An Island Adrift in a Tidal Wave of Consumerism Exploring the relationship between waste generation and the social lifestyle on Guam*

Golabi¹⁾, M.H., Kirk. Johnson¹⁾, Takeshi Fujiwara²⁾, and Eri Ito³⁾

University of Guam, Mangilao, Guam
Okayama University, Okayama, Japan
Yachiyo Engineering Co., Ltd., Japan

ABSTRACT

Over the past several decades, solid waste generation and disposal has transitioned from a concern needing a remedy to a crisis of monumental proportions. There is an urgent need to develop a comprehensive solid waste management and recycling plan on the island of Guam to minimize cost and avoid undesirable environmental effects of legal and illegal dump sites and to enable utilization of recyclable as well as green and other refuse as a resource which is currently discarded.

Accurate information of waste generation, especially waste characteristics is necessary to study the feasibility of any waste reduction and recycling in Guam and the other islands of Micronesia. Due to the lack of accurate information especially on waste generation, present data on Guam is not reliable enough for developing a comprehensive management practice and recycling strategies.

Furthermore, social behavior and life style may have a major impact on waste characterization and waste generation. Basic data from the Ordot land fill over the past several years suggests that the Guam residents produce more per capital than the U.S. average (Johnson, 2009). However, very little is known about consumption patterns and behavior of the people of Guam regarding waste generation and waste handling. Any waste management policies for the future of this island must find meaning and purpose within the framework of consumption patterns. Resident's education and awareness with regard to the types and amount of waste generated and the handling of the discard is an essential part of any waste management strategy that would be economically feasible and culturally acceptable while maintaining the integrity of the island's environment.

In order to grasp not only the waste generation by waste component, but also citizen's consciousness to waste reduction and recycling, the questionnaire survey to citizens was designed for statistical analysis and behavioral study as a management tool. The results are best understood within the framework of a growing consumer culture. In this paper we present the survey results developed and conducted over a period of two years. The analysis of results is expected to help us understand the social behavior and the island resident's lifestyle as the first step towards the development of a sound and effective waste management strategy for the island of Guam.

*This project was funded jointly by the University of Guam (sustainability grant) and the College of Engineering (division of waste management) of the University of Okayama in Okayama, Japan

INTRODUCTION

The Island of Guam is located on the Western edges of Micronesia in the Pacific (Fig 1). Since World War II and the influence of American cultural values and processes of modernization brought on by globalization, the island has experienced a fundamental cultural shift that has had far reaching effects. One of these impacts can be seen in the consumption patterns of island residents. As the island struggles to find a balance between traditional ways of living within the framework of a growing consumer culture, we pause to explore some initial findings that shed light on important questions of life style choices and social behavior that has over the past several decades moved from in a real concern in need of a remedy to a crisis of monumental proportions.



Figure1. A view of the island of Guam in the western pacific

There is an urgent need to develop a comprehensive solid waste management and recycling plan on the island of Guam to minimize cost and avoid undesirable environmental effects of legal and illegal dump sites and to enable utilization of recyclable as well as green and other refuse as a resource which is currently discarded.

Social behavior and life style may have a major impact on waste characterization and waste generation. Guam residents produce more waste per capital than the U.S. average. Yet, very little is

known about consumption patterns and behavior of the people of Guam regarding waste generation and waste handling. Any waste management policies for the future of this island must find meaning and purpose within the framework of consumption patterns. Resident's education and awareness with regard to the types and amount of waste generated and the handling of the discard is an essential part of any waste management strategy that would be economically feasible and culturally acceptable while maintaining the integrity of the island's environment.

In this paper we present the survey results developed and conducted over a period of two years. The analysis can help us understand the social behavior and the island resident's lifestyle as the first step towards the development of a sound and effective waste management strategy for the island of Guam.

Two Perspectives on Waste

Understanding and combating the problems of waste management can be approached from two very different vantage points:

- From one perspective, the question that guides the work centers on what a community does with the waste it has produced. This question is one that every community around the world struggles with today – some more effectively than others. From cities as far apart as Manila to Sao Paolu or from Isfahan to Okayama, the world-wide experience of managing waste is a common one. While Guam struggles with this same question in fact has come a long way over the past two decades in methods, techniques and processes of managing its own waste.
- 2) The other perspective on this question highlights a deeper cultural paradigm shift that demands our attention.

