



Solid Waste Management in the Pacific

Tonga Country Snapshot

BACKGROUND

The Kingdom of Tonga had a population of approximately 103,300 in 2012 with annual population growth of around 0.2%.¹ Approximately 67% of the population resides on the main island of Tongatapu, where the nation's capital of Nuku'alofa is located. The population of Nuku'alofa is approximately 36,000. In 2012, Tonga's per capita gross domestic product (GDP) was T\$7,738 Tongan pa'anga (T\$) (approximately \$4,240) (footnote 1).

Tongatapu has recently undergone a complete transformation of its SWM system, provided through the enactment of the Tonga Waste Management Act (2005), and the implementation of the Tongan Solid Waste Management Project (TOSWMP)² supported by the government and the Australian Agency for International Development. The act provides a comprehensive legislative base for the effective development and management of the sector.

TECHNICAL ASPECTS

Solid Waste Generation

Tongatapu Island, including Nuku'alofa, is served by a single integral solid waste management (SWM) system. Reliable data is not available regarding the amounts and types of municipal solid waste (MSW) generated on Tongatapu as regular waste assessments are not undertaken. Information available for Pacific island nations in general indicates that per capita MSW generation rate may be 0.45 kilograms per person per day, with variations based on GDP, level of urbanization, and other factors. In Nuku'alofa, MSW generation rates will most likely be higher, and considerably lower in rural areas. Assuming this average per capita

generation rate, the daily MSW household generation rate for the island is therefore about 30 tons per day, equivalent to about 10,000 tons per year. From 2012 until 2030, assuming nominal growth in population and per capita generation, Tongatapu can be expected to generate in excess of 200,000 tons of household waste, quite a significant amount for a small island nation. To put this in perspective, if all the wastes were placed in a single line of waste trucks, the line would extend to a distance of over 500 kilometers (km). Additional MSW would be generated by commercial and institutional establishments, the volume of which is currently unknown.

A recent solid waste composition assessment on Tongatapu showed that green waste (primarily vegetation waste) accounts for roughly 33% of its municipal waste stream. Organic materials (primarily food waste) make up another 15%, followed by diapers; and smaller amounts of paper, plastic, glass, textiles, ferrous and nonferrous metals, and other materials.

Waste Collection and Transfer

Historically, consumers provided their own waste containers, including an array of plastic bags, containers, steel drums, and wheeled bins. Recently, the Waste Authority Limited (WAL) modified the collection system by providing uniquely identifiable plastic bags to fully paid-up household consumers for their MSW collection, and these were the only bags collected by the WAL collection vehicles. The objective of the bags is to differentiate between consumers who pay the WAL tariff from those who do not, so that only those who pay receive the service. Because of difficulties in procuring these printed bags from overseas WAL has recently returned to the original system of consumers using their own waste containers.

1 ADB. 2013. *Key Indicators for Asia and the Pacific 2013*. Manila.

2 The TOSWMP helped establish the Waste Authority Limited, replace the MSW collection system, develop the Tapuhia landfill, support recycling, and promote public awareness.

MSW generated by commercial institutional generators is usually transported to the landfill by private MSW service companies, WAL and the commercial/institutional operators own vehicles. Commercial business are charged only a monthly MSW disposal fee by WAL.

WAL's MSW collection service is currently collecting around 65% of the island's urban household MSW and around 25% in rural areas. This equals only about 20 tons per day, leaving about 10 tons per day uncollected by the municipal system. Of the uncollected amount, a small fraction is taken by private vehicle to the disposal facility whilst considerable proportion of MSW continues to be burned, or illicitly dumped on farm lands, quarries, other vacant areas, and the ocean.

The primary reason for the low collection efficiency is that WAL has only three waste collection trucks, one of which is inoperable. The two operable trucks, each with a capacity of 6 cubic meters, are therefore required to service the entire island of 71,000 people, living in dispersed communities over a total area of over 250 km². Although the collection of commercial and institutional waste is also under WAL's responsibilities, this service is predominantly provided by private service providers or the commercial/institutional owner. Surveys of commercial/institutional owners have shown that they favor this arrangement as do the private service providers.

Waste Recycling

Many households segregate waste components, including food waste (animal feed) and green waste (compost) as well as reusing items of perceived value such as plastic containers. Many households continue to segregate aluminium, steel and plastic bottles and cans placing them in some 170 community recycling cages located in most villages and throughout urban Nuku'alofa. When full, these cages are emptied by a private recycling company who pays the community operators (usually a sporting group, women's group or village group) upon collection of recyclables.

