



ENVIRONMENTAL PERFORMANCE DATA

Energy

Disclosure	Performance	Unit	Year			
			2019	2020	2021	2022
GRI 302-1	Total energy consumption within the organization ¹	MWh	2,005,125.90	2,041,213.70	2,074,139.55	2,112,045.00
	Total non-renewable energy consumed	MWh	3,581,348.76	3,532,552.71	3,545,132.72	3,536,148.18
GRI 302-1	Stationary combustion	MWh	3,580,656.85	3,532,005.84	3,543,780.28	3,533,725.50
	Natural gas ²	MWh	3,580,642.69	3,531,983.13	3,543,749.63	3,533,666.28
		GJ	12,890,210.55	12,715,037.54	12,757,396.60	12,721,096.85
		MMBTU	12,217,662.91	12,051,629.56	12,091,778.54	12,057,372.73
	Diesel	KG	ND	ND	ND	246,521,343.00
		MWh	14.16	22.71	30.65	59.21
		GJ	50.99	81.76	110.33	213.17
	Mobile combustion	Liter	1,400.00	2,245.00	3,029.50	5,853.00
		MWh	691.91	546.87	1,352.44	2,422.69
	Diesel	MWh	656.28	515.43	1,274.33	2,084.46
GJ		2,362.61	1,855.54	4,587.58	7,504.07	
Gasoline	Liter	64,871.16	50,948.45	125,963.21	206,042.53	
	MWh	35.63	31.45	78.11	338.23	
	GJ	128.28	113.20	281.21	1,217.61	
	Liter	4,075.00	3,596.00	8,933.00	38,678.86	

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. Decline in COVID-19 in 2022 had caused the Company's activities and energy consumption to increase when compared to last year.

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



Disclosure	Performance	Unit	Year			
			2019	2020	2021	2022
GRI 302-1	Total non-renewable energy sold ³	MWh	1,628,796.94	1,586,867.46	1,600,174.99	1,593,951.63
	Non-renewable electricity sold	MWh	1,560,849.24	1,535,429.42	1,543,171.23	1,533,338.61
		GJ	5,619,012.31	5,527,501.70	5,555,371.97	5,519,974.82
	Steam sold	MWh	67,947.70	51,438.04	57,003.77	60,613.03
		GJ	244,609.77	185,175.46	205,211.93	218,205.15
	Non-renewable electricity generated and consumed within the organization	MWh	ND	ND	ND	0.00
		GJ	ND	ND	ND	0.00
	Total energy purchased and consumed within the organization	MWh	17,260.70	8,708.58	10,521.86	4,491.23
	Electricity purchased and consumed within the organization	MWh	17,260.70	8,708.58	10,521.86	4,491.23
		GJ	62,138.51	31,350.90	37,878.71	16,168.31
	Total renewable energy consumed	MWh	ND	50,041.11	87,596.57	165,357.22
	Renewable electricity from solar energy consumed	MWh	ND	ND	ND	0.00
		GJ	ND	ND	ND	0.00
	Renewable electricity from hydropower consumed	MWh	ND	50,041.11	87,596.57	165,357.22
		GJ	ND	180,147.98	315,347.64	595,281.23
	- Total transmission loss	MWh	ND	ND	ND	112,758.97
GJ		ND	ND	ND	405,929.04	
- Total renewable electricity consumption within organization	MWh	ND	ND	ND	52,598.25	
	GJ	ND	ND	ND	189,352.18	

Remarks:

- ND means No Data Available

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



Disclosure	Performance	Unit	Year			
			2019	2020	2021	2022
GRI 302-1	Total renewable energy sold	MWh	2,535,123.97	7,241,637.74	9,172,747.20	9,883,066.03
	Renewable electricity sold	MWh	2,535,123.97	7,241,637.74	9,172,747.20	9,883,066.03
		GJ	9,126,446.29	26,069,895.86	33,021,889.92	35,578,753.09
GRI 302-3	Energy intensity					
	Total energy consumption within the organization per total energy generated	MWh /MWh	0.61	0.23	0.19	0.18
THSI	Total electricity consumption per total energy generated	MWh/MWh	ND	ND	ND	0.0004

