



Session 3:
Asian Situation in Transboundary Movements of Hazardous Wastes

**Situation in Environmental Concerns
related to Recycling Activities
PHILIPPINES**

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Background, Objectives, & Scope of the Country-Led-Initiatives (CLI)

Background

- Recycling of Waste Electrical and Electronic Equipment (WEEE) is backyard industry which are usually “informal” thus **no environmental permits and clearances** as well as business permits
- Recycling facilities that recover precious metals are not practicing or utilizing Best Available Techniques (BAT) and Best Environmental Practices (BEP)
- WEEEs are not yet classified as prescribed hazardous wastes under the present regulation





Background, Objectives, & Scope of the Country-Led-Initiatives (CLI)

Objective(s)

- Abate or control the indiscriminate disposal of hazardous residual waste components from recycling of WEEE
- Bring into compliance recycling facilities that recover precious metals and other reusable components of WEEE and practice or utilize BAT and BEP
- Institute the concept of environmentally sound management (ESM) in the WEEE recycling industry





Background, Objectives, & Scope of the Country-Led-Initiatives (CLI)

Scope

- Establish or strengthen information education campaign (IEC) on the environmental and health risks or hazards posed by informal way of recycling of WEEE
- Survey and assessment of all recycling facilities in collaboration and cooperation with Local Government Units (LGUs) and the Trade and Industry Department (DTI) specifically the Board of Investment (BOI), Bureau of Import Services (BIS) and Bureau of International Trade Relations (BITR)
- Conduct survey and estimation of local generation of WEEE including second-hand EEE that are usually imported disguised for direct reuse





Overview of Current Situations of TBM and Recycling of Hazardous Wastes and second-hand EEE

TBMs

- 2007 Importation - 98,823 metric tons (MTs)
- Scrap Metals & Lead-Tin Alloy - (Thailand, Pakistan, Bangladesh, India, Japan), Used Lead-Acid Batteries (ULABs) – (New Zealand, Singapore, Papua New Guinea, Sri Lanka, Ghana), Scrap Plastics - (Germany, Japan, Korea, Malaysia), Scrap Electronics – (Korea)
- Majority of Importations are Scrap Plastics and ULABs

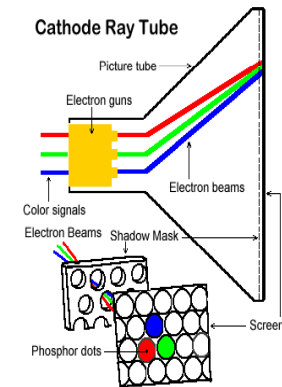




Overview of Current Situations of TBM and Recycling of Hazardous Wastes and second-hand EEE

Local WEEE Generation

- Estimation of Obsolete Computers in the Philippines (unpublished) –Environmental Engineering Graduate Program of the University of the Philippines
- Project case study implemented by DTI-BOI thru JICA & MOE-Japan (EX Corporation) on Collection of Cellphone Waste
 - Increase public awareness on proper disposal of cellphone waste
 - Assess feasibility of collection in shops or drop-off points



Local Recycling Facilities

- Recyclers and Importers-Resellers (2007) - 53 facilities





Estimation of Obsolete Computers in the Philippines

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Environmental Engineering Graduate Program

University of the Philippines





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1. E-waste Initiatives in the Philippines
 2. Drivers of Computer Usage
 3. Stock Estimate
 4. PC Obsolescence
 5. End-of-Life Analysis
 6. Present Management Schemes
 7. Conclusion