The reality of waste in the 21st century, rather than being seen as a problem to be addressed, can be understood as a symptom of a much deeper crack in the collective cultural social system. The problem of waste generation on the island of Guam, or for that matter anywhere else in the world (Figure 2), highlights a fundamental shift in cultural values resulting in an unprecedented rise of a consumer-based society.



Figure 2: Solid waste generation and disposal of it has transitioned from a concern needing a remedy to a crisis of monumental proportions all around the world.

Prior to WWII, in their daily lives, islanders produced waste that was completely biodegradable. But over the past several decades, globalization, modernization and consumerism has swept over the island of Guam like a tidal wave leaving in its wake a mountain of waste that has become known as Mt. Ordot (Fig. 3) which will remain an island landmark for the next thousand years.

When island residents come face to face with this monumental crisis they are often at a loss for words and are left in complete and utter shock, not knowing how or when their island arrived at this juncture. Change of this kind is slow enough that we often take it as normal, but when we stand back and look at it over two or three generations we recognize how much of a shift has occurred in a relatively short period of time. This crisis has even resulted in courses being offered at the University of Guam on Waste Management, a reality that just even 15 years ago would have been a suggestions discarded without even a second thought.



Figure 3: A mountain of waste that has become known as Mt. Ordot (a and b) is being visited and observed by students from University of Guam (c and d) to evaluate its extent and the environmental impact of the 'landfill'.

Thus, the question before us at this stage in our island history is this: How did we get here? How did we as a society arrive at a place in our social evolution that see 300 tons of waste produced on Guam each and every day (total population is approximately 180,000). If the island of Guam faces such a crisis then we can also think of the globe as an island in space facing similar challenges. Since the Industrial Revolution, we have imposed a linear model of development on a planet that functions in circles:

EXTRACTION – PRODUCTION – DISTRIBUTION – CONSUMPTION \downarrow WASTE

Some countries measure their progress as to how fast they can go through this process. The faster one can move from EXTRACTION to WASTE the better a country's economic spread sheet appear. We must consider what drives this linear model of development – Is it PRODUCTION? Is it DISTRIBUTION? Or is it CONSUMPTION?



Figure 4: showing that the consumption is the driver of capitalism and is also a symptom of a deeper crack in the collective social system.

As one analyzes this question it becomes clear and unequivocal that CONSUMPTION (Figure 4) is the driver of this petroleum-based model of capitalist development. One's identity in the modern world is often based on how much one can consume. And the end result of this model is an accumulation of excesses of waste never before imagined.

Sut Jhally (<u>http://www.sutjhally.com/</u>) explores these phenomena of consumerism and turns our attention to the writings of Karl Marx, the pre-eminent analyst of 19th century industrial capitalism. Marx opened his famous *Capital* with these words, "The wealth of societies in which the capitalist mode of production prevails appears as an 'immense collection of commodities'" (Marx 1976, p.125). In seeking to initially distinguish his object of analysis from preceding societies, "Marx referred to the way the society showed itself on a surface level and highlighted a quantitative dimension - the number of objects that humans interacted with in everyday life" (Jhally).

Indeed, Jhally argues, no other society in history has been able to match the immense productive output of industrial capitalism.

'This feature colors the way in which the society presents itself -- the way it appears. Objects are everywhere in capitalism. In this sense, capitalism is truly a revolutionary society, dramatically altering the very landscape of social life, in a way no other form of social organization had been able to achieve in such a short period of time. (In The Communist Manifesto Marx and Engels would coin the famous phrase "all that is solid melts into air" to

highlight capitalism's unique dynamism.) It is this that strikes Marx as distinctive as he observes 19th century London. The starting point of his own critique therefore is not what he believes is the dominating agent of the society, capital, nor is it what he believes creates the value and wealth, labor - instead it is the commodity. From this surface appearance Marx then proceeds to peel away the outer skin of the society and to penetrate to the underlying essential structure that lies in the "hidden abode" of production'.

