Ejjelok Kwopej!

Turning Rubbish into Resource

A Waste Reduction Plan for the Urban Marshall Islands

Prepared for the United Nations Development Programme,
***Multi-Country Office*,**
Fiji

By

Alice Leney
Pacific Reef Savers,
Coromandel,
New Zealand
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Note on Quantities and Measures:

- All dollar values are US$ unless otherwise stated;
- Exchange rate of USD to AUD is calculated at US$0.75:A$1 throughout;
- Figures are rounded where estimates are involved;
- Units used are ***metric*** units unless otherwise stated;

Preface: A Note on Report Structure

This report is produced primarily for an audience that is familiar with the problems of solid waste on atolls in general, and the RMI in particular. Conventionally, the report would commence with a detailed analysis of the existing conditions, and justification for the proposals set forth. However, as most readers will already be well acquainted with these facts, and aware of the need for action, this report goes straight into the mechanics of the proposals. This is a working document that can be used for project implementation, and as a reference document for those seeking to implement such a project. As such, it details the economics of a possible recycling operation, and the plans and costs to implement such a system. Analysis of the existing situation may be found at the back of the report, for those unfamiliar with the current situation.

This approach was specifically requested by key people in the Marshall Islands during the research phase of this report, and it is an approach with which this author fully concurs. For those interested in detailed analysis of waste streams and different options for waste management in the Marshall Islands, this information has already been laid out in several excellent reports previously produced, detailed in the bibliography at the end of this document.

This document contains five basic components:

- **The Recycling System:** how a Container Deposit System works; the income, expenditures, employment and capital equipment of a sustainable recycling business;
- **Legislation:** type of legislation required, and timeline for implementation;
- **The Public Awareness Programme:** elements required, and strategy for implementation of a concurrent program;
- **Other Waste Reduction:** simple strategies that could significantly impact quantities of waste going to landfill, principally organics;
- **Project Work Plan / Budget:** requirements of a project to put a CDL system in place, how the project management might be organised, and total budget;
- **Sustainability:** How the operation of the recycling system could be a World Class model of Sustainable Development.

The report also includes outlines of discussions with various people and organisations involved in aspects of waste management in the Marshall Islands. There are also examples of the sort of specialist equipment required for the system operation. These sections are included as Appendices.

1. Summary

The Marshall Islands has a pressing need to improve its solid waste management, in particular in the urban areas of Majuro and Ebeye. There are resources in the current waste stream that can be easily turned into economic opportunities, as well as providing a solution to what is currently seen as just a problem. This approach not only saves money spent on waste management, but also creates employment and economic activity: indeed, it is even profitable.

The difficulty – and lack of - resource recovery from the waste stream is usually explained as the cost of doing so. Use of Container Deposit Legislation (CDL) can mean that the cost of separation is borne by the waste producer, and this individually is usually near zero. The resources, primarily cans and bottles of aluminium and PET plastics, are then separated at source by the people who made the waste, as these items become valuable. The design promoted here would make each can and bottle worth 5c at Refund. Items returned to designated Collection Points would thus collect Refunds. To put such a system in place requires simple legislation: an Act of the Nitijela, plus some associated regulations (examples of which can be found in Appendix II).

The system is commercially viable: a 6c Deposit is paid at import, and 1c of this 6c becomes a handling fee, which, along with the value of the materials collected, is sufficient to make the operation of the entire system economic. Running the system is projected to employ 12 full-time positions, providing employment for both sexes. The analysis of the business economics has been deliberately 'hard-headed' to avoid any unrealistic expectations; also, the ability to draw information from an existing system in Kiribati has been of great help to ensure that the resulting analysis is realistic.

A Materials Recovery Facility (MRF) must be established in order to press and pack for export the recycled materials collected. The model outline below proposes that the MRF could be run by a commercial business, under a service contract to Government. The MRF and the capital equipment would remain Government property. The recycling business would be regulated through the legislation and a contract. The establishment of an MRF, financed through CDL, in turn means that other waste materials, which would normally be uneconomic to recycle on their own, can now be recovered at marginal cost. This in turn saves more money on landfill space, and the cost of collecting and transporting waste to landfill. These savings in avoided costs are considrable over time.

The introduction of CDL can also be used to encourage a new approach in the people to waste management. Much of the organic waste can be separated out, chipped, and so produce a valuable resource. The report clearly lays out how a public awareness and education campaign can be conducted that would promote and reinforce the changes. There are also several existing initiatives in the Marshall Islands that can be cooperated with to maximise this effect. Working with the IWP, for example, would allow preliminary testing and improvement on any project plan, whilst complimenting the IWP project activities.

Finally, by small extra care and effort during the MRF establishment, the project could demonstrate a World Class sustainable development model by running any diesel engines on coconut oil, by harvesting all water needs from the processing shed roof and storing in rainwater tanks, by constructing a compost toilet for human waste, and by installing a grid-connected solar power system (i.e. one without batteries) that would produce the annual electricity requirement. Thus, the entire operation can 'close the loops' on energy, water, and waste. All three of these essential elements are issues of grave concern in the urban atoll environment.

The report also contains a sample budget and implementation plan that would result in a major reduction in waste currently landfilled in the Marshall Islands.

1.2 Purpose and Scope of this Study

Dealing with today's wastes when one lives on an Atoll is a very demanding activity. Land is scarce, and the environment so very easily polluted, with the water, fresh or sea, being so close at any time. Solid Waste Management (SWM) rapidly becomes a great problem, one that is often seen as unsolvable, or else very expensive to deal with effectively. However, like most things, the solution depends on the approach to the problem.

This document comprises an Implementation Plan that uses economic tools to improve the Solid Waste Management in the Marshall Islands. Success requires a fundamentally different approach to the conventional 'problem' of waste management. Waste streams contain great resources, and the plan detailed here can capture those resources. This plan draws from similar operating systems to provide insight.

Over the last year, Kiribati – an atoll nation similar in may ways to the Marshall Islands, has put in place a large recycling operation financed through the leverage available using Container Deposit Legislation (CDL). Deposit-type systems are a recognised Solid Waste Management tool incorporating Extended Producer Responsibility (EPR), which is when the means to deal with the waste is included with the product. The Kiribati recycling system is financed by capturing the high value of the aluminium cans in the waste stream. This is done by giving the cans a value using a deposit system. This approach is used in many countries as a waste management strategy, and has proved very successful. The Project that created the Kiribati system was financed through its implementation stage by a coalition of donors, the largest being the UNDP. Part of the Project Specification was to produce a model that could be used in other Pacific Island counties should that be feasible. The Republic of the Marshall Islands (RMI) suffers from similar waste management problems to Kiribati. This feasibility study for the RMI draws from the experience of the Kiribati model as Kiribati has now six months of full operation. Also, it is apparent from the Kiribati experience that benefits to SWM are wider than just the materials included in the deposit refund scheme.

This report will thus evaluate the logistics, costs and feasibility of establishing a recycling project in the RMI. It proposes that Container Deposit legislation would provide the financial and material flows required to operate a comprehensive recycling system for the RMI, and one that requires no external financing after establishment, and one that can operate as a business, under contract to Government.

1.3 Objectives of this Study

- Develop a financially sustainable recycling operation that provides employment to Marshallese people;
- Recover resources from the waste stream, and reduce the effort required by Government to collect and landfill wastes.
- Produce an example of the Private Sector providing public services under contract to the RMI Government.
- Reverse the ongoing accumulation of waste in the sea, beaches and other land areas of the islands of the RMI.

1.4 Research Required

- Issues concerning the drafting of suitable Container Deposit Legislation for the RMI;
- Identify types of media available for a public awareness program associated with recycling, and cost typical activities using those media;
- Outline the elements of a public awareness campaign to compliment the setting up of a recycling operation;
- Identify local organizations with whom partnerships might be formed to achieve a successful recycling operation;
- Identify any current activities on SWM that any recycling project might cooperate with;

- Suitable equipment that may be required by the project;
- Analyse data from any previous waste stream analyses;
- Collect data on imports, and analyse data to indicate material flows for recycling;
- Identify current recycling activities within the RMI;
- Identify markets for materials collected for recycling;
- Identify shipping costs to markets identified;

As a result of the research conducted above, contained at the relevant sections of this report, the following is also produced below:

- ❖ A Project Implementation Plan for the practical and logistical elements of the recycling program.

- ❖ Advice as to which materials to incorporate in the system;

- ❖ Quantities of recyclable materials expected to be available;

- ❖ Cost estimates of a Materials Recovery Facility in Majuro;

The necessary research to produce this report was conducted in the twenty days between June 3rd and June 23rd 2005 in Majuro, Marshall Islands.

2. The Recycling System

Container Deposit Legislation (CDL) systems are fairly common all over the World, but have not been used much in the Pacific untill recently. They use a small deposit paid on an item at sale or import, which is then refunded when the item is bought back to a collection point for recycling.

2.1 What is a Container Deposit System?

A 'Container Deposit System' is where Beverage Containers (drink cans and bottles) have a deposit included in with the purchase price. When the can and bottles are returned to designated collection points, whoever brings them in gets a refund. The deposits paid are usually only a few cents; and refunds commonly are slightly less than the deposit, so that the cost of collecting and processing the waste containers is paid for (a 'Handling Fee'). These systems have often been used to control litter, but as waste management becomes more and more expensive, using a deposit / refund system can massively increase the amount of cans and bottles collected for recycling, so providing employment, and saving expensive landfill space. A Container Deposit System is an example of Extended Producer Responsibility (EPR), where the producer and purchaser of a product that becomes waste is economically involved in dealing with that waste. EPR is an economic tool to make sure that those who make the waste pay for the solution. EPR puts a value on waste.

These systems can use either the shops that sell the products as collection points, or designated Collection Points that only collect the specified waste items. Using the shops is fine in a highly developed economy with sophisticated logistics systems, and Government can be completely uninvolved, save to pass legislation, but in a simpler commercial environment, with many small stores involved, this becomes harder to arrange. The model outlined below uses the designated Collection Point model, as used in South Australia and Kiribati, as this is relatively easy to set up and operates well in a simple economy.

2.2 Advantages of CDL systems

Container Deposit systems have many advantages that accrue to Government, business, and the wider community,. All these advantages are effectively financed by a tiny charge on each beverage container that participates in the system, and the resulting very low cost of recovering valuable materials. Advantages include:

- Dramatic reduction in litter where beverage container litter is a problem;
- Very high recovery rates for beverage containers for recycling;
- Increased national export income in small islands, in particular from recovered aluminium;
- Generate employment;
- Community fundraising potential by organisations who collect beverage containers from their constituencies;
- Generation of sufficient income to make a wider recycling operation self-sustaining;
- Reduce the quantity of garbage requiring collection by local Government;
- Reduce the quantity of garbage requiring landfill, thus increasing the life of the landfill, and decreasing the landfill cost per year;
- Normally 'uneconomic' materials can be include in the scheme for recycling;
- Recycled materials flows become very consistent.

The indirect effects are that that the waste stream now becomes perceived as a source of resources, fundamentally changing the way in which waste is dealt with. Also, once CDL is in place to deal with beverage containers, additional materials and items can be specified that can be recovered for recycling, through revising Regulations.

2.3 How might a CDL system work in the Marshall Islands?

A specified deposit, let us say 6 cents, is paid at import for every aluminium drink can or PET plastic (No.1) bottle. The money, paid by the importer, is collected by the Customs when filing an import entry. The money is then deposited into escrow account, often referred to as a 'Special Fund', which is set up by the legislation under an Act of the Nitijela.

The money in the escrow account is only available for refunding the items which have had a deposit paid, or associated recycling activities. The Importer has now paid 6 cents deposit per item, and must pass the 6c deposit on to the stores, who must pass it on to the consumer. *The deposit belongs to whoever holds the can*. The consumer drinks the drink, collects their cans, and brings the cans to a Collection Point run by the recycling system 'Operator', and receives 5 cents per item, or effectively 25c for 5 cans and bottles. This rate of Refund is determined in the Regulations under the Container Deposit Legislation. If the minimum payout is set at 25c for five items, then this greatly simplifies refund payments and monitoring, as cash is paid out to people who bring in cans for refunds, and these cash payments must be carefully reconciled with items collected and paid for by the system. (The fact that the US$ system uses 25c coins is the determining factor in the Marshallese case.) The Refund only needs to be large enough to encourage a high return rate of containers, that is its sole purpose.

The recycling system 'Operator' claims back 6 cents for every item refunded, from the escrow account administrator. Thus the 'Operator' receives a 1c 'Handling Fee' that the Operator keeps as a contribution to running costs. This Refund is claimed by completing a specified claim form, which is submitted to the escrow account administrator, (possibly the Minister of Finance), who administers the Fund. The recycling system 'Operator' crushes the material and exports and sells it for recycling, and receives payment for the value of the materials exported. The 'Operator' must pay all costs of operating the system, and crushing and exporting materials, from the income received from the handling fee, and the money from materials. The Handling Fee component is essential to create a system the recycles anything other than aluminium cans as only aluminium cans are worth collecting if there is no handling fee in place.

