Guidelines on Disclosure of CO_2 Emissions from Transportation & Distribution

Policy Research Institute for Land, Infrastructure and Transport

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Contents

1. Introduction

1.1 Purpose and concept

- Japanese companies with global business operations have a responsibility to identify and disclose volumes of CO_2 emitted throughout their supply chains, including overseas emissions, and to respond to requests for such information from investors and other interested parties.
- These guidelines provide corporate groups wishing to voluntarily release such information with a standard methodology for calculating and disclosing consolidated data on CO_2 emissions from international transportation & distribution activities and internal transportation & distribution within foreign countries.
- Compared to assessing CO_2 emissions from domestic transportation & distribution, there are a number of constraints on identifying CO_2 emissions from international transportation & distribution and transportation & distribution within foreign countries. Respecting companies' autonomy, we have provided them with a simple methodology for calculating such emissions by, as far as possible, compiling and presenting useful emission factors and calculation methods.
- Identifying and managing quantitative CO_2 emissions data on an ongoing basis, including emissions from international transportation & distribution and transportation & distribution within foreign countries, will help to accelerate companies' efforts to reduce their CO_2 emissions.
- Making companies' efforts to identify CO_2 emissions to encompass their supply chains visible to third parties.

1.2 Candidate company

Although the main candidate company supposing practical use of this guidelines is a "specific shipper" company in the revised energy saving law in Japan, it expects the practical use of a company in various types of industry which are not concerned with a specific shipper but active conduct of business is globalizing.

2. Contents

2.1 Identifying calculation scope of CO_2 emissions

(1)Calculation scope on supply chain

Identification of CO_2 emissions in the transportation & distribution supply chain is divided into the six categories below, based on regional divisions and GHG Protocol Scope 3 standards, using your own company as the central point.

Overseas /Domestic	Overseas		Domestic		Overseas	
	Within country	International	Own company		International	Within country
Category No.	i	ii	iii	iv	v	vi
GHG Protocol category	Upstream Scope 3 (to own company)			Downstream Scope 3 (from own company)		

i: Transportation & distribution within foreign countries in the course of procurement
ii: International transportation & distribution in the course of procurement
iii: Domestic transportation & distribution in the course of procurement
iv: Domestic transportation & distribution in the course of sales
v: International transportation & distribution in the course of sales
vi: Transportation & distribution within foreign countries in the course of sales

(2)Calculation scope on cargo ownership

In expanding the scope of data to be identified and disclosed to cover the entire supply chain, companies should take a broad interpretation and count any goods they control, regardless of whether they own such goods. Companies should identify transportation & distribution exceed the range of their corporate groups, such as procurement from suppliers, and sales to end users from sales store.

(3)Calculation scope on corporate group

For the purposes of calculating and disclosing CO_2 emissions, the scope of the corporate group should be the same as that used for consolidated financial statements; in principle, emissions by the parent company, subsidiaries and affiliates should all be disclosed. However, allowance should be made for excluding subsidiaries or affiliates of minimal importance in terms of CO_2 emissions. Conversely, companies with significant CO_2 emissions from transportation & distribution should be included in calculations even if they are not important from a financial accounting perspective.

2.2 How to advance calculation of CO_2 emissions

(1)Calculation methods

There are 3 methods to calculate CO_2 emissions from transportation & distribution.

Calculation method		Data used	
Fuel method	Calculate CO_2 emissions from volume of fuel used (CO_2 emissions = volume of fuel used x CO_2 emission factor)	・Actual volume of fuel used	
Fuel consumption method	Calculate CO_2 emissions from transport distance and fuel consumption (CO_2 emissions = transport distance/fuel consumption x CO_2 emission factor)	・Actual fuel consumption (including sampling surveys) ・Estimate of fuel consumption (including estimates prepared by local agencies and estimates prepared for other regions)	
		・Transport distance	
Ton-km method	Calculate CO_2 emissions from cargo volume and ton-km CO_2 emission factor (CO_2 emissions = cargo volume x ton-km CO_2 emission factor)	・Emission factor based on actual figures obtained from transport operator ・Average of emission factors for each regional/transport agency ・Substitution by emission factor set for other region	Emission factor subdivided for transport situation(Improved ton-km method) Single emission factor (Conventional ton-km method)
		・Transport distance	

High-level

Work load

Accuracy

Low-level

(2)Procedure of how to advance calculation of CO_2 emissions

In consideration of accuracy, first consider identifying emissions by the fuel method, and then by the fuel consumption method. If it is difficult to obtain the data needed for these methods, the ton-km method should be used for calculations.