Yet, it is not simply the production of an "immense collection of commodities" but the fact that they must be SOLD that ensures further production. And thus the problem of capitalism is one of consumption and not production. As it is consumption that drive the model and ensure the extraction, production, distribution and even waste accumulation continues.

'So central is consumption to its survival and growth that at the end of the 19th century industrial capitalism invented a unique new institution – the advertising industry – to ensure that the "immense accumulation of commodities" is converted back into a money form. The function of this new industry would be to recruit the best creative talent of the society and to create a culture in which desire and identity would be fused with commodities – to make the dead world of things come alive with human and social possibilities (what Marx would prophetically call the "fetishism of commodities"). And indeed there has never been a propaganda effort to match the effort of advertising in the 20th century. More thought, effort, creativity, time, and attention to detail has gone into the selling of the immense collection of commodities that any other campaign in human history to change public consciousness. One indication of this is simple the amount of money that has been exponentially expended on this effort. Today, in the United States alone, over \$175 billion a year is spent to sell us things. This concentration of effort is unprecedented. (Jhally)'.

Advertising is one of the most powerful forces for social change in the 21st century. The values it conveys, and the ideas it portrays (Fig. 5) go against our very survival instinct. These values are individualize and selfish and run counter to the values and ways of living of island cultures. Traditional cultures, based on collectivist values, offer the world an alternative model to the dominant globalized capitalist one.



Figure 5: Advertising has begun to colonize our culture – literally taking up space in our cultural landscape... Each day we are exposed to numerous advertising images.... A powerful force to get us to buy things...

Guam and its people are being pulled in two opposite directions and in the process have entered the 21st century with a realization that a sustainable island society cannot afford to continue to be blind to the crisis thrust upon itself in the form of waste accumulation without a plan or method of reducing, recycling or reusing.

Any waste management policies for the future of Guam must find meaning and purpose within the framework of consumption patterns. Resident's education and awareness with regard to the types and amount of waste generated and the handling of the discard is an essential part of any waste management strategy that would be economically feasible and culturally acceptable while maintaining the integrity of the island's environment.

Background:

Over the past two decades, the solid waste generation and disposal has transitioned from a concern needing a remedy to a crisis of monumental proportions. Therefore, waste reduction and recycling is fundamental to any future waste management in Guam. Accurate information of waste generation, especially waste characteristics is necessary to study the feasibility of any waste reduction and recycling in Guam and the other islands of Micronesia. Due to the lack of accurate information especially on waste generation, present statistical analysis on island's wastes is not reliable enough for developing a comprehensive management practice and recycling strategies for Guam and the neighboring islands.

Step in the right direction:

In order to grasp not only the waste generation by waste component, but also citizen's consciousness to waste reduction and recycling, a questionnaire survey to citizens has been designed for statistical analysis as the first step towards developing a management tool. The contents of the survey questionnaire are: 1) educational background of head of the households; 2) awareness of environmental problem associated with waste; 3) waste characteristics and willingness to segregation; and 4) participation to 3R activity. By analyzing survey questionnaires, citizen's consciousness to waste management strategy (i.e., recycling, composting) will be identified for use in a comprehensive waste management strategy. It is expected that survey questionnaires representing a true sample of the citizens in Guam will aid the distribution and processing (collecting, compiling) of waste necessary to obtain high recovery ratio. It must be noted that the results are best understood within the framework of a growing consumer culture.

Therefore, in this paper we present the survey results developed and conducted over a period of two years. The analysis of results is expected to help us understand the social behavior and the island resident's lifestyle as the first step towards the development of a sound and effective waste management strategy for the island of Guam.