A schematic of the system proposed might look like this:

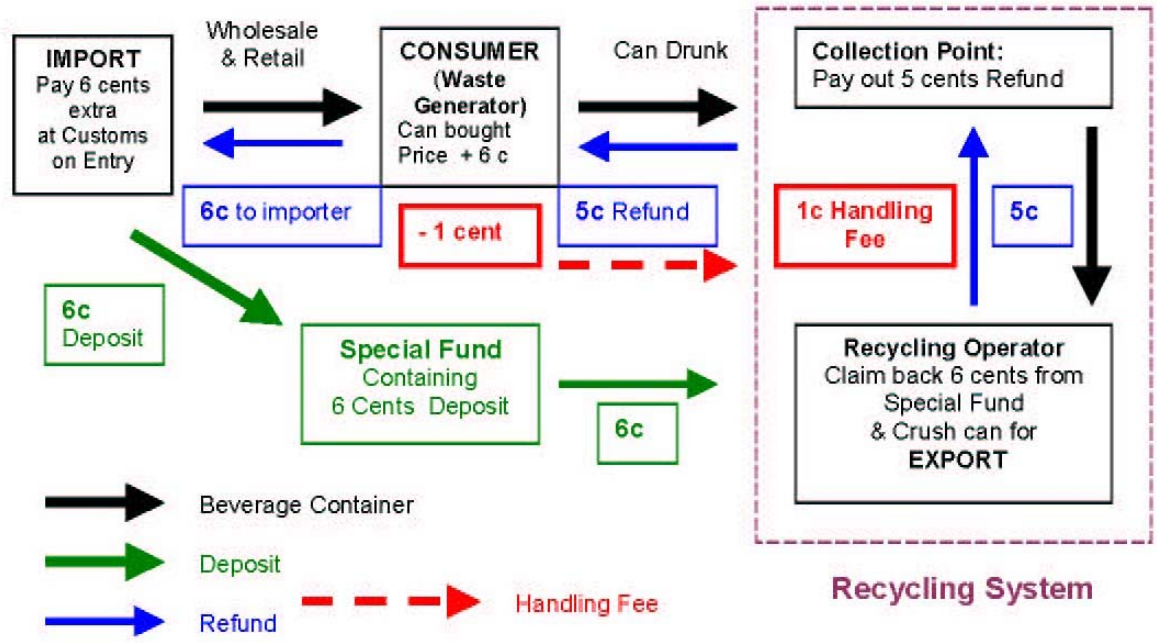

Figure 1: Container Deposit System for the Marshall Islands

Unredeemed deposits are those deposits paid into the Fund for items that are never returned (thrown in the sea for example). That money will build up over time, once the system has settled do. The legislation should specify that money in the Fund is only available for Refunds or for capital equipment replacement for the Recycling system equipment.

The recycling system envisaged would collect drink containers of Aluminium cans, glass bottles, and PET (no.1) plastic. It would also be able to recycle HDPE (No.2) plastic bottles, and cardboard cartons, although these would not be part of the deposit system, as initially there is no advantage in making the system too complicated. Aluminium will provide the bulk of the revenue, and the operation uses this high value material to effectively subsidise the recycling of less valuable materials, such as glass bottles and cardboard. The system is expected to generate about twelve full time jobs, plus generate fundraising opportunities for schools and churches and the like through collecting cans and bottles, from their constituents for refund. It will also create some informal jobs through people who make a living by searching out cans and bottles.

2.4 System Monitoring

It is essential with such a system that there is a full monitoring program. The greatest danger is that of paying out refunds twice! Kiribati has developed a simple system that is easy for all staff to comply with, yet provides a tight monitoring of material flows. This not only ensures that cans and bottles are not bought twice (by leaking out of the 'Back Door' and round to the collection point again), but also provides ongoing data for Refund Claims from the Deposit Fund, and information to the operator regarding when Full Container Loads (FCLs) will be ready for shipment. The system used in Kiribati will be readily transferable to the Marshalls, with little, if any, adjustment required.

2.5 Recycling System Economics

Below is an analysis of the practical economics of such a system as described above. Figures used have all erred to the conservative side, so that a hard-headed approach is taken to the business side of the recycling operation. The next section – 3 – looks at the business expenses expected to operate the system.

2.5.1 Items in waste stream suitable for CDL and recycling

The main types of beverages widely available in the Marshalls, Beer, Soda, Water, Fruit Juices, Wines & Spirits, and Mixers. Of these, soda in aluminium cans is by far the largest group, with beer in cans second. Detailed data for the other groups is not available as to quantity, but observations of bar sales, and larger stores stocks, indicate that a considerable quantity of PET (No.1 plastic) is available; also HDPE (No.2). Both materials are easily recycled. Quite a quantity of glass exists, principally as beer bottles, soy sauce bottles, wines and spirits. Glass is readily recycled, however, it is low value and difficult to handle, and also prone to shipment rejection as a high level of product quality is demanded. Glass can be used in the Marshalls, once crushed, as a construction material for non-structural concrete, displacing coral mined from the lagoon. This coral displacement effectively reduces the damage that coral mining inevitably causes to local ecosystems.

2.5.2 Potential Material Flows

Beer, Soda, and Water beverage containers comprise the bulk of the materials of interest, comprising principally aluminium and PET, and so below is an economic analysis of a potential system using only those items. If glass containers were added, income would increase without increasing costs much. Whilst there is some data for the main beverage categories, it is not systematically collected. Thus there is some uncertainty over the actual amounts of beer and soda being imported into the Marshall Islands. The following numbers all refer to FY 2004, and are extrapolated from Import Entry data for the months of May and June, and then annualised.[1]

[1] Data provided by EPPSO, pers comm Carl Hacker, Director, 26/6/05

2.5.3 Beer Cans

Discussions with Shipping agents initially suggested that the figure for beer was perhaps twelve containers per month. Recently, beer consumption has dropped due to increase taxation of 25c per can that has been levied to support the CMI. At 12 containers per month average, this would equate to around 5.8 million cans/bottles per year.

From a brief survey by the Director of Customs of his data regarding beer imports, he estimated around 6 per month in FY 2004. This would equal around 2.9 million cans/bottles per year of beer. Two busy local bars surveyed consumed about 175,000 cans/bottles per year together. Much beer is consumed outside of bars.

Initial work by EPPSO indicated 44 million cans per year, however, this seemed highly unlikely. Revised work resulted in a figure of 785,000, based on figures for May and June 2004. This seems low, considering that Kiribati consumes 4.5 million per year, with a much lower per capita GDP but a similar urban population.
Looking at data for soda imports[2], May and June are quiet months, so that may be the same with beer. However, the figure of 780,000 for beer will be used, although it is expected that this is low.

2.5.4 Soda Cans

From a brief survey by the Director of Customs of his data, indications were that there were about 116 containers of soda imported in 2004, equal to about 5.9 million cans. From EPPSO data for May and June 2004 again, a figure of 4,965,000 is obtained per year.

Again the lower figure will be used, although, from the Customs data of containers of Soda, May and June do appear to be quiet months[3] (see appendix XX for raw data).

2.5.5 Water

EPPSO data indicates 765,000 bottles of water imported per year. The Director of Customs information indicated about 11 containers per annum, which is reasonably consistent with the EPPSO figure. Added to this is around 200,000 bottles produced by Pacific Pure Water, the local water bottler, to give a figure of about 960,000 bottles of water. These are all PET.

2.5.6 Totals

780,000 cans and bottles of beer, plus 4,960,000 cans of soda, plus 960,000 bottles of water give a potential flow of 6.7 million items. Given that virtually all the Soda is in cans, and all the water is in PET bottles, and most of the beer is in cans, that gives us figures of around 5.2 million aluminium cans available. This equates to over 80 tonnes of aluminium. PET is harder to calculate given the varied size of PET bottles, but would be at a minimum 40 tonnes.

2.5.7 Markets

Ready markets exist for aluminium cans, PET and HDPE plastics, and cardboard. Typical prices paid, per tonne in Australia, in mid 2005, are:

- ⇒ Aluminium cans: A$1,350[4] US$1,000
- ⇒ PET/HDPE: A$350[5] US$262
- ⇒ Cardboard: A$80[6] US$60

These represent the current prices paid to the buyer of materials from the KSWMP. This buyer buys from several PICs and accepts materials freight paid, FOB, and handles all clearance and trucking on the Australian end. Enquires with other recyclers indicate that prices are competitive, especially given that the seller in the Pacific Islands has no need to handle any operations at the receiving end.

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[2] Appendix X table X
[3] ibid
[4] Macs Metals, March 24th 2005 to KSWMP payment advice
[5] Alan Morgan, Macs Metals, pers comm.15/2/05
[6] ibid: pers comm. 25/7/05

2.5.8 Expected Recovery Rates.

The experience of Kiribati, and other countries[7], is that where there is a ready system to accept the cans and bottles for refund, very high rates of return can be obtained, especially where there is high unemployment and low wages. Working on an assumption that a 90% return rate will be achieved (in practise this should be higher), the above figures indicate that 6 million items will enter the system. At one cent per item, this equals $60,000. Aluminium would amount to around 72t, and PET to 36t.

2.6 Price Impact of CDL as a Percentage of Retail Cost

Is this going to impact prices? Beer varies in price typically from $1.50 to $2.50, with a median price of $1.82 from the several outlets surveyed. At a 6c Deposit, this would be about 3% of the price, an amount easily lost in the 'noise of varying prices. The cheapest Soda is hardest hit, with some cans being sold for 49c. Given the huge prevalence of diabetes in the Marshalls, and the fact that a can of Soda typically contains 10 teaspoons of sugar, the price increase can only be a good thing if it discourages a little marginal consumption. Soda at a typical small store price of 75c would be hit by an 8% increase. See Appendix V for beverage price information.

Six cents might appear an odd amount for the retailers to handle. It would remain to be seen how much the price increases actually were. In Kiribati, a 5c deposit has seen price changes vary from zero to ten cents. For the operators of Bars and Hotels, places where beverages are consumed on the premises, there is no need to change prices, as they can retain the cans and bottles for Refund from the recycling system. In this case the Bar pays the 1c Handling Fee (i.e. it costs the bar 1c), but as the bar is effectively the Waste Generator, this is perfectly in order, as the bar gains from generating waste that the wider society must deal with. Bars typically charge round figures for prices for ease of operation, just as the recycling system might chose a 6c Deposit and a 5c Refund for ease of operation.

[7] Independent Review of Container Deposit Legislation 2002 Dr. Stuart White, Institute of Sustainable Futures, Sydney, Aus.

3 The Recycling Business

Taking the system detailed in the previous section as the model to be implemented, we now look at the costs of operating that business, and the potential for revenue generation. Working on an assumption that a 90% return rate will be achieved (in practise this may well be higher), the above figures indicate that 6 million items will enter the system. At one cent per item, this equals $60,000. Aluminium would amount to around 72t, and PET to 36t. This analysis below is ignoring income from glass bottles handling charges for beer, wines and spirits, and also PET Vodka bottles, which are common in Majuro. These would all add positively to the overall economics. Shipping densities have been pitched low, so as to give a maximum cost picture for shipping; these densities can easily be improved, but depend on equipment purchased. The point here is not to take an overly optimistic scenario, as this may give an unrealistic picture.

3.1 Income

At a 90% recovery rate, and using current market rates, basic income would look like this:

⇒ 72 tonnes Aluminium cans	$72,000
⇒ 36 tonnes PET bottles	$ 9,400
⇒ 1c Handling Charge 6 million items	$60,000
Total	**$141,400**

3.2 Cost of Business

Of course there are considerable expenses involved in a national recycling operation that would handle, on the above figures, about 24,000 items per day on average, or 120,000 per week. These costs fall into three basic categories of wages, shipping, and operational overheads:

3.2.1 Wages

Using the Kiribati operation as a guide, which handles about 20,000 items per day on average, it is estimated that 12 positions might be required.

- Collection Point Operators: the people who measure the items bought in for refund at the Collection Points, and pay out the money for refunds. This position has to handle, and account for, quite a quantity of cash. It is similar to someone who is taking money behind a bar or a busy store. In Kiribati, women fill all these positions. It is estimated that seven positions could be created, but this includes Ebeye, and perhaps Jaluit. The Collection Point Operators will also act as labourers in the MRF crushing cans and bottles when they are not at Collection Points, as many Collection Points do not require 5-day operation, opening for half days two or three times each week.
- Truck Driver: The truck that collects from the Collection Points, and delivers to the MRF. A single position.
- Labourers: one as a Truck Driver's Assistant; one full time in the MRF, or perhaps at Ebeye crushing cans.
- Foreman: in the MRF.
- Manager: overseeing the whole operation.

Below is an estimation of the annual cost of those positions, based on PSC rates for similar government positions. This includes MISSA contributions from the system Operator. Total wage bill, per annum, at these rates, is **$78,000**.

Position	Labourer	Driver	Collection Point Operator	Foreman	Manager
No. reqd.	2	1	7	1	1
Salary	$4,600	$5,900	$5,300	$7,800	$18,000
Total	$9,200	$5,900	$37,100	$7,800	$18,000

Table I: Estimated number of positions and wage costs

3.2.2 Shipping Costs, including Container Movements

Such an operation as this requires continual movement of empty containers into the MRF for filling, and full containers for export.

Empty shipping containers will need be moved from the Stevedore yard at the Delap dock, to the MRF, and then back after packing. This requires two lifts and two transports with a side-lifter. Chief Container Service, a division of Swire Company, one of the world's largest shipping companies, can offer a rate to Australia of $900, plus Bunker Adjustment Factor (BAF), which will change depending on world fuel oil prices. Experience with Kiribati indicates that if container turnover is reasonably brisk, container rental is not required. These costs are summarised in Table X below

Item	Stevedore Charges	Lifting Charge (two lifts)	Side-lifter Transport (two trips)	Freight CCS	BAF	Total
20ft FCL	$52	$80 ($40)	$220 ($110)	$900	$270	***$1522***

Table II: Cost of shipping to Australia

Shipping 72 tonnes of aluminium cans, at 10 tonnes[8] per 20ft FCL, would require seven containers. 36 tonnes of PET, if shredded, might require six containers[9]. A total of thirteen containers at $1522 each would require about **$20,000** for container shipping in total.

3.2.3 Operational Overheads: Monthly Costs

Monthly operational expenses typically include: diesel fuel, electricity, machine maintenance, workforce support (clean up soap, tea, coffee, cold water, toilet paper,) Site Office costs (paper, toner, files, account ledger books, computer repairs and support), tools, locks, vehicle repairs, site maintenance.

Some operational costs can be hard to predict. To gain an estimate, reference is made to the Tarawa MRF and associated Collection Points, where there is very comprehensive data for 6 months of commercial operation. Costs in Tarawa are on the whole lower than in Majuro, and in A$; the workforce comprises 10 persons. Annualised costs of the Tarawa System come in at A$ 9,400/yr, or just over $7,000, or around $600 per month. In Tarawa, a 2 ton truck is travelling a 40km road five days a week, similar to Majuro. The price of fuel is roughly comparable as Majuro, and in Kiribati the fuel cost is about $200/mth. Price of electricity is A$0.47kWhr, approximately double the Majuro cost, and the bill is around $100/mth. However, equipment in Majuro would likely be bigger due to larger volumes of material to process, so the difference might soon evaporate. Given the lower value of the A$, and the slightly larger size of the operation in Majuro, an estimated figure of **$12,000/yr,** or $1,000/mth should allow plenty of room for error.

