

Analysis of Transboundary Movements of Hazardous Wastes and Other Wastes in Asia

The current status of transboundary movements of hazardous wastes and other wastes in accordance with the Basel Convention reported at the 1st CLI meeting revealed the following facts.

<Statistics on transboundary movements reported at the 1st CLI meeting>

- The amount of legal transboundary movements for the purpose of final disposal from OECD countries (developed countries) to non-OECD countries (developing countries), and among non-OECD countries is extremely small. Transboundary movements among non-OECD countries for the purpose of recycling (roughly 2/3) are much larger than those from OECD countries to non-OECD countries (1/3).
- Among the Parties to the Basel Convention, most of the transboundary movements from non-OECD countries to OECD countries, and among non-OECD countries are made for the purpose of recycling, and the major disposal operations are R4 (recycling/reclamation of metals and metal compounds), R5 (recycling/reclamation of other inorganic materials) and R8 (recovery of components from catalysts).

At the 1st CLI meeting, participants agreed that further analysis is required concerning transboundary movements of hazardous wastes and other wastes made among non-OECD countries for recycling. In response to this need, the report aims to clarify whether the same trends as noted above are to be found in the Asian region and analyzes with a particular focus on understanding the status of transboundary movements of hazardous wastes and other wastes among non-OECD countries in the region. The following issues are analyzed in the report:

<Issues analyzed in the report>

- Background information: economic status of Asian countries
- Development of recycling facilities for hazardous wastes and other wastes in the Asian region
- Transboundary movements of hazardous wastes and other wastes in the Asian region
 - ✧ Total amount of transboundary movements of hazardous wastes
 - ✧ Transboundary movements of individual type of hazardous waste (waste lead-acid batteries, waste electronic and electrical equipment (E-waste))
 - ✧ Transboundary movements of hazardous wastes by category (hazardous wastes requiring special treatment, metallic hazardous wastes, other recyclable hazardous wastes)
 - ✧ Transboundary movements of used electronic and electrical equipment (EEE) (TV sets, air conditioners, refrigerators, washing machines, and PCs)

The countries surveyed were Brunei, Cambodia, China, Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam, all of which are non-OECD member countries of the Asian Network for Prevention

of Illegal Transboundary Movement of Hazardous Wastes hosted by the Ministry of the Environment of Japan.

<Summary of the analysis results>

- Compared to the situations in 1995 when the Ban Amendment was adopted, some Asian non-OECD countries have reached the similar or even higher economic levels (GDP per capita) as OECD countries (e.g. Japan and Republic of Korea). Even in such countries as Cambodia or Vietnam with relatively low economic levels, rapid economic growth has been observed in recent years (P.4 “Background information: economic status of Asian countries”).
- Non-OECD countries with a higher income level (e.g. Singapore and Malaysia) are establishing facilities capable of recycling and treatment of hazardous wastes and other wastes at a comparatively high technological level. In Thailand and the Philippines as well, facilities are being developed and records of recycling for imported wastes have been confirmed. On the other hand, in countries with relatively low GDP per capita, recycling and treatment facilities for hazardous wastes have not been fully developed, and these countries have not reported the import of hazardous wastes and other wastes for recycling (P.5 “Development of recycling facilities for hazardous wastes and other wastes in the Asian region”).
- Regarding the fact reported at the 1st CLI meeting: “transboundary movements of hazardous wastes and other wastes among non-OECD countries surpass those from OECD countries to non-OECD countries,” the same trend can be observed in the Asian region. Most of such transboundary movements are made for the purpose of recycling including recovery and reclamation of metals and inorganic substances (P.8 “Total amount of transboundary movements of hazardous wastes, and P.17 “Transboundary movements of hazardous wastes by category”).
- Combinations of exporting and importing countries differ according to the type of hazardous wastes. In addition to the development status of recycling technology for individual type of hazardous waste, such combinations are significantly affected by any import restriction regulations stipulated by domestic laws of importing countries. For example, until 2002, Indonesia was the largest importer of waste lead-acid batteries but, with the adoption of import ban, Republic of Korea has become the largest importer of such items (P.14 “Transboundary movements of waste lead-acid batteries” and P.16 “Transboundary movements of E-waste”).
- It has been observed that non-OECD countries are actively importing the following wastes: metallic hazardous wastes by the Philippines and Malaysia; and recyclable hazardous wastes by Malaysia, Thailand, and the Philippines. On the other hand, hazardous wastes requiring special treatment such as mercury wastes (e.g. waste fluorescent lamps) and PCB wastes, are exported to Japan and other OECD countries for proper treatment (P.17 “Transboundary movements of hazardous wastes by category”).
- With growing demand for secondhand products and market expansion in the region, the amount of transboundary movements of used EEE is being active. Both OECD and non-OECD countries are exporters of used EEE (P.24 “Transboundary movements of used EEE”).

→In the Asian region, countries that import hazardous wastes for recycling are non-OECD countries such as Malaysia and Thailand whose economic level is high, and where recycling facilities for hazardous wastes and other wastes are being developed. Transboundary movements by those countries are becoming more and more active, with the progress of economic growth, due to increasing demand for recyclable resources and development of recycling facilities.

<Notes: limitation of data and information used in the report>

- The Basel Convention national reporting mainly referred to in this analysis is statistical data on legal transboundary movements in accordance with the Basel Convention; therefore, the data does not give a comprehensive picture of transboundary movements including illegal movements.
- The amount of transboundary movements of hazardous wastes and other wastes reported to the Secretariat is more likely to be the amount which was notified to and obtained consent from importing countries pursuant to the prior notification procedures under the Convention. The amount notified may be in general larger than the amount actually exported and imported.
- The data of transboundary movements of hazardous wastes and other wastes in the national reporting is being compiled by weight. Therefore, when the total amount of transboundary movements – not quantities of individual type of hazardous waste – are analyzed, the trend would be skewed by heavier items; the difference in average weight of individual type of hazardous waste must be taken into account.
- National reporting data is based on each country's reporting system; there is no uniformity in the description of wastes reported, and it is difficult to assess the accurate flow of each type of waste (e.g. it is hard to know whether a description of "lead" refers to lead-acid batteries or other lead wastes).
- It is not known from the national reporting data which facility received hazardous wastes imported since there is no specific information on the destination facilities; while disposal operation as per Annex VI of the Convention (R or D codes) is reported.
- Due to the significant variations in the amount of transboundary movements according to the year; it is difficult to find any clear time-series trends from the currently available data.
- The list of recycling and disposal facilities for hazardous wastes and other wastes approved by each country's environmental authority is often publicized on his/her website as well as the Secretariat's website of the Basel Convention. However, the information regarding treatment methods, capacity, and environmental management systems in any facility is lacking; therefore, further information gathering is required for making any judgment as to whether such facility operates in an environmentally sound manner.
- Transboundary movements of used EEE were analyzed using export statistics only; analysis based on import statistics may be also required for the cross checking purpose.

1. Background information: economic status of Asian countries

- Compared to the situations in 1995, the economic levels of non-OECD countries in Asia has improved; not only Brunei and Singapore, but also Malaysia has been reaching the economic (income) level equivalent to those of Annex VII countries (OECD countries) (Table 1).
- Even in the countries with a relatively low economic level such as Cambodia or Vietnam, rapid economic growth has been observed in recent years (Table 2).

Table 1 GDP per capita (Unit: purchasing power parity with US dollar)

Non-Annex VII countries (non-OECD countries)			Annex VII countries (OECD countries)		
	1995	2007		1995	2007
Singapore	25,422	51,226	Japan	22,464	34,116
Brunei	42,143	50,199	Republic of Korea	12,766	27,692
Hong Kong	22,685	43,847	Poland	7,256	17,537
Malaysia	7,521	14,081	Mexico	8,090	14,534
Thailand	4,684	8,239	Turkey	6,700	13,139
China	1,514	5,970	Romania	5,876	12,600
Indonesia	2,265	3,980	Bulgaria	5,674	12,322
Philippines	1,981	3,515			
Vietnam	1,009	2,794			
Cambodia	647	2,082			

* As of 1995, Poland, Romania, and Bulgaria were all non-EU or non-OECD countries.

Source: IMF Data and Statistics (<http://www.imf.org/external/data.htm>)

Table 2 GDP growth rates: Asian countries (Unit: %)

	2000	2001	2002	2003	2004	2005	2006
China	8.4	8.3	9.1	10.0	10.1	10.4	11.1
Cambodia	8.8	8.1	6.6	8.5	10.3	13.3	10.8
Vietnam	6.8	6.9	7.1	7.3	7.8	8.4	8.2
Singapore	10.1	-2.4	4.2	3.1	8.8	6.6	7.9
China (Hong Kong)	10.0	0.6	1.8	3.2	8.6	7.5	6.9
Malaysia	8.9	0.3	4.4	5.5	7.2	5.2	5.9
Indonesia	5.4	3.6	4.5	4.8	5.0	5.7	5.5
Philippines	6.0	1.8	4.4	4.9	6.4	4.9	5.4
Brunei	2.9	2.7	3.9	2.9	0.5	0.4	5.1
Thailand	4.8	2.2	5.3	7.1	6.3	4.5	5.0
Republic of Korea	8.5	3.8	7.0	3.1	4.7	4.2	5.0
Japan	2.9	0.2	0.3	1.4	2.7	1.9	2.2

Source: IMF Data and Statistics (<http://www.imf.org/external/data.htm>)

2. Development of recycling facilities for hazardous wastes and other wastes in the Asian region

Based on the Basel Convention national reporting and information from literature surveys, this section analyzes the development status of recycling facilities for hazardous wastes and other wastes in Asian non-OECD countries.

- It is reported that some non-OECD countries have imported hazardous wastes (e.g. lead-acid batteries or PVC) for recycling, mainly for R4, R5, and R8 operations in accordance with the Basel Convention (Table 3).
- It can be seen that facilities to recycle or treat hazardous wastes have been established in Asian non-OECD countries (Table 4).
- Some countries, such as Singapore and Malaysia, are developing many facilities capable of treating hazardous wastes using comparatively high standards of technology, while other countries have not yet fully developed such facilities. In the latter countries, health damage and environmental pollution caused by inappropriate treatment of hazardous waste is a particular concern (Table 5, for information on specific facilities, refer to Appendix 1).
- In general, the development status of facilities in each non-OECD country is correlated with the economic level the country achieves (Table5).