When using the fuel consumption method and the ton-km method, it is ideal to use actual transportation distance and emission factors of ton-km method. However, when it is difficult, they can be assumed by using the distance data and emission factors of following chapters.

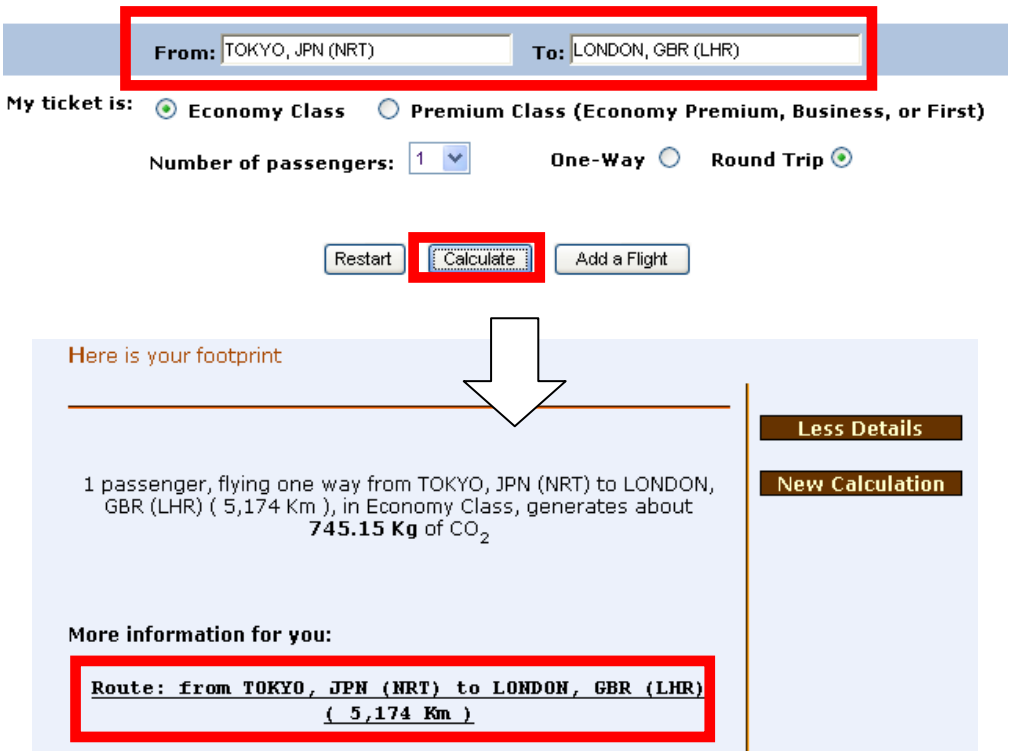
(3) How to get the information for calculation