3.2.4 Operational Overheads: Annual Costs

Land Rental

Land Rental charges are not easy to estimate, given the sit is currently unknown. A suitable site would be a piece of land that has previously been a landfill site, but is still unstable enough that building cannot yet be done at the site. Using such a piece of land as an MRF for a few years would allow settling so that it would be useful for more permanent structures later. A figure of $10,000/yr per acre has been used. Perhaps two acres might be required for an MRF. Land Rental would thus be **$20,000**

Insurances

There are several insurances required for a competent commercial operation, principally vehicle, Public Liability, and Workers Compensation.

[8] 10t/20ft FCL is using a very small press; a more suitable item would get 15t/20ft FCL.

[9] Estimated; depends on shredder used.

After discussions with a local insurer, based in Guam, the following figures were obtained. These are for indicative purposes, as actual insurance costs can only be obtained with a working operation with specified insurance history, equipment and costs. With that caveat, the following provides an indication of costs:

New $50,000 truck, fully comprehensive,		$2,300/yr
New $75,000 truck, fully comprehensive,		$3,300/yr
$1million Public Liability	up to	$5,000/yr
Workers compensation, High Risk business (on a $80,000 annual wage bill),	up to	$2,000/yr
Total Insurance per annum		**$10,300**

3.3 Total Expenditures

Annualised estimated expenditures are thus estimated at:

Wages	$78,000
Shipping	$20,000
Monthly Operational costs/yr	$12,000
Land Rental	$20,000
Insurances	$10,300
Total	$140,300

3.4 Profit & Loss Analysis

This figure is of course very close to the projected income. However, significant savings can be made by using a crushing press for aluminium cans that puts 15t per 20ft container. There are no doubt other areas where significant savings can be made, especially by an established business.

Also, experience suggests that the figure for beer consumption used is very low, and increased quantities of beer cans will add significantly to income as they provide both 1c per unit, plus the value of the aluminium at 1.5c each, whilst adding very little to expenditures. There would also be other income from glass beverage containers, primarily beer, wine and spirits bottles, and also some other PET containers, again vodka bottles. These could easily amount to perhaps half a million per year, given that beer imported from New Zealand and Australia is almost exclusively in glass.

The projections for the Kiribati system gave a similar slim margin from the initial paper study, but once the system was operational, surplus was found to be much more in line with a commercially acceptable level, as figures used had been, as here, on the conservative side.

3.5 Capital Investment

Capital investment is required in machinery for crushing and baling; a truck for Collection Point collections; A portable site office building for MRF administration and lunch room for workers; an open shed area for processing of materials, free from sun and rain; Shipping containers for conversion to Collection Points; Signage; office equipment; pallet truck, sack trolleys, and some hand tools.

The main items comprise:

- A press for baling cans, ideally of about 3 HP suitable to gain an FCL weight of about 15-16 tonnes;
- A vertical baler of about 10 HP suitable for baling PET and HDPE plastic bottles and Cardboard cartons;

- A 12" Chipper that can chip PET and HDPE, and be used to chip Green Waste;
- A Processing Shed which can accommodate the presses and also allow truck unloading and parking in bad weather;
- A Portable Building of shipping container size, to act as a site office and workers lunch room;
- A Compost Toilet facility (to avoid expensive sewer connections);
- Water tanks to collect rainwater from roofs (to provide water without urban reticulation connection);
- Six 20ft shipping containers in good condition for conversion as Collection Points
- Five 20ft shipping containers to serve as holding / lock-up areas for tools and materials in MRF;
- Desk top Computer, and printer/scanner/photocopier/fax machine;
- Electrical wiring for shed and office;
- Water piping for rain water collection system with washing taps;
- High pressure water washer for truck and machine / processing area wash-down;
- Wool sacks for handling uncrushed cans and bottles;
- Wire frames for measures;

If the operation of the Container Deposit system is contracted out to a Private Sector Operator, who has a management contract with the RMI, *then all the capital equipment remains the property of the RMI.* Under this scenario, Capital Investment is made by the RMI, perhaps with the assistance of a Donor Agency. These items are costed out in the Project Budget in Section 7, and typical examples of equipment are detailed in Appendix III**.** A full costing analysis has not been done, but prices are indicative.

3.6 Suitable site for an MRF in Majuro

The study has identified potential sites of interest, but they are in private land ownership it is believed. No landowners were approached as part of this study, thus potential sites are not identified. Areas recently landfilled can be suitable sites whilst the land is settling, as an MRF requires no permanent structures, and the operation of containers and trucks would help settle the land for future use. A good MRF site would be close to Delap Dock for exports.

A suitable site needs good road access for large trucks carrying containers. It should not be adjacent to residential areas as it is an industrial facility. It needs to be fenced, and secure enough that cans and bottles cannot be removed at night and resold for refund. Ideally, it would not be west of the Delap dock, to avoid unnecessary container traffic through the urban D-U-D.

The site needs to be big enough to easily turn container-carrying trucks around without difficulty, and plenty of room to park containers awaiting packing. It should also be readily accessible to the public for vehicles bringing large quantities of cans and bottles in for recycling, as well as other materials that the MRF may be handling. The MRF needs access to a 3-phase power supply - for best results - and telephone lines. None of the buildings required need permanent foundations, even the big processing shed. This allows the MRF to re-located at a later date should completed landfill space be required, and the existing site ready for reuse. In this way, the MRF can be used as a land recycling facility too.

4. Container Deposit Legislation

To put into operation such a recycling system as described in the previous section requires legislation, passed by the Nitijela, that requires a deposit to be paid on certain specified items, i.e. aluminium drink cans, PET drink bottles, and glass drink bottles. These deposits will be paid at import by imported drinks, and at the point of import of the pellets of PET to blow bottles for locally produced water sales.

4.1 Outline of the Legislation

A look at the Kiribati example will help. In December 2004, The Maneaba Ni Maungatabu, the Parliament of Kiribati, passed the Special Fund (Waste Materials Recovery) Act. This Act set up a Special Fund, into which deposits are paid by specified items. The items that are required to pay a deposit are then specified in Regulations promulgated under the Act. A copy of both the Act, and Regulations is included at Appendix II**.** The specified items required to pay at import are beer, soft drink and water cans and bottles, and also lead-acid batteries. The money in the fund can only be used to pay refunds on deposits already paid. (Any money that remains in the fund, that is unredeemed deposits, is also specified to be only available for SWM activities, and in practise it is used for capital equipment replacement for the recycling system.

4.2 Process Required to Enact Legislation

In the RMI, in order to put such a piece of legislation in place, the following procedure would need be followed:[10]

- ⇒ A Cabinet Paper on the subject, proposing the legislation as an effective means to address the solid waste issue, and save the government money in the future, needs to be presented to Cabinet for their consideration;
- ⇒ The Cabinet accepts the Paper's recommendation to draft legislation, and directs the Office of the Attorney General to draft suitable legislation;
- ⇒ Legislation is drafted, and presented to Cabinet through the Office of the President;
- ⇒ Cabinet advises the Attorney General as to any changes it requires in the legislation;
- ⇒ Final Draft goes back to Cabinet;
- ⇒ The Legislation is placed on the Government Legislative Programme for the next session of the Nitijela;
- ⇒ Nitijela conducts a first reading, and may pass the Bill for review;
- ⇒ A Public Hearing is held on the Legislation, where the Public can make submissions;
- ⇒ A Committee then reviews the legislation, and may recommend a Second Reading;
- ⇒ The Bill is presented again to the Nitijela (possibly with some amendments as a result of the previous steps) for a Second Reading;
- ⇒ If the Bill passes, it receives Assent from the President and becomes an Act and law.

This entire process can clearly take some time. However, as can be seen from the Kiribati legislation**,** the Act itself need not be complex, the detail being in the Regulations. This approach allows more flexibility both for Government, public and business to fine tune the system to achieve the best outcomes for the entire community, without having to go back to the Nitijela to make any changes, as these can be done by the Government of the day through the prescribed regulatory process.

[10] As described to the author by the Assistant Attorney General of the RMI on Tuesday 14th June 2005

4.3 Regulations

Any Regulations proposed under the Act would need to follow a similar process:

- ⇒ Regulations are presented to Cabinet for approval by the Office of the President;
- ⇒ Cabinet sends the Regulations to the Office of the Attorney General;
- ⇒ The AG checks them for administrative procedure and constitutionality;
- ⇒ The Regulations are posted, with 30 days for the Public to respond;
- ⇒ If all acceptable, the Regulations are Published and Enacted.

4.4 Time Frame for Passing Legislation

The Nitijela sits twice a year for fifty days each sitting, starting in January and again in August. It is quite feasible for the First and Second Readings, and associated Public Hearings and Committee Stage, to occur during a single sitting. This would of course require that the legislation had been agreed by Cabinet and drafted before the sitting commenced. This in turn would require that a Government Department had proposed the Paper on the subject, and done the research required to have a clear idea of what form the Act would take. It seems likely that the appropriate Government agency to present a Paper to Cabinet on CDL would be the Office of Environmental Planning & Policy Coordination. There has been close cooperation with the Director of OEPPC during the course of this study research phase.

The logistics and planning of any project to implement a CDL system in the RMI will be dictated by the schedule associated with passing the required legislation. This is an essential, and defining, element of such a project, and determines all other planning aspects.

The Kiribati model is very simple in that it allows the details to be dealt with later, and adjusted as circumstances change. This is of great advantage when initially drafting the legislation for a system not yet in operation. It also allows more time to work out the details of the Regulations, whilst the Bill is working its way through the legislative process. This allows for more time for consultations with the Community whilst the ball of CDL is already rolling.

The approach of the detail being contained in Regulations also allows the Government great flexibility in the future to deal with some other SWM issues such as scrap vehicles and scrap air conditioners, both of which are an increasing problem in urban Marshallese areas, but, as the price of metals climbs steeply, may be also recovered using the same legislation. The cost of recovery to a processing facility of such materials is frequently the limiting factor in recovery, yet the cost to the Government, and by extension, the wider community of taxpayers, is great in landfill space or pollution and health effects.

5. Public Awareness Programme

Any project of this nature requires a publicity program to run alongside it to educate the Public to the changes in waste management. The new recycling system can also be used to encourage an overall new approach to the way people create and manage waste. If conducted carefully, a public awareness program can capitalise greatly on the new mood that real change is happening. The primary element, and the one that has most effect on all other aspects of such a program, is to choose a *Kajin Majol* name for the new system that is readily accepted by the population. Once this is in place, the rest may come much easier.

5.1 A *Kajin Majol* Name

This must be short, lyrical, and ideally humourous. For example, in Kiribati, the name developed was Kaoki Mange!: it rolls off the tongue, and it means 'Send Back the Rubbish!' which provided a simple and humourous answer to Kiribati famous beer can litter problem. It also described the system of exporting waste for industrial recycling far more effectively than earlier attempts to develop a local language word for recycling. The name embodies both the solution to the problem, and the process of dealing with the waste. This slogan was developed though informal short workshops with local NGO educators, people who work with public education on a daily basis.

5.2 Media Used in Public Awareness

A public awareness program should work primarily through the three available media of newspaper advertisements, radio spots, and simple TV adverts for local cable TV use. Typical budget requirements can be found in the Implementation Plan at Table **X.** Cost are based on a nine month saturation coverage of one newspaper advert per week in the Marshall Islands Journal, four radio spots per day on V7AB AM (free spots for community announcements) and the top FM radio Station in Majuro and Ebeye, Emon FM, and a daily slot on the Public announcements on Marshalls Broadcasting Company (MBC) for 40 weeks.

The other area that would be very fruitful is to develop a suitable play of 20 minutes or so duration that could be shown at schools and any appropriate public event where many people gather. A crucial factor of Play development is the writing of one or two songs that contain within them the signature 'jingle' which can then be used for the radio and TV spots. This is an essential component of the whole process to develop a local name and at least one motivation slogan to tag the recycling system. This must be developed right at the beginning of the whole program.

5.3 Communications Strategy

The overall aim of communications is to condense the activities and purpose of the recycling system to a name and one or two slogans. For example 'Don't Drink and Drive' is well understood in many countries as to mean: 'do not drink excessive amounts of alcohol and drive vehicles as that is how people get killed, and your life will get in a big mess one way or another if you are involved in such accidents'. It does not mean "Don't drink anything and drive anything" which is literally what it says. Similarly, the aim here is to get people to participate in the recycling system because they see it as overall to their personal and the community advantage. And ideally, it shows that *not* to do so is being anti-social in some way as it is contributing to the degradation of life in the Marshall Islands. To do this takes a degree of skill. However, there are some simple steps along the way that can help.

Overall Objective:

Make the recycling system an integral part of daily life in the Marshall Islands.

Aim:

To provide a small set of visual and aural signs that become universally recognisable in the Marshall Islands that identify the recycling and minimisation of waste materials.

5.3.1 Give the Project a Kajin Majol Name

This is the number one most important aspect that will likely define the real success of a public awareness program to run alongside the introduction of CDL.

Step 1:

Convene a small working group of media and public awareness professionals and agree on a name for the project in Marshallese. Not more than three words. Should be snappy.

Step 2:

Test this name on a few local groups: school kids, teachers; media people; educators; then the general public through a small survey. This need not be a long process, as poor slogan will soon show up negative.

Step 3:

Run a week of two simple Radio Spots a day and then survey briefly to see if people remember the slogan at all.

5.3.2 Develop a Recycling Play

A Play is a very effective way to reach a lot of people who are not so use to absorbing information through written media. The Play will also provide songs for the Radio Spots that are developed.

Step 1:

Commence development of a recycling play once step two above is reached. Choose a local group who have experience in this kind of public awareness work.

Step 2:

Once there is confidence in the name, develop a song or two that are part of the play, but with a good 'jingle' aspect, so that it can be used in the radio and TV spots.

Step 3:

Once the play is rehearsed, play it a few times to schools to test it, and modify to suit.

Step 4:

As the theatre group become comfortable playing the song, take them to a recoding studio and record the Play songs.

5.3.3 Make Radio Spots

Radio spots are a very effective and cheap way to achieve high visibility for the project. Also, as they are not obtrusive, they provide a way to daily reinforce the message. Radio can also reach a large number of people, especially in the Marshalls where there are few radio stations.

