



Official Website of  
**Department Of Environment**  
Ministry of Natural Resources and Environment



# **THE E-WASTE INVENTORY PROJECT IN MALAYSIA**

**By**

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**Protect Our Environment**

# PROJECT SCOPE

- PURPOSE OF THE PROJECT

- Obtain an indication of the volume of e-waste generation

Cover 7 types of EEE:

- television set, personal computers, mobile phone, refrigerator, air conditioner, washing machine & rechargeable batteries (mobile phone).

Funded by MOE Japan, administered via EX Corporation  
(design project methodology)

Managed by DOE Malaysia & executed by Perunding Good Earth Sdn. Bhd.

# PROJECT METHODOLOGY

## Target Respondents

- 3 Main Respondent –
  - household from various socioeconomic level
  - wide scale of business entities & institutional group
  - recyclers:- importers, exporters, manufacturers, collectors, second-hand shop, repair shop etc.
- Target 1200 questionnaires collected & minimum target for each group is 400 questionnaires
- Respondent from 11 main cities – based on population density & socioeconomic level
  - KL, Ipoh, Kuantan, KK, Kuching etc

# PROJECT METHODOLOGY

- 5 principal types of questionnaire were designed by EX Corporation:-
  - Household
  - Business Entities and Institutions
  - Importer & Exporter
  - Collectors, repair shop, second-hand shops, dismantlers
  - Manufacturers

# PROJECT METHODOLOGY

Sources of data:-

- Department of Statistic Malaysia,  
Department of Environment, Malaysian  
Communication and Multimedia  
Commission (MCMC), Malaysia External  
Trade Development Corporation  
(MATRADE)

# PROJECT METHODOLOGY

- Data Compilation & Analysis
  - serial number used to control data from being entered twice
  - EX Corporation developed analytical method which be used to analyze the various categories of respondent, EEE types and equations for summarizing & calculating the data.

# RESULT OF THE STUDY

Television Set

## AMOUNT OF BRAND-NEW TELEVISION SETS DOMESTICALLY PRODUCED/ SHIPPED AND IMPORTED/ EXPORTED

Year	Brand-new Television Sets			
	Production	Import	Export	Domestic Consumption
2002	12,030,000	12,328,465	17,976,783	6,381,682
2003	11,932,000	12,449,675	18,734,001	5,647,674
2004	11,676,000	5,718,757	13,741,709	3,653,048



# PURCHASE USE PATTERN TELEVISION SETS (TV)

Purchase use Of Pattern Television Sets (TV)				
Item	User	Household (by income level)		
		High	Middle	Low
Average of TV currently possessed		1.7	1.2	1.0
Type television Sets currently possessed	Colour CRT	505 (92.7%)		
	LCD	40 (7.3%)		
Average duration for use of discarded Television Sets (in year)	Brand-new	10.8	9.2	9.9
	Second-hand	7.8	8.6	14.5
Way to obtain Television Sets currently possessed	Bought	521 (95.6%)		
	Given	19 (3.5%)		
	Other	5 (0.9%)		
Ration of second hand and brand-new Television Sets possessed	Brand-new	519 (95.2%)		
	Second-hand	26 (4.8%)		
Disposal Method	Discarded	118 (75.2%)		
	Currently possessed	39 (24.8%)		

# PURCHASE PATTERN FOR TELEVISION SETS – BUSINESS ENTITIES AND INSTITUTIONS

Purchase use Of Pattern Television Set					
<div style="display: flex; align-items: center; justify-content: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Item</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">User</div> </div>		Business Entity & Institution			
		Commercial (by # employees)			
		Institution	Small (5-50 employees)	Medium (51-150 employees)	Large (>150 employees)
Average of TV currently possessed		36.6	1.1	2.0	5.3
Purchase use Pattern of TV	Colour CRT	4053 (99.9%)	227 (92.7%)		
	LCD	5 (0.1%)	18.0 (7.3%)		
Average duration for use discarded TV (in year)	Brand-new	5.9	6.8	5.5	3.0
	Second-hand	4.5	7.9	2.5	8.0
Way to obtain TV currently possessed	Bought	3772 (93.8%)	246 (95.7%)		
	Lease	245 (6%)	n.a.		
	Other	1 (0.2%)	11 (4.3%)		
Ration of second hand and brand-new TV possessed	Brand-new	234 (91.1%)	234 (91.1%)		
	Second-hand	23 (8.9%)	23 (8.9%)		
Disposal Method	Discarded	17 (56.7%)	17 (56.7%)		
	Currently possessed	13 (43.3%)	13 (43.3%)		

