Environmental Performance during 2016-2019

GRI Standards	Performance	Unit	2016	2017	2018	2019
Energy						
GRI 302-1	Total energy consumption within the organization	million GJ	9.59	10.35	10.92	11.06
	Non-renewable energy	million GJ	3.25	3.51	3.48	3.43
	- Coal	million GJ	0.82	0.89	0.76	0.65
	- Fuel oil	million GJ	0.55	0.55	0.72	0.86
	- Diesel	million GJ	0.32	0.35	0.33	0.29
	- Gasoline	million GJ	0.02	0.02	0.02	0.02
	- LPG	million GJ	0.27	0.30	0.27	0.27
	- Natural gas	million GJ	1.27	1.40	1.38	1.36
	Renewable energy	million GJ	1.98	2.21	2.69	2.88
	- Biodiesel	million GJ	0.00	0.00	0.00	0.01
	- Rice husk	million GJ	0.00	0.00	0.01	0.00
	- Corn cob	million GJ	0.18	0.18	0.19	0.05
	- Palm kernel shells	million GJ	0.02	0.02	0.15	0.07
	- Fire wood/ scrap wood/ woodchips	million GJ	0.99	1.18	1.47	1.58
	- Sawdust	million GJ	0.09	0.13	0.11	0.07
	- Charcoal	million GJ	0.01	0.00	0.01	0.05
	- Cashew nutshell	million GJ	0.02	0.01	0.00	0.01
	- Biogas	million GJ	0.61	0.59	0.71	1.02
	- Solar Energy	million GJ	0.00	0.00	0.00	0.00
	- Others	million GJ	0.05	0.07	0.04	0.01
	Electricity purchased	million kWh	1,212	1,285	1,319	1,317
		million GJ	4.36	4.63	4.75	4.74
GRI 302-3	Energy per production unit	GJ/ton of products	1.24	1.23	1.30	1.32

Environmental Performance during 2016-2019

GRI Standards	Performance	Unit	2016	2017	2018	2019
Greenhouse Gas Emissions						
-	Direct and Indirect GHG emissions (Scope 1 + 2)	million tons CO_2e	0.91	0.92	0.92	0.84
GRI 305-1	Direct GHG emissions (Scope 1)	million tons CO_2e	0.24	0.26	0.25	0.25
GRI 305-2	Indirect GHG emissions (Scope 2)	million tons CO_2e	0.67	0.67	0.67	0.59
GRI 305-2	Indirect GHG emissions (Scope 2) - Gross location-based Energy	million tons CO_2e	ND	ND	ND	0.56
GRI 305-2	Indirect GHG emisison (Scope 2) - Gross market-based Enery	million tons CO_2e	ND	ND	ND	0.03
GRI 305-4	Direct and Indirect GHG emissions per production unit (Scope 1 + 2)	kg CO_2e/ ton of products	117.01	110.00	109.31	100.71
-	Biogenic GHG emissions	million tons CO_2e	0.18	0.20	0.25	0.26
Water						
GRI 303-1	Total water withdrawal	million m^3	195.14	174.2	154.77	145.69
	- Surface water	million m^3	143.18	137.91	119.89	108.95
	- River	million m^3	17.50	18.66	17.76	22.18
	- Canal	million m^3	76.54	86.29	73.37	67.31
	- Seawater	million m^3	44.38	28.20	24.74	18.40
	- Other surface water sources	million m^3	4.76	4.76	4.02	1.06
	- Groundwater	million m^3	16.51	15.98	19.50	21.69
	- Rainwater	million m^3	27.11	10.85	7.62	6.79
	- Wastewater from outside	million m^3	0.00	0.00	0.00	0.00
	- Municipal water supply	million m^3	6.57	6.49	6.65	7.31
	- Purchased water (excluding drinking water)	million m^3	1.77	2.97	1.11	0.95
	Water withdrawal per production unit	m^3/ton of products	25.17	20.71	18.40	17.40
GRI 303-3	Recycled and reused water	million m^3	24.16	24.15	27.64	30.39
		percentage of total water withdrawal	12.38	13.86	17.86	20.86

