No.

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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Contents

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.

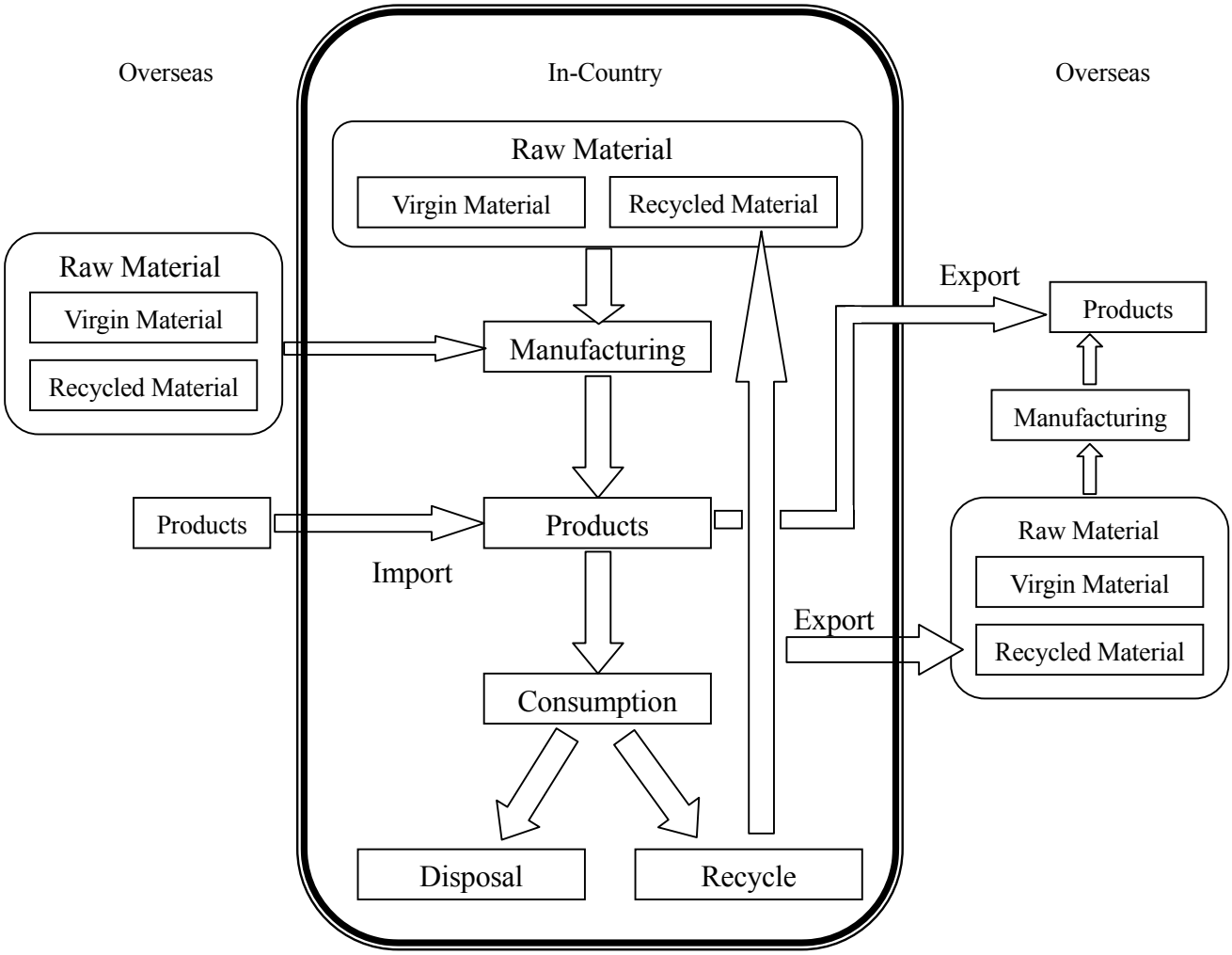


Figure 1.1 A Typical Example of Material Flow of Recyclables

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

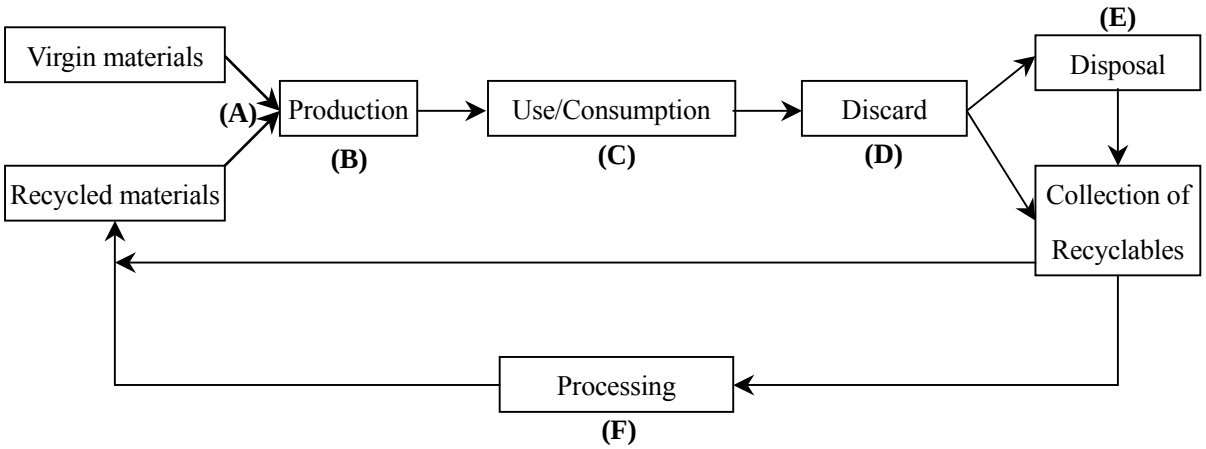
Type of Industries	Amount (tons per year)				
	Raw Material Input			Theoretically possible input of recycled raw materials	Potential Input of recycled raw materials
	Virgin	Recycled			
		Domestic	Foreign		
	①	②	③	④	④－②
Pulp & Paper Industry					
- Copy/printing paper					
- Newsprint					
- Cardboard					
- 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	229,842	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.

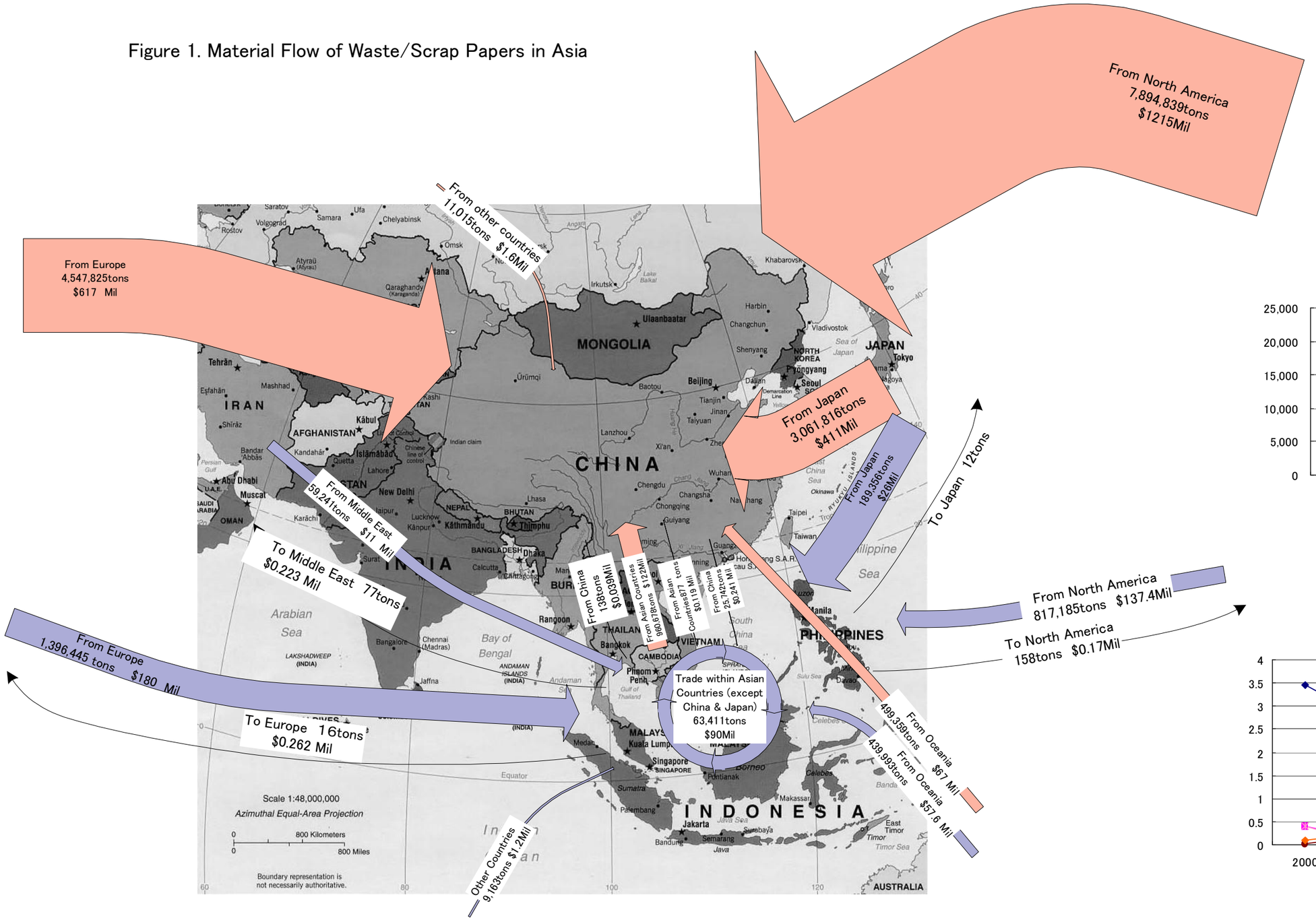
（2） Trend of Waste/Scrap Papers Trade in China

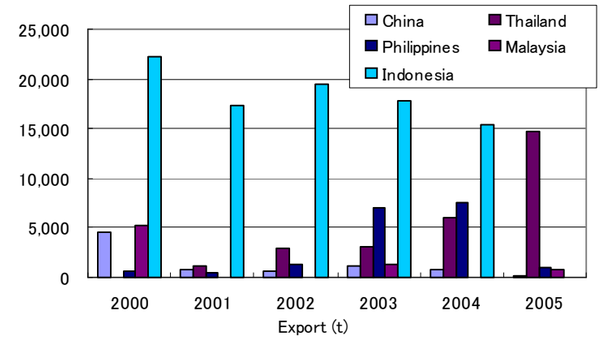
The main import origins of waste/scrap papers for China include the North American countries (United States and Canada), European countries, and Japan. It indicates that China imports waste/scrap papers not just from the Asian countries but also from the others at global scale. China's import of waste/scrap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

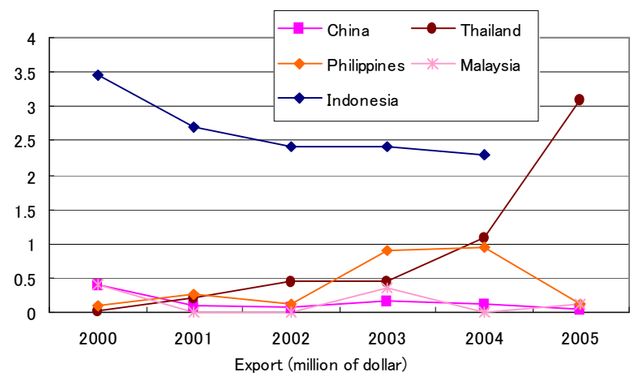
（3） Trend of Waste /Scrap Papers Trade in Other Asian Countries

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





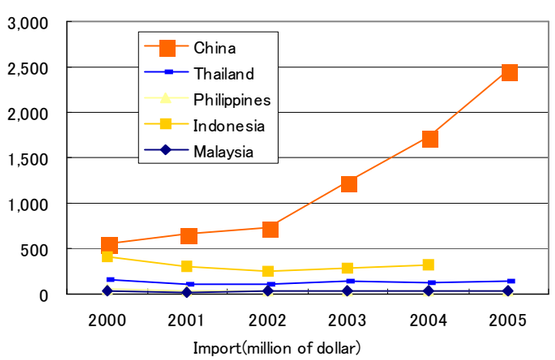


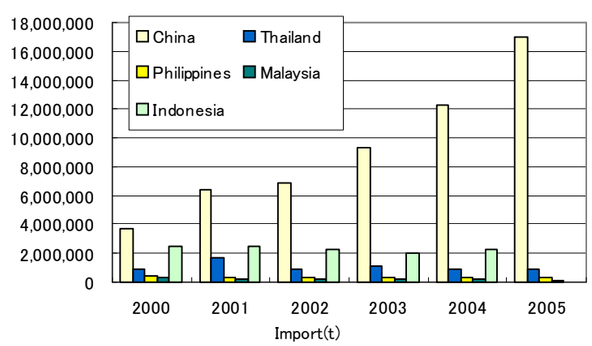
To China

To Asian countries
(except China and
Japan)

Export
15,764tons
$2.889Mil

- 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	5,099,104	9,776,318	7,853,465	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	172,693
		US $	34	25	33	53	82	99
	Import	Quantity	741,332	696,512	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	3,803,918	3,133,188	5,136,917	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 $	137	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.