Table 3 Examples of import of hazardous wastes to Asian non-OECD countries

Year	Country	Type of waste	Disposal operation
1998	Indonesia	Lead-acid batteries	R4
1999	Indonesia	Lead-acid batteries	R4
2000	Indonesia	Lead-acid batteries	R4
2002	Philippines	Lead-acid batteries, waste oil, PVC	R4, R9
2003	Philippines	Lead-acid batteries, waste oil, PVC	R4, R9
	Thailand	Cathode-ray tube	R4
2004	Philippines	Lead-acid batteries, waste oil, PVC, solder dross (lead/tin)	R4, R9
2005	Philippines	Lead-acid batteries, nickel hydroxide, solder dross (lead/tin)	R4
2006	Malaysia	Gypsum	R11
	Singapore	Used solvent	R2

Source: Extracted from the document of 1st CLI meeting “Paper 3 - Statistics on waste flows from North to South and from South to South”

Table 4 Recycling facilities reported to the Secretariat of the Basel Convention
by Asian non-OECD countries¹

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Indonesia	R4	R4, R9	R2, R4, R9	R2, R4, R9	R2, R4, R5, R9	R2, R4, R5, R9	R2, R4, R5, R6, R7, R9, R13	R2, R4, R5, R6, R7, R9, R13	R2, R4, R5, R6, R7, R9, R13
Malaysia	R2, R4, R6, R8, R9	R2, R4, R6, R8, R9	-	R2, R4, R5, R6, R9	R2, R3, R4, R5, R6, R8, R9, R11	R2, R4, R5, R6, R8, R9, R11			
Philippines	-	-	-	-	R4	R4	R4	R4	-
Singapore	-	-	-	R2	R2	R2	R2	R2	R2
Thailand	R1, R2, R4	R1, R2, R4	R1, R2, R4	-	R1, R2, R4	R1, R2, R4	R1, R2, R4	R1, R2, R3, R4, R5, R9	-

Legend: The - symbol indicates no report was made to the Secretariat of the Convention.

Source: Basel Convention national reporting

Table 5 Development of recycling and treatment facilities for hazardous wastes in Asian countries

	Development of recycling and treatment facilities	GDP per capita (US dollar, PPP in 2008)
Singapore	<ul style="list-style-type: none"> ✓ 8 recycling facilities were reported in the national reporting (2006). ✓ As of April 2009, 49 recycling facilities were listed on the website of the National Environment Agency (NEA)². 	51,226
Japan	<ul style="list-style-type: none"> ✓ A large number of facilities capable of advanced recycling and treatment have been established. ✓ As of April 2006, the number of facilities permitted by the Government reached 19,164 for recycling and treatment and 2,335 for final disposal. 	34,116
Republic of Korea	<ul style="list-style-type: none"> ✓ A large number of facilities capable of advanced recycling and treatment have been established. 	27,692
Malaysia	<ul style="list-style-type: none"> ✓ 104 recycling facilities were reported in the national reporting (2006)³. ✓ A list of contractors authorized to recover, transport, storage and treat scheduled wastes onsite or offsite is publicized on the website of the Department of Environment (DOE)⁴. Regarding E-waste, 16 contractors are registered for full recovery and 117 are registered for partial recovery⁵. 	14,081

¹ In reference to the development status of treatment facilities in national reporting, not all signatories to the Convention have made reports, and the definitions of type of wastes differ according to each country; these points need to be noted.

² <http://www.nea.gov.sg/cms/rcd/Local%20Recycling%20Plants.pdf>

³ <http://www.basel.int/natreporting/2006/compI/t3.pdf>

⁴ <http://www.doe.gov.my/en/content/list-scheduled-waste-contractors-malaysia>

⁵ For others, the following results are reported: waste oil, mineral sludge, and waste coolants: 34 companies; waste solvent: 22; storage batteries: 7; dross, ash, slag, and waste catalyst: 39; used containers, ink, dye, and paint: 31; heavy metal sludge, and rubber: 28; waste acid, and waste alkali: 29; production of materials for cement: 9; waste gypsum: 4; waste film: 4; phenol, adhesive, and resin: 9.

	Development of recycling and treatment facilities	GDP per capita (US dollar, PPP in 2008)
Thailand	✓ As of February 2009, 1,356 waste treatment and recycling facilities were registered with the Department of Industrial Works (DIW) of the Ministry of Industry. Details are: facilities for landfill or incineration: 139; separation: 962; recycling: 255.	8,239
China	✓ 7 recycling facilities were reported in the national reporting (2006). ✓ Treatment of imported waste requires permission from the Government, particularly the import and processing of mixed metal (Type 7 waste) is strictly controlled. Every year a list of permitted importers of Type 7 waste is released ⁶ , and in 2009, 589 companies were listed in China.	5,970
Indonesia	✓ 25 recycling facilities were reported in the national reporting (2006). ✓ In 2004, the Ministry of Environment (KLH) issued 225 permits for B3 waste management, including 6 permits for treatment and disposal of B3 wastes. As of 2004, 30 permits were issued for effective use of hazardous wastes.	3,980
Philippines	✓ A list of registered treatment/storage/disposal (TSD) facilities is publicized on the website of the Environmental Management Bureau (EMB) of the Department of Environment and Natural Resources (DENR) ⁷ . ✓ As of October 31, 2009, 114 TSD facilities were registered with the EMB.	3,515
Vietnam	✓ Urban Environment Company (URENCO) is the leading company in waste treatment, while the number of other companies capable of recycling and treatment of hazardous wastes is limited. ✓ Most of hazardous wastes are considered to be treated in informal sectors or disposed at landfill sites with other solid wastes.	2,794
Cambodia	✓ There is only one landfill site for special industrial wastes within the country; the site is normally used for waste generated from clothing factories. ✓ In general, there are very few facilities for intermediate treatment and recycling of hazardous wastes.	2,082

* Brunei is not included in the table since insufficient data is available to assess the development status of recycling and treatment facilities of hazardous wastes.

Other references:

Institute of Developing Economies Japan External Trade Organization: "Fiscal Year 2005 Report of Information Provision Projects Concerning Industrial Wastes and Recycling Policies in Asian Countries" (2007)

Ex Corporation: "Fiscal Year 2007 Report of the Project on the Examination of Policies for Promoting Appropriate Treatment of Wastes in Asian Countries" (2007)

Recycle One, Inc.: "Fiscal Year 2008 Report of an Examination Concerning the Validity Evaluation of the Basel Convention Including 1995 Amendment and Review of the Strategic Plan" (2008)

Ex Corporation: "Fiscal Year 2008 Report of a Strategic Examination Concerning Policies for Promoting Resource Recycling in Asia" (2008)

⁶ Publication of companies permitted to process and use mixed metal (http://www.sepa.gov.cn/info/bgw/bgg/200908/t20090807_157226.htm)

⁷ <http://www.emb.gov.ph/hazardous/Treater.PDF>

3. Transboundary movements of hazardous wastes and other wastes in the Asian region

(i) Total amount of transboundary movements of hazardous wastes

Based on the Basel Convention national reporting, this section analyzes the total amount of transboundary movements of hazardous wastes subject to the Convention in the Asian region.

[Overall trend of transboundary movements of hazardous wastes subject to the Basel Convention]

- Both the amount of import and export varies greatly according to the year, and no clear time-series trend can be observed (Fig. 1).
- In most of the years, the total amount of import of hazardous wastes is much larger than that of export in the region (Fig. 1).
- According to the data reported by exporting countries in 2006, the amount exported from OECD countries (Japan and Republic of Korea) were small; the amount exported from non-OECD to OECD countries and among non-OECD countries accounted for the majority (Fig. 2).
- In the region, most of the countries importing hazardous wastes have reached relatively high economic levels and have developed recycling and treatment facilities within the countries (Table 6).

[Analysis of import and export by country] (Refer to Appendix 2)

■ Import

- The Asian largest importer of hazardous wastes by weight is Malaysia, due to the import of large amount of blast furnace slag.
- Indonesia used to be a big importer, but, since the total import ban of waste lead-acid batteries in September 2002, this has been reduced to zero.
- Among other non-OECD countries, the Philippines imports hazardous wastes every year (although national reporting data in 2006 is lacking). However, variations by year are considerably high.
- Thailand has also reported import of hazardous wastes since 2003; while the amount by weight is small.
- Brunei, Cambodia and Vietnam have not reported the import of hazardous wastes.

■ Export

- The amount exported from Republic of Korea in 1998 was extremely large due to the export of a massive amount of steel scale wastes to Taiwan and Japan.

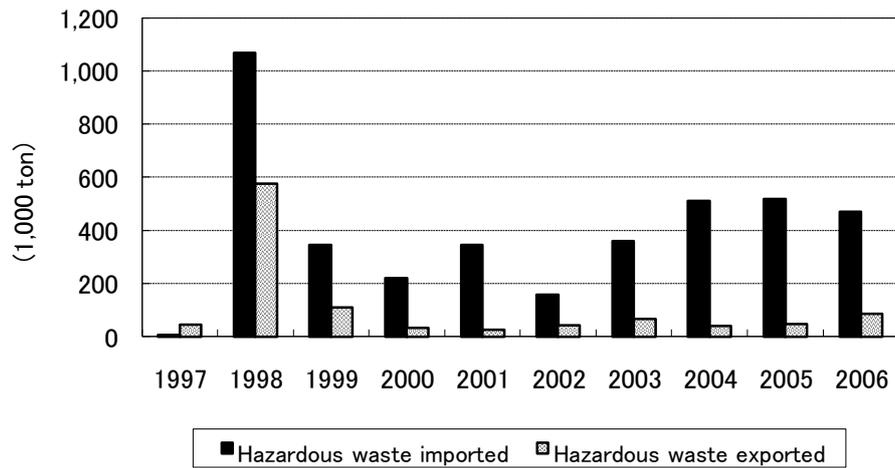


Fig. 1 Import and export of hazardous wastes in Asian countries (1997-2006)

