

Environmental performance							
ESG metrics	GRI STANDARD	List	Unit	2021	2022	2023	2024
E2.2C	GRI 302-1	Internal energy use					
	(1+2-3)	Total internal energy use/3	mega joule	2,254,789,189.86	2,153,700,259.81	2,007,170,527.80	2,017,439,727.82
		((non-renewable energy + renewable energy) - total	megawatt-hour	590,341.85	561,357.64	518,742.08	519,670.65
	(1+2+3)	Total internal energy use	mega joule	2,254,789,189.86	2,153,700,259.81	2,007,170,527.80	2,017,439,727.82
		(non-renewable energy + renewable energy)	megawatt-hour	590,341.85	561,357.64	518,742.08	519,670.65
	Ratio	Proportion of renewable energy use to total energy	%	75%	75%	67%	64%
		Proportion of non-renewable energy use to total energy	%	25%	25%	33%	36%
	1	Total internal non-renewable energy use	mega joule	567,790,604.79	540,418,868.11	653,380,487.93	723,315,497.64
			megawatt-hour	121,731.13	113,223.92	142,689.29	160,191.70
		Stationary combustion	mega joule	431,108,431.59	401,034,136.50	507,567,272.39	570,861,086.68
			megawatt-hour	119,752.34	111,398.37	140,990.91	158,572.52
		- LPG	mega joule	32,535.56	27,359.44	236,770.11	158,389.00
			kilogram	660.00	555.00	4,803.00	3,213.00
		- NGV	mega joule	422,393,744.28	400,606,074.62	504,700,334.19	565,504,965.96
			cubic feet	414,111,514.00	392,751,053.55	494,804,249.20	554,416,633.29
		- Fuel oil	mega joule	8,075,815.51	-	234,6231.15	496,997.36
			liter	203,063.00	-	58,995.00	124,968.00
		Other fuel (total)	mega joule	606,336.24	400,702.44	283,936.94	227,754.36
		- Gasoline	liter	0.00	949.93	0.00	0.00
		- Diesel	liter	16,632.00	10,162.00	7,777.00	6,233.00
		- Acetylene for construction and maintenance	kilogram	12.00	14.00	14.00	15.00
		Mobile combustion	mega joule	7,123,634.25	6,571,991.43	6,114,187.13	5,829,031.19
			megawatt-hour	1,978.79	1,825.55	1,698.39	1,619.18
		- Fuel oil (total)	mega joule	7,123,634.25	6,571,991.43	6,114,187.13	5,829,031.19
		- Gasoline	liter	1,079.35	2,223.97	5,558.31	4,290.41
		- Diesel	liter	194,663.82	178,527.75	163,075.55	156,341.82
		Total purchased electricity and steam used in the production process	mega joule	129,558,538.95	132,812,740.17	139,699,028.41	146,625,379.78
			megawatt-hour	35,988.48	36,892.43	38,805.29	40,729.27
		- Total purchased electricity from non-renewable energy source	mega joule	129,558,538.95	132,812,740.17	139,699,028.41	146,625,379.78
			megawatt-hour	35,988.48	36,892.43	38,805.29	40,729.27
		- Total purchased steam energy from non-renewable energy source	mega joule	0.00	0.00	0.00	0.00
			megawatt-hour	0.00	0.00	0.00	0.00
			ton	0.00	0.00	0.00	0.00
E2.3C	2	Total internal renewable energy use	mega joule	1,686,998,585.07	1,613,281,391.70	1,353,790,039.86	1,294,124,230.18
			megawatt-hour	468,610.72	448,133.72	376,052.79	359,478.95
		Electricity and steam energy purchase from external renewable energy source	mega joule	583,664,084.48	629,495,778.05	425,798,267.13	560,043,572.44
			megawatt-hour	162,128.91	174,859.94	118,277.30	155,567.66
		- Purchased steam energy from renewable energy source	mega joule	465,457,619.65	538,430,336.45	333,250,992.39	425,398,366.84
			megawatt-hour	129,293.78	149,563.98	92,569.72	118,166.21
			ton	168,425.60	194,830.74	120,586.70	153,930.18
		- Purchased electricity from solar cell	mega joule	8,533,778.83	9,018,828.00	11,776,665.60	15,401,160.00
			megawatt-hour	2,370.49	2,505.23	3,271.30	4,278.10