a)Distance Data

- International air freight

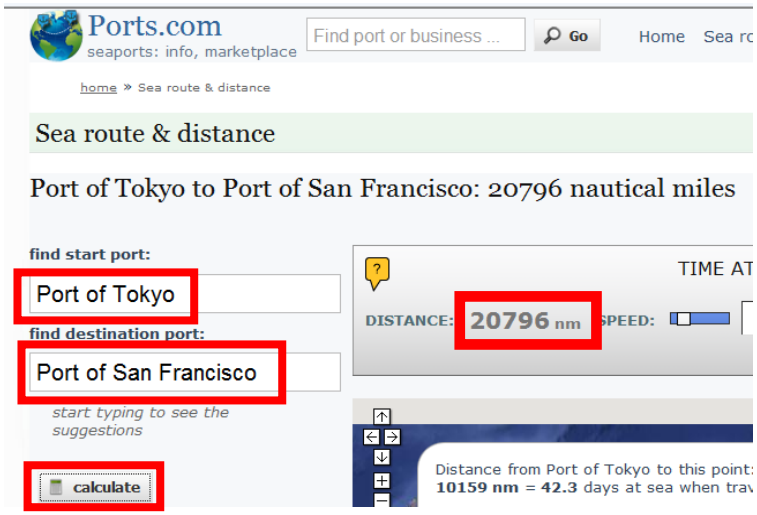
  Airline websites showing the number of miles between airports can be used to determine the distance between two air transport points. Since this mileage data generally conforms to Ticket Point Mileage (TPM) data published each year by the International Air Transport Association (IATA), there is almost no difference between airlines.

  The International Civil Aviation Organization (ICAO) "Carbon Emissions Calculator" also displays distance between two points on the results screen (see below). Another simple distance calculation tool is "Flying distances between 325 major airports in the world," provided free of charge on website.



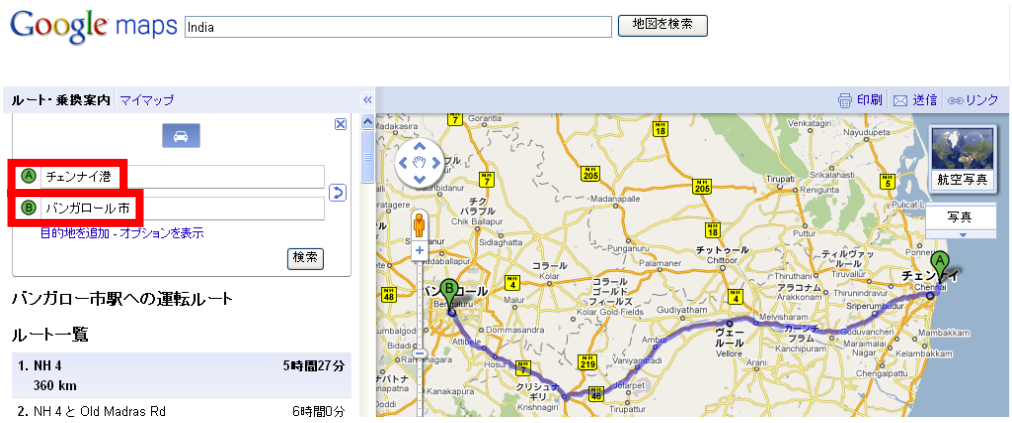
- International sea freight

There are free tool for calculating distances between ports for international sea freight on web sights(“Ports.com : Sea route & distance” “Dataloy : Dataloy Distance Table” “Sea-Rates.com : Port to port distances”). Select departure and arrival ports to calculate the distance between two points (see below).



- Transportation & distribution within foreign countries

Free tool such as “Google Maps”and other web services can be used to search road transport routes in many countries(see below).



b)Emission factors of ton-km method

About emission factors of ton-km method, it is decided in various forms regardless of organizations, and systems.

About official announcement values, such as a government agency and a research institution, the list is published to “Calculation tool for CO_2 Emissions from Transportation & Distribution (MS Excel)”.

3. Calculation tool for CO_2 Emissions from Transportation & Distribution

3.1 Purpose

Simple methods have been used to create calculation tool for CO_2 emissions in order to support the identification and disclosure of CO_2 emissions from transportation & distribution on international routes and within foreign countries.

The tool has been designed on the basis of these guidelines and incorporates existing calculation methods, emission factors, and distance data to provide convenient calculation mechanisms for companies in accordance with the level of transportation & distribution data they have available.

3.2 Outline of tool

The tool consists of six sheets. “Calculation table” “Details list” “Distance table” “Non_protected_sheet” “emission factors list” “Total table”. Input & selection result in the “Calculation table” sheet is reflected in the “Total table” sheet, and the amount of emission is calculated.

