO₂eq 5,275 tonnes of CO₂eq 9,660,986 tonnes of CO₂eq

The agreed level of assurance is: Reasonable, at materiality of 5%

Registration Date: 29 June 2021

Mr.Kiatchai Maitriwong Executive Director Thabnd Greenhouse Gas Management Organization (Public Organization)



Bangchak Group: GHG Emissions







Strategy



Climate-related risks	Type of climate- related risks	Impacts on businesses, strategy, and financial planning (before taking mitigation approaches)	Strategies in different climate scenarios			
Drought (under RCP 8.5 BAU)	Physical	 Water shortage of the refinery in which tap water reduced by 1,500 m³/day resulting in approximate financial loss around THB 2.6M/day 	 Water management through 3Rs (Reduce, Reuse & Recycle) Principles to continuously reduce tap water consumption over 1,700 m3/day Spare three groundwater wells within the refinery which can receive water intake of 4,840 m3/day 			
Floods due to El Niño and La Niña phenomenon (under RCP 8.5 BAU)		 Physical damage and financial loss due to business interruption for approximately THB 20M 	 Permanent and temporary dyke construction around the refinery using sheet pile for flood prevention 			
Carbon tax		 EBITDA reduced by 1.1- 3.3% EBITDA reduced by 26.3% 	 Reduce GHG emissions through energy efficiency improvement projects 			
below 2°C scenario		EBITDA reduced by 20.3%	 Accelerate green portfolio Study pay fuels (bydrogon) 			
Carbon prices aligning with 1.5°C scenario	Transition	• EBITDA reduced by 31.8%	 Carbon offsetting from renewable energy businesses 			
Thailand cap-and-trade scheme		• EBITDA reduced by 0.2 - 0.7%	 Implement shadow prices for new investment decision-making and energy efficiency projects Seek negative emission technologies (carbon sink or CCUS) 			

- Physical risk : **Drought**
- Conduct risk assessment through water stress mapping tools

Projected water stress in 2040

of little water demand

No data





• Conducted risk assessment and management plans associated with water shortage of the refinery

Strategic Risk 💮 Pinancial Risk Operation Risk 🚳 Reputation Risk

- Climate-related physical risks: Drought
- **Risk description:** Climate change impact results in domestic water availability which may lead to water shortage risks for the production of the Refinery. For the last ten years, however, water shortage has not occurred. Nevertheless, Bangchak has conducted water-related risk assessment and had mitigation measures for water shortage risks
- Financial impacts (estimated THB) before taking mitigation approaches
 - ➢ In the scenario of tap water reduced by 1,500 m3/day:
 - Refining capacity reduction
 - Loss: 2.6 MTHB/day
- Average estimated time frame (in number of years) for financial implications of the risk: 5 years
- **Cost of mitigation actions:** 1.5 MTHB of investment in the improvement of groundwater wells

- Water Management:
 - 3Rs (Reduce, Reuse & Recycle) Principles of water management to continuously reduce tap water consumption over 1,700 m3/day
 - Spare three groundwater wells within the refinery which can receive water intake of 4,840 m3/day
- Plan includes a target to implement relevant adaptation measures within: **10 years**
- Risk assessment and adaptation plans to physical climate risk cover: 100% of existing and new operations of Bangchak refinery

(conduct. of groundwater < 800 us/cm

Information and measures of water consumption for production

- Groundwater
- 3Rs (internal)

• Physical risk : **Floods**

Risk Event :	Floods cause damages to the refinery its operations	npact	
Root Cause Analysis	Heavy rain in Thailand due to El Niño and La Niña phenomenon in 2018	Ц	
Risk Impact :	All refining units cannot be operated		
Risk Owner :	Refinery and Trading Business (RFBG)		
Target :	Stable at 1,4 level		
Degree of Acceptance:	Mitigating		

Existing Risk Response

1. Monitor water level situation of dams continuously and prepare prevention plans

2. Complete the study of flood risk for the refinery in FY 2017

Required Risk Response	Cost (MB)	Due Date	Owner	Progress
1. Study and design the dam for flood prevention	3	Aug 2018	ESD	

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

El Niño Transitioning to La Niña

Source : PIRA

Current flood prevention measures

North dyke

Bangchak refinery is located in the east of Chao Phraya River and away from the north of the Gulf of Thailand about 20 km

Bangchak Refinery is under the water management of

- the BMA
 - The dyke for flood prevention can cope with water level in 2011
 - Temporary flood prevention in the areas which the water level is higher than the dyke
 - Bang Aor Pumping Station and Bangchak Pumping Station
 - The Great Tunnel at Suan Luang Rama IX