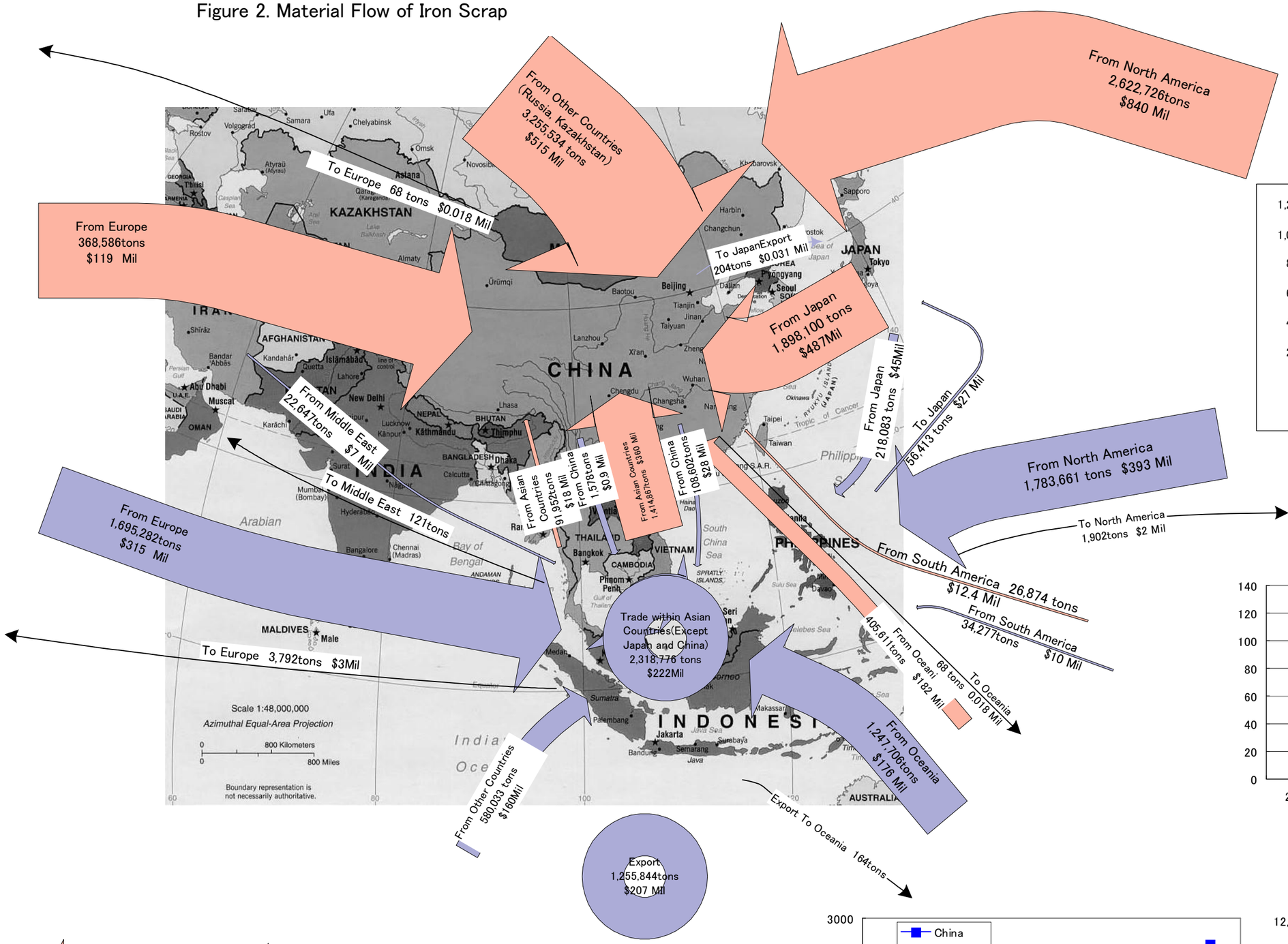
（２） Trend of Iron Scrap Trade in China

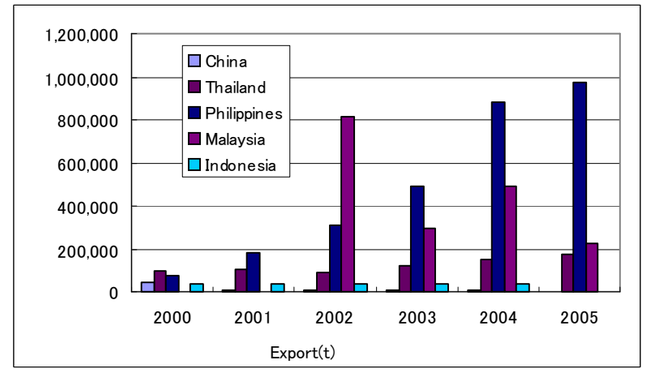
China is the largest importer of iron scrap, reaching its annual import of 10 million tons or 2.6 billion US dollars in 2005, which is three or fivefold of the imports of Thailand and Malaysia. China's import of iron scrap has been doubled between 2000 and 2005. Major origins of iron scrap imports for 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.

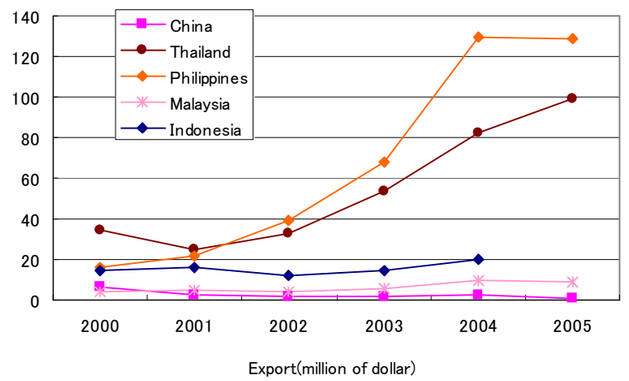
（３） Trend of Iron Scrap Trade in Other Asian Countries

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



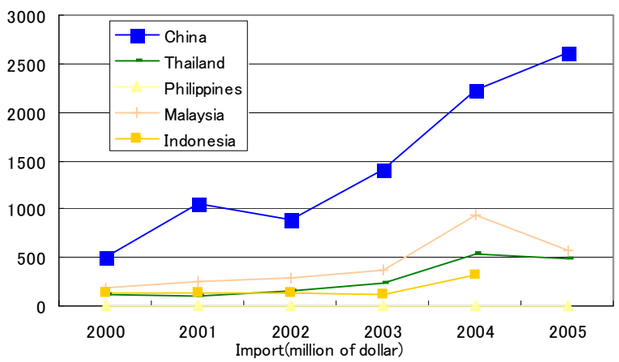


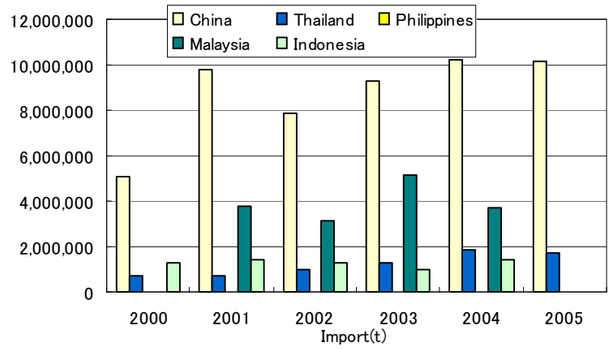


To China

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.

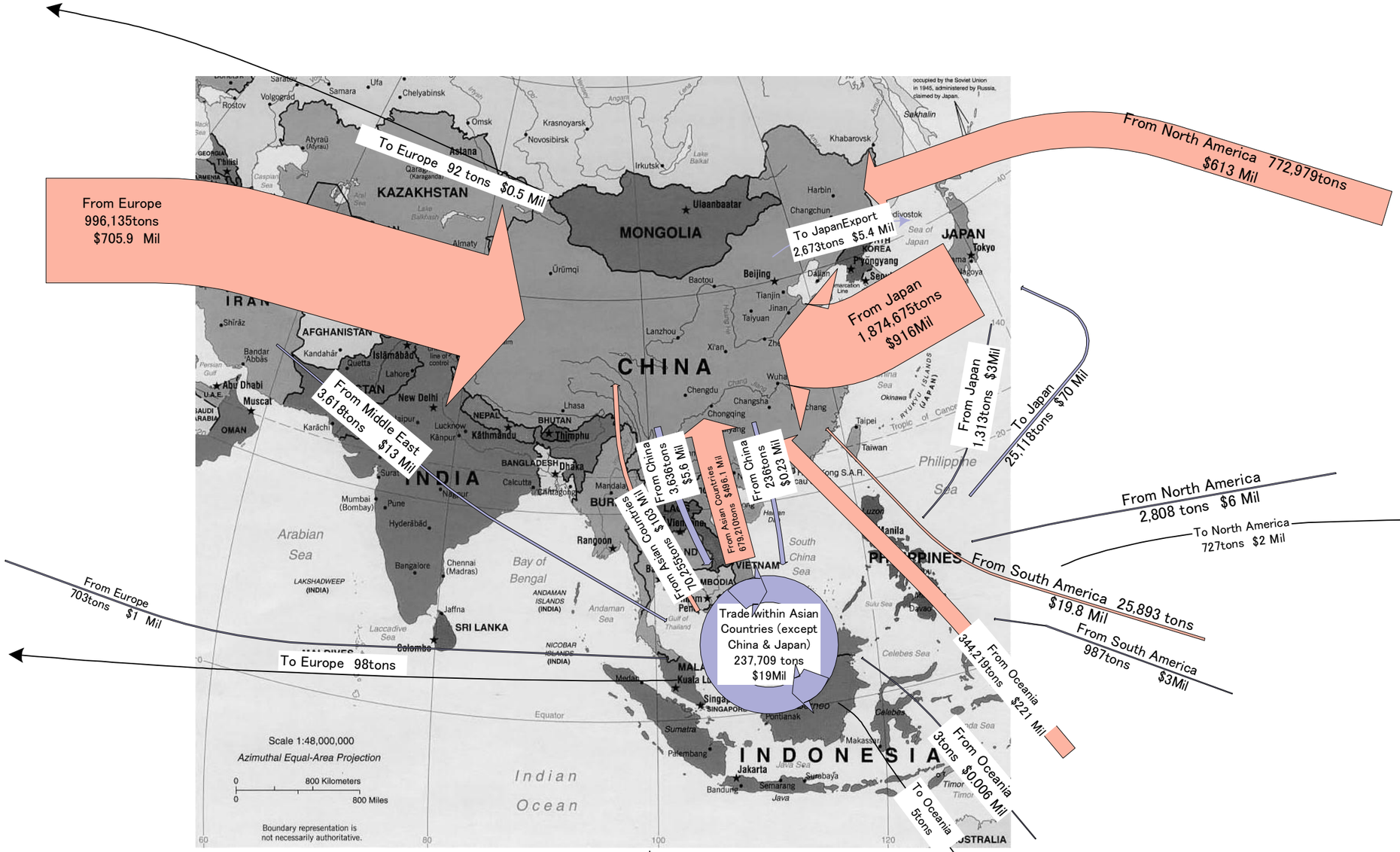
（2） Trend of Copper Scrap Trade in China