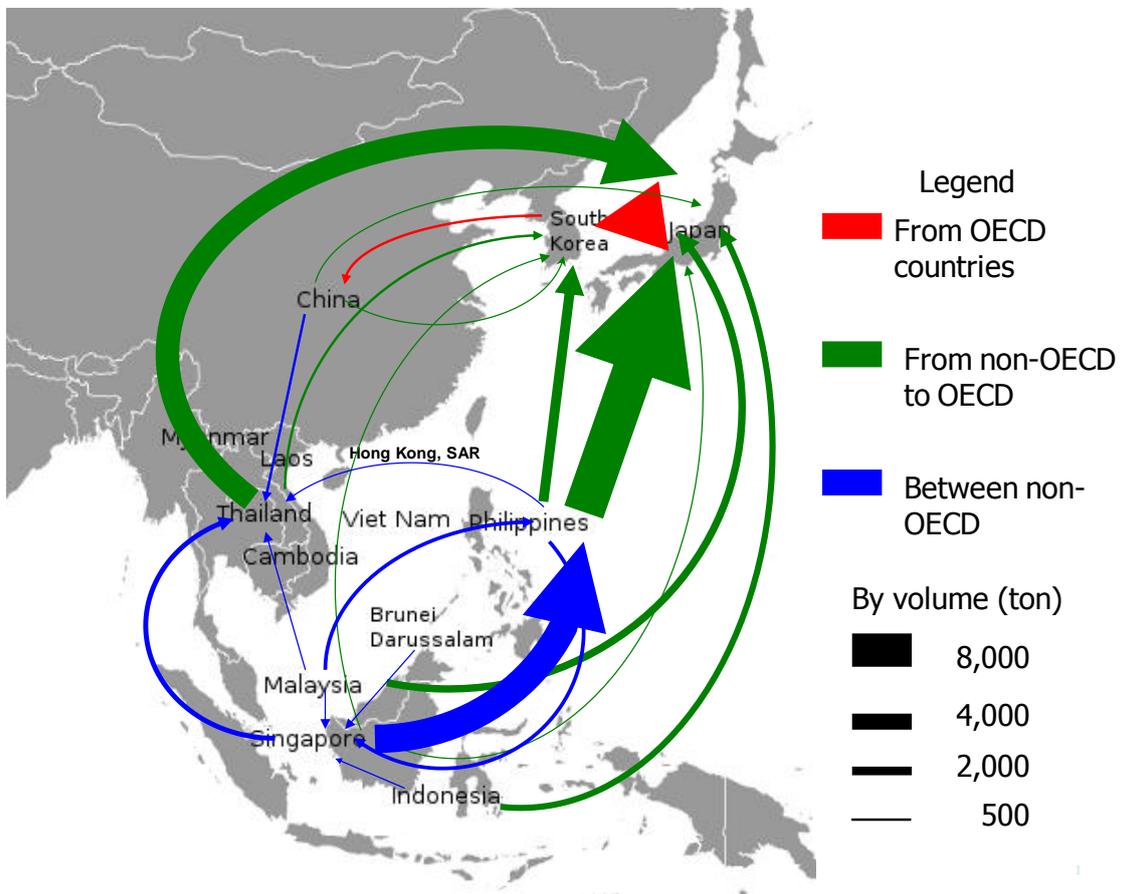


Fig. 2 Transboundary movements of hazardous wastes among Asian countries (Export statistics: 2006)

Table 6 Summary table of import of hazardous wastes compared with the country's economic status and development of recycling and treatment facilities

	Import of hazardous wastes		GDP per capita (US dollar, PPP in 2008)	Development of recycling and treatment facilities
	Average amount of annual import (2001 to 2006)	Main types of wastes imported		
Malaysia	213,215	Blast furnace slag, copper slag, waste catalysts	14,081	<ul style="list-style-type: none"> ✓ 104 recycling facilities were reported in the national reporting (2006). ✓ A list of contractors authorized to recover, transport, storage and treat scheduled wastes onsite or offsite is publicized on the website of the Department of Environment (DOE). Regarding E-waste, 16 contractors are registered for full recovery and 117 are registered for partial recovery.
Republic of Korea	107,953	Waste lead-acid batteries and other wastes containing lead, waste nickel-cadmium rechargeable batteries	27,692	<ul style="list-style-type: none"> ✓ A large number of facilities capable of advanced recycling and treatment have been established.
Indonesia	47,759	Waste lead-acid batteries <i>(Since the total import ban of waste lead-acid batteries in 2002, there have been no import)</i>	3,980	<ul style="list-style-type: none"> ✓ 25 recycling facilities were reported in the national reporting (2006). ✓ In 2004, the Ministry of Environment (KLH) issued 225 permits for B3 waste management, including 6 permits for treatment and disposal of B3 wastes. As of 2004, 30 permits were issued for effective use of hazardous wastes.
Philippines	21,468	Waste lead-acid batteries and other wastes containing lead, waste oil, other metallic hazardous wastes	3,515	<ul style="list-style-type: none"> ✓ A list of registered treatment/storage/disposal (TSD) facilities is publicized on the website of the Environmental Management Bureau (EMB) of the Department of Environment and Natural Resources (DENR). ✓ As of October 31, 2009, 114 TSD facilities were registered with the EMB.
Japan	4,225	CRT glass, E-waste, precious metals, rare metals (e.g. silver sludge), difficult-to-treat wastes (e.g. waste fluorescent lamps)	34,116	<ul style="list-style-type: none"> ✓ A large number of facilities capable of advanced recycling and treatment have been established. ✓ As of April 2006, the number of facilities permitted by the Government reached 19,164 for recycling and treatment and 2,335 for final disposal.
Thailand	327	CRT glass, waste OA equipment	8,239	<ul style="list-style-type: none"> ✓ As of February 2009, 1,356 waste treatment and recycling facilities were registered with the Department of Industrial Works (DIW) of the Ministry of Industry. Details

	Import of hazardous wastes		GDP per capita (US dollar, PPP in 2008)	Development of recycling and treatment facilities
	Average amount of annual import (2001 to 2006)	Main types of wastes imported		
				are: facilities for landfill or incineration: 139; separation: 962; recycling: 255.
Singapore	62	E-waste, etc.	51,226	<ul style="list-style-type: none"> ✓ 8 recycling facilities were reported in the national reporting (2006). ✓ As of April 2009, 49 recycling facilities were listed on the website of the National Environment Agency (NEA).
China	0	No record of any import	5,970	<ul style="list-style-type: none"> ✓ 7 recycling facilities were reported in the national reporting (2006). ✓ Treatment of imported waste requires permission from the Government, particularly the import and processing of mixed metal (Type 7 waste) is strictly controlled. Every year a list of permitted importers of Type 7 waste is released, and in 2009, 589 companies were listed in China.
Vietnam	0	No record of any import	2,794	<ul style="list-style-type: none"> ✓ Urban Environment Company (URENCO) is the leading company in waste treatment, while the number of other companies capable of recycling and treatment of hazardous wastes is limited. ✓ Most of hazardous wastes are considered to be treated in informal sectors or disposed at landfill sites with other solid wastes.
Cambodia	0	No record of any import	2,082	<ul style="list-style-type: none"> ✓ There is only one landfill site for special industrial waste within the country; the site is normally used for waste generated from clothing factories. ✓ In general, there are very few facilities for intermediate treatment and recycling of hazardous wastes.

* In the table, surveyed countries are arranged in the order of their average amount of annual import of hazardous wastes (six years from 2001 to 2006). Brunei is not included in the table since insufficient data is available to assess the development status of recycling and treatment facilities of hazardous wastes.

(ii) Transboundary movements of individual type of hazardous waste

This section analyzes transboundary movements of individual type of hazardous waste (waste lead-acid batteries and E-waste), based on the Basel Convention national reporting.

(1) Summary of transboundary movements by individual type of hazardous waste (Refer to Appendix 3)

- The most imported and exported hazardous wastes by weight in Asia are as follows: blast furnace slag, waste lead-acid batteries, copper slag, CRT glass, lead (except for lead-acid batteries and CRT glass), waste catalysts, and waste oil.
- Malaysia is the largest importer of blast furnace slag (46.5% of the total nine-year import in the region). Malaysia treated blast furnace slag as designated waste (hazardous waste) and it was subject to import controls. However, following the amendment of the regulations for designated waste in 2005, blast furnace slag was excluded from the list of designated waste; no transboundary movements were reported in 2006.
- The large amount of iron exported from Republic of Korea in 1998 was accounted for by the export of a massive amount of steel scale wastes to Taiwan and Japan.

(2) Waste lead-acid batteries

- From 1998 to 2002, Indonesia was the major importer of waste lead-acid batteries, but due to import ban in 2002⁸, the amount of import to Republic of Korea increased from 2004 onward (Fig. 3).
- The constant amount of import to the Philippines is observed, presumably for deliveries to registered recycling facilities (Fig. 4).
- Republic of Korea imports and recycles lead-acid batteries from all over the world. This would imply the fact that facilities capable of recycling waste lead-acid batteries in an environmentally sound manner have been established in the country. (Figs. 5 and 6).

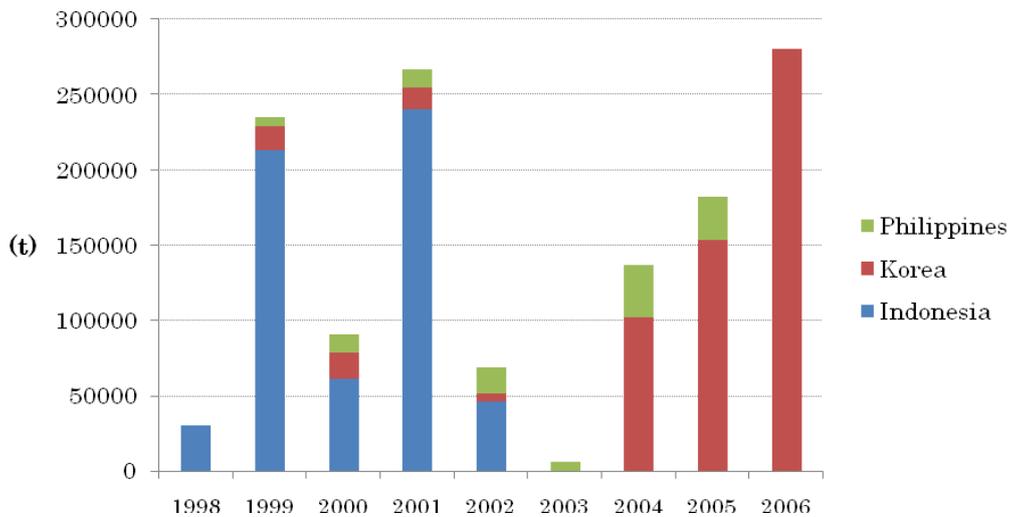


Fig. 3 Import of waste lead-acid batteries (1998 to 2006)

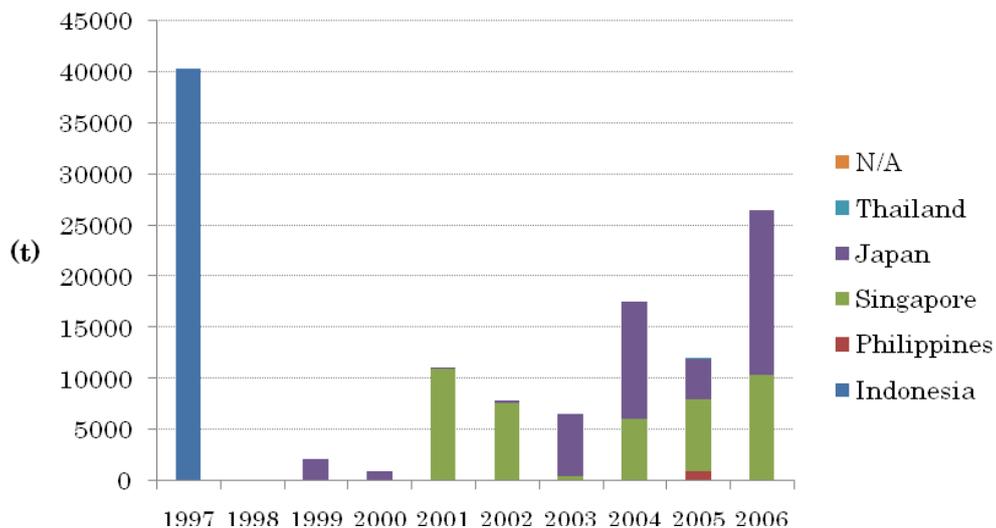


Fig. 4 Export of waste lead-acid batteries (1997 to 2006)

⁸ In 1997 Indonesia incorporated provisions that banned the import of hazardous wastes in Article 21 of the Law Concerning Environmental Management; however only lead-acid batteries were given a grace period until total ban of import came into effect from September 2002.