The Survey:

Determination of the waste generation and characterization

Although studies (EC, 2004, Martinho and Silveira 2008), relate the necessity of choosing the waste containers placed in public areas (i.e., apartment complexes) as the ideal sampling technique, this choice has higher costs than the one proposed in this study. In this study, the waste generation and its characterization was determined via resident's response to the questionnaires which are designed (Appendix I) to not only characterize the waste generation but also the amount generated at the house level. This approach not only would obtain up-to-date data about the amount and the type of waste generated but also would promote and educate the residents about the island environment, and remind the public and private sector as well as the government agencies about recycling and the composting of the organic waste.

Results and Discussions:

A survey on household waste was conducted on the residents of island of Guam. Most residents had a difficult time answering some of the questions and had to be therefore guided personally through the survey questionnaire by the surveyor.

Attribute and characteristics of the head of the household

The participants were among a diverse group of residents with different age group, cultural background and various occupations as shown in Fig. 6 (a-h).

Regarding the marital status, 49% of the participants were single, 41% were married while about %10 of participants had different marital status (Fig. 6h).

Referring to the number of household who are working, 34% of households have only one person whom works and in 32% of the household two persons are working and receiving income (Fig. 6f) while in 16% of the households 3 persons are the working members. About 3% of respondents indicated that, there are 5 or more working members in their households (Fig. 6f).

Waste Generation and Separation

As shown in Figure 7, most respondents were able to characterize the type of waste that is generated in their household. On the other hand, the amount and number of bulky items discarded seems to be at its minimum (Fig. 8). According to the data shown in Figure 7, up to 80% of the waste generated was organic that could be composted and applied to garden soils as organic amendments. The fact is that most participants knew the waste categories and would segregate them if mandated.

Awareness

A shown in Fig. 9, about 79 percent of the respondents were aware that the household waste was collected by the collection truck once a week on the regular basis. On the other hand about 4% did not know nor had no answer. The data therefore indicated that the resident's awareness at least regarding the waste collection schedule in Guam is quite high, an encouraging factor for waste management strategy and planning purposes.

It was interesting to know that about 78% of respondents have some college degree or higher (Fig. 6b) and about 64% have income of \$40,000 and more (Fig 10) which corresponds to the awareness level of percent.

Conclusion:

Majority of the respondents understand that solid waste on Guam is an issue. Most of the respondents agreed that recycling could help save the environment and conserve resources. It is recommended that the general public needs to acquire more information on properly disposing of household waste, where the waste is sent to, and how improper disposal of solid wastes affects the environment. In order to maintain a greener and cleaner environment in Guam a clear and explicit plan on solid waste management needs to be developed and implemented.

Project Impact:

In addition to waste characterization via survey questionnaires (Appendix I), the project uses a comprehensive approach that includes increasing public awareness towards comprehensive waste management strategies and more importantly provides knowledge transfer to other islands in the Western Pacific and in Japan (i.e., Okinawa).

References

European Commission - documentation (EC 2004). Methodology for the Analysis of Solid Waste (SWA-Tool) User version. Project: SWA-Tool, Development of a Methodological Tool to Enhance the Precision & Comparability of Solid Waste Analysis Data. European Commission. 5th Framework Programme, European Union. Project Coordinator: iC consulenten ZT GmbH, Austria. Prepared by SWA-Tool Consortium, 57pp.

Guam Solid Waste Receivership Information Center 2009. *http://www.guamsolidwastereceiver.org/ Accessed August 13, 2009.*

Guam Integrated Solid Waste Management Plan 2006. http://node.guamepa.net/programs/air/2006iswmp_final.pdf Accessed August 13, 2009.

Jhally, Sat, https://mediasrv.oit.umass.edu/~sutj/Apocalypse.pdf

Johnson, Kirk. 2009. Waste generation rate for Guam resident (Personal communication).

Marx, Karl (1976) Capital (Vol 1), tr. B. Brewster, Penguin, London.

Martinho, Maria de Graca Madeira, and Ana Isabel Silveira. 2008. Report: New guidelines for characterization of municipal Solid Waste: the Portuguese case. Waste Management and Research, The official Journal of the International Solid Waste Association (ISWA). Vol. 26, Issue #5. Pp 486-490.



Figure 6 (a-h): The participants were among a diverse group of residents with different age group, cultural background and various occupations.



