THE STUDY ON THE MEASURES FOR TECHNICAL COOPERATION FOR BUILDING RESOURCE CIRCULATION SOCIETY IN ASIA

FINAL REPORT SUMMARY

MAY 2006

JAPAN INTERNATIONAL COOPERATION AGENCY

EX CORPORATION

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1. Outline of the Study

1.1 Background and Objective

"The Ministerial Conference on 3R Initiative" was held in April 2005 in Tokyo with the attendance of the Ministers from 20 countries, including G8 members (Japan, United States, United Kingdom, Germany, France, Canada, Italy, and Russia), ASEAN countries (China, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam), and 4 multilateral organizations, i.e. UNEP, OECD, Secretariat of Basel Convention, and League Arab States. During the conference, participating countries and organizations shared the information on 3R activities with each other while having extensive and active discussions for further actions to be taken to promote 3R. As the outcome of the conference, the participating countries and organizations have a common recognition on the necessity of the following actions for further promotion of 3R:

- Formulation and implementation of visions and/or strategies leading to a sound material-cycle society;
- Reduction of barriers to the international flow of goods and materials;
- Cooperation between developed and developing countries;
- Cooperation among stakeholders;
- Science and technology suitable for the 3Rs.

Many of developing countries is currently facing serious difficulty in coping with the health and environmental threats caused by solid waste. Due to limited capacity of solid waste management, a large amount f waste is not properly collected, treated, and disposed at landfills while its generation continuously increases with the growth of economy and shift of lifestyle to mass consumption-oriented. Efficient use of resources and minimization of waste through 3Rs is of great urgency for developing economy to solve their solid waste management issues.

In these developing countries, private sector currently takes the leading role in reuse and recycling of waste and used materials although it is usually small or medium sized informal industries. Because of active recycling by such industries, some of the cities in the Asian countries such as Penang (Malaysia) and Ho Chi Minh (Vietnam) have already achieved the comparative result of recycling with the developed countries for several recyclable items.

However, many of the recycling activities carried out by such Sees are based on the manual sorting dismantling and collection of valuables by low-cost labor and not really care about their health and environmental pollution. In the context of developing countries, recycling is not just the issue of solid waste management, but also the issue of socio-economic equality and poverty alleviation.

Japan has a high potential of providing technical cooperation to the developing countries in this area in terms of its well-established legal and regulatory framework for promoting 3Rs as well as of its accumulation of advanced technologies and know-how. Nevertheless, it is not possible to effectively transfer policies, technologies and know-how if the unique socio-economic background of traditional practice on SWM and recycling are not properly captured for each of the developing countries.

With the above recognition in mind, this Study aims at:

- Identifying the current efforts of 3R activities in the Asian countries and obstacles/issues for building resource circulation society and
- Making recommendations regarding the policies and approach for providing technical cooperation to the Asian countries to further promote 3Rs and building of resource circulation society.

1.2 Coverage of the Study

The Study covers the following countries in Asia and recyclable materials.

Countries Covered	China, Vietnam, Indonesia, Malaysia, Philippines, Thailand
Recyclable Materials Covered	Papers, Glass, Scrap Metals, Scrap plastics, Used Electric and Electronic Home Appliances

1.3 Methodologies and Approach of the Study

The key methodologies and approach applied in the Study focus on the following study subjects:

Subject 1 :	Identification on current status of solid waste management
Subject 2 :	Identification on current material flow of recyclables
Subject 3 :	Identification of the issues for promoting resource circulation society

Subject 1 : Identification on current status of solid waste management

The purpose of identifying the current status of solid waste management is to capture the country-wise characteristics of waste generation, collection, treatment, and disposal at macro-level. The key data and information collected form each country are shown in the table below:

Table 1.3.1 Data and Information Collected on Country-Wise SWM

Study Item	Data and Information Collected
SW generation	▪ Total SW generation ▪ Per capita SW generation
Composition of SW	▪ Composition of SW by types (food/kitchen waste, waste papers, waste plastics, scrap glass, scrap metals, etc.)
SW collection	▪ Methods of SW collection (door-to-door, curbside, station, etc.)

Study Item	Data and Information Collected
	▪ Coverage of SW collection services)
SW treatment and disposal	▪ Methods of intermediate treatment (incineration, composting, recycling, etc.) ▪ Amount of intermediate treatment and volume reduction rate by such *treatment* ▪ Methods of final disposal (open dumping, semi-controlled/controlled landfills, etc.) ▪ Amount of final disposal and ratio of final disposal to the total SW generation ▪ Remaining capacity of existing landfills

Subject 2 : Identification on current material Flow of Recyclables

Material flow, in this study, is defined as the diagram that illustrates the flow of specific materials starting from their input as raw materials and followed by production (manufacturing), consumption, reuse, recycling, and disposal in terms of their quantity and quality changes. The figure below represents a typical example of material flow of recyclables.