Environmental Performance during 2016-2019

GRI Standards	Performance	Unit	2016	2017	2018	2019
Wastewater						
GRI 306-1	น้ำที่ปล่อยออกสู่ภายนอก/ Water discharge					
	Total water discharge	million m^3	94.41	100.87	93.17	68.56
	- Sea	million m^3	29.60	27.00	23.32	12.84
	- River	million m^3	7.16	8.24	9.04	8.93
	- Canal	million m^3	51.32	56.23	50.39	42.59
	- Public waterway	million m^3	4.34	8.40	6.23	3.51
	- Others (Not discharged water from swine farms used in farmer's agricultural areas)	million m^3	1.99	0.99	4.19	0.69
	Quality of discharged water					
	BOD value					
	- Livestock feed business	mg/L	ND	ND	24.75	10.25
	- Aquatic feed business	mg/L	ND	ND	10.41	3.92
	- Broiler business	mg/L	ND	ND	9.11	12.28
	- Poultry business	mg/L	ND	ND	ND	31.54
	- Duck business	mg/L	ND	ND	14.09	19.12
	- Swine business	mg/L	ND	ND	14.81	21.00
	- Aquatic animal farm business	mg/L	ND	ND	4.68	4.31
	- Food business	mg/L	ND	ND	7.60	7.18
	- Processing business	mg/L	ND	ND	ND	11.25
	- Five star and restaurant business (Production plants)	mg/L	ND	ND	30.23	12.75
	Nitrogen value					
	- Livestock feed business	mg/L	ND	ND	29.35	9.00
	- Aquatic feed business	mg/L	ND	ND	49.43	4.81
	- Broiler business	mg/L	ND	ND	24.37	40.82
	- Poultry business	mg/L	ND	ND	ND	33.40
	- Duck business	mg/L	ND	ND	6.84	8.23
	- Swine business	mg/L	ND	ND	31.74	15.38
	- Aquatic animal farm business	mg/L	ND	ND	2.14	1.95
	- Food business	mg/L	ND	ND	5.18	12.59

Environmental Performance during 2016-2019

GRI Standards	Performance	Unit	2016	2017	2018	2019
	- Processing business	mg/L	ND	ND	ND	3.70
	- Five star and restaurant business (Production plants)	mg/L	ND	ND	14.35	9.67
	- BOD quantity	thousand tons	0.58	1.18	0.49	0.38
	- Nitrogen quantity	thousand tons	0.49	0.55	0.45	0.56
Waste						
GRI 306-2	Total waste generated	million tons	0.44	0.51	0.93	0.92
	Total non-hazardous waste generated	thousand tons	384.63	513.29	928.10	917.89
	- Reused	thousand tons	1.14	2.81	2.86	0.40
	- Recycled	thousand tons	13.73	20.49	21.74	26.45
	- Composting	thousand tons	333.20	367.10	799.50	813.17
	- Used as animal feed	thousand tons	ND	73.33	62.92	54.33
	- Used as composite materials	thousand tons	ND	0.26	5.48	2.25
	- Incineration	thousand tons	2.62	2.07	1.59	1.08
	- Landfill	thousand tons	23.22	28.38	24.06	18.71
	- Stored in packaging containers	thousand tons	ND	0.44	0.07	ND
	- Used as dual fuel	thousand tons	ND	0.26	0.08	1.50
	- Stored in the operation units	thousand tons	ND	0.05	0.00	ND
	- Stored in the operation units to be disposed	thousand tons	10.72	18.10	9.80	ND
	Total hazardous waste generated	thousand tons	1.16	1.81	1.12	0.66
	- Reused	thousand tons	0.27	0.28	0.06	0.02
	- Recycled	thousand tons	0.64	0.69	0.75	0.51
	- Incineration	thousand tons	0.07	0.07	0.07	0.02
	- Landfill	thousand tons	0.13	0.37	0.24	0.11
	- Stored in the operation units to be disposed	thousand tons	0.05	0.40	0.00	ND
	Waste disposed by landfill and incineration	thousand tons	26.04	30.89	25.96	19.92
	Waste disposed by landfill and incineration per production unit	kg/ton of products	3.36	3.67	3.08	2.38

