

Environmental Performance

Disclosure	Performance		Unit	2020	2021	2022	2023
GRI 302-1	Total energy consumption within the organization ¹		MWh	2,041,213.70	2,074,139.55	2,112,045.00	2,108,270.85
	Total non-renewable energy consumed		MWh	3,532,552.71	3,545,132.72	3,536,148.18	3,559,657.37
	Total non-renewable energy consumed	Stationary combustion	MWh	3,532,005.84	3,543,780.28	3,533,725.50	3,556,936.80
		Natural gas ²	MWh	3,531,983.13	3,543,749.63	3,533,666.28	3,556,899.17
			GJ	12,715,037.54	12,757,396.60	12,721,096.85	12,804,734.58
			MMBTU	12,051,629.56	12,091,778.54	12,057,372.73	12,136,646.65
		Diesel	kg	ND	ND	246,521,343.00	240,663,151.00
			MWh	22.71	30.65	59.21	37.63
			GJ	81.76	110.33	213.17	135.48
			Liter	2,245.00	3,029.50	5,853.00	3,720.00
		Mobile combustion	MWh	546.87	1,352.44	2,422.69	2,720.57
		Diesel	MWh	515.43	1,274.33	2,084.46	2,041.27
			GJ	1,855.54	4,587.58	7,504.07	7,348.59
			Liter	50,948.45	125,963.21	206,042.53	201,773.39
		Diesel B7	MWh	ND	ND	ND	337.89
			GJ	ND	ND	ND	1,216.42
			Liter	ND	ND	ND	33,399.69
		Gasoline	MWh	31.45	78.11	338.23	341.40
			GJ	113.20	281.21	1,217.61	1,229.03
			Liter	3,596.00	8,933.00	38,678.86	39,041.70

Remarks :

- ND means No Data Available

1 The Company increased the data coverage of energy indicators to include the Company's Headquarter and number of transmission loss for the first time 2022.

2 The Company consumed natural gas only in the Bangpa-in Cogeneration power plant.

Disclosure	Performance		Unit	2020	2021	2022	2023	
GRI 302-1	Total non-renewable energy sold ³		MWh	1,586,867.46	1,600,174.99	1,593,951.63	1,604,580.92	
	Total non-renewable energy sold	Non-renewable electricity sold	MWh	1,535,429.42	1,543,171.23	1,533,338.61	1,542,060.25	
			GJ	5,527,501.70	5,555,371.97	5,519,974.82	5,551,372.48	
		Steam sold	MWh	51,438.04	57,003.77	60,613.03	62,520.68	
			GJ	185,175.46	205,211.93	218,205.15	225,072.64	
			Metric ton	ND	ND	78,036.00	80,492.00	
		Non-renewable electricity generated and consumed within the organization		MWh	ND	ND	ND	ND
	Total energy purchased and consumed within the organization		MWh	8,708.58	10,521.86	4,491.23	3,703.03	
	Electricity purchased and consumed within the organization		MWh	8,708.58	10,521.86	4,491.23	3,703.03	
			GJ	31,350.90	37,878.71	16,168.31	13,330.82	
	Total renewable energy consumed		MWh	50,041.11	87,596.57	165,357.22	149,491.37	
	Total renewable energy consumed		Renewable electricity from solar energy consumed	MWh	ND	ND	0	0
				GJ	ND	ND	0	0
			Renewable electricity from hydropower consumed	MWh	50,041.11	87,596.57	165,357.22	149,491.37
				GJ	180,147.98	315,347.64	595,281.23	538,164.62
			Total renewable electricity consumption within organization	MWh	ND	ND	52,598.25	51,667.90
				GJ	ND	ND	189,352.18	186,002.94
			Total transmission loss	MWh	ND	ND	112,758.97	97,823.47
				GJ	ND	ND	405,929.04	352,161.68
	Total renewable energy sold)		MWh	7,241,637.74	9,172,747.20	9,883,066.03	8,594,597.34	
	Renewable energy sold		Renewable electricity sold	MWh	7,241,637.74	9,172,747.20	9,883,066.03	8,594,597.34
				GJ	26,069,895.86	33,021,889.92	35,578,753.09	30,940,302.89
	GRI 302-3	Energy intensity	Total energy consumption within the organization per total energy generated	MWh	0.23	0.19	0.18	0.20
/MWh								
SET ESG Ratings	Total electricity consumption per total energy generated		MWh	ND	ND	0.0004	0.0004	
			/MWh					

Remarks :