Step 1:

Take the Play song recording, and cut out suitable bits to bracket a message that pushes the name, and contains a message on waste. Aim at 30-second spots, to keep the message snappy.

Step 2:
Make more spots, and always include the local name along with different messages.

Step 3:
Try out new slogans and see what 'sticks'.

5.3.4 Newspaper Adverts

Develop Newspaper adverts that follow a standard, easily recognisable format in which the name and slogan are dominant, but allow insertion of different messages. Develop through time a visual 'Logo' device that can be used subsequently on Sign Boards and Collection Points to identify Recycling Activities on the street.

5.3.5 Make TV spots

TV ads in the Marshalls are primarily in the form of static public announcements on a 'endless' roll that continues for 24 hours. The TV ad can be drawn from materials used to make the Newspaper ads. Simple TV Community service TV ads will use the local name and slogan predominantly. TV work will involve developing visual signs, as will newspaper adverts.

By starting with the naming process, and then the Play, and then the Radio spots and Newspaper ads, a consistent stream of experience builds up. It is very important to be consistent with messaging across all media, whilst using the particular media's strengths in creative ways.

5.4 Overall Costs

Costs for developing a play are not known at this stage, but other Media costs in Majuro are detailed in Table III below:

Media	Unit	Cost/unit	Frequency	Day or weeks	Total cost
Radio spots Emon FM	30sec	$2.25	4/day	270 days	$2,430
Radio spots V7AB	30sec	free	4/day	270	$0
Marshall Is. Journal	½ page	$200	1/week	36wks	$7,200
MBC TV	24 hr	$10	7/week	30	$2,100
Total				**9 months**	**$11,730**

Table III: Media Costs for Nine Months

6. Other Waste Reduction Strategies

The introduction of the recycling system can be used to push wider changes to the waste management system. In particular, the removal of organic wastes is a very significant step to take. Organic materials in the waste stream are a valuable resource than can be used, just as aluminium cans are. Organic materials in landfills on atolls are not just an expensive way to take up valuable landfill space, but actually contribute to the detriment of the soil. Atoll soils are so poor anyway, that any removal of plant matter from the ecosystem has a degrading effect. Most of the goodness of the soil will be locked up in plants, as the plants specifically draw this from the soil. By taking the organic materials away, and mixing them with inorganic, man-made wastes, to produce a completely useless cocktail, is completely detrimental to the longer term sustainability of atoll life. Plants also play a crucial role in many atoll environments by cleaning ground water lens, and to degrade the soils is to damage the quality of ground water. Typically, the poorest members of the community rely on groundwater as they often have no rainwater tanks, and probably no mains water connection. Food wastes in particular also encourage rats and flies to landfills, and again it is generally the poorest members of the community who bear the consequences (for example the most likely new site for an urban landfill in Majuro is next to Jenrok, one of the lowest income, and poor quality housing, areas of Majuro).

Economically, to landfill organic wastes is perverse, as organics make up around half of the waste stream, and landfill space is around $35m^3$, as already noted by BECA[11]. Clearly, landfilling organics is an expensive way to degrade the environment on an atoll. Organic materials found in the waste stream do not even make good land reclamation landfill, as such land takes a long time, and a considerable amount of material, before it is stable enough for serious long-term use that can support any buildings.

6.1 Push organics out of waste stream

The point cannot be made strongly enough that to collect and landfill organic wastes in an atoll environment is directly contributing to the degradation of the soil but removing scarce nutrients, as well as damaging ground water (where it exists) as plants are removed. It is also a very expensive business, as organics are bulky and take up expensive dumpster and then landfill space.

Figure 2: Green waste content of Dumpster in Majuro

6.1.1 A 'Green Bin' System of Organic Collections

The simplest way to approach this is to start with the big pieces of organic material first. In Majuro, this comprises mostly coconut palm fronds, and tree trimmings. There are several of the existing dumpsters in use in Majuro that are highly corroded in the panelling. These are increasing unsuitable for normal household wastes, as rubbish tends to fall out of the dumpsters on route to the landfill. These could be given a brisk rub down (and perhaps a simple patch up) with a coat of green paint, and branded as green-waste only 'Green Bins'. These can be promoted to the public as such using the techniques developed in the public awareness program part of the project. A initial survey of existing dumpsters should indicate where a higher content of organics is found; the Green Bins can be placed alongside the usual dumpsters in several of those locations, and by a little trialling, a suitable system to encourage green waste to be put in these bins can be found. Once a suitable set of tools is developed, the system can be promoted in urban areas using the public awareness programs skill and expertise.

[11] Solid Waste Management in Majuro, BECA International Consultants Ltd. August 2003, Appendix C Jenrock landfill costs.

6.1.2 Processing the collected organics

Green wastes so collected can be chipped. It may be found that in some places where there are plenty of gardens, that it can be chipped on site by a mobile chipper, so that local people can come and take the chips away for their gardens. Higher density housing areas may well require removal of green waste to another location, possibly the MRF. A mobile chipper may chip the material at the dumpster site into a truck for transport. The current recycling truck[12] is equipped with a tow bar and a hatch at the rear to accept chips blown from a mobile chipper chute. This material will again be found to be of value to anyone in the plant growing business once it is chipped. If a large chipper is used, foreign bodies that enter the green waste stream will not cause it undue concern, and the presence of odd pieces of metals or plastics in the chips will not be too serious a problem for general use, as inevitably there will be some contamination, particularly as disposable plates and aluminium foil containing food is likely in Majuro; this should not cause too much problem as the aim is *not* to produce a high quality commercial product – at least not in the early stages. The same machine used for chipping Green Waste can also be used to shred PET and HDPE plastics[13], and so increase container densities for shipping those plastics for recycling. Thus, the operation of a Green Waste Chipper could be arranged under the MRF operations, so the MRF staff would also maintain the machine. If a chipper is used increase revenues with the export of plastics waste, there is a direct economic incentive to ensure that it remains in good working order. Organics chipped at the MRF can be stockpiled so that people can come and take material for gardens. It may be found that it can be bagged and sold, if the Market exists to do so. At least, if it is removed by people for free, it still returns to the soil, and does not take up expensive landfill space.

6.2 Commercial Participation – Retail Stores and Restaurants

A significant amount of the waste in dumpsters is commercial waste. This would be much better for both generator and waste management authorities if usable components were separated at source before they reach the dumpster. This saves the business from taking the materials to the dumpster, and the waste managers from having to separate dirty wastes. Collection of these wastes of course involves cost; however, once a Materials Recovery Facility is operating, financed by a Container Deposit system, other materials and collections can be added at much lower additional cost than starting from scratch. Materials that conventionally might not appear economic can be added to the recycling, as the additional cost to the existing operation is not great. When the avoided landfill costs are factored in (costs that are readily apparent), not to mention intangibles such as improved water quality and health through better solid waste management, the economics looks increasingly attractive. Of course the systems proposed here must pay for themselves some way, but as the MRF matures, and the approach to SWM changes, this is not so hard to do.

6.2.1 Commercial Organics

A considerable amount of food waste is generated from the many restaurants in Majuro in particular. This needs to be collected and chipped in with the stringy palm and wood wastes to improve any organic materials for compost use. Targeting restaurants is much easier than trying to get all households to participate, especially in the beginning. As a system is developed and improved, households may begin to participate. Restaurants merely need to use a dedicated bin service for food wastes. The MRF operation or perhaps MALGOV could incorporate this collection on a daily basis (or bi-daily basis if the bins have good lids). Chipping food wastes with woody wastes produces a much better mix for good composting. The addition of some copra mill waste, or fish processing wastes, would potential produce an excellent fertilizer material. The Taiwanese farm at Laura has been experimenting for many

[12] At the time of the repost this vehicle was unused and sitting in the grounds of the Capitol building.
[13] Pers. Comm. 'Bandit Industries' Laurie Pant, 20/7/05

years with compost mixes from available materials, and would likely be a useful local source of expertise.

6.2.2 Commercially Generated Cardboard

A significant quantity of landfill waste is currently cardboard carton. When it is appreciated that nearly al consumer goods – food, drink, household goods – come in cardboard cartons, it is easy to see that even small economies such as Majuro and Ebeye will create considerable quantities of cardboard. Commercially generated cardboard can be easily collected from the large generators, such as wholesalers, bars, hotels and large retail stores. This also save the store from taking it to the dumpsters, which saves them money, and the cardboard can be kept clean and unmixed with other wastes. Significant quantities of cardboard are not generated from households.

Figure 3: Commercial cardboard In the Majuro Waste Stream

Cardboard is not a very high value recycled material, but with a suitable sized machine, densities can be achieved to maximise container capacity. Current price in Australia for cardboard is A$80/tonne[14], and up to 30t can be put in a 20ft container, making a potential $1,800 per container, which costs A$1,500 to send. The avoided cost of landfilling the 33m³ of cardboard is $1155, at a density which landfilling would not likely achieve anyway. If the avoided cost of landfilling could be transferred to the cardboard recycling, that would result in a profit of about $1400 per container. This recycling process would also create more jobs, and other local economic activity, not to mention relieving MALGOV of the cost of carting all that cardboard to landfill. This illustrates that there are huge potential savings a available at little extra cost. The introduction of a Container Deposit system can fire the necessary rearrangement of the waste management regime to dramatically reverse the current problem.

6.3 Lead-acid Batteries

Vehicle batteries, and increasing numbers of deep-cycle solar batteries, can also be accepted by a functioning MRF at very little extra cost. Removing these from the environment is major achievement as they are so toxic. It is a simple matter for the MRF to pack batteries and ship to a suitable refinery[15], and they can be shipped 'wet' with the acid inside, so avoiding any complex and dangerous acid removal and neutralisation procedures.
The Kiribati MRF collected over 4,000 batteries in the first 12 weeks of commercial operation; given the far greater number of vehicles on Majuro and Ebeye, one might expect that there are over 10,000 batteries readily available for recycling, amounting to around ten containers of batteries for export, with perhaps an annual collection of three or four FCL. These batteries would not only come from the public, but such a collection would be of great advantage to a commercial automotive repair sector where old batteries are a problem. Also, keeping them out of landfill is major advantage in ensuring that the resulting landfilled land is useful in the future. The RMI EPA already runs a battery collection system, and this could easily be transferred to the MRF.

6.4 White Goods

With the dramatic increase in steel prices, an operating MRF could also take disused white goods for recycling. Air conditioners, fridges, cookers, washing machines can all have some metal parts removed very quickly and easily by semi-skilled staff. Whilst the residue might then be landfilled, again, quantities to landfill are decreased, saving government money, and

[14] Pers. Comm. Alan Morgan, Macs Metals, Brisbane June 25th 2005; Amcor Industries current price.
[15] Australian Refined Alloys in Sydney, NSW accepts batteries 'wet' from the Pacific Islands.

also generating economic activity. Copper and aluminium parts can be accumulated to achieve very favourable prices currently, and the value of non-ferrous metals is not expected to drop significantly given increasing world demand for raw materials.

6.5 Glass

Glass can be crushed and used as a substitute for coral in non-structural concrete. Concrete work often requires areas such as non-load bearing floors, parking areas, ramps, paths, low walls; all of these types of constructions can use crushed glass in the mix. Price per m³ would be dictated by current market value of mined coral stone. Use of glass in this way avoids the usual problems of colour separation, which is essential for correct glass recycling. Special machinery can be purchased to crush glass that can then be used as a road surface: it may be that quantities of glass available would be sufficient, in which case a very good quality road surfacing product could be made locally, although it is unlikely that sufficient glass would be produced for major road projects, such as surfacing the long stretches of road. However, it may be sufficient for side road and parking areas.

7. Implementation Plan

In order to bring a CDL-based recycling system into place, a carefully crafted plan is required. There are significant events and time frames that determine how the whole plan is structured. Primary of these is the legislative process, and the point at which legislation comes into force that requires the deposits to be paid. The other big determining factors are logistical: lead time to select, procure, order, and ship the required equipment, and time taken to create a functioning MRF that can handle the material flows that a deposit system will immediately generate once it come into force.

7.1 Key Elements

Any plan to implement a CDL-based recycling system will require several main components:

- **A Legislative component:** to ensure that required materials are drafted for Government to present to the Nitijela;
- **A Public Awareness component:** to ensure that the public is aware of the changes, how to use the new system, and also to encourage other simple waste minimisation strategies, primarily those of pushing the cardboard and Green Waste out of the landfill waste stream;
- **A Logistical Component:** that will oversee the procurement of equipment, the securing of a suitable site for the MRF, and installation of equipment on site to bring the MRF into operation.
- **A Business component:** To operate and run the MRF based recycling system in the initial stages as the Container Deposit system comes into full operation.
- **Project Support**: the necessary management and donor reporting structures to coordinate the above components.

Before any of these processes can commence, it would be necessary for the RMI Government to commit to the drafting of legislation, and commit to the presentation of legislation to Parliament. This would require the commitment of a Government Agency to promote a CDL project to Cabinet as described in the Legislation section above. Once the commitment to take legislation to the Nitijela is confirmed, a project could commence. A possible Implementation Plan can be found at Table IV. Project Implementation should be comfortably achievable in one year.

7.2 Structure of implementation

Any project of this nature requires an Executing Agency, which is a Government Agency who would oversee coordination of the Project. There is also required an Implementing Agency, who actually runs the project day to day, deals with finances, produces reports, hires personnel, and reports to Steering Committee, Executing Agency and Donor. It is clear, from the nature of this particular program, that close cooperation between Government and the Private Sector is essential. A Public Awareness program, as part of the Implementation Plan, is a crucial component. Elsewhere, a very successful model for implementation has been where an NGO is the Implementing Agency, and the necessary personnel are contracted to provide the skills required. NGO accounting systems are primarily designed for Project Management in the non-commercial sector, and as the Implementation Phase is a non-commercial operation, this fits well. Government financial and hiring policies generally are unsuited for the kind of short-term flexibility required on a reasonable short project such as this. Once a viable business operation is established, then management of the MRF should pass to the Private Commercial Sector, as they are most experienced in this area. Government participation continues through an ongoing regulatory role, the traditional function of Government.