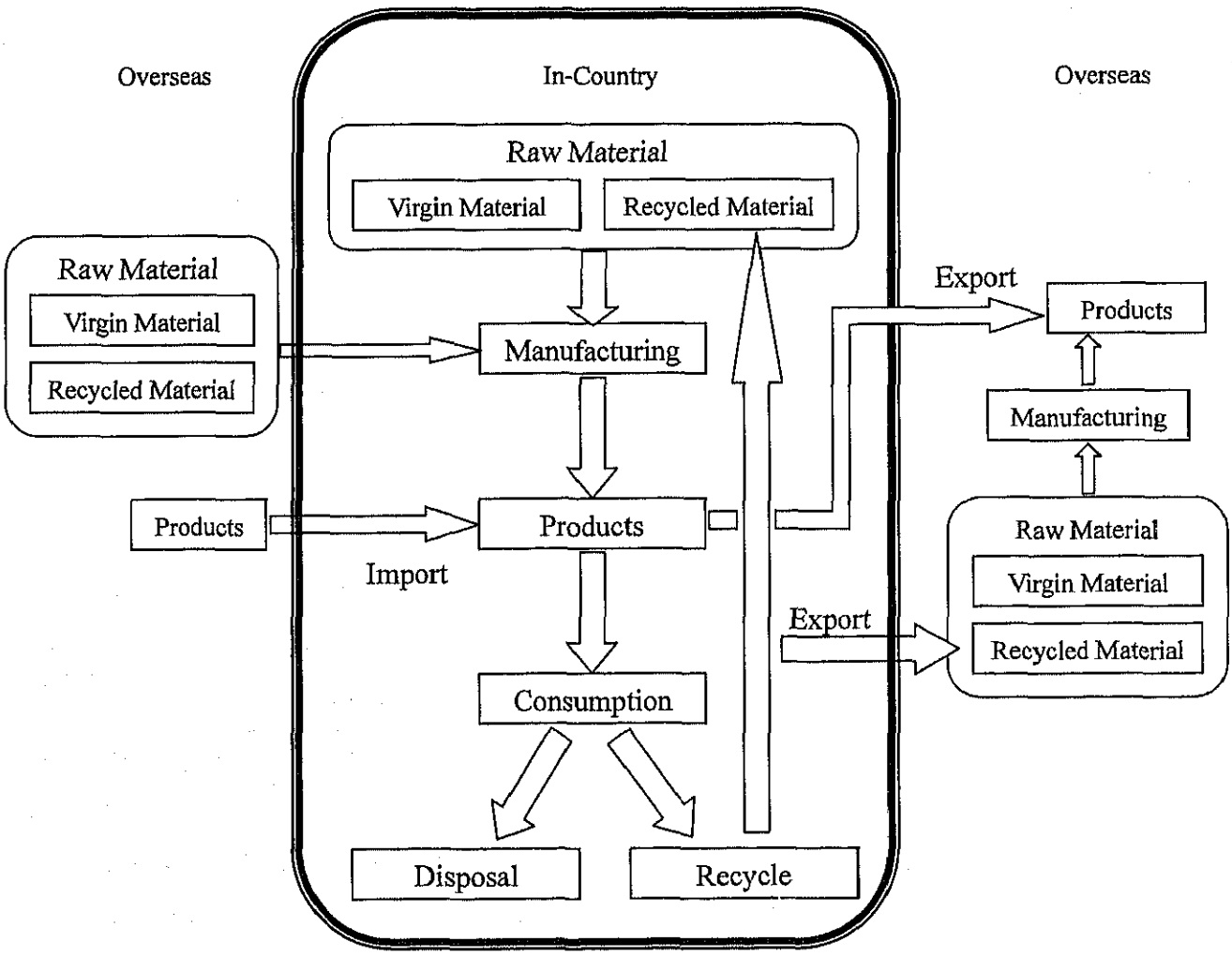


Figure 1.1 A Typical Example of Material Flow of Recyclables

Subject 3 : Identification of the issues for promoting resource circulation society

To identify the issues of each country in promoting resource circulation society, the following methodologies and approaches are applied in this Study.

(1) Identification of Recycling Potential in Each Country

As the baseline information for identifying the specific issues of each country in building the resource circulation society, the recycling potential of each country needs to be quantitatively clarified for each recyclable item. The study quantified the recycling potential of each country by the following methodologies

a. Quantification of domestically available recyclable resources

Based on the result of material flow survey on recyclables under "Subject 2" above, the amount of domestically available recyclable sources are quantified in accordance with Table 1.3.2.

Table 1.3.2 Amount of Domestically Available Recyclable Resources

Item	Amount (tons per year)					
	Domestic Recycling	Export	Final disposal	Total Potential Recyclables	Domestic Recycling Ratio	Recycling Potential
	①	②	③	①+②+③	①/(①+②+③)	②+③
Waste papers						
- Old newspaper						
- Old magazines						
- Cardboards						
- Other papers						
Scrap Glass						
- Glass bottles						
- Other glass products						
Scrap Metals						
- Scrap iron						
- Scrap aluminum						
- Scrap copper						
- Other scrap metals						
Scrap Plastic						
- PET bottles						
- Rigid plastics						
- Film plastics						
- Styrofoam						
- Other plastics						
Electric Home Appliances						
- Refrigerator						
- Washing machine						
- A/C						
- TV set						

By filling the blanks in the table above for each country, the progress on the use of recyclable resources can be compared among the countries. It also helps to identify each country's current progress and issues of recycling specifically by each recyclable material.

b. Quantification on the potential of receiving recyclable materials by domestic industries

Quantification on the potential of domestic industries to utilize recyclable materials can be estimated based on data collection on the use of raw materials by types of industries as shown in the table below.

Table 1.3.3 Quantification on the Potential Recycling in Domestic Industries

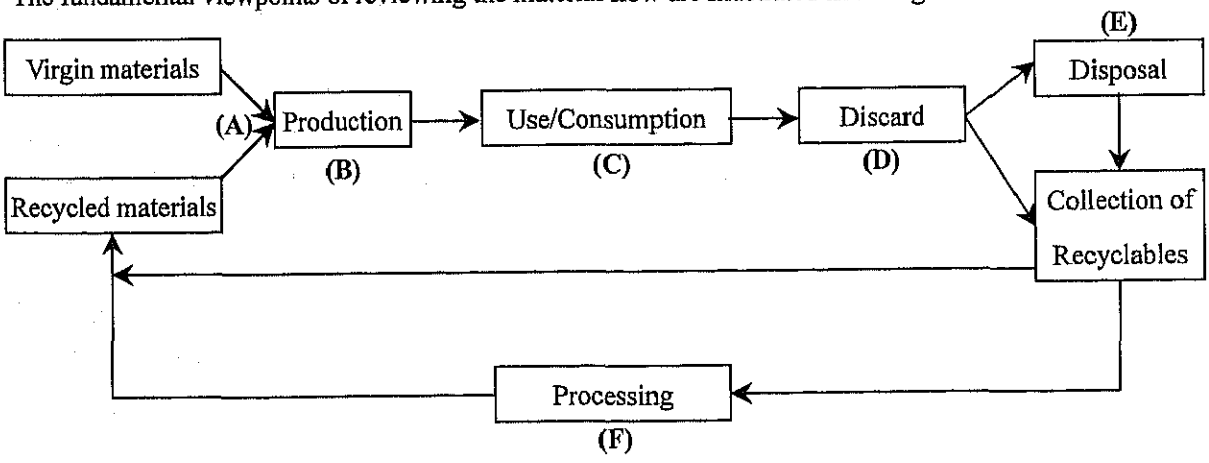
Type of Industries	Amount (tons per year)				
	Raw Material Input			Theoretically possible input of recycled raw materials	Potential Input of recycled raw materials
	Virgin	Recycled			
		Domestic	Foreign		
	①	②	③	④	④−②
Pulp & Paper Industry					
- Copy/printing paper					
- Newsprint					
- Cardboard					
- Other paper products					
Glass Manufacture					
- Glass bottles					
- Other glass products					
Metal Products Manufacture					
- Iron & steel					
- Aluminum products					
- Copper products					
Plastic Products Manufacture					
- Flat plate/sheet					
- Corrugated plate/sheet					
- Rigid plastic film					
- Non-rigid plastic film					
- Rigid plastic foam					
- Non-rigid plastic foam					
- Other plastic products					

By filling all the blanks above from the available data, the recycling potential of domestic industries can be estimated for each recyclable material.

(2) Identification of the barriers to promotion of recycling

To identify the barriers to promotion of recycling, every step of the flow of materials ranging from input as raw materials to its disposal at landfills are all closely reviewed for each type of recyclables.

The fundamental viewpoints of reviewing the material flow are illustrated in the figure below.



Phase of Material Flow	Barriers to Promotion of Recycling
(A) Input of Raw Materials	**Market competitiveness of recyclable materials against virgin materials** ▪ Steady supply of materials ▪ Quality of materials to meet the requirement of buyers and end-users ▪ Price of materials
(B) Production/Manufacturing	**Potential of utilizing recyclable materials by domestic industries** ▪ Scale of existing potential industries ▪ Technological capacity of existing industries to utilize recyclable materials ▪ *Cost-efficiency of utilizing recyclable materials for the industries*
(C) Use and Consumption	**Market Competitiveness of Recycled Products** ▪ Price competitiveness of the recycled products ▪ Quality of the recycled products ▪ Consumers' preference to the recycled products
(D) Discarding	**Consumers' behavior of discarding waste and used materials** ▪ Dissemination level of source separation of recyclable materials ▪ Dissemination level of voluntary cooperation to collection of recyclable materials
(E) Disposal	**Benefit of promoting recycling in terms of socio-economic and environment cost of SWM** ▪ Current and future cost of SWM (collection, haulage, treatment, and final disposal) ▪ Potential socio-economic and environmental impact of improper SWM practices (open dumping, waste picking, scattering of SW due to limited coverage of SW collection services, etc.)
(F) Processing of Collected Recyclables	**Potential of primary processing industries of recyclable materials** ▪ Current technological development of recycling ▪ Cost-efficiency of primary processing of recyclable materials (sorting, downsizing, pelletizing, etc.) ▪ Added value of recyclable materials by primary processing

Figure 1.2 Key Potential Barriers to Promotion of Recycling

1.4 Scope of Study Works

The Study consists of the following series of study works.