ESG metrics	GRI STANDARD	List	Unit	2021	2022	2023	2024
E2.3C	2	- Purchased electricity from biomass or biogas	mega joule	109,672,686.00	82,046,613.60	80,770,609.15	119,244,045.60
			megawatt-hour	30,464.64	22,790.73	22,436.28	33,123.35
		<b>Total produced electricity and steam energy from renewable energy source</b>	mega joule	1,103,334,500.59	983,785,613.65	927,991,772.73	734,080,657.74
			megawatt-hour	306,481.81	273,273.78	257,775.49	203,911.29
		- Electricity from solar cell	mega joule	0.00	0.00	0.00	3600.00
			megawatt-hour	0.00	0.00	0.00	1.00
		- Biogas (electricity/steam production from biogas)	mega joule	471,384,336.85	325,544,225.65	343,132,944.09	348,439,074.60
			megawatt-hour	130,940.09	90,428.95	95,314.71	96,788.63
			cubic feet	22,521,946.34	15,553,952.49	16,394,311.71	16,647,829.65
		- Biomass: chopped wood (electricity/steam production from biomass)	mega joule	587,052,158.94	553,393,432.80	568,773,510.24	291,378,947.55
			megawatt-hour	163,070.04	153,720.40	157,992.64	80,938.60
			kilogram	36,713,706.00	34,608,720.00	35,570,576.00	18,222,573.33
		- Biomass: husk (electricity/steam production from biomass)	mega joule	44,898,004.80	104,847,955.20	16,085,318.40	94,259,035.58
			megawatt-hour	12,471.67	29,124.43	4,468.14	26,183.07
			kilogram	3,117,917.00	7,281,108.00	1,117,036.00	6,545,766.36
	3	<b>Total produced renewable energy distribution (electricity, thermal energy)</b>	mega joule	0.00	0.00	0.00	0.00
			megawatt-hour	0.00	0.00	0.00	0.00
		- Non-renewable energy distribution (electricity/steam)	mega joule	0.00	0.00	0.00	0.00
			megawatt-hour	0.00	0.00	0.00	0.00
		- Renewable energy distribution (electricity/steam)	mega joule	0.00	0.00	0.00	0.00
			megawatt-hour	0.00	0.00	0.00	0.00
E2.5R	GRI302-3	<b>Energy use ratio per product unit</b>					
		Biodiesel and glycerin	megajoul/liter	1.79	1.91	2.00	1.86
		Ethanol	megajoul/liter	9.71	11.64	9.14	6.53

Note

1. Water management reporting scope of BBGI Public Company Limited Group 2024 covers company groups as follow:

- 1.1. BBGI Public Company Limited Head Office
- 1.2. BBGI Bioethanol Public Company Limited
- 1.3. BBGI Bioethanol (Chachoengsao) Company Limited
- 1.4. BBGI Biodiesel Company Limited
- 1.5. BBGI Utility and Power Company Limited

2. Thermal energy calculation is calculated from the fuel amount multiplied by the conversion factor according to the Department of Alternative

3. Calculate the energy value of biomass fuel (chopped wood and rice husk) for 2021 and 2022 from the wet weight of the fuel multiplied by the net calorific value. This is because the moisture percentage of the biomass fuel used is not collected.