7.3 Tripartite Partnership of RMI, NGO and Private Sector

A Project of this nature requires Government, Commerce, and NGOs to work in partnership. The proposed method of Project implementation is by an NGO filling the project management and coordination roles. This allows a responsive, flexible Project Management to be in place.

7.3.1 Government Role

The Government sets the legal environment, and steers the outcome for the benefit of the nation. The Government can initially support applications to suitable donors who may be interested to finance the project – or parts of it. Government ensures that the Project is consistent with wider Government Policy and Planning Goals, and that the project is on track and has responsible management. A Government Agency acts as the Executing Agency; this might be OEPPC given current RMI structures, but of course this is for Government to decide.

7.3.2 NGO Role

The NGO Project Management must also coordinate efforts between the Government work of preparing and enacting legislation, the Private Sector's work to integrate themselves with the changes, and the NGO public awareness and education efforts. One advantage that NGO Project management has in a Marshallese context is that the movement has not been closely involved in the issues of the last few years concerning the ongoing SWM crisis in Majuro. The NGO is also a 'disinterested partner' who will with draw at the end of the project, with Government and Private sector having ongoing roles. The NGO acts thus to ensure that the system developed and implemented is of use to the community at large, especially the more disadvantaged members who will have potentially the most to gain.

7.3.3 Private Sector Role

Close cooperation with the Private Sector is crucial, as the project must develop in a Marshallese commercial environment, and the outcome is to provide a running business. A Private Sector Partner, supported by the wider commercial community, i.e. the Majuro Chamber of Commerce, as the Project Partner, is a very valuable component. The Private Sector partner can hire casual and permanent labour as required, under contract to the Project, as requirements fluctuate, particularly in the earlier stages. The Private Sector partner can also provide valuable information and knowledge about operating a business in the Marshall Islands.

7.4 Steering Committee

The overall direction of the project is monitored and guided by a Steering Committee, composed of representatives from all of the above, plus any other relevant parties, such as other projects or donors representatives whom the Committee sees fit to include. A Solid Waste Task Force already exists, with the Chair the Mayor of Majuro, and membership of the Chief Secretary, OEPPC, EPA, MIVA, MPW, EPPSO and the Chamber of Commerce. This is clearly a very good place to start, and a steering committee for a CDL project would clearly sit very well operating under the Solid Waste Task Force.

7.5 Financial Management

The Donor funds can be placed in a single, dedicated account, in which only project funds are held. Money is managed from this account by the project, using the NGO Financial Officer's expertise. With the account being dedicated solely to the project, financial reconciliation and reporting becomes a simple matter. This is very important, as once the project is rolling, delays in receiving funding can be very detrimental. Timely financial reporting is essential to ensuring that the next quarter funds are processed and sent to the Project.

Another reason for holding a separate account is that once Refunds are being paid out, and the Project is running as a recycling business, financial movements can be large. Problems in the Project finances would easily cause great troubles for an NGO if the project funds are not ring-fenced, and were inadvertently drawing on other project funds.

7.6 Work plan and Budget

EXPECTED OUTPUTS & MONITOR-ING ACTIVITIES	Key Activities *List all the activities to be undertaken during the year*	TIMEFRAME												RESPONS- IBLE PARTNER	PLANNED BUDGET		
		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12		Source of Funds	Budget Description	Amount (US$)
1.1 Set Up Materials recovery Facility System to handle 50,000 beverage containers/day	**1.1.1** obtain land suitable for MRF on industrial land near the Delap Dock															land Rental	15,000
	1.1.2 Purchase, move and set-up portable office bldg in recycling yard.															Capital Equipment	10,000
	1.1.3 Set up office in building															Capital Equipment	4,000
	1.1.4 Purchase Processing shed, ship and install															Capital Equipment	16,000
	1.1.5 Purchase used Shipping Containers & convert to Collection Points															Capital Equipment	18,000
	1.1.6 Purchase, ship and install can press.															Capital Equipment	23,000
	1.1.7 Purchase, ship and install Vertical Baler press.															Capital Equipment	15,000

	1.1.8 Purchase truck for recyclables collection.															Capital Equipment	60,000
	1.1.9 Conduct test buyback of cans and bottles at 2c each															Operation-al testing	35,000
1.2 Develop and operate recycling system to prepare for handover to Operator	**1.2.1** Yard operational costs inc. utilities															O & M	9,000
	1.2.2 Pack for export and arrange acceptance with buyer Brisbane															Income Generating	10,000
	1.2.3 Wages for MRF workforce															Operation	50,000
1.3 Create and test monitoring system	**1.3.1** Develop and test daily sheets system															NDC	0
	1.3.2 Develop database and GIS layer and update monthly															NDC	0
2.1 Public Awareness Campaign	**2.1.1** Develop Local Name for System															NDC	0
	2.1.2 Develop Play with songs															Public education	1,500
	2.1.3 Radio Spots															Public education	2,500
	2.1.4 TV spots															Public education	2,500
	2.1.5 Develop Newspaper ads and run															Public education	7,200
	2.1.6 Waste plays shows at public places															Public education	4,000

2.2 Promote separation of Organic wastes & cardboard	**2.2.1** Organic separation system development															Capital Equipment	3,000
	2.2.2 Radio and newspaper ads															Public education	3,800
	2.2.3 Procurement of Chipper															Capital Equipment	27,000
	2.2.4 Work with Commercial sector to recover resources															Public education	1,000
	2.2.5 Chipper in Operation															O &M	1,000
3.1 Functioning tripartite committee of GoK, Private sector and NGOs.	**3.1.1** Steering Committee direction of project; Monthly meeting															Meeting expenses	1,500
	3.1.2 Monitor financial and logistical activities															NDC	0
3.2 Private Sector Management Contract	**3.2.1** tender advertising															Media	750
	3.2.2 Contract signed															NDC	0
3.3 Coordination with other Programme's activities	**3.3.1** Work with IWP Pilot Area, EPA and others															NDC	0
	3.1.3 Project Newsletter to region															Production	800
4.1 Container Deposit legal framework	**4.1.1** Draft Legislation to establish Special Fund for Container deposits															Legal assistance	1,000
	4.1.2 Present an Act to Nitijela a															NDC	0
	4.1.3 Act comes into force															NDC	0

5.1 Evaluation & monitoring	**5.1.1** Quarterly reports															NDC	0
	5.1.2 Adjust / review planning and budgeting.															NDC	0
6.1 Staff	**6.1.1** Project Manager															personnel	30,000
	6.1.2 Project Assistant															personnel	14,000
	6.1.3 Technical Adviser															personnel	30,000
	6.1.4 Accountant part time															personnel	10,000
6.2 Office Costs	**6.2.2** Office equipment															operations	5,000
	6.2.2 Project Support from NGO															operations	10,000
	6.2.3 Sundries															operations	3,000
7.1 UNDP Monitoring	**7.1.1** Monitoring Visits															M & E	4,000
	7.2.2 Auditing															M & E	1,000
TOTAL														**Sub Total**			**$429,550**
														Less Project Income			**$45,000**
														Total			**US$ 384,550**
[1] NDC = No Direct Cost.																	

8. Existing Programmes on Waste

There are several existing programs and activities that are working in the SWM field. Any project implementing the proposals in this document should be coordinating with these programmes and their staff to ensure best use of resources, to avoid 'reinventing the wheel', and to draw from experience already in the community.

8.1 International Waters Programme

The RMI IWP has a pilot area in Jenrok village that is used to pilot low cost community based waste reduction initiatives. This project is part of 14 Pacific Island nation programme run through SPREP. The project is a GEF funded programme, executed by UNDP. The RMI IWP programme has great potential to trial the introduction of a CDL based system in the Marshalls. The project is run out of the Office of Environmental Planning & Policy Coordination (OEPPC).

Figure 4: IWP Recycling Station at Jenrok

8.1.1 Potential to Trial Refund System at IWP Pilot Area

There is a proposal with the IWP to set up a small recycling facility at Jenrok, in the Pilot Area. This facility, if approved, would be the ideal place to test the collection side of any Container Deposit system before it legally entered force. It is necessary to test the Refund payments and monitoring systems of any Container Deposit scheme prior to national implementation, to ensure that a viable system is available to the Public as soon as the system comes into legal force. The work already done in Kiribati, in a similar environment, would provide a very good basis for any Marshallese system; however, some fine-tuning may be required to suit local conditions.

As there is an existing beverage container litter problem, a trial program that bought up existing cans at 2c each could remove the existing litter, whilst shaking down the system, but without overall great cost to the project, as the cans would generate an income to the project of about 1.3c each after export, requiring the project to actually only pay 0.7c each after sale to the recycler in Australia.

8.2 Environmental Protection Authority

The RMI EPA has an Education Unit run by Mr. Julian Alik. Any recycling project should cooperate closely with the EPA and the education unit to share skills and expertise, as Mr. Alik has many years of experience working in this field. The school education program outlined below would be easily integrated with a public awareness program to promote a container deposit system, and organics separation in urban areas. The EPA also collects old lead-acid batteries under the POPS toxics program.

8.2.1 Schools Program

The school education programme on waste has a competition for schools to recycle cans. The top three schools by amount of cans collected are sharing $500 in First, Second and Third prizes. There are 18 schools in program, both public and private, amounting to over 2000 students. The programme has distributed 82 manual can crushers of bin collection type. Cans collected by the schools are delivered to Tang's Recycling in Delap. There are still more can crushers to distribute.

Mr. Alik uses a 'Trash Line', a string with various common items of trash hung on a fishing line, with which he educates the children. With this device he is educating children on the

effects of different types of trash on the environment, and the time taken to degrade. The Unit has a good 'Power Point' presentation of recycling cans that is shown to schools. Some outer island schools are participating, namely Jaluit High School and Ebeye High School. However, the Unit has no local name or slogan for the program. Only Mr. Alik works in the education unit. A JICA volunteer due in July.

8.2.2 Lead-Acid Battery Collection

The EPA is collecting disused lead-acid batteries at its Delap Dock site. These are collected under a Persistent Organic Pollutants (POPs) programme coordinated throughout the Pacific Islands by SPREP. This is a one-off program to remove toxic stockpiles in PICs. As the number of vehicles in the Marshalls is increasing rapidly, large number of batteries are generated. The POPs program is nota long-term solution. A CDL based recycling system could act as the exporter of batteries, as a Basle Permit will be required for ongoing export, and this will require commercial contracts and arrangements that Government may find onerous in the long-term.

8.2.3 Cardboard Baler

Figure 5: EPA Cardboard Baler

The EPA also has a cardboard baling machine at its Delap dock station. It appears to have been out of use for some time, and may have been used for crushing cans, a task for which it is not really suited as densities will be low. However, filled with flattened cardboard it makes handle-able bale. This could possibly be refurbished for use in the early stages of developing a cardboard recycling system, but does not appear to be large enough to gain the required densities for an ongoing commercial removal of cardboard. Never-the-less, its use to encourage commercial collections of cardboard initially would be invaluable.

8.3 Marshall Islands Visitor Authority (MIVA)

MIVA has run regular advertisements in the M.I. *Journal* encouraging people not to litter for many years. They also operate clean-up crews who pick up litter in public places around Majuro, and who empty 44 gallon oil drums set out by MIVA for public litter. The experience gained through these long-running activities would be very useful to the planning and execution of any public awareness program.

8.4 College of the Marshall Islands (CMI)

The CMI has a can collection program, and cans collected are sold on to Tang's recycling (see below). This collection is part of a fundraising program; container deposits can only increase income from recyclables based fundraising programs. The CMI collection should be promoted as a model for schools, churches and other community groups to collect can and bottles for fundraising. Co-op School has also run can recycling in the past, and promotes improved waste management behaviour to the students.

8.5 Existing Metals Recycler

Currently, all aluminium cans collected are sold in to Mr. Tang, who has a small scrap collection yard next to the Island Apartments, opposite the Nitijela in Delap. Mr. Tang pays 10c per pound for aluminium cans. He has also worked in with the EPA school program to pick up cans collected by schools as part of recycling education. It would be useful to work with Mr. Tang initially to process cans collected at the early stages of any project to implement a CDL system.

8.6 United States Army Kwajalein Atoll

USAKA military base operates a comprehensive recycling program, with materials collected being shipped to the USA. The recycling system operators there have demonstrated a functioning system to RMI officials in the past. However, integration with the USAKA system would likely be difficult due to the difficulties of introducing materials and personnel from off the base. It would be worth looking at their markets to see if opportunities exist there. It may be useful in the early stages if a site visit was possible with local project staff.

8.7 E-Z Price Store

E-Z Price owner Neil Skinner, and Manager Liz Roddick have been promoting better waste management to the staff and of the store wastes, but the lack of a downstream acceptance system is a handicap. However, this business would actively engage in any new initiatives, and would be very helpful to any project by having a working business environment to test out some ideas on. E_Z Price produces a large quantity of cardboard carton from its operations.

Figure 6: E-Z Price Recycling Bins

8.8 Possible Projects

The ADB has a draft proposal for a pre-project design phase, with focus on building community support for improved SWM in the urban Marshall Is.[16] This pre-project, if enacted, would focus its practical work on the Jenrok IWP site, so working in with the RMI and OEPPC for maximum effectiveness. This proposal, and its attendant resources, could be greatly increased in effectiveness if conducted in close coordination with the implementation of a Container Deposit System for the Marshall Is.

[16] Increasing Ownership and Effective Demand for Improved Urban Waste Management and Disposal in the Republic of the Marshall Islands, Draft Concept Paper, Asian Development Bank, April 6th 2005

9. Additional Benefits of A Container Deposit System To the RMI

Container deposit legislated systems can deliver many additional benefits to a nation, which are more than the decrease in litter. Some of these advantages are in 'intangibles' or economic externalities such as improved environment, improved ground water, and resulting improved health. These can be hard to quantify. However, there are benefits that can readily be quantified, and these include:

- ⇒ Improved monitoring of high revenue imports (such as beer, wines and spirits) resulting in budgetary advantages;
- ⇒ Savings in 'Avoided Cost' of landfill;
- ⇒ Savings to MALGOV in hauling less garbage to landfill;
- ⇒ Increased employment;
- ⇒ No budgetary call on Government finances for decrease in waste costs;
- ⇒ Ability to recycle other materials at low additional cost.

