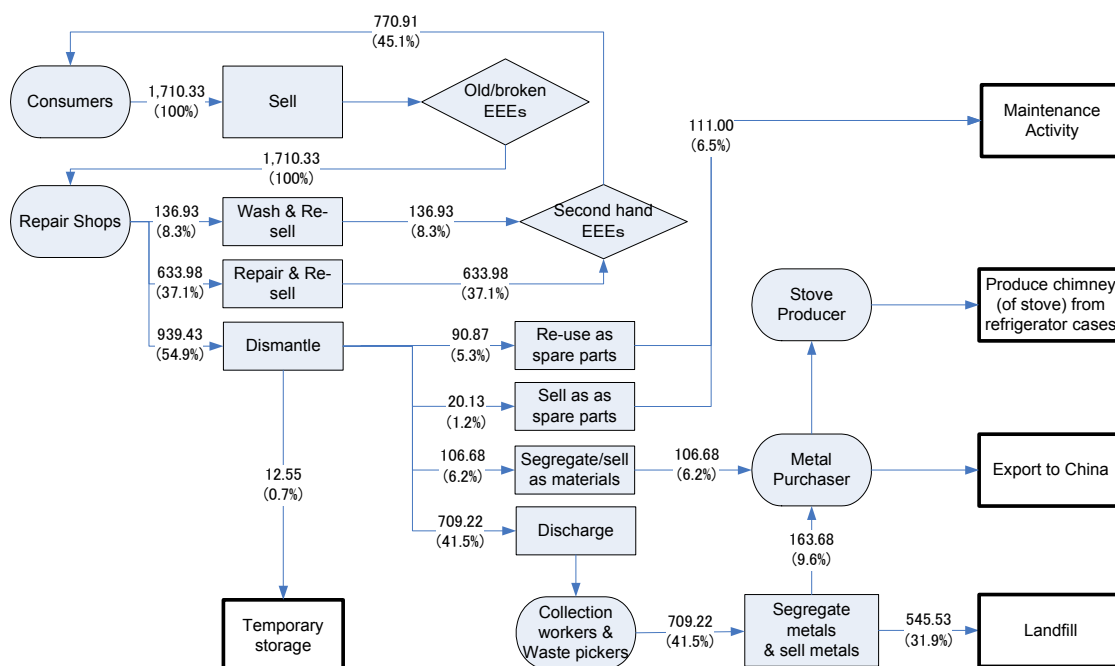


e. 「モ」国全体のWEEEリサイクルフロー

以上の分析に基づき、2009年におけるモンゴル国におけるWEEEのリサイクルフローを計算すると、以下の通りとなる。

表 A-10: 「モ」国における WEEE リサイクルフロー

#	Stages of WEEE Recycling Cycle	Measure unit	TV		PC		Refrigerator		Washing machine		Total WEEE	
			Weight	Share in the	Weight	Share in the	Weight	Share in the	Weight	Share in the	Weight	Share in the
1	Average unit weight of EEEs	ton	0.0175		0.0174		0.0404		#####			
2	Total amount of WEEEs	unit ton	18,467 322.25		60,589 100.0%		4,032 162.77		3,748 170.46		#####	100.0%
<i>Re-used amount:</i>												
3	Resell amount	unit ton	4,081 71.22		0 0.0%		1,417 57.19		187 8.52			
	Repair & resell amount	unit	8,264		17,311		1,816		2,530			
		ton	144.21	44.8%	301.39	28.6%	73.32	45.0%	115.06	67.5%	633.98	37.1%
Total re-used amount		unit ton	12,345 215.43		17,311 301.39		3,233 130.51		2,717 123.58			
4	Dismantled amount	unit ton	6,122 106.82		43,278 753.47		799 32.26		1,031 46.88			
<i>Recycled amount by repair shops:</i>												
5	Re-used as spare parts	ton	14.31	4.4%	61.43	5.8%	3.35	2.1%	11.79	6.9%	90.87	5.3%
	Sold as spare parts	ton	1.32	0.4%	17.55	1.7%	1.26	0.8%	0.00	0.0%	20.13	1.2%
	Segregated/sold as materials	ton	1.15	0.4%	77.75	7.4%	13.63	8.4%	14.16	8.3%	106.68	6.2%
	Total recycled by repair shops	ton	16.77	5.2%	156.73	14.9%	18.24	11.2%	25.94	15.2%	217.68	12.7%
6	Temporarily stored spare parts	ton	0.00	0.0%	12.55	1.2%	0.00	0.0%	0.00	0.0%	12.55	0.7%
7	Amount discharged by repair shops	ton	90.05	27.9%	584.21	55.4%	14.02	8.6%	20.93	12.3%	709.22	41.5%
8	Amount segregated by WP and CW	ton	3.38	1.0%	156.86	14.9%	1.09	0.7%	2.35	1.4%	163.68	9.6%
9	Landfill amount	ton	86.67	26.9%	427.35	40.5%	12.93	7.9%	18.58	10.9%	545.53	31.9%