(1) Collection and review of available data and information materials on 3R activities for each country

The available data and information materials on 3R activities were extensively collected from various information sources including donors, multilateral organizations (World Bank, Asian Development Bank, etc.), and government ministries/agencies of each country to review their current 3R activities.

The collected data and information is compiled in accordance with the items given in the table on next page.

Table 1.4.1 Data and Information Collected and Compiled for Each Country

Subject	Data and Information
(1) Waste Generation	▪ Annual waste generation - Total generation - Generation in urban and rural areas - Generation by types (municipal solid waste and industrial solid waste) - Per capita waste generation
(2) Waste Composition	▪ Composition of municipal solid waste (food waste, papers, scrap metals, glass, plastic, etc.) ▪ Composition of industrial solid waste (if data is available)
(3) Collection, Treatment and Disposal of Waste	▪ Coverage of SW collection service ▪ Methods of SW collection ▪ Methods of intermediate treatment and final disposal of SW
(4) Recycling	▪ Recycling rate of the total SW ▪ Recycling rate by types of recyclables ▪ Existing recyclers (inc. informal recyclers)
(5) Recycling Industries and Market of Recyclables	▪ Types of recyclables collected and traded in each country ▪ Performance of recycling industries ▪ The current domestic market of recyclable materials
(6) Material Flow of Recyclables	▪ Import and export of recyclable materials ▪ Domestic use of recyclable materials ▪ International relationship on trade of recyclables
(7) Policies, laws/regulations and institutions	▪ Laws and regulations on 3R and SWM ▪ National policies, strategies and plans on 3R and SWM ▪ Roles and responsibilities of relevant government ministries and agencies in relation to SWM and 3R activities ▪ Other relevant issues
(8) Efforts of 3R activities by stakeholders	▪ National government ▪ Local government ▪ Private sector ▪ NGO ▪ Community (general public)
(9) Economic and Financial Aspect of SWM and 3R	▪ Socio-economy (GDP, population, etc.) ▪ Industries ▪ Budget allocation for SWM and 3R activities ▪ Current cost of SWM (collection, haulage, treatment, final disposal)

(2) Review of donors' activities in relation SWM and 3R activities

Prior activities by donors (bilateral and multilateral) were reviewed with their focus on the areas of SWM and 3R activities.

(3) Field Survey on Vietnam and China

According to the Terms of reference for this Study instructed by JICA, field surveys were conducted in Vietnam and China for the following purposes:

- Detailed identification of current status of 3R policies, programmes and activities by relevant

stakeholders;

- Identification of the potential areas of technical cooperation contributing to building of resource circulation society;
- Identification of the needs of technical cooperation in each country in relation to promotion of 3R activities

(4) Formulation of the Basic Policies for Promoting Establishment of Resource Circulation Society in the Asian Countries

Based on the identification of current status and various issues to be addressed for promoting 3R activities, the Study formulates the basic policies for promoting establishment of resource circulation society in the Asian Countries depending upon unique conditions of each country in dealing with SWM and 3R.

(5) Recommendations on Potential Areas and Approaches of Technical Cooperation in Promoting Establishment of Resource Circulation Society

In accordance with the basic policies formulated above, the Study made recommendations regarding the potential areas and approaches of technical cooperation for promoting establishment of resource circulation society in the Asian countries.

2. Trend of Material Flow of Major Recyclables based on import and export data

2.1 Waste/Scrap Papers

The trend of import and export of waste/scrap papers are shown in the table below.

Table 2.1.1 Trend of Import/Export of Waste/Scrap Papers (2000-2005)

Unit (Quantity) : ton
Unit (US $) : million US$

			2000	2001	2002	2003	2004	2005
China	Export	Quantity	4,553	873	680	1,085	740	138
		US $	0	0	0	0	0	0
	Import	Quantity	3,713,597	6,417,931	6,872,681	9,382,453	12,300,697	17,032,079
		US $	557	658	732	1,232	1,726	2,457
Thailand	Export	Quantity	77	1,096	2,917	3,111	5,982	14,767
		US $	0	0	0	0	1	3
	Import	Quantity	953,029	1,700,117	879,321	1,098,718	940,534	946,206
		US $	155	101	105	151	133	137
Philippines	Export	Quantity	652	423	1,230	7,043	7,542	1,059
		US $	0	0	0	1	1	0
	Import	Quantity	416,079	358,775	365,696	374,549	369,958	287,195
		US $	53	37	34	37	40	31
Malaysia	Export	Quantity	5,285	7	11	1,279	72	860
		US $	0	0	0	0	0	0
	Import	Quantity	303,218	240,102	251,175	229,891	228,842	166,352
		US $	44	26	28	31	41	27
Indonesia	Export	Quantity	22,215	17,337	19,504	17,729	15,356	N/A
		US $	3	3	2	2	2	N/A
	Import	Quantity	2,436,800	2,483,612	2,208,605	2,014,507	2,201,944	N/A
		US $	402	301	256	277	313	N/A

(1) Overall Trend of Waste/Scrap Papers Trade

All the countries are net importers of waste/scrap papers, among which China is the largest importer reaching the annual import of approximately 17 million tons or 2.5 billion US dollars while Malaysia is the smallest in the import of about 170 thousand tons or 2.7 million US dollars according to the data in 2005. China overwhelmingly dominates the trade share of waste/scrap papers among the Asian countries.