# RESULT OF THE STUDY

Personal Computer (PC)

## DOMESTIC CONSUMPTION DATA FOR AIR CONDITIONER, PERSONAL COMPUTER AND MOBILE PHONE

DOMESTIC CONSUMPTION			
YEAR	Personal Computer	Mobile Phone	Air Conditioner
2002	4,320,000	10,920,000	2,180,799
2003	5,040,000	13,320,000	2,018,819
2004	5,880,000	17,400,000	1,685,318
2005	6,840,000	19,440,000	1,693,284
2006	7,800,000	Not Available	1,648,147

# PURCHASE PATTERN FOR COMPUTERS IN HOUSEHOLDS

Purchase use Of Pattern Personal Computer (PC)				
Item	User	Household (by income level)		
		High	Middle	Low
Average of Personal Computer currently possessed		1.7	1.0	0.7
Type Personal Computer currently possessed	CRT	256 (55%)		
	LCD	43 (9.2%)		
	Notebook	170 (36.2%)		
Average duration for use of discarded Personal Computer (in year)	Brand-new	5.2	4.7	1.3
	Second-hand	1.7	3.8	5.0
Way to obtain Personal Computer currently possessed	Bought	436 (93%)		
	Given	26 (6%)		
	Other	5 (1%)		
Ratios of second hand and brand-new Personal Computer possessed	Brand-new	462 (98.5%)		
	Second-hand	7 (1.5%)		
Disposal Method	Discarded	61 (81.3%)		
	Currently possessed	14 (18.7%)		

## PURCHASE PATTERN FOR PERSONAL COMPUTER – BUSINESS ENTITIES AND INSTITUTIONS

Purchase use Pattern OF Personal Computers					
<div> <div>Item</div> <div>User</div> </div>		Business Entity & Institution			
		Commercial (by # employees)			
		Institution	Small (5-50 employees)	Medium (51-150 employees)	Large (>150 employees)
Average of PC currently possessed		21.4	9.6	68.1	220.4
Type PC currently possessed	CRT	2374 (89.3%)	3605 (52%)		
	LCD	248 (9.3%)	2563 (37%)		
	Notebook	36 (1.4%)	766 (11%)		
Average duration for use discarded PC (in year)	Brand-new	5.3	5.4	4.6	6.2
	Second-hand	5.0	5.3	1.0	2.5
Way to obtain PC currently possessed	Bought	2562 (96.4%)	4557 (65.7%)		
	Lease	60 (2.2%)	2219 (32%)		
	Other	36 (1.4%)	158 (2.3%)		
Ratios of second hand and brand-new PC possessed	Brand-new	2580 (97.1%)	6693 (96.5%)		
	Second-hand	78 (2.9%)	241 (3.5%)		
Disposal Method	Discarded	412 (92.2%)	1126 (78.7%)		
	Currently possessed	35 (7.8%)	304 (21.3%)		

# RESULT OF THE STUDY

Mobile Phone

# DOMESTIC CONSUMPTION DATA FOR AIR CONDITIONER, PERSONAL COMPUTER AND MOBILE PHONE

DOMESTIC CONSUMPTION			
YEAR	Personal Computer	Mobile Phone	Air Conditioner
2002	4,320,000	10,920,000	2,180,799
2003	5,040,000	13,320,000	2,018,819
2004	5,880,000	17,400,000	1,685,318
2005	6,840,000	19,440,000	1,693,284
2006	7,800,000	Not Available	1,648,147



