

Aluminium Can Management

Executive Summary

Many Pacific Island Countries collect aluminium cans for recycling. Some of these countries include: American Samoa, Cook Islands, Fiji, Kiribati, Niue, Tonga, Tuvalu, Vanuatu and Papua New Guinea. The operations through most of the countries are conducted by private businesses, indicating that recycling of aluminium cans is profitable, making it a relatively easy recyclable commodity.

Aluminium is used in many every day products including beverage cans, window frames, cars, cooking utensils and roofing materials. Aluminium recycling is both economically and environmentally effective, as it requires a lot less energy to recycle than it does to mine, extract and smelt aluminium ore. Aluminium exposed to fires at dumps can release poisonous gases and cans dumped in the environment can harbour mosquito breeding. Refer section – Health and Environmental Impacts.

A crusher or baler is required to flatten the cans to reduce volume, enabling shipping to be more cost effective and put the crushed cans in an easily transportable block form. A small baler can be purchased from New Zealand for NZ\$10,250. Refer section – Equipment.

To effectively collect aluminium cans, bins need to be located in readily accessible places, in every village and/or adjacent to drink supplies. A regular collection will need to occur of the bins. Contamination of the cans needs to be minimised so that the highest price will be paid for the cans. After baling cans should be stored in a clean, covered area. Some collectors in the Pacific will hose the baled cans to clean of any remaining residues after compaction. Refer section – Collection and Preparation.

Due to the facts that can recycling can operate as a profitable business and also the environmental advantages, it is an effective charity operation with some organisations returning profits for their community. Refer section – Management.

A case study for sending aluminium cans from Samoa to New Zealand was estimated, revealing a profit of over NZD6,000 per shipment. Refer section - Case Study of Fees.

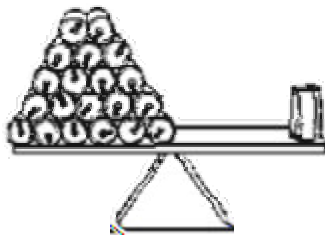
Introduction

Many Pacific Island Countries collect aluminium cans for recycling. Some of these countries include: American Samoa, Fiji, Kiribati, Niue, Tonga, Vanuatu and Papua New Guinea. The operations through most of the countries are conducted by private businesses, indicating that recycling of aluminium cans is profitable, making it a relatively easy recyclable commodity. There is the potential to increase the volume of aluminium cans being recycled in most countries across the Pacific.

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Health and Environmental Impacts

The environmental consequence of discarding aluminium cans to the environment is primarily a visual one, however, the cans harbour mosquito breeding. Aluminium can disposal is also a waste of a valuable resource. Aluminium is easily recyclable and requires only 5% of the energy used to make primary aluminium. When metal is exposed to excessive heat, for instance, on fire at a dump, fumes given off by molten metal are extremely poisonous.



The energy needed to make one new aluminium can is the same as the energy needed to recycle twenty aluminium cans.

Adapted from Alcoa Australia

Undesirable Practices

- ~~✗~~ Burning metal at the dump
- ~~✗~~ Littering or dumping cans (and other metal materials) in streams, the ocean, by the roadside
- ~~✗~~ The addition of foreign objects such as stones or cigarette butts, to the cans. These can interfere with the recycling process.

Desirable Practices

- ~~✗~~ Distribution of cages in locations easily accessible which will increase the amount of aluminium cans collected,
- ~~✗~~ Regular emptying of cages and collection at central facilities or businesses.

Present Situation

The following outline details the extent of can recycling in Pacific Island Countries.

American Samoa

American Samoa Power Authority (ASPA) sends several shipments of aluminium cans a year to New Zealand for recycling. Metals are collected at their scrap metal recycling center by a contractor, LT Limited, where customers are given money in return for cans. The densifier used was purchased brand new.

Cook Islands

Can Crushers operate a regular pick up service for aluminium cans around the main island of Rarotonga. It is a non-profit company and profits are shared amongst 3 catholic schools. The predecessor of the business, Father Glover, initiated the collection of cans and formed a successful business from it. In 1999, the company was bought and handed over to John George who operates it part-time.

The Cook Islands have opened a Recycling Station in 2002 that collects recyclables from Rarotonga's domestic waste. Part of the recycling service is for the collection of aluminium cans. Collection is by a truck which picks up recyclables and follows the domestic waste collection truck around the island. The Station is open 6 days a week and was funded by NZAid who provided most of the equipment. Although it is currently being managed by the Public Works Department, it is proposed that Environment Services will manage it soon.