1. E-waste Initiatives in the Philippines

E-waste issues and measures in the Philippines

GL Peralta and PM Fontanos

- Coverage: TVs, refrigerators, air conditioners, washing machines, and radios

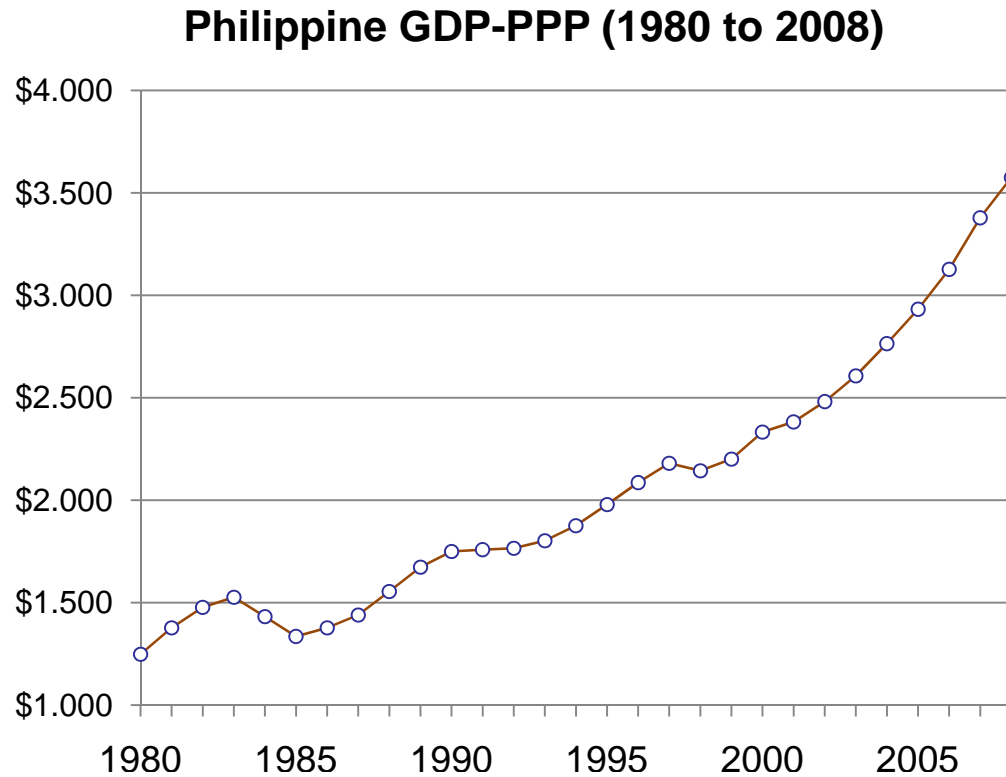
Republic Act No. 6969: Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990

Republic Act No. 9003: Ecological Solid Waste Management Act of 2000





2. Drivers of computer Usage

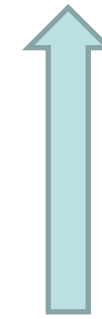


[http://www.indexmundi.com/philippines/gdp_per_capita_\(ppp\).html](http://www.indexmundi.com/philippines/gdp_per_capita_(ppp).html)

The Philippines IT Report 2008 (<http://www.businessmonitor.com/it/philippines.html>)

Information Technology Market

\$2.6B (2012)



\$1.46B (2007)





Business Process Outsourcing (BPO)



Contact Centers

Software development

Legal & medical transcription

Finance, logistics & accounting

Animation & engineering design

\$2.4B market

162,250 workforce

(2005)

\$3.6B market

244,000 workforce

(2006)





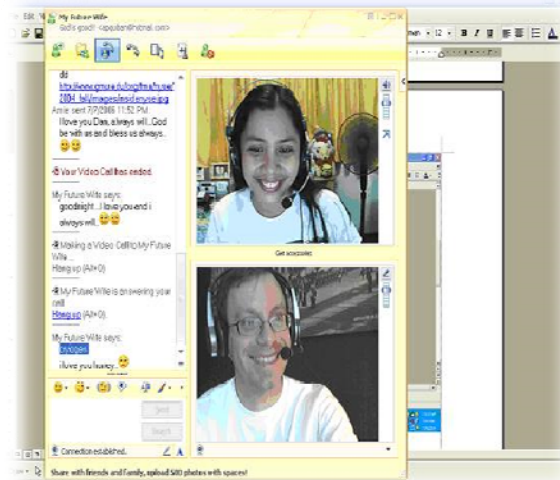
Philippine Computer/Internet Usage

Social Networking



Universal McCann (2008): Philippines, the social networking capital of the world.