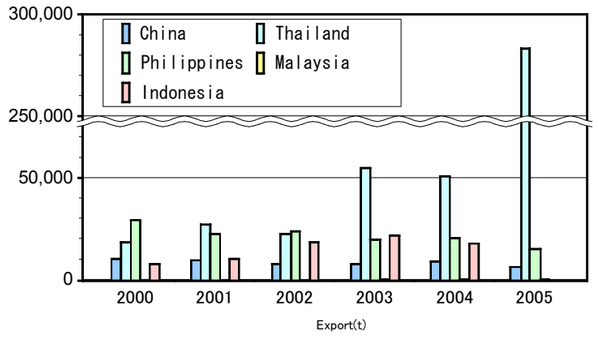
China is the largest importer of copper scrap, reaching the annual import amount of 4.8 million tons or about 3.2 billion US dollars in 2005. Its scale of import is far beyond the other countries in Asia. China's import of copper scrap has also been doubled between 2000 and 2005. The major origins of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

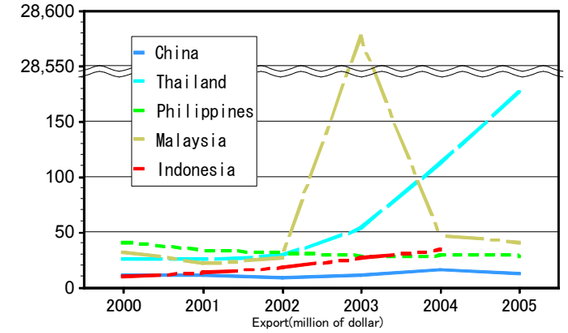
（3） Trend of Copper Scrap Trade in Other Asian Countries

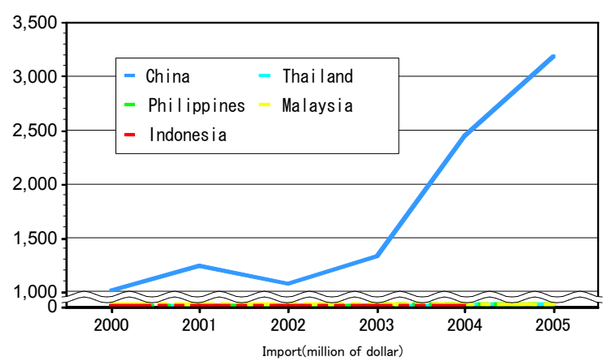
Although Malaysia is the net importer of copper scrap in 2005, its annual trade amount only reached 240 thousand tons, one twentieth of China in the same year. The copper scrap materials collected in the net exporter countries such as Indonesia, Thailand, and the Philippines are mostly brought into China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

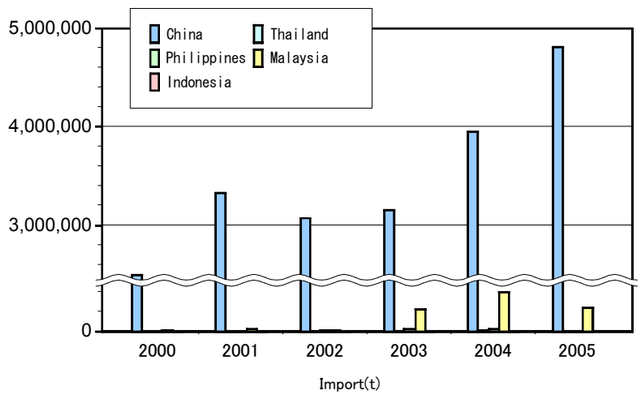
Figure 3. Material Flow of Copper Scrap in Asia











- 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	15,972	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.

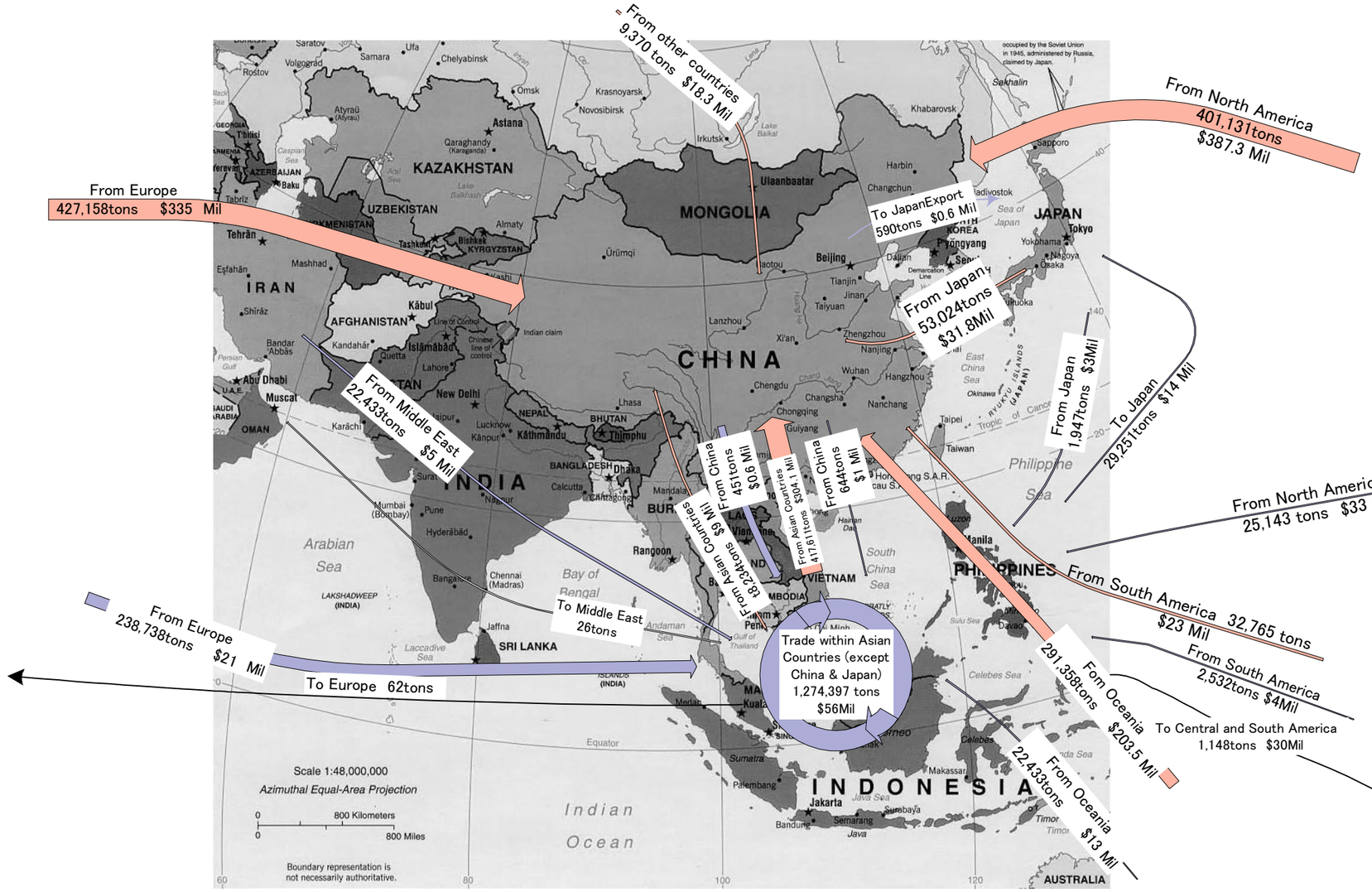
（2） Trend of Aluminum Scrap Trade in China

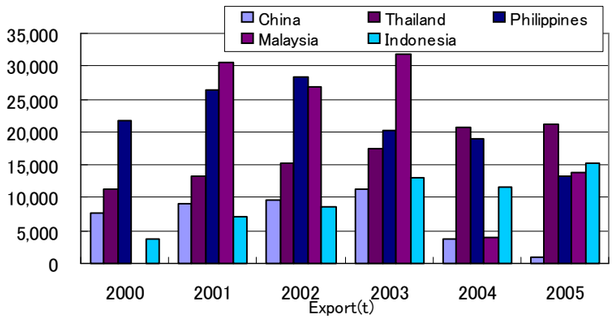
As is the case with other scrap metals, China is the largest importer of aluminum scrap, reaching the annual import of about 1.7 million tons or 1.37 billion US dollars. China's import itself has also been doubled between 2000 and 2005. The main origins of aluminum scrap import for China are North America,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

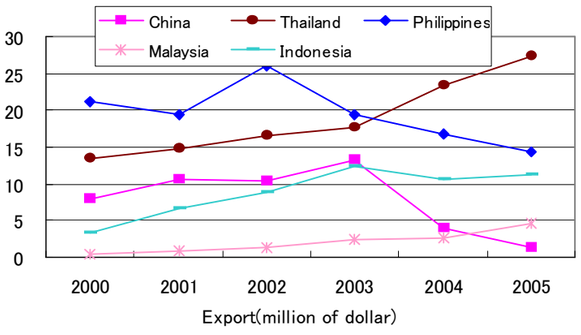
（3） Trend of Aluminum Scrap Trade in Other Asian Countries

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.

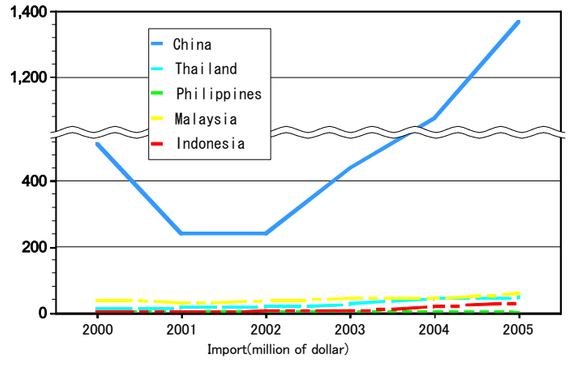
Figure 4. Material Flow of Aluminium Scrap

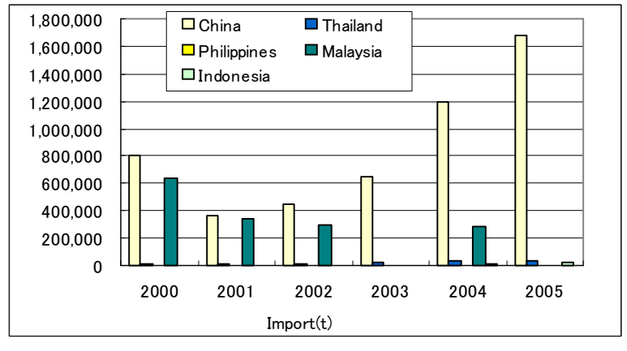






- The circle on the map indicates the amount of Import within Asian Countries
- The circle to the left indicates the amount of Export to Asian Countries





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.

2.5 Glass Scrap

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

Table 2.5.1 Trend of Import/Export of Glass Scrap (2000-2005)

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

			2000	2001	2002	2003	2004	2005
China	Export	Quantity	42,871	31,856	54,102	99,090	140,594	127,050
		US $	13	10	15	26	38	34
	Import	Quantity	4,688	1,991	4,601	2,679	4,368	8,579
		US $	2	2	4	5	11	13
Thailand	Export	Quantity	21,439	8,674	32,140	14,210	2,359	1,722
		US $	1	0	1	1	0	0
	Import	Quantity	2,240	1,736	2,973	1,955	3,426	16,125
		US $	0	0	0	0	0	2
Philippines	Export	Quantity	67	14	68	112	73	117
		US $	0	0	0	0	0	0
	Import	Quantity	21,528	8,054	35,784	9,857	2,919	2,201
		US $	1	1	2	1	1	0
Malaysia	Export	Quantity	10	687	28	42	385	873
		US $	0	0	0	0	1	0
	Import	Quantity	9,044	9,947	15,524	12,880	24,966	28,400
		US $	8	5	8	5	9	10
Indonesia	Export	Quantity	281	212	1,292	963	1,238	501
		US $	0	0	1	1	0	0
	Import	Quantity	619	235	3,754	622	131	2,358
		US $	0	0	0	1	0	0

（1） Overall Trend of Glass Scrap Trade

As to glass scrap, China is the only net exporter in the countries while the others are net importers in the year of 2005.

