JSDA Standard for Calculating Greenhouse Gas Emissions Related to Steel Drums

Technical Committee

Japan Steel Drum Association

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1. Outline

1.1 Establishment

This standard was developed to standardize among industry peers the calculation method of greenhouse gas (CO_2) emissions from the manufacture of 200L steel drums based on the emissions calculation guidelines of the Green Value Chain Platform,*1 an information platform operated by the Ministry of the Environment and the Ministry of Economy, Trade and Industry. Developed by a working group formed by the Japan Steel Drum Association (JSDA), this standard was drafted in March 2024 and approved and established by the Technical Committee in the same month.

*1 https://www.env.go.jp/earth/ondanka/supply_chain/gvc/index.html

1.2 Scope of Application

1) Target drums

This standard applies to 200L tight head steel drums and 200L open head steel drums.

2) Calculation items

Supply chain calculations shall be made for each of the following categories.

(i) Scope 1

Greenhouse gases directly emitted by the company of interest (city gas, kerosene, diesel oil, etc.)

(ii) Scope 2

Greenhouse gases indirectly emitted by the company of interest (electricity, steam, etc.)

(iii) Scope 3

Major greenhouse gases emitted after purchasing raw materials and selling products (bung caps, steel, and paint)

2. Calculation Method

2.1 Reference Databases

For calculation, download the latest list of data for each category from the following websites.

(i) Scope 1

Ministry of the Environment: https://ghg-santeikohyo.env.go.jp/calc
List of Calculation Methods and Emission Factors for Calculation, Reporting, and Publication Systems

(ii) Scope 2

Ministry of the Environment: https://ghg-santeikohyo.env.go.jp/calc
List of Emission Factors for Specific Electric Utilities

(iii) Scope 3

Green Value Chain Platform of the Ministry of the Environment and the Ministry of Economy, Trade and Industry
https://www.env.go.jp/earth/ondanka/supply_chain/gvc/estimate.html
Emissions Intensity Database for Calculating an Organization's Greenhouse Gas Emissions Throughout its Supply Chain

2.2 Emission Factors

1) Scope 1

For fuels other than city gas, select a value for each fuel type used from the List of Calculation Methods and Emission Factors for Calculation, Reporting, and Publication Systems described in 2.1. Values for city gas shall be determined by referring to the website of each gas utility.

2) Scope 2

For electricity use, select a value from the contract menu of the relevant electric utility from the List of Emission Factors for Specific Electric Utilities described in 2.1. Normally, select the value of "Menu X (residual)." For industrial steam, use a value for industrial steam in the List of Calculation Methods and Emission Factors for Calculation, Reporting, and Publication Systems.

3) Scope 3

Use the following emission factors to calculate emissions for bung caps, steel plates, and paint as main supply chain items.

(i) Bung cap: 0.00059 t-CO_2/set (Calculated by the bung cap manufacturer)

(ii) Steel plate: 2.13 t-CO_2/t (*)
(iii) Paint: 2.30 t-CO_2/t (*)

* Quoted from "[5] Industry-related table-based emissions intensity" in the Emissions Intensity Database for Calculating an Organization's Greenhouse Gas Emissions Throughout its Supply Chain (Ver. 3.3, Excel, 6.72 MB) described in 2.1 (No. 165 cold-finished steel for steel plates, and No. 129 paint for paint).

2.3 Calculation

The annual CO_2 emissions are calculated by multiplying the emission factor obtained in 2.2 by the annual usage for each item and adding the products up (Annex 1).

[Appendix 1] CO_2 Emissions Calculation Form

[1] Scopes 1 and 2						
	Energy	Unit	CO_2 emissions per unit		Amount used	t-CO_2
	Volatile oil (gasoline)	kl	2.29	t-CO2/kl		
	Kerosene	kl	2.50	t-CO_2/kl		
	Light oil	kl	2.62	t-CO_2/kl		
	Liquefied petroleum gas (LPG)	t	2.99	t-CO2/t		
	Coke oven gas	1000 m3	0.735	t-CO2/1000 m3		
	City gas (Example: TOKYO GAS)	1000 m3	2.19	t-CO2/1000 m3		
	Electric quantity (Example: TEPCO Energy Partner, Inc.)	MWh	0.390	t-CO2/MWh		
	Industrial steam	GJ	0.0654	t-CO_2/GJ		
	(i) CO_2 emissions					
[2] Scope 3						
	Target component	Unit	CO_2 emissions per unit		Amount used	t-CO_2
	Calculated emissions for supply chain					
	Closure (1 set/drum)	set	5.9×10^{-4}	t−CO_2/set		
	Quoted from GVCP emissions intensity database of the Ministry of the Environment					
	Paint (per unit basis: 0.12 kg/drum)	t	2.30	t-CO_2/t		
	Cold-rolled steel (per unit basis: 21 kg/drum)	t	2.13	t-CO_2/t		
	(ii) CO_2 emissions					
	(i) CO_2 emissions + (ii) CO_2 emissions					