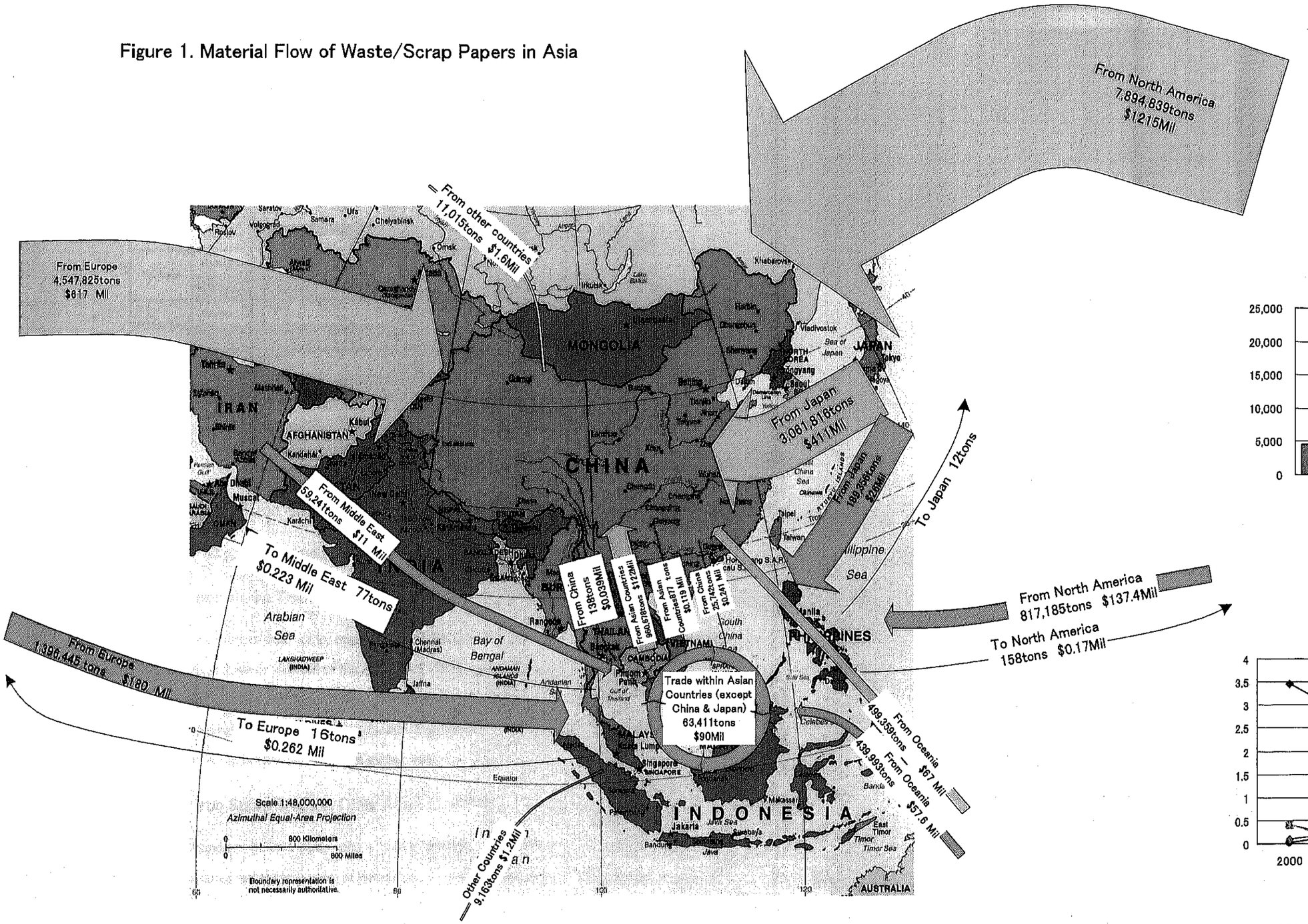
(2) Trend of Waste/Scrap Papers Trade in China

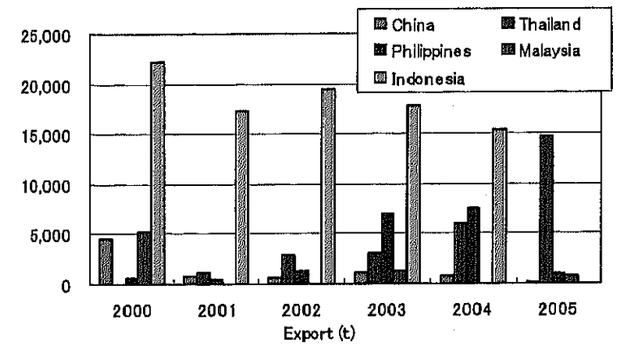
The main import origins of waste/scrap papers for China include the North American countries (United States and Canada), European countries, and Japan. It indicates that China imports waste/scrap papers not just from the Asian countries but also from the others at global scale. China's import of waste/scrap papers have increased by four- to fivefold between 2000 and 2005.

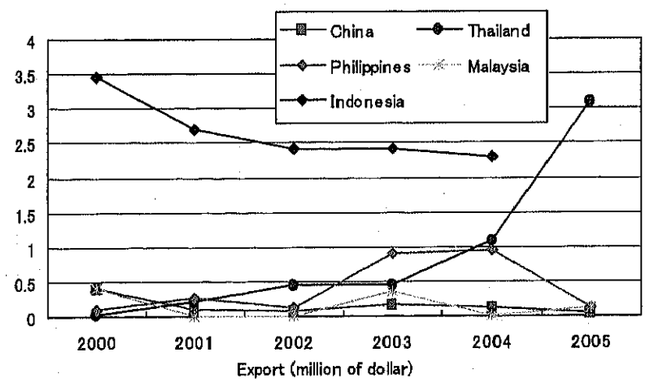
(3) Trend of Waste /Scrap Papers Trade in Other Asian Countries

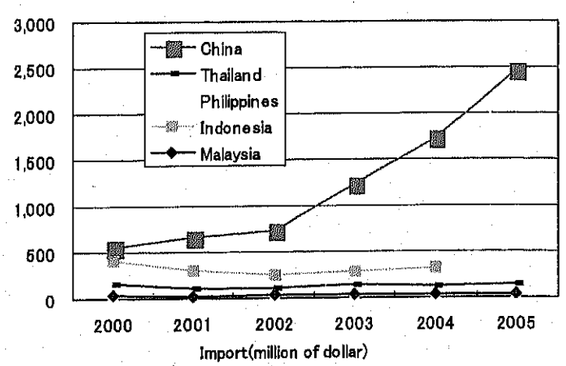
The second largest importer of waste/scrap papers is Indonesia, recording more or less 2 million tons of waste/scrap papers import on average during 2000-2004. Import of waste/scrap paper from the North American countries, Europe and Japan is also dominant in other Asian countries.

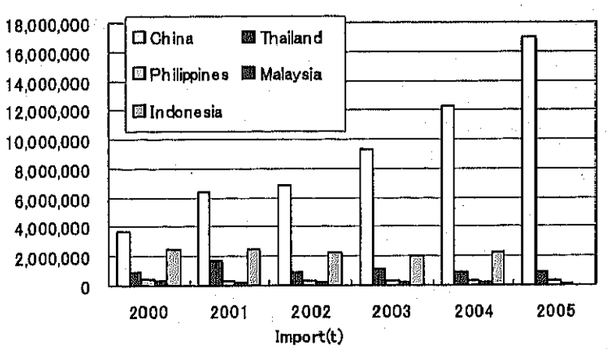
Figure 1. Material Flow of Waste/Scrap Papers in Asia











- The circle on the map indicates the amount of Import within Asian Countries
- The circle to the left indicates the amount of Export to Asian Countries

The figure is based on custom statistics (yearly base: Jan. – Dec.) of China, Indonesia, Malaysia, Philippine, Thailand, Indonesia obtained from World Trade Alamanac.
The data of top 20 trades are extracted for figure.

2.2 Iron Scrap

The trend of import and export of iron scrap is shown in the table below.