Aitutaki collects aluminium cans for recycling through the Seventh Day Adventist Church. Discussed further in the section Case Study.

Kiribati

Mary's Enterprises at Bairiki uses a hand operated hydraulic press where cans are compressed into small pellets. The Ministry of Environment was providing wire-mesh baskets in 2000, which were used to collect empty cans. The baskets are placed at strategic points: outside shops, supermarkets, eating places, schools and around public offices. Once a week or whenever the baskets are full, the cans are emptied into a truck and brought to the crush yard. The pellets are then stacked into containers and shipped to Australia. Considering the export rate of one container every six months and expenses involved (cost of cans, truck, labour, repayment for crusher etc) aluminium can recycling is a profitable business. However, Mary's Enterprises mostly uses family labour and spare time to run the operations (SPREP SKM-Kiribati 2000)

Moel trading company at Betio successfully exports aluminium cans to Australia. The can and ferrous metals export recycling is called Cancare.

Tarawa Cancare exports about 2 to 3 containers of crushed cans per year. The business has a motorized hydraulic press arrangement and large wire

netting cages for the cans. In 2000, the estimated profit of the can recycling business was about \$10,000 to \$11,000 per container load. The major capital cost is the cost of a crusher which was valued at approximately \$40,000 (Waste Characterisation Study)

Niue

The Niue Can Venture is a Government Initiative to clean Niue of empty cans and recycle them. Residents take their own cans to the can depot in Niue's capital, Alofi. Approximately one container a year is shipped to New Zealand for recycling. There is a levy of 5 cents per beer can imported to pay for the empty cans to be recycled and 5 cents is paid for bringing a can in. No profit is made through the venture.

Tonga

Moana Recycling collects aluminium cans from niteclubs and provide a pick up service for aluminium cans. Some cans are also sourced from scavengers at the dump site. Moana Recycling has been in operation almost 20 years and sends approximately 2 containers per year of metals (aluminium cans and scrap metals). The crusher used in their operation was supplied by a recycler in Australia and paid off over a couple of years.

Waste Management Limited has been collecting aluminium cans for the past year. Atenisi University collects aluminium cans for recycling also.

Tuvalu

Cancare is a well established recycling operator in Funafuti.

Vanuatu

Vanuatu Recyclers buy cans from the Coca-Cola company and a number of unemployed elderly people who gather the cans from the roadways. This provides an income to these people and since the streets of Port Vila are clear of cans there is a reduced risk of health related mosquito diseases such as dengue fever. Vanuatu Recyclers have been in operation since 1980 and send approximately four containers of baled UBC per year to Australia.

Table 1: Amount of aluminium and steel cans available in each. (Unfortunately, a figure for only aluminium is not available).

Country	In area in country	Amount (tonnes/year)
Fiji	Lautoka	630
Kiribati	Tarawa	320
Papua New Guinea	Port Moresby	5300
Samoa	Apia	800
Solomon Islands	Honiara	660
Tonga	Nuku'alofa	95
Tuvalu	Funafuti	70
Vanuatu	Port Vila	320

Collection and Preparation

Bins need to be provided in readily accessible places, in every village and/or adjacent to drink suppliers. The bins need to be readily identifiable so that they are not mistaken for disposal of other rubbish. An education program would then require implementation so that the public will use the bins appropriately.

The bins for can collection require frequent disposal when full. If the well intentioned can disposer cannot dispose of the can, the system will not maintain peoples enthusiasm which is required for continued collection. The cost of the service could be met from the value of cans picked up or from a levy on incoming cans.

To avoid odour problems and to reduce pests during transport and storage process, the cans should be rinsed. The cans then need to be crushed and baled for volume reduction to enable transportation to be more effective.

If cans are collected from public places to sell at buy back centers, then before the can is crushed, check that no sharp objects, such as syringes, have been placed inside the can.

Kaal Australia, which is a subsidiary of Alcoa, has found that the main issue with all UBC purchases is the level of iron (Fe) contamination in the cans. The cans need to be passed across a magnetic sorter to remove any steel cans, twist tops and other magnetic contaminants. If these items are being found in the returned aluminium cans, a magnetic sorter may need to be purchased. If this is too costly for some operations (it may make the recycling unprofitable, which is generally the case with smaller operations) it may be feasible to hand pick through the cans. It is considered iron contamination of aluminium cans would not be a significant issue for Pacific island countries.

Equipment

The most effective method of transporting cans is by compressing crushed cans into a briquette and shipping them in containers. The facility that accepts the crushed cans requires sufficient space and adequate staff to receive the uncrushed cans, handle payments, operate the press and store the briquettes.