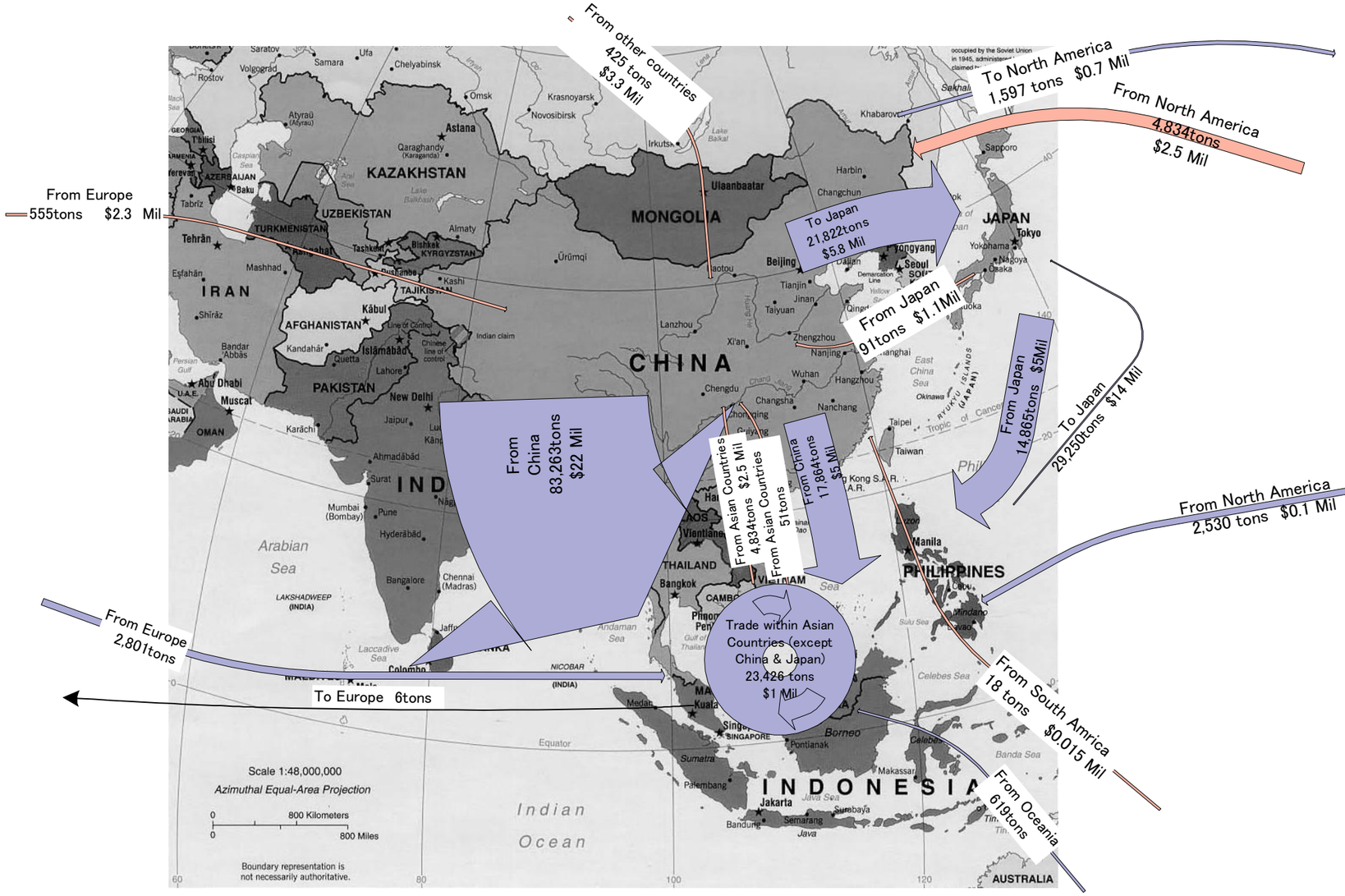
（2） Trend of Glass Scrap Trade in China

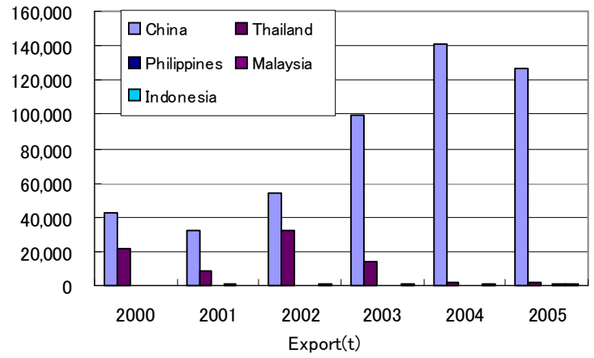
The export of glass scrap in China was about 127 thousand tons or 34 million US dollars in 2005. The trade amount of glass scrap in China is far smaller than the other recyclable materials in terms of its amount as well as value. The main destinations of export are neighboring Asian countries such as Korea, Japan, Malaysia, and Singapore.

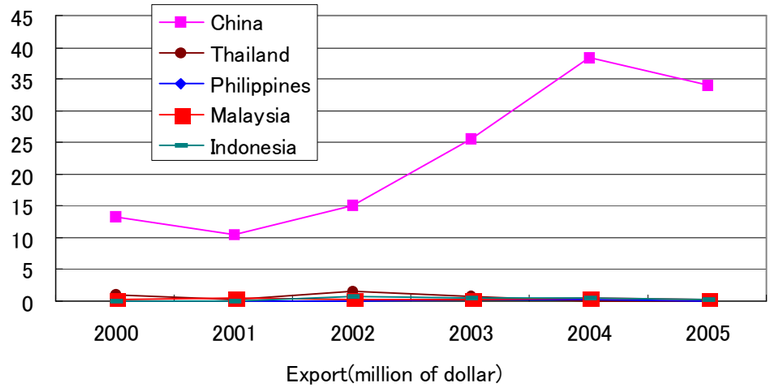
（3） Trend of Glass Scrap Trade in Other Asian Countries

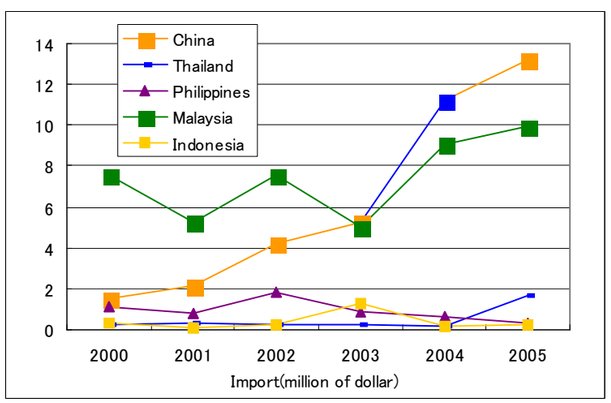
Malaysia, the largest importer of glass scrap among the countries above in 2005, only imported about 30 thousand tons in amount or 10 thousand US dollars in value while the import of Thailand imported about 16 thousand tons in the same year. Comparing with other recyclable materials mentioned above, the scale of trade is very small for glass scrap. The largest importing partner of glass scrap for Malaysia is China, followed by Singapore, Germany, USA, and Japan while Thailand mainly imports glass scrap from neighboring Asian countries.

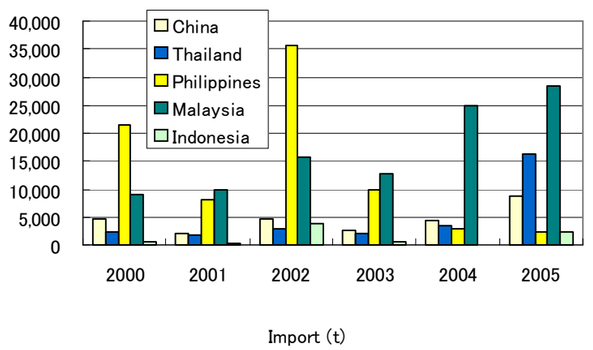
Figure 5. Material Flow of Glass Scrap in Asia











- 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.

2.6 Waste Plastics

The trend of import and export of waste plastic is shown in the table below.

Table 2.6.1 Trend of Import/Export of Waste Plastics (2000-2005)

Unit(quantity): ton
Unit(Amount of US$): million of US$

			2000	2001	2002	2003	2004	2005
China	Export	quantity	10,200	23,191	28,653	30,397	39,998	44,590
		US $	2	4	5	7	7	10
	Import	quantity	2,007,165	2,225,104	2,457,502	3,024,087	4,095,725	4,956,529
		US $	491	526	541	774	1,378	1,928
Thailand	Export	quantity	29,101	29,153	39,787	59,861	102,676	130,429
		US $	0	0	0	0	0	0
	Import	quantity	735	519	1,164	757	2,794	1,104
		US $	1	0	1	1	2	1
Philippine	Export	quantity	16,894	19,811	19,384	25,083	47,771	80,037
		US $	4,196	5	5	7	12	24
	Import	quantity	5,241	6,707	15,296	8,472	14,841	7,556
		US $	2	2	4	2	4	2
Malaysia	Export	quantity	79,522	74,748	153,507	60,536	86,014	112,402
		US $	17	14	18	21	35	57
	Import	quantity	10,637	9,579	13,632	27,809	61,215	75,706
		US $	7	5	6	10	20	29
Indonesia	Export	quantity	13,734	12,119	12,577	19,278	30,108	N/A
		US $	4	3	6	11	18	N/A
	Import	quantity	2,881	2,607	3,132	4,058	2,048	N/A
		US $	3	2	2	2	1	N/A

（1） Overall Trend of Waste Plastics Trade

In the case of waste plastics, all the above-mentioned countries except China are the net exporters while China is the only net importer. Most of the waste plastics coming from the Asian countries are exported to China. It indicates that China is the largest export market of waste plastics in Asia.

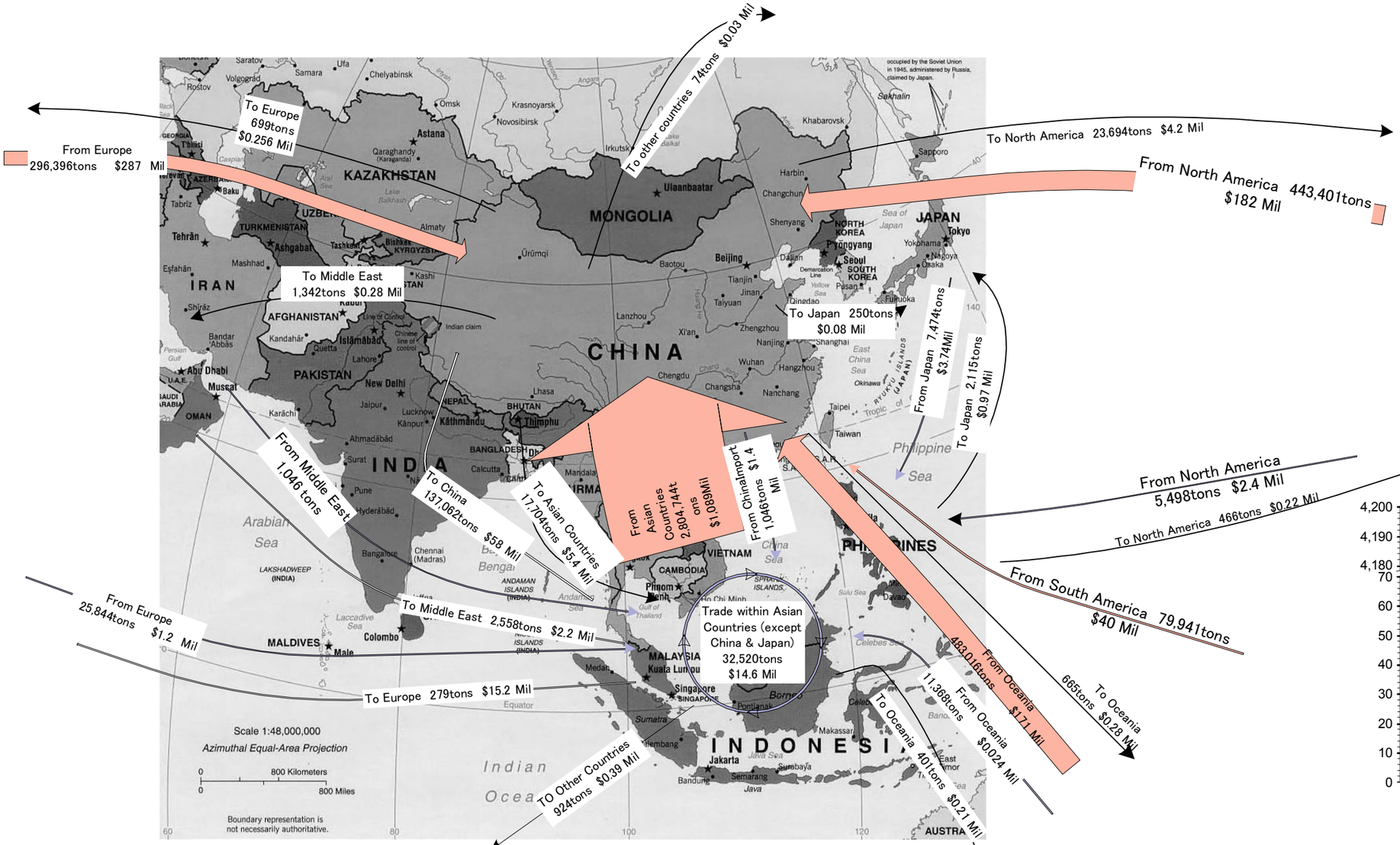
（2） Trend of Waste Plastics Trade in China