Scope 1

(Reference 1) Emission factors for fuel use (Appended Table 1 × Appended Table 2 × (44/12))

Fuel type		Quantity	Value
Solid fossil fuel	Imported raw coal	tCO_2/t	2.59
	Coking coal	tCO_2/t	2.60
	Raw coal for blowing	tCO_2/t	2.60
	Imported steam coal	tCO_2/t	2.33
	Domestic steam coal	tCO_2/t	2.15
	Imported anthracite	tCO_2/t	2.64
	Coal coke	tCO_2/t	3.18
	Petroleum coke or FCC coke (carbon deposited on catalysts used in fluid catalytic cracking)	tCO_2/t	3.06
	Coal tar	tCO_2/t	2.86
	Petroleum asphalt	tCO_2/t	2.99
Liquid fossil fuel	Condensate (NGL)	tCO_2/kl	2.34
	Crude oil (excluding condensate (NGL))	tCO_2/kl	2.67
	Volatile oil	tCO_2/kl	2.29
	Naphtha	tCO_2/kl	2.27
	Jet fuel oil	tCO_2/kl	2.48
	Kerosene	tCO_2/kl	2.50
	Light oil	tCO_2/kl	2.62
	A-type heavy oil	tCO_2/kl	2.75
	B- and C-type heavy oil	tCO_2/kl	3.10
	Lubricating oil	tCO_2/kl	2.93
Gaseous fossil fuel	Liquefied petroleum gas (LPG)	tCO_2/t	2.99
	Petroleum hydrocarbon gas	$tCO_2/1000\ m^3$	2.43
	Liquefied natural gas (LNG)	tCO_2/t	2.79
	Natural gas (excluding liquefied natural gas (LNG))	$tCO_2/1000\ m^3$	1.96
	Coke oven gas	$tCO_2/1000\ m^3$	0.735
	Blast furnace gas	$tCO_2/1000\ m^3$	0.313
	Blast furnace gas for power generation	$tCO_2/1000\ m^3$	0.334
	Converter gas	$tCO_2/1000\ m^3$	1.16
Use of waste as fuel	RDF	tCO_2/t	1.07
	RPF	tCO_2/t	1.64
	Waste tire	tCO_2/t	1.64
	Waste plastics (general waste)	tCO_2/t	2.76
	Waste plastics (industrial waste)	tCO_2/t	2.57
	Waste oil (except vegetable and animal oil), and fuel hydrocarbon oil produced from waste oil (except vegetable and animal oil)	tCO_2/kl	2.64
	Fuel hydrocarbon oil produced from waste plastics	tCO_2/kl	2.62

[Statutory basis] Article 2, Paragraph 4 and Appended Table 1 of the Ministerial Order for calculation

Scope 2

[Retail electric utilities]