従って、「モ」国におけるWEEEリサイクルフローは以下の通りとなる。

図 A-5: 「モ」国における WEEE のリサイクルフロー

以下製品毎にフローを示す。

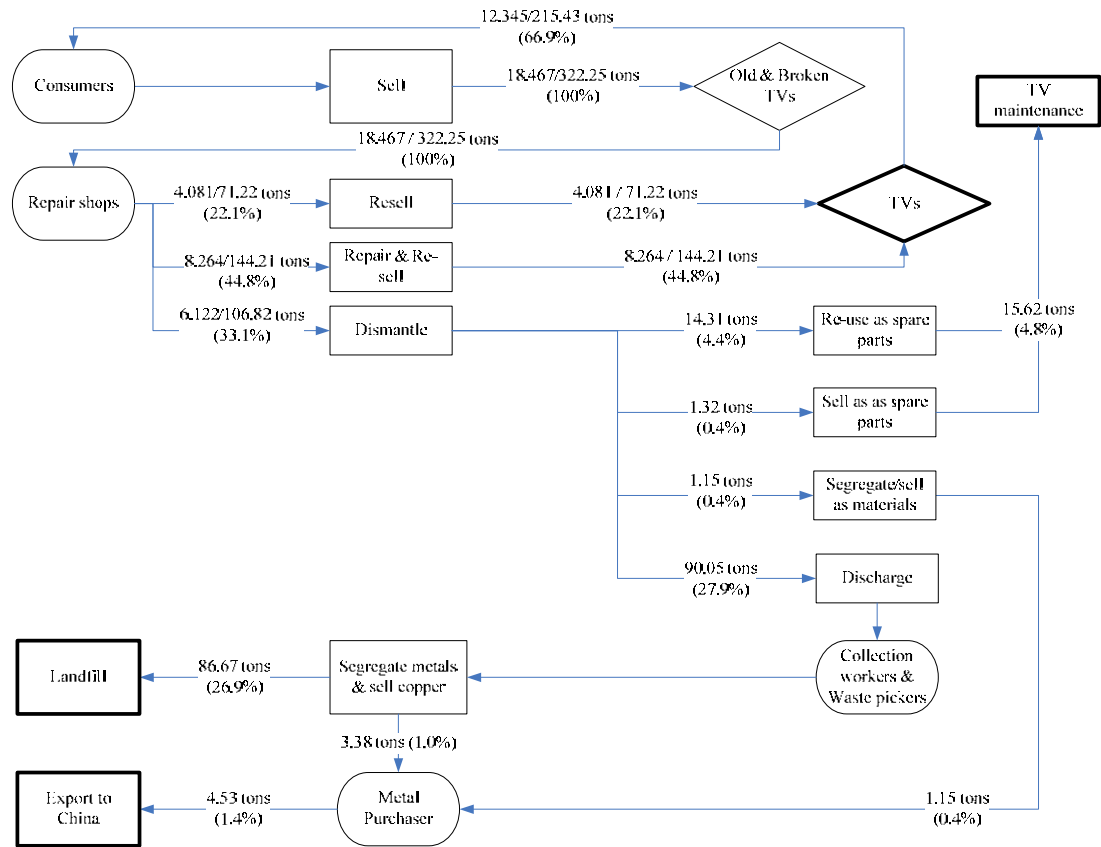


図 A-6: 「モ」国における TV のリサイクルフロー

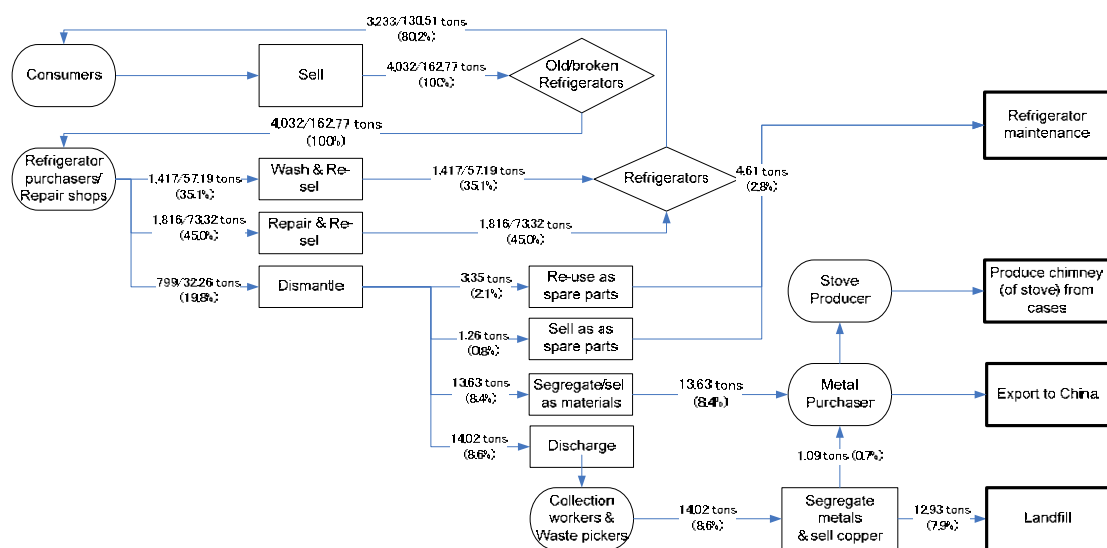


図 A-7: 「モ」国における冷蔵庫のリサイクルフロー

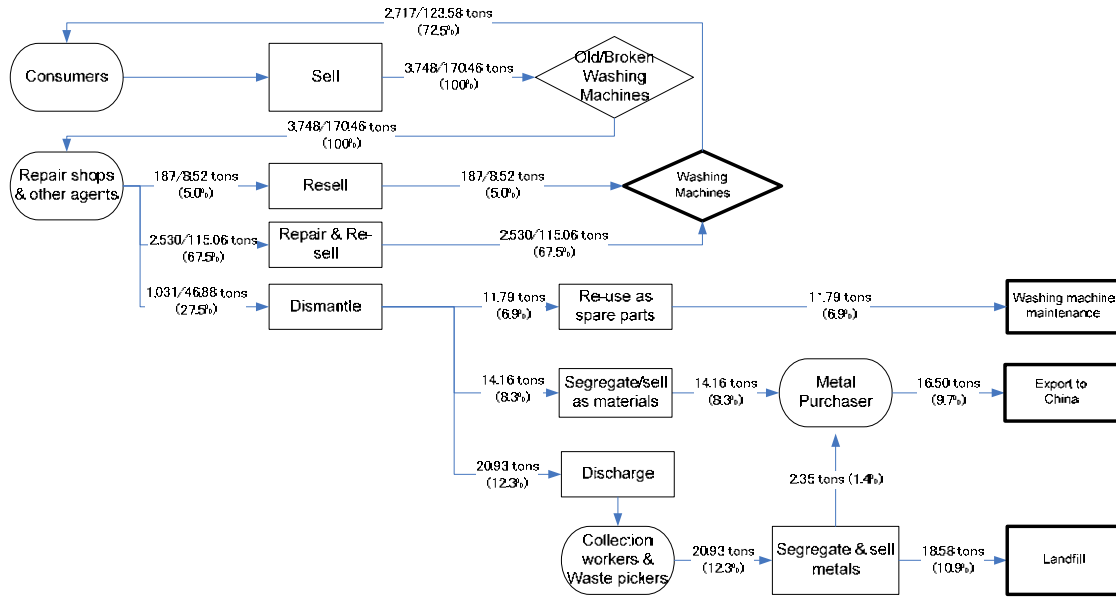


図 A-8: 「モ」国における洗濯機のリサイクルフロー

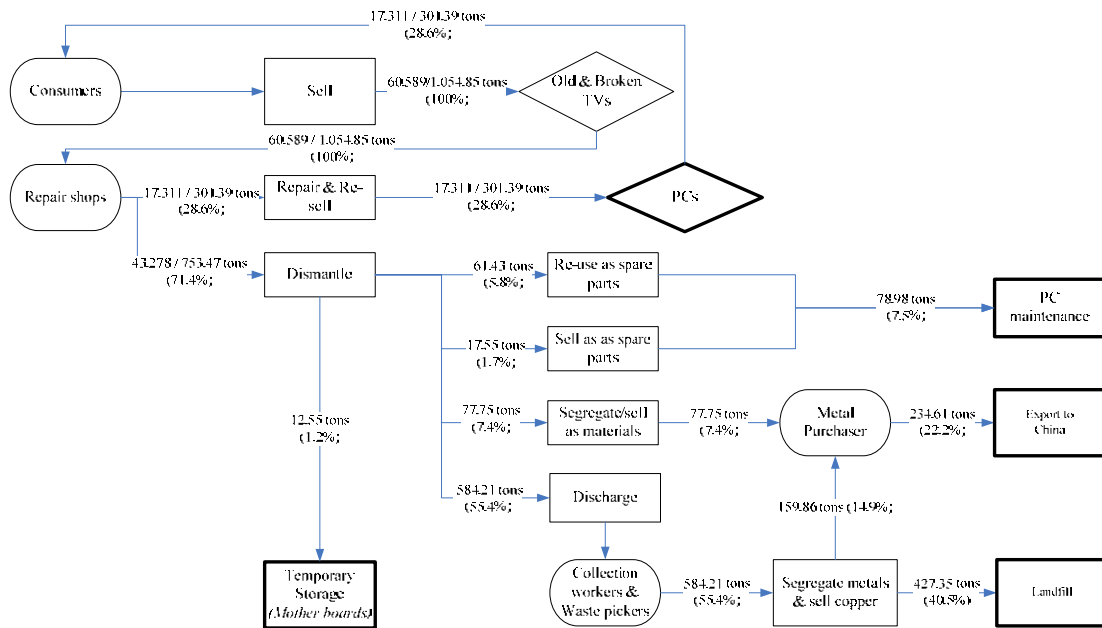


図 A-9: 「モ」国におけるパソコンのリサイクルフロー

f. 結論と勧告

f.1 結論

- 今回調査対象とした電気・電子製品は、テレビ、冷蔵庫、洗濯機、パソコンの4種類であるが、重量比平均で45%が再利用され、23%がリサイクル（スペアパーツとして保管されるものをふくむ）、32%が廃棄されていることが判明した。

- 製品によって異なるが、「モ」国においては一般的に再利用の割合は非常に高く、67%~80%となった。ただしパソコンについては再利用が29%という低い数字となったが、これは重量で半分以上を占めるCRTモニターが再利用が困難なためであると考えられる。
- リサイクル率は23%という結果であるが、これはPCのリサイクル率が31%と高く、これを除くと10%以下となる。またこのうち半分以上は金属の回収であり、部品としてリサイクルされるものはわずか(6.5%)であった。
- WEEEのうち重量比で32%、重量で525トンが廃棄されていることがわかったが、このうち大部分を占めるのが、TV及びPCのCRTモニターであると推定される。

表 A-11: 「モ」国における WEEE のフロー

#	Stages of WEEE Recycling Cycle	Measure unit	TV		PC		Refrigerator		Washing machine		Total WEEE	
			Weight	Share in the	Weight	Share in the	Weight	Share in the	Weight	Share in the	Weight	Share in the
1	Re-Used Amount	ton	215.43	66.9%	301.39	28.6%	130.51	80.2%	123.58	72.5%	770.91	45.1%
2	<i>Recycled amount by repair shops:</i>											
	Used for	ton	15.62	4.8%	78.98	7.5%	4.61	2.8%	11.79	6.9%	111.00	6.5%
	Segregated/sold as materials	ton	4.53	1.4%	234.61	22.2%	14.72	9.0%	16.50	9.7%	270.36	15.8%
	Total recycled parts	ton	20.15	6.3%	313.59	29.7%	19.33	11.9%	28.29	16.6%	381.37	22.3%
3	Temporarily stored spare parts	ton	0.00	0.0%	12.55	1.2%	0.00	0.0%	0.00	0.0%	12.55	0.7%
4	Landfill amount	ton	86.67	26.9%	427.35	40.5%	12.93	7.9%	18.58	10.9%	545.53	31.9%
	Total Amount	ton	322.25	100.0%	#####	100.0%	162.77	100.0%	170.46	100.0%	#####	100.0%

f.2 リサイクルショップが抱える問題

今回調査したリサイクルショップ（修理店）のうち、24の店が現在抱える問題について回答した。以下回答の多い順にならべると、

1. 安い金利の短期運転資金を借り入れるのが困難。（37.5%）
2. 金属類を除いて、分解した部品を購入先が限られている、もしくは「モ」国内に存在しない。（33.3%）
3. 売却額が減少傾向である。（12.5%）

「モ」国においては金利が高く¹、特にリサイクルショップなどの中小規模の商店においては、短期運転資金の調達が一番困難でありことがわかった。また「モ」国内には金属の精錬業を初め、製造業の数が非常に限られているため、リサイクルのために分解しても、購入相手が少なく、中国まで輸送費を使っても採算が合うもののみに対象が限られてしまう傾向が明らかになった。

f.3 勧告

¹ 2010年7月現在、市中銀行の中小規模の事業者に対する短期貸し付け金利は、1%~1.85%/月となっている。

1. 「モ」国におけるWEEEのリサイクルフローの特徴としては、リユースの割合が非常に高いことがある。市街地には多くの中古ショップがある。これらはWEEEの廃棄量を抑える上で、大きな役割を担っている。経済の発展と共にこの割合は下がっていくことが予想されるが、古いものを大事に直してつかう習慣は、先進国においても見直されてきており、今後も大事にしたい習慣である。

2. WEEEのうち32%が処分場に廃棄されていると推定されるが、そのうち大部分はTVやPCのCRTであることがわかった。CRTは水銀をふくむため、その処分においては、周辺の環境に悪影響を与えないように十分に気をつける必要がある。水銀の回収には精錬業などのリサイクル産業を育てる必要があり時間を要するため、短期的には水銀など有害金属が溶出しないように保管し、有害廃棄物専用の処分場などの建設を推進することを推奨する。

3. 「モ」国においては、今回の対象となる電気・電子製品を製造する工場はなく、全てを輸入にたよっている。従って出来るだけ有害金属をふくまない製品の輸入を奨励する必要がある。しかしこれらの政令・省令・条例の制定にあたっては、輸入品単価の上昇を招く危険性があるため、国民の同意を得ながら、段階的に実行していくことを推奨する。

4. 「モ」国においてWEEEのリサイクルは、小さな規模の修理店がその大きな役割を担っている。これらの店は、短期運転資金の確保に大きな問題を抱えている。従ってリサイクルをより推進するには、これらの店に対して有利な貸付金利を適用するなどの、振興策が必要となる。またこれらの店をリサイクル業として登録制度を整備し、リサイクル量の把握と、不法投棄の防止につとめることを推奨する。

A.3.2 有害廃棄物セミナー

2010年11月3日に、環境省、保健省、各区PSD長官などを招いて、有害廃棄物に関するセミナーを開催した。セミナーでは、保健省が医療有害廃棄物に関する現状と将来の計画、環境省は有害産業廃棄物に関する現状と計画、JETが日本及び「ウ」市における家庭から出る有害廃棄物について、EPWMDが第1年次に実施した廃家電に関する現状と計画について、それぞれ説明した。セミナーに関する資料などは下記の通り。



a. Agenda

a.1 Background and Objectives

a.1.1 Background

Environmental Pollution and Waste Management Department of Mayor's office of Municipality of Ulaanbaatar is responsible for all kind of environmental pollution and waste management in Ulaanbaatar City.

JICA is implementing the project called "Strengthening the Capacity for SWM in Ulaanbaatar City Mongolia" from September 2009 till August 2012. One of the expected outcomes from the project is to strengthen the capacity of EMPWMD for policy making and planning for solid waste management.

Under such circumstances, Municipality of Ulaanbaatar will organize seminar on hazardous waste in Ulaanbaatar City to discuss current situation and future planning among relevant authorities under assistance of JICA Project Team.

Although hazardous waste is not included as a target waste in JICA technical cooperation project, some of Japanese experience might be contributed to establish an environmental friendly city through environmentally sound SWM system which is the fundamental goal of the Master Plan for SWM in MUB.

a.1.2 Objective

The objectives of the seminar are:

- To share the information among relevant authorities about current situation and future planning on hazardous waste management in UBC
- To introduce Japanese experience on hazardous waste management especially on household waste
- Discussion among Authorities concerned.

a.2 Outline of the Seminar

a.2.1 Date and Venue

Date: November 3rd (Wed), 2010

Place: Ulaanbaatar Hotel 6th Floor, Hall “Urguu”

a.2.2 Participants

Upon consideration of the objective of the seminar, the participants will be invited from the following organizations:

EPWMD

Ministry of Finance

Ministry of Nature Environment and Tourism

Ministry of Health

Ministry of Food, Agriculture and Light Industry

Ministry of Mineral Resources and Energy

National Emergency Management Agency

City Emergency Management Agency

Administration of Land Affairs, Construction, Geodesy and Cartography

City Development Policy Department of Governor’s Office

Capital City’s Inspection Agency

Representatives of district PSD

a.2.3 Seminar Program

The seminar program is shown in the table below.

