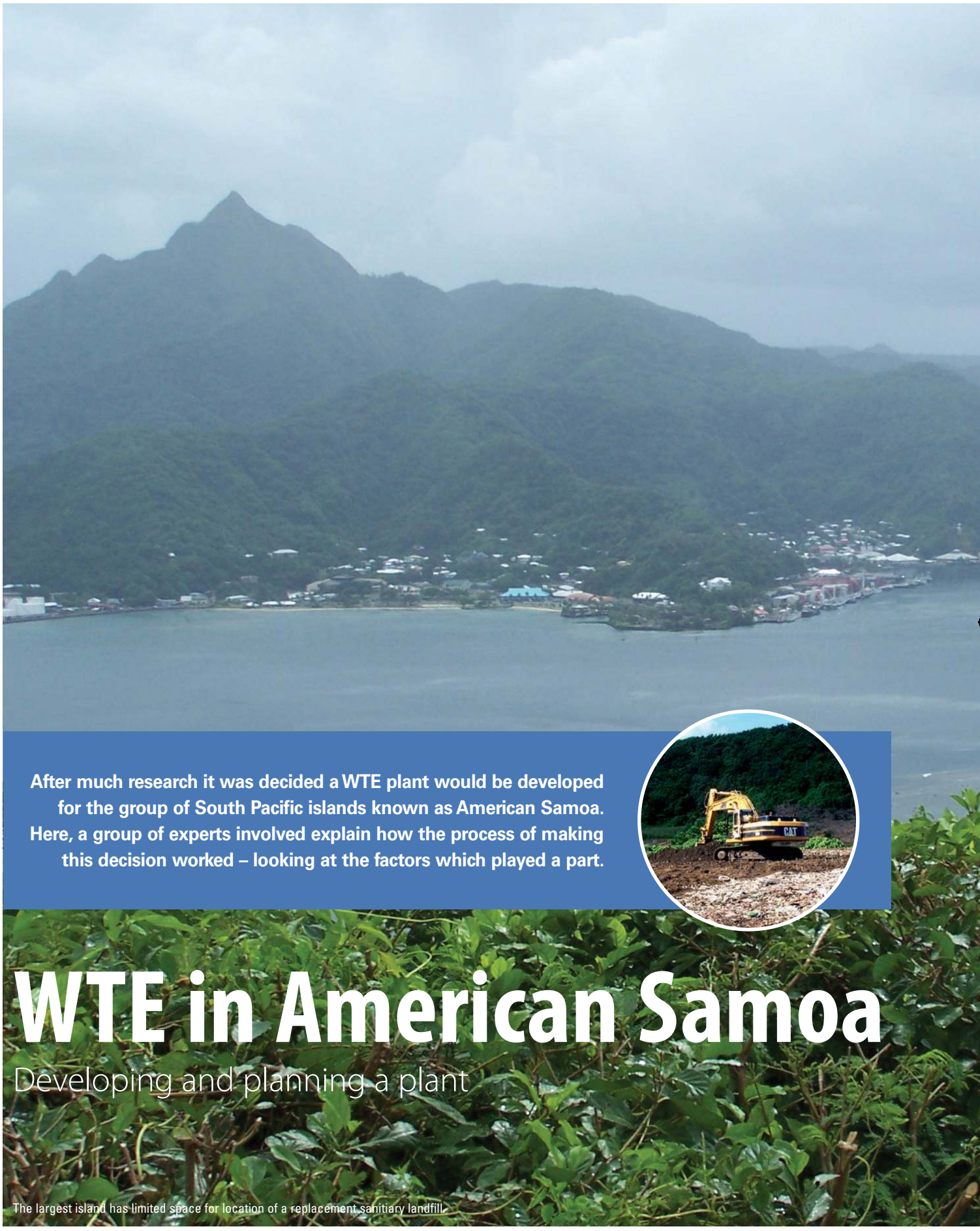

After much research it was decided a WTE plant would be developed for the group of South Pacific islands known as American Samoa. Here, a group of experts involved explain how the process of making this decision worked – looking at the factors which played a part.

WTE in American Samoa

Developing and planning a plant

The largest island has limited space for location of a replacement sanitiary landfill.

American Samoa is a territory of the USA and part of the Samoan archipelago, a group of volcanic islands in the South Pacific. The main islands are Aunu'u, Ofu, Olosega, Ta'u and Tutuila, which are located approximately 3701 km (2300 miles) southwest of Hawaii and about 4345 km (2700 miles) northeast of Australia. The largest and most populated island in American Samoa is Tutuila, on which Pago Pago, the seat of its legislature, judiciary, and the office of the Governor is located. This article addresses solid waste management issues on this main island.

The American Samoa Power Authority (ASPA) is the territory's publicly-run municipal utility which provides electric, water, wastewater, and solid waste services to the residents of American Samoa. Under its enabling legislation, ASPA is mandated to operate self-sufficiently at full-cost recovery. ASPA has the ability and the mandate to charge fees in return for its services. This power to assess rates, charges and fees to its customers provides ASPA with a mechanism to fund solid waste management projects, which could not otherwise be funded under a tax-subsidized program.