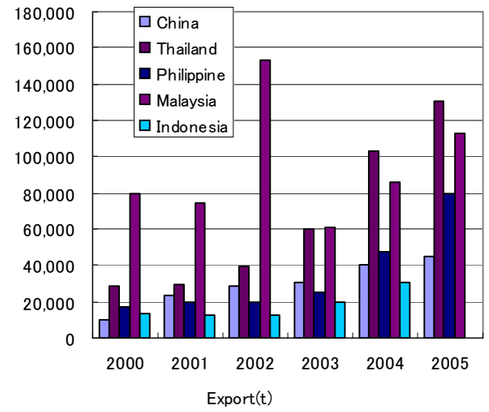
China's import of waste plastics reached about 5 million tons or 1.9 billion US dollars in 2005. The import of waste plastics in China itself has been more than doubled between 2000 and 2005. Its main origins of import spread over the world including Hong Kong (1.8 million tons), Germany (0.5 million tons), Taiwan (0.45 million tons), Australia (0.4 million tons), and USA (0.33 million tons).

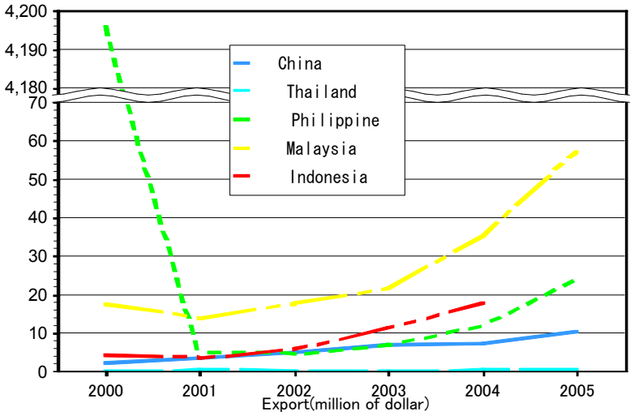
（3） Trend of Waste Plastics Trade in Other Asian Countries

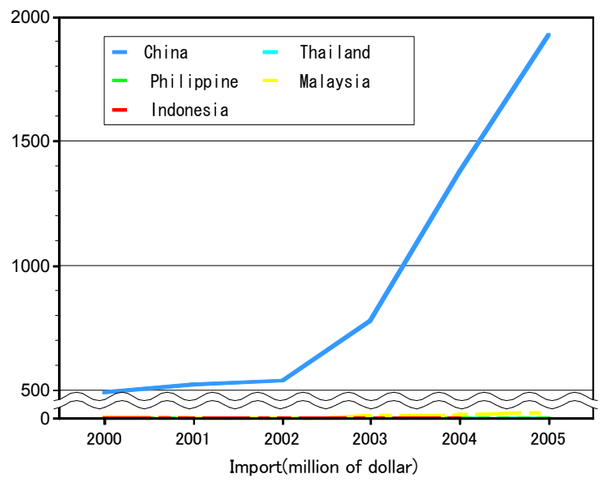
In contradiction to China, the other Asian countries are all net exporters of waste plastics. Thailand is one of the largest exporters of waste plastics in Asia, exporting about 130 thousand tons in 2005, most of which goes to China and Hong Kong. Similar situation is also found in other countries in Malaysia, Indonesia, and the Philippines.

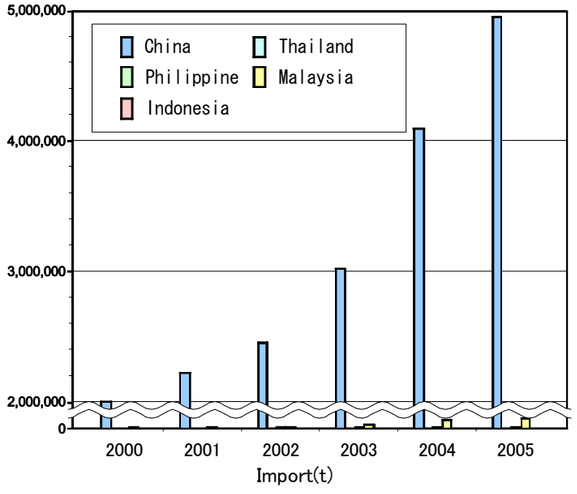
Figure 6. Material Flow of Waste Plastics in Asia











- 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.

2.7 Used Electric and Electronic Home Appliances and E-Waste

（1） Methodology for Estimating the Import and Export of Used Electric and Electronic Home Appliances (UE2HA) and E-Waste

In estimating the export and import of UE2HA and E-Waste, the Study utilizes the data on import and export of the target items between 2000 and 2005, referring to the World Trade Atlas 2006.

① Category of Target Materials in accordance with HS Coding System

The Target UE2HA and E-Waste is categorized as shown in the table below in accordance with HS Coding System.

Table 2.7.1 HS Code and Definition of Target E2HA and E-Waste

Category	HS Code	Definition
TV Set	8528.12	Color Television Receivers
	8528.13	Black and White or Other Monochrome Television Receivers
Air Conditioner	8415.10	Air Conditioning Machines, Window or Wall Types, Self-contained
Refrigerator	8418.10	Combined Refrigerator-freezers, fitted with separate external doors
Washing Machine	8450.11	Fully-automatic Washing Machines, Dry Linen Capacity Not Exceeding 10kg
	8450.12	Machines, With Built-in Centrifugal Drier, Capacity Not Exceeding 10kg
	8450.19	Other Washing Machines, Each of a Dry Linen Capacity Not Exceeding 10kg
Personal Computer	8471.30	Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, of which portable and digital (the machines less than 10kg in weight that include at least central processing unit: CPU, keyboard, and displaying device
	8471.41	Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, that at least include central processing unit: CPU and data input/output unit in the same housing unit regardless of whether the data input and output device is separate or unified.

② Methodology for Estimating Import and Export Amount of UE2HA and E-Waste

The import and export amount of UE2HA and E-Waste was estimated in accordance with the methodology outlined below:

a. Collection of data on export and import of target items by each country of trade

For each target item, data on the amount and value of export-import is to be collected for each partner country of trade.

b. Estimation of per unit value of import and export by each target item as well as by each partner country of trade

Per unit value of import and export is to be estimated for each partner country of trade by dividing the total export or import value by the total amount of export or import.

c. Estimation of the total import and export amount of UE2HA and E-Waste based on the per unit import or export value of each item

To identify the amount of UE2HA and E-Waste trade, the Study assumed the lowest per unit import and export value for each item as shown in the table below.

Table 2.7.2 Assumed Lowest Per Unit Import/Export Value of Each Target Item

Category	HS Code	Assumed Lowest Value Per Unit
TV Set	8528.12	US$50/unit
	8528.13	US$30/unit
Air Conditioner	8415.10	US$100/unit
Refrigerator	8418.10	US$50/unit
Washing Machine	8450.11	US$50/unit
	8450.12	US$50/unit
	8450.19	US$50/unit
Personal Computer	8471.30	US$70/unit
	8471.41	US$50/unit

Based on the values set above, the Study assumed that if the average per unit value of export or import is below the lowest value above, all the items exported to or imported from that country were not brand new items. This is the basic methodology applied for estimation of the import and export amount of UE2HA and E-Waste. Obviously, this methodology is only for first step rough estimation of the import and exports of UE2HA and E-Waste and includes high uncertainty. There, this estimation results need to be carefully cross-examined validated based on the collection of more accurate information from proper country-wise sources.

In addition, since there is no available data in World Trade Atlas on the import and export for Vietnam while export and import value data is only available in Thailand, these two countries are not discussed in this section.

（２） Import and Export of TV Set

① China

Based on the import data of World Trade Atlas in 2005, the import of second-hand color TV sets can be described as shown in the table below.

Table 2.7.3 The Estimated Number of Imported Second-Hand Color TV Sets by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
Japan	47	114,589
Hong Kong	28	28,074
Indonesia	7	20,655
India	14	2,037

As shown in the table above, there are 4 (four) countries where the average per unit import value of TV set is lower than 50 dollars US, among which Japan is assumed as the largest import origin of second-hand TV set for China. The table below shows the estimated export amount of second-hand TV sets from China.

Table 2.7.4 The Estimated Number of Exported Second-Hand Color TV Sets by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Germany	32	4,431,835
UK	49	3,575,255
Netherlands	38	2,623,807
Italy	42	1,442,423
Spain	36	1,099,877
Indonesia	32	987,852
Egypt	43	521,438
India	48	463,900
Poland	47	134,354
Iraq	49	130,556
Kenya	32	89,736
Syria	47	59,429
Luxemburg	45	53,638
Angola	41	27,186
Albania	43	26,200
Malta	18	16,105
Afghanistan	44	7,339
Togo	40	3,449

According to the table above, a considerable amount of second-hand TV sets were estimated to be exported from China, but it is still uncertain that the above average per unit export value of TV set is lower than the value of bran new ones manufactured in China. This can only be utilized as a guide to identify the macro situation.

As to the second-hand monochrome TV set, its import for China is estimated to be as small as 60 thousand units per year mainly from Taiwan according to the World Trade Atlas in 2005 while its export extended all over the world as shown in the table below.

Table 2.7.5 The Estimated Number of Exported Second-Hand Monochrome TV Sets by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
USA	8	3,146,465
Hong Kong	7	2,631,331
India	8	604,447
Spain	10	501,536
Mexico	11	466,502
UAE	8	383,112
UK	9	265,408
Italy	15	260,524
South Africa	28	238,527
Kyrgyzstan	9	187,960
Bangladesh	22	185,506
North Korea	10	161,444
Chile	9	155,495
Brazil	7	154,696
Indonesia	9	146,234

② Indonesia

The table below shows the estimated import amount of second-hand color TV set in Indonesia.

Table 2.7.6 The Estimated Number of Imported Second-Hand Color TV Sets by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
Japan	5	1,346,172
Singapore	5	878,829
China	44	95,087
Taiwan	37	7,707
Hong Kong	14	5,934
Denmark	22	172

As shown in the table above, the import from Japan and Singapore is dominant for Second-hand color TV sets in Indonesia. The table below shows the export of the same items in Indonesia.

Table 2.7.7 The Estimated Number of Exported Second-Hand Color TV Sets by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
UK	0.2	770,845
Hong Kong	19.6	349,903
Vietnam	6.5	274,110
India	11.7	166,843
Spain	3.0	25,972
China	1.0	25,899
Korea	40.9	2,344
Samoa	0.6	450

The color TV unit of which the average value is lower than 10 dollars US can be considered second-hand. According to this assumption, main exporting destinations of second-hand color TV sets for Indonesia are UK, Vietnam, Spain, and China. Another table below shows the estimated import of second-hand monochrome TV set in Indonesia.

Table 2.7.8 The Estimated Number of Imported Second-Hand Monochrome TV Sets by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
China	4	115,737
Hong Kong	28	684

As to the export of second-hand monochrome TV set, Singapore is the major export destination where about 16 thousand sets were exported from Indonesia at the unit export value of 0.4 dollars US.

③ Malaysia

In the case of Malaysia, the average per unit import value of color TV set far exceeds 100 dollars US for all origins of import, therefore, it is assumed that there will be virtually few imports of second-hand ones in Malaysia. As to the export, on the other hand, a considerable number of second-hand ones are exported as shown in the table below.