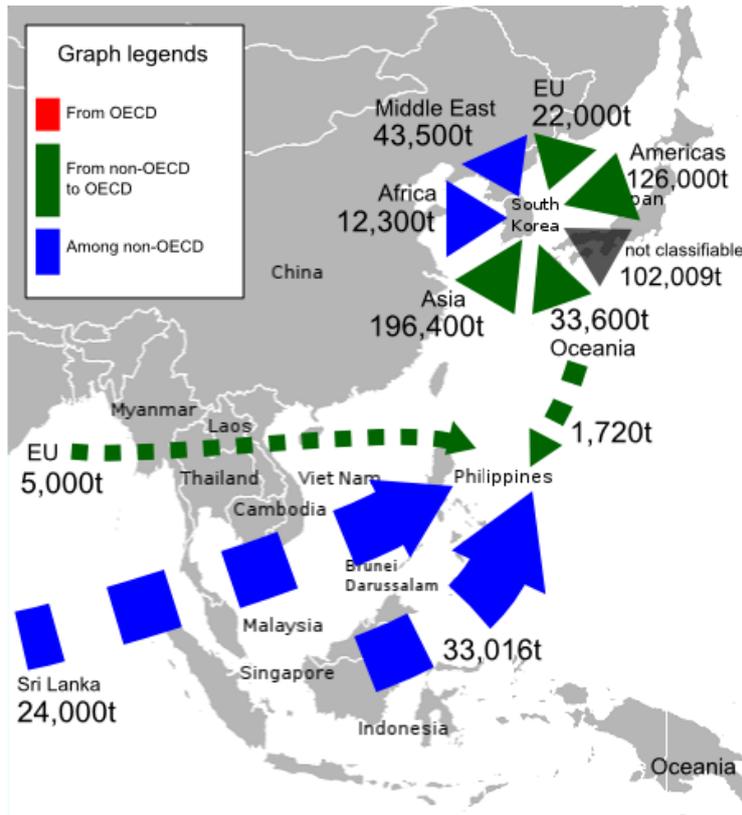


Fig. 5 Transboundary movements of waste lead-acid batteries (Import statistics: 2004 to 2006)

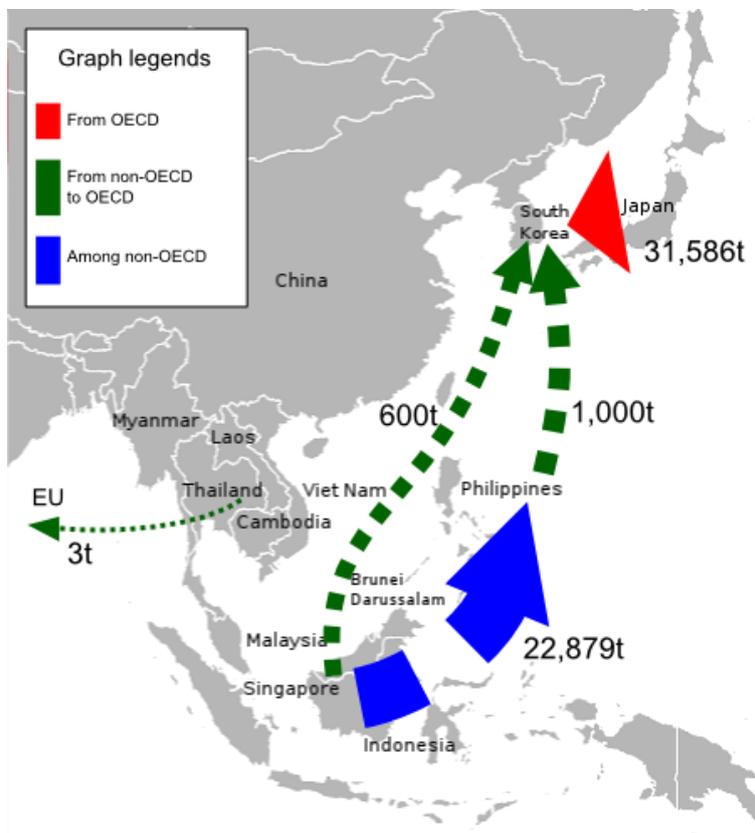


Fig. 6 Transboundary movements of waste lead-acid batteries (Export statistics: 2004 to 2006)

(3) E-waste (waste electronic and electrical equipment)

- The major importer of E-waste is Japan. Japan has imported waste printed-circuit boards from the Philippines and electronic scrap from Thailand, Singapore, and the Philippines (Figs. 7, 9, and 10).
- The major exporters of E-waste are the Philippines and Thailand. The Philippines mainly exports waste printed-circuit boards to Japan. Thailand also exports E-waste mainly to Japan (Figs. 8, 9, and 10).
- In 2006 Malaysia and Singapore exported E-waste and the main importer was Thailand (Figs. 8 and 10).

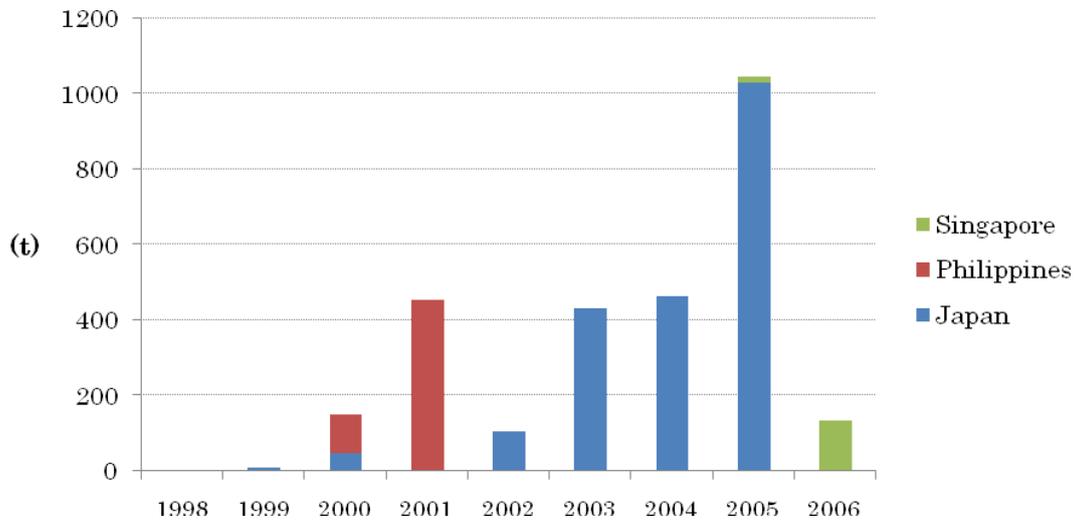


Fig. 7 Import of E-waste (1998 to 2006)

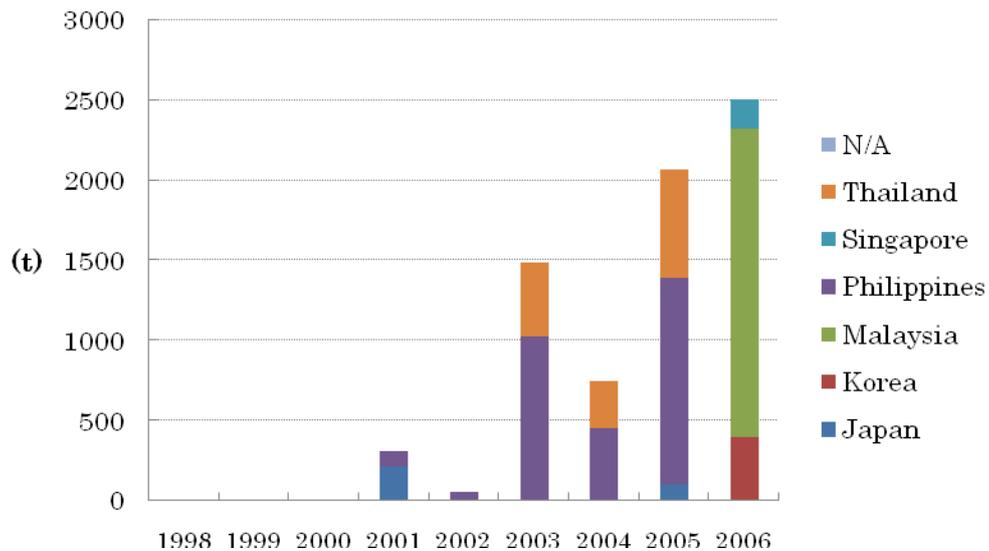


Fig. 8 Export of E-waste (1998 to 2006)