ASPA also receives an annual capital improvement grant from the US Department of Interior (DOI). Grant funds are used to purchase new and replacement equipment such as bins, containers, collection trucks and equipment for ASPA's Futiga landfill and scrap metal yard.

In 2009, ASPA applied DOI funds to re-establish control of solid waste collection services from private haulers, which resulted in a substantial drop in solid waste expenses as projected by several cost benefit analyses conducted in the past. Furthermore, services reached more consumers compared to when it was under the private haulers.

In 2008, ASPA was awarded a technical assistance grant from DOI to conduct a waste composition study to quantify and characterize the composition of waste disposed of at the Futiga landfill. The overall objectives of the project were to develop reliable estimates of the quantity and composition of wastes disposed by key generator groups. The data was then used to identify potential waste-to-energy options for American Samoa, including the types of processing facilities potentially suitable for island conditions, facility costs and energy generation. Current power costs for ASPA are in the range of $0.26 per kilowatt-hour, more than triple that of a typical city on the mainland USA.

Past solid waste planning

Over the past 20 years, a number of solid waste consultants have been engaged by the territorial government, Environmental Protection Agency (EPA) and DOI to study solid waste management conditions on the island and make recommendations for improvements. These studies provided conceptual evaluations of possible changes to the solid waste system in American Samoa with respect to collection, transfer, recycling, volume reduction via incineration and disposal. The territorial government and, later ASPA, has implemented some of these projects as part of the DOI grant process. But the territory as a whole, up until the present time, has not progressed much beyond basic landfilling of solid waste and recycling of some scrap metals. The objective of this study was to enable ASPA to extend and maximize capacity and extend the life of the Futiga landfill due to volumetric reductions obtained by waste through incineration.

ASPA staff operate a sanitary landfill, which receives about 80–150 tons (73–136 tonnes) per day, and is covered daily with a layer of volcanic ash. Samples for the waste composition study were selected from incoming loads.

Waste loads were separated by a team of sorters into more than 50 different categories and then a Btu value of the entire waste stream was calculated.

ASPA de-privatized solid waste collection services in the territory and expanded its staff of drivers for operation of its fleet of automated and front-loader vehicles.

With respect to waste incineration, all of the former studies came to the same basic conclusion. That is, waste incineration with energy recovery appeared promising for the main island, given ASPA's high costs to produce power from conventional technologies. These costs have escalated dramatically in recent years due to reliance on increasingly expensive, imported diesel fuel. Recommendations included the construction and operation of a dual, modular solid waste incineration system, either on a single site or two sites optimally spaced across the main island.

How much waste is available for WTE?

A study team from SCS Engineers, an environmental consultancy and contracting firm, conducted a waste volume and composition assessment program at the Futiga landfill over a period of several weeks. Data from this program was extrapolated to forecast the amount of waste delivered to the island's only disposal site each year. Since there were no working scales installed at the landfill at that time, all haulers, residents and businesses were asked to weigh in and out at a weigh scale at the scrap yard during the term of this study. The raw data was corrected for observed anomalies then converted to approximate the municipal solid waste (MSW) stream that would be typically disposed of at the landfill, and thus available for feedstock to a future WTE plant. Typical WTE facilities are run continuously on a 24-hour, seven-day-a-week operational pattern. Thus, to estimate the island's waste stream available for this proposed facility, this data was converted using to a seven-day average for plant sizing purposes. The weigh data appear to show that approximately 56 tonnes (62 tons) per day of MSW, tires, and waste oil would be initially available as feedstock/fuel for the plant.

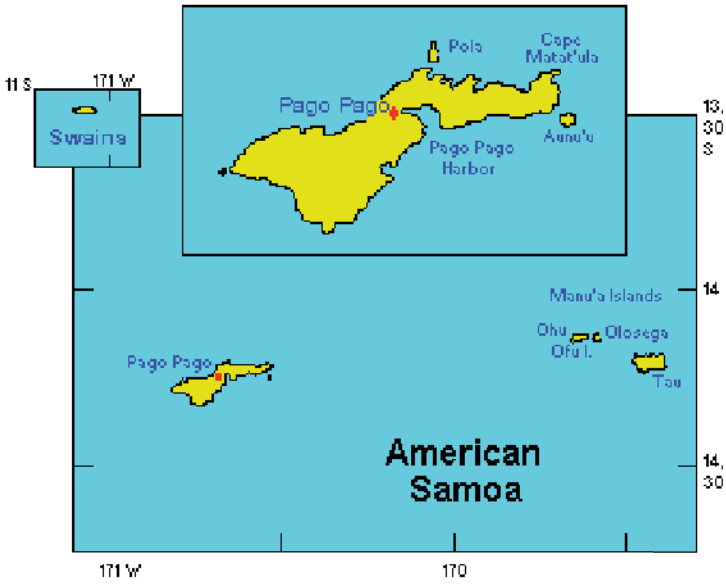

Figure 1: The islands of American Samoa, including a close-up of the main island – Pago Pago – where the WTE facility will be located

Conducting an island waste composition study

The waste composition sampling was critical to help designers to obtain a clear picture of the heating value for the incoming waste stream. To accomplish this objective, data gathered was obtained during two week-long waste sampling seasons (wet and dry), and was used to provide a complete picture of waste composition and heating value.