Table 2.2.1 Trend of Import/Export of Iron Scrap (2000-2005)

Unit (Quantity) : ton
Unit (US $) : million US$

			2000	2001	2002	2003	2004	2005
China	Export	Quantity	47,280	9,673	6,264	3,836	5,813	1,940
		US $	7	2	2	1	2	1
	Import	Quantity	6,099,104	9,776,318	7,853,485	9,293,782	10,224,821	10,135,704
		US $	509	1,060	896	1,405	2,231	2,608
Thailand	Export	Quantity	99,960	102,465	87,122	117,927	154,321	172,893
		US $	34	25	33	53	82	99
	Import	Quantity	741,332	666,512	977,555	1,279,889	1,849,787	1,683,042
		US $	117	105	156	240	528	486
Philippines	Export	Quantity	76,801	181,084	306,152	494,231	882,066	971,652
		US $	16	22	39	68	130	129
	Import	Quantity	3,557	2,987	2,796	19,260	22,905	13,294
		US $	2	4	1	2	7	3
Malaysia	Export	Quantity	0	0	813,314	294,490	493,020	227,455
		US $	4	5	4	5	9	9
	Import	Quantity	0	3,803,916	3,133,188	5,136,617	3,723,754	N/A
		US $	184	257	277	369	–	566
Indonesia	Export	Quantity	40,082	36,916	35,094	37,723	38,586	N/A
		US $	14	16	12	14	20	N/A
	Import	Quantity	1,263,506	1,438,338	1,318,025	966,458	1,399,510	N/A
		US $	107	139	132	111	327	N/A

* Quantity of imported iron scraps for Malaysia in 2004 is from SEAISI "2005 Steel Statistical Yearbook."
For the sake of convenience, imported value was calculated from the average of unit price derived from other four nations.

(1) Overall Trend of Iron Scrap Trade

As to iron scrap, the Philippines is the only net exporter while the others are all net importers of iron scrap.

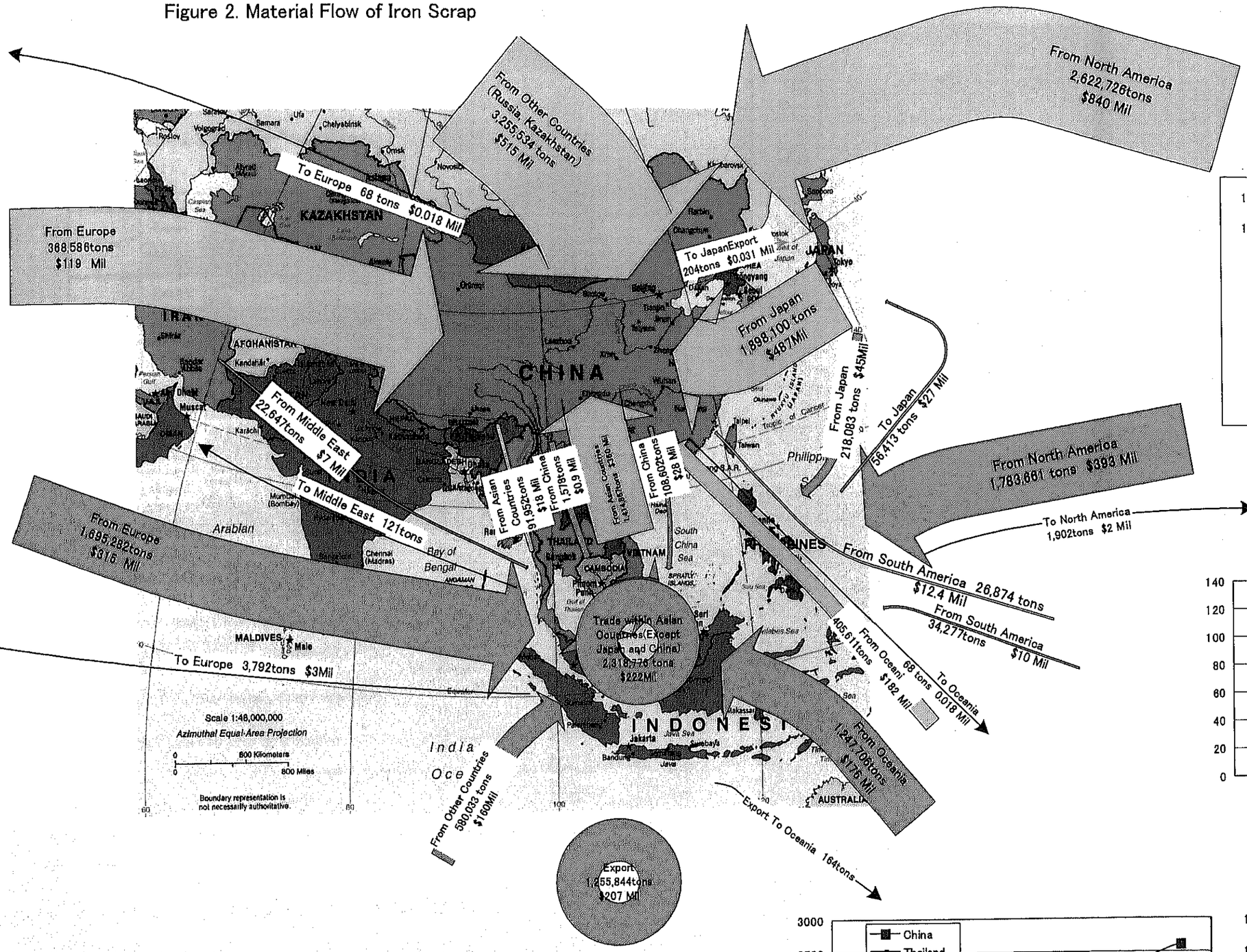
(2) Trend of Iron Scrap Trade in China

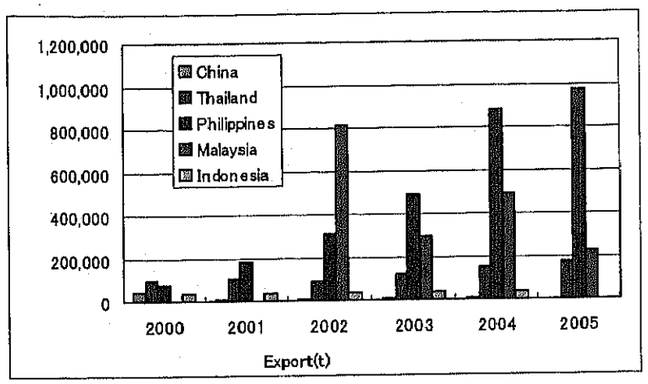
China is the largest importer of iron scrap, reaching its annual import of 10 million tons or 2.6 billion US dollars in 2005, which is three or fivefold of the imports of Thailand and Malaysia. China's import of iron scrap has been doubled between 2000 and 2005. Major origins of iron scrap imports for China include the countries of former Soviet Union such as Russia and Kazakhstan, Europe, North America, and Japan. China's import of iron scrap is also carried out at global scale.

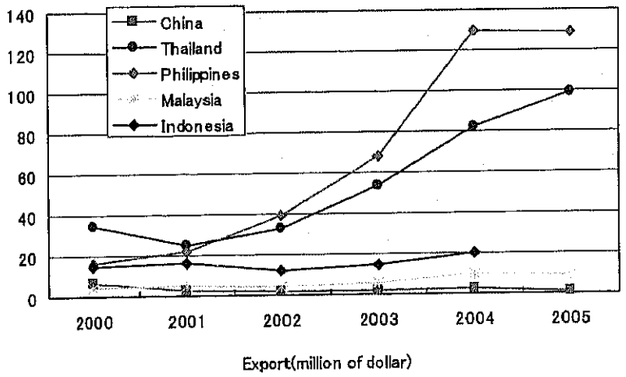
(3) Trend of Iron Scrap Trade in Other Asian Countries

The second largest importer of iron scrap after China is Malaysia followed by Thailand and Indonesia. All of these three countries are net importers of iron scrap. Only the Philippines is the net exporter of iron scrap due to limited potential of iron and steel industry that is the main receivers of iron scrap materials. Domination of imports from Europe and North America is also found in other three countries.