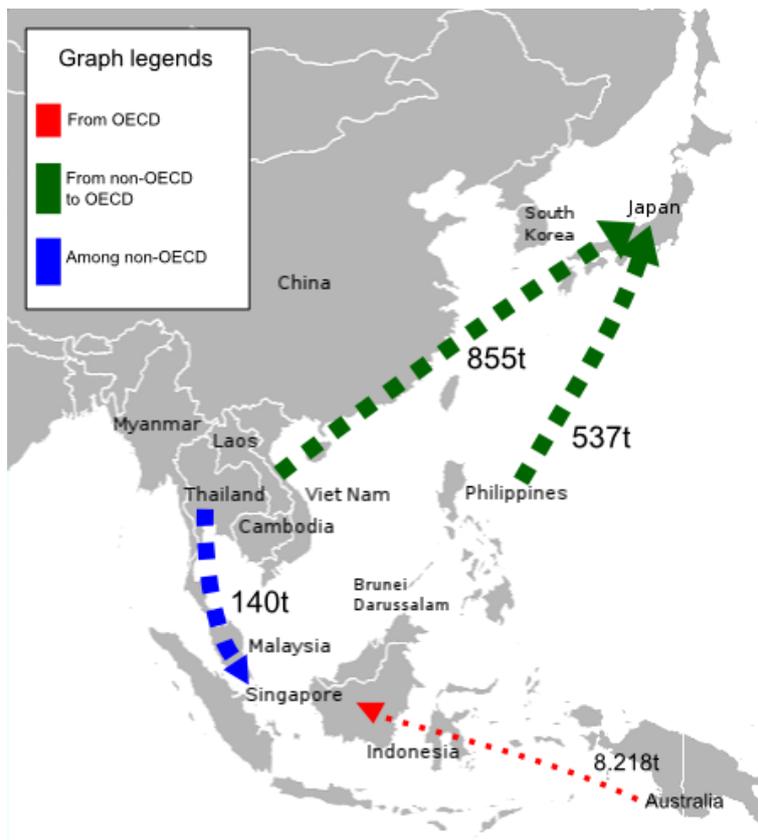


Fig. 9 Transboundary movements of E-waste (Import statistics: 2004 to 2006)

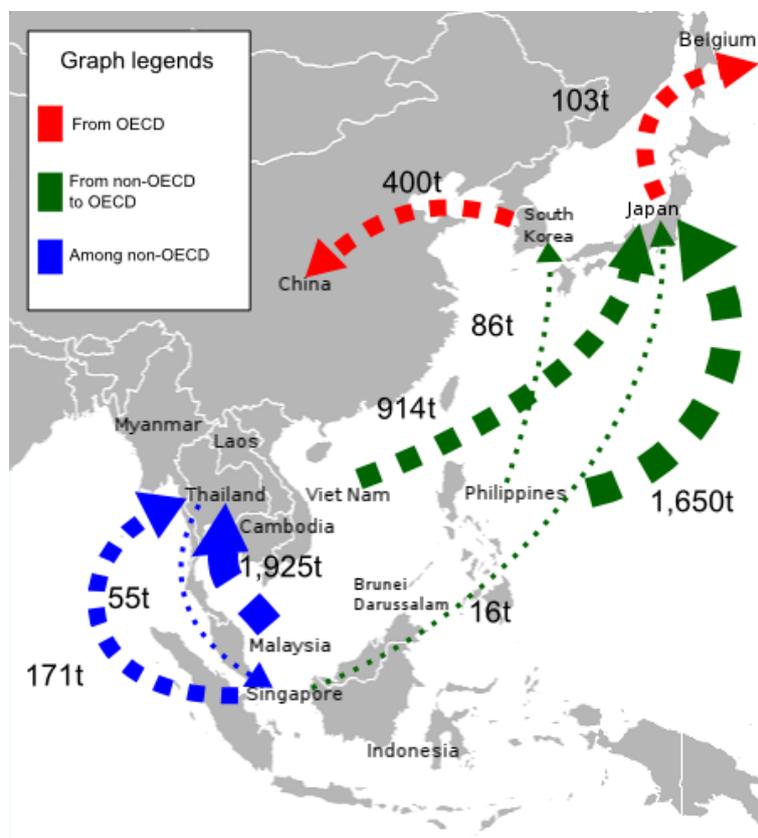


Fig. 10 Transboundary movements of E-waste (Export statistics: 2004 to 2006)

(iii) Transboundary movements of hazardous wastes by category

Based on the Basel Convention national reporting, this section analyzes transboundary movements of hazardous wastes according to the category of hazardous wastes as shown below (for classification by category, refer to Appendix 4).

- ✧ Wastes that contain mercury or PCB and require special treatment (difficult-to-treat wastes)
- ✧ Metallic hazardous wastes mainly consisting of ferrous or nonferrous metals
- ✧ Other recyclable hazardous wastes to be used as raw material

(1) Transboundary movements by category

- The majority of import to the Asian countries is metallic hazardous wastes and other recycling wastes (Fig. 11).
- Metallic hazardous waste for recycling/reclamation of metals and metal compounds (R4) accounts for the major reason of export (Fig. 12).

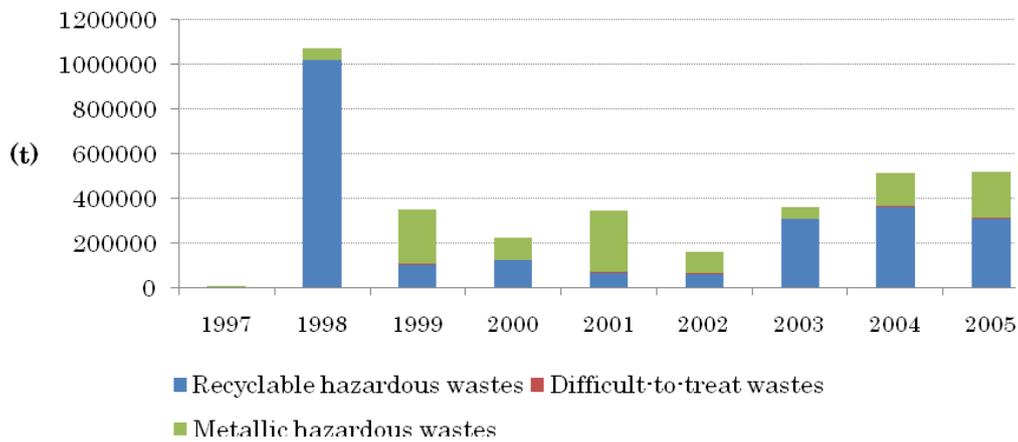


Fig. 11 Import of hazardous wastes by category (1997 to 2005)

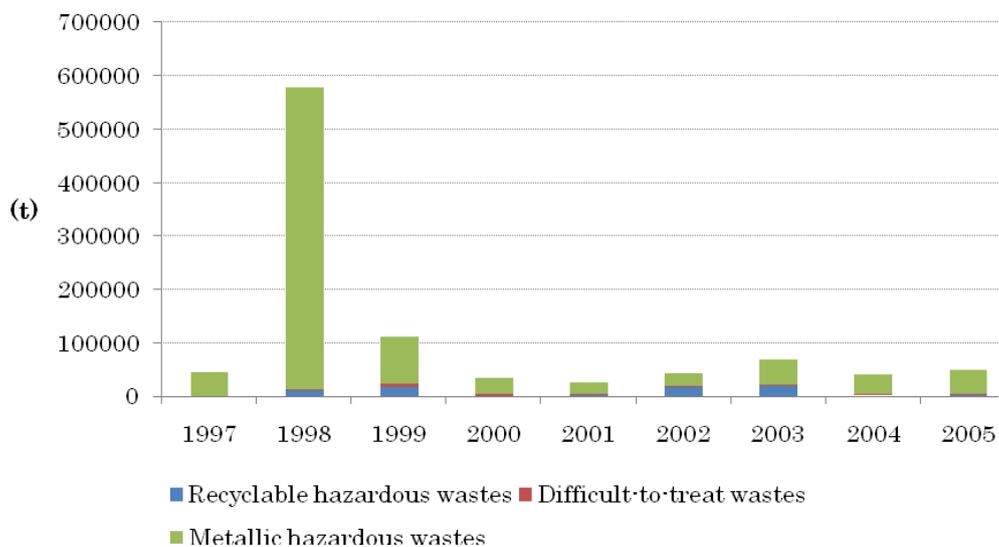


Fig. 12 Export of hazardous wastes by category (1997 to 2005)

(2) Hazardous wastes requiring special treatment (difficult-to-treat wastes)

- In general, transboundary movements of hazardous wastes requiring special treatment (e.g. wastes containing mercury or PCB) tended to decrease (Figs. 13 and 14). (In 1997 Republic of Korea imported more than 100 tons of waste fluorescent lamps from Germany).
- In recent years, the only importer of difficult-to-treat wastes within the region is Japan; the main imported waste is waste fluorescent lamps from the Philippines and other countries (Figs. 13 and 15).
- The major exporter of difficult-to-treat wastes from 1998 to 2001 was China; the country exported mercury wastes and PCB wastes to France and Finland for incineration (D10). In recent years the Philippines has been the largest exporter and exports waste transformers and waste fluorescent lamps to EU countries for incineration (D10) (Figs. 14 and 16).

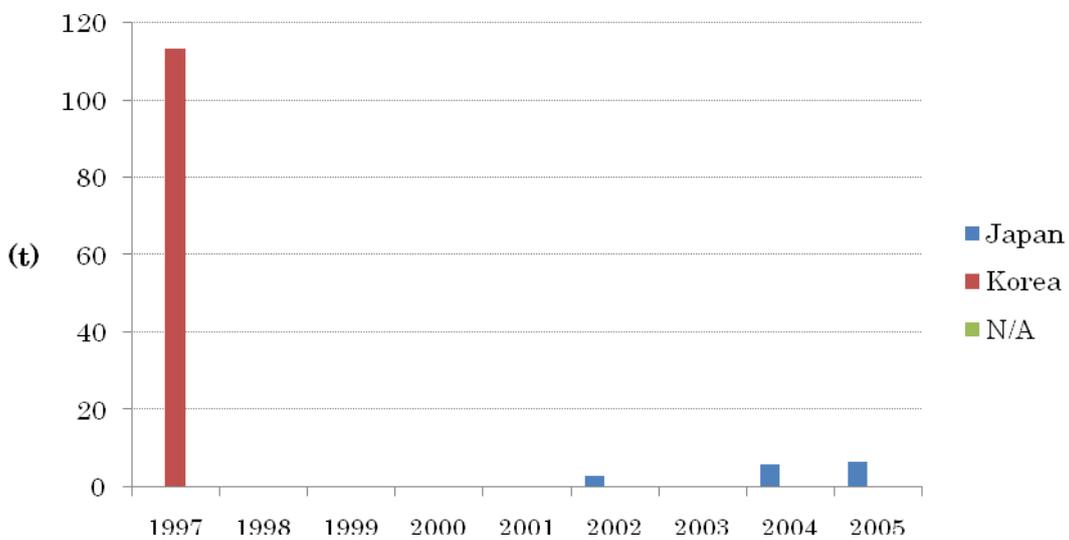


Fig. 13 Import of difficult-to-treat wastes (1997 to 2005)