Registration No.	Electric utility name	Base emission factor ($t\text{-}CO_2/kWh$)	Adjusted emission factor ($t\text{-}CO_2/kWh$)		Each utility's percentage of ascertainment (%)	Reason for not being able to ascertain
A0256	A-COOP Service	0.000324		0.000410	100.00	
A0257	Sanrin Co., Ltd.	0.000437	Menu A	0.000000	100.00	
			Menu B (residual)	0.000382		
			(Reference value) Entire utility	0.000440		
A0258	Miyazaki Gas Living Co., Ltd.	0.000404		0.000423	100.00	
A0259	San-in Electric Alliance	0.000479		0.000423	100.00	
A0261	Melife-East Co., Ltd.	0.000562		0.000524	100.00	
A0263	Wood Energy	0.000000		0.000595	100.00	
A0264	San-in Sanso Corporation	0.000479		0.000424	100.00	
A0265	Buyo Gas Co., Ltd.	0.000451	Menu A	0.000000	100.00	
			Menu B (residual)	0.000456		
			(Reference value) Entire utility	0.000308		
A0267	Hokkaido Electric Power Co., Inc.	0.000533	Menu A	0.000000	99.58	Due to receiving electricity from a utility with an alternative emission factor value.
			Menu B	0.000000		
			Menu C (residual)	0.000541		
			(Reference value) Entire utility	0.000533		
A0268	Tohoku Electric Power Co., Inc.	0.000477	Menu A	0.000000	96.96	Due to receiving electricity from a utility with an alternative emission factor value.
			Menu B	0.000000		
			Menu C	0.000000		
			Menu D (residual)	0.000471		
			(Reference value) Entire utility	0.000483		
A0269	TEPCO Energy Partner, Inc.	0.000457	Menu A	0.000000	99.97	Due to receiving electricity from a utility with an alternative emission factor value.
			Menu B	0.000000		
			Menu C	0.000000		
			Menu D	0.000000		
			Menu E	0.000000		
			Menu F	0.000000		
			Menu G	0.000000		
			Menu H	0.000000		
			Menu I	0.000000		
			Menu J	0.000000		
			Menu K	0.000000		
			Menu L (residual)	0.000390		
			(Reference value) Entire utility	0.000451		
A0270	Chubu Electric Power Miraiz Co., Inc.	0.000433	Menu A	0.000000	99.85	Due to receiving electricity from a utility with an alternative emission factor value.
			Menu B (residual)	0.000459		
			(Reference value) Entire utility	0.000382		
A0271	Hokuriku Electric Power Company	0.000487	Menu A	0.000000	99.33	Due to receiving electricity from a utility with an alternative emission factor value.
			Menu B (residual)	0.000514		
			(Reference value) Entire utility	0.000484		
A0272	The Kansai Electric Power Co., Inc. (Formerly, Kenes Energy Service Co., Ltd.)	0.000360	Menu A	0.000000	100.00	
			Menu B	0.000000		
			Menu C	0.000000		
			Menu D	0.000000		
			Menu E	0.000000		
			Menu F	0.000000		
			Menu G	0.000000		
			Menu H	0.000000		
			Menu I (residual)	0.000434		
			(Reference value) Entire utility	0.000309		
A0273	The Chugoku Electric Power Co., Inc.	0.000537	Menu A	0.000000	99.89	Due to receiving electricity from a utility with an alternative emission factor value.
			Menu B	0.000000		
			Menu C	0.000000		
			Menu D	0.000000		
			Menu E	0.000000		
			Menu F	0.000000		
			Menu G (residual)	0.000552		
			(Reference value) Entire utility	0.000536		
A0274	Shikoku Electric Power Co., Inc.	0.000370	Menu A	0.000000	100.00	
			Menu B	0.000000		
			Menu C (residual)	0.000454		
			(Reference value) Entire utility	0.000526		
A0275	Kyushu Electric Power Co., Inc.	0.000407	Menu A	0.000000	99.33	Due to receiving electricity from a utility with an alternative emission factor value.
			Menu B (residual)	0.000475		
			(Reference value) Entire utility	0.000382		
A0276	The Okinawa Electric Power Co., Inc.	0.000710	Menu A	0.000000	100.00	
			Menu B (residual)	0.000680		
			(Reference value) Entire utility	0.000684		
A0277	Kitanihon-Oil, Ltd.	0.000468		0.000429	100.00	
A0278	Chiba Electric Power	0.000412		0.000385	100.00	
A0279	Botchan Electric Power	0.000536		0.000481	100.00	
A0280	Yame Energy Inc.	0.000333		0.000277	100.00	
A0281	Earth Infinity Co., Ltd.	0.000465		0.000529	100.00	
A0283	Ashikaga-Gas Co., Ltd.	0.000454		0.000457	100.00	
A0284	Misumi Co., Ltd.	0.000339		0.000283	100.00	
A0285	Yonago Gas Co., Ltd.	0.000479		0.000424	100.00	
A0286	LPIO Co., Ltd.	0.000269		0.000307	100.00	
A0287	Hamada Gas	0.000479		0.000423	100.00	
	(*) An alternative value is applied to the base emission factor or adjusted emission factor calculated using the method specified in the Notice and found to be an outlier.					
	(-) It is difficult to calculate the percentage of ascertainment because an alternative value is applied, or because the amount of electricity received from a utility whose base emission factor is an alternative value exceeds the amount of electricity sold.					

Table 5. Industry-related table-based emissions intensity (2005 GLIO table)