Remarks:

- ND means No Data Available



GHG

Disclosure	Performance	Unit	Year			
			2019	2020	2021	2022
GRI 305-1, GRI 305-2	Total GHG emissions scope 1 and 2	tCO ₂ e	731,151.00	717,296.83	721,309.65	717,775.96
	Total GHG emissions scope 1	tCO ₂ e	723,452.73	713,447.64	716,049.77	715,530.79
	Stationary combustion	tCO ₂ e	723,126.85	713,299.86	715,684.30	714,330.78
	Natural Gas	tCO ₂ e	723,126.81	713,299.80	715,676.10	714,314.93
	Diesel	tCO ₂ e	0.04	0.06	8.20	15.85
	Mobile combustion ⁴	tCO ₂ e	187.03	147.78	365.47	652.55
	Diesel	tCO ₂ e	177.77	139.61	345.18	564.68
	Gasoline	tCO ₂ e	9.26	8.17	20.29	87.87
	Sulfur hexafluoride: SF6 ⁵	tCO ₂ e	138.85	0.00	0.00	253.80
	Weight of sulfur hexafluoride: SF6	KG	5.91	0.00	0.00	10.80
GRI 305-1	Refrigerants	tCO ₂ e	ND	ND	ND	293.66
	Refrigerant R134a	tCO ₂ e	ND	ND	ND	0.00
		KG	ND	ND	ND	0.00
	Refrigerant R32	tCO ₂ e	ND	ND	ND	0.00
		KG	ND	ND	ND	0.00
	Refrigerant R410a	tCO ₂ e	ND	ND	ND	0.00
		KG	ND	ND	ND	0.00
Refrigerant R407C ⁶	tCO ₂ e	ND	ND	ND	293.66	
	KG	ND	ND	ND	180.80	

Remarks:

- ND means No Data Available

4. The increased in data coverage of GHG emissions indicators in 2022 led to increase GHG emissions from stationary combustion when compared to last year

5. The Company conducted maintenance activities in Nam Ngum 2 power plant in 2022, which lead to the use of SF6.

6. The Company conducted maintenance activities in Xayaburi power plant in 2022, which lead to the use of refrigerant R407C.



Disclosure	Performance	Unit	Year			
			2019	2020	2021	2022
	Biogenic emissions	tCO ₂ e	ND	ND	ND	0.00
	Stationary combustion: Diesel B7	tCO ₂ e	ND	ND	ND	0.00
	Mobile combustion: Diesel B7	tCO ₂ e	ND	ND	ND	0.00
	Total GHG emissions scope 2	tCO₂e	7,698.27	3,849.19	5,259.88	2,245.17
GRI 305-2	Purchased electricity GHG emissions scope 2 [Location-based]	tCO ₂ e	7,698.27	3,849.19	5,259.88	2,245.17
	Purchased electricity GHG emissions scope 2 [Market-based]	tCO ₂ e	7,698.27	3,849.19	5,259.88	2,245.17
	GHG emissions intensity					
GRI 305-4	Total energy generated ⁷	MWh	3,310,966.06	8,851,869.97	10,771,901.16	11,704,379.09
	GHG emissions scope 1 and 2 per total energy generated	tCO ₂ e/MWh	0.221	0.081	0.067	0.061
	GHG emissions scope 1 and 2 per total energy sold	tCO ₂ e/MWh	ND	ND	ND	0.063
GRI 305-6	Refrigerant R22	tCO ₂ e	ND	ND	ND	23.41
		KG	ND	ND	ND	13.30

Remarks:

- ND means No Data Available

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



Disclosure	Performance	Unit	Year			
			2019	2020	2021	2022
GRI 305-7	Other air emissions ⁸					
	Nitrogen oxides: NOx	PPM	ND	ND	ND	168.91
		KG	600,637.09	597,770.75	598,910.61	636,065.50
	Sulphur oxides: SOx	PPM	ND	ND	ND	1.16
		KG	18,555.05	17,258.39	24,398.44	34,192.07
	Persistent organic pollutants: POP	KG	ND	ND	ND	0.00
	Volatile organic compounds: VOC	KG	ND	ND	ND	0.00
	Hazardous pollutant: HAP	KG	ND	ND	ND	0.00
	Particulate matter: PM	PPM	ND	ND	ND	14.14
		KG	25,834.65	21,890.13	33,911.76	28,978.59
	Direct mercury emission	Metric ton	ND	ND	ND	0.00
	Other air emissions intensity					
	Nitrogen oxides: NOx	PPM per MWh	ND	ND	ND	0.000
		Kg per MWh	0.144	0.068	0.056	0.054
	Sulphur oxides: SOx	PPM per MWh	ND	ND	ND	0.000
		Kg per MWh	0.004	0.002	0.002	0.003
	Persistent organic pollutants: POP	Kg per MWh	ND	ND	ND	0.000
	Volatile organic compounds: VOC	Kg per MWh	ND	ND	ND	0.000
	Hazardous pollutant: HAP	Kg per MWh	ND	ND	ND	0.000
Particulate matter: PM	PPM per MWh	ND	ND	ND	0.000	
	Kg per MWh	0.006	0.002	0.003	0.002	
Direct mercury emission	tons per MWh	ND	ND	ND	0.000	
Avoided GHG emissions	tCO ₂ e	771,413.64	3,226,203.54	4,604,509.49	5,023,206.78	
-	Total renewable energy generated	MWh	1,729,626.99	7,299,103.04	9,210,861.16	10,048,423.25
	Grid emission factor for Thailand	tCO ₂ e/MWh	0.4460	0.4420	0.4999	0.4999

Remarks:

- ND means No Data Available

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



Water and Effluents

Disclosure	Performance	Unit	Year			
			2019	2020	2021	2022
GRI 303-3	Total water withdrawal from all areas ⁹	Million Liters	2,033.15	1,910.00	1,722.86	10,621.26
	Total water withdrawal from non-water stress areas	Million Liters	2,033.15	1,910.00	1,722.86	10,621.26
	Municipal water suppliers	Million Liters	2,033.15	1,910.00	1,722.85	1,837.46
	Surface water	Million Liters	ND	ND	0.01	8,783.80
	Groundwater	Million Liters	ND	ND	ND	0.00
	Water recycled and reused within the organization	Million Liters	ND	ND	ND	0.00
GRI 303-3	Total water withdrawal from water stress areas	Million Liters	0.00	0.00	0.00	0.00
	Municipal water suppliers	Million Liters	0.00	0.00	0.00	0.00
	Surface water	Million Liters	0.00	0.00	0.00	0.00
	Groundwater	Million Liters	ND	ND	ND	0.00
	Water intensity					
	Total water consumption from all areas per total energy generated	Million Liters /MWh	0.001	0.000	0.000	0.001
GRI 303-4	Total water discharged	Million Liters	407.81	381.44	344.56	9,042.01
	Municipal water suppliers	Million Liters	407.81	381.44	344.56	367.72
	Surface water	Million Liters	ND	ND	ND	8,674.29
	Groundwater	Million Liters	ND	ND	ND	0.00
GRI 303-5	Total water consumption	Million Liters	1,625.34	1,528.56	1,378.30	1,579.25

Remarks:

- ND means No Data Available

9. 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.