Chairperson: Director of EPWMD/Project manager

Topic	Expositor	Time
Opening Address by Mongolian Side	MUB	9:00 - 9:10
1 Current Situation and Future Planning for medical waste management in Mongolia	MOH	9:10 - 9:40

2. Current Situation and Future Planning for hazardous waste management in Mongolia	MONET	9:40 -10:10
Tea Break		10:10 - 10:30
3. Household Hazardous Waste Management	JICA Expert Team	10:30 – 11:10
4. Current Situation and Future Planning for e-Waste in UBC	EPMWD/MUB	11:10 – 11:30
5. Question and Comment	Participants	11:30 – 12:10
6. Closing Speech	Director of EPWMD	12:10 – 12:20

b. List of Attendants

#	Organization/Position	Attendants
1	PSD of SKhD, director	Mr. Baasansuren. O
2	PSD of SBD, director	Mr. Batdelger. B
3	PSD of ChD, director	Ms. Bulgan. D
4	PSD of BGD, director	Amarbayasgalan
5	PSD of BZD, director	Ganchudur
6	PSD of KhD, director	Mr. Begz
7	Agency of Land, construction, geodesy and cartography	Ms. Khangaisaikhan. N
8	Municipal Specialized Inspection Agency	Ms. Badamkhand
9	General Emergency Agency	
10	Governor's Office	Mr. Itgelt
11	Ministry of Health	Ms. Tsetsegsaikhan
12	Ministry of Nature, Environment and Tourism	Ms. Jargalsaikhan
13	Municipal Emergency Department	Ms. Ganchimeg
14	Element Co., Ltd, director	Mr. Bayarsaikhan
15	South gobi Co., Ltd, specialist of environment	Ms. Enkhbayasgalan

c. Presentation Materials

c.1 PROGRAM 1: Current Situation and Future Planning for medical waste management in Mongolia by MOH

2010.11.03

Activities of the Ministry of Health to improve Health Care Waste Management

B. Tsetsegsaikhan (Ph.D.)
Office of the Public Health Policy Implementation Coordination Department,
Ministry of Health

RISKS FROM HEALTHCARE WASTE

The main risks associated with Healthcare wastes are:

- Physical risks
- Chemical risks
- Microbiological risks
- Radiological risks
- Environmental risks



RISKS From Healthcare Waste

The WHO has estimated that unsafe waste practices (including unsafe transport practices) caused:

- 21 million hepatitis B virus (HBV) infections (32% of all new infections);
- 2 million hepatitis C virus (HCV) infections (40% of all new infections);
- 260 000 HIV infections (5% of all new infections).



HEALTHCARE WASTE: WHO'S AT RISK?

- People within a Healthcare Facility
- Nurses, physicians and hospital maintenance staff
- Patients
- Visitors
- Workers in support services e.g. laundries, waste handling & transportation



HEALTHCARE WASTE: WHO'S AT RISK? II

- People outside Healthcare Facilities
- Local population
- Waste carrier
- Workers in waste disposal facilities, e.g. landfills or incinerators
- Waste pickers



Health Care Waste Management

- The safe collection, transportation and treatment of all different kind of hazardous Health Care Waste (HCW)
- Tracing and control of these waste streams
- Environmentally correct management & treatment of hazardous HCW:
 - Infectious waste (about 60-70%)
 - Chemical waste (about 20-25%)
 - Pathological waste (about 5-10%)
 - Other hazardous waste (< 5%)
- Final disposal of the treated waste, including generated by-products
- Consideration of environmental aspects
- Consideration of economical aspects

Copyright © Healthcare Waste (HCW)

1

Legal aspects of the Health care waste management

Relevant Laws on Health Care Waste Management

1. The Law on Household and Industrial Waste, 2003
2. Environmental protection law, 1995
3. The Law on the import, export and crossborder transport of hazardous wastes, 2000
4. Law on chemicals, 2006
5. Environment Impact Assessment Law, 1996
6. Hygiene Law,
7. Law on protection and security of radio activity , 2009
8. Law on Air , 2010
9. Law on Air payment, 2010

Relevant Guideline, policies

National Programme for Waste reducing, 1999 (under revision)

- The document defines the policies, activities, ways to reduce the amount of waste based on the Basel convention principles, law on environment protection

National Programme on "Environmental Health", 2003

- The document defines the policies, activities, ways to establish safe, healthy environment for people

Relevant Guideline, policies

Government Resolution 2001, # 61
The state policy on Public Health

Health Sector Master Plan
Strategy II
Improve the health care, public service and disposal of the... revised design, 2008-2015

Measures for strengthening waste management - Government Resolution 2008

Regulations for the Removal and Disposal of Hazardous Wastes - Government Decision 2005

Guidelines

Guidelines on classification, collection, storage, transportation and disposal of health care waste (HCW), 2007 (last revision) code: 2007/011, June 2007

Regulation on storage, transportation, usage of the clinical waste, 2008 (last revision) code: 2008/010, July 2008

Regulation on storage, usage, public transport, transportation, usage of the used and disposable waste, 2009 (last revision) code: 2009/010, June 2009

Regulation on the safe assessment of the toxic, infectious diseases, 2009 (last revision) code: 2009/010, June 2009

Regulation of the common methods, standards, specifications and regulations for the assessment, usage of the medicines, chemicals, insecticides and disinfectants (M.V.C.T. Med. W.C. Staff) last update - revised

Minister of Health's Orders

Health care waste management strategy, plan of action for 2005 - 2013 (environmentally friendly, non-burning technology)

Minister of Health's Order, September 2009, # 203

Calculation methodology for wastes generated from hospitals (based on number of beds)

Minister of Health's Order, 2010, # 73

2

Activities to improve the HCWM

Research, survey

- Baseline survey to assess the structure and amount of HCW - 2005
- Assessment of the same level hospitals current situation by questionnaire - 2006
- Assessment of the HCW situation of the national and provincial level - 2006 - 2007

Research, survey

2009 - 2010

- Assessment of the needle stick injury and prevalence of Hepatitis B.C. among medical workers
- Baseline survey of the awareness containing status of the health sector

Meeting, seminars

- "Improvement of HCWM" WHO Regional Intersectoral Meeting Ulaanbaatar, May, 2006
- AN local meetings, 2006-2010
- "Improvement of HCWM" seminar - Darkhan-Uul, 2008-2010 on
- "Improvement of HCWM" seminar - Dornod, 2008-2010 on
- "Improvement of HCWM" seminar - Dornod, 2010 on
- India Grant National Clean University Diseases Training on HCWM for 6 counties
- HCWM 3 day training, WHO Consultant, October 2010

HCW Centralized Treatment Facility

1. UB city CTF
2. Agreement for cooperation and leasing of the equipment with Element Co., Ltd
3. Darkhan-Uul, Dornod among HCW CTF
4. Tuv aimag Erdena aimag pilot project for HCWM at town level

3

Further activities to improve the HCWM

Sample Strategy

Further steps

- Revision of the Joint Ministers Order on Guidelines for classification, collection, storage, transportation and disposal of medical waste
- Approval of the equipments, their technical specifications for the second ITCOM
- Revision of the Calculation methodology (based on the number of treated patients)
- Hospital waste management service

Further steps

- Develop training materials for all level health workers, organized business course and trainings
- Organize further Ghazal National Open University distance training on ITCOM
- Develop ITCOM handbook on ITCOM

Further steps

- PNM project in Ulaanbaatar on change management
- Improvement of CTCs
- PNM project on Airing level treatment facility, Dava Khivd always
- PNM project with photo-biosorb

Thank you for your attention

Our cooperation is most valuable

c.2 PROGRAM 2: Current Situation and Future Planning for hazardous waste management in Mongolia by MONET

<h3 style="text-align: center;">Government measures and its results on elimination and disposal of hazardous waste</h3> <p style="text-align: center;">Ph.D.L. Jargalsaikhan, Head of Working Group of National Council on Chemical Toxic and Hazardous Substances</p>	<h3 style="text-align: center;">Legal Environment</h3> <ul style="list-style-type: none"> • Law on Environment Protection, 1995 • Law on Household and Industrial Waste, 2003 • Law on Importation, Trans-border Transportation Prohibition and Exportation of Hazardous Waste, 2000 • Law on Chemical Toxic and Hazardous Substances, 1995 (2006) • Criminal Code, Article 23, 2002 • Law on Air, 1995 • Law on Radiation Protection and Security, 2001 • Law on Air Fee, 2010 <p>Draft Law</p> <ul style="list-style-type: none"> • Law on Environment Pollution Payment 	<h3 style="text-align: center;">Legal Environment</h3> <ul style="list-style-type: none"> • Basel Convention on Control of Trans-boundary Movements of Hazardous Wastes and their Disposal <ul style="list-style-type: none"> • Ratified by the Parliament of Mongolia on 5 December 1996 • Joined as a Party to the Convention on 14 May 1997 • National Focal Point: MONET • Stockholm Convention on Persistent Organic Pollutants <ul style="list-style-type: none"> • Ratified by the Parliament of Mongolia on 7 November 2003 • Joined as a Party to the Convention on 20 April 2004 • First project was implemented, first time inventory for POPs was conducted, and National Program prepared in 2003-2005
<h3 style="text-align: center;">Legal Environment</h3> <ul style="list-style-type: none"> • Waste Reduction Program /1999-2010/, Government Resolution No.50, 1999 <ul style="list-style-type: none"> • Revision of the Program is underway, 2010 • National Program on Persistent Organic Pollutants /Government Resolution No.99, 3 May 2006/ 	<h3 style="text-align: center;">Legal Environment</h3> <ul style="list-style-type: none"> • Regulation on Separation, Collection, Packaging, Temporary Location, Detoxification, Storage and Disposal, Government Resolution No. 135, 2002 • Regulation on waste disposal and special treatment facilities, categories and requirements of disposal sites, and activities of individuals, companies and organizations engaged in waste disposal operations, Ministerial Ordinance No.404, MONET • Classification and Grading of Hazardous Waste, Ministerial Ordinance No.324/318/336, MONET, MOH and MOECS • Regulation on Certification of Hazardous Waste, Government Resolution No.258, 2006 • Regulation on State Inventory and Reporting of Waste, Ministerial Ordinance No.21, 27 January 2009 • Methodology to Set Waste Standards, Government Regulation No.8, 2007 • Methodology to Set Waste Fees, Government Regulation No.8, 2007 	<h3 style="text-align: center;">Studies on Waste</h3> <ul style="list-style-type: none"> • Study on Solid Waste Management Master Plan in Ulaanbaatar, Mongolia 2004-2020, JICA • Study on Medical Waste in Ulaanbaatar, MOH and WHO, 2005 • Preliminary Inventory of Persistent Organic Pollutants, MONET and UNIDO, 2004-2005 • Report on Results of State Inspection on Activities by Individuals and Companies that Use Chemical Substance, MONET, 2007, 2008 • Preliminary Inventory of Hazardous Waste, MONET, 2004-2005

Results of Preliminary Inventory of Hazardous Waste

Waste treatment method	Amount of hazardous waste
1. Incineration	7,994 ton/year
2. Reuse	1,354 ton/year
3. Disposal	998 ton/year
4. Treatment	455 ton/year
Total hazardous waste	10,801 ton/year

Measures

Drafting of methodology to establish human health and environment friendly disposal site and sample design drawings (Geo Ecology Institute, Academy of Sciences)

- Arkhangai
- Dornod
- Zavkhan
- Uvurkhangai
- Tuv
- Uvs
- Khovd
- Khovsgul
- Darkhan-Uul

2010
+4

Measures

- Solid Waste Master Plan (WB, NEMO-2 Project)
 - Khovd
 - Zavkhan
- 2010:
 - Other aims

Feasibility Study and Basic Design of Hazardous Waste Disposal Facility

Annual capacity of hazardous waste treatment facility

- Incineration section
 - Incinerate 10,000 ton annually, and manufacture 200-250 kWt electricity power
- Physical and chemical treatment section
 - Physical and chemical treatment of 1,000 ton of waste
- Solidification and reinforcement section
 - 1,480 ton
- Landfill
 - Annual capacity is 3,030 ton. Lifetime is 10-12 years with 40,000m³ capacity
- Medical waste treatment section (disinfection)
 - 1,000 ton
- Waste recycling
 - 1,350 ton
- Storage
 - 8,000 ton
- Laboratory