4. Calculated from every business's total energy use difference and electrical power and steam distribution.

ESG metrics	GRI STANDARD	List	Unit	2021	2022	2023	2024
	GRI303-3	Total water withdrawal (1 megaliter = 1,000 cubic meters)					
		Total water withdrawal by source					
		Total water withdrawal	megaliter	3,129.60	2,562.73	2,705.72	3,172.99
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	3,129.60	2,562.73	2,705.72	3,172.99
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Surface water	megaliter	2,562.90	1,994.43	2,047.98	2,515.11
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	2,562.90	1,994.43	2,047.98	2,515.11
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Groundwater	megaliter	566.62	568.17	657.60	657.74
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	566.62	568.17	657.60	657.74
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Water from other processes	megaliter	0.000	0.000	0.000	0.000
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Water from other agencies (tap water)	megaliter	0.077	0.121	0.138	0.147
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	0.077	0.121	0.138	0.147
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		Total water resource withdrawal in water stress area	megaliter	1,496.14	1,428.46	1,609.40	1,617.96
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	1,496.14	1,428.46	1,609.40	1,617.96
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Surface water	megaliter	929.52	860.28	951.80	960.22
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	929.52	860.28	951.80	960.22
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Groundwater	megaliter	566.62	568.17	657.60	657.74
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	566.62	568.17	657.60	657.74
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Water from other processes	megaliter	0.000	0.000	0.000	0.000
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Water from other agencies (tap water)	megaliter	0.000	0.000	0.000	0.000

ESG metrics	GRI STANDARD	List	Unit	2021	2022	2023	2024	
		- Total other water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000	
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000	
	GRI303-4	Wastewater						
		Total wastewater in every area	megaliter	77.40	120.80	138.30	147.00	
		Total wastewater from factory	megaliter	0.00	0.00	0.00	0.00	
		- Surface water source	megaliter	0.00	0.00	0.00	0.00	
		- Groundwater source	megaliter	0.00	0.00	0.00	0.00	
		- External source (Send to external wastewater treatment)	megaliter	0.00	0.00	0.00	0.00	
		-Total water released (with the suspended or dissolved solid amount less than 1,000 mg/liter)	megaliter	0.00	0.00	0.00	0.00	
		-Total other water released (with the suspended or dissolved solid amount more than 1,000 mg/liter)	megaliter	0.00	0.00	0.00	0.00	
		Total water released from M-Tower (BBGI-HQ)	megaliter	77.40	120.80	138.30	147.00	
		- Surface water source	megaliter	0.00	0.00	0.00	0.00	
		- Groundwater source	megaliter	0.00	0.00	0.00	0.00	
		- External source (Send to external wastewater treatment)	megaliter	77.40	120.80	138.30	147.00	
		E3.5R	- Percentage of treated wastewater before releasing	megaliter	100%	100%	100%	100%
			- Total water released (with the suspended or dissolved solid amount less than 1,000 mg/liter)	megaliter	77.40	120.80	138.30	147.00
			- Total other water released (with the suspended or dissolved solid amount more than 1,000 mg/liter)	megaliter	0.00	0.00	0.00	0.00
			Total wastewater in water stress area (water stress areas)	megaliter	0.00	0.00	0.00	0.00
			- Total water released (with the suspended or dissolved solid amount less than 1,000 mg/liter)	megaliter	0.00	0.00	0.00	0.00
			- Total other water released (with the suspended or dissolved solid amount more than 1,000 mg/liter)	megaliter	0.00	0.00	0.00	0.00
E3.2C	GRI303-5		Total water consumption (total water consumption - total water released in every area)					
		- Total water consumption	megaliter	3,052.20	2,441.93	2,567.42	3,025.99	
		- Total water consumption in water stress area	megaliter	1,496.14	1,428.46	1,609.40	1,617.96	
E3.4R	-	Water consumption ratio per product unit (per million liters)						
		Biodiesel	megaliter/ megaliter	1.08	1.14	1.15	0.95	
		Glycerin	megaliter/ megaliter	4.06	3.80	2.97	3.79	
		Ethanol	megaliter/ megaliter	15.59	15.71	16.09	13.91	

## Note

1. Water management reporting scope of BBGI Public Company Limited Group 2024 covers company groups as follow:

- 1.1. BBGI Public Company Limited Head Office
- 1.2. BBGI Bioethanol Public Company Limited
- 1.3. BBGI Bioethanol (Chachoengsao) Company Limited
- 1.4. BBGI Biodiesel Company Limited
- 1.5. BBGI Utility and Power Company Limited