# PURCHASE PATTERN FOR MOBILE PHONES IN HOUSEHOLDS

Purchase use Of Pattern Mobile Phone (MP)				
<div>Item</div> <div>User</div>		Household (by income level)		
		High	Middle	Low
Average of Mobile Phone currently possessed		1.5	1.9	1.5
Average duration for use of discarded Mobile Phone (in year)	Brand-new	2.9	3.1	3.1
	Second-hand	3.3	2.5	4.2
Way to obtain Mobile Phone currently possessed	Bought	720 (94.1%)		
	Given	45 (5.9%)		
	Other	n.a		
Ratios of second hand and brand-new Mobile Phone possessed	Brand-new	698 (91.2%)		
	Second-hand	67 (8.8%)		
Disposal Method	Discarded	225 (70.1%)		
	Currently possessed	96 (29.9%)		

# PURCHASE PATTERN FOR MOBILE PHONES – BUSINESS ENTITIES AND INSTITUTIONS

Purchase use Pattern OF Mobile Phones					
<div> <div>Item</div> <div>User</div> </div>		Business Entity & Institution			
		Commercial (by # employees)			
		Institution	Small (5-50 employees)	Medium (51-150 employees)	Large (>150 employees)
Average of MP currently possessed		7.0	3.3	10.7	77.8
Average duration for use discarded MP (in year)	Brand-new	4.3	3.8	5.5	3.0
	Second-hand	4.0	3.0	5.0	5.0
Way to obtain MP currently possessed	Bought	35 (100%)	507 (99.8%)		
	Lease	n.a.	n.a.		
	Other	n.a.	1 (0.2%)		
Ratios of second hand and brand-new MP possessed	Brand-new	25 (71.4%)	506 (99.6%)		
	Second-hand	10 (28.6%)	2 (0.4%)		
Disposal Method	Discarded	n.a.	2 (33.3%)		
	Currently possessed	n.a.	4 (66.7%)		

# RESULT OF THE STUDY

Refrigerator

# AMOUNT OF BRAND-NEW REFRIGERATOR DOMESTICALLY PRODUCED/ SHIPPED AND IMPORTED/ EXPORTED

Year	Brand-new Refrigerator			
	Production	Import	Export	Domestic Consumption
2002	10,410,000	60,102	900	10,469,202
2003	9,915,000	63,791	1,721	9,977,070
2004	9,895,000	4,193	1,027	9,898,166
2005	10,529,000	1,903	718	10,530,185

# PURCHASE PATTERN FOR REFRIGERATOR IN HOUSEHOLDS

Purchase use Of Pattern Refrigerator				
<div>Item</div> <div>User</div>		Household (by income level)		
		High	Middle	Low
Average of Refrigerator currently possessed		1.3	1.0	0.9
Average duration for use of discarded Refrigerator (in year)	Brand-new	8.2	8.1	10.8
	Second-hand	9.9	7.6	11.0
Way to obtain Refrigerator currently possessed	Bought	429 (96.4%)		
	Given	15 (3.4%)		
	Other	1 (0.2%)		
Ratios of second hand and brand-new Refrigerator possessed	Brand-new	421 (94.6%)		
	Second-hand	24 (5.4%)		
Disposal Method	Discarded	69 (89.6%)		
	Currently possessed	8 (10.4%)		

# PURCHASE PATTERN FOR REFRIGERATOR – BUSINESS ENTITIES AND INSTITUTIONS

Purchase use Pattern Of Refrigerator					
<div> <div>Item</div> <div>User</div> </div>		Business Entity & Institution			
		Commercial (by # employees)			
		Institution	Small (5-50 employees)	Medium (51-150 employees)	Large (>150 employees)
Average of Refrigerator currently possessed		34.6	1.6	2.0	0.1
Average duration for use discarded Refrigerator (in year)	Brand-new	5.2	6.4	7.0	8.0
	Second-hand	7.8	7.0	8.3	6.0
Way to obtain Refrigerator currently possessed	Bought	3457 (99%)	310 (85.2%)		
	Lease	30 (0.9%)	30 (8.2%)		
	Other	3 (0.1%)	24 (6.6%)		
Ratios of second hand and brand-new Refrigerator possessed	Brand-new	3123 (89.5%)	314 (86.3%)		
	Second-hand	367 (10.5%)	50 (13.7%)		
Disposal Method	Discarded	2 (66.7%)	13 (66.7%)		
	Currently possessed	1 (33.3%)	2 (13.3%)		