Proposed locations

- Narangiin Enger
- Morin Davaa
- Buurlin Davaa

Landfill of waste contaminated with chemical pollutants

197,687 ton of sludge accumulated in 230 sites of 370 soums of 9 aimags has been detoxified (stabilization) and landfilled, and 128,444m² area is cleaned

Elimination of poly chloride biphenyl containing waste

- Program on POPs
 - Stop the usage of equipment containing poly chloride biphenyl, and eliminate it by environmentally sound manner by 2020
- 2008-2012 Mongolia Government Action Plan
 - "Strengthening the capacity of reduction and monitoring of equipment waste containing poly chloride biphenyl" within the framework of the objective "to ensure environmental balance"
- "Capacity Building for Environmentally Sound PCBs Management and Disposal", UNIDO, 2009-2012
 - State Inventory of PCBs containing equipment
 - Laboratory
 - Cleaning technology

Current issues

- Legal regulation on hazardous waste is insufficient
 - Laws and regulations are not sufficient
 - Not sufficient and not harmonized with each other
 - Insufficient implementation of laws and regulations (conditions for implementation of laws and regulations have not established yet)
- Appropriate system for hazardous waste management is not established
 - No collection and separation system of hazardous waste
 - No special facilities for elimination, storage and disposal of hazardous waste
- Hazardous waste is accumulated in large amount and stored in not appropriate facilities
 - Expired chemical substances, pesticides and their packages (10.2 ton of arsenic peroxide in former glass factory in Nalsakh District)
 - Waste discharged from factories that use chemicals (waste containing chromium generated from leather factories)
 - Sludge generated from industries and waste water treatment facilities
- Environment degradation due to unregulated disposal of hazardous waste
 - Petroleum products waste, used oil
 - Batteries
 - Electronic parts, printers and their cartridges
 - Ash and filter oil
 - Construction material, paint, lacquer, asbestos
 - Packages of chemical substance and etc.
- Waste incineration facilities do not meet requirements (medical waste incineration stove)

Future measures

- Improve legal environment on hazardous waste
- Improve waste management
- Establish hazardous waste elimination, storage and disposal facility

Thank you for your attention

c.3 PROGRAM 3: Household Hazardous Waste Management by JET



Household Hazardous Waste Management

November 3, 2010
JICA Expert Team for
Strengthen the Capacity for
SWM in Ulaanbaatar City
Mongolia
Susumu SHIMURA



Outline of the Lecture

- A) Household Hazardous Waste (HHW)
- B) HHWM in Japan
- C) HHWM in Ulaanbaatar City



A) Household Hazardous Waste (HHW)

- 1. What is Hazardous Waste (HW)?
- 2. What is Household Hazardous Waste (HHW)?



1. What is Hazardous Waste (HW)? (1)

- Law of Mongolia on Household and Industrial Waste defines hazardous waste (HW) as follows:
“*hazardous waste*” shall mean waste containing explosive, toxic, flammable, infectious, or actively reactive substances harmful to humans, livestock, animals or plants, and having potentially adverse impacts on progeny of humans, livestock, animals or plants, and disrupting environmental balance;



1. What is HW? (2)

- There is no specific categorization for HW by laws and regulation.
- HW may be categorized by the generation sources as follows:
 - 1. Industrial (Factory) HW
 - 2. Medical HW
 - 3. Household (Municipal) HW
 - 4. Construction HW
 - 5. Agricultural HW



1. What is Household Hazardous Waste (HHW)?(1)

- EPWMD of MUB has drafted “Regulation for Waste Separation” which defines HHW as follows:
 - Household hazardous waste is waste that poses substantial or potential threat to public health or the environment which is generated from residential households. Household hazardous waste includes the followings => See next screen

1. What is Household Hazardous Waste (HHW)?(2)

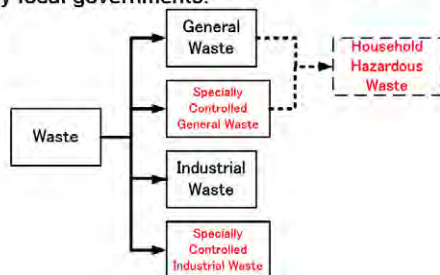
1. Paint and solvent
2. Automotive wastes (Used motor oil, antifreeze, tyre)
3. Pesticides
4. Mercury containing wastes (thermometers, switches, fluorescent lightings)
5. Electronics (PC, TV, cell phones) => WEEE
6. Aerosols (propane cylinders)
7. Caustics (cleaning agent)
8. Refrigerant containing appliances
9. Some special batteries (lithium, nickel cadmium, button cell batteries)
10. Ammunition
11. Radioactive waste (smoke detector)

B) HHWM in Japan

1. Waste Categorization in Japan
2. HHWM in Japan
3. HHWM in Ome City
4. HHWM in USA

1. Waste Categorization in Japan

- There is no specific categorization for HHW by law in Japan.
- HHW is included both categories of general waste and specially controlled general waste and managed by local governments.



2. HHWM in Japan

- Since there is no specific law on HHW except specially controlled general waste, *each local government (LG) manages it by their own regulation.*
- Generally some of HHW are managed by LG and some are subject to the management of dischargers.
- The reasons for the above-management may be:
 1. Discharge amount of HHW is very little. => 0.16% of MSW in Ome City
 2. There are so many kinds of HHW.
 3. Proper disposal of them differs each other.
 4. Proper disposal of HHW needs considerable cost.

3. HHWM in Ome City (1)

- Population: 140,000, Area: 103.3 km²
- General Waste Collection Amount: **A = 44,106 ton/year**
- HHW Collection Amount: **B = 71 ton/year**
- $A/B \times 100 = 0.16 \%$
- **HHW to be collected by the City:** Dry-cell battery, fluorescent lamp, containers for flammables, etc.
- **HHW to be managed by the Discharger:** WEEE, Tyre, Car battery, Solvents, Waste oil, Chemicals, Paint, etc.

3. HHWM in Ome City (2): Location of Two Landfills in Tokyo



3. HHWM in Ome City (3): Offshore Landfill for 23 Wards of Tokyo (1): Bird's Eye View



3. HHWM in Ome City (4): Offshore Landfill for 23 Wards of Tokyo (2)



平成13年の写真
新海田処分場の建設工事が始まっている。(黄の部分)
電線トンネルと架け橋が延長トンネルがつながる。平成14年4月開通(黄の部分)

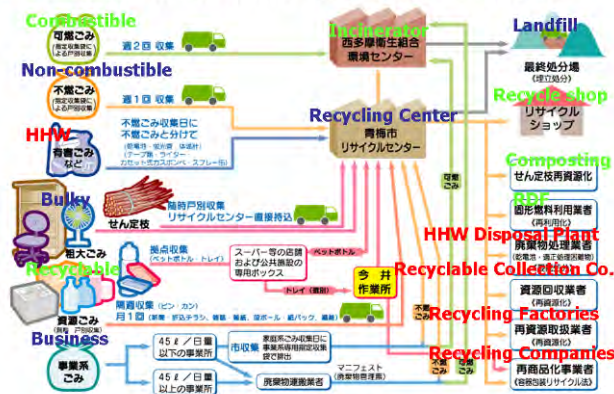
3. HHWM in Ome City (5): Inland Landfill for 26 Municipalities of Tokyo (1)



3. HHWM in Ome City (6): Inland Landfill for 26 Municipalities of Tokyo (2)



3. HHWM in Ome City (7): MSWM



3. HHWM in Ome City (8)



Fluorescent lamp containing mercury crushed and sent to previous mercury mining factory in Hokkaido



Dry-cell battery sent to Hokkaido

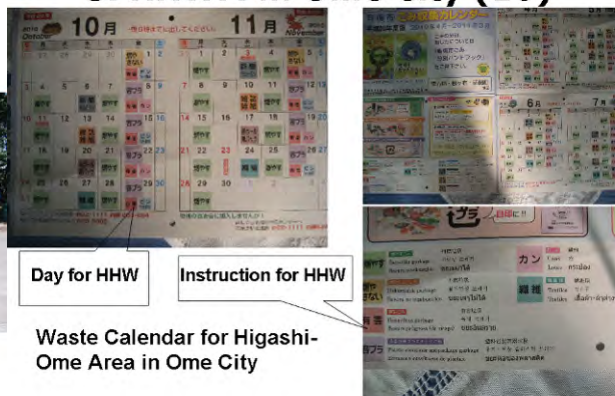
jica 3. HHWM in Ome City (9)



Container for Aerosols sent to metal or plastic recycling after gas release

HHW for Shipping

jica 3. HHWM in Ome City (10)



Day for HHW

Instruction for HHW

Waste Calendar for Higashi-Ome Area in Ome City

jica 3. HHWM in USA (1)

- Environmental Protection Agency (EPA) of USA defines HHW in its web-site as follows:
"Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "HHW." Products, such as paints, cleaners, oils, batteries, and pesticides, that contain potentially hazardous ingredients require special care when you dispose of them. "
- EPA issues several publications on HHW to promote 3R and proper disposal of it.
- HHWM: A Manual for One-day Community Collection Programs provides a useful information for HHWM by local governments.

jica 3. HHWM in USA (2)

- According to the Manual, the average US household generates more than 20 pounds (9 kg) of HHW per year.
- The local government (LG) provides collection sites for HHW.
- The discharger (residents) of HHW shall be requested to store it in its compound and bring it to a collection site. Then discharges it according to the category of HHW.
- Manufactures and distributors of household products, which becomes HHW, shall collect and recycle or treat it.

jica C) HHWM in Ulaanbaatar City (UBC)

1. Hazardous Waste Management Study
2. HHWM in UBC
3. Recommendations

jica 1. Hazardous Waste Management (HWM) Study

- "The Feasibility Study of the Hazardous Waste Management Facility in Mongolia" (HWM Study) was completed in June 2009.
- The HWM Study reported the following HW generation in UBC:
 1. Total HW: 10,801 ton/year
 2. Hazardous medical waste: 284.7 ton/year
 3. HHW: 58.4 ton/year (Note: 0.02 % of all MSW generation amount of 292,000 ton/year in 2010. 0.02 % is in the "Waste Characterization Study, UB Mongolia 2002 by WHO/MOH/city Inspectorate")

2. HHWM in UBC (1)

- HHWM has been not been established in UBC.
- EPWMD of MUB has drafted “Regulation for Waste Separation” which defines HHW.
- Most of HHW, which are not reused or recycled, are collected and disposed of at municipal landfill.
- Generation of HHW other than WEEE may be 0.16 ton/day (58.4 ton/year) by WHO rate of 0.02% to 1.28 ton/day (467.2 ton/year) by Ome City rate of 0.16%.

2. HHWM in UBC (2)

- Generation of WEEE in the country is 1,710 ton/year.
- It of UBC may be more than half of the 1,710 ton/year, i.e. 860 ton/year.

3. Recommendations (1)

- Proper hazardous waste management (HWM) is the highest prioritized issue.
- However, in terms of risks both quality and quantity of HHW is much less than other kind of HW such as industrial and medical HW.
- The priority of establishment of proper HWM shall be given to industrial and medical HW at this moment.
- The following aspects shall be considered for planning of proper management of HHW:
 1. There are so many kinds of HHW.
 2. Proper disposal of them differs each other.
 3. Proper disposal of HHW needs considerable cost.