2. Total surface water and groundwater withdrawal is collected from water meter reading.

3. Total water withdrawal from third party is collected from waterworks invoice.

ESG metrics	GRI STANDARD	List	Unit	2021	2022	2023	2024
	GRI305-1	Direct greenhouse gas emission from the production process (scope 1)			base year		
		Direct greenhouse gas emission from the production	tCO2e	46,329	60,846	52,613	39,568
		- Carbon dioxide (CO2 )	tCO2e	24,993	23,083	29,931	32,751
		- Methane (CH4 )	tCO2e	20,854	37,006	21,009	5,790
		- Nitrous oxide (N2 O)	tCO2e	424	440	453	441
		- HFCs leakage	tCO2e	57	241	1,106	334
	Separate report	- Carbon dioxide from biogenic (Biogenic CO2)	tCO2e	-	76	113	252
		- Other Biogenic	tCO2e	42	184,116	187,491	230,121
		- R22 leakage	tCO2e	179,956	-	-	-
	GRI305-2	Indirect greenhouse gas emission from electricity, steam, and biogas purchase (scope 2)					
		Indirect greenhouse gas emission from electricity,	tCO2e	18,446	22,046	22,932	22,195
		- Carbon dioxide (CO2 )	tCO2e	18,446	22,046	22,932	22,195
		- Methane (CH4 )	tCO2e	0	0	0	0
		- Nitrous oxide (N2 O)	tCO2e	0	0	0	0
		- Carbon dioxide from biogenic (Biogenic CO2)	tCO2e	0	0	0	0
		- Other Biogenic	tCO2e	0	0	0	0
E5.2C		Total greenhouse gas emission (scope 1+2)					
		Total greenhouse gas emission (scope 1+2)	tCO2e	64,775	82,892	75,545	61,763
	GRI305-3	Other related indirect greenhouse gas emission (scope 3)					
		Other related indirect greenhouse gas emission	tCO2e	N/A	258,691	328,207	424,024
		Upstream	tCO2e	N/A	254,900	323,121	416,354
		- Cat.1 Product and service purchase (raw material	tCO2e	N/A	240,231	303,989	389,138
		- Cat.4 Upstream product transportation and distribution (raw material transportation)	tCO2e	N/A	12,687	17,304	24,293
		- Cat.4 Waste transportation	tCO2e	N/A	1,982	1,827	2,900
		- Cat.6 Business travel	tCO2e	N/A	-	-	-
		- Cat.7 Employee's commuting between home and workplace	tCO2e	N/A	-	-	-
		Downstream	tCO2e	N/A	3,791	5,086	7,669
		- Cat.9 Downstream product transportation and distribution (product transportation)	tCO2e	N/A	3,791	5,086	5,660
E5.5R		Total greenhouse gas emission (scope 1+2+3)					
		Total greenhouse gas emission (scope 1+2+3)	tCO2e	N/A	341,583	403,752	485,787
		Separate greenhouse gas emission by establishment					
		Total direct greenhouse gas emission from the	tCO2e	46,329	60,846	52,613	39,568
		Total direct greenhouse gas emission from the	tCO2e	18,446	22,046	22,932	22,195
		Total other related indirect greenhouse gas emission	tCO2e	N/A	258,691	328,207	422,091
		BBGI Public Company Limited Head Office					
		Direct greenhouse gas emission from the production	tCO2e	N/A	8	11	10
		Direct greenhouse gas emission from the production	tCO2e	N/A	48	49	59
		Other related indirect greenhouse gas emission (scope 3)	tCO2e	N/A	1	2	3