On a commercial scale, significant recycling initiatives continue through the drive of an enterprising and proactive private recycling company. This recycler who also operates in Vava'u and is about to commence operations in Ha'apai collects all ferrous and nonferrous products including plastic bottles, paper and cardboard, automotive batteries and used oil. In calendar year 2013, 1,470 tonnes of steel (108 tonnes sourced from Vava'u), 9.5 tonnes of copper, 15.5 tonnes of aluminium, 54,000 litres of used oils and 50.4 tonnes of wet batteries were exported from Tonga by this private recycling company. A number of staff have now undertaken training

courses supported by New Zealand and are now certified to pack and export hazardous goods (i.e., car batteries) to New Zealand. Most recycled products are exported to New Zealand with waste oils sent to India and batteries sent to Korea and New Zealand. The company also collects and exports e-waste and operates one full sized car crusher, two half sized car crushers (one unit is located in Vava'u) and a plastics/cardboard/paper crushing/bundling machine. This is a remarkable private industry initiative whilst the Government is yet to develop and promote a successful, island-wide waste minimization and recycling strategy for Tongatapu.

Waste Disposal

The Tapuhia disposal facility was established as part of TOSWMP. The facility, located 1.5 km northwest of Vaini, is connected to the main arterial Taufu'ahau Road by a 0.5 km long access road. The site covers an area of approximately six hectares, its dimensions being about 300 meters by 200 meters. The surface elevation of the site is between 15 and 20 meters above sea level. It is a former quarry, extending to a depth of about nine meters beneath the existing ground surface. The quarry area, covering approximately four hectares, is used as the sanitary landfill. The landfill is prepared with a basal liner system and leachate collection and transfer system, the floor of which has been raised above the existing groundwater table. Filling has proceeded in the western extremity of the landfill footprint, which is the first cell to be filled. An access ramp leads into the quarry area from the east, constructed with natural earth materials. A custom-built covered area in the northwestern extremity of the landfill is to be used to store designated wastes.

The eastern part of the site houses the ancillary facilities, including a gatehouse, an unused waste transfer platform, a recycled material storage area, a decommissioned hazardous waste incinerator, a leachate treatment system, sludge drying beds, and a vehicle and equipment storage facility. Groundwater monitoring wells are also placed around the facility. Although the facility layout and design features appear appropriate, observations indicate a number of areas of facility operations that could be improved. These are summarized as follows:

- Waste entering the facility is disposed of in Cell No. 1, and compacted but daily cover is irregularly used due to a shortage of operational funding to purchase cover soil.
- The covered area for the storage of designated wastes is not being used as the preparation for storage is complex and costly. Special wastes, of which there is very little in Tongatapu are buried in special excavations in the waste mass and covered.

- Landfill gas collection and treatment systems are not installed at the facility as the waste stream in Tongatapu is extremely dry due to the segregation of much organic food materials by households for chickens, pigs, and dogs.
- The vehicle and equipment storage area needs to be kept tidy and the ground must be protected from waste oils leaks.

In summary, although the facility is well designed and constructed, good operational management supervision and monitoring is continuously essential for it to operate as designed. Managed in this way it can adequately serve the island over the medium term (20+ years).

Medical Waste Management

The Ministry of Health (MOH) is responsible for the collection, storage, transfer, treatment, and disposal of medical waste generated on Tongatapu. A color-coded bin system allows for the segregation of infectious and hazardous waste from general MSW. Medical waste is transported in a special collection vehicle, which collects medical waste from the island's seven clinics and other facilities and transfers it to the main hospital in Nuku'alofa. The waste is then sterilized in an autoclave, using standard operating procedures. Following sterilization, the treated waste is then transported to the Tapuhia landfill facility for disposal. This treated medical waste is buried in specially excavated holes in the waste mass and then covered. A medical waste incinerator, installed at Tapuhia in 2008, is not operated due to a lack of MOH funding.

INSTITUTIONAL ARRANGEMENTS

The Waste Management Act (2005) provides a comprehensive legislative base for the effective development and management of the sector. It provides for the establishment of an SWM authority, in this case WAL, mandating its functions, powers, and responsibilities. These are wide ranging, including the provision of MSW collection, transfer, and disposal services; promotion of waste reduction and recycling programs; development of rules and codes of practice; monitoring of public health and environmental impacts; public awareness raising; SWM community responsibilities; imposition and collection of SWM fees; and prosecutions for violations. The Act is specific on operational responsibilities, including the contracting of services to the private sector. There appear, however, to be requirements and responsibilities in the Act with which WAL is yet to fully comply.

Other salient legislation includes (i) the Public Health Act (1992), providing regulations pertaining to waste containers, waste collection, SWM and hazardous waste disposal, street cleaning, and the prohibition of waste import and export; and (ii) the Public Enterprises Act (2002) and Companies Act (1995) which relates to public enterprise establishment and operation.