Source : TEAM Consultant

Example of the dyke improvement around the refinery from the consultant

Bangchak Port area

For Bangchak's port area, temporary flood prevention system is required at some areas. Area preparation for the prompt installation of temporary flood prevention systems is needed

Bangchak Refinery area

The evaluation of flood prevention system around Bangchak refinery

Bangchak has low risk level of flood as a result of the BMA's flood prevention system. In case of the Company need the flood prevention without relying on the external flood prevention system, the dyke construction around the refinery using sheet pile is recommended which include

- (1) Permanent flood prevention dyke
- (2) 8 temporary dyke (at refinery's gates)
- (3) consider the enhancement of 3 Sump pit Guard Basin

Transition risks : Carbon taxes, Carbon prices aligning with well below 2°C scenario, Carbon prices aligning with 1.5°C scenario, and Thailand cap-and-trade scheme

<u>Concept</u>

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Conduct different scenarios analysis associated carbon prices to test impact on EBITDA

TASK FORCE ON CLIMATE-RELATED FINANCIAL

TCFD

Scenario Analysis for Climate Change Transition Risks

No.	Code	Scenario	Description	Carbon prices (\$/tCO ₂ e)	Likelihood	Impact
Scenario 1	A1	Carbon tax (Static Price)	Assume that Thailand may implement carbon tax (with static price) in FY 2025	5		
Scenario 2	A2	Carbon tax (Evolving Price)	Assume that Thailand may implement carbon tax (with evolving prices) in FY 2025	5-15		
Scenario 3	A3	Well below 2.0 degree scenario	Assume that Bangchak would be pressured from investors, suppliers or customers to reduce GHG emissions to align with Well below 2 degree Celsius scenario in FY 2022	32-80	 High = Expectation > 70% 	 High = Profit decreases > 10% Medium =
Scenario 4	A4	1.5 degree scenario	Assume that Bangchak would be pressured from investors, suppliers or customers to reduce GHG emissions to align with 1.5 degree Celsius scenario within FY 2100	85-145	 Medium = Expectation 30-70% 	Profit decreases between 5- 10%
Scenario 5	A5	Thai cap-and- trade scheme (high @20%)	Assume that Thailand would implement GHG emission trading / Cap-and-Trade scheme, and Bangchak would require to reduce GHG emissions by 20% compared with the BAU	13 With 5% annual incremental	 Low = Expectation <30% 	 Low = Profit decreases < 5%
Scenario 6	A6	Thai cap-and- trade scheme (low @5%)	Assume that Thailand would implement GHG emission trading / Cap-and-Trade scheme, and Bangchak would require to reduce GHG emissions by 5% compared with the BAU	13 With 5% annual incremental		

Scenario Analysis for Transition Risks

Scenario	Likelihood (%)	Impact levels (% of profits decreased)*	Risk levels in 2030
A1 Carbon tax (Static Price)	Medium (50%)	Low (2.2%)	$M \times L$
A2 Carbon tax (Evolving Price)	Medium (50%)	Medium (6.6%)	$\mathbf{M} \times \mathbf{M}$
A3 Well below 2.0 degree scenario	High (75%)	High (35.1%)	$\mathrm{H} \times \mathrm{H}$
A4 1.5 degree scenario	Medium (50%)	High (63.7%)	$\mathbf{M} \times \mathbf{H}$
A5 Thai cap-and-trade scheme (high @20%)	Medium (50%)	Low (1.4%)	$M \times L$
A6 Thai cap-and-trade scheme (low @5%)	Medium (50%)	Low (0.4%)	$M \times L$

* Carbon prices applied in scenario analysis is the global average carbon prices which are required to achieve climate change targets. Therefore, actual prices/costs occurring of Bangchak may be different from these values

Climate Change Transition Risks in Different Scenarios

Bangchak Group: Carbon Neutral Roadmap

Contribution of "Green Portion"

Niche Products

Refinery

Greenovative **Destination**

Renewable Energy "Pure Green"

Synthetic Biology

Frontier Businesses

Metrics & Targets

- Bangchak defined GHG emissions reduction as corporate KPI and CEO KPI to demonstrate our intention to limit and slow down climate change impacts

Source: Bangchak's Integrated Sustainability Report 2021, PDF page 93, https://www.bangchak.co.th/storage/document/sd-report/sd2021-en.pdf

- Bangchak disclosed scope 1 GHG emissions targets of 821,960.67 tCO2e and scope 2 GHG emissions of 17,949.87 tCO2e for FY 2021.

https://www.bangchak.co.th/storage/document/sd-report/sd2021-en.pdf

- The Company also disclose the target of carbon neutrality in FY 2030.