Figure 2. Material Flow of Iron Scrap





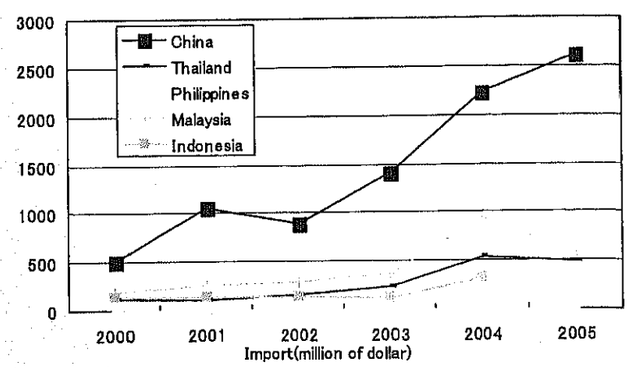


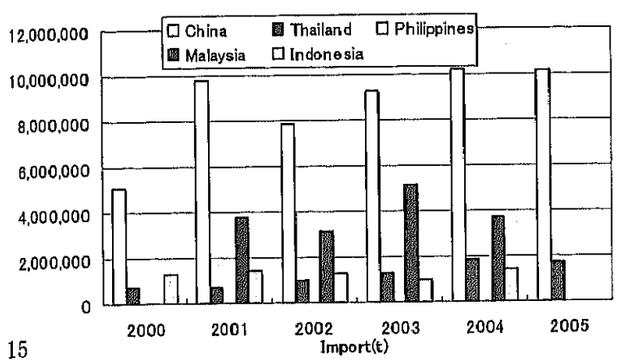
To China

To Asian countries
(except China and
Japan)

- The circle on the map indicates the amount of Import within Asian Countries
- The circle to the left indicates the amount of Export to Asian Countries

The figure is based on custom statistics (yearly base: Jan. – Dec.) of China, Indonesia, Malaysia, Philippine, Thailand, Indonesia obtained from World Trade Alamanac.
The data of top 20 trades are extracted for figure.





2.3 Copper Scrap

The trend of import and export of copper scrap is shown in the table below.

Table 2.3.1 Trend of Import/Export of Copper Scrap (2000-2005)

unit (quantity) : ton
unit (US Dollars) : million US $

			2000	2001	2002	2003	2004	2005
China	Export	Quantity	10,154	9,934	7,775	7,644	8,735	6,403
		US $	11	11	9	10	16	12
	Import	Quantity	2,501,167	3,332,534	3,080,126	3,162,432	3,952,568	4,820,940
		US $	1,008	1,242	1,068	1,328	2,453	3,181
Thailand	Export	Quantity	18,446	26,942	22,449	54,920	51,322	283,427
		US $	26	25	29	53	112	176
	Import	Quantity	4,358	4,210	4,245	4,757	6,560	5,015
		US $	6	6	5	9	15	15
Philippines	Export	Quantity	29,053	22,668	24,020	20,188	20,776	15,197
		US $	40	33	31	27	29	28
	Import	Quantity	1,042	286	12,705	31,197	19,490	4,166
		US $	1	0	3	16	18	10
Malaysia	Export	Quantity	31	20	36	472	211	75
		US $	31	22	27	28,577	46	39
	Import	Quantity	15,982	32,274	10,510	218,394	404,292	236,565
		US $	22	16	14	17	22	23
Indonesia	Export	Quantity	7,791	10,128	18,934	22,025	17,565	N/A
		US $	10	13	18	26	33	N/A
	Import	Quantity	3,966	3,939	2,372	3,318	2,848	N/A
		US $	5	3	2	2	2	N/A

(1) Overall Trend of Copper Scrap Trade

In the case of copper scrap, China and Malaysia are the net importers while the others are net exporters. It reflects the current development of copper smelter in each country.

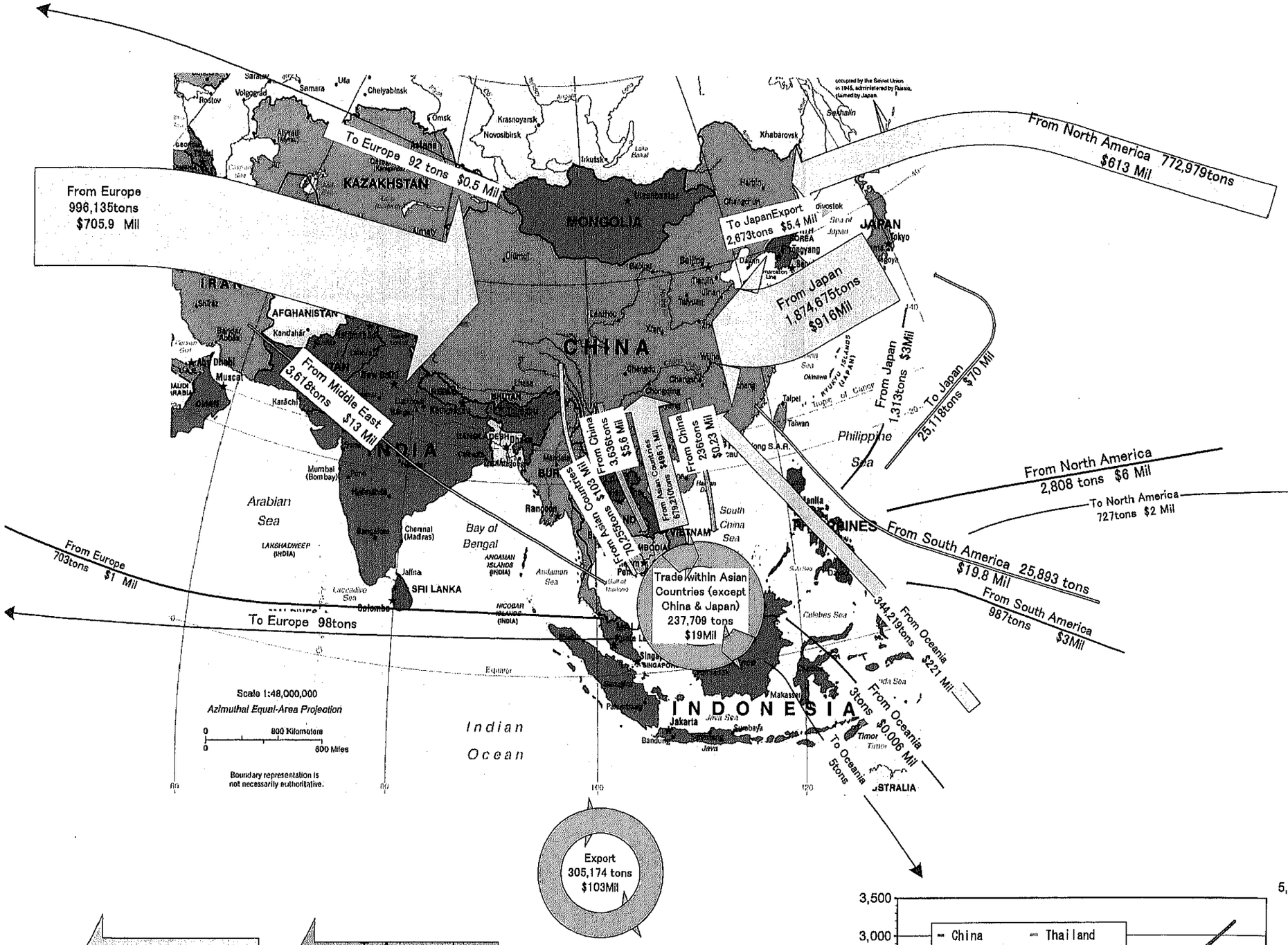
(2) Trend of Copper Scrap Trade in China