- ND means No Data Available

3 The Company sold non-renewable-energy only from the Bangpa-in Cogeneration power plant.

Disclosure	Performance		Unit	2020	2021	2022	2023
GRI 305-1, GRI 305-2	Total GHG emissions scope 1 and 2		tCO ₂ e	717,296.83	721,309.65	717,775.96	721,781.47
GRI 305-1	Total GHG emissions scope 1 and 2	Total GHG emissions scope 1	tCO ₂ e	713,447.64	716,049.77	715,530.79	719,930.32
		Total GHG emissions scope 1	Stationary combustion	tCO ₂ e	713,299.86	715,684.30	714,330.78
			Stationary combustion	Natural gas	tCO ₂ e	713,299.80	715,676.10
				Diesel	tCO ₂ e	0.06	8.20
			Mobile combustion	tCO ₂ e	147.78	365.47	652.55
			Mobile combustion	Diesel	tCO ₂ e	139.61	345.18
				Diesel B7	tCO ₂ e	ND	ND
				Gasoline	tCO ₂ e	8.17	20.29
			Sulfur hexafluoride: SF6	Sulfur hexafluoride: SF6	tCO ₂ e	0	0
				Weight of sulfur hexafluoride: SF6	kg	0	10.80
			Refrigerants	tCO ₂ e	ND	ND	293.66
			Refrigerants	Refrigerant R134a	tCO ₂ e	ND	ND
					kg	ND	ND
				Refrigerant R32	tCO ₂ e	ND	ND
					kg	ND	ND
				Refrigerant R410a	tCO ₂ e	ND	ND
					kg	ND	ND
				Refrigerant R407C	tCO ₂ e	ND	ND
					kg	ND	ND
GRI 305-2	Total GHG emissions scope 2	Total GHG emissions scope 2	tCO ₂ e	3,849.19	5,259.88	2,245.17	1,851.15
		Total GHG emissions scope 2	Purchased electricity GHG emissions scope 2 [Location-based]	tCO ₂ e	3,849.19	5,259.88	2,245.17
			Purchased electricity GHG emissions scope 2 [Market-based]	tCO ₂ e	3,849.19	5,259.88	2,245.17

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Disclosure	Performance					Unit	2020	2021	2022	2023
GRI 305-3	Total GHG emissions scope 3	Total GHG emissions scope 3				tCO ₂ e	ND	ND	122,367.29	119,586.41
		Category 3: Fuel- and energy-related activities not included in scope 1 or 2				tCO ₂ e	ND	ND	122,367.29	119,586.41
		GHG emissions from transmission & distribution losses of purchased electricity				tCO ₂ e	ND	ND	443.28	365.49
		GHG emissions from upstream fuel uses				tCO ₂ e	ND	ND	121,924.01	119,220.92
		GHG emissions from upstream fuel uses	Narural gas			tCO ₂ e	ND	ND	121,770.14	119,049.42
			Diesel			tCO ₂ e	ND	ND	130.96	149.38
			Gasoline			tCO ₂ e	ND	ND	22.91	22.12
			Liquefied petroleum gas: LPG			tCO ₂ e	ND	ND	0	0
			Natural gas for vehicles: NGV			tCO ₂ e	ND	ND	0	0
GRI 305-4	GHG emissions intensity	Total energy generated ⁴				MWh	8,851,869.97	10,771,901.16	11,704,379.09	10,412,371.50
		GHG emissions scope 1 and 2 per total energy generated				tCO ₂ e/MWh	0.0810	0.0670	0.0613	0.0693
		GHG emissions scope 1 and 2 per total energy sold				tCO ₂ e/MWh	ND	ND	0.0625	0.0708
The GHG Protocol Corporate Accounting and Reporting Standard		Biogenic emissions				tCO ₂ e	ND	ND	0	5.59
		Biogenic emissions	Stationary combustion: Diesel B7			tCO ₂ e	ND	ND	0	0
			Mobile combustion: Diesel B7			tCO ₂ e	ND	ND	0	5.59
		Refrigerant R22				tCO ₂ e	ND	ND	23.41	12.14
						kg	ND	ND	13.30	6.90

Remarks :

- ND means No Data Available

4 Data from 2019-2021 were reported using power purchase agreement (PPA) between the Company and suppliers as reference, while data from 2022-2023 were reported using the Company's actual total energy generation.