ESG metrics	GRI STANDARD	List	Unit	2021	2022	2023	2024
		BBGI Biodiesel Company Limited			base year		
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	25,222	26,774	32,850	34,632
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	8,581	9,118	10,682	9,298
		Other related indirect greenhouse gas emission (scope 3)	tCO <sub>2</sub> e	N/A	208,294	284,538	322,468
		BBGI Bioethanol (Chachoengsao) Company Limited					
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	1,100	1,169	1,203	1,144
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	8,680	9,244	8,852	9,107
		Other related indirect greenhouse gas emission (scope 3)	tCO <sub>2</sub> e	N/A	13,471	8,745	6,592
		BBGI Bioethanol Public Company Limited (Bo Ploi)					
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	19,432	19,519	148	141
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	3,560	733	1,153	787
		Other related indirect greenhouse gas emission (scope 3)	tCO <sub>2</sub> e	N/A	N/A	33,736	31,069
		BBGI Bioethanol Public Company Limited (Nam Phong)					
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	488	24,073	13,261	1,560
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	452	1,571	1,770	2,424
		Other related indirect greenhouse gas emission (scope 3)	tCO <sub>2</sub> e	N/A	3,169	3,882	35,461
		BGI Utility and Power Company Limited (Bo Ploi)					
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	-	8,637	4,904	1,456
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	-	30	51	-
		Other related indirect greenhouse gas emission (scope 3)	tCO <sub>2</sub> e	-	20	326	76
		BGI Utility and Power Company Limited (Nam Phong)					
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	-	-	194	52
		Direct greenhouse gas emission from the production	tCO <sub>2</sub> e	-	-	-	-
		Other related indirect greenhouse gas emission (scope 3)	tCO <sub>2</sub> e	-	-	7	7
E5.6R	GRI305-4	Greenhouse gas emission ratio per product unit					
		BBGI Biodiesel Company Limited	tCO <sub>2</sub> e/mil. Litre	135	163	150	127
		BBGI Bioethanol (Chachoengsao) Company Limited	tCO <sub>2</sub> e/mil. Litre	202	227	209	188
		BBGI Bioethanol Public Company Limited (Bo Ploi)	tCO <sub>2</sub> e/mil. Litre	220	42	34	22
		BBGI Bioethanol Public Company Limited (Nam Phong)	tCO <sub>2</sub> e/mil. Litre	23	562	345	76
		BGI Utility and Power Company Limited (Bo Ploi)	tCO <sub>2</sub> e/mil. Nm <sup>3</sup>	-	1,293	745	85
		BGI Utility and Power Company Limited (Nam Phong)	tCO <sub>2</sub> e/mil. Nm <sup>3</sup>	-	-	38	4

## Note

1. Greenhouse gas account reporting scope of BBGI Public Company Limited Group 2024 covers company groups as follow:

- 1.1. BBGI Public Company Limited Head Office
- 1.2. BBGI Bioethanol Public Company Limited
- 1.3. BBGI Bioethanol (Chachoengsao) Company Limited
- 1.4. BBGI Biodiesel Company Limited
- 1.5. BBGI Utility and Power Company Limited

2. Greenhouse gas report, scope 1 and 2, calculated from the Company's calculation tool, which uses IPCC 2006 calculation principle.

3. Greenhouse gas emission scope 1 calculation uses emission factors from IPCC 2006 and the API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry 2009

4. Greenhouse gas emission scope 2 calculation uses emission factors of electricity consumption from the Energy Policy and Planning Office, Ministry of Energy.

5. Greenhouse gas emission scope 3 calculation uses emission factors according to TGO's database, with reference to Thai National LCI Database, TIIS-MTEC-NSTDA.

6. Greenhouse gas emission reporting scope 3 in 2022 reports 3 categories based on the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard, i.e.

Category 1: Purchased goods – raw materials  
Category 4:Transportation of raw materials  
Category 9:Transportation of products  
Category 9:Transportation of waste

- 7. Fuel to energy conversion uses calorific value from the Department of Alternative Energy Development and Efficiency.
- 8. Since 2022 Global Warming Potentials ( GWP) uses IPCC Fifth Assessment Report (AR5) values from the Greenhouse Gas Protocol.
- 9. Gases included in the calculation are CO2, CH4, N2O.
- 10. GHG Intensity is calculated from Scope 1 and Scope 2 only.
- 11. BBGI Public Company Limited Group has disclosed greenhouse gas account report covering the scope of operations in every business group. The verification results are verified and certified by Third-party in 2022. Therefore, 2022 is the base year.