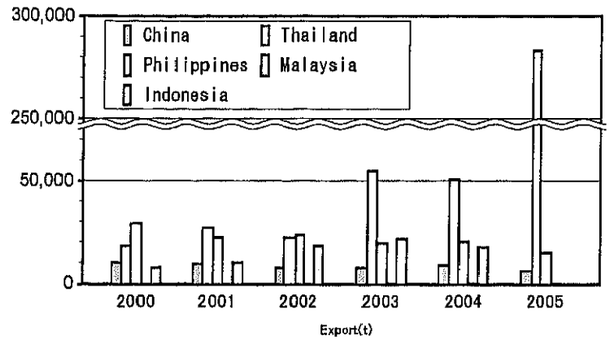
China is the largest importer of copper scrap, reaching the annual import amount of 4.8 million tons or about 3.2 billion US dollars in 2005. Its scale of import is far beyond the other countries in Asia. China's import of copper scrap has also been doubled between 2000 and 2005. The major origins of copper scrap import for China are mostly same as iron scrap including the countries of former Soviet Union, Japan, Europe and North America.

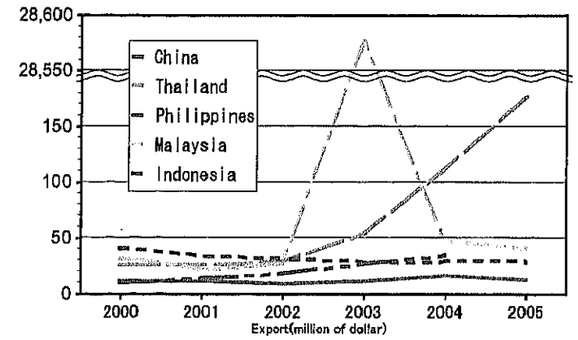
(3) Trend of Copper Scrap Trade in Other Asian Countries

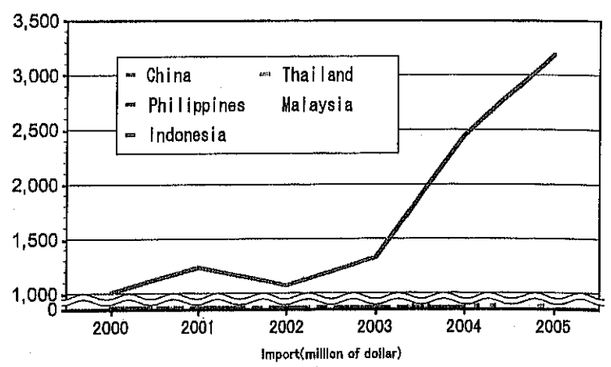
Although Malaysia is the net importer of copper scrap in 2005, its annual trade amount only reached 240 thousand tons, one twentieth of China in the same year. The copper scrap materials collected in the net exporter countries such as Indonesia, Thailand, and the Philippines are mostly brought into China though their total amount is very small in comparison with the trade amount of Malaysia or China alone.

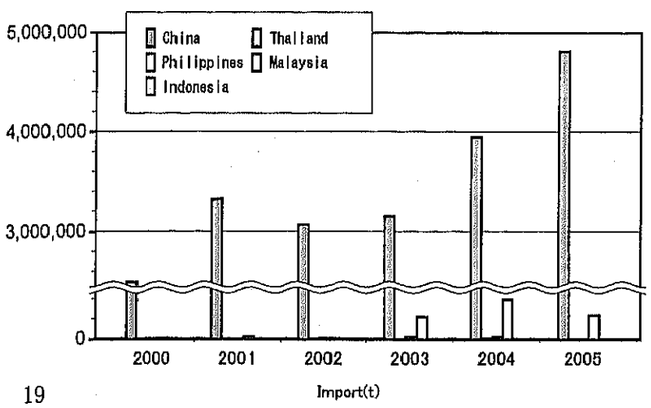
Figure 3. Material Flow of Copper Scrap in Asia











To China

To Asian countries (exoept China and Japan)

- The circle on the map indicates the amount of Import within Asian Countries
- The circle to the left indicates the amount of Export to Asian Countries

The figure is based on custom statistics (yearly base: Jan. – Dec.) of China, Indonesia, Malaysia, Philippine, Thailand, Indonesia obtained from World Trade Alamanac.
The data of top 20 trades are extracted for figure.

2.4 Aluminum Scrap

The trend of import and export of aluminum scrap is shown in the table below.

Table 2.4.1 Trend of Import/Export of Aluminum Scrap (2000-2005)

Unit (Quantity) : ton
Unit (US $) : million US$

			2000	2001	2002	2003	2004	2005
China	Export	Quantity	7,557	9,189	9,605	11,411	3,793	1,042
		US $	8	11	10	13	4	1
	Import	Quantity	804,629	367,802	447,280	653,601	1,200,009	1,687,139
		US $	515	241	240	442	1,075	1,369
Thailand	Export	Quantity	11,354	13,389	15,321	17,489	20,623	21,298
		US $	13	15	16	18	23	27
	Import	Quantity	11,485	13,126	17,602	22,364	31,177	31,784
		US $	14	16	21	28	44	47
Philippines	Export	Quantity	21,634	26,418	28,440	20,252	19,061	13,290
		US $	21	19	26	19	17	14
	Import	Quantity	436	709	1,419	2,249	1,256	224
		US $	0	0	1	1	0	0
Malaysia	Export	Quantity	0	30,570	26,980	31,674	4,065	13,805
		US $	1	1	1	2	3	5
	Import	Quantity	643,754	346,047	299,147	N/A	288,327	N/A
		US $	37	28	38	45	44	59
Indonesia	Export	Quantity	3,634	7,241	8,690	13,149	11,502	15,164
		US $	3	7	9	12	11	11
	Import	Quantity	2,838	3,690	5,662	5,903	16,972	23,437
		US $	4	4	5	6	21	31

(1) Overall Trend of Aluminum Scrap Trade

In the case of aluminum scrap, China and Malaysia are the two largest net importers followed by Thailand and Indonesia while the Philippines is the net exporters. It also reflects the development status of aluminum industry in each country.