3. Recommendations (2)

- The priority of establishment of proper HHWM shall be given to higher risk ones, such as mercury containing waste, pesticides, etc.
- MUB may provide collection and storing sites for HHW. So that people will bring their HHW there.
- If proper treatment and recycling of those HHWM may not be possible, it should be stored until HW disposal facility will be operated.



**Thank you very much for your
attention!!!
Clean your City!!**

c.4 PROGRAM 4: Current Situation and Future Planning for e-Waste in UBC by EPMWD/MUB

Program 4: Current Situation and Future Planning of WEEE management in Mongolia

EPWMD of MUB
Ms. Chantsalnurmaa

Agenda

1. Outline of the Survey
2. Current Condition of WEEE management system in UBC
3. Estimation of WEEE amounts in Mongolia
4. WEEE flow in Mongolia
5. Findings from the Survey
6. Future Planning for WEEE management in Mongolia

What is WEEE

Waste Electrical and Electronic Equipment



1. Outline of the Survey

1. Objectives

- To understand the current way of discharge, recycle and disposal of WEEEs in UBC; and
- To identify the amount and the flow of WEEEs.

2. Scope of the Survey

- Target: TV, refrigerator, PC and washing machine.
- WEEE: EEEs which lifetime is over.

3. Duration

- 2 months (from 18 Jan 2010 to 18 Mar 2010)

Applied Methodology (1)

Data collection:

1. Qualitative Survey (Interview) => Identification of current WEEE recycling system (the ways of discharge, collection and disposal; stages of WEEE flow)=20 respondents
 2. Quantitative Survey (Questionnaire) => Identification of recyclables, amounts of treated WEEEs by recycling methods=58 cases
- #### Principles of data processing:
1. Unit of WEEE amount: weight=kg or ton
 2. Total amount of WEEE=Imported EEE which lifetime was over in 2009
 3. Duration of lifetime: Assume same as those in Japan

Applied Methodology (2)

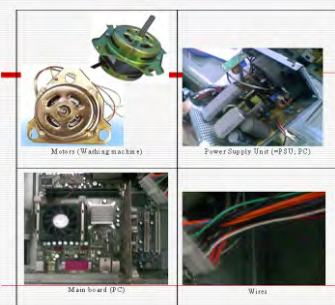
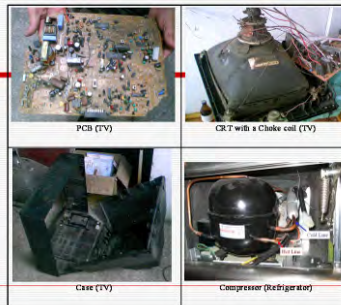
Procedure to identify WEEE flow:

1. Identification of WEEE Management System (process, way of recycling etc.) =>Description of WEEE Recycling Stages or Processes
2. Identification of calculation factors to be used for estimation of amounts treated at each process of WEEE management
3. Determination of annual WEEE amount in UBC
4. Estimation of WEEE amounts treated at each processes of WEEE management=>(3)x(2)
5. Identification of the WEEE flow.

2. Current Condition of WEEE Management System (1)

1. Recyclables and Non-Recyclables

	TV sets	Refrigerator	Washing machines	PC
Recyclable:	PCB	Compressor	Motor	Main board items
	Choke coil	Iron cases	Iron cases	Some functional parts
	Wires	Wires	Wires	Power supply unit
				Processor case
Non-recyclable:	CRT	Rubber items	Plastic items	CRT monitor
	Plastic cases	Glass		Optical drives
		Plastic		Floppy drive
				Plastics & mixed items



WEEE Treating Processes

	Primary Process	Secondary Process	Tertiary Process	Quaternary Process	Final Process
Re-use	Resell				Use as EEEs
	Repair & Sell				Use for maintenance
Recycle	Dismantle	Use as spare parts			Use for maintenance
		Sell as spare parts	Use as spare parts		Export to China
		First segregation	Sell metals		Export to China
		Discharge	Second segregation	Sell metals	Landfill

WEEE Recyclers

- Repair shops & Repairmen
- Collection workers & Waste pickers
- Metal purchasers



WEEE Flow in Mongolia



3. Estimation of WEEE flow in Mongolia

1. Samples of Analysis

No. of Cases: TV-27; Refrig.-16; PC-11 & WM-12

Type of Survey	Target areas	Number of Questionnaires		
		Distributed	Returned	Used for Analysis
Interview	Naranbulak	4	4	4
	Khair Khori	5	5	5
	Subtotal	9	9	9
Questionnaire	BZD	18	18	11
	ChD	18	5	4
	BD	18	18	11
	BGD	18	7	5
	KhUD	18	13	10
	SKhD	18	15	8
	Subtotal	108	76	49
	TOTAL	117	85	58

Assumptions for estimating WEEE amount

- An item on PCB (TV) occupies 1/6 in its weight based on questionnaire contents.
- Recycle rate of CRT equals to 20% based on interviews.
- The size of CRT monitors (PC) is 14 inches=>10 kg; Keyboard=0.5 kg (based on an experiment)
- Same parts of all EEEs dismantled by the same respondent are treated in same manners.
- Ave. weight of EEEs are assumed as same as those in previous survey in other countries.

Weight of each parts of EEEs per Unit

WEEE	Parts	Unit: Kg			
		Refrigerator	Washing machine	PC	
PCB	Compressor	0.96	23.12	3.46	
Plastic case	Plastics	1.01	6.42	0.58	
CRT glass	Glass	0.74	0.83	1.16	
Copper	Aluminum	0.03	0.77	0.44	
Diather wire	Copper	0.16	0.55	0.46	
Other scraps	Glass	0.16	0.16	0.31	
	Aluminum (bridge)	0.22	0.31	0.31	
	Diather wire	0.22	11.02	0.55	
	Rubber gasket	0.02	0.02	0.02	
	Diatherium	0.28			
Unit weight		17.48	49.37	48.48	17.41

Source: Kikuchi Kogyo (Thailand) Co., Ltd. Report for Survey on Electrical and Electronic Waste (Complete Version), 2004

Reuse, Recycle and Disposed Amount in each WEEE

#	Rank parameter	Unit	TV		Refrigerator		Washing machine		PC	
			Share to the total	Weight	Share to the total	Weight	Share to the total	Weight	Share to the total	Weight
1	Amount of weight of WEEE	kg	111	877	57	47	48	111	111	111
2	Total amount of WEEE	kg	3145	100%	468.87	100%	109.9	100%	407.6	100%
3	Reuse Amount	kg	69	2.2%	59	1.3%	2	2%	8	2%
	Recycle amount	kg	496.38	15.8%	171.43	37%	90.36	83%	6.88	1.7%
	Repair & reuse amount	kg	1413.43	45%	383.58	82%	1222.88	112%	139.28	34%
	Temporarily stored amount	kg	23	0.7%	23	5%	23	21%	23	6%
	Sub total	kg	1111.44	35%	359.23	77%	1338.51	121%	178.39	44%
4	Disposing Amount	kg	1047.61	33%	409.44	87%	98.59	90%	328.21	81%
	Recycled Amount by repair shops	kg	100.32	3.2%	90.1	19%	173.31	158%	38.37	9.6%
	1) Sold as spare parts	kg	12.59	0.4%	14.82	3.2%	0.88	0.8%	8.11	2.0%
	2) Sold as spare parts	kg	11.14	0.4%	39.53	8.4%	131.88	120%	35.91	9.0%
	3) Temporarily stored amount	kg	7.80	0.2%	20.22	4.3%	276.88	252%	26.65	6.6%
5	Temporarily stored amount	kg	23	0.7%	23	5%	23	21%	23	6%
	Discharge amount	kg	53.12	1.7%	36.88	7.9%	25.88	24%	21.49	5.3%
	1) Discharged to landfills	kg	89.12	2.8%	35.54	7.6%	198.12	180%	137.49	34%
	2) Landfill amount	kg	892.44	28%	368.62	78%	233.98	213%	349.96	86%
	Sub total	kg	1047.61	33%	409.44	87%	98.59	90%	328.21	81%

Reuse, Recycle and Disposed Percentage in each WEEE

#	WEEE at Recycling Stage	TV	Refrigerator	Washing machine	PC**
		Reuse to the total	Reuse to the total	Reuse to the total	Reuse to the total
1	Total amount of WEEE	100.0%	100.0%	100.0%	100.0%
2	Reuse amount	22.1%	35.1%	5.0%	0.0%
3	Recycle amount	44.9%	45.0%	67.5%	28.6%
4	Total Re-use amount	66.9%	80.1%	72.5%	28.6%
5	Amount of Discharging	33.1%	19.9%	27.5%	71.4%
6	Recycled Amount by repair shops:				
7	Re-use as spare parts	4.4%	2.1%	6.9%	5.8%
8	Sold as spare parts	0.4%	0.4%	0.0%	1.9%
9	Temporarily stored amount	0.4%	8.4%	8.3%	7.4%
10	Total Recycled by Repair Shops	5.2%	11.2%	15.2%	14.9%
11	Temporarily Stored Parts	0.0%	0.0%	0.0%	1.2%
12	Amount Discharged by Repair Shops	27.9%	8.6%	12.3%	55.4%
13	Amount Segregated by WP and CW*	1.0%	0.7%	1.4%	14.9%
14	Landfill amount	26.9%	7.9%	10.2%	40.9%

Duration of Lifetime for each EEE

Items	TV set	Refrigerator	Washing machine	PC**	
1	Lifetime period of EEEs (years)*	12	12	11	7
2	The year of necessary data for identification of WEEE amounts	1997	1997	1998	2002

* Source for EEEs except PC: Interview survey conducted by METI covering 4,700 households in 1997
** Source for Desktop PC: Interview survey conducted by Kakusai Kagyo (Thailand) Co., Ltd in 2003

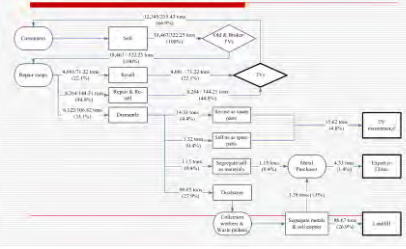
Imported Amount of each EEE for estimation of WEEE amount in 2009

Year	TV set		Refrigerator		Washing machine		Desktop PC	
	100**	Customer Office**	100	Customer Office	100	Customer Office	100	Customer Office
1997	18,467	18,467	963	4,632	3,789	3,788	49,589	49,589
1998	14,249	14,249	4,892	4,892	3,788	3,788	49,589	49,589
1999	17,997	17,997	5,256	5,256	5,256	5,256	5,256	5,256
2000	25,173	25,173	5,488	5,488	5,799	5,799	5,799	5,799
2001	22,466	22,466	4,726	4,726	8,262	8,262	43,292	43,292
2002	N.A.	23,973	N.A.	4,438	N.A.	11,808	49,589	49,589
2003	34,492	34,492	10,827	10,827	N.A.	23,459	25,508	25,508
2004	41,148	41,148	5,798	5,798	N.A.	23,181	114,809	114,809
2005	43,412	43,412	1,351	1,351	N.A.	31,493	234,695	234,695
2006			16,175	16,175	N.A.	41,507	89,453	89,453
2007			16,175	16,175	N.A.	98,728	195,114	195,114