Disclosure	Performance		Unit	2020	2021	2022	2023
GRI 305-7	Other air emissions ⁵	Nitrogen oxides: NOx	ppm	ND	ND	168.91	32.49
			kg	597,770.75	598,910.61	636,065.50	703,548.78
		Sulphur oxides: SOx	ppm	ND	ND	1.16	1.29
			kg	17,258.39	24,398.44	34,192.07	37,992.93
		Persistent organic pollutants: POP	kg	ND	ND	0	0
		Volatile organic compounds: VOC	kg	ND	ND	0	0
		Hazardous pollutant: HAP	kg	ND	ND	0	0
		Particulate matter: PM	mg/m ³	ND	ND	14.14	1.67
			kg	21,890.13	33,911.76	28,978.59	16,733.91
		Direct mercury emission	Metric ton	ND	ND	0	0
	Other air emissions intensity	Nitrogen oxides: NOx	kg/MWh	0.068	0.056	0.054	0.068
		Sulphur oxides: SOx	kg/MWh	0.002	0.002	0.003	0.004
		Persistent organic pollutants: POP	kg/MWh	ND	ND	0	0
		Volatile organic compounds: VOC	kg/MWh	ND	ND	0	0
		Hazardous pollutant: HAP	kg/MWh	ND	ND	0	0
		Particulate matter: PM	kg/MWh	0.0025	0.0031	0.0025	0.0016
		Direct mercury emission	Ton/MWh	ND	ND	0	0
-	Avoided GHG emissions		tCO ₂ e	3,226,203.54	4,604,509.49	5,023,206.78	4,371,169.94
-	Total renewable energy generated		MWh	7,299,103.04	9,210,861.16	10,048,423.25	8,744,088.70
-	Grid emission factor for Thailand		tCO ₂ e/MWh	0.4420	0.4999	0.4999	0.4999

Remarks :

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5 The Company had other air emissions only from the Bangpa-in Cogeneration power plant.

Disclosure	Performance		Unit	2020	2021	2022	2023
GRI 303-3	Total water withdrawal from all areas ⁶		Million Liters	1,910.00	1,722.86	10,621.26	8,512.74
	Total water withdrawal from non-water stress areas		Million Liters	1,910.00	1,722.86	10,621.26	6,672.50
	Total water withdrawal from non-water stress areas	Municipal water suppliers Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million Liters	1,910.00	1,722.85	1,837.46	0.60
		Surface water Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million Liters	ND	0.01	8,783.80	6,628.11
		Groundwater Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million Liters	ND	ND	0	43.79
		Water recycled and reused within the organization	Million Liters	ND	ND	0	0
	Total water withdrawal from water stress areas ⁷		Million Liters	0	0	0	1,840.24
	Total water withdrawal from water stress areas	Municipal water suppliers Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million Liters	0	0	0	1,840.24
		Surface water Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million Liters	0	0	0	0
		Groundwater Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million Liters	ND	ND	0	0
	Water intensity	Total water withdrawal from all areas per total energy generated	Million Liters /MWh	0	0	0.0009	0.0008
GRI 303-4	Total water discharged		Million Liters	381.44	344.56	9,042.01	6,837.44
	Total water discharged	Municipal water suppliers Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million Liters	381.44	344.56	367.72	328.70
		Surface water Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million Liters	ND	ND	8,674.29	6,508.73
		Groundwater Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million Liters	ND	ND	0	0
GRI 303-5	Total water consumption from all areas		Million Liters	1,528.56	1,378.30	1,579.25	1,675.30
	Total water consumption from water stress areas ⁷		Million Liters	0	0	0	1,511.88
SET ESG Ratings	Total water consumption per unit total energy generated		m ³ /kWh	0.00017268	0.00012795	0.00013493	0.00016090
S&P Global	Total water consumption from water stress areas per unit total energy generated		m ³ /kWh	0	0	0	0.00017674

Remarks :

- ND means No Data Available

6 The Company increased the data coverage of water indicators to include Xayaburi power plant, Nam Ngum 2 power plant and the Company's Headquarter for the first time in 2022.

7 The Company had water withdrawal and water consumption from water stress areas only from the Bangpa-in Cogeneration power plant.