The sorting crew hand-sorted approximately six to eight samples daily for each week's sampling program. Samples were manually sorted into 53 material categories, and the material in each category was weighed. The largest component of the overall waste stream is paper and related material (as shown in Figure 2 on page 31). Organics and mixed residue comprised the next largest components, at 19.6% and 16%, respectively. The remaining waste types together accounted for about 46% of the landfill's waste stream.

Since the sale of energy plays an important role in the economic feasibility of a WTE project, the heating value of the waste stream is a key design factor. The heating value of solid waste is typically measured by Btus per pound of MSW in the USA, and is well documented. Using published Btu (British thermal unit) values of waste, combined with the waste composition data and moisture content obtained from this study, the team calculated the projected energy content of the overall waste stream. Waste oil and tyres are potential additional waste-sourced fuels available in the territory.

WTE feasibility

Results of this initial feasibility study indicate that WTE is a viable solid waste management alternative for American Samoa. Given current waste composition and generation trends, a modular-type WTE system, somewhere in the range of 63–77 tonnes (70–85 tons) per day capacity, would provide roughly 2.0 MW of electrical power for the territory's total energy production of 29 MW. Given the limited flat land available for construction (due to the island's volcanic terrain), it appears the best site for this facility would be a three acre (1.2 hectares) parcel adjacent to ASPA's existing Tafuna Power Plant, near the island's airport and only industrial park. The site has access to electric power, the island's grid, potable water and wastewater services.

As part of the feasibility analysis, a Pro Forma Economic Model was developed to explore the projected costs and revenues of a WTE facility. These results indicate that the projected tipping fees, if any, revenues from energy sales and carbon credits should be adequate to pay for the facility's operating and maintenance expenses and debt service/loan payments. Further scenarios examined the impact of a 30% capital cost savings potentially available to the project under the recently enacted U.S. Department of the Treasury grant program, pursuant to the American Recovery and Reinvestment Act of 2009.

ASPA's next steps

The implementation of a WTE facility would require a significant capital investment by ASPA for planning, engineering, permitting, equipment and construction, perhaps constituting one of the largest

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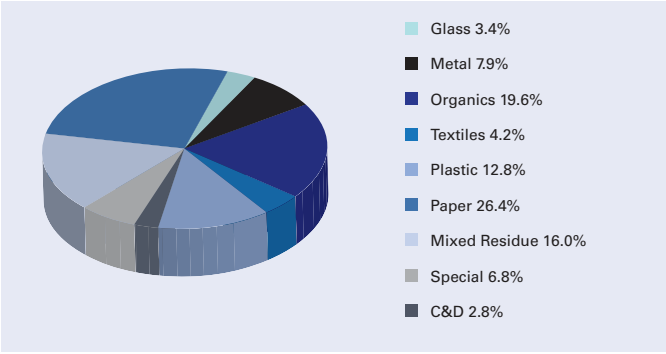

Figure 2: Average waste composition for composite sampling programme.

public works/utility projects in the territory. Nevertheless, this WTE project would result in a long-term solid waste management solution for American Samoa, as well as providing base load power resources for electricity generation.

At the outset of the overall programme, ASPA appointed an internal project team to help guide the project through all of the critical steps. This team consists of government officials and outside consultants, representing engineering and environmental management, financial, public involvement and legal expertise.

Efforts have begun to craft an inclusive Request for Proposal (RFP), which will include technical specifications for the project, define the roles and responsibilities for the parties (vendor and ASPA), basic contractual requirements, a financing plan, and the method that will be used by ASPA to evaluate vendor proposals. In concert with the development of the RFP, ASPA has engaged the services of an experienced permitting professional to initiate the air quality permit application for the WTE facility with the US EPA, the permitting agency for this matter.

At the same time, ASPA has begun an analysis of available land at the current landfill for design, permitting, and construction of a lined cell for disposal of ash residues from the proposed WTE plant. While recycling of the plant's ash stream is possible over the long-term, the prudent course of action is to design and construct a landfill cell for ash residues.

Lastly, ASPA has undertaken a proactive public involvement and outreach program to inform territory citizens about the project's aims to provide for long-term solutions for solid waste management issues, while providing an alternative, renewable energy supply for the territory. This public outreach program will involve periodic media information releases on the project, development of a project brochure and ASPA interviews. It will assure most members of the public that the project has been prudently developed.

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