Also, it is possible to change a setup of the transportation section, transportation distance, and the ton-km method emission factors by setting change of “Calculation table” “Details list” “Distance table” sheet according to the situation of each user's physical distribution.

(1) Explanation of the function in each sheet

a)Calculation table

- Calculations using the conventional ton-km method form the basis of its design.
- When cargo weights are entered and transportation methods and sectors (departure and arrival points) are selected from the pull-down menus, transportation distance and CO_2 emission factors are inserted automatically to calculate the volume of CO_2 emissions.
- If you wish to insert your own figures for transportation distances and CO_2 emission factors, you may enter these directly into the calculation.
- While the conventional ton-km method forms the basis of calculations, the system is designed to enable calculations using the improved ton-km method, the fuel method, and the fuel consumption method, and to prioritize calculation results obtained from each of these methods (priority is given to the most precise figures).

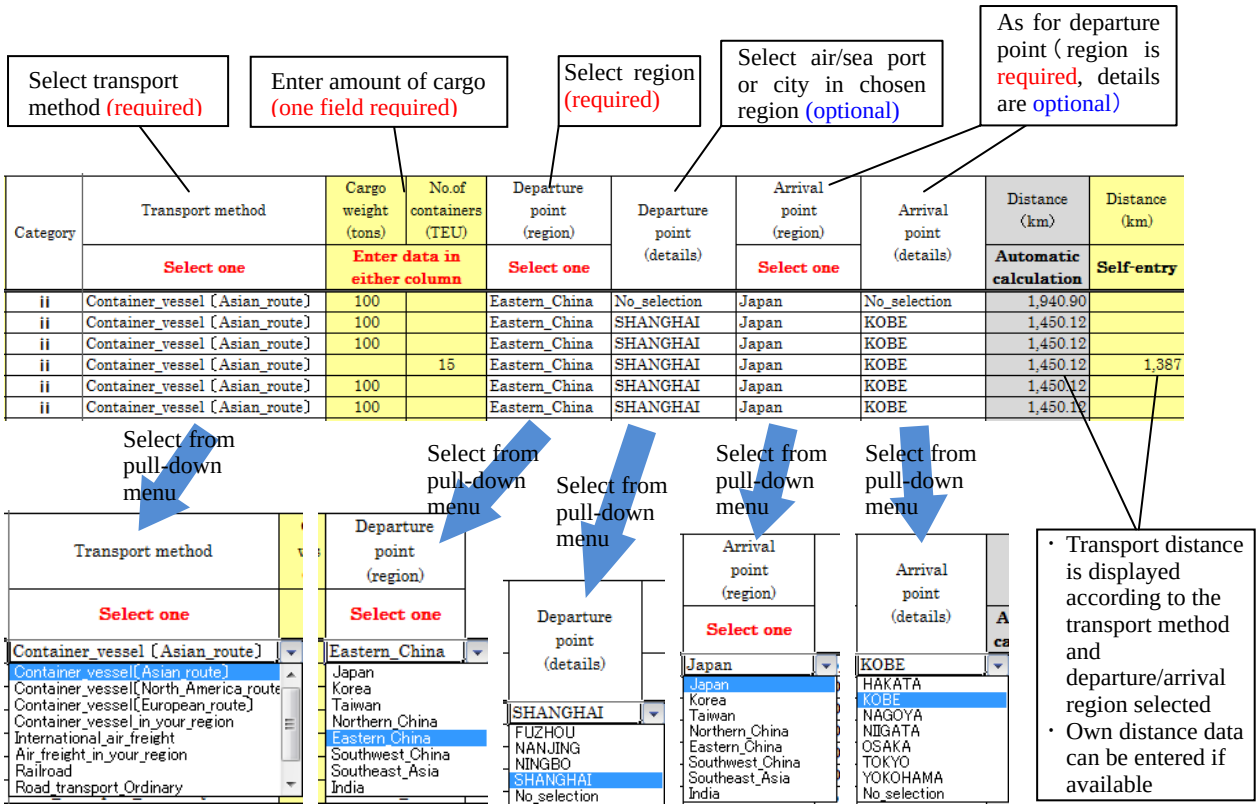
Company name	Policy Research Institute for Land, Infrastructure and Transport