9.1 Implications for Budgeting: Monitoring of Beer Imports

The lack of readily accessible data on beer imports has some implications for government budgeting. Currently, it is very difficult for the government to assess the effects of increasing beer taxes, such as the 25c per beer can/bottle imposed to raise additional funds for the CMI. The Container Deposit system would allow simple tracking of beer imports as when a beer shipment pays a deposit into the Deposit Fund, a simple code with the payment entry details will allow instant assessment by computer of the beer imports between any two days by checking the Deposit Payments. When a Deposit system includes wines, spirits and mixers, it is a very simple tracking system to see what is coming in, and thus what revenue is being generated by these imports. This would potentially allow maximisation of alcohol revenues as it is easy to see when a tax increase has depressed sales, and so reduced tax income.

For example: according the 2001 Statistical Yearbook, the RMI imported $1,652,353 worth of Beverages, Wines and Spirits. However, for Kiribati, that same year, the figure is A$1,575,920 for beer in cans alone. Even given the difference in US$:A$ exchange rate at the time, as little as 1:2 it is still surprising, given that the Marshallese economy is at least twice that of Kiribati. This suggests that the statistical data may be unreliable, an assertion whose veracity was reinforced during the data collection process for this report.

An incidental advantage of a Container Deposit system is that it becomes clear if there exists a major problem with beer smuggling. After the system has settled down to steady flows, if the Refunds are outstripping the Deposits (and investigations shows that the fault is not fraud in the refund system), then it can be demonstrated that there is beer smuggling of some sort going on by analysing the beer cans flows at the collection end. It is clearly easier to track smuggling when one knows that it is occurring, rather than if there is only a suspicion. Soda cans are not usually smuggled due to the low tariffs and low value of the product.

9.2 Potential Savings to Government through 'Avoided Costs' in SWM

Savings to Government are very apparent and easily costed in two areas: the cost of transporting waste to landfill, and the cost of landfill space. Such money saved by not doing something is termed an 'Avoided Cost', and the diversion of waste from landfill is a classic case of avoided cost. Avoided Costs are not only dollars that the Government *does not* have to spend, but in a situation of limited budgets, it means that more money is available to spend elsewhere.

9.2.1 MALGOV: Waste Transportation

Local Government, MALGOV, has responsibility to pick up waste. If there is less waste to pick up through waste reduction, then the Dumpsters will take longer to fill. This means less

effort in moving dumpsters to the dump, or conversely, improved service in turnaround times. Currently, MALGOV runs an overtime shift on the trucks picking up dumpsters, from 6 p.m. to 12 p.m. six days a week. It is quite possible that by pushing cans, bottles and cardboard from businesses out of the dumpsters, and promoting organic wastes as a resource so that some never enters the dumpsters, that this shift might be reduced or disappear altogether. Any reduction in hours not only means lower costs in garbage collection, but also, in a stretched local government budget, money available to other local government services.

9.2.2 Ministry of Public Works: Landfill Space

For National Government, who pays for and operate the landfill through the Ministry of Public Works there are major savings. A consultants' report of 2003[17] shows the costs of new landfill at between $27 and $33 per cubic yard ($35 - $43 m³). A 20ft container of crushed cans is 33m³, which amounts to $1,155 saved for every container of cans shipped. Given that cans crushed in a press will take up much less space than cans squashed in a landfill, the actual saving would likely be considerably greater. The same applies to PET bottles, which are very difficult to squash in landfill past a simple flattening. Given that at 10 tonnes a container of cans, and perhaps 13 containers of cans are available per year, that is a *minimum* of $15,000 saving in 'Avoided Landfill' costs per annum. Over the 21-year life of a projected landfill at Jenrok[18] that amounts to $315,000 in savings from aluminium cans alone. Clearly, if a CDL system could remove most beverage containers of aluminium, PET and glass from the landfill, and be used to remove some of the commercial cardboard waste, potential landfill cost savings become *very* significant.

9.2.3 Equipment Operation & Maintenance

Reduced waste also takes pressure of vehicle and landfill equipment usage, which usually results in better and longer operation as the equipment is not pressed so hard, and reduced maintenance costs. Whilst the difference might be slight with just a can and bottle system, the stage is set for improvements once the basic EPR model is shown as a real solution to solid waste management. These savings are very significant in the longer term, but may not be immediately apparent.

9.3 Equal Opportunity Employment for Ri-Majol

There are clearly employment opportunities with a Container Deposit system for the Marshall Islands. This study predicts that there would be 9 unskilled positions, plus one for a Truck Driver, one for a Foreman, one for a Manager; perhaps also a part-time position in the office (as in Tarawa); at least 12 positions. It would also create extra jobs on outer islands, where enterprising people can collect cans for 2c or 3c, and sell them in to Majuro for 5c. Ebeye would likely require two positions. (Details for such outer island satellite operations are beyond the scope of this report at this stage.) These jobs span the range of skills, and many of these jobs would be suitable for women, in particular the collection point operators (Tarawa employed 5.5 women for a total of 10.5 positions in May 2005). Many are positions easily filled by young people, especially the collection point operators, where a good understanding of basic math is an advantage, suiting High School Graduates. No positions will require non-Marshallese employees.

9.4 Advantages to Government of Private Sector Operation of the System

The system outlined this report provides a good example of how the private sector can supply services to Government (and this includes Local Government), and, in this case, not cost the Government anything. The Government can put in place a recycling system with no budgetary demands from existing budgets. Rather, the operation of the system saves the Government money as the amount of waste handled by the Government is decreased, so

[17] Solid Waste Management in Majuro, BECA International Consultants Ltd. August 2003, Appendix C
[18] ibid

requiring less Government resources in landfill construction, and collecting and hauling waste to the landfill.

By arranging the economic parameters of the system correctly at the outset through regulation, The frame work in which the private business tenders for the operation of the system is clear. The Tender is a Concession to operate the recycling system. The contracting business increases profitability by running a more efficient operation. This way, if a poor service is provided, low profits result, encouraging a better service if the business is to increase profitability. As the Government remains the owner of the capital equipment and the yard area, a contractor who provides an inadequate service can be terminated and a new operator bought in very quickly[19]. Also, as the Government effectively has control over investment, the system can be tilted toward the most suitable mix of labour and machinery to suit the local requirements. For example, in the Marshall Islands, there is a clear need for more unskilled labour, whilst conversely, machinery can be a great problem when there are mechanical problems. Thus, the system designed is tilted toward being labour intensive, with equipment pitched to provide maximum safe working conditions. Whilst this may not result in the most profitable operation possible, job creation should be a central element in system design, whilst allowing for good profitability.

However, as the private operator works under a contract to Government, and as the rates of Deposit and Refund are set by the Regulations, the Government maintains ability to set the parameters of overall profitability, to ensure that the community at large, and other businesses, are receiving a fair service from the system, and excessive profits cannot be generated through a monopoly situation. Competition is provided through the Tender process, where business can compete for the Concession to run the system, and at any subsequent re-tendering rounds.

The government also only needs to become closely involved with the running of the system at the time of Tender Evaluation, and so has no need to set up additional positions or Government Departments to run the system. Ongoing oversight can be conducted as part of routine SWM activities, for example through the EPA Solid Waste Division. The operator of the system will supply ongoing monitoring information as part of the procedure for claiming Refunds from the Deposit Fund. The manner of how that information is provided is detailed in the contract to Government. It thus becomes a simple matter to monitor the system, requiring little time from Government officials.

9.5 Other materials that a CDL based system could recycle

A CDL based system could handle other materials other than beverage containers. Lead-acid batteries are easily recycled, and are part of the Kiribati system, with a $5 deposit and refund. Air Conditioners are very common in the waste stream in the RMI. They are bulky, yet easily recyclable, containing copper, steel and aluminium parts. A $20 deposit or similar is not going to affect the purchase price much, as this is the difference between one store's price and the next. But it would be sufficient to encourage return to a central facility to get a refund. Car tyres are another common item in the RMI waste stream, and do not compact well in a landfill. When present in sufficient quantity, they can be used to build retaining walls. They can also be baled and used as fill for walls and roads. They can be shredded and exported; they are expensive to landfill as they are bulky. Once a EPR system is set up using Beverage Containers, it is a simple matter to add other materials to the system at a later date, using the same mechanism, albeit different deposit and refund rates. The existence of a working Materials Recovery Facility means that additional materials can be added at very low overhead cost to the recycling operation, making the recycling of some materials possible that would otherwise be uneconomic in a stand-alone capacity.

[19] Indeed, this very scenario happened in Kiribati in June, but a very smooth handover was obtained; the existing operator was unable to continue for reasons outside of the recycling operation, but a new operator could take over with little interruption of service to the public.

10. Brief History of Waste issues in Majuro

Waste Management in the RMI has had a difficult history. Only two atolls are heavily populated, and of these two, Ebeye Island in Kwajalein (one of the most densely populated places on the planet) grows by virtue of its garbage landfill. Virtually all attempts to deal with waste in a more systematic manner have taken place on Majuro Atoll, which is the nation's capital.

10.1 Majuro Landfills

The approach has been the conventional one of landfill. The landfill option is now at a point of crisis, as the current landfill is exceeding its rated capacity. The fact that the current landfill is taking quantities of garbage that exceed its design capacity has been a point of open and vigorous public debate for the last four years. There has been much community discussion on the issue, and a keenness on the part of the private sector to have a place in any improved system.

The single official landfill on Majuro has exceeded its design capacity for several years now. The landfill is a simple affair where rubbish is tipped behind a seawall, and a bulldozer does its best to compact the waste. The landfill is immediately adjacent to an area of housing that existed prior to the establishment of the site. The indication that it has exceeded its design capacity is that in many places the garbage has exceeded the height of the containment sea wall. In 2001 the Taiwanese government (Republic of China) donated seventy 20 cu m dumpster roll-offs for garbage collection, and two roll-off trucks which transport the dumpsters to the landfill where they are emptied. This has resulted in the immediate urban area of Majuro becoming visibly cleaner. People take their garbage to the nearest dumpster in garbage bags, and the dumpsters are emptied every few days. They are always full, and it is clear that there is little or any excess capacity in the system.

The Marshall Islands Visitor Authority (MIVA) has funded and placed red oil drums at public parks and picnic spots on Majuro in order to help keep Majuro cleaner from a litter point of view. MIVA funds a Clean-up Team of about five people that go around and pick up litter in Majuro. MIVA actively promotes litter reduction in Majuro as part of its activities to promote tourism. It is clear that the litter is considerably less that in the past.

In 2002 the RMI Economic Policy, Planning and Statistics Office (EPPSO) engaged consultants from San Diego to assist in drawing up a detailed plan to tackle the waste issue. Their report[20] stated:

"In order to extend the life span of the landfill, waste reduction and recycling activities have to be implemented. At present about 50% of the waste currently heading into the landfill could be converted into compost. In addition recycling or reprocessing of other materials (aluminium, plastic drinking containers, glass and tires) could divert another 10% - 15% of the waste stream from the landfill ".

10.2 Current Situation for Waste Collections

Currently, the collections of all household and commercial waste material on Majuro Atoll are done by MALGOV. An executive committee manages the operations of the local government. Waste collections are financed by revenue collected by MALGOV from various licences and other sources. There is no waste collection fee as such. Majuro has a current population of around 35-40,000 people. MALGOV is the local authority for the entire atoll.

[20] : 'Proposal for Improving Solid Waste Reduction and Recycling for Majuro Atoll': Environmental Services Division from the City of San Diego, 2003.

10.2.1 MALGOV Equipment and Staff

The waste collection division of MALGOV has approximately 23 staff members. There are currently 57 dumpsters operating, with two trucks (though at the time of report one truck is out of action for a while). The current fleet of dumpsters is nearing the end of their life as most are exhibiting severe corrosion. Also in their inventory are one heavy front-end loader, one front loader/backhoe and small dump truck. RMIEPA collects hazardous material, including lead-acid batteries, under the SPREP POPs collection regional programme.

10.2.2 Waste Disposal and Landfill Operation

The solid waste materials collected by MALGOV in the dumpsters are disposed into a landfill at Batkan, over the bridge, about one mile toward the airport. Ministry of Public Works (MPW) is currently in charge of the construction, maintenance and management of the landfill on Majuro, but it is RMI EPA's responsibility to locate suitable landfill sites. Although RMIEPA regulations require the separation of hazardous materials such as car batteries, it appears there is no sorting of this kind at the dumpsite, potentially posing significant hazardous waste leakage/contamination into the surrounding environment.

10.3 Waste Stream Analysis

There have been several waste stream analyses done for Majuro. For considering the feasibility of a CDL system, they do not comprise primary data as the essential information is the number of potential items available that will have a deposit paid on them, and this, in a small island situation, is taken mostly from import data. However, as CDL system introduction has a far wider effect on the waste stream, and as the introduction of CDL can provide an excellent opportunity to introduce new measures for dealing with waste, the information from the most recent waste stream analysis[21] is provided below. This information is drawn from the International Waters Programme (IWP) Pilot Area in Jenrok village, in urban Majuro. Jenrok is in fact one of the most densely populated spots in Majuro (if not the World) with a population density of 87,000 people per sq. mile.

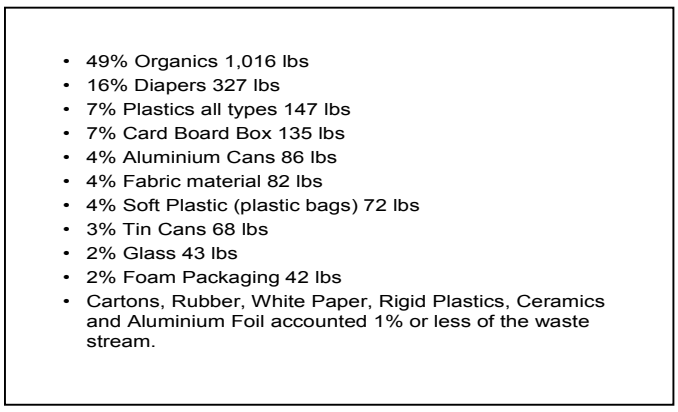

Figure 7: Waste tream analysis of Jenrok village, IWP Pilot Area, Majuro, 2004

Of particular note is that half the waste is organic, and of course is a valuable resource that should not be going into the dump at all. The 16% of diapers in the household waste stream could even be potentially chipped with other organics for composting in some applications. The 4% of aluminium cans would be low as a total component of the waste stream, as Jenrok is a high density housing area, and most beer in cans is not drunk at home. Indeed, several visits to the IWP collection points in early June bore this observation out as the IWP collection of aluminium cans showed very little beer cans in the collection bins. Not also that the cans are 4% by weight, but would be considerably more by volume. It is volume that costs money to landfill, not weight. The 86lbs of cans is worth $39 in Australia, and yet has been thrown out here as worthless; it represents 2,500 cans which would be worth $125 at 5c each refund.