Figure 7: Waste characterization via survey questionnaires conducted in Guam



Figure 8: the amount and number of bulky items discarded seems to be at its minimum



Fig. 9: Resident's awareness regarding the waste collection schedule in Guam is quite high (an encouraging factor for waste management strategy and planning purposes)



Figure 10: Respondents have some college degree or higher (Fig. 6e) and about 64% have income of \$40,000 and more (Fig 10) which corresponds to the awareness level of 79%.

Appendix I

QUESTIONNAIRE SURVEY FOR HOUSEHOLD Respondents

Questionnaire Survey of Household's Solid Waste 1 A. Attribute of head of household 1.1 What is your village? ſ) 1.2 Age **1**)18 - 24 **2**)25 - 29 **3**) 30 - 34 **4**) 35 - 39 **5**) 40 - 49 **6**)50 - 54 **7**) 55 - 59 **8)** 60 - 64 **9)** 65 - 69 **10)** over 70 1.3 Gender 1) Male 2) Female 1.4 Race **1)** Chamorro **2)** American **3)** Philippine **4)** Other () 1.5 Occupation 1) Professional 2) Administrative 3) Clerical 4) Sales 5) Services 6) Agricultural 7) Production 8) Other () **B. Household characteristic** 1.6 Are you married? 1) Single 2) Married 3) divorced 4) widow 1.7 Household size including respondent 2) 2 person **1)** 1 person 3)3 person 4)4person **5)**5 person **6)**6 person 7)7 person 8)8 person 9)9 person 10) 10 and more 1.8 Total income of household per one year **1**) Less than \$25,000 **2**) \$25,000 - \$39,999 **3**) \$40,000 - \$64,999 **4**) \$65,000 - \$84,999 **8**) \$85,000 -\$94,999 9) More than \$95,000 1.9 Are you hiring housekeeper? **1)** Yes **2)** No 2 **Awareness** 2.1 How many times in a week does collection car come to collect your household waste? **1)** Twice a day **2)** Once a day **3)** Every other day (once in 2 days) **4)** Once a week **5)** Twice a week **6)** Depends on the amount 2.2 Do you know waste collection days of your area? 1) Yes 2) No 2.3 Do you know where the collected waste is being sent? 1) Yes 2) No 2.4 Have you ever heard of "3R"? 1) Yes 2) No

If your answer is yes, answer the next question. If your answer is no, proceed to question 2.5

2.5 Do you know what does the "3R" represent?

1) Yes 2) No

- 2.6 Do you know that most of waste generated can be recycled, and will reduce the amount of waste in the landfill area thus help lengthen the landfill lifespan?
 - 1) Yes 2) No
- 2.7 Do you know that by Recycling we are not only helping to conserves our country natural resources but also helping to conserves world natural resources?

1) Yes 2) No

3 Waste generation and separation

Collecting household wastes by segregation is very important to for Recycling. The wastes are first separated into several groups. Later, the collected wastes are being treated to be used as a new products, this process is called Recycling. Some of the benefits of Recycling are that besides conserving natural resources, it helps to reduce the amount of wastes sent to the landfill area. And also prevents pollution caused by the manufacturing of products from virgin materials, saves energy and decreases emissions of greenhouse gases. In a nutshell, segregation and recycling helps sustain the environment for future generations.

3.1 How much of the following waste type is generated in your household in daily basis?

Weight examples of the items





Apple=0.4lbs

Slice of bread=0.04lbs



Egg=0.16lbs



Paper(letter size)=0.03lbs









Newspaper=0.5lbs Cardboard(1 *1

Cardboard(1 *1 m)= 1.3lbs Adl

Adult T-shirt(M size)=0.4lbs

All house waste (total)	lbs /day
Bottle waste	10074443
Can waste	items /dav
Glass bin waste	items/day
PET bottle waste	items/day
Carton bottle waste	items /day
General waste	
Food waste	lbs /day
Newspaper/magazine waste	lbs /day
Other paper waste	lbs/day
Plastic waste	lbs /day
Rubber/Leather waste	lbs /day
Fabric/Cloth/Linen waste	lbs /day
Grass/Leave/Wood waste	lbs /day
Ceramics/Glass/Ash waste	items /day
Card board	lbs /day
Bulk waste	items /month
Furnishing waste	
Furniture	pieces/year
Electric appliance	pieces/year
Others furnishing waste	pieces/year
Other waste	
Other waste	lbs /day