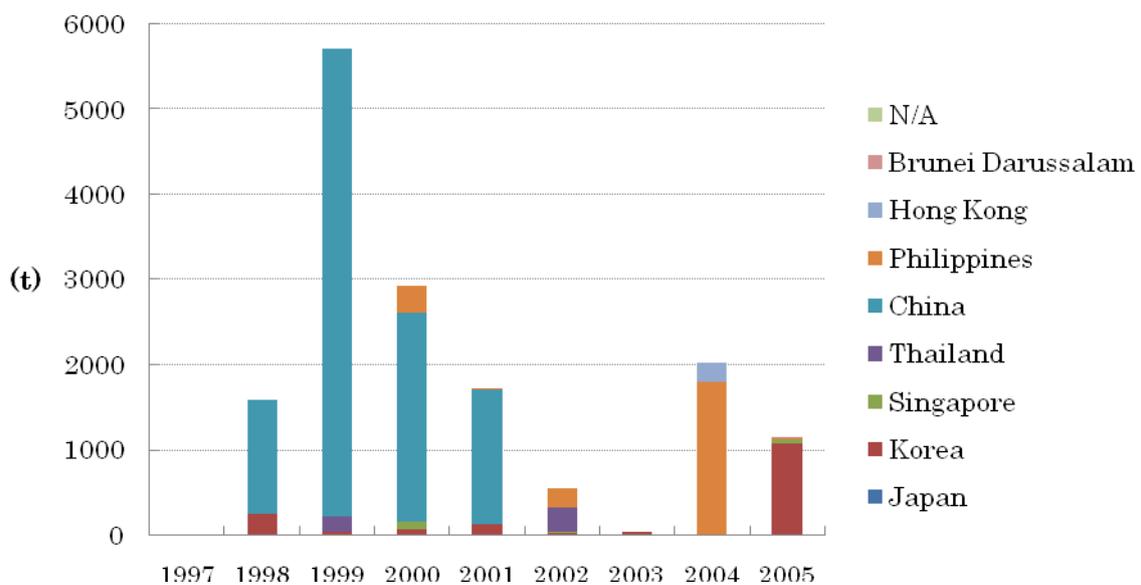


Fig. 14 Export of difficult-to-treat wastes (1997 to 2005)

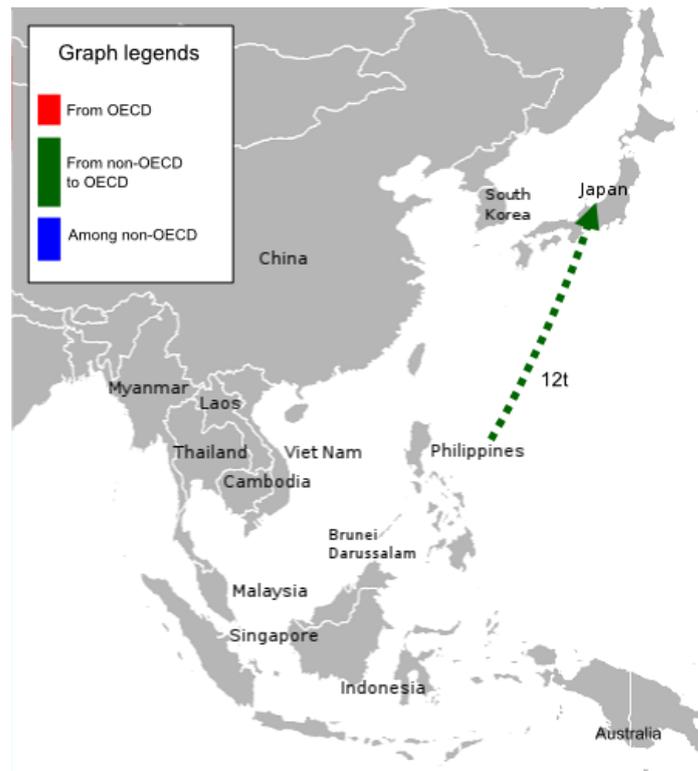


Fig. 15 Transboundary movements of difficult-to-treat wastes (Import statistics: 2004 to 2006)

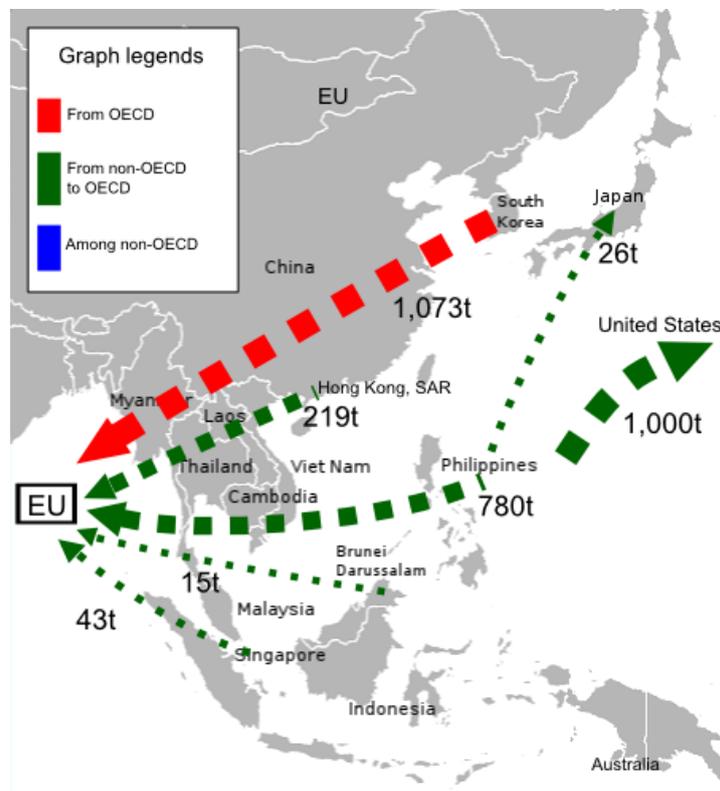


Fig. 16 Transboundary movements of difficult-to-treat wastes (Export statistics: 2004 to 2006)

(3) Metallic hazardous wastes

- Indonesia used to be the largest importer of metallic hazardous wastes, but in recent years Republic of Korea and the Philippines have increased the amount of import (Fig. 17).
- Waste lead-acid batteries account for a large proportion of metallic hazardous waste; over the nine years from 1997 to 2005 they accounted for 87% of the whole metallic hazardous wastes import.
- The amount of export in 1998 was extremely large due to the export of a massive amount of steel scale wastes from Republic of Korea to Taiwan and Japan (Fig. 18).
- Asia plays a role as an importer of metallic hazardous wastes in the world. When comparing the total figures for the years from 1997 to 2005 (excluding 1998), the amount of import is 3.4 times larger than that of export (Figs. 17 and 18).
- Transboundary movements of hazardous wastes for recycling of metal are quite active and many non-OECD countries functions as both importers and exporters (Fig. 19).

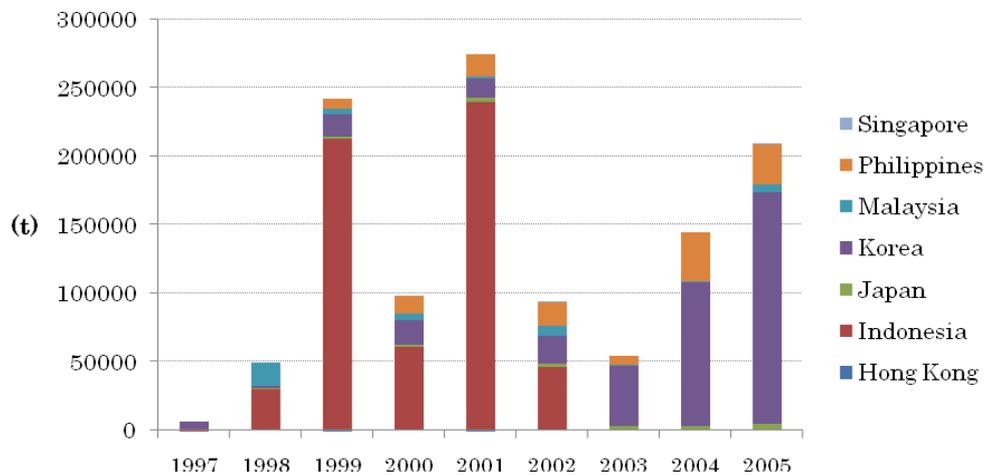


Fig. 17 Import of metallic hazardous waste (1997 to 2005)

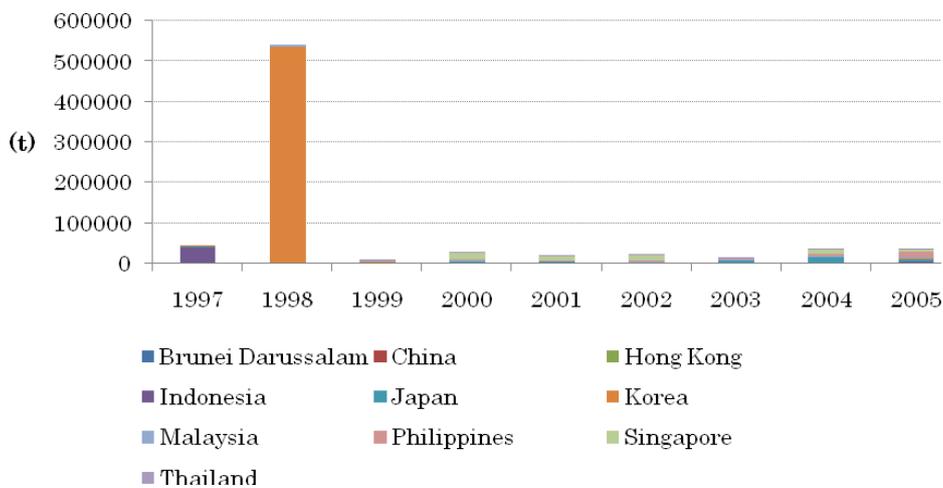


Fig. 18 Export of metallic hazardous waste (1997 to 2005)

(4) Other recyclable hazardous wastes

- Import of blast furnace slag account for almost all of the total import of other recyclable hazardous wastes by weight (98.5% of the total import over the eight years from 1998 to 2005). All of them were imported from Japan, China, and Singapore to Malaysia (Fig. 20).
- The amount of export varies greatly according to the year and it is difficult to find any clear trends; China has exported such wastes in very large amount, e.g. blast furnace slag to Malaysia; and the Philippines has continuously exported them, e.g. waste OA equipment to Thailand and the US, and waste oil to EU countries (Figs. 21 and 23).
- In addition to OECD countries, imports to Thailand and the Philippines can be observed to be used as raw material (Figs. 22 and 23).