Table 2.7.9 The Estimated Number of Exported Second-Hand Color TV Sets by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
China	2.1	176,571
Portugal	0.48	14,635
Spain	1.92	7,965
Paraguay	41.58	345

As to second-hand monochrome TV set, no export was identified from Malaysia while it was estimated to be imported from the countries shown in the table below.

Table 2.7.10 The Estimated Number of Imported Second-Hand Monochrome TV Sets by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
China	9	19,518
Australia	1	5,839
UK	2	4,007
Hong Kong	4	500

④ The Philippines

As the import and export data of E2HA are given in weight (kg) in the case of the Philippines, the Study assumed the average weight of TV set as 25kg/unit to estimate per unit value of TV set and the number of units. The table below shows the estimated import of second-hand color TV sets in the Philippines.

Table 2.7.11 The Estimated Number of Imported Second-Hand Color TV Sets by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
Korea	14.0	253,450
Japan	2.5	230,350
Italy	4.3	448
UAE	12.5	298
Spain	1.3	136

On the other hand, it is estimated that there will be no export of second-hand color as well as monochrome TV sets from the Philippines. The import of second-hand monochrome TV sets is estimated to exist as shown in the table below although the number is very limited.

Table 2.7.12 The Estimated Number of Imported Second-Hand Monochrome TV Sets by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
China	16.8	3,470
Korea	4.5	1,370
Taiwan	22.0	1,061
Hong Kong	47.8	964
Japan	4.0	855
Singapore	4.8	270
Australia	30.5	15

（３） Import and Export of Air Conditioners

① China

According to the World Trade Atlas 2005, the average per unit import of value of air conditioner for China is 382 dollars US while the average per unit export value is 143 dollars US. There is no country of import origin where the average per unit import value is lower than 100 dollars US. As to the export, only Burkina Faso recorded the average per unit export value of less than 50 dollars US while there are some countries where the air conditions are exported from China at the per unit export value lower than 100 dollars US as shown in the table below.

Table 2.7.13 The Estimated Number of Exported Second-Hand Air Conditioners by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Korea	99	17,523
Thailand	98	435
Colombia	99	310
India	98	4,584
Nepal	87	46
Burkina Faso	38	67

② Indonesia

According to the World Trade Atlas 2005, the average per unit import of value of air conditioner for Indonesia is 73.5 dollars US while the average per unit export value is 0.8 dollar US. The estimated import of second-hand air conditioners for Indonesia is as shown in the table below.

Table 2.7.14 The Estimated Number of Imported Second-Hand Air Conditioners by Import origins (2004)

Import Origins	Average Price (US$/unit)	Number of Unit
China	51.9	293,457
Malaysia	65.2	91,501
Japan	53.3	78,409
Singapore	12.5	71,467
Hong Kong	64.8	6,373
USA	62.0	178

The table below shows the estimated export of second-hand air conditioners from the Indonesia

Table 2.7.15 The Estimated Number of Exported Second-Hand Air Conditioners by destinations (2004)

Export Destinations	Average Price (US$/unit)	Number of Unit
Singapore	0.7	915,413
Maldives	12.2	88
Australia	78.9	9

The table indicates that most of the second-hand air conditioners are estimated to be exported to Singapore.

③ Malaysia

According to the World Trade Atlas 2005, the average per unit import of value of air conditioner for Malaysia is 122 dollars US while the average per unit export value is 188 dollar US. Only the per unit import value of air conditioners from Italy is lower than 100 dollars US that is estimated to be second-hand ones. The number of air conditioners imported from Italy was 1,540 while the average per unit value was 85 dollars US. The imported air conditioners from other countries are estimated to be brand new taking into account their high per unit export value exceeding 100 dollars US. As to the export, on the other hand, the average per unit value is lower than 100 dollars US for several export destinations as shown in the table below. It is estimated that a considerable number of air conditioners exported to these countries may include second-hand ones.

Table 2.7.16 The Estimated Number of Exported Second-Hand Air Conditioners by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Iran	47.8	96,843
China	50.9	2,710
New Caledonia	76.3	142
Denmark	76.3	120
Hungary	77.4	115
Paraguay	82.9	95
Malta	86.0	75
Kenya	66.6	26
Ghana	81.1	20
Philippines	72.4	20

④ The Philippines

As the import and export data of E2HA are given in weight (kg) in the case of the Philippines, the Study assumed the average weight of air conditioner as 51kg/unit based on the case of Japan to estimate per unit value of air conditioner and the number of units. The tables below show the estimated import and export of second-hand air conditioners in the Philippines.

Table 2.7.17 The Estimated Number of Imported Second-Hand Air Conditioners by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
Hong Kong	80.1	10,864
USA	90.8	3,170
Singapore	24.0	896
Australia	14.3	427
UAE	15.3	98

Table 2.7.18 The Estimated Number of Exported Second-Hand Air Conditioners by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Samoa	56.6	1,471
Micronesia	46.4	403
Palau	16.3	23

（4） Import and Export of Refrigerators

① China

According to the World Trade Atlas 2005, the average per unit import of value of refrigerator for China is 650 dollars US while the average per unit export value is 144 dollar US. There is no country of import and export for China where the average per unit import or export value is as low as 50 dollars US, at which price the refrigerator is assumed second-hand.

② Indonesia

According to the World Trade Atlas 2005, the average per unit import of value of refrigerator for Indonesia is 154 dollars US while the average per unit export value is 50 dollar US. The estimated import and export of second-hand refrigerators in Indonesia are shown in the tables below.

Table 2.7.19 The Estimated Number of Imported Second-Hand Refrigerators by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
Singapore	9	12,691
Malaysia	7	338

Table 2.7.20 The Estimated Number of Exported Second-Hand Refrigerators by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Pakistan	3	5,081
Japan	18	651
Singapore	1	20

As clearly shown in the tables above, transaction of second-hand refrigerators is still very small and limited in Indonesia.

③ Malaysia

There is no data in World Trade Atlas on export and import of refrigerators in Malaysia regardless of whether they are brand new or second-hand.

④ The Philippines

As the import and export data of E2HA are given in weight (kg) in the case of the Philippines, the Study assumed the average weight of refrigerator as 59kg/unit based on the case of Japan to estimate per unit value of refrigerator and the number of units. The tables below show the estimated import and export of second-hand refrigerators in the Philippines according to the assumptions above (There is no export of second-hand refrigerators according to our estimation.).

Table 2.7.21 The Estimated Number of Imported Second-Hand Refrigerators by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
Japan	15.3	1,507
China	31.3	728
Taiwan	35.4	509
UAE	11.8	69

（５） Import and Export of Washing Machines

① China

a. Fully Automatic Washing Machine (for Household and Commercial Use)

According to the latest data available in World Trade Atlas 2000, the study could not identify the import of second-hand fully automatic washing machines in China. As to the export, it is estimated that a small number of second-hand may be exported to a few countries from China as shown in the table below.

Table 2.7.22 The Estimated Number of Exported Second-Hand Washing Machines (fully automatic) by destinations (2000)

Export Destinations	Average Price (US$/unit)	Number of Unit
Switzerland	15	710
Ethiopia	49	540

b. Semi-Automatic Washing Machine with centrifugal dehydrator

According to the data of World Trade Atlas 2005, the average per unit import value of washing machine of this type is 450 dollars US, which is not considered as second-hand. As to the export, on the other hand, the average per unit export value is 48 dollars US, that can be considered as second-hand although it is still not uncertain taking into account the lower production cost in China. As a reference, the table shows the average per unit value and amount of export to the countries where the second-hand washing machines may be exported.

Table 2.7.23 The Estimated Number of Exported Second-Hand Washing Machines (Semi-automatic) by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
UAE	49	292,221
Thailand	47	275,402
Indonesia	42	212,167
Saudi Arabia	51	199,578
Jordan	51	171,932
Malaysia	45	169,064
Russia	42	136,258
Pakistan	38	135,135
India	49	124,615
Morocco	46	123,055

c. Other Washing Machines

According to the data of World Trade Atlas 2005, the average per unit import value of washing machine of this type is 1,550 dollars US, which is not considered as second-hand. As to the export, on the other hand, the average per unit export value is 24 dollars US, that can be considered as second-hand although it is still not uncertain taking into account the lower production cost in China. As a reference, the table shows the average per unit value and amount of export to the countries where the second-hand washing machines may be exported.

Table 2.7.24 The Estimated Number of Exported Second-Hand Washing Machines (Other types) by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Philippines	27	56,137
Russia	17	51,849
Netherlands	14	37,705
USA	14	35,352
Poland	21	21,693
UAE	34	21,032
Angola	38	20,841
Japan	32	16,582
Morocco	35	15,982
Switzerland	18	15,348

② Indonesia

As to the case of Indonesia, only the import and export value data ids available for the washing machines. Since it is not enough to estimate the number of second-hand ones, it is not discussed here.

③ Malaysia

a. Fully Automatic Washing Machine (for Household and Commercial Use)

According to the latest data available in World Trade Atlas 2005, the average per unit import value of washing machine of this type is 110 dollars US, higher than the assumed maximum per unit value of second hand one of 50 dollars US. Malaysia also does not import them from any countries at the average import value less than 50 dollars US. As to the export, on the other hand, the average per unit value is 31 dollars US, which is lower than the maximum per unit value of 50 dollars US and considered to be second-hand. The table below shows the import of washing machines from the countries where the average per unit value is lower than 100 dollars US.

Table 2.7.25 The Estimated Number of Imported Second-Hand Washing Machines (Fully Automatic) by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
China	74.1	46,158
Japan	55.6	2,551
Hong Kong	52.9	1,759

The per unit import value given in the table is much lower than the sales price in each country; therefore these imported ones may be second-hand. However, it needs to be further investigated in detail.

The table below shows the estimated export amount of second-hand washing machines by destinations.

Table 2.7.26 The Estimated Number of Exported Second-Hand Washing Machines (Fully Automatic) by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Vietnam	1.3	196,016
UK	14.8	41,480
Maldives	48.5	642

As to the export to Vietnam, second-hand washing machines may be considerably included while more detail investigation is necessary for the other two countries to more accurately identify the amount of second-hand washing machines.

b. Semi-Automatic Washing Machines with Centrifugal Dehydrator

According to World Trade Atlas 2005, the amount and average per unit value of semi-automatic washing machine import is as shown in the table below.

Table 2.7.27 The Estimated Number of Imported Washing Machines (Semi- Automatic) by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
Thailand	128.4	54,241
China	22.0	21,869
Philippines	89.6	17,712
Indonesia	93.3	720
Vietnam	118.3	480
India	115.7	100
Switzerland	159.0	20
USA	743.8	19
Netherlands	2,856.0	1

Among the countries of import origins above, import from China is estimated to include a certain number of second-hand ones while the import from other countries mainly consist of brand new ones.

As to the export, Thailand and Singapore are the main destinations, but most of them are considered to be brand new taking into account the average per unit export value that is much higher than 100 dollars US.

c. Other Washing Machines

According to World Trade Atlas 2005, the amount and average per unit value of other washing machine import is as shown in the table below.

Table 2.7.28 The Estimated Number of Imported Washing Machines (Other Types) by Import origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
Thailand	108.3	69,831
China	23.2	987
Germany	216.6	22
India	144.6	20
USA	2,557.8	20
Japan	175,425	1

From the table above, the import from China is estimated to include a considerable number of second-hand ones while the import from the others mostly consists of brand new ones.

The table below shows the export of Washing Machines (Other Types).

Table 2.7.29 The Estimated Number of Exported Washing Machines (Other Types) by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Thailand	0.7	15,002
Indonesia	1,660.3	24
Maldives	69.2	20
Tanzania	1,802.7	8
Brunei	3,148.1	4
Philippines	59.2	2
China	39,013.8	1

From the table above, the washing machines exported to Thailand in 2005 will mainly consist of second-hand ones. For other countries, more detail investigation is necessary to identify the current status.

Although the per unit export value of washing machine is very high for several countries as shown in the table above, it may be due to inclusion of the washing machine for commercial use such as laundries and dry cleaners.

④ Philippines

As the import and export data of E2HA are given in weight (kg) in the case of the Philippines, the Study assumed the average weight of washing machine as 29kg/unit based on the case of Japan to estimate per unit value of washing machine and the number of units.

a. Fully Automatic Washing Machine (for Household and Commercial Use)

The table below shows the estimated import number of washing machines (fully automatic) by import origins in the Philippines according to World Trade Atlas 2005.