Waste

Disclosure	Performance	Unit	Year			
			2019	2020	2021	2022
GRI 306-3	Total waste generated ¹⁰	Metric ton	42.70	95.96	130.86	136.16
GRI 306-3	Total non-hazardous waste generated	Metric ton	14.82	87.16	114.11	120.53
GRI 306-4	Total non-hazardous waste diverted from disposal	Metric ton	0.00	15.40	29.19	14.82
GRI 306-5	Total non-hazardous waste directed to disposal	Metric ton	14.82	71.76	84.92	105.71
GRI 306-3	Total hazardous waste generated	Metric ton	27.88	8.80	16.75	15.62
GRI 306-4	Total hazardous waste diverted from disposal	Metric ton	26.41	4.84	5.03	4.60
GRI 306-5	Total hazardous waste directed to disposal	Metric ton	1.47	3.96	11.72	11.02
	Total waste diverted from disposal [on-site and off-site]	Metric ton	26.41	20.24	34.22	19.42
	Total hazardous waste diverted from disposal [on-site]	Metric ton	26.41	4.84	5.03	0.00
	- Preparation for reuse [on-site]	Metric ton	21.31	2.54	3.00	0.00
	- Recycling [on-site]	Metric ton	5.10	2.30	2.03	0.00
	- Other recovery operations [on-site]	Metric ton	0.00	0.00	0.00	0.00
	Total hazardous waste diverted from disposal [off-site]	Metric ton	0.00	0.00	0.00	4.60
	- Preparation for reuse [off-site]	Metric ton	0.00	0.00	0.00	0.00
	- Recycling [off-site]	Metric ton	0.00	0.00	0.00	0.00
GRI 306-4	- Other recovery operations [off-site]	Metric ton	0.00	0.00	0.00	4.60
	Total non-hazardous waste diverted from disposal [on-site]	Metric ton	0.00	0.00	14.58	9.20
	- Preparation for reuse [on-site]	Metric ton	0.00	0.00	14.58	0.00
	- Recycling [on-site]	Metric ton	0.00	0.00	0.00	0.00
	- Other recovery operations [on-site]	Metric ton	0.00	0.00	0.00	9.20
	Total non-hazardous waste diverted from disposal [off-site]	Metric ton	0.00	15.40	14.61	5.62
	- Preparation for reuse [off-site]	Metric ton	0.00	0.00	0.00	0.00
	- Recycling [off-site]	Metric ton	0.00	0.00	0.00	5.62
	- Other recovery operations [off-site]	Metric ton	0.00	15.40	14.61	0.00

Remarks:

10. The Company increased the data coverage of waste indicators to include the Company's Headquarter for the first time in 2022. Decline in COVID-19 in 2022 had caused the Company's activities and amount of waste to increase when compared to last year.



Disclosure	Performance	Unit	Year			
			2019	2020	2021	2022
GRI 306-5	Total waste directed to disposal [on-site and off-site]	Metric ton	16.29	75.72	96.64	116.74
	Total waste directed to disposal [on-site]	Metric ton	1.47	48.80	74.94	82.24
	Total hazardous waste directed to disposal [on-site]	Metric ton	1.47	2.46	9.19	0.00
	- Incineration with energy recovery [on-site]	Metric ton	0.00	0.00	0.00	0.00
	- Incineration without energy recovery [on-site]	Metric ton	0.00	2.02	6.83	0.00
	- Landfilling [on-site]	Metric ton	1.47	0.44	1.28	0.00
	- Other disposal operations [on-site]	Metric ton	0.00	0.00	1.08	0.00
	Total non-hazardous waste directed to disposal [on-site]	Metric ton	0.00	46.34	65.75	82.24
	- Incineration with energy recovery [on-site]	Metric ton	0.00	0.00	0.00	0.00
	- Incineration without energy recovery [on-site]	Metric ton	0.00	42.50	44.86	40.18
	- Landfilling [on-site]	Metric ton	ND	3.84	20.88	42.06
	- Other disposal operations [on-site]	Metric ton	0.00	0.00	0.00	0.00
	Total waste directed to disposal [off-site]	Metric ton	14.82	26.92	21.70	34.50
	Total hazardous waste directed to disposal [off-site]	Metric ton	0.00	1.50	2.53	11.02
	- Incineration with energy recovery [off-site]	Metric ton	0.00	0.00	0.00	10.50
	- Incineration without energy recovery [off-site]	Metric ton	0.00	0.00	0.00	0.02
	- Landfilling [off-site]	Metric ton	0.00	1.50	2.53	0.34
	- Other disposal operations [off-site]	Metric ton	0.00	0.00	0.00	0.17
	Total non-hazardous waste directed to disposal [off-site]	Metric ton	14.82	25.42	19.17	23.47
	- Incineration with energy recovery [off-site]	Metric ton	0.00	0.00	0.00	0.00
- Incineration without energy recovery [off-site]	Metric ton	14.82	13.92	19.17	14.35	
- Landfilling [off-site]	Metric ton	0.00	11.50	0.00	0.00	
- Other disposal operations [off-site]	Metric ton	0.00	0.00	0.00	9.12	