- Bangchak discloses scope 1 & 2 GHG emissions on PDF page 166 - 171 of Bangchak's Integrated Sustainability Report 2021,

Source: Bangchak's Integrated Sustainability Report 2021, PDF page 93, https://www.bangchak.co.th/storage/document/sd-report/sd2021-en.pdf

Key Success Indicators

The proportion of refined oil transportation by trucks decrease the GHG emissions (Target: Increase 2% per year and decrease

(scope 2)	- Biogenic CO2	KCOV															
	- CH4	*COR										1.00					55.41
	- N2O	*COR										3.67					71.95
	- Other Biogenic (CH4 & N2O)	KCOM															
	Total indirect GHG emission from power and biogos purchased (SCOPE 2.) Xinos maint based score 2.0HG emissions)	KCDr															
	- 002	KCOR															
	- Biogenic CO2	KCDV															
icope 1+2	Total GHG emissions (SCOPE 1+2)	KCDy	987, N4.23	954,812,22	909,342.43	892,636.55	KM,853.86					1,069.M	8,716.48	13,093.85	15,655.24	12,61111	13,189.72
	Total Direct GHG emission (SCOPE	1)															
	Table Direct (147 ambulan (17/108 1)		071 614 70	00000348	A10.000 A1	101 (10.17	#10.001 #0					170				22.0	177.64
	(01)	1000	ATLANTA	800.007.43	87.843.75	883 744 55	#10.000 Te					448.02				201.74	100.00
	- Cola	1000	40.71	5115	20.00	18.04	5.10					41.10				14.83	65.12
	- Old and Existing Old	1000	W5.06	526.77	50.11	1 615 72	142145										
681305-1	- *OH and Fugitive CH4 emission	tan	15.40	13.15	13.24	52.43	SALET										
		100	145.14	126 77	805.11	117.84	307.50					1.44				0.65	41.17
(scope 1)	- Crie			208.11													
	- "Une emission D.67s disclosure requirements!	tans	15.40	13.13	13.24	12.95	12.30					8.65				0.02	149
	Fugitive CH4 Fugitive CH4 with OH4 ince 2829, in 2821, fugitive CH4 and CH4 are separatedly reported for data temperatery:	KOR				1,332.99	1343										
	- N2O	1008	\$29.61	399.46	398.10	386.55	364.00					5.80				6.23	5.49
	- Other Biogenic (CH4 & N2O)	1000			9.11	0.13	1.02									0.13	
	Total indirect GHG emission from electricity, steam and biogas purchased (SCCPE 2.)																
	Total Indirect GHG emission from electricity, steam and biogas purchased ISCOPE 2.1	1000	14.00.01	14.28.37	16,750.41	533596	57434					591.35	4271.07	6,812.12	\$14.05	7,30,59	1,044,31
	Total Indirect GHG emission from power and biogas purchased (SCOPE 2.) (Invest tocation-based scope 2 (HG emission))	1000	14,850	14,28,37	16,758.41	0059	574534					591.35	4271.07	6,812.72	\$14LB	2,301,59	1,044,31
GF8305-2	- 002	1000	14,050.01	14.129.37	10,750,41	6,835.96	5,748,34					585.86	4,271,07	8,812,72	\$141.05	2,701.58	6,979,16
(scope 2)	- Biogenic CO2	1000															
	- CH4	10001										1.80					21.48
	- N2O	1009										3.67					\$1.44
	- Other Biogenic (CH4 & N2O)	1008															
	Total Indirect GHG emission from power and biogas purchased (SCOPE 2.) Gross	KCD+															
	CO3	-															
	- Cost	1000															
	Table Cit container (CCORE 1-2)	1000	441 144 10		100.000.00	-	-					10000	410.00	4 801 73			1171.14
Augor 1+2	TOTAL ONLY BUILDING COUPE 1420	1.11	P8-,104.23	A PARTY	MA(042.52	vm,436.34	AACODE.04					10030	10110	~38LL 12	XI4CI0	A04.0	0/2.9
68305-	4 GHGs Intensity	National Material	0.14	0.14	0.14	0.13	0.12										

Bangchak Group Climate Action Targets

Carbon neutral in 2030 Net zero emissions in 2050 ("Race to Zero" pledge plan)