Table 2.7.30 The Estimated Number of Imported Washing Machines (Fully Automatic) by Import Origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
China	24.5	55,139
Thailand	68.8	10,413
Japan	10.0	1,626
India	44.3	1,376
Singapore	27.5	1,266
Hong Kong	26.3	1,081
Malaysia	108.5	611
Taiwan	10.0	449
Brazil	65.8	182
USA	5.0	100
Korea	100.3	7
Indonesia	161.0	1

From the table above, the import from Japan, Taiwan, and USA, where the average per unit import value is less than 10 dollars US, is estimated to include a considerable number of second-hand washing machines. For other countries, more detail investigation is needed.

The next table below shows the export of washing machines by destinations.

Table 2.7.31 The Estimated Number of Exported Washing Machines (Fully Automatic) by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Indonesia	61.5	93,922
Malaysia	88.8	39,199
Japan	90.0	35,099
Thailand	67.3	34,858
Singapore	86.8	14,774
Jordan	82.5	6,383
UAE	66.0	4,847
Bahrain	93.3	3,082
Oman	63.0	1,799
Qatar	60.5	1,432
Cambodia	67.8	671
USA	188.0	549
Yemen	54.5	413
Sudan	351.5	396
Bangladesh	108.0	242
Papua New Guinea	136.8	96
China	216.8	42
Hong Kong	2,347.5	5
Israel	82.8	4

As long as the figures shown in the table above, the number of second-hand washing machines exported from the Philippines is considered minimal, but more detail investigation is required to accurately identify the situation.

b. Semi-Automatic Washing Machines with Centrifugal Dehydrator

The table below shows the estimated import number of washing machines (semi-automatic) by import origins in the Philippines according to World Trade Atlas 2005.

Table 2.7.32 The Estimated Number of Imported Washing Machines (Semi-Automatic) by Import Origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
China	21.8	32,277
Thailand	64.0	16,783
India	45.8	8,719
Brazil	67.3	1,635
Italy	96.3	1,194
Korea	61.0	1,095
Japan	9.3	143
Taiwan	59.0	5
USA	188.8	4

From the table above, import from China and Japan is estimated to include second-hand washing machines while the import from the other countries may include a considerable number of brand new ones although it is not possible to even roughly estimate the numbers without any further investigations.

The next table below shows the export of washing machines of this type by destinations.

Table 2.7.33 The Estimated Number of Exported Washing Machines (Semi-Automatic) by destinations (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Indonesia	61.5	94,009
Malaysia	89.0	39,858
Japan	95.8	37,809
Thailand	68.8	35,442
Singapore	86.8	14,774
Jordan	82.5	6,383
UAE	66.0	4,847
Bahrain	93.3	3,082
Oman	63.0	1,799
China	244.5	1,504
Qatar	60.5	1,432
Cambodia	67.8	671
USA	188.0	549
Yemen	54.5	413
Sudan	351.5	396

From the figures given above, many of the exported washing machines of this type are estimated brand new

ones although further study is required to accurately identify the situation.

c. Other Washing Machines

The table below shows the estimated import number of washing machines (other types) by import origins in the Philippines according to World Trade Atlas 2005.

Table 2.7.34 The Estimated Number of Imported Washing Machines (Other Types) by Import Origins (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
China	20.0	65,319
Thailand	49.3	20,431
Japan	26.8	3,604
Hong Kong	19.3	2,349
USA	9.8	1,151
Korea	89.3	857
Singapore	105.3	612
Italy	6.0	210
India	56.0	196
Taiwan	168.3	62

From the table above, the import from the countries where the average per unit import value is lower than 30 dollars US may include second-hand washing machines, but further investigations are required for identifying more precise information and data. As to the export, there is no available data for 2005 in the Philippines.

（6） Import and Export of Personal Computers (PCs)

① China

a. Laptop Computers

According to World Atlas 2005, the table below shows the average per unit import value of laptop computers with their number of imports, focusing the countries of import origin where more than 1000 laptop computers were imported to China in 2005.

Table 2.7.35 Import of Laptop Computers in China (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
Taiwan	681	323,511
Japan	1,169	301,055
Korea	947	15,603
Singapore	1,064	3,719
Thailand	177	3,200
USA	825	2,094

From the table above, the import of laptop computers is estimated to include a considerable number of second-hand ones while the import from the other countries is presumed brand new.

As to the export of laptop computers from China, the average per unit export value is 723 dollars US, which is nearly the retail price of brand new one. The table below shows the top 10 exporting destinations of laptop computers for China.

Table 2.7.36 Export of Laptop Computers in China (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
USA	657	12,618,916
Hong Kong	909	5,471,964
Germany	706	5,108,658
Japan	893	3,089,853
Netherlands	762	2,696,386
Luxemburg	687	2,476,774
France	765	1,623,375
Canada	786	906,978
Australia	775	813,511
Ireland	243	787,977

The table above indicates that most of the exports of laptop computers from China are brand new one. There several export destinations where the average per unit export value is lower than 300 dollars US and estimated to be second-hand such as Ireland above, but it needs further investigation of the data to more clarify the situation. Although there are some other countries such as Russia and Colombia where second-hand laptop computers may be exported from China, its amount is still limited in number of units.

b. Desktop Computers

According to World Atlas 2005, the average per unit import value of desktop computer is more than 1,000 dollars US, nearly the price of brand new one. As far as depending upon the statistics, most of imported desktop computers to China are estimated brand new although the Study also found a number of second-hand and used desktop computers disassembled in China.

As to the export, the table below shows the average per unit export value of desktop computers and their number of units exported for the top 20 export destinations from China.

Table 2.7.37 Export of Desktop Computers in China (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Japan	657	2,525,639
Netherlands	206	1,293,288
USA	574	925,336
Hong Kong	352	670,129
UK	175	245,905

Export Destinations	Average Price (US$/unit)	Number of Unit
Australia	680	30,134
Korea	603	19,826
France	655	17,197
Sudan	510	12,635
Singapore	917	9,249
North Korea	365	8,963
Germany	574	4,389
Belgium	1,026	4,127
Taiwan	3,377	3,707
Mongolia	428	3,011
Italy	1,271	2,809
Uzbekistan	926	1,656
Philippines	195	1,553
UAE	444	1,516
Myanmar	451	1,326

From the table above, the export to Netherlands, UK, and Philippines is estimated to include second-hand desktop computers. Especially the countries where the average per unit export value is lower than 500 dollars US, a considerable number of second-hand desktop computers may be included. Further investigation into the data above is required to capture more accurate data.

② Indonesia

a. Laptop Computers

The table below shows the import of laptop computers in Indonesia with its focus on the countries where Indonesia imported them more than 1,000 units in 2005 according to World Trade Atlas.

Table 2.7.38 Import of Laptop Computers in Indonesia (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
China	303.1	63,578
Japan	30.4	44,965
USA	446.7	28,184
Singapore	187.9	22,459
Malaysia	768.4	7,629
Hong Kong	117.0	2,971
Taiwan	449.0	2,665
Philippines	832.5	735

From the table above, most of laptop computers imported from Japan are estimated second-hand ones. The imported laptop computers from Singapore, Hong Kong, China, USA, and Taiwan may also include second-hand ones at a certain percentage.

The next table below shows the export of laptop computers in Indonesia.

Table 2.7.39 Export of Laptop Computers in Indonesia (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Singapore	1.5	3,469,306
Thailand	3.2	52,640
Hong Kong	2.6	20,185
Morocco	5.0	9,681
Malaysia	53.8	6,944
China	34.6	308
USA	400.7	244
Taiwan	36.6	221
India	183.1	206
Australia	194.6	125

From the table above, a large number of second-hand and/or used laptop computers are exported to Singapore, Thailand, Hong Kong, and so forth from Indonesia. However, it is still questionable about whether these laptop computers are actually consumed, used and disposed of in Indonesia or not, taking into account the possibility that they are transferred from other third countries. More detail investigation is required to verify the figures above.

b. Desktop Computers

According to World Trade Atlas 2005, the import of desktop computers in Indonesia is as shown in the table below.

Table 2.7.40 Import of Desktop Computers in Indonesia (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
China	23.0	181,890
Malaysia	466.8	19,537
Singapore	966.2	8,719
USA	1,435.6	4,967
Hong Kong	181.8	1,626
Taiwan	181.4	445
Spain	3,323.0	443
Japan	2,093.5	359
Australia	94.8	204
Indonesia	557.4	189

This table indicates that the imports from China, Hong Kong, Taiwan, and Australia are supposed to include second-hand ones in a certain portion. Meanwhile, the export of desktop computers in Indonesia is as shown in the table below.

Table 2.7.41 Export of Desktop Computers in Indonesia (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Singapore	1.3	2,161,497
Japan	2.2	202,882
Hong Kong	0.6	106,207
Malaysia	2.3	91,134
Philippines	0.1	63,881
India	8.0	1,026
Korea	11.9	567
Vietnam	10.7	547
Germany	6.3	80
UAE	366.5	50

The table above indicates that many of the desktop computers exported from Indonesia may be second-hand ones. However, it is also questionable about whether they were actually consumed, used and disposed at within Indonesia or transferred from other countries.

③ Malaysia

a. Laptop Computers

The import of laptop computers in Malaysia is as shown in the table below, focusing on the countries where Malaysia imported them more than 1,000 units in 2005.

Table 2.7.42 Import of Laptop Computers in Malaysia (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
China	118.7	6,368,346
Taiwan	104.3	2,179,591
USA	81.8	230,631
Korea	58.5	84,264
Japan	314.4	47,533
Hong Kong	115.8	40,938
Germany	26.3	15,092
Ireland	91.0	3,586
Morocco	10.8	1,950
Australia	291.8	1,938
Norway	19.3	1,228
UK	1,117.7	1,114

There are several countries where the average per unit import value of laptop computer is lower than 100 dollars US. It indicates that the imported laptop computers from these countries may include second-hand ones at a certain extent.

The next table below shows the export of laptop computers in Malaysia with its focus on the countries where more than 1,000 units were exported in 2005.

Table 2.7.43 Export of Laptop Computers in Malaysia (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
USA	861.4	6,657,925
China	13.2	455,939
India	818.1	242,611
Taiwan	671.8	91,343
Canada	23.0	55,444
Australia	1,115.9	53,030
Netherlands	11.2	32,634
UK	3,866.2	15,138
Hong Kong	107.6	13,881
Pakistan	679.9	4,195
Ireland	1,665.8	3,152
UAE	95.3	2,363
Korea	348.9	1,382
Afghanistan	639.5	1,380
Italy	90.4	1,308

The exports to China, Canada, and Netherlands, and so forth, where the average per unit value of laptop computer is lower than 100 dollars US, a considerable number of second-hand ones may be included.

b. Desktop Computers

The table below shows the import of desktop computers in Malaysia in 2005.

Table 2.7.44 Import of Desktop Computers in Malaysia (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
Philippines	4.56	58,089
USA	75.12	35,398
Indonesia	3.54	8,656
Singapore	239.15	5,428
Hong Kong	74.88	1,977
Japan	331.76	1,611
China	250.05	657
Korea	1,336.48	442
Taiwan	444.93	267

From the table above, the imports from the Philippines and Indonesia may include a large number of second-hand desktop computers. The imports from USA and Hong Kong, where the average per unit export value is lower than 100 dollars US, may also include second-hand ones at a certain extent.

The next table shows the export of desktop computers in Malaysia.

Table 2.7.45 Export of Desktop Computers in Malaysia (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Australia	757.9	378,205
China	46.3	249,825
Korea	656.4	192,985
Japan	2.6	94,141
New Zealand	656.0	75,831
India	1,404.2	29,102
Netherlands	56.9	28,647
USA	77.0	16,078
Sri Lanka	403.6	13,777
Brazil	0.2	12,000
Pakistan	892.5	8,495
Canada	30.4	5,001
South Africa	82.1	4,383
UAE	265.2	3,023
Austria	29.3	1,600
Nepal	777.6	1,563
Taiwan	106.8	1,151
Maldives	657.0	1,088
Zimbabwe	680.0	1,040
Hong Kong	402.9	986

The exports to the countries where the average per unit value of desktop computer is lower than 100 dollars may include a considerable number of second-hand ones. In terms of the number of exported second-hand ones, China and Japan is estimated as the main destinations.