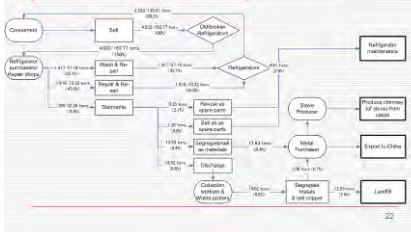
Estimated Reuse, Recycle and Disposed WEEE amount in 2009

#	WEEE Recycling Stage	TV	PC	Refrigerator	Washing machine	Total WEEE
		Reuse to the total	Reuse to the total	Reuse to the total	Reuse to the total	Reuse to the total
1	Amount of weight of WEEE	111	111	111	111	111
2	Total amount of WEEE	100%	100%	100%	100%	100%
3	Reuse amount	6.9%	0%	1.4%	1.0%	1.4%
4	Recycle amount	44.9%	45.0%	67.5%	28.6%	44.9%
5	Total Re-use amount	51.8%	0%	8.8%	2.0%	51.8%
6	Amount of Discharging	33.1%	19.9%	27.5%	71.4%	33.1%
7	Recycled Amount by repair shops:					
8	Re-use as spare parts	4.4%	2.1%	6.9%	5.8%	4.4%
9	Sold as spare parts	0.4%	0.4%	0.0%	1.9%	0.4%
10	Temporarily stored amount	0.4%	8.4%	8.3%	7.4%	0.4%
11	Total Recycled by Repair Shops	5.2%	11.2%	15.2%	14.9%	5.2%
12	Temporarily Stored Parts	0.0%	0.0%	0.0%	1.2%	0.0%
13	Amount Discharged by Repair Shops	27.9%	8.6%	12.3%	55.4%	27.9%
14	Amount Segregated by WP and CW*	1.0%	0.7%	1.4%	14.9%	1.0%
15	Landfill amount	26.9%	7.9%	10.2%	40.9%	26.9%

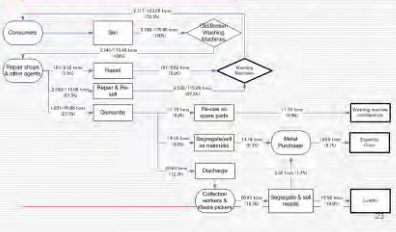
WEEE Flows for TV



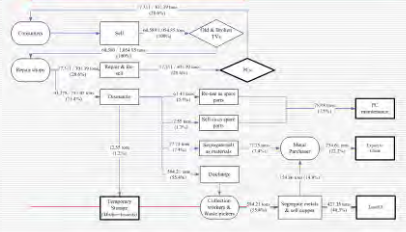
WEEE Flows for Refrigerator



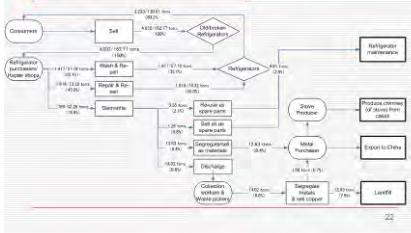
WEEE Flow for Washing Machines



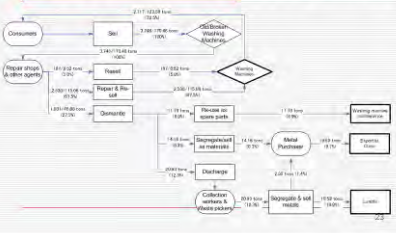
WEEE Flows for PC



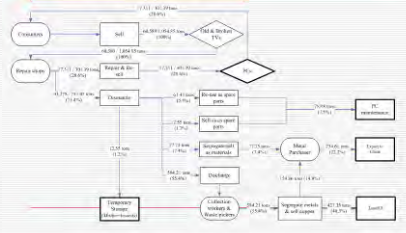
WEEE Flows for Refrigerator



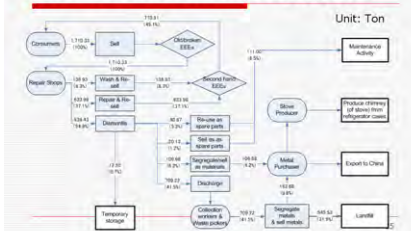
WEEE Flow for Washing Machines



WEEE Flows for PC



Total WEEE Flows in Mongolia:



Findings from the Survey - 1

- 45.1% in the total WEEE is re-used, 23.0% is recycled (including stored spare parts) and 31.9% is disposed.
- Re-use rate of each type of WEEE is usually high (ranging from 66.9% to 80.2%) except PC. As for PC, the indicator is only 28.6% since CRT monitors, which occupy the major part in the weights of PC, are usually impossible to re-use.

Findings from the Survey - 2

- The most part of the total recycle rate calculated as 23% has been formed by the recycled amount of PC parts. Taking the PC out of account, the overall recycle rate falls to a value less than 10.0% of the total amount of WEEE. More than half of the recycled parts are sold metals and only the minority (6.5% in the total amount) is used for maintenance as spare parts.
- As mentioned above, the total disposed amount (landfill amount) occupies 31.9% in the total (545.53 tons). As the amount is estimated by weights of the disposed parts, the majority of the total disposed waste has been resulted from disposed CRTs of PCs and TV sets.

Future Planning for WEEE management -1

- One of characteristics of the waste flow of WEEE in Mongolia is high rate of re-use. There is a lot of repair shops and second hand shops where WEEE are sold by consumers and they are repaired and sold as second hand EEs. These re-use rate will be gradually decreased according to the economic growth. But these habits are important to reduce disposal amount of WEEE and maintain high re-use and recycling rate.
- As CRTs contain heavy metals such as mercury that cause serious health problems to human beings, the major attention should be paid to their disposal. A separate disposal site where hazardous wastes are disposed in safe manners is required to be constructed following the *Feasibility Study of the Hazardous Waste Management Facility in Mongolia* by MONET

Future Planning for WEEE management-2

- There are no manufacturers of the target EEs in Mongolia; as the result, all of these EEs are imported from abroad. Therefore, encouraging imports of EEs that do not contain hazardous substances is needed; however, this may lead to higher prices for EEs to be imported in the future in comparison with those for the existing EEs at the market. For this reason, regulation should be conducted step by step at the same time with building consensus among the public.
- The re-use and the recycle of WEEEs are conducted mainly by individual recyclers and the main problem that has been faced by them is the difficulty in obtaining financial assets such as loans or credits with discounted interest rates. Based on the condition, it is necessary to promote and develop these individuals as formal recyclers by supporting their status such as accommodating low interest rate loans after achieving a complete control on their activities by registering the recyclers, identifying the amounts and the flows of parts dismantled by them and preventing possible illegal dumping.

Thank you for the Attention

d. Content of Discussion

d.1 About Element Company:

Question (By attendant of SKhD PSD):

Whether Element Company possesses a special permission for operating the medical waste treatment facility or not? What kind of management is utilized to separate, collect, transport, incinerate and landfill the medical waste. Does the medical waste is separated at the generation sources or at Element Company?

Is it possible to treat other household hazardous waste such as aerosol, fluorescent lamps and others at the Element Company's waste treatment facilities?

Answer-1 (By Mr. Bayarsaikhan, Director of Element):

The company has started its operations in December 25, 2009. The main operations are to incinerate and disinfect the medical waste. It is considered as a pilot facility run by the Ministry of Health and Ministry of Environment. Since it is first-kind of operation in Mongolia, certainly, there are some errors during the implementation. Thus, we have received the WHO expert recently who had visited our facilities and will write his report and recommendations about the medical waste treatment operations conducted by our company. He noted that, at least, it is good that Mongolia has started such kind of operations that would contribute to the better monitoring system.

As for the separation, the medical institutions are separating anatomic or biological waste only. Others such as sharps, syringes and etc are not separated although, the medical institutions have been enrolled in various capacity development activities such as seminars (7-8) starting from this year.

The requirement of MOH, MONET and CSIA are to reduce the incineration of waste and do more disinfection by autoclave and landfill. In this framework, we are improving our equipment. We have ordered a new autoclave which will arrive about one month time, and we have made 11 mln MNT investment to renovate our incineration stove. So, that the technology would improve.

The company has not got any special permission. It has been operating based on the contract signed between the company and the MOH. The wastes the company transports to the facility are not separated.

Answer-2 (By Mr. Jargalsaikhan, MONET):

The MONET has not involved in selection of Element Company; the company has no EIA conducted, and therefore, we did not grant any special permission to the company.

Answer-3 (By Mr. Tsetsegsaikhan, MOH):

The selection of the operator for the facility was conducted by the MOH. The MOH has equipment rental agreement only with the Element Company. As there are no regulations on licensing contractors who operate such kind of facility (medical waste treatment facility), it has been difficult for us to grant a license to Element. In the future, the legal environment including the licensing should be improved. Currently, Element has been operating under a contract signed between the MOH and the company.

d.2 Hazardous waste to be generated from Tattoo activity:

Comment/Recommendation-1 (By Mr. Batdelger, SBD PSD):

Nowadays, many people have tattoo on their body. Although the waste to be generated from tattoo service is very hazardous, no survey or study has covered this activity and the amount of these wastes has not been identified. I suggest that tattoo service shops should be registered and hazardous wastes from this service should be identified. However, the expression “registration of tattoo services” does not mean licensing.

On the other hand, the WEEE survey presented here should have covered public organizations. Because public organizations are usually the biggest PC users and they have storing a large amount of PC wastes waiting permissions from their supervising organizations on disposal of the PCs.

Comment/Recommendation-2 (By Mr. Ariguun, EPWMD):

Before considering the waste from tattoo, we should identify each household hazardous waste and their impact or risks. Based on the recommendation by the JET to concentrate on the highest-risk wastes, we should decide which waste we pay attention to in order not to spent inefficient costs.

d.3 Recommendations to MONET by ChD PSD:

As for the management of hazardous waste, I want the MONET to take policy measures in advance and not afterwards. We have seen presentations about the polluted environment of Mongolia by mining companies which is going to take impact for quite a long period of time

in the future. Instead, the MONET should take measures that would prevent such kind of environmental pollutions. Also, the MONET raised the issue if funding for the hazardous waste disposal facilities. They say that Mongolia now has no problem with the money and investment (referring to the evening news on TV) from now on. They say Mongolia has embarked into the age of so-called Dutch Disease. So, those funds need to be utilized for such purposes and the Ministry has to ensure the usage of funds to finance above mentioned activities.