Remark:

- ND = No Data
- The calculation is in accordance with CPF SHE&En Key Performance Indices (CPF SHE&EN KPIs) (GRI 302-1)

- o Total fuel consumption = the sum of (the consumption of each fuel type X heating value)
  Unit: *GJ per month (the conversion factors are based on Department of Alternative Energy Development and Efficiency's annual report)*
- o Electricity consumption = the sum of electricity consumption (in kWh) X 3.6
  Unit: *GJ per month*
- o Total energy consumption = total fuel consumption + total electricity consumption
  Unit: *GJ per month*

- Energy types included in the calculation of intensity per production ton are non-renewables including coal, fuel oil, diesel, gasoline, LPG, and natural gas as well as renewables including biogas, biomass (such as rice husk, corn cob, palm kernel shells, fire wood/ scrap wood/ woodchips, sawdust, charcoal and cashew nutshell, etc.) and biodiesel, and electricity within the organization only (GRI 302-3)
- The chosen consolidation approach for greenhouse gas emissions is operational control (GRI 305-1 and GRI 305-2)
- Reporting of the greenhouse gas emissions covers CO_2, CH_4, and N_2O. The Global Warming Potential (GWP) used in the calculation is referred to the given values of IPCC, while the emission fators are referred to information from Greenhouse Gas Management Organization (Public Organization), and Energy Policy and Planning Office, Ministry of Energy (GRI 305-1, GRI 305-2, and GRI 305-4)
- GHG scope 1 includes GHG emisions from fuel combustion only, but excludes biogas combustion from flaring (GRI 305-1 and GRI 305-4)
- Reporting scope of GHG intensity includes only GHG scopes 1 and 2 (GRI 305-4)
- Total water consumption is calculated using data from water meters, water bills, flow rates of water pumps, and average volume of rainwater from Meteorological Department (GRI 303-1: 2016 Version)
- Total reused / recycled water volume is calculated using the data from water meters and flow rates of water pumps (GRI 303-3: 2016 Version)
- Biochemical Oxygen Demand (BOD) value measures the amount of oxygen required or consumed for the microbiological decomposition of organic material in water, used for measuring water quality (GRI 306-1)
- BOD and Total Kjeldahl Nitrogen (TKN) values are derived from the results from sources of wastewater, analyzed by a laboratory certified by ISO/IEC 17025 (GRI 306-1)
- BOD quantity = volume of discharged water X average BOD intensity (GRI 306-1)
- TKN quantity = volume of discharged water X average nitrogen intensity (GRI 306-1)
- Wastewater data is collected from water meters for business units with Online BOD installed, and from wastewater volume assessment from the efficiency of wastewater pumps, for business units without water meters (GRI 306-1)
- Approaches to treating wastewater include: (GRI 306-1)
  - o In Feed business, wastewater from aquatic feed mills is treated using activated sludge process
  - o In Farm business, wastewater from swine farms is treated by anaerobic digestion, followed by in oxidation ponds, while wastewater from aquatic animal farms is treated in oxidation ponds
  - o In Food business, wastewater from food factories is treated using activated sludge process.
- Non-hazardous and hazardous waste stored within our facilities was cumulative sum from previous years (GRI 306-2)
- Total waste generated was the sum of total non-hazardous and hazardous waste generated during the year.
  Amount of waste stored within our facilities during the year = cumulative waste stored during the current year – cumulative waste stored during the previous year (GRI 306-2)
- Waste disposal information was obtained from disposal method or waste manifest provided by waste disposer (GRI 306-2)
- In 2016-2017, the amount of discharged water from swine farms used in farmers' agricultural areas was reported as water discharge to others. Since 2018, this discharged water is defined as waste for composting.
- The amounts of waste disposed by others method in 2016 at 54.32 thousand tons had not been reported in the table since it cannot be specified as disposal method listed in the table.
- The amounts of waste stored in the operation units to be disposed in 2016-2017 had been re-calculated.