④ Philippines

As the import and export data of E2HA are given in weight (kg) in the case of the Philippines, the Study assumed the average weight of laptop computer as 3kg/unit while desktop computer as 20kg/unit based on the case of Japan to estimate per unit value of each computer and the number of units.

a. Laptop Computers

The import of laptop computers in the Philippines is estimated as shown in the table below.

Table 2.7.46 Import of Laptop Computers in the Philippines (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
China	423.0	49,021
Hong Kong	184.1	19,682
Singapore	266.5	12,873
Malaysia	187.9	10,120
Taiwan	146.8	5,213
Japan	168.6	4,855
Korea	38.9	3,280

Import Origins	Average Price (US$/unit)	Number of Unit
Australia	70.7	3,214
USA	452.2	1,786
Ireland	486.2	214

According to the figures given in the table above, the imports from Korea and Australia are supposed include a large number of second-hand laptop computers. For the import from other countries, more detail investigation is required to identify the portion of second-hand laptop computers.

The next table below shows the export with its focus on the countries the Philippines exported more than 1,000 units of laptop computers in 2005.

Table 2.7.47 Export of Laptop Computers in the Philippines (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Germany	204.3	703,626
USA	1,212.6	372,937
Netherlands	256.8	131,358
Japan	386.6	46,285
Australia	126.4	9,870
Hong Kong	277.2	7,616
UK	256.3	4,022
Spain	248.3	3,490
Taiwan	634.4	2,937
Norway	272.5	2,519
India	172.7	2,054
Czech	238.3	2,017
South Africa	253.1	1,956
Turkey	233.6	1,820
Egypt	226.8	1,779
UAE	182.0	1,377
Saudi Arabia	214.7	1,072

The above data is not enough to identify the number or amount of second-hand laptop computers exported from the Philippines. More detail investigations are necessary.

b. Desktop Computers

The import of desktop computers in the Philippines is as shown in the table below.

Table 2.7.48 Import of Desktop Computers in the Philippines (2005)

Import Origins	Average Price (US$/unit)	Number of Unit
Korea	24.8	15,262
Singapore	175.8	13,999
Malaysia	661.8	3,515
Japan	93.2	2,960
Hong Kong	427.2	2,354
USA	781.0	2,004
Australia	11.6	852
Canada	22.8	350
China	560.6	309
Ireland	3,850.0	250

From the figures in the table above, a high percentage of second-hand desktop computers are estimated to exist in the imports from Korea, Japan, Australia, and Canada while the imports from USA, China and Malaysia may be mostly brand-new according to the figures above.

The next table shows the export of desktop computers in the Philippines.

Table 2.7.49 Export of Desktop Computers in the Philippines (2005)

Export Destinations	Average Price (US$/unit)	Number of Unit
Mexico	63.5	596
USA	12.9	252
Japan	66.3	88
Canada	29.5	36
China	385.1	21
Singapore	291.1	11
Malaysia	39.8	6
Taiwan	46.1	5
Korea	109.5	2
Hong Kong	210.0	1

The export to USA, Canada and Malaysia may considerably include second-hand desktop computers, but the total export value as well as amount themselves are very small in the Philippines.

3. The Basic Policies on Resource Utilization Efficiency Improvement for Establishment of Resource Circulation Society in Asia

3.1 Basic Policies on Resource Saving for Establishment of Resource Circulation Society in Asia

The Study set the following basic policies on resource saving for establishment of resource circulation society in Asia.

（１） Establishment of Material-Cycle Society through domestic efforts of 3Rs (Reduce, Reuse, Recycle) in each country;

（２） Maximizing domestic reuse and recycling of materials/resources generated in each country;

（３） Maximizing the utilization of domestic industries to promote resource circulation in each country;

（４） Fair and equitable allocation of roles and responsibilities among the stakeholders in establishing the resource circulation society including proper utilization of informal sector currently playing key role in traditional recycling system in each country;

（５） Promotion of voluntary partnership among Government, Business, and General Public;

（６） Establishment of international trade system for recyclable materials and resources in Asia on the basis of fair and transparent market controlled by international trade rules to be established in Asian countries

（７） Treatment and disposal of recyclable materials and their residues with attention to proper management of hazardous materials

3.2 Country-wise Basic Policies on Resource Utilization Efficiency Improvement

（１） Resource Utilization Efficiency Improvement Policies for China

In most of the key recyclable materials, China is the largest net importer where domestic demand of recyclable materials far exceeds its domestic supply. Chine is also one of the largest exporters of various products made from such recyclables in Asia. In this respect, China currently takes unique and significant roles in circulation of resources in the Asian region. The policies for resource utilization efficiency

improvement in China should consider its unique position and roles in Asia.

① Current Efforts of Chinese Government towards Establishment of "Circulation Economy"

The concept of "Circulation Economy", which was discussed in the National People's Congress (NPC) in March 2006, becomes a new slogan in China, symbolizing the change of its economic policy priority from the growth and development to stability and sustainability with attention to resource saving and environmental conservation. The Government of China is currently in the process of establishing "Circulation Economy Act" while examining and preparing the relevant laws and regulations on specific recyclable materials such as used electric and electronic home appliances (E-Waste).

The central government organizations such as "National Development and Reform Committee (NDRC)" and "State Environmental Protection Administration (SEPA)" carried out a series of studies and researches on legal and regulatory framework for circulation economy in Germany and Japan to learn their experience for establishment of such framework in China. However, China does not yet have its own cleat vision of "Circulation Economy (CE)" and technical assistance is required for formulating policy framework for building CE. According to the interviews to the relevant government organizations in China, transfer of Japanese experience in this field is strongly required to assist this process.

China also has serious environment issues in relation to the pollution by small and medium industries (SMIs), including small-scale recyclers. Although SMIs are serious sources of environmental pollution, they take very important roles in supporting livelihood of low income and socio-economically weak people. In this regard, proper management of SMIs is not just issue of environment, but also of socio-economy and welfare of the people in China.

② Recycling Industries in China

Recycling industries in China are mainly divided into two types, i.e. small and medium scale recyclers that supports recycling of materials generated within the country and large scale recyclers that deal with a large amount of recyclables based on global trade of such materials.

Small-scale individual collectors and dealers mainly support collection of domestically produced recyclable materials while the government involvement in collection of such recyclables is very limited in China. Collection of recyclables based on segregation at sources can only be found successful at very limited areas and has not yet been applied at wider scale.

Since it is difficult to secure the quality and quantity of recyclable materials only from domestic sources, most of large-scale recyclers depends their recyclable materials supply on the imports from abroad while

domestically collected recyclables goes to small and medium scale recyclers. Many of these small and medium scale recyclers have serious problems in terms of their working environment as well as pollutions to the surrounding areas because of their primitive sorting and dismantling technologies depending upon low-cost manual labor. On the other hand, such recycling industries are also the basis of livelihood for low-income and socio-economically weak people.

Most of small and medium scale operations of recycling in China are carried out with the ignorance of any environmental considerations. If the pollution control laws and regulations are strictly enforced, such small and medium scale recycling will not be economically feasible, same as the cases in most of other developing countries.

Meanwhile, the recycling operations based on the imports of recyclable materials become one of growing industries in China. These large-scale industries carry out cost-efficient and competitive recycling operations through combination of applying the state-of-the-art recycling technologies with the maximized utilization of low-cost labor for sorting and dismantling of valuable materials. Proper measures are also usually taken by these large-scale recyclers for working environment and pollution control.

Although the total scale of recycling industry in China is the largest among the Asian countries, there are still many rooms for improvement in terms of proper and efficient utilization of recyclable materials especially produced within the country. Establishment of the appropriate collection and utilizations mechanism is the key to increase in the efficiency of utilizing domestically produced recyclable materials in China.

In addition, the measures for small and medium scale recyclers are also of great importance in China in terms of pollution control as well as social welfare of the workers in these SMIs

③ Basic Policies for Resource Utilization Efficiency Improvement in China

The Study set the following basic policies for resource utilization efficiency improvement in China:

- Increased utilization of domestically collected recyclable materials based on the establishment of proper collection and recycling system within the country (Collection supply of high quality recyclables based on separation at sources, Development of industrial base for recycling);
- Normalization of domestic recycling industries (proper environment management and pollution control);
- High value-added manufacturing of recycled materials and products through improvement of resource utilization efficiency, quality, and diversification of manufactured products
- Resource saving in the industries (efficient utilization of recyclable materials, productivity

improvement, cleaner production)

（２） Basic Policies for Resource Utilization Efficiency Improvement in the Southeast Asian Countries

In most of the Southeast Asian countries, domestic supply of recyclable materials exceeds its domestic demand. It indicates that the potential of domestic industries to utilize recyclable materials are not yet fully developed in these countries. In this respect, they should first determine the policies on how to develop and promote recycling industries in their countries. Since many of the Southeast Asian countries exports a considerable amount of recyclable materials to China, the motivation to develop domestic recycling industries will be limited as far as the demand from China continues.

On the other hand, many of Southeast Asian countries are currently facing serious difficulty in solid waste management resulting from drastic increase of waste generation with economic growth as well as the expansion of "NIMBY (not in my backyard) Syndrome" among the people to refuse waste management facilities such as incinerators and final disposal landfills to be located at nearby area. Reduction of solid waste is one of the most urgent issues especially in the metropolitan cities in the Southeast Asian Countries to cope with the current SWM issues with their limited financial capacities.

In this respect, development of the capacity of domestic industries to receive recyclable materials is of great importance for the Southeast Asian countries to contribute to the solution of domestic solid waste management issues.

The Study set the following basic policies for promoting recycling in the Southeast Asian countries:

① Establishment of stable domestic supply system of recyclable materials (development of high quality recyclable materials supply based on source-separated collection of recyclables);

② Promotion on utilization of domestically collected recyclable materials by domestic industries (support or incentives for utilizing recyclables as raw materials to the industries, promotion of primary processing industries of recyclables to provide high quality raw materials)

③ Identification of strategic industries to promote recycling and resource circulation within the country and examination of the policy measures to encourage the industries to utilize recyclables

4. Potential Approaches of Technical Cooperation for Establishment of Resource Circulation Society in the Asian Countries

4.1 Common Needs and Approaches of Technical Cooperation

The following needs and approaches are commonly required for China as well as other Southeast Asian countries:

（１） Development of data and information management system on recyclable materials (Capacity development of relevant government organizations on data/information collection, management and utilization);

（２） Establishment of legal/regulatory framework and formulation of policies for building resource circulation society (Capacity Development of relevant government staff through training programmes);

（３） Standardization on the quality of recyclable materials and establishment of import/export standard of recyclable materials (Capacity development of relevant government organizations);

（４） Institution building for promoting the use of recycled products (Green purchasing/procurement policies, Eco-labeling); and

（５） Support for enhancement of awareness and change of behaviors among the general public to promote resource circulation society (Promotion of source separation of recyclables, Promotion of 3R (Reduce, Reuse, Recycle) activities among the relevant stakeholders)

4.2 Potential Themes of Technical Cooperation for China

Taking into account the unique conditions of current recycling practice, the potential themes of technical cooperation for China are recommended as follows:

（１） Cooperation for establishment of domestic resource circulation system (Institution building for collection of recyclable materials based on separation at sources, implementation of pilot projects on collection and utilization of recyclable materials);

（２） Cooperation for proper formalization of recycling industries（Institution building for proper environmental management of small and medium scale recyclers）;

（３） Cooperation for technological development and application for production of high value-added recycled materials and products (financial support for the investment in recycling, development of recycling industry base, preparation and dissemination of the guidelines for utilization of recyclable materials by items);

（４） Cooperation for resource utilization efficiency improvement (preparation of the guidelines for resource utilization efficiency improvement by types of industries, implementation of pilot projects on resource utilization improvement)

4.3 Potential Themes of Technical Cooperation for the Southeast Asian Countries

The potential themes of technical cooperation for the Southeast Asian countries are as follows:

（１） Cooperation for building proper collection and recycling network based on separation of recyclable materials at sources (Implementation of recycling pilot projects and dissemination of their results);

（２） Cooperation for development of recycling industries and entrepreneurs (Technical and financial assistance for the investment in recycling of pioneering status)

（３） Cooperation for promotion on utilization of domestically generated recyclable materials by domestic industries; and

（４） Cooperation for formulation and implementation of the master plan for promotion of strategic industries for establishment of resource circulation society