No.	Column code	Category name	(i) Physical volume-based emissions intensity GHG emissions intensity (I-A)-1 t-CO_2 eq/○○		(ii) Price-based emissions intensity Producer price-based GHG emissions intensity (I-A)-1 t-CO_2 eq/1 million yen	Purchaser price-based (Endogenous sector total: excluding transportation) GHG emissions intensity (I-A)-1 t-CO_2 eq/1 million yen	(Reference) Unit price (From the 2005 item-specific production table) million yen/○○	
121	204102	Thermoplastic resin	1.29	t	8.98	7.72	0.1398	t
122	204103	High performance resin	2.45	t	7.88	6.78	0.3012	t
123	204109	Other synthetic resins	2.80	t	8.96	7.67	0.3043	t
124	205101	Rayon and acetate	7.76	t	16.63	11.73	0.4464	t
125	205102	Synthetic fiber	4.04	t	11.68	9.75	0.3389	t
126	206101	Medical supplies	-		3.02	2.56	-	
127	207101	Soap, synthetic detergents, and surfactants	1.60	t	5.46	4.65	0.2755	t
128	207102	Cosmetics and toothpaste	0.0195	kg	4.32	3.50	0.004000	kg
129	207201	Paint	**2.30**	**t**	6.28	4.99	0.3381	t
130	207202	Printing ink	3.52	t	5.64	4.88	0.5988	t
131	207301	Photosensitive materials	0.00235	m^2	6.55	5.45	0.00034	m^2
132	207401	Agrochemicals	11.32	t	7.56	5.86	1.332	t
133	207901	Gelatin and adhesives	0.00223	kg	6.15	5.14	0.00034	kg
134	207909	Other chemical end products	5.77	t	7.41	6.36	0.7533	t
135	211101	Petroleum products	0.573	kl	8.60	7.13	0.06360	kl
136	212101	Coal products	0.321	t	21.54	19.54	0.01482	t
137	212102	Pavement materials	-		4.25	3.48	-	
138	221101	Plastic products	1.95	t	4.71	4.00	0.3878	t
139	231101	Tires and tubes	-		7.14	6.11	-	
140	231901	Rubber footwear	4.94	thousand pairs	3.36	2.72	1.155	thousand pairs
141	231902	Plastic footwear	5.05	thousand pairs	4.35	3.37	0.9444	thousand pairs
142	231909	Other rubber products	1.64	t	4.56	3.96	0.3416	t
143	241101	Leather footwear	0.0180	pairs	3.14	2.57	0.004558	pairs
144	241201	Leather and fur	0.0484	unit	6.73	5.36	0.006738	unit
145	241202	Bags, sacks, and other leather goods	0.0127	unit	3.20	2.74	0.003437	unit
146	251101	Plate glass and safety glass	0.0322	m^2	5.81	4.94	0.005338	m^2
147	251201	Glass fiber and products made of glass fiber	0.00269	kg	9.64	8.00	0.00027	kg
148	251909	Other glassware	2.46	T	6.16	5.39	0.3894	t
149	252101	Cement	0.758	T	137.71	101.62	0.005491	t
150	252201	Ready-mixed concrete	0.316	m^3	27.30	19.53	0.01133	m^3
151	252301	Cement products	0.232	t	10.45	7.60	0.02092	t
152	253101	Ceramics	-		7.31	5.78	-	
153	259901	Refractory	1.346	t	10.24	7.92	0.1264	t
154	259902	Other soil and stone products for construction	0.257	t	10.87	7.71	0.02222	t
155	259903	Carbon and graphite products	-		8.45	7.21	-	
156	259904	Abrasives	6.92	t	6.25	4.86	1.051	t
157	259909	Other ceramic, soil, and stone products	0.112	t	7.15	5.99	0.01508	t
158	261101	Pig iron	1.88	t	72.59	67.06	0.02592	t
159	261102	Ferroalloy	5.13	t	19.19	17.81	0.2665	t
160	261103	Crude steel (converter)	2.04	t	45.50	43.74	0.04477	t
161	261104	Crude steel (electric furnace)	0.711	t	14.33	13.78	0.04944	t
162	2612011	Scrap iron	-		0.00	-	-	
163	262101	Hot-rolled steel	1.90	t	26.80	23.18	0.07028	t
164	262201	Steel pipe	2.40	t	17.96	15.06	0.1320	t
165	262301	Cold-rolled steel	**2.13**	**t**	20.44	17.70	0.1034	t
166	262302	Plated steel	1.42	t	15.50	12.86	0.09021	t
167	263101	Cast and forged steel	4.66	t	11.94	11.18	0.3887	t
168	263102	Cast-iron pipe	3.40	t	12.80	11.80	0.2644	t
169	263103	Cast iron and wrought iron products (iron)	3.49	t	16.97	15.80	0.2053	t
170	264901	Steel shear slitting	-		14.61	13.46	-	
171	264909	Other steel products	-		9.94	9.29	-	
172	271101	Copper	4.49	t	10.17	9.50	0.4390	t
173	271102	Lead and zinc (including recycled)	1.48	t	9.30	8.77	0.1585	t
174	271103	Aluminum (including recycled)	1.49	t	7.50	6.41	0.1939	t
175	271109	Other nonferrous metal ingots	13.5	t	8.26	7.45	1.612	t
176	2712011	Nonferrous metal scrap	-		0.00	-	-	
177	272101	Electric wire and cable	8.70	t-conductor	6.28	5.68	1.354	t-conductor
178	272102	Fiber optic cable	0.0556	Kmcore	6.27	5.67	0.008693	Kmcore
179	272201	Wrought copper and copper-alloy products	4.19	t	7.29	6.03	0.5490	t
180	272202	Aluminum rolled products	5.33	t	11.01	9.42	0.4745	t