(Recorded by Gantumur. B)

A.4 研修教材: ウェストフローの作成方法

<p style="text-align: center;">Waste flow making guide</p> <hr/> <p style="text-align: center;">March, 2010 Japanese Expert Team</p> <p style="text-align: right;">1</p>	<p style="text-align: center;">Generation Per Unit (GPU) for Household waste in 2006</p> <table border="1"> <thead> <tr> <th>Unit g/person/day</th> <th>Winter</th> <th>Summer</th> </tr> </thead> <tbody> <tr> <td>Apartment area</td> <td>264</td> <td>235</td> </tr> <tr> <td>Ger area</td> <td>956 =168 *1 + 788 *2</td> <td>208</td> </tr> </tbody> </table> <p>*1 Waste amount without ash from stove *2 Amount of Waste of ash</p> <p style="text-align: right;">2</p>	Unit g/person/day	Winter	Summer	Apartment area	264	235	Ger area	956 =168 *1 + 788 *2	208								
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Generation amount for Household waste in this year

□ GPU × NGS = Generation amount

Unit Tons/day	Winter	Summer
Apartment area	117.1	104.1
	288 × 406622	256 × 406622
Ger area	651.1	152.2
	971 × 670607	227 × 670607

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Generation Per Unit (GPU) for Business waste in 2006

	Winter	Summer	Unit
Commercial Waste (Restaurant)	258	278	g /chair/day
Commercial Waste (Other Shop)	1,236	1,689	g /shop/day
Office Waste	134	185	g /employee/day
Market Waste	876	1,772	g /stall/day
School Waste	3.1	1.5	g /student/day
Hotel Waste	134	113	g /room/day
Business Total	-	-	-
Public Area Cleaning Waste	3.0	5.1	g /m2/day

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The number of generation source (NGS) for Business waste in 2006

	NGS (Number of Generation Source)
Commercial Waste (Restaurant)	44,112 chairs
Commercial Waste (Other Shop)	3174 shops
Office Waste	111,172 employees
Market Waste	4593 stalls
School Waste	278,977 students
Hotel Waste	12,139 rooms
Business Total	-
Public Area Cleaning Waste	3,430,451 m2

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Generation amount for Business waste in 2006

Unit : tons / day	Winter	Summer
Commercial Waste (Restaurant)	11.4	12.3
Commercial Waste (Other Shop)	3.9	5.4
Office Waste	14.9	20.6
Market Waste	4.0	8.1
School Waste	0.9	0.4
Hotel Waste	1.6	1.4
Business Total	36.7	48.2
Public Area Cleaning Waste	10.3	17.5

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Generation Per Unit (GPU) for Business waste in this year

	Winter	Summer	Unit	Calculation
Commercial Waste (Restaurant)	282	304	g /chair/day	X ₂₀₀₆ × 1.03 ³
Commercial Waste (Other Shop)	1,350	1,846	g /shop/day	X ₂₀₀₆ × 1.03 ³
Office Waste	146	203	g /employee/day	X ₂₀₀₆ × 1.03 ³
Market Waste	957	1,936	g /stall/day	X ₂₀₀₆ × 1.03 ³
School Waste	3.4	1.5	g /student/day	X ₂₀₀₆ × 1.03 ³
Hotel Waste	146	123	g /room/day	X ₂₀₀₆ × 1.03 ³
Business Total				
Public Area Cleaning Waste	3.0	5.1	g /m2/day	X ₂₀₀₆ × 1.03 ³

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The number of generation source (NGS) for Business waste in this year

	NGS (Number of Generation Source)	Calculation
Commercial Waste (Restaurant)	51,798 chairs	X ₂₀₀₆ × 1.055 ³
Commercial Waste (Other Shop)	3,727 shops	X ₂₀₀₆ × 1.055 ³
Office Waste	130,543 employees	X ₂₀₀₆ × 1.055 ³
Market Waste	5,394 stalls	X ₂₀₀₆ × 1.055 ³
School Waste	337,170 students	X ₂₀₀₆ × 120.9%
Hotel Waste	14,254 rooms	X ₂₀₀₆ × 1.055 ³
Business Total	-	
Public Area Cleaning Waste	4,146030 m2	X ₂₀₀₆ × 120.9%

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Generation amount for Business waste in this year

Unit : tons / day	Winter	Summer
Commercial Waste (Restaurant)	14.6	15.7
Commercial Waste (Other Shop)	5.0	6.9
Office Waste	19.1	26.5
Market Waste	5.2	10.4
School Waste	1.1	0.5
Hotel Waste	2.1	1.8
Business Total	47.1	61.8
Public Area Cleaning Waste	12.4	21.1

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Generation amount for Industrial waste in 2006

- Medical Waste : 16.8 tons / day
- Factory Waste : 67.9 tons / day
- Construction Waste :
60.6 tons / day in winter
123.0 tons / day in Summer

* Please refer to attachment for detail.

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<p>Generation amount for Industrial waste in this year</p> <ul style="list-style-type: none"> ❑ Medical Waste : 20.4 tons / day By Population Rate (120.9%) ❑ Factory Waste : 79.6 tons / day =X₂₀₀₆ × 1.055³ ❑ Construction Waste : 93.9 tons / day in winter 375.5 tons / day in Summer <p>* Please refer to attachment for detail.</p> <p style="text-align: right;">15</p>	<p>Recycled waste amount in 2006</p> <table border="1"> <thead> <tr> <th>Unit : tons / day</th> <th>Winter</th> <th>Summer</th> </tr> </thead> <tbody> <tr> <td>Recycling Activity from MSW</td> <td>5.3 (1.0 % of Generation from MSW)</td> <td>5.6 (2.2 % of Generation from MSW)</td> </tr> <tr> <td>Recycling Activity from Landfill site</td> <td>11.2 (2.0 % of Generation from MSW)</td> <td>11.7 (4.4 % of Generation from MSW)</td> </tr> </tbody> </table> <p style="text-align: right;">16</p>	Unit : tons / day	Winter	Summer	Recycling Activity from MSW	5.3 (1.0 % of Generation from MSW)	5.6 (2.2 % of Generation from MSW)	Recycling Activity from Landfill site	11.2 (2.0 % of Generation from MSW)	11.7 (4.4 % of Generation from MSW)
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A.5 研修教材:タイムアンドモーション調査方法

<p>How to conduct time & motion survey</p> <p style="text-align: center;">March, 2010 Japanese Expert Team</p> <p style="text-align: right;">1</p>	<p>Objectives</p> <ul style="list-style-type: none"> ❑ To know the current situation of waste collection system in order to improve it. <p>From How organization, How much of waste, How, When Do they collect ? And how about its frequency ?</p> <ul style="list-style-type: none"> ❑ To know the amount of recyclables collect by collection worker. <p style="text-align: right;">2</p>																										
<p>Outline of survey</p> <table border="1"> <tbody> <tr> <td>1. Method</td> <td>To record the all activities to trace the waste collection vehicle</td> </tr> <tr> <td>2. Duration</td> <td>1 week</td> </tr> <tr> <td>3. Target</td> <td>A waste collection vehicle running at Target area</td> </tr> <tr> <td>4. Target area</td> <td>A khoroo needed to achieve the purpose of survey</td> </tr> <tr> <td>5. Recorded items</td> <td>Specification of vehicle, Contents of work, time, amount of waste collected, collection point, collection rout, etc.</td> </tr> </tbody> </table> <p style="text-align: right;">3</p>	1. Method	To record the all activities to trace the waste collection vehicle	2. Duration	1 week	3. Target	A waste collection vehicle running at Target area	4. Target area	A khoroo needed to achieve the purpose of survey	5. Recorded items	Specification of vehicle, Contents of work, time, amount of waste collected, collection point, collection rout, etc.	<p>1. Recording</p> <p style="text-align: right;">4</p>																
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<p style="text-align: right;">1.recording</p> <p>Materials should be prepared</p> <ul style="list-style-type: none"> ❑ Basic information sheet ❑ Recording of activities sheet ❑ Recording recyclables dealt sheet ❑ The map of target area ❑ Others needed <p style="text-align: right;">5</p>	<p style="text-align: right;">1.recording</p> <p>Basic information sheet</p> <ul style="list-style-type: none"> ❑ It is used to calculate the volume of waste <table border="1"> <tbody> <tr> <td>Date</td> <td>17th April 2010</td> </tr> <tr> <td>District</td> <td>Sukhbaatar</td> </tr> <tr> <td>Khoroo</td> <td>5</td> </tr> <tr> <td>Type of Collection Truck</td> <td>Compactor truck</td> </tr> <tr> <td>Registration Number</td> <td>UNB 2354</td> </tr> <tr> <td>Year Made</td> <td>1997</td> </tr> <tr> <td>Volume</td> <td>7.0 m³</td> </tr> <tr> <td>Capacity</td> <td>3 tons</td> </tr> <tr> <td>Volume of compaction hopper</td> <td>0.4 m³</td> </tr> <tr> <td>Crew</td> <td>Driver: Galbedrakh, Collection worker: Tulgas, Bayaras</td> </tr> <tr> <td>Name of Company</td> <td>Emergency Unit</td> </tr> <tr> <td>Trip Number</td> <td>5</td> </tr> <tr> <td>Wastes weighed on weigh bridge of NEDS</td> <td>3,040 kg</td> </tr> </tbody> </table>	Date	17 th April 2010	District	Sukhbaatar	Khoroo	5	Type of Collection Truck	Compactor truck	Registration Number	UNB 2354	Year Made	1997	Volume	7.0 m ³	Capacity	3 tons	Volume of compaction hopper	0.4 m ³	Crew	Driver: Galbedrakh, Collection worker: Tulgas, Bayaras	Name of Company	Emergency Unit	Trip Number	5	Wastes weighed on weigh bridge of NEDS	3,040 kg
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Wastes weighed on weigh bridge of NEDS	3,040 kg																										

1.recording

Basic recording sheet (1)

Items should be recorded

Activities:	Time	Number of rotation of loading Plate	Apartment No.	D/C	Number of Watch man	Name of organization	Type	Number on map
1.Preparation 2.Collection 3.Travel 4.Service/repair 5.Disposal 6.Record 7.Fuel 8.Recycle 9.Lunch 10.Idling/Others		0: Less than 1		1.Yes 2.No			0: apartment 1: Institute 2: Schools 3: Factory 4: Shops 5: Barbers 6: Restaurant 7: Hotel 8: Hospital 9: Gasoline 10: Others	

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1.recording

Basic recording sheet (2)

Sample format of basic recording sheet

Address		Time		Apartment		Business		Type	
From	To	From	To	Apartment No.	with D/C	with D/C	with D/C	with D/C	with D/C
1. Preparation									
2. Collection									
3. Travel									
4. Service/repair									
5. Disposal									
6. Record									
7. Fuel									
8. Recycle									
9. Lunch									
10. Idling/Other									

1.recording

Basic recording sheet (3)

Sample of sheet filled by hand-writing

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1.recording

Recording recyclables dealt sheet

Date	17 th march 2010	
Trip no.	3 rd trip, Total weight 3,064 kg	
	price	weight
Glass	1000 tg	* Have to calculate
Plastic	590 tg	1.80 kg
Colored plastic	230 tg	1.80 kg
bone	640 tg	21.30 kg
can	0 tg	0.00 kg
paper	1890 tg	27.00 kg
iron	0 tg	0.00 kg
brass	1440 tg	0.38 kg
alloy	530 tg	1.06 kg
Total	6320 tg	53.34 kg

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The map of target khoroo

It is used to be point the collection point on its and to specify the collection route on target area.

11

1.recording

Others needed

Camera
It is used to record the situation graphically in order to get the amount of waste and to show other people its situation.

Measure
It is used to measure the volume of wastes on container and D/C for collection by dump truck and the volume of body of collection vehicles.