# RESULT OF THE STUDY

Air Conditioner

# **DOMESTIC CONSUMPTION DATA FOR AIR CONDITIONER, PERSONAL COMPUTER AND MOBILE PHONE**

<b>DOMESTIC CONSUMPTION</b>			
<b>YEAR</b>	<b>Personal Computer</b>	<b>Mobile Phone</b>	<b>Air Conditioner</b>
<b>2002</b>	<b>4,320,000</b>	<b>10,920,000</b>	<b>2,180,799</b>
<b>2003</b>	<b>5,040,000</b>	<b>13,320,000</b>	<b>2,018,819</b>
<b>2004</b>	<b>5,880,000</b>	<b>17,400,000</b>	<b>1,685,318</b>
<b>2005</b>	<b>6,840,000</b>	<b>19,440,000</b>	<b>1,693,284</b>
<b>2006</b>	<b>7,800,000</b>	<b>Not Available</b>	<b>1,648,147</b>



# PURCHASE PATTERN FOR AIR CONDITIONER IN HOUSEHOLDS

Purchase use Of Pattern Refrigerator				
Item \ User		Household (by income level)		
		High	Middle	Low
Average of Air Conditioner currently possessed		1.7	0.7	0.2
Average duration for use of discarded Air Conditioner (in year)	Brand-new	9.2	5.2	5.7
	Second-hand	8.1	7.5	11.0
Way to obtain Air Conditioner currently possessed	Bought	341 (96.6%)		
	Given	10 (2.8%)		
	Other	2 (0.6%)		
Ratios of second hand and brand-new Air Conditioner possessed	Brand-new	310 (87.8%)		
	Second-hand	43 (12.2%)		
Disposal Method	Discarded	21 (65.6%)		
	Currently possessed	11 (34.4%)		

# PURCHASE PATTERN FOR AIR CONDITIONER – BUSINESS ENTITIES AND INSTITUTIONS

Purchase use Pattern Of Air Conditioner					
<div style="display: flex; align-items: center; justify-content: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Item</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">User</div> </div>		Business Entity & Institution			
		Commercial (by # employees)			
		Institution	Small (5-50 employees)	Medium (51-150 employees)	Large (>150 employees)
Average of Air Conditioner currently		14.6	3.9	13.8	14.5
Average duration for use discarded Air Conditioner (in year)	Brand-new	2.8	6.1	1.0	5.3
	Second-hand	2.7	4.3	n.a.	7.0
Way to obtain Air Conditioner currently possessed	Bought	1673 (98.5%)	1709 (93.5%)		
	Lease	9 (0.5%)	5 (0.3%)		
	Other	16 (0.9%)	114 (6.2%)		
Ratios of second hand and brand-new Air Conditioner possessed	Brand-new	1363 (80.3%)	1488 (81.4%)		
	Second-hand	335 (19.7%)	340 (18.6%)		
Disposal Method	Discarded	1 (50%)	16 (88.9%)		
	Currently possessed	1 (50%)	2 (11.1%)		

# RESULT OF THE STUDY

Washing Machine

# AMOUNT OF BRAND-NEW WASHING MACHINES DOMESTICALLY PRODUCED/ SHIPPED AND IMPORTED/ EXPORTED

Year	Brand-new Washing Machines			
	Production	Import	Export	Domestic Consumption
2002	478,000	396	120	478,276
2003	603,000	276	27	603,249
2004	1,019,000	281	9	1,019,272
2005	Not Available	222	32	Not Available
2006	Not Available	5,848	8	Not Available