Web Chat/ Voice Over Internet Protocol



Cheaper way to connect with family members/friends abroad

Internet Cafes



Lower cost: more available broadband/wireless connectivity and decreasing PC average selling prices





3. Stock Estimate

= Household + Business (Leigh, et al., 2005)

- Household

$$C_H = \sum_{i=1}^m \sum_{j=1}^n i \times OwnershipRate_{ij} \times HH_j$$

- Business

$$C_B = \sum_{i=1}^n BusiCompRate_i \times Emp_i$$





Household Estimation (C_H)

$$C_H = \sum_{i=1}^m \sum_{j=1}^n i \times Ownership_{ij} \times HH_j$$

C_H = total number of household computers in the country

i = number of computers in a household

j = household income level

HH_j = total number of households at income category j

$Ownership_{ij}$ = number of households at income category j that have i number of computer(s)





Family Income & Expenditure Survey (FIES) 2000

Income Decile (i)	Number of House holds	Number of HH with PCs					Number of PCs
		w/ 1 PC	w/ 2 PCs	w/ 3 PCs	w/ 4 PCs	w/ 5+ PCs	
1st	1,507,185	0	0	0	0	0	0
2nd	1,507,281	0	0	0	0	0	0
3rd	1,507,186	85	0	0	0	0	85
4th	1,507,373	172	0	0	0	0	172
5th	1,506,815	456	0	0	0	0	456
6th	1,507,254	2,649	0	0	0	0	2,649
7th	1,507,507	11,338	0	0	0	0	11,338
8th	1,507,032	25,649	0	0	0	0	25,649
9th	1,507,097	61,015	1,331	0	0	0	63,676
10th	1,507,210	314,191	12,513	8,379	0	0	364,355
Total	15,071,940	415,555	13,844	8,379	0	0	468,380





Household PCs from FIES 2000, 2003, 2006

Category (j)	Number of Households						
	2000	2001	2002	2003	2004	2005	2006
1	0	0	0	0	381	763	1,144
2	0	0	0	0	484	968	1,452
3	85	750	1,416	2,081	2,258	2,435	2,612
4	172	1,353	2,535	3,716	4,207	4,698	5,189
5	456	1,808	3,160	4,512	5,554	6,595	7,637
6	2,649	5,572	8,495	11,418	13,841	16,263	18,686
7	11,338	14,753	18,169	21,584	29,016	36,447	43,879
8	25,649	36,500	47,350	58,201	72,405	86,610	100,814
9	63,676	84,792	105,907	127,023	165,650	204,277	242,904
10	364,355	425,703	487,052	548,400	634,899	721,399	807,898
Total	468,380	571,232	674,084	776,936	928,696	1,080,455	1,232,215





Number of Household PCs

$$C_H = \sum_{i=1}^5 \sum_{j=1}^{10} i \times Ownership_{ij} \times HH_j$$

2000	2001	2002	2003	2004	2005	2006
468,380	571,232	674,084	776,936	928,696	1,080,455	1,232,215





Business PC Estimation (C_B)

$$C_B = \sum_{i=1}^n \text{BusiCompRate}_i \times \text{Emp}_i$$

C_B = total number of computers (business sector)

i = industry category

Emp_i = no. of employees in industry i /year

BusiCompRate_i = % of Employees that use computers in industry i





*BusiComp Rate_i **

INDUSTRY CLASSIFICATION (<i>i</i>)		% USE	<i>BusiComp Rate_i</i>		
1	Construction	0.83%	0.83%		
2	Manufacturing	20.92%	20.92%		
3	Agriculture	0.31%	0.63 %		
	Fishing	0.15%			
	Mining and Quarrying	0.17%			
4	Transportation, Storage And Communication	1.92%	10.78%		
	Telecommunication	8.50%			
	Motion Pictures, Radio, and TV Production	0.36%			
5	Wholesale and Retail Trade	4.50%	4.50%		
6	Financial Intermediation	14.49%	14.49%		
7	Real Estate, Renting and Business Activities	Real Estate, Renting and Business Activities	3.07%	6.67%	5.33%
		Computer & Related Services and Business Activities	3.60%		
8	Public Administration and Defense, Compulsory Social Security (NCC)		25.00%	25.00%	20.00%
9	Services	Electricity, Gas and Water Supply	2.32%	41.21%	32.96%
		Hotels and Restaurants	0.81%		
		Health and Social Work	1.11%		
		Education	36.54%		
		Other Community, Social & Personal Services	0.43%		
Total			125.03%		100.00%

* Survey of Information & Communications Technology (SICT) for Philippine Business Industry (2002) + Government Survey (National Computer Center)



Workshop 2009 of the Asian Network for Prevention of Illegal Transboundary Movement of Hazardous Waste
Kuala Lumpur, Malaysia, 20-22 January 2009