3.2 Do you attempt to minimize waste amount generated in your household?

1) Yes **2)** No

3.3 Base on the following statement, if waste segregation is being introduced in your area, will you participate or not?

Waste segregation Statement/ Your answer	Yes	No	Not Sure
If we separate our waste, we can use them as other things or again.			
Example: biodegradable waste→composted			
not biodegradable waste→reused or recycled			
The separated waste have to be kept in the house for some amounts of times before it is being collected by its category. Example: biodegradable waste →twice a week not biodegradable waste →twice a month			
Longer time have to be spend on waste handling. Example: drink bottle → clean with water, take out the label and cap			
Segregation helps to reduce the amount of waste that has to be sent to landfill.			

4 Participation

4.1 Have you ever taken part in any campaign related to waste management or environmental protection?

1) Yes **2)** No

4.2 Have you ever sold or taken you garbage to the waste centre?

1) Yes **2)** No

4.3 Do you use second-hand items in your household?

1) Yes **2)** No

Thank you for your cooperation!

Waste is a consequence of life: What to do with the wastes that are generated? What are the lessons to be learn for Managing waste in large Cities/Islands (Guam)?

> Mohammad H. Golabi, PhD Associate Professor, College of Natural and Applied Sciences Kirk. Johnson, PhD Professor, College of Liberal Arts and Social Sciences UNIVERSITY OF GUAM

> > Takeshi Fujiwara PhD

Professor, Graduate School of Environmental Science, Solid Waste Management Research Center Eri Ito, Graduate Student Graduate Student, Graduate School of Environmental Science,

OKAYAMA UNIVERSITY

WHERE IS GUAM?







What is waste "Waste a consequence of life"

- Consequences of today's life style is the generation of humongous amount of wastes.
- Over the past several decades, solid waste generation and disposal in large cities and even small islands (i.e., Guam) has transitioned from a waste management concern to an environmental crisis.
- Population growth and life style may have a major impact on waste characterization and waste generation.

Waste a consequence of Life (cont'd)

- There is an urgent need to develop a comprehensive solid waste management and recycling plan in order to avoid undesirable environmental impact on cities and islands (Guam).
- Land-filling of huge volume of organic waste material not only causes environmental problems for the cities/islands, but it is in fact loss of valuable resources which could be composted and make available for land application as soil amendment in forest lands, farm field, and home gardens.
- Composting on the other hand reduces both the volume and mass of the raw material while transforming them into a valuable soil conditioner.

waste characteristics and generation is also a consequence of:

- Production and packaging of products
- Advertising and Distribution of Products
- Consumption

Production and packaging of products?

Considerable percentage of the packaging material plus the product itself becomes waste due to consumption patterns



Advertising and Distribution of products?

Advertising has begun to colonize our culture – literally taking up space in our cultural landscape... Each day we are exposed to numerous advertising images.... A powerful force to get us to buy things...



Consumption of products?

Consumption: a byproduct of today's lifestyle



By-products of Consumption





Facts about Waste Generation in major cities/islands

- What are the questions?
- How Much waste is generated and Where?
- How to Reduce and/or Minimize the Amount of Waste Generated?
- How to Manage the Waste that is Generated?