Disclosure	Performance		Unit	2020	2021	2022	2023
GRI 306-3	Total waste generated ⁸		Metric ton	95.96	130.86	136.16	143.58
GRI 306-3	Total non-hazardous waste generated		Metric ton	87.16	114.11	120.53	119.49
GRI 306-4	Total non-hazardous waste generated	Total non-hazardous waste diverted from disposal	Metric ton	15.40	29.19	14.82	21.24
GRI 306-5		Total non-hazardous waste directed to disposal	Metric ton	71.76	84.92	105.71	98.25
GRI 306-3	Total hazardous waste generated		Metric ton	8.80	16.75	15.62	24.09
GRI 306-4	Total hazardous waste generated	Total hazardous waste diverted from disposal	Metric ton	4.84	5.03	4.60	8.21
GRI 306-5		Total hazardous waste directed to disposal	Metric ton	3.96	11.72	11.02	15.87
GRI 306-4	Total waste diverted from disposal [on-site and off-site]		Metric ton	20.24	34.22	19.42	29.46
	Total hazardous waste diverted from disposal [on-site]		Metric ton	4.84	5.03	0	0
	Total hazardous waste diverted from disposal [on-site]	Preparation for reuse [on-site]	Metric ton	2.54	3.00	0	0
		Recycling [on-site]	Metric ton	2.30	2.03	0	0
		Other recovery operations [on-site]	Metric ton	0	0	0	0
	Total hazardous waste diverted from disposal [off-site]		Metric ton	0	0	4.60	8.21
	Total hazardous waste diverted from disposal [off-site]	Preparation for reuse [off-site]	Metric ton	0	0	0	7.00
		Recycling [off-site]	Metric ton	0	0	0	0
		Other recovery operations [off-site]	Metric ton	0	0	4.60	1.21
	Total non-hazardous waste diverted from disposal [on-site]		Metric ton	0	14.58	9.20	16.77
	Total non-hazardous waste diverted from disposal [on-site]	Preparation for reuse [on-site]	Metric ton	0	14.58	0	0
		Recycling [on-site]	Metric ton	0	0	0	1.30
		Other recovery operations [on-site]	Metric ton	0	0	9.20	15.47
	Total non-hazardous waste diverted from disposal [off-site]		Metric ton	15.40	14.61	5.62	4.47
	Total non-hazardous waste diverted from disposal [off-site]	Preparation for reuse [off-site]	Metric ton	0	0	0	0
		Recycling [off-site]	Metric ton	0	0	5.62	4.47
		Other recovery operations [off-site]	Metric ton	15.40	14.61	0	0

Remarks :

8 Major overhaul activity at Nam Ngum 2 power plant in 2023 had caused the Company's amount of waste to increase when compared to last year.

Disclosure	Performance			Unit	2020	2021	2022	2023	
GRI 306-5	Total waste directed to disposal [on-site and off-site]			Metric ton	75.72	96.64	116.74	114.12	
	Total waste directed to disposal [on-site]			Metric ton	48.80	74.94	82.24	73.97	
	Total waste directed to disposal [on-site]	Total hazardous waste directed to disposal [on-site]		Metric ton	2.46	9.19	0	1.42	
		Total waste directed to disposal [on-site]	Incineration with energy recovery [on-site]	Metric ton	0	0	0	0	
			Incineration without energy recovery [on-site]	Metric ton	2.02	6.83	0	1.42	
			Landfilling [on-site]	Metric ton	0.44	1.28	0	0	
			Other disposal operations [on-site]	Metric ton	0	1.08	0	0	
		Total non-hazardous waste directed to disposal [on-site]		Metric ton	46.34	65.75	82.24	72.55	
		Total non-hazardous waste directed to disposal [on-site]	Incineration with energy recovery [on-site]	Metric ton	0	0	0	0	
			Incineration without energy recovery [on-site]	Metric ton	42.50	44.86	40.18	31.88	
			Landfilling [on-site]	Metric ton	3.84	20.88	42.06	40.67	
			Other disposal operations [on-site]	Metric ton	0	0	0	0	
		Total waste directed to disposal [off-site]			Metric ton	26.92	21.70	34.50	40.15
		Total waste directed to disposal [off-site]	Total hazardous waste directed to disposal [off-site]		Metric ton	1.50	2.53	11.02	14.45
			Total hazardous waste directed to disposal [off-site]	Incineration with energy recovery [off-site]	Metric ton	0	0	10.50	14.06
				Incineration without energy recovery [off-site]	Metric ton	0	0	0.02	0.04
	Landfilling [off-site]			Metric ton	1.50	2.53	0.34	0.24	
	Other disposal operations [off-site]			Metric ton	0	0	0.17	0.12	
	Total non-hazardous waste directed to disposal [off-site]		Metric ton	25.42	19.17	23.47	25.69		
	Total non-hazardous waste directed to disposal [off-site]		Incineration with energy recovery [off-site]	Metric ton	0	0	0	0	
			Incineration without energy recovery [off-site]	Metric ton	13.92	19.17	14.35	10.08	
			Landfilling [off-site]	Metric ton	11.50	0	0	4.72	
			Other disposal operations [off-site]	Metric ton	0	0	9.12	10.90	

Remarks :
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