[21] Jenrok Waste Stream Survey, RMI International Waters Programme; Ben Chutaro, January 2005.

11. Creating A World Class Model of Sustainable Development

The scheme detailed in this report is a classic case of sustainable development in nearly every respect. It closes the loop on the waste stream, and it does that by building the solution into the cost of the product. Thus, increase in specified wastes actually makes the system work better as economies of scale improve. Also, by recovering waste materials that would normally be lost to landfill, it is contributing to energy efficiency, and thus increased action on climate change, as climate change is driven by energy use in a world that relies so heavily on carbon based fossil fuels. This point is more than of academic interest to a nation whose very existence is threatened by climate change impacts, and whose Government spends considerable time and energy trying to persuade the larger Greenhouse Gas emitters of this world to decrease their emissions and switch to renewable energies.

By looking at the energy use of the recycling system, and principally the MRF, alternatives can be seen. It would be a simple matter to have the entire operation running on locally produced Renewable Energy. If the MRF water demand is filled through rain water tanks filled from the Processing shed and office roofs, and a compost toilet is erected to avoid the cost of a sewer connection, then if the energy demand is met by locally produced energy, the Materials Recovery Facility would become a World Class model of Sustainable Development. This can be achieved at very little cost; the only additional cost is for a grid connected Solar PV system.

11.1 Recycling System Energy Use

The system described requires two main sources of external energy, outside of human labour. They are:

- Fuel for the Collection truck;
- Electricity for the presses and office equipment.

Both energy demands can be met locally: Truck fuel from Coconut Oil, and electricity from Solar Energy. The Solar would not be a battery based stand-alone system, but a grid-connected (or grid-tie) system where the PV panels are connected to the electricity supply via an inverter. Excess energy is pumped into the Grid if not used at the point of production, and the meter spins backwards to account for this. As electricity demand is greater than solar generation at that point in time, the required amount of power is drawn in from the grid. This system is very common now in Europe, the USA and Australia, and all the necessary equipment is available of-the-shelf.

11.2 Coconut Oil As Diesel Fuel Substitute

Any Truck purchased for the Recycling system would almost certainly be diesel powered, as a 4-ton truck is required. In Majuro, this could very easily be powered by Coconut Oil with no modifications whatsoever. The Toblar Copra Mill at the Delap dock runs several different types of diesel engines on Coconut oil; and the PII construction company, also in Delap, has run a similar sized truck as that required for the recycling system on coconut oil from new; over 50,000 Km has been covered it is reported.[22] A suitable fuel is of course available at Toblar Copra Mill in Delap, for $2 per gallon, or 53c per litre. (In Tarawa diesel is USc75/litre, and the fuel bill is US$135 - $150 per month.) Current pump diesel price in Majuro is around $3.50/gallon, or $1.08/litre. Running on Coconut oil will decrease operational expenses.

Any Chipper of a size suitable for the operation described above would have its own diesel engine, and this too can run on coconut oil with no modifications. (In many locations in the world, a coconut oil powered internal combustion engine would require a heater for the oil to stop it solidifying in cooler weather. This is not required in the low-lying tropical islands of the Pacific.)

[22] Pers. Comm. Nov 2004, Dr. Gerhard Zieroth, Renewable Energy Division, SOPAC

The Coconut oil is of course produced within the Marshall Islands, so avoiding the need to import fuel, and spend money overseas. It is a renewable energy resource.

11.3 Solar Energy As Fossil Fuel Electricity Substitute

The other energy requirement is for electricity. Currently, electricity provided by the Marshall Energy Company (MEC) comes from a diesel powered 12MW plant in Delap. The MRF described in this report would use two large pieces of electrical equipment, a Vertical Baler for cardboard and maybe PET (if not shredded), and a Horizontal Press for cans.

Predicting electricity use for the MRF is not easy; however, data is readily available for a similar sized operation in Tarawa. The Tarawa presses are both small, and one might expect to be less efficient as a result. Tarawa handles around 20,000 cans and bottle per day, most of it cans which require a lot of force to compress them into a suitable block. The Tarawa operation also handles cardboard. Tarawa electricity demand is typically around 200kWhr/month, with up to 250kWhrs. If we assume that a slightly larger operation in Majuro (at 24,000 items per day) would consume 300kWhr/mth, then total electricity requirement would be about 3,600kWhrs. Using data from a 512Wp PV solar system currently operating in Majuro on Kiddenen Island, and monitored closely for the past three years of operation[23], it appears that a 1kWp array of PV panels in Majuro would easily produce around 1450kWhrs of electricity in a year.

Thus, to cover the electricity demand of the MRF envisaged by this study, a solar PV array of 2.5 kWp should be sufficient to generate the annual electricity requirement. This energy would be most effectively used by grid connecting the PV system, so that no battery bank is required, thus making the system cost considerably cheaper, and far more efficient.

An array of this size could be achieved through use of amorphous silicon roofing panels, which double as a roofing material, and can be obtained in a stainless steel backing form, highly advisable for such a corrosive environment as Majuro. Using roofing type amorphous panels would also decrease installation costs as the array could be incorporated into the MRF design as a roofed area. The amorphous PV materials appears to perform well in a tropical environment, as heat dose not adversely affect this type of panel. A 3 kW grid-tie inverter would be used, and many suitable examples are available on the market.

The whole system could be purchased and installed for between $20-25,000. The savings to the operation, when arranged on a net-metered one for one basis, would be around $700 per year. These savings can expect to escalate rapidly, as the cost of diesel is climbing very fast, and so the cost of electricity will increase too. It is even quite feasible to find that, should predictions of ‘peak oil’ arriving soon be true, that small Pacific Island Countries on the end of long supply chains for scarce fuel will suffer shortages in the future.

The demonstration value of such a grid-tie system would be great, as this would be the first grid-tie PV system in the Marshall Islands. The model that this would demonstrate to a wider audience would be World Class, as very little extra cost.

11.4 Rainwater Harvesting

Rainwater could be easily collected of the large processing shed roof, that, coupled with suitable size tanks, could cover the fairly low water use requirements for the MRF. Water is a commodity often in short supply on an Atoll, indeed, Majuro water is usually only supplied certain days of the week, so tank storage is essential anyway. Couple rainwater harvesting with a compost toilet, and the external water requirements of the MRF can easily become zero. A compost toilet at the Tarawa MRF has proved to be excellent, as the yard area has no sewer connection.

[23] Kiddenen Solar System Service Report, Pacific Reef Savers, June 2005

APPENDIX I: Container Deposit Systems in the Region

Australia
The oldest example in the region is that of the state of South Australia, which has operated for 30 years. The deposit rate there is 5c per beverage container, and the recovery rate from the deposit system is around 85%[24]. The New South Wales Government is looking closely at putting in place a CDL system, and has lobbied the Australian Federal Government to introduce a nationwide system.

United States
California introduced such a system in 1986, and is achieving recovery rates of 80% for aluminium, 60% for glass, and 65% for PET plastic bottles[25]. Deposits are 5c and 10c. Ten US states have CDL systems, whilst nearly all Canadian states use the system to increase recycling. In January 2005, Hawaii introduced CDL system[26] to control litter and increase recycling, expecting an 80% plus recovery rate of beverage containers.

Pacific Islands
In the Pacific Islands, **Nuie** has a deposit system on cans, and **Samoa** has one on some bottles. The Fiji Department of the Environment is pursuing a policy of introducing a container deposit system to deal with the rapidly increasing PET plastic bottle problem.

In February 2005 **Kiribati**[27] introduced a Container Deposit based recycling system to assist in efforts to deal with the dire waste problem of the urban areas of the country. The effect has been dramatic in removing all drink can and bottle litter from the street. The system also includes lead-acid batteries and removed over 4,000 disused batteries from the environment in the first three months. But the Kiribati system has had a far greater effect than just those materials targeted for recycling under the deposit system. A Materials Recovery Facility set up to handle materials to be recycled also collects cardboard from retail outlets on Tarawa, and is also collecting scrap metals at its site next to the container port.

Figure 8: Customers at Bonriki in Tarawa bring in cans for Refunds

[24] Independent Review of Container Deposit Legislation, Institute of Sustainable Futures, Sydney, Aus. Vol 2, section 3 pg. 17
[25] Ibid, section 2, pg. 13
[26] Honolulu Solid Waste Integrated Management Plan, 5.4.2, p 69.
[27] Government of Kiribati: Special Fund (Waste Materials Recovery)Act 2004; Assented and passed into law February 3rd 2005.

APPENDIX II: Kiribati Container Deposit Legislation

REPUBLIC OF KIRIBATI
(No. 9 of 2004)

I assent,

Beretitenti
3/2/2004

AN ACT TO LEVY DEPOSITS IN RESPECT OF THE RECOVERY OF WASTE MATERIALS IN KIRIBATI; AND FOR CONNECTED PURPOSES

Commencement:
2004

MADE by the Maneaba ni Maungatabu and assented to by the Beretitenti.

PART I
PRELIMINARY

Short title

1. This Act may be cited as the Special Fund (Waste Material Recovery) Act 2004.

Interpretation

2. In this Act unless the context otherwise requires –

"deposit" means a deposit leviable under this Act;

"the Special Fund" means the Special Fund established pursuant to section 7.

PART II
DEPOSITS

Power to levy Deposits for waste material recovery

3. (1) The Minister responsible for environment acting in accordance with the advice of the Cabinet may, subject to the provisions of this Act, levy Deposits in respect of prescribed materials for waste material recovery.

(2) Deposits levied under subsection (1) of this section shall be laid before the Maneaba ni Maungatabu within forty-eight hours of the day on which the next meeting of the Maneaba commences and shall come into operation on publication unless the Maneaba by resolution amends it or rejects it as the case may be.

Orders relating to Deposits

4. (1) The Minister responsible for environment acting in accordance with the advice of the Cabinet may by order make provision as to the classes of materials for recovery in respect of which the Deposits are to be levied and as to the scales and other provisions in accordance with which they are to be levied.

(2) An order made under subsection (1) of this section shall be laid before the Maneaba ni Maungatabu within forty-eight hours of the day on which the next meeting of the Maneaba commences and shall come into operation on publication unless the Maneaba by resolution amends it or rejects it as the case may be.

(3) Any such scales or other provisions may provide for Deposits to be levied at different rates by reference to such circumstances or combination of circumstances (whether relating to classes of materials, seasons of the year, days of the week, times of day or otherwise) as the Minister may consider appropriate.

(4) An order under this section may provide that materials of any description specified in that behalf in the order (notwithstanding that they are materials of a class specified in the order pursuant to subsection (1) of this section) shall be exempted from the payment of Deposits.

Regulations for waste material recovery scheme

5. (1) Provision may be made by regulations made by the Minister responsible for environment acting in accordance with the advice of the Cabinet, under this section –

(a) for the designation of one or more places at which Deposits are to be paid;
(b) as to the persons by whom such Deposits are to be paid and the manner in which they are to be paid;
(c) for ensuring that materials in respect of which Deposits are leviable do not enter Kiribati without payment of the Deposit;
(d) for regulating the recovery of materials, including expenditure on recovery of materials;
(e) for general administration of waste material recovery in Kiribati.

(2) Regulations made in pursuance of paragraph (c) of subsection (1) may include provisions for prohibiting or otherwise preventing any such material from entering Kiribati or further entering Kiribati until any Deposit leviable in respect of the material has been paid.

(3) Any regulations made under this section may provide for a notice, specifying the classes of materials in respect of which Deposits are leviable, to be displayed at each place designated in accordance with subsection (1)(a) of this section.

PART III
FINANCIAL PROVISIONS

Establishment of Special Fund

6. A Special Fund to be known as Waste Material Recovery Fund shall be established in accordance with section 107(2) of the Constitution and section 13 of the Public Finance (Control and Audit) Ordinance.

Payments into the Special Fund

7. There shall be paid into the Special Fund –

(a) any money appropriated by the Maneaba ni Maungatabu for the purposes of the Fund; and
(b) any monies collected as Deposits under this Act or orders or regulations made thereunder; and
(c) any other money lawfully available to the Fund.

Payments out of the Special Fund

8. (1) There shall be paid out of the Special Fund –

(a) the amount of any expenditure by the Republic on the costs of recovering waste materials; and

(b) the expenses, as approved by the Minister responsible for finance with the concurrence of the Minister responsible for environment, of the administration and carrying into effect of the provisions of this Act.

(2) No money shall be paid out of the Special Fund except in accordance with a Warrant under the hand of the Minister responsible for finance authorising the Chief Accountant to issue the money to the accounting officer responsible for operating the Fund.

Control of the Special Fund

9. In the performance of his functions under this Part of this Act and under section 13 of the Public Finance (Control and Audit) Ordinance in relation to the Special Fund the Minister shall use his best endeavours to manage the Special Fund in such a way that, taking one year with another, the income of the Special Fund is not less than sufficient to meet its outgoings including depreciation charges.

Annual reports

10. (1) The Minister responsible for finance shall, before the end of each financial year, submit to the Mancaba ni Maungatabu –

(a) a statement showing the estimated income and expenditure of the Special Fund for the current financial year; and

(b) estimates of the income and expenditure of the Special Fund for the next financial year.

(2) The Minister responsible for finance shall, within six months after the end of each financial year, lay before the Mancaba ni Maungatabu a report dealing generally with the operations of the Special Fund during the preceding financial year and containing the audited statement of accounts for that financial year.