Enter data
Select from pull-down menu
Automatic calculation

										Conventional ton-km method		Improved ton-km method				Fuel consumption method			Fuel method			
Category	Transport method	Cargo weight (tons)	No. of containers (TEU)	Departure point (region)	Departure point (details)	Arrival point (region)	Arrival point (details)	Distance (km)	Distance (km)	Emission factor ($g\text{-}CO_2/tkm$)	Emission factor ($g\text{-}CO_2/tkm$)	Max. load (kg)	Max. load (kg)	Load factor (%)	Emission factor ($g\text{-}CO_2/tkm$)	Fuel type (gasoline, diesel, type A fuel oil, etc.)	Fuel consumption (km/l)	Portion of cargo controlled by your company (%)	Fuel type (gasoline, diesel, type A fuel oil, etc.)	Amount of fuel used (liters)	Portion of cargo controlled by your company (%)	CO_2 emissions ($t\text{-}CO_2$)
	Select one	Enter data in either column		Select one		Select one		Automatic calculation	Self-entry	Automatic calculation	Enter data		Enter data	Enter data	Automatic calculation							Automatic calculation
ii	Container vessel Asian route	100		Eastern China	No selection	Japan	No selection	1,941		26					0							5.0
ii	Container vessel Asian route	100		Eastern China	Shanghai	Japan	Kobe	1,450		26					0							3.8
ii	Container vessel Asian route	100		Eastern China	Shanghai	Japan	Kobe	1,450		26	23				0							3.3
ii	Container vessel Asian route		18	Eastern China	Shanghai	Japan	Kobe	1,450	1,387	26	23				0							4.0
ii	Container vessel Asian route	100		Eastern China	Shanghai	Japan	Kobe	1,450		–					0	Type B/C fuel oil	0.08	6%				3.2
ii	Container vessel Asian route	100		Eastern China	Shanghai	Japan	Kobe	1,450		–					0				Type B/C fuel oil	20,000	6%	3.6
i	Road transport in foreign country	2		Northern China	No selection	Northern China	No selection	–	500	135					0							0.1
i	Road transport in foreign country	2		Northern China	Qingdao	Northern China	Tianjin	543		669					0							0.7
i	Road transport in foreign country	2		Northern China	Qingdao	Northern China	Tianjin	543	480	669	400				0							0.4
i	Road transport in foreign country	2		Northern China	Qingdao	Northern China	Tianjin	543	480	–		Diesel 6,000 –7,999		80%	148							0.4
i	Road transport in foreign country	2		Northern China	Qingdao	Northern China	Tianjin	543	480	–			8,000	75%	144							0.4
i	Road transport in foreign country	2		Northern China	Qingdao	Northern China	Tianjin	543	480	–					0	Diesel	2	75%				0.5
i	Road transport in foreign country	2		Northern China	Qingdao	Northern China	Tianjin	543	480	–					0				Diesel	240	75%	0.5

① ② ③

① Enter details common to all calculation methods



Category	Transport method	Cargo weight (tons)	No.of containers (TEU)	Departure point (region)	Departure point (details)	Arrival point (region)	Arrival point (details)	Distance (km)	Distance (km)
	Select one	Enter data in either column		Select one		Select one		Automatic calculation	Self-entry
ii	Container_vessel〔Asian_route〕	100		Eastern_China	No_selection	Japan	No_selection	1,940.90	
ii	Container_vessel〔Asian_route〕	100		Eastern_China	SHANGHAI	Japan	KOBE	1,450.12	
ii	Container_vessel〔Asian_route〕	100		Eastern_China	SHANGHAI	Japan	KOBE	1,450.12	
ii	Container_vessel〔Asian_route〕		15	Eastern_China	SHANGHAI	Japan	KOBE	1,450.12	1,387
ii	Container_vessel〔Asian_route〕	100		Eastern_China	SHANGHAI	Japan	KOBE	1,450.12	
ii	Container_vessel〔Asian_route〕	100		Eastern_China	SHANGHAI	Japan	KOBE	1,450.12	