ESG metrics	GRI STANDARD	List	Unit	2022	2023	2024
EUT-E3.1	GRI 305-7	Releasing air pollution				
		Particulate matter from combustion (TSP)(a)	Metric tons/year	6.61	2.11	4.27
		nitrogen oxide (from combustion) (NOx)(a)	Metric tons/year	58.25	54.27	30.59
		sulfur dioxide (from combustion) (SOx)(a)	Metric tons/year	11.76	15.01	69.81
		Carbon monoxide (CO)(a)	Metric tons/year	60.77	35.72	63.16

Note

- 1. Waste management reporting scope of BBGI Public Company Limited Group 2024 covers company groups as follow:
  - 1.1. BBGI Public Company Limited Head Office
  - 1.2. BBGI Bioethanol Public Company Limited
  - 1.3. BBGI Bioethanol (Chachoengsao) Company Limited
  - 1.4. BBGI Biodiesel Company Limited
  - 1.5. BBGI Utility and Power Company Limited
- 2. Waste disposal method and quantity from the letter notifying the request results to remove waste or unused materials outside

Contaminant type	Air contaminants amount from fuel combustion (biomass)
TSP (mg/m3)	≤320 mg/m3 or 84 ton/Y*
SO2 (ppm)	≤60 ppm or 41 ton/Y*
NO2 (ppm)	≤200 ppm or 100 ton/Y*
CO (ppm)	≤690 ppm or 208 ton/Y*

\* Emission/Poluution (Ton) = [(Emission concentrantion x MW/24.45) Volumetric gas flow rate (Nm3/hr) x Hours Emitted (Hour/Year) / (10^9)  
; Emission concentration หน่วย ppm at % O2 Actual  
; MW ; Nox = 30 SO2 = 40 , TPS = 50, CO = 60  
  
With Flowrate = 30,000 Nm3/hr and Operation Hour = 8,760 Hour/Year  
  
\* Since 2022-2023, BBGI Public Company Limited Group has not released air pollutants exceeding the standard according to the announcement of the Ministry of Industry on determination of contaminant amount in the air released from the factory B.E. 2549

ESG metrics	GRI STANDARD	List	Unit	2021	2022	2023	2024
E4.2C	GRI 306-3 (HW+NHW)	<b>Waste classified by type and management measure (* HW - hazardous waste, NHW - non-hazardous waste)</b>					
		Total amount of waste generated/1	Metric tons/year	2,309,426	1,804,919	1,247,791	1,465,901
		- Total amount of hazardous waste	Metric tons/year	338	594	51	54
		- Total amount of non-hazardous waste	Metric tons/year	2,309,088	1,804,325	1,247,740	1,465,847
		Proportion of waste that is not disposed by landfill	%	100.00%	100.00%	100.00%	100.00%
		% The amount of waste that is not disposed by landfill)					
		- Reused and recycled waste (recycling, compost, animal feed)	%	91.19%	88.76%	75.88%	74.24%
		- Waste that is disposed by other measures	%	8.52%	10.95%	23.62%	25.27%
		- Waste that is disposed by conversion back to fuel energy (alternative fuel/mixed fuel)	%	0.29%	0.29%	0.50%	0.49%
		- Waste that is disposed without reusing energy	%	0.00%	0.00%	0.00%	0.00%
		- Waste that is disposed by other disposal measures	%	0.00%	0.00%	0.00%	0.00%
		- Landfill	%	0.00%	0.00%	0.00%	0.00%
E4.4R	GRI 306-4	<b>Waste that is managed (not by landfill)</b>					
		Total amount of waste during management process (not by landfill)	Metric tons/year	2,302,809	1,799,683	1,241,508	1,458,710
		- Total amount of hazardous waste during management process that is not by landfill	Metric tons/year	1.12	102.61	0.42	5.08
		- Total amount of non-hazardous waste during management process that is not by landfill	Metric tons/year	2,302,808	1,799,580	1,241,508	1,458,705
		Total amount of hazardous waste during management process that is not by landfill - outside/inside establishment	Metric tons/year	1.12	103	0.42	5.08
		- Preparation for reuse	Metric tons/year	0.20	0.08	0.00	0.00
		- Recycling - outside establishment	Metric tons/year	0.92	103	0.42	5.08
		- Enter into the recovery process to reuse	Metric tons/year	0.00	0.00	0.00	0.00
		Total amount of hazardous waste during management process that is not by landfill - outside/inside establishment	Metric tons/year	2,302,808	1,799,580	1,241,508	1,458,705
		- Preparation for reuse	Metric tons/year	0.00	0.00	0.00	0.79
		- Recycling - outside establishment	Metric tons/year	42	66	44	108
		- made into fertilizer - inside establishment	Metric tons/year	2,105,785	1,601,902	946,090	1,078,046
		- animal feed - outside establishment	Metric tons/year	127	13	707	10,180
		- Enter into the recovery process to reuse (biological treatment) - outside establishment	Metric tons/year	196,854	197,600	294,666	370,371
	GRI 306-5	<b>Direct disposed waste</b>					
		Total amount of direct disposed waste	Metric tons/year	6,617	5,236	6,283	7,191
		- Total amount of direct disposed hazardous waste	Metric tons/year	337	492	51	49
		- Total amount of direct disposed non-hazardous waste	Metric tons/year	6,280	4,744	6,232	7,142
		Total amount of direct disposed hazardous waste	Metric tons/year	337	492	51	49
		- * <sup>DIW</sup> combustion (reusing energy: alternative fuel / mixed fuel) - outside establishment	Metric tons/year	337	490	50	49
		- Combustion (not reusing energy)	Metric tons/year	0.00	1.45	0.68	0.06
		- Landfill	Metric tons/year	-	0.01	0.05	0.13