PART IV
SUPPLEMENTARY PROVISIONS

Offences

11. Any person who –

(a) wilfully refuses, or without reasonable excuse neglects or fails to pay a Deposit which he is required to pay under this Act or order or regulations made thereunder or wilfully avoids payment of any such Deposit; or

(b) wilfully, with intent to defraud, claims or takes the benefit of any exemption from the Deposit (whether the exemption in question subsists by virtue of section 4(4) of this Act or otherwise) without being entitled to that benefit; or

(c) in circumstances not falling within either of the preceding paragraphs, contravenes provisions of this Act or any orders or regulations made under this Act,

shall be guilty of an offence and liable on summary conviction to a fine not exceeding $1,000 and in default of payment of such fine, to imprisonment for a term not exceeding 2 months.

Civil proceedings

12. Without prejudice to any proceedings under section 11, any Deposit which remains unpaid after it has become due for payment shall be summarily recoverable by the Republic from the person liable to pay the Deposit as a civil debt.

SPECIAL FUND (WASTE MATERIAL RECOVERY) ACT 2004

EXPLANATORY MEMORANDUM

This Act seeks to empower the Minister responsible for environment, acting in accordance with the advice of the Cabinet, by order to levy deposits for the recovery of waste materials from the importers of waste materials.

An order made by the Minister responsible for environment in respect of the levying of deposits shall be laid before the Maneaba ni Maungatabu within forty-eight hours of the day on which the next meeting of the Maneaba commences and shall come into operation on publication unless the Maneaba by resolution amends it or rejects it as the case may be.

Section 4 of the Act empowers the Minister responsible for environment to classify materials in respect of which deposits are to be levied and prescribe the scales and the criteria in accordance with which deposit are to be levied.

An order made by the Minister responsible for environment under Section 4 of the Act shall be laid before the Maneaba ni Maungatabu within forty-eight hours of the day on which the next meeting of the Maneaba commences and shall come into operation on publication unless the Maneaba by resolution amends it or rejects it as the case may be.

Sections 6, 7 and 8 establish a Special Fund (outside the Consolidated Fund) into which shall be paid, among others, all deposits collected in respect of the materials. All monies by the Republic to meet or defray costs of recovering the materials shall also be paid out of the said Special Fund.

Section 11 makes it an offence wilfully to refuse or neglect to pay a deposit which is required to be paid under this Act.

Titabu Tabane
Attorney General
4 May 2004

LEGAL REPORT

I hereby certify that in my opinion none of the provisions of the above Act conflict with the Constitution and that the Beretitenti may properly assent to the Act.

Titabu Tabane
The Attorney General

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Appendix III: Examples of Suitable Equipment for the MRF.

Horizontal Baling Press for Aluminium Cans

Manufactured by Alert Engineering in New Zealand, this machine will comfortably handle the quantities of cans available in the Marshall Islands, whilst giving a good FCL density and low power consumption.
Current price ex-works, Auckland, NZ is NZ$26,000

Vertical Baling Press

Suitable for baling PET & HDPE plastic bottles, and cardboard cartons into bales for shipping in Containers.

This particular model is made in the USA by Harris-Selco, and is about US$11,000 ex-works Alabama, USA.

A larger model might push cardboard densities to a commercially profitable level

12 inch Chipper

Suitable for chipping organics and PET plastics. This machine has its own diesel engine, is hand fed, and can be towed by a light truck.
Made by Bandit Industries, USA
Price, depending on options,
Ex-Works West coast USA,

Appendix IV: List of Consultations and Contact Details

1. RMI Government

Customs Division:
Chief, Division of Customs: Daniel Timothy
mhcustoms@ntamar.net Capitol Building ground floor
PO Box 29 Majuro, Tel 625 8606, Fax; 625 5730

⇒ Using HS96 6 digit system at the moment, expecting to move to HS6 full 8 digit system and electronic entries in September, (or at least by the end of the year).

Office of Environmental Planning & Policy Coordination (OEPPC)
Director: Yumi Crisostomo,
oeppc@ntamar.net yumikocrisostomo@yahoo.com Tel: 625 7944 fax: 625 7918
Marshall Islands Development Bank Building,

International Waters Programme RMI
National Coordinator, Lowell Alik; l_alik@hotmail.com operates from OEPPC office.

Environmental Protection Authority:
John Bungitak, Director; rmiepa@ntamar.net
Coastal Mangement Officer; Caleb McClennen, caleb.mcclennen@tufts.edu
Education Unit: Julian Alik rmiepa@ntamar.net
Solid Waste Officer, Coordinator for the Waste and Pollution Division; Roney Arelong, Roney_arelong123@hotmail
National Coordinator POPs Programme: Steven Lepton rmiepa@ntamar.net
Hazardous Waste Officer; Milton Clarence, rmiepa@ntamar.net

Economic Planning, Policy and Statistics Office (EPPSO)
Director, Carl Hacker, Office of the President
planning@ntamar.net 625 3802 / 625 3801

Office of the Attorney General
Deputy Attorney General: S.Posesi Bloomfield
agoffice@ntamar.net possesi@gmail.com
Tel: 625 3244 / 625 8245 Fax: 625 5218; PO Box 890 Majuro

Majuro Atoll Local Government (MALGOV)
Executive Director Dept of Parks and Recreation: Jisam Kaisha
malgov@ntamar.net Tel:625 3415 / 625 8186 Fax: 625 5714; PO Box 796 Majuro

Ministry of Public works
Solid Waste Officer, landfill manager of Batkan / Jabele landfill, Craig Karben
Site Visit 22/6/05

2. Private Sector

Majuro Chamber of Commerce
Presentation to the monthly meeting at Marshall Islands Resort on CDL system for the Marshall Islands, June 9th.
Contact: commerce@ntamar.net , Chair: Carlos Dominick
Majuro CoC has an ongoing interest in solid waste. Has continually met with the government over the SWM situation. Frequent topic at meetings over the last few years. Has made several submissions to RMI over the last few years.

Shipping agents:

Micronesian Shipping agencies Inc.Phil Walsh: shipping agent for Chief Container Service msaiship@ntamar.net Tel: 625 2021 Fax: 625 2020; 3396 Lagoon Rd, Delap MI 96960

Matson: Bori Ysawa Manager CENPAC (Central Pacific Maritime)
administration@rreinc.com www.rreadmin.com Tel: 625 3250 ext 281 Fax: 625 3505
PO Box 1, Majuro part of Robert Reimers Enterprises Inc.

Metals Recycler:

Tangs Recycling: Mr. Tang, next to Island Hotel, Opposite Nitijela, 625 4384 / 625 7068

Hotels and Bars:

Marshall Islands Resort
Manager: Bill Weza,
625 2525 mir@ntamar.net
supportive of concept.

Marshall Island Club / Flame Tree
Bar and hotel owner Joe Murphy, also major beer importer.
journal@ntamar.net, 625-3142
Complained that recycling cans and bottles was depriving the country of valuable landfill materials. Noted the recent tax increase of 25c per can of beer, additional costs on beer likely to hurt sales he said.

3. Non-Government Organisations

Marshall Islands Council of NGOs (MICNGOs)
Director: Marie Maddisson WUTMI (Women United Together in the Marshall Islands).

Community Members at the IWP Pilot Site
Alab Anwel Biranej: Jenrok Weto Alab[28]. Very supportive the system when explained to him through IWP coordinator interpretation. Already collecting cans.
Jebarke Heran: Vice-Chair Na Weto Womens Club, house behind Home and Garden store, Na Weto, Jenrok. Very supportive of proposed system. Collects cans for women's group fundraising.

4. Development Professionals

BCI: Ben Chutaro. Consultant to IWP and ADB. BCI Consultants
Has conducted a Waste stream analysis from Jenrok. Provided invaluable support during field study, including logistical assistance. High level of understanding regarding SWM in Majuro. Accountant by profession, project management abilities.
Completed Socio-economic study of Jenrok.
bako@ntamar.net

Steve Pollard, ADB Senior Economist (Poverty Reduction) Pacific Dept.
Frequent visitor to Marshall Islands on ADB missions. Interest in SWM issue for Majuro. ADB has a study proposal on SWM for the RMI.
spollard@adb.org

[28] Weto: parcel of traditional land; Alab: midlevel traditional community leader.

Appendix V: Selected Beverage Data

Imports:

Customs Data

A brief survey from the Director's computer: average 2140 cases per FCL soda cans

Table IV: Soda Imports FCL only, FY 2004

Month	Soft Drink	Cola
Dec	4	13
Jan	1	7
Feb	8	3
Mar	8	5
Apr	5	6
May	N/A	7
June	N/A	7
July	N/A	6
Aug	3	4

Beverage Prices:

Table V: Beer Prices in some Majuro stores

Stores	**product**	**Price**
Payless	Bud 355ml	$1.99
	Miller lite 355ml	$1.69
	XXX 340ml	$1.39
Mapvision	Budweiser 355ml	$1.75
RRE	BUD 355ml	$1.55
	XXXX 375ml	$1.24 (case 24)
Small Stores Majuro	Bud 335ml	$2
Ebeye	Bud 355 ml	$3 +
Average Store		**$1.82**
BARS		
Tide Table	Bud 355ml	$2.80
	Bud Lite 335ml	$2.50
	Speights 375ml	$2.30
Flame Tree	Bud 355 ml	$2.25
	XXXX 375 ml	$2.50
MIC	Bud 335 ml	$1.50
Nite clubs	Bud 355ml	$2.50
Average Bar		**$2.33**

SODA

Table VI: Soda Prices some Majuro Stores

Store	**Product**	**Price**
Payless	All Soda 355ml	$0.69
Mapvision	All Soda 355 ml	$0.75
RRE	Western Fam. 355	$0.49
	Other Soda 355 ml	$0.65
	(Fruit juice in cans	$1.15 - $1.25)
Small stores Majuro	Soda 355 ml	$0.75 or $1
Ebeye	Soda	$0.75 - $1
Average store		**$0.72**

Water

Table VII: Water Prices some Majuro Stores

Store	Bottle size	price
Payless	500 ml	$0.59
Mapvision	500ml	$0.50
RRE	355ml	$0.59
	3.57litre	$1.59
Small Store	500 ml	$0.60

Appendix VI: Terms Of Reference for this Study

A Feasibility Study to Investigate the Potential to use the Principals of Extended Producer Responsibility and Product Stewardship to Improve the Economics of Solid Waste Management in the Marshall Islands

Over the last year, Kiribati has put in place a recycling operation financed through the leverage available using Container Deposit Legislation (CDL). This is a recognised Solid Waste Management (SWM) tool, incorporating Extended Producer Responsibility (EPR), and Product Stewardship. The leverage occurs from capturing the high value of a recovery most of the aluminium component through giving the beverage containers a value using a deposit system. This approach is used in many countries as a waste management strategy, and has proved very successful. The Project that created the Kiribati system was financed through its implementation stage by the UNDP. Part of the Project Specification was to produce a model that could be used in other Pacific Island counties should that appear feasible. The Republic of the Marshall Islands (RMI) suffers from similar waste management problems to Kiribati. The information from a feasibility study in the RMI could use the Kiribati model in order to develop a suitable design for the RMI. It is apparent from the Kiribati experience that benefits to SWM are wider than just the materials included in the deposit refund scheme.

Objective

Evaluate the logistics, costs and feasibility of establishing a recycling project in the RMI, based on CDL, which would:

- Reverse the ongoing accumulation of waste in the sea, beaches and other land areas of the islands of the RMI.
- Develop a financially sustainable recycling project that provides employment to Marshallese people;
- Through privatization, produce a model of the Private Sector providing public services to the RMI.

Tasks will include:

- Research issues concerning the drafting of suitable Container Deposit Legislation for the RMI;
- Identify types of media available for a public awareness program associated with recycling, and cost typical activities using those media;
- Outline the elements of a public awareness campaign to compliment the setting up of a recycling operation;
- Identify local organizations, and key people in those organisations with whom partnerships might be formed to achieve a successful recycling operation;
- Identify any current activities on SWM that any recycling project might be required to cooperate with;
- Research suitable equipment that may be required by the Project;
- Identify previous studies involving SWM that might be useful in developing a recycling system;
- Analyse data from any previous waste stream analyses;
- Collect data on imports, and analyse that data, for relevant items that would indicate material flows for recycling;
- Identify current recycling activities within the RMI;
- Identify possible markets for materials collected for recycling;
- Identify shipping costs to markets identified;
- Develop a Project Implementation Plan for the practical and logistical elements of the recycling program;
- Design recycling collection points for collection of recyclables from the community.
- Advise as to which materials to collect;

- Research and report on quantities and types of recyclable materials likely available on Majuro;
- Identify uses for materials that it may not be feasible at this stage to export for recycling, but are locally reusable in some form;
- Produce and initial Design, and cost estimates of a Materials Recovery Facility in Majuro;
- Present outcomes to civil society and relevant Government authority for feedback on proposed strategy; and
- Finalize proposal in UNDP format and advise UNDP on appropriate/possible resource mobilization strategy (if approved by Government)

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Solid Waste Management in Majuro, BECA International Consultants Ltd. August 2003

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Kiribati Solid Waste Management Project Newsletter, Vol 1 & 2, 2004, Vol 3: 2005;

List of Acronyms

ADB	Asian Development Bank
BAF	Bunker Adjustment Factor
D-U-D	Delap – Uliga – Darrit (Majuro urban area)
EPPSO	Economic Policy, Planning and Statistics Office
EPR	Extended Producer Responsibility
FCL	Full Container Load
HDPE	High Density Polyethylene
IWP	International Waters Programme
KSWMP	Kiribati Solid Waste Management Project
KWp	Kilowatt peak (a measure of solar panel output)
MALGOV	Majuro Atoll Local Government
MISSA	Marshall Islands Social Security Administration
MPW	Ministry of Public Works (RMI)
MRF	Materials Recovery Facility
OEPPC	Office of Environmental Planning & Policy Coordination (RMI)
PET	Polyethylene Terephthalate (Number 1 plastic bottles)
POPs	Persistent Organic Pollutants
PSC	Public Service Commission (RMI)
PV	Photovoltaic (solar electricity)
RMI	Republic of the Marshall Islands (often refers to the Government of)
RMI EPA	RMI Environmental Protection Authority
SOPAC	South Pacific Applied Geo-Science Commission
SPREP	South Pacific Regional Environmental Programme
UNDP	United Nations Development Programme.
USEPA	United States Environmental Protection Agency