Transport method: Select one
Container_vessel〔Asian_route〕
Container_vessel〔Asian_route〕
Container_vessel〔North_America_route〕
Container_vessel〔European_route〕
Container_vessel_in_your_region
International_air_freight
Air_freight_in_your_region
Railroad
Road_transport_Ordinary

Departure point (region): Select one
Eastern_China
Japan
Korea
Taiwan
Northern_China
Eastern_China
Southwest_China
Southeast_Asia
India

Departure point (details)
SHANGHAI
FUZHOU
NANJING
NINGBO
SHANGHAI
No_selection

Arrival point (region): Select one
Japan
Japan
Korea
Taiwan
Northern_China
Eastern_China
Southwest_China
Southeast_Asia
India

Arrival point (details)
KOBE
HAKATA
KOBE
NAGOYA
NIIGATA
OSAKA
TOKYO
YOKOHAMA
No_selection

②Enter/select data specific to each separate calculation method

Conventional ton-km method	
Emission factor (g-CO_2/tkm)	Emission factor (g-CO_2/tkm)
Automatic calculation	**Self-entry**
26.00	
26.00	
26.00	23
26.00	23
-	
-	
135.00	
669.00	
135.00	
669.00	400
-	
-	
-	
-	

・ Emission factor is displayed according to method of transport selected in (1)
・ Own emission factor data can be entered if available Emission factor will not be displayed if entries are made for other calculation

Improved ton-km method			
Max. load (kg)	Max. load (kg)	Load factor (%)	Emission factor (g-CO_2/tkm)
	Self-entry	**Self-entry**	**Automatic calculation**
Diesel 6,000~7,999		80%	147.67
	8,000	75%	142.58

・ Used for road transport only
・ Emission factor displayed according to maximum load selected/entered for vehicle and load factor specified

Fuel consumption method			Fuel method		
Fuel type (gasoline,diesel, type A fuel oil, etc)	Fuel consumption (km/liters)	Portion of cargo controlled by your company (%)	Fuel type (gasoline,diesel, type A fuel oil, etc)	Amount of fuel used (liters)	Portion of cargo controlled by your company (%)
Type B･C fuel oil	0.08	6%			
			Type B･C fuel oil	20000	6%
Diesel	2	75%			
			Diesel	240	75%

・Fuel consumption method: automatically calculates by fuel consumption method when fuel type is selected and fuel consumption and portion of cargo controlled by your company are entered
・Fuel method: automatically calculates by fuel method when fuel type is selected and amount of fuel used and portion of cargo controlled by your company are entered

③CO_2 emissions are calculated on the basis of data entered in (1) and (2).

CO_2 emissions (t-CO_2) **Automatic calculation**
5.046
3.770
3.335
3.350
3.241
3.576
0.135
0.727
0.147

・Automatic calculation based on data entered/selected in (1) and (2). Calculated using the conventional ton-km method as the default, but other calculation methods will be prioritized if data is entered in the relevant columns.
・Designed so that calculation results will appear if data is entered or selected in the required fields as a minimum.

The ton-km method emission factors according to transport method are displayed.

CO_2 emissions (t-CO_2) **Automatic calculation**	Remarks

Transport_method	Emission Factor (gCO2/tkm)
Container_vessel(Asian_route)	26.0
Container_vessel(North_America_route)	15.7
Container_vessel(European_route)	14.2
Container_vessel_in_your_region	39
International_air_freight	903
Air_freight_in_your_region	1443
Railroad	22
Road_transport_Ordinary	135
Road_transport_Small	669

b) Details list

- The pull-down list of “Calculation table”sheet is set up by this sheet.
- It will be reflected in a pull-down list if a setup in each Transport method and Region is changed.