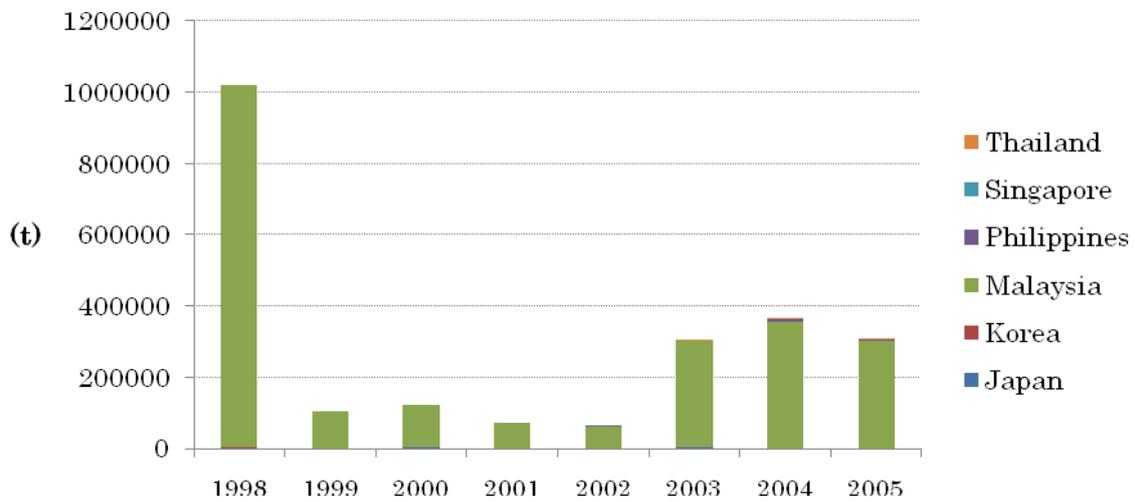


Fig. 20 Import of recyclable hazardous wastes (1998 to 2005)

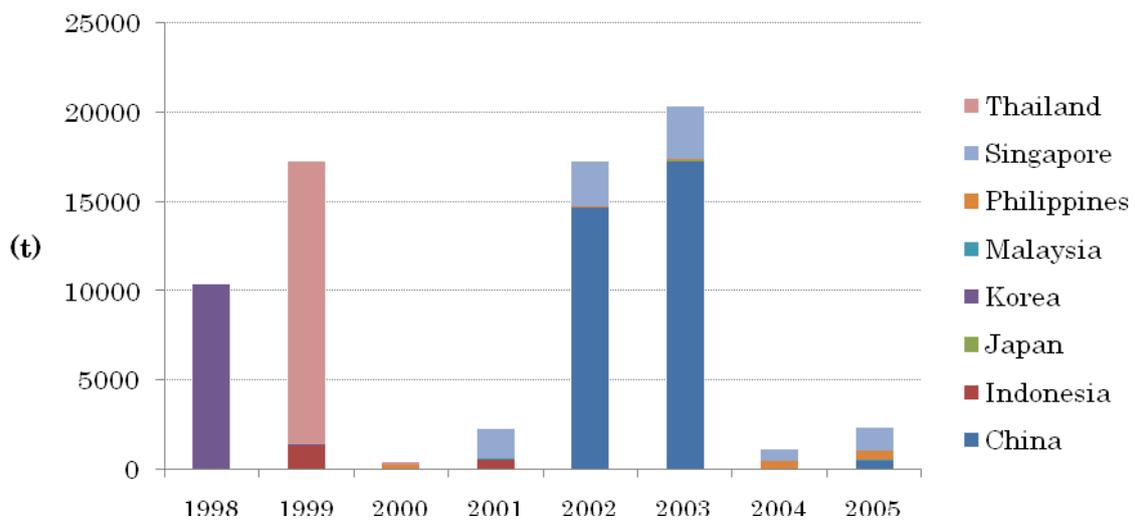


Fig. 21 Export of recyclable hazardous wastes (1998 to 2005)

(iv) Transboundary movements of used EEE

Based on the World Trade Atlas data, a survey was conducted in 2008 to estimate the amount of transboundary movements of used EEE among Asian countries. This section summarizes the estimated results not by weight but by quantity targeting on the products below:

Product	HS code
Color TV sets	85.2812
Air conditioners	84.1510
Refrigerators	84.1810
Washing machines	84.5011
Desktop PCs	84.7141
Laptop PCs	84.7130

The transboundary movements of secondhand products are not distinguished from those of new products in the current trade statistics. For this reason, the following assumption was used to estimate the amount of transboundary movements of used EEE: products were assumed to be used EEE when their average unit price (USD/unit) in export statistics is cheaper than that of the secondhand products of the same kind traded in local markets of the importing country.

In their efforts to overcome the uncertainty in estimation and to have better control targeted to used EEE, Japan developed a specific domestic HS code to distinguish used EEE from new products depending on whether or not they are individually packaged for retail sale.

- For all types of used EEE, considerable amount of transboundary movements of used EEE has been observed not only from OECD countries to non-OECD countries, but also among non-OECD countries. At present, non-OECD countries are also exporters of used EEE in the region (Figs. 24 to 29).
- Combinations of exporting and importing countries differ according to the type of products. Some countries are both importers and exporters of the same products.
- Significant amounts of used EEE, e.g. used color TV sets, are exported to countries such as Hong Kong and Singapore; most of them are considered to be re-exported to other countries.

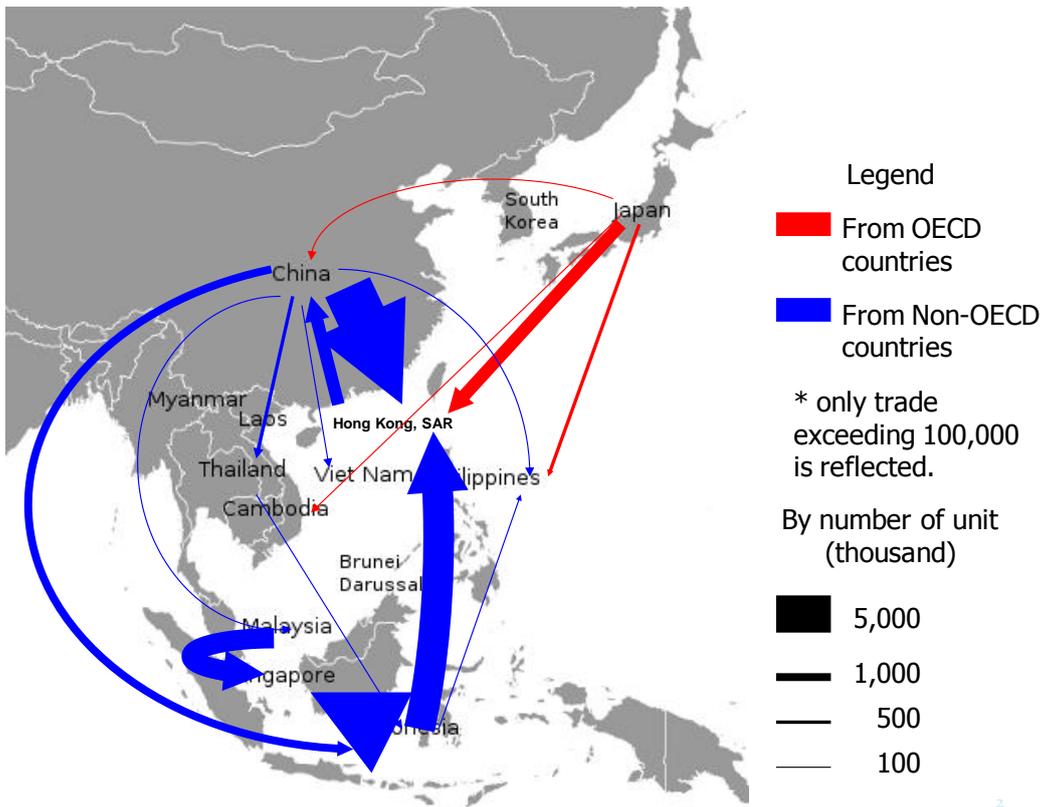


Fig. 24 Transboundary movement of used color TV sets (Export statistics: 2006)

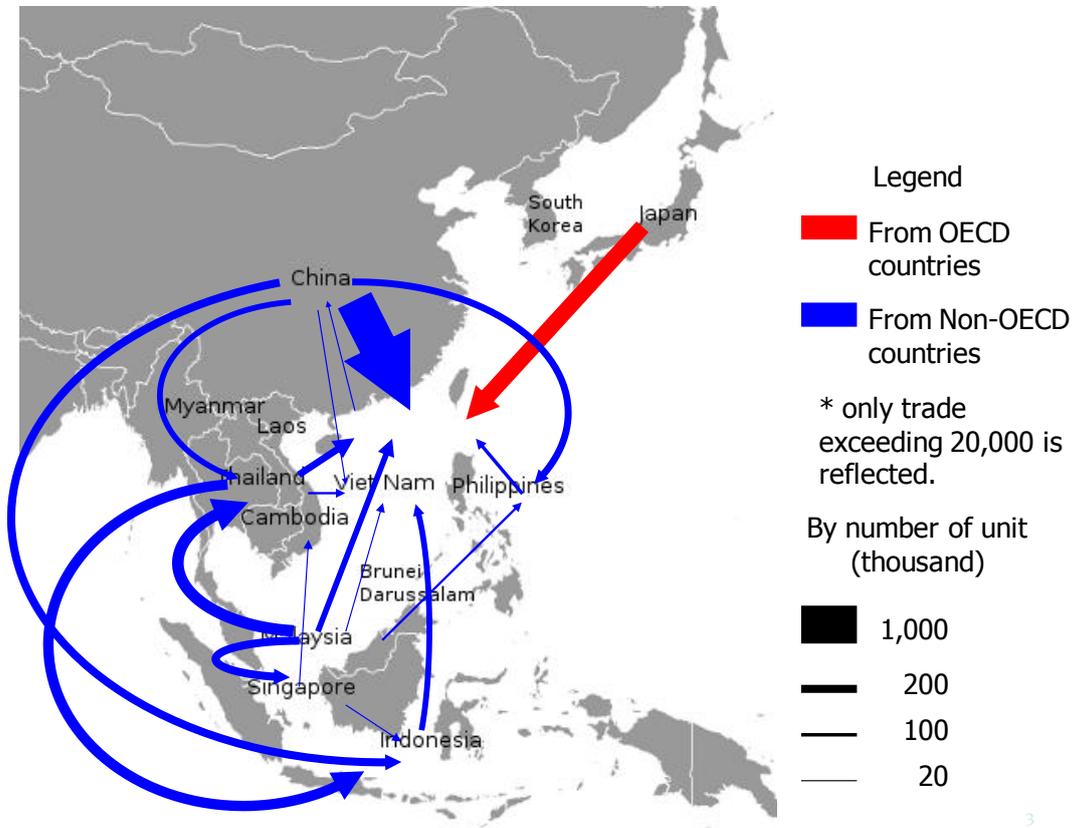


Fig. 25 Transboundary movement of used air conditioners (Export statistics: 2006)