Established in late 2006, WAL is responsible for the entire municipal SWM system on Tongatapu. It reports directly to the Ministry of Public Enterprises, and comprises of an executive board and a staff of 31, led by a Chief Executive Officer. WAL has three primary divisions: financial, corporate, and operational services. It recently moved into its own premises in Nuku'alofa.

Although the current Board and management team are doing a commendable job of improving the operations of WAL, it faces significant challenges. As indicated by its relatively low MSW collection efficiency, it is challenged to provide a reliable, collection service to the island's 71,000 residents or its commercial and institutional clients. Tariff collections remain low in rural areas, resulting in limited operational funding resources, leading to an inability to provide reliable services, which in turn affects tariff collection efficiency.

WAL does not outsource its operations to the private sector. Private sector waste haulers do, however, operate on the island, negotiating contracts directly with commercial and institutional MSW generators. This waste is also transferred to the Tapuhia landfill, where it is disposed. Two private sector septic tank sludge tankers also operate on the island, delivering the sludge to the drying beds at the Tapuhia landfill facility. MOH staff are well trained in medical waste management, and appropriate systems and procedures are in place relating to the segregation, transfer, and autoclave sterilization of waste. The disposal of the waste remains an area of concern.

The SWM sector on Tongatapu is funded through consumer tariffs paid directly to WAL. In fiscal year 2014 consumer payments in Nuku'alofa significantly improved when waste charges were included in Tonga Water Board bills. The existing household tariff is 10.00 TOP, (approximately \$ 5.75) per month. There are three tariff tiers for commercial waste: small generators (TOP 17.00 per month); medium sized generators (TOP 25.00 per month); and large generators, such as markets and hospitals (TOP 128.00 per month). There are tipping fees at the landfill for waste and septic sludge, which are now fully administered. Until recently, WAL also received a direct Government subsidy for its operations of TOP 0.5 million annually.

The ADB-funded Nuku'alofa Urban Development Sector Project is providing technical assistance and capital investments to WAL directly, including the provision of additional waste trucks. This is expected to further increase the consumer base served and the tariff revenues from this expanded consumer base.

WAL faces significant challenges in terms of its financial sustainability going forward. The existing WAL Board and senior management are, however, implementing initiatives in order to improve the current status. A revenue and tariff study is being implemented by NUDSP. It will report to WAL in late 2014 and it is anticipated that better revenue collection will improve proper and regular maintenance of waste collection equipment. Recently improved revenue increases have seen improved management and operation of the Tapuhia landfill minimizing previous environmental and public health concerns. There are still insufficient funds to support full administrative functions, public awareness activities, and effective tariff collection activities. For rural areas, it is planned to trial a system allowing the SWM tariff to be charged on the same bill as electricity as TWB does not provide water supply services to rural villages. This scheme is being pilot tested in cooperation with the Tonga Power Limited.

PUBLIC AWARENESS

TOSWMP included a range of targeted public awareness initiatives relating to the adoption of the Waste Management Act, establishment of WAL, and various recycling activities supported by the project. In addition, TOSWMP worked closely with village women's committees to enable them to act as tariff collection agencies and portals for relevant information. Public awareness activities have also involved the Tongan Environmental Community Action Network, and town and district officers. The Tonga Community Development Trust has been involved in the promotion of household composting. Currently in schools, WAL has a budget for a public awareness program, and television and radio announcements. There has not been a shortage of public awareness activities in SWM on Tongatapu during recent years. It may be that the low level of public support for the WAL system, as reflected by the low level of tariff collection efficiency, is less to do with a lack of consumer understanding and appreciation of SWM issues and need for compliance: What counts more to them is that before consumers are willing to pay for a service, they want to first experience it.

CONCLUSIONS

The SWM system on Tongatapu can be summarized as follows:

1. Over the past decade, the Government has begun transforming the SWM sector on Tongatapu, assisted in large part by the adoption of the Waste Management Act and the implementation of the TOSWMP.
2. The Government initiatives have resulted in the formation of WAL as a largely autonomous entity, being responsible for the SWM sector. It provides collection services, operates and maintains the Tapuhia landfill, collects its own tariffs, promotes waste reduction and recycling, develops rules, monitors impacts, and raises public awareness.
3. Physical system upgrades and rehabilitation of the MSW collection and transfer system and of the Tapuhia landfill facility are currently underway.
4. WAL faces critical financing challenges but tariff revamping have increased significantly in 2013–14 with combined waste and water billing.
5. Despite considerable recycling activities, sustainable island-wide, household level waste minimization and recycling initiatives need further awareness raising and promotion on Tongatapu.
6. Medical waste disposal remains a concern.

Overall, this initial review has highlighted the progress achieved by Government and private operators in the sector over the past decade, but at the same time, has identified issues that WAL and the sector in general face in moving forward. The WAL Board and senior management are aware of these issues, and have already initiated a number of key actions in order to gradually address these challenges and improve sector performance. ■

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