ESG metrics	GRI STANDARD	List	Unit	2021	2022	2023	2024
	GRI 306-5	- Other disposal measures	Metric tons/year	0.00	0.00	0.00	0.00
		- Total amount of direct disposed non-hazardous waste	Metric tons/year	6,280	4,744	6,232	7,142
		- outside / inside establishment					
		- * <sup>DIW</sup> combustion (reusing energy: alternative fuel / mixed fuel)	Metric tons/year	6,280	4,744	6,223	7,118
		- Combustion (not reusing energy)	Metric tons/year	0.00	0.06	0.03	0.03
		- landfill - outside establishment	Metric tons/year	0.50	0.00	0.00	0.00
		- Other disposal measures	Metric tons/year	0.00	0.00	9	24
	* Additional clarification on hazardous waste management						
According to the announcement of the Department of Industrial Works (DIW), BBGI Public Company Limited Group has complied with the announcement of the Department of Industrial Works 2007, waste or unused materials management principles and procedures, B.E. 2550, B.E. 2551 and the Hazardous Substance Act B.E. 2535 and waste management has been classified and managed according to the announcement of the Ministry of Industry regarding the Hazardous Substance Act B.E. 2535 and waste or unused materials disposal, B.E. 2548. Waste management can be classified into 8 methods: Method 01 Segregation for resale, Method 02 Storing in containers, Method 03 Reusing, Method 04 Reusing for further use, Method 05 Recovery, Method 06 Treatment, Method 07 Disposal, and Method 08 Other management methods.							
	* <sup>DIW</sup>	Amount of direct disposed hazardous waste <sup>/1</sup>	Metric	338.22	490.39	49.82	49.76
	04	Recycling (disposal code 042,041 and 044)					
		- 041: Used as alternative fuel	Metric	0.00	0.00	0.00	0.00
		- 042: Used as mixed fuel	Metric	338	490	50	50
		- 044: as alternative raw material in cement kiln	Metric	0.00	0.00	0.00	0.00
	* <sup>DIW</sup>	Amount of direct disposed non-hazardous waste <sup>/1</sup>	Metric	6016.53	4744.16	5210.35	7158.23
	04	Recycling (disposal code 042,041 and 044)					
		- 041: Used as alternative fuel	Metric	3,452	2,747	-	-
		- 042: Used as mixed fuel	Metric	2,549	1,997	5,168	7,118
		- 044: as alternative raw material in cement kiln	Metric	15	-	43	40

**Note**

1. Waste management reporting scope of BBGI Public Company Limited Group 2024 covers company groups as follow:

- 1.1. BBGI Public Company Limited Head Office
- 1.2. BBGI Bioethanol Public Company Limited
- 1.3. BBGI Bioethanol (Chachoengsao) Company Limited
- 1.4. BBGI Biodiesel Company Limited
- 1.5. BBGI Utility and Power Company Limited

2. Waste disposal method and quantity from the letter notifying the request results to remove waste or unused materials outside the factory area. Department of Industrial Works and waste transportation document.