BusiComp Rate_i =

	INDUSTRY CLASSIFICATION (<i>i</i>)	<i>BusiComp Rate_i</i>
1	Construction	0.66%
2	Manufacturing	16.73%
3	Agriculture /Fishing/ Mining and Quarrying	0.50%
4	Transportation, Storage And Communication	8.62%
5	Wholesale and Retail Trade	3.60%
6	Financial Intermediation	11.59%
7	Real Estate, Renting and Business Activities	5.33%
8	Public Administration and Defense, Compulsory Social Security	20.00%
9	Services	32.96%





Emp_i *

INDUSTRY CLASSIFICATION (i)		NUMBER OF EMPLOYEES in '000 (<i>Emp_i</i>)						
		2000	2001	2002	2003	2004	2005	2006
1	Construction	1,550	1,585	1,596	1,683	1,700	1,708	1,677
2	Manufacturing	2,825	2,906	2,869	2,941	3,061	3,077	3,053
3	Agriculture, Fishing, Mining and Quarrying	11,029	10,953	11,235	11,324	11,499	11,751	11,821
4	Transportation, Storage and Communication	2,217	2,118	2,162	2,310	2,427	2,451	2,483
5	Wholesale and Retail Trade	5,544	5,255	5,613	5,601	5,872	6,147	6,202
6	Financial Intermediation	306	292	312	303	328	341	344
7	Real Estate, Renting and Business Activities	588	516	544	639	690	734	783
8	Public Administration & Defense, Compulsory Social Security	1,428	1,382	1,442	1,415	1,491	1,481	1,485
9	Services	2,999	2,928	2,974	3,020	3,059	3,105	3,174

* From Labor Force Survey, National Statistics Office





Number of Business PCs per Industry ($C_{B,i}$)

INDUSTRY CLASSIFICATION (i)		NUMBER OF COMPUTERS						
		2000	2001	2002	2003	2004	2005	2006
1	Construction	10,230	10,461	10,534	11,108	11,220	11,273	11,068
2	Manufacturing	472,623	486,174	479,984	492,029	512,105	514,782	510,767
3	Agriculture, Fishing, Mining and Quarrying	55,145	54,765	56,175	56,620	57,495	58,755	59,105
4	Transportation, Storage & Communication	191,105	182,572	186,364	199,122	209,207	211,276	214,035
5	Wholesale and Retail Trade	199,584	189,180	202,068	201,636	211,392	221,292	223,272
6	Financial Intermediation	35,465	33,843	36,161	35,118	38,015	39,522	39,870
7	Real Estate, Renting and Business Activities	31,340	27,503	28,995	34,059	36,777	39,122	41,734
8	Public Admin & Defense, Compulsory Social Security	285,600	276,400	288,400	283,000	298,200	296,200	297,000
9	Services	988,470	965,069	980,230	995,392	1,008,246	1,023,408	1,046,150
	Total	2,269,563	2,225,966	2,268,911	2,308,084	2,382,658	2,415,630	2,443,001





Number of Business PCs

$$C_B = \sum_{i=1}^n \text{BusiCompRate}_i \times \text{Emp}_i$$

2000	2001	2002	2003	2004	2005	2006
2,269,563	2,225,966	2,268,911	2,308,084	2,382,658	2,415,630	2,443,001





PC Stock Estimate in the Philippines

Category	2000	2001	2002	2003	2004	2005	2006
Household	468,380	571,232	674,084	776,936	928,696	1,080,455	1,232,215
Business	2,269,563	2,225,966	2,268,911	2,308,084	2,382,658	2,415,630	2,443,001
Total	2,737,943	2,797,198	2,942,995	3,085,020	3,311,354	3,496,085	3,675,216





4. PC Obsolescence

Year	2000	2001	2002	2003	2004	2005	2006
Stock	2,737,943	2,797,198	2,942,995	3,085,020	3,311,354	3,496,085	3,675,216
Sales	59,255	145,797	142,025	226,334	184,731	179,131	

Purchased Item (Sales) $\xrightarrow{+ 3 \text{ years}}$ Obsolete PC





5. End-of-Life Analysis

Assumptions:

Initial Lifespan	3 years
Years Reused	2 years
Years Stored	3 years

End of Life Model:

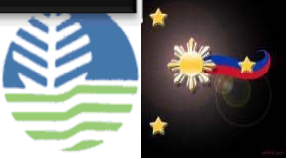
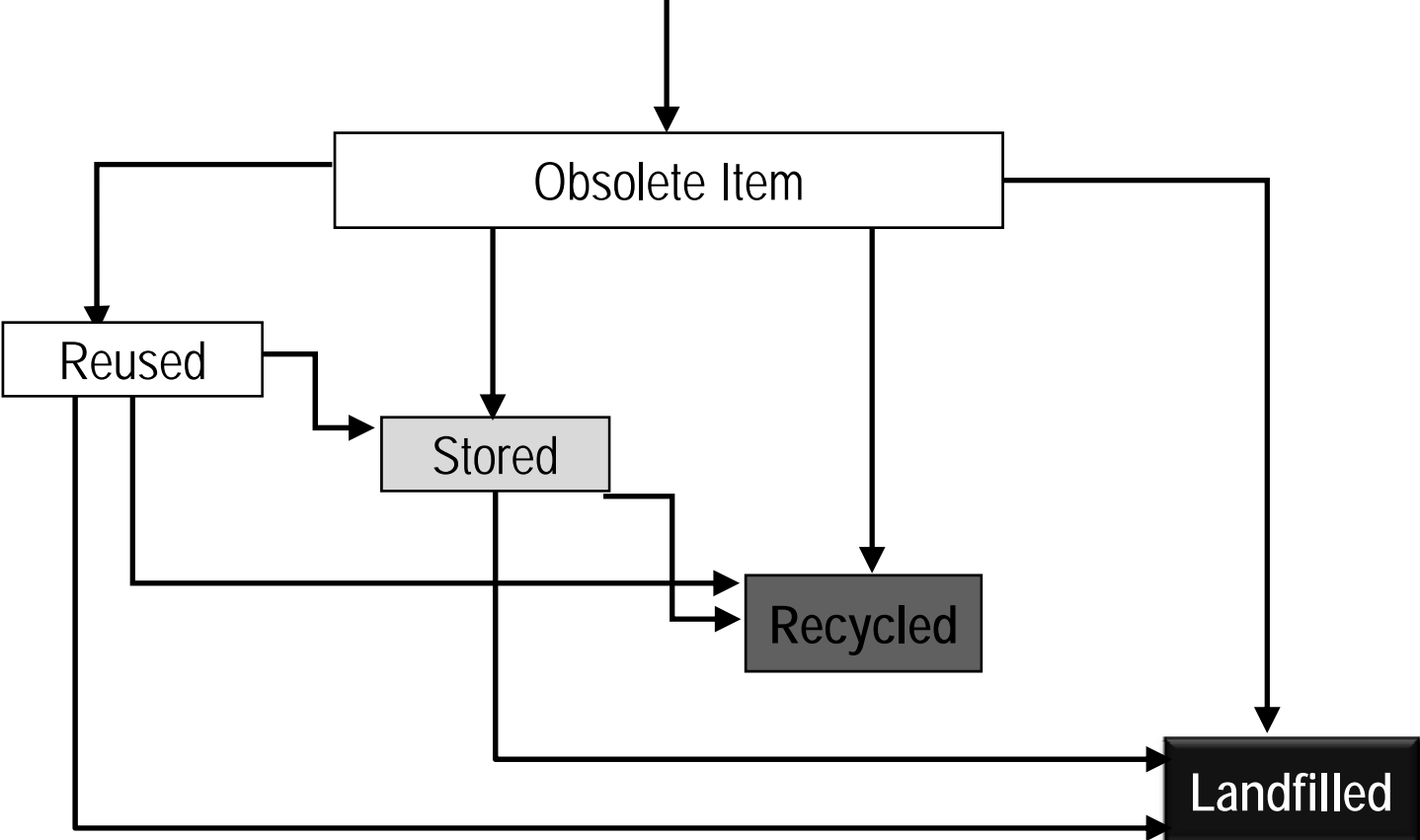
Peralta and Fontanos (2005)
Matthews, et al (1997)