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2. Analyzing

13

2.Analyzing

Products of survey

- Time and motion sheet
- The map of collection route
- The income list of recyclables

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2 Analyzing

Time and motion sheet (1)

□ To input the data recorded to excel format

2 Analyzing

Time and motion sheet (2)

□ Calculation method of waste amount on each collection point (1)

Formula

$$A / B \times C = D$$

A Number of rotation at the collection point
B Total Number of rotation on this trip
C Wastes weighed on weigh bridge of NEDS
D Wastes amount on the collection point we would like to know

2 Analyzing

Time and motion sheet (3)

□ Calculation method of waste amount on each collection point (2)

Example

No.	Trip No.	Activity	From	time	date	Number of Rotation of Loading Plate	Weight estimated (kg)	Apartment No
5	1	Collection	8:51	00:12	3/31	2	165.45	24
Total	1					44	3,640	

$$2 / 44 \times 3,640 \text{ kg} = 165.45 \text{ kg}$$

2 Analyzing

Time and motion sheet (4)

□ Making tables by collection time, waste amount from apartment and business entities or anything we want by using pivot table, excel function

2 Analyzing

Time and motion sheet (5)

□ For example, it is possible to make table like this using the result of analysis

	Collection Point	daily (kg/day)	Rate	population	per unit (kg/day/person)
D/C	1	287	12%	790	0.36
	2	427	17%	834	0.51
	Sub Total	714	29%	1,624	0.44
Non D/C	23	181	7%	635	0.28
	24	206	8%	654	0.31
	30	193	8%	524	0.37
	31	208	8%	525	0.40
	33	82	3%	258	0.32
	38a	182	7%	330	0.55
	41,59	87	4%	411	0.21
	Sub Total	1,734	71%	5,837	0.30
Total	2,448	100%	7,461	0.33	

2 Analyzing

Time and motion sheet (6)

□ For example, it is possible to make table like this using the result of analysis

		3/31 (wed)	4/1 (thu)	4/2 (fri)	4/3 (sat)	4/1 (sun)	4/5 (mon)	4/6 (tue)
D/C	1				10:11			
	2							10:30
Non D/C	33				8:55			
	23	8:27		9:25			9:34	
	24	9:02		9:55			10:19	
	115,116,29,58	9:03		10:08			10:39	
	30	9:36	Holiday	10:24		Holiday	11:02	
	31	10:01		10:47			14:14	13:51
	37a	13:49		13:45			14:44	
	37b,38b,40,57	14:05		13:59			15:08	
	41,41a,59	14:52		14:29			15:35	
	D8	15:12		14:50			15:51	
38a	15:45		15:28			15:58		

The map of collection route

□ It is possible to overwrite collection point and some explanation to the map which each khoroo has.

□ This map, windows meta file allow to us modifying it on power point.

2 Analyzing

The income list of recyclables (1)

□ To input the data recorded to excel format

	4/15	4/16	4/17,4/19(1)	4/19(2)	4/21	Total
Plastic (price)	2500 kg	1450 kg	1850 kg	260 kg	360 kg	9210 kg
Plastic (kg)	14,00 kg	8,80 kg	18,00 kg	7,80 kg	4,00 kg	82,60 kg
Colored plastic (price)	5600 kg	3620 kg	7200 kg	3120 kg	1600 kg	33910 kg
Colored plastic (kg)	10,00 kg	12,00 kg	2,00 kg	3,80 kg	1,00 kg	44,00 kg
bone (price)	1200 kg	1430 kg	440 kg	626 kg	150 kg	3256 kg
bone (kg)	15,00 kg	15,00 kg	1,00 kg	1,00 kg	1,00 kg	16,00 kg
can (price)	150 kg	090 kg	1,80 kg	1,50 kg	1,00 kg	8,40 kg
can (kg)	15,00 kg	9,00 kg	18,00 kg	15,00 kg	10,00 kg	64,00 kg
paper (price)	6,00 kg	19,00 kg	31,00 kg			56,00 kg
paper (kg)	380 kg	1520 kg	2480 kg			4480 kg
iron (price)	27,00 kg	40,00 kg		13,00 kg	3,70 kg	88,50 kg
iron (kg)	1600 kg	3360 kg		1,006 kg	370 kg	3056 kg
brass (price)						0,00 kg
brass (kg)						0,00 kg
silvy (price)						0,00 kg
silvy (kg)						0,00 kg
Refrigerator (price)						0,14 kg
total	58,50 kg	97,70 kg	52,80 kg	25,80 kg	9,70 kg	53,00 kg
total	12800 kg	12870 kg	13770 kg	6500 kg	4080 kg	18885 kg

<p>The income list of recyclables (2) 2.Analyzing</p> <p>□ For example, it is possible to make table like this using the result of analysis</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #d9ead3;"> <th>Items</th> <th>total price (tg) /8 trip</th> <th>Total weight (kg)</th> <th>Price per kg (tg/kg)</th> </tr> </thead> <tbody> <tr> <td>Glass</td> <td>11400</td> <td>190.0</td> <td>-</td> </tr> <tr> <td>Plastic</td> <td>13200</td> <td>33.0</td> <td>400</td> </tr> <tr> <td>Colored Plastic</td> <td>2500</td> <td>23.5</td> <td>106</td> </tr> <tr> <td>Bone</td> <td>0</td> <td>0</td> <td>-</td> </tr> <tr> <td>Can</td> <td colspan="3">Can is included in the Glass count</td> </tr> <tr> <td>Paper</td> <td>0</td> <td>0</td> <td>-</td> </tr> <tr> <td>Iron</td> <td>900</td> <td>30.0</td> <td>30</td> </tr> <tr> <td>Brass</td> <td>0</td> <td>0</td> <td>-</td> </tr> <tr> <td>Alloy</td> <td>1,800</td> <td>4.0</td> <td>450</td> </tr> <tr style="background-color: #d9ead3;"> <td>Total</td> <td>29,800</td> <td>280.5</td> <td>-</td> </tr> </tbody> </table> <p> <small> •The survey result shows collector gets the income of 3725 tg per trip on average. •Its weight is 1.1 % of amount of waste transported to NEDS. </small> </p>	Items	total price (tg) /8 trip	Total weight (kg)	Price per kg (tg/kg)	Glass	11400	190.0	-	Plastic	13200	33.0	400	Colored Plastic	2500	23.5	106	Bone	0	0	-	Can	Can is included in the Glass count			Paper	0	0	-	Iron	900	30.0	30	Brass	0	0	-	Alloy	1,800	4.0	450	Total	29,800	280.5	-	<p>Findings 3.Findings</p> <p>For example, we have got these findings as following in BZD #7</p> <ul style="list-style-type: none"> □ Collection route and time are pre-fixed □ Watchmen are discharging wastes just before truck comes. □ Most of the peoples are discharging wastes within plastic bags. □ People/Watchmen are used to keep their wastes in their premises at least two days. □ Discharging manner of business wastes needs to be improved. □ Encourage people to separate recyclables at generation source and to reduce wastes <p style="text-align: right;"><small>24</small></p>
Items	total price (tg) /8 trip	Total weight (kg)	Price per kg (tg/kg)																																										
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<p>Reporting 4.Reporting</p> <hr style="border: 1px solid red;"/> <p>□ We have only report of time and motion survey on target areas in Japanese version at this moment so far.</p> <p>We will provide you the report in English or Mongolian version later.</p> <p style="text-align: right;"><small>25</small></p>	<p>Practice</p> <hr style="border: 1px solid red;"/> <p>□ It is the outline of method for conducting time & motion survey. But practice is very important rather than method and theory.</p> <p>Then, we are going to begin this survey in BZD #1 which is on CMPUA collection service from this Friday, 7th May.</p> <p>Please join us !</p> <p style="text-align: right;"><small>26</small></p>																																												

A.6 モンゴル国廃棄物関連法規とその変遷

No	Law and Regulation relating to SWM	Category	Year	DRAFTED	Comments collected	Status City Mayor Board Meeting	Approval by City Council	2012年4月11日確認
	Schedule in 2010							
1	Revision of WSF Regulation	WSF	2010	○	○	○		Draftが策定され、City Mayor Board Meetingに提出されている。家庭・産業廃棄物法が改訂された後に再度見直し修正を予定。
2	Revision of Current Fee Tariff	Fee	2010					現在の料金率の算定根拠について、見直し指示が市長より2011年1月にあった。これを受け、本技プロで「適正なごみ料金設定ガイドライン」を策定した。
3	Provisional Regulation on Chemicals, Toxic and hazardous substances	Hazardous Waste	2010	○				作成していない。
4	Amendment of Law on Household and Industrial Waste	Law	2010					「産業廃棄物法」と名称変更し、家庭・産業廃棄物法、Law on Export and Prohibition of Import and Trans-boundary Transportation of Hazardous Waste, Law on Prohibition of Ultra Thin Plastic Bagといった現行法を統合した改訂案を中央政府を通じて国会に提出しており、2012年の5月に施行された。(※2012年6月確認)
5	Regulation of Waste Collection and Transportation	Waste Collection	2010	△				EPWMDが作成を検討中。
6	Regulation on Selection, Evaluation and Financing of Waste Collection Organizations	Waste Collection	2010	○				家庭・産業廃棄物法の改訂案が承認され次第、作成することを計画
7	Regulation on Waste Separation	3R	2010	○	○	○		EPWMDがDraftを作成中。
8	Law to Impose an Import Tax on Products that can not be reused	Law	2010	○				EPWMDは、Lawを策定できない。EPWMD has submitted the draft of "Proposal to Impose an Import Tax on Products that can not be reused" to MONET. MONET has been preparing a draft for "Law on Eco-Tax" based on the draft submitted by EPWMD.
9	Ordinance, Regulations, Instructions and manuals related to the Introduction of 3Rs	3R	2010					11.Waste Reduction Programに考え方は組み込まれた。
10	Regulation on Activities related to car services and maintenance shops, washing pit, shops that sell oil and lubricant	Business Waste	2010					制度システム/AM/Pの見直しに取って、余り重要でないで未確認。
11	Waste Reduction National Program	3R	2010					MONETがDraftを作成済み、しかし、家庭・産業廃棄物法が改訂されることから、現時点では、中央政府に提出していない。法案が承認され次第、修正し、関連機関に提出することを予定。
12	Guidelines to inspect operation of NEDS of waste management division of CMPUA under Mayor's Office of UBC	Landfill	2010	○				本プロジェクトでJETとEPWMDが協同して作成し、2010年10月20日より実施した。
	Schedule in 2011							
1	Regulation on Activities related to car services and maintenance shops, washing pit, shops that sell oil and lubricant	Business Waste	2011	○				制度システム/AM/Pの見直しに取って、余り重要でないで未確認。
2	Regulation on activities of organizations, companies and individuals in the Sukhbaatar Square	Business Waste	2011	○				制度システム/AM/Pの見直しに取って、余り重要でないで未確認。
3	Regulation on collection, sorting, selling and purchase of secondary raw materials	3R	2011	○				EPWMDが作成中。
4	Amendment of Regulation on Certification of Toxic Chemicals and Hazardous Waste	Law	2011					MONETが原案を作成し、2006年10月4日に中央政府によって承認。承認以降何もしていない。
5	Regulation on Collection and Transportation	Waste Collection	2011	○				EPWMDが作成を検討中。
6	Regulation on Delivery of Construction Waste to Final Disposal Sites	Business Waste	2011	○				EPWMDが作成し、市長を通じて市議会に提出済み。
7	Examine the possibilities to increase household waste fee tariff in Baganuur, Bagakhangai, and Nalaikh Districts and amend Resolution No182	Fee	2011	○				制度システム/AM/Pの見直しに取って、余り重要でないで未確認。
8	Regulation to collect waste generation fees from Ger area households and to follow for financial operations	Fee	2011	○	○	○		電気料金に上乗せしてゲル地区のごみ収集料金を徴収する条例であり、2011年6月17日に発布し、7月1日より施行された。