# PURCHASE PATTERN FOR WASHING MACHINES IN HOUSEHOLDS

Purchase use Of Pattern Washing Machines				
Item \ User		Household (by income level)		
		High	Middle	Low
Average of Washing Machines currently possessed		1.0	0.9	0.8
Average duration for use of discarded Washing Machine (in year)	Brand-new	8.7	5.7	7.6
	Second-hand	9.4	5.0	8.0
Way to obtain Washing Machine currently possessed	Bought	387 (97.2%)		
	Given	11 (2.8%)		
	Other	n.a.		
Ratios of second hand and brand-new Washing Machine possessed	Brand-new	384 (96.5%)		
	Second-hand	14 (3.5%)		
Disposal Method	Discarded	84 (85.7%)		
	Currently possessed	14 (14.3%)		

# PURCHASE PATTERN FOR WASHING MACHINE – BUSINESS ENTITIES AND INSTITUTIONS

Purchase use Pattern Of Washing Machine					
<div> <div>Item</div> <div>User</div> </div>		Business Entity & Institution			
		Commercial (by # employees)			
		Institution	Small (5-50 employees)	Medium (51-150 employees)	Large (>150 employees)
Average of Washing Machine currently		4.0	2.9	1.0	1.5
Average duration for use discarded Washing Machine (in year)	Brand-new	11.0	7.3	11.0	4.5
	Second-hand	7.0	8.0	6.5	6.0
Way to obtain Washing Machine currently possessed	Bought	48 (85.7%)	61 (92.4%)		
	Lease	6 (10.7%)	2 (3%)		
	Other	2 (3.6%)	3 (4.5%)		
Ratios of second hand and brand-new Washing Machine possessed	Brand-new	56 (100%)	63 (95%)		
	Second-hand	n.a.	3 (5%)		
Disposal Method	Discarded	1 (50%)	6 (85.7%)		
	Currently possessed	1 (50%)	1 (14.3%)		

# RESULT OF THE STUDY

ASSUMPTION

# Assumption for the Projection

## Assumption 1

- From the domestic shipment/sales figure only 80% translated into actual sales in domestic markets.
  - because – portion of unsold EEE due to competition among manufacturers, unattractive pricing, not suit to the consumers desires, needs, style etc.
- The 'assumed total domestic sales' was used as the input parameter in the Weibull statistical inference to estimate the discarded used EEE.



- Assumption 2
  - Future domestic sales growth 2005-2020 based on Malaysia's average annual population growth rate of 2.2% from 2003-2005.

- Assumption 3

- No reliable data for domestic shipment of rechargeable batteries for mobile phones, the data from mobile phone was used as a proxy; 1 unit mobile phone = 1 unit battery
- Lifespan of the battery is about 2 year, therefore, the proxy number is multiplied by 1.5 as the average replacement unit of batteries for the average duration of mobile phone use recorded.

- Assumption 4
  - Based on Malaysia's average annual population growth rate of 2.6%.

- Assumption 5
  - Estimating according to the respondent categories, separate domestic sales data of each categories.- to indicate target number.
  - Assumption was made based on the ownership ratio for each of the EEE by household and business entities and institutions

- Assumption 6

- Average weight for ;

- television set – 35 kg
- computer unit – 30 kg
- mobile phone – 0.1 kg
- refrigerator – 70 kg
- air conditioner – 60 kg
- washing machines – 50 kg
- rechargeable mobile phone battery – 0.01 kg

# OVERALL WEIGHT (METRIC TONNES) OF WEEE DISCARDED BY THE HOUSEHOLD AND BUSINESS ENTITIES AND INSTITUTIONS

FUTURE PROJECTION OF WEEE IN MALAYSIA FOR THE YEAR 1981-2020 (Metric Tonnes)							
YEAR	TV	PC	MP	REF	AC	WM	MPRB
2008	278,173	162,263	468	70,836	145,359	30,874	92
2009	228,000	190,119	599	11,766	146,201	31,195	107
2010	236,817	222,820	795	73,457	142,982	29,299	125
2011	206,739	256,981	1,030	60,990	139,516	29,710	146
2012	215,176	294,339	1,276	59,057	140,935	29.633	169
2013	231,750	328,479	1,514	60,889	145,559	29,497	191
2014	242,320	379,142	1,726	62,554	148,226	31,205	211
2015	261,837	418,897	1,892	64,100	146,878	33,153	229