Waste is a Global Problem (source: k. Johnson, 2012)

MARKEN BERNE

>> Delhi, India

Mt. Ordot. Guam

Managua

Windsor

Nairobi-Kenya



Mumbai Dump

11

Waste disposal in Manila Rivers and Bays



A waste dumping site in Managua: As it can be seen people live off the waste



A waste dumping site in Delhi, India



What to do with the wastes that are generated?
You saw what was done to the waste in some underdeveloped countries

Let see what is done to waste to waste in developed and/or developing countries

Segregated house-hold Waste discard site (typical community-Okayama city)



Land filling It – Okayama City, Japan

Source: UOG/Okayama University joint project

Waste is being burned in an incinerator (Okayama city, Japan)



Waste is being converted to methane gas via gasification (Okayama city, Japan - pilot project)

ごみ押出し装置 Source: UOG/Okayama University joint project

Composting Sections



AeroMaster Compost turner at UOG Station



AeroMaster Compost Turner at display before the Guam officials





Transforming It into a valuable soil conditioner via a knowledge based <u>Resource</u> <u>Recovery</u> <u>Management</u> <u>Strategy</u>

AND/OR

Zero Waste Management System VIA COMPOSTING

Considering a more efficient and effective 'Zero' Waste Management Strategy for big Cities/Islands

Example:

Examining the composting facility in Isfahan (Iran) as a potential example for Guam and the other similar Islands/cities in the western pacific

كارخانه كمبوست اصفهان

1212121212121007

ISFAHAN COMPOST FACTORY

Receiving Station



A view of the Receiving Conveyers and their control towers



Typical day's garbage being pushed to the conveyers/rolling vibrators



VIBRATOR SET IN ISFAHAN COMPOST FACTORY – IRAN دستگاه ویبراتور در کارخانه کمپوست اصفهان

Operational Steps

Conveyers convey the garbage to vibrating screens for initial sorting in order to separate plastics, glasses, cloths, etc.,



دستگاه خرد کن در کارخانه کمپوست اصفهان

Operational Steps Cont'd

- Second sets of vibrators are used to further unpack packages and separate the organic materials while loosening everything else.
- Following the loosening/unpacking, two magnets separate metals from the rest.

Magnet rollers separate metals from the rest

آهن رباي جذب فلزات در كارخانه كود كمپوست اصفهان MAGNET OF ISFAHAN COMPOST FACTORY

All metallic materials are separated and dropped into a delivery compartment



Garbage is conveyed to drum sieves for further sorting

DRUM SIEVE SET IN ISFAHAN COMPOST FACTORY - IRAN

سرند در کارخانه کمیوست اصفهان



A typical Screening Drum Sieve



Organic Matter Separation

- The segregated organic materials is then conveyed to fermentation section for composting.
- Organic material is then processed to become mature compost via aerobic processing in the large windrow lines.

Organic material falling beneath the conveyer to form a Windrow



ماشین ویندرو در کارخانه کود کمپوست اصفهان WINDROW MACHIN

ST. Lake

سایت تخمیر کارخانه کمپوست اصفهان

FERMENTATION SITE OF ISFAHAN COMPOST FACTORY

Products produced is packaged for sale

Here mature Compost Is taken to Local Farmers following testing



Isfahan waste management center operational chart



TRASH TO TREASURE

AN IDEA FOR RENEWABLE ENERGY:

BIOCONVERSION OF ORGANIC WASTE FOR REDUCING FOSSIL FUEL ENERGY CONSUMPTION



Trash is being delivered to the Processing Station



Trash is being Dumped for processing



Trash is being sorted for plastics, and other inorganic material



Metallic materials such as aluminum cans are being picked up using magnetic sorter



Trash is being grinded for uniformity



Digester is being filled with uniformed organic wastes



Gas is being produced pushing the organic waste out of the digester for composting



Methane Gas is being sent to the gas tank filling up the balloon


Methane gas produced is being sent to the methane gas operated electric generator



Electricity generated by the methane gas generator is being sent to the end users



Sludge residue is being sent out from the digester as was shown before



Dewatered sludge is being sent to composting station



Composter mixing the dewatered organic wastes to produce mature compost

TRASH TO TREASURE

- Not only the gas produced from the fermentation of trash is used to produce electricity for the end users
- Also the residual sludge is being used to produce organic fertilizer (compost) for domestic as well as for international sale.
- Recycle Reduce Re-Use A Resource Recovery Management Strategy is being implemented

A simple home made set up that we assembled at the Yigo station resembles the 'waste-to-energy' technology that was just discussed



Benson burner is used to test the presence of methane gas





Thank You Si yuus Maase