The cans need to be flattened and put in a bale for easy transportation. The crushing and baling equipment manufactured nowadays are multifunctional and will do both tasks. Refer to the contact list for some suppliers.

There are many suppliers which offer a wide range of crushing and baling equipment. Suppliers must be sourced from the United States, New Zealand and Australia.

Some suppliers include:

- Ullrich Exports,
- MachineRunner,
- Marathon Equipment, and,
- Wastedrive Pty Ltd.

Table 1: Cost and details of equipment for baling aluminium cans.

Equipment	Description	Capacity	Indicative Price*
Balers	1.5kw, single phase, bale size 350 x 350, weight 350kg	26 tonne of compactive force	NZD10,250 (USD5,157)
	Bale size 760 x 760, weight 34-57	3, 561kg platen force	AUD15,000 (USD8,440)
	Bale size 1524 x 1219, weight 408 – 454	23,224kg platen force	AUD20,000 (USD11,254)

* the price listed is the cost of the equipment at the supplier and does not include shipping costs.

Some recyclers in the Pacific, rinse down the cans after compacting so that they are clean and also has the dual purpose of minimising cockroach problems.

Storage Facilities

Aluminium can bales may need to be stored for some time before there is an adequate number to fill a shipping container. If this is required, an undercover storage area is preferable, else the bales should be securely covered with a tarpaulin or similar. Dirt should be kept out of them as well, so that the bales are not unnecessarily contaminated.

Export and Import Permits

There are no particular export or import permits that are required for shipping aluminium cans.

Management

Co-ordination is required so that every step in the can clean up is effective. To oversee the program, Government may be required and be prepared to step in if any part is not performing properly.

Another consideration in the recycling program is whether the funds will be donated to charitable organisation. If the operations contribute to charity, it will be easier to gain the support of the community, suppliers and shipping lines to make the most generous concessions.

The recycling of aluminium cans in Aitutaki in the Cook Islands uses community support to maximise contributions, see case study section below.

Recycling Facilities

Aluminium for recycling can be sent to either Australia or New Zealand from Pacific Island Countries. The companies that will buy UBC include:

- ?? Kaal Australia,
- ?? Talls Ingots,
- ?? Sims Metals,
- ?? Comalco, and,
- ?? Paper Reclaim.

Quality Requirements

The specifications for aluminium cans being sent to Kaal Australia has been outlined below. Kaal is a subsidiary of Alcoa and is the largest consumer for Used Aluminium Cans (UBC) in the southern hemisphere.

Two forms of baled UBC are acceptable:

1. UBC in bale or briquette form stacked on pallets.

The size of the bale is not critical in the constraint that no-one dimension should exceed 0.4 metres. Bales should be of a uniform size with no protruding edges and should not overhang the pallet.

2. UBC supplied in large single bales.

These are referred to as 'Harris bales' but other large bales are acceptable. The maximum acceptable bale dimensions are 1500 x 750 x 1200mm. Smaller bales are preferred.

All scrap supplied to Kaal Australia must be free of contaminants capable of causing an explosion hazard when charged into molten aluminium. In particular:

- ?? Heavy grease and oils,
- ?? Residual chemicals such as nitrate and sulphate and other oxidizing materials

- ?? Corroded and oxidized material
- ?? Water and other volatile substances whether in solid or liquid form
- ?? Salt fluxes
- ?? Bottles (glass or plastic) pressure packs, butane lighters, or any other sealed containers.

Baled UBC should be free of any other non-UBC materials which in themselves do not constitute a safety hazard. These include steel, lead, other metals, paper, plastic, wood, dirt and other aluminium scrap. All UBC should be mechanically separated prior to baling to ensure there is no iron or steel contamination. As collection of UBC in Pacific Island Countries does not include steel, there is a much reduced risk of iron and steel contamination.

If upon melting it is determined that a particular delivery of UBC has resulted in contamination of the melt with iron, lead, zinc or any other element to the extent that it renders the metal unusable for further processing by Kaal, the metal will be cast out as sows. The sows will be disposed of and the UBC supplier may be liable for the financial losses incurred by Kaal as a result of this transaction.

Packaging and Transport

Small bales of UBC are to be shipped on sound hardwood universal or double faced pallets conforming to AS 2068. CHEP pallets are preferred.

No pallet is to be stacked to a height of more than two metres as these cannot be charged directly into the furnace. Bales should be stacked on the pallet so that they interlock together to minimize the load movement. Bales must not overhang the pallet. The top layer must be even to facilitate packing at Kaal.

