Technical Assistance Consultant's Report

Project Number: 32566 (TA 4653)
February 2007

Republic of Marshall Islands: Increasing Ownership of and Effective Demand for Improved Urban Waste Management

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Asian Development Bank and Republic of the Marshall Islands

Final Report:
Progress and Outcomes of the Stakeholder Participation and Consultation Program

TA No. 4653 (RMI)
Increasing Ownership of and Effective Demand for Improved Urban Waste Management

Republic of the Marshall Islands February 2007

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Legal establishment of the new corporation was an important step, and the MAWC board is now discussing future plans for the corporation. It is still unclear if or to what extent the corporation will be funded, however, and there has been no agreement between the two prospective owners on matters of funding or on the disposition of their current solid waste assets, staff, and budgets.

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The consensus preferred collection option that emerged from the stakeholder consultations was Collection Option 11, which would employ two small ($10m^3$ capacity) compactor trucks with mechanical bin lifters and $3m^3$ high-impact plastic bins with lids to collect solid waste from households and from participating commercial customers in the area from Rita to Laura (see Attachment 1 for details). MALGov would pay the cost of household collections (about $2.90 per household per month) using revenue from the local sales tax that MALGov levies partly for that purpose. Commercial customers would pay for whatever level of service they desired at cost—that is, with no cross subsidy between household and commercial customers.

The consensus preferred disposal option that emerged from the stakeholder consultations was Disposal Option 10, which would employ a 24 ton/day Batch Oxidation System (BOS) "gasifier" incinerator with energy (heat) recovery to run a 340 kW generator to produce electricity that would be sold into the MEC power grid.

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The TA sought an independent assessment of concept design Disposal Option 10. The independent assessment concludes that:

- The BOS "system will handle a wide variety of wastes with minimal maintenance."
- BOS "systems are relatively simple to operate, maintain and will handle a wide variety of waste materials. Most of the repairs can be easily handled by local craftsman."
- The BOS "is the optimal system to handle the waste stream generated on the Atoll."
- "Electric generation through energy recovery can be readily integrated into this system."

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The concept design and financial estimates for Disposal Option 10 changed significantly for the better last week when the manufacturer of the BOS incinerator presented a revised concept design for the heat recovery and electricity generation system. The previous design had employed an air-cooled condenser as a way to deal with the occasional water shortages on Majuro. The new

concept design instead employs a water-cooled (rainwater and/or seawater) condenser—with the immediate result that electricity output would be increased 50 percent from 225 kW to 340 kW.

The design change would add only $50,000 to overall capital costs. In preparing a new financial estimate for Disposal Option 10, the TA also added a flat $200,000 to the estimated installation costs just to make the overall estimate more conservative.

The financial effect of adding $250,000 to first-year capital equipment and installation costs would be to increase the NPV of all disposal costs to a total of $347,000 per year. On the other hand, the effect of the design change would be to increase estimated revenue from electricity sales to $518,000 per year—leaving a net profit of $171,000 and a positive cash flow of $291,000 per year. Each ton of solid waste would generate electricity valued at about $90. The estimated cost of generating electricity is about $0.05 per kWh when counting only costs of the steam boiler and generator system or about $0.13 per kWh when counting all costs of the BOS incinerator and the electricity generation systems together. This compares to MEC's average cost of $0.30 per kWh.

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The project itself published "*Ta Eo Am Lemnak?* What Do You Think? Consensus on Solid Waste Collection and Disposal Options for Majuro Atoll" as an insert in the *MI Journal* and on the www.Yokwe.net web site for public comment. Six NGOs sponsored a public hearing on the report.

No significant objections were expressed against Collection Option 11. Many participants appeared to want the TA to be responsible for deciding which option to implement and then actually implementing that option. Some participants asked directly for that outcome or implicitly criticized the TA for not guaranteeing, enforcing, or itself implementing the option. Public frustration over lack of government action and the absence of visible participation by MALGov, RepMar, or MAWC in the meeting or in any other TA activity probably lent support to those views.

Some participants—all expatriates working for or with MICS—argued explicitly or implicitly against Disposal Option 10 and any collection or disposal option that hinders or did not require industrial-scale composting and separating and then shipping overseas all materials that could be recycled.

MICS has recently received several large USDA and other grants to implement a subsidized composting and recycling scheme. Together, the grants provide direct financial and other benefits to MICS personnel. Justification for the scheme would disappear if MAWC implemented Disposal Option 10. This would appear to place senior MICS personnel in a conflict of interest if they are also board members or senior personnel in MAWC.

The basic argument presented against Disposal Option 10 was the claim that it would increase global warming and discourage recycling. The TA did not reply directly during the public hearing, but instead replied in an open letter after the meeting. An edited version appears below.

6. Which Disposal Option Is Best for the Environment and at What Cost? (pp. 7-9)

The net environmental effect of Disposal Option 10 would be to cut the amount of diesel and waste oil MEC burns by about 211,000 gallons per year, cut total carbon emissions and other pollutants in the energy production system, cut ground and water pollution from improper disposal of waste oils and paint, and remove thousands of old tires from the environment. Financial estimates indicate that Disposal Option 10 would likely generate a small overall cash profit.

In contrast, the overseas recycling scheme requires large subsidies. Those subsidies might be offset in part