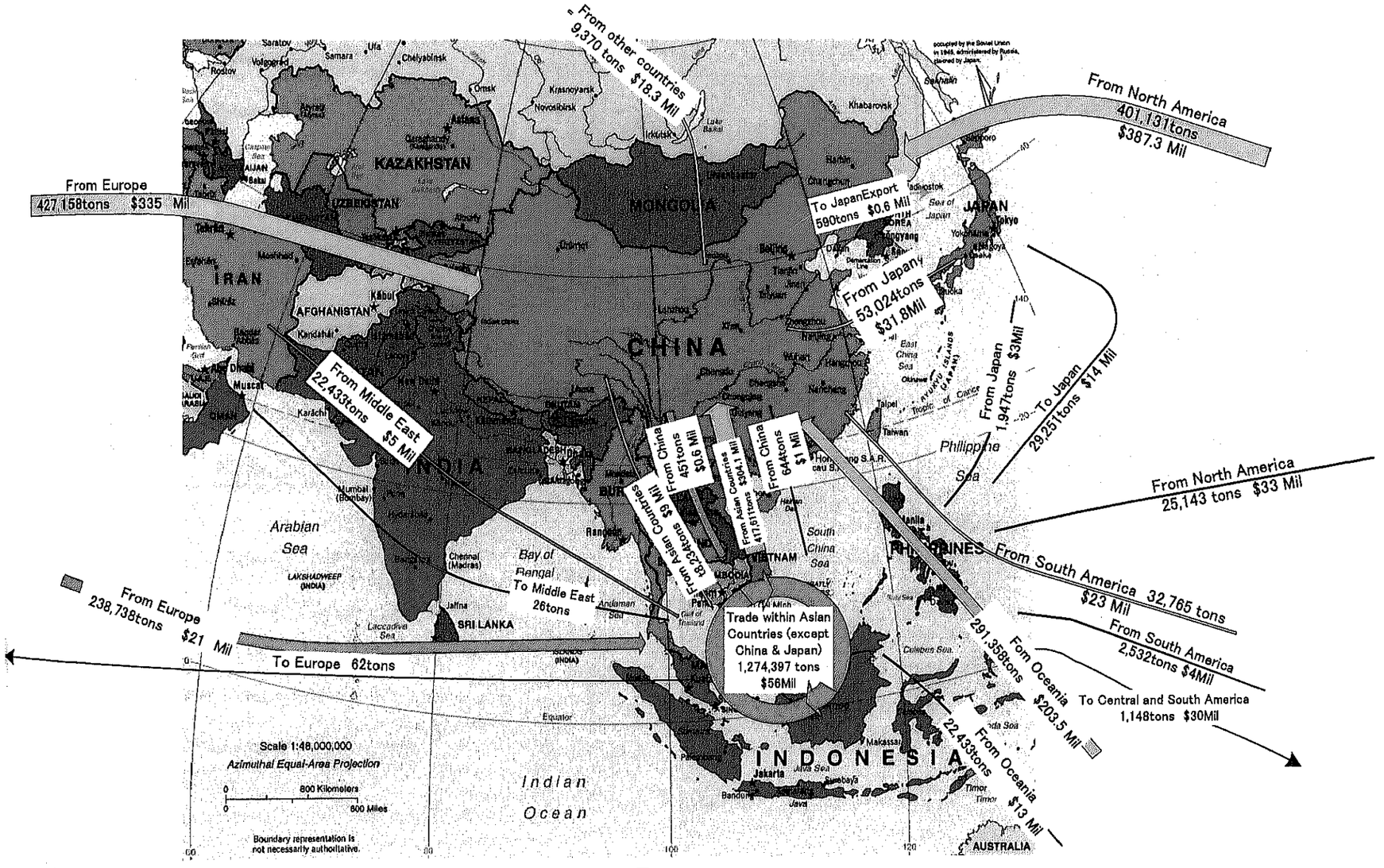
(2) Trend of Aluminum Scrap Trade in China

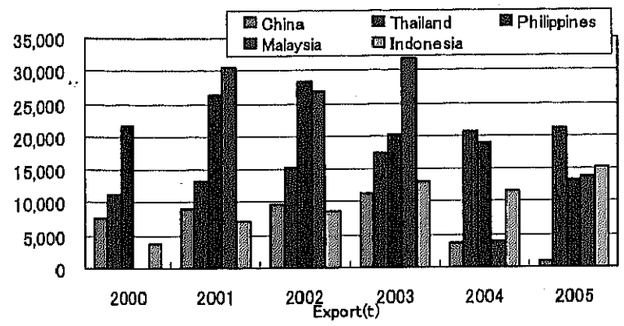
As is the case with other scrap metals, China is the largest importer of aluminum scrap, reaching the annual import of about 1.7 million tons or 1.37 billion US dollars. China's import itself has also been doubled between 2000 and 2005. The main origins of aluminum scrap import for China are North America, Europe and Asia, from each of which approximately 400 thousand tons were imported in 2005.

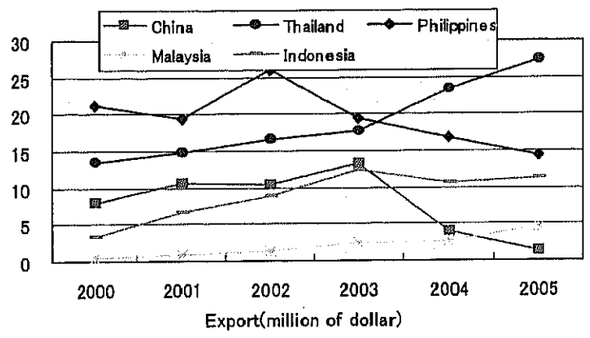
(3) Trend of Aluminum Scrap Trade in Other Asian Countries

Malaysia, the second largest importer of aluminum scrap after China, totally imported approximately 288 thousand tons mainly from neighboring Asian countries such as the Philippines and Singapore. In the case of Thailand and Indonesia, on the other hand, they import aluminum scrap from European and North American countries while they export them to neighboring Asian countries such as Korea, China, and Japan. The main export destinations of aluminum scrap in the Philippines are also neighboring Asian countries.

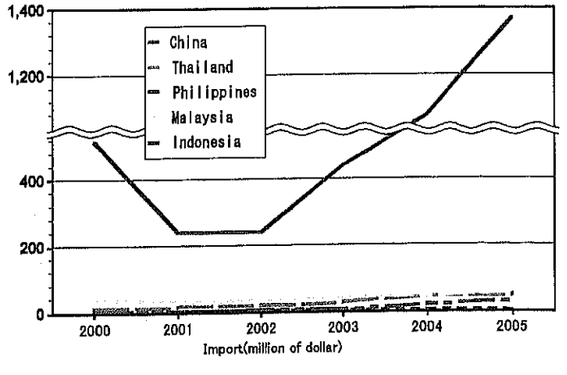
Figure 4. Material Flow of Aluminium Scrap

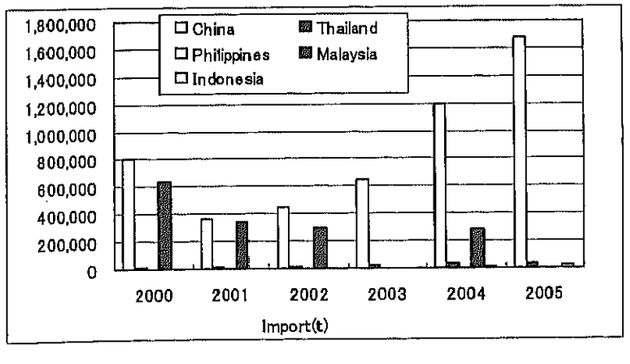






- The circle on the map indicates the amount of Import within Asian Countries
- The circle to the left indicates the amount of Export to Asian Countries





The figure is based on custom statistics (yearly base: Jan. - Dec.) of China, Indonesia, Malaysia, Philippine, Thailand, Indonesia obtained from World Trade Alamanac.
The data of top 20 trades are extracted for figure.
Note that import data of Malaysia is removed due to irregularity observed in 2003 & 2005.