Only steel or aluminium stacking is acceptable. Plastic strapping or shrink or bandage wrapping is unacceptable. Steel strapping should be a minimum of 19 mm wide and aluminium strapping a minimum of 32 mm wide. There should be a minimum of four vertical straps, two each on adjacent sides, as well as girth straps securing the top row of bales. Harris bales should be secured with a maximum of 4 wire straps. Aluminium wire is preferred, but steel is acceptable.

Bales of UBC must be stored and transported under cover at all times. (Used Beverage Container Specifications, Kaal Australia)

Whilst some collectors across the region do tie straps to the bales, there is a proportion that do not and simply place their small bales into shipping containers without straps and pallets, refer Figure 1. It is best to liaise directly with the company who will be buying the cans as to what their specific requirements will be.



Figure 1: Aluminium cans being packed for shipping.

Shipping

Shipping containers filled with baled aluminium cans will weigh different weights depending on the compactor used and its efficiency. Generally, the weight will not achieve the maximum weight of shipping containers and will be between 14MT to 18MT in a 20 foot container. All collectors who were consulted for these guidelines did not pack bales onto pallets for shipping.

Economics

There is between 58 – 60 aluminium cans in one kilogram and a shipping container can hold approximately 9 tonne of aluminium cans. This density will of course depend on the efficiency of the can baler. Therefore, 522,000 – 540,000 cans needs to be collected before one 20ft container can be filled for shipping.

Similarly to all recyclables, the prices of aluminium cans is not immune to fluctuation. In 1994, prices for aluminium in Melbourne, Australia was AUD1,000/tonne, whilst the present value in Auckland is NZD1,000/tonne (Waste Awareness, November issue, 2002).

One recycler in the Pacific has reported that NZD\$27,000 has been cleared on a single shipment of aluminium cans during the last few years, although current prices indicate large profits such as this are impossible without a lot of cost discounts (see below).

Case Study of fees

The cost of transporting a 20 foot container of aluminium cans from Samoa to New Zealand is outlined in the following table. This economics analysis does not take into account collection costs which can form a large component of resources and time. The highest fees have been assumed when considering this analysis, so reductions are likely.

Table 1: Outline of costs for transporting aluminium cans from Samoa to New Zealand.

Fee	\$ Value	Unit charge	Total
Hire of container for two days to load	ST14 (US4)	day	- ST28 (USD8)
Transport cost of container from company to wharf	ST150 (USD105)	For 20ft container	- ST150 (USD45)
Port Service charge in Samoa	ST30 (USD9)	Per container	- ST30 (USD9)
Wharfage fee in Samoa	ST2.5 (for 20ft cont.) (USD1)	Per m ³ (cont is 33m ³)	- ST82.5 (USD25)
Shipping cost from Samoa to NZ	NZD1200 (USD600)	Per 20ft container	- NZD1200 (USD600)
BAF (as at 5/8/02)	12.1	%	- NZD145 (USD72)
CAF (as at 5/8/02)	18.7	%	- NZD224 (USD112)
Import service charge in NZ	NZD130 (USD65)	Lump sum	- NZD130 (USD65)
Customs Clearance	NZD85 (USD42)	Lump sum	- NZD85 (USD42)
GST	12.5	%	- NZD1,125 (USD560)
Transport to Company in Auckland's metro area	NZD165 (USD82)	Lump sum	-NZD165 (USD82)
Total cost to door of company			- NZD2,404 (USD1,201)
Income from Product	NZD1,000 (US120)	tonne	+ NZD9,000 (USD4,497)
Income – Cost =			+NZD5,851 (USD2,916)

It can be estimated from the above analysis that the cost for shipping compacted cans from Samoa to New Zealand, excluding collection costs, is \$270/tonne.

Case Study

Aitutaki is a small atoll in the Cook Islands and has a population of approximately 2,400 people (1996 Census). The island also gets approximately x tourists each year. The Seventh Day Adventist School has started collecting aluminium cans and are crushing them with a can crusher bought second hand from someone on the island for NZ\$6,000.

There are ten bins located around the island at bars, nightclubs and shops, which volunteers constructed themselves. Shopkeepers and Bar owners will

notify the school when the bins require emptying. Two collections are made per week to empty the bins and if the bins fill outside these collections, shopkeepers and bar owners will notify the school. There is no crushing work done on Fridays because it is the Sabbath and cans are collected on Monday and Wednesday, whilst crushing is dedicated to Tuesdays and Thursdays. Most of the operations are carried out by teachers and adult volunteers, and the children assist sometimes by separating rubbish from the cans.

There is a direct shipping line to New Zealand departing Aitutaki and the Principal of the school is negotiating to get reduced shipping rates.