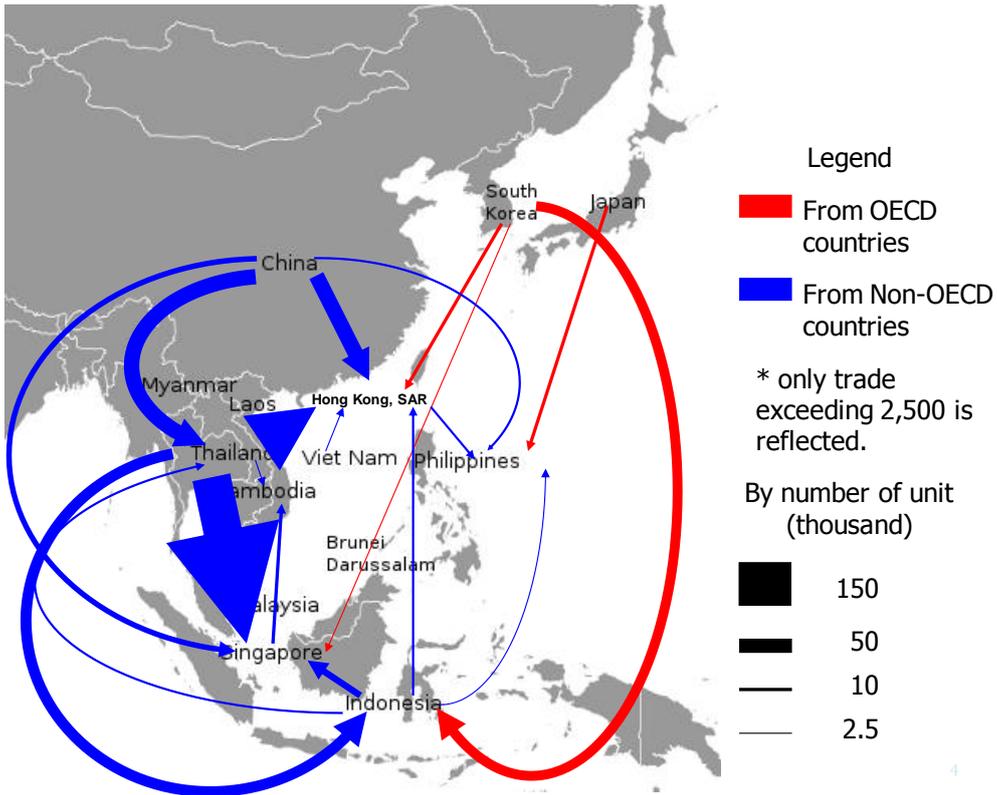


Fig. 26 Transboundary movement of used refrigerators (Export statistics: 2006)

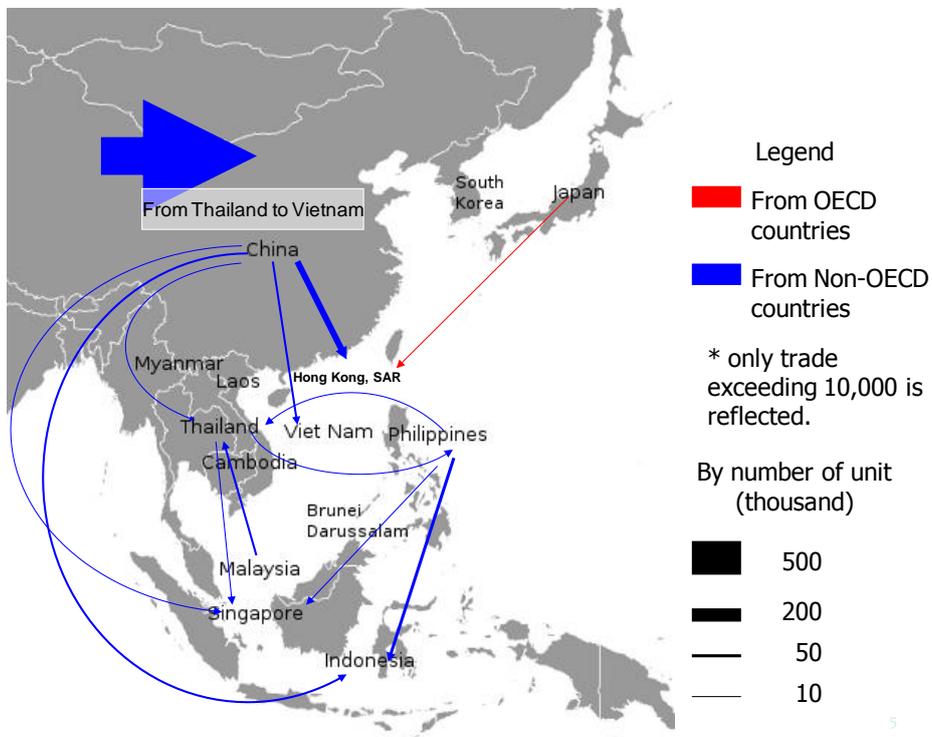


Fig. 27 Transboundary movement of used washing machines (Export statistics: 2006)

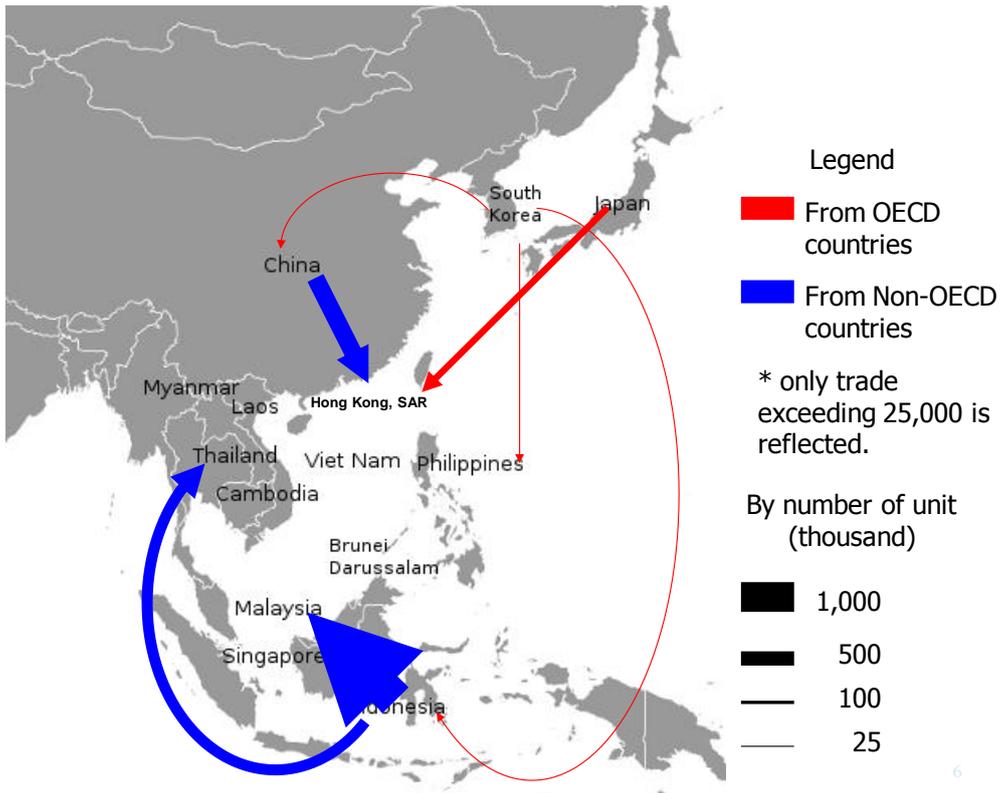


Fig. 28 Transboundary movement of used desktop PCs (Export statistics: 2006)

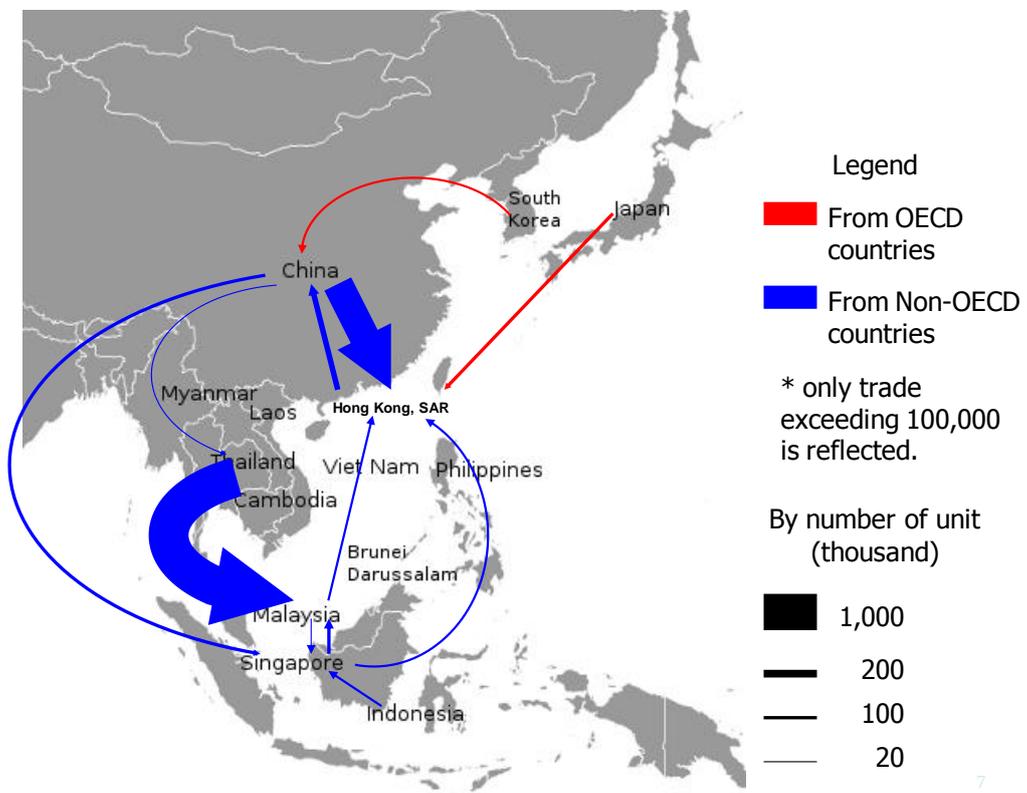


Fig. 29 Transboundary movement of used laptop PCs (Export statistics: 2006)