End of Life Model

Purchased Item





Fate of Obsolete PCs

Year	Sales	Total per Year				
		Obsolete	Reused	Recycled	Stored	Landfilled
2000	59,255	-	-	-	-	-
2001	145,797	-	-	-	-	-
2002	142,025	-	-	-	-	-
2003	226,334	59,255	26,665	2,963	26,665	2,963
2004	184,731	145,797	65,609	7,290	65,609	7,290
2005	179,131	142,025	63,911	28,433	77,244	12,434
2006	206,569	226,334	101,850	63,804	134,655	24,438
2007	216,897	184,731	83,129	60,366	115,085	22,019
2008	227,742	179,131	80,609	97,103	131,534	35,993
2009	239,129	206,569	92,956	93,234	134,520	43,356
2010	251,085	216,897	97,604	91,310	137,908	42,944
Sum	2,078,695	1,360,739		444,501		191,438





Fate of Obsolete PCs from 2003 to 2010

444,501 units recycled

At 31.5 kg/unit, this is **14,000 tons** of waste waiting for materials recovery and job creation

191,438 units, or more than **6,000 tons** discarded to landfill the local government should try to avoid

By the end of 2008

131,534 units stored waiting either to be recycled or landfilled (or taken back by manufacturers)





6. Present Management Schemes

Computer Recycling in the Philippines:

- A number of unregistered informal small recycling businesses

- HMR Envirocycle
 - ✓ Certified TSD (treatment, storage, and disposal) facility by the Environmental Management Bureau
 - ✓ The first and only full-service environmental processor of electronic waste in the country.





HMR Envirocycle

5,000 m² facility in Santa Rosa, Laguna
(38 km south of Manila)
200 tons/month operating capacity



- E-waste De-manufacturing and Disposal
- Disassembling and stripping down to basic materials.
- CRTs cut and crushed into glass cullet.
- Metals sorted using a magnetic separator.
- System sealed and dust contained using HEPA filtration.

Projected recycled e-waste in 2008:

97,103 units/year

255 tons/month (vs. 200 tons/month capacity)

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Kuala Lumpur, Malaysia, 20-22 January 2009





7. Conclusion

- a) Capacity of local recycler (HMR Envirocycle) not enough for the projected E-waste coming from obsolete computers (other sources of E-waste not included)
- b) Present environmental laws (RA 6969 and RA 9003) need amendment to address current e-waste issues.
- c) More research on how to best implement 3Rs and toxic chemical use substitution (RoHS compliant).
- d) Strengthen campaign to increase consumer awareness and enjoin manufacturers to institutionalize responsible care program or take-back policy (market-based instrument, MBI).
- e) Need for **environmental health impact assessment** to estimate likely health impacts of E-waste and justify stringent policies and investment on recycling and treatment facilities.





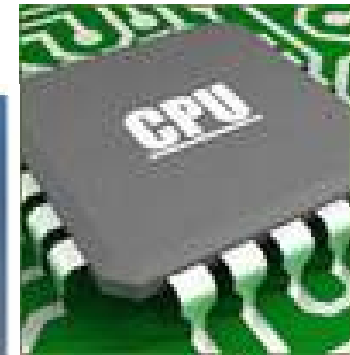
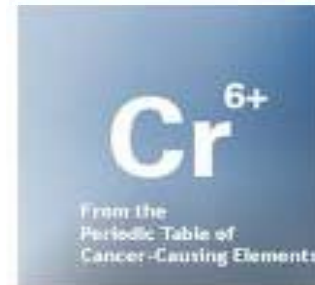
Environmental concerns related to recycling activities

Precious Metal Recovery from WEEE in the Philippines

(Cardenas, M.M.F., et.al., MOE-Japan & EX Corporation, Dec 2008-Feb 2009)

Chapter 5: Artisanal Gold Extraction from PCBs

- Gold Trade Flow
 - Sourcing, processing, and selling
- Gold Processing Stakeholder Profiles
 - Buy & sell shops; Scrapper/dismantler; Financier; Artisan chemists, smelters & refiners; extraction/smelting/refining facility
- Gold Extraction from PCBs
 - Scrapping & gold recovery; smelting & refining; **pollution & health concerns**; costs & profits from PCB-extracted Gold





Recycling Policies and Activities

Republic Act (RA) 9003 – Solid/Municipal Wastes

- Classification of E-wastes under Special Wastes
- Annual Recycling Events (Earth Day & Environment Month)

Republic Act (RA) 6969 – Hazardous Wastes

- Registration of hazardous E-waste generators
- Registration of E-waste importers & recyclers
- Registration of TSD (E-waste recycling) Facility





MARAMING SALAMAT PO!!!