Transport method Region	Container_vessel〔Asian_route〕	Container_vessel〔Asian_route〕 Japan	Container_v Korea
Name	Japan	HAKATA	BUSAN
	Korea	KOBE	No_selection
	Taiwan	NAGOYA	
	Northern_China	NIIGATA	
	Eastern_China	OSAKA	
	Southwest_China	TOKYO	
	Southeast_Asia	YOKOHAMA	
	India	No_selection	

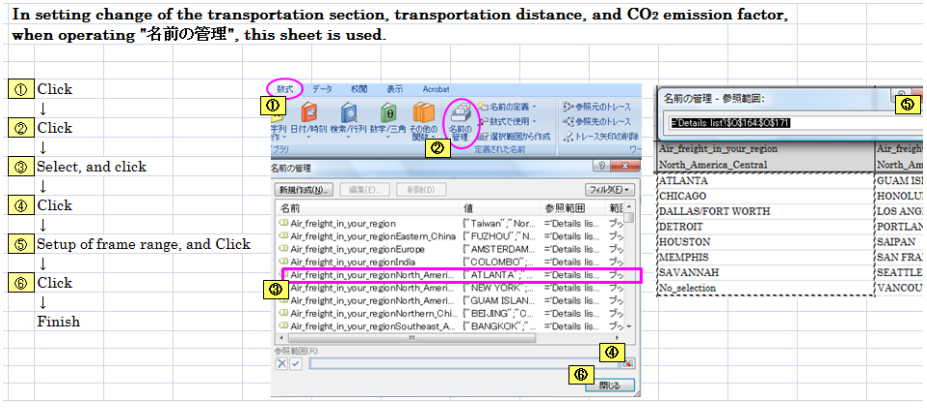
c) Distance table

- The distance between 2 points is set up for each transport method.
- The distance between 2 points is displayed in pull-down list of “Calculation table”.

Departure point	Arrival point	Container_vessel〔Asian_route〕
BANGKOK	JAKARTA	2,390.93
BANGKOK	JAWAHARLAL NEHRU	6,009.74
BANGKOK	KAOHSIUNG	3,120.62
BANGKOK	KARACHI	6,885.74
BANGKOK	KOBE	5,786.34

d) Non_protected_sheet

- It is necessary to operate the function of「名前の管理」on this sheet at the time of setting change.
- The procedure of setting change is shown in the sheet.



e) Emission factors list

- Emission factors which various organizations have released are published.
- Emission factor is shown according to every countries and every transport method.
- Transport method is classified into Ship, Air, Rail, Vehicles by Mode, and is classified in detail for every transport method by Details1, 2.

Country	Transport method		
	Mode	Details-1	Details-2
Japan	Ship	Container	< 999TEU
Japan	Ship	Container	3000< 4999TEU
Japan	Ship	Container	5000< 7999TEU
Japan	Ship	Container	Coastal
Japan	Air	International	
Japan	Air	Domestic	
Japan	Rail		

- Emission factor is classified by target Green House Gas (GHG) and target emission process (see below).

CO2 emission factor			
TTW-CO2 gCO2/tkm	TTW-GHG gCO2eq/tkm	WTW-CO2 gCO2/tkm	WTW-GHG gCO2eq/tkm
26.00	–	–	–
15.70	–	–	–
14.20	–	–	–
39.00	–	–	–
903.00	–	–	–

- TTW (Tank To Wheel): The emission process at the time of fuel use.
  WTW (Well To Wheel): The emission process including from supply of fuel to combustion.
- CO2 : Only CO_2 emission factor
  GHG : Emission factor including GHG(s) other than CO_2

f) Total table

- The calculation result on "Calculation Table" sheet is totaled and displayed for each transportation & distribution supply chain(**i ～vi**).

Overseas / Domestic	Overseas		Domestic		Overseas		
	Within country	International	Own company		International	Within country	
Category No.	i	ii	iii	iv	v	vi	Total
CO2 emissions (t-CO2)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cargo Weight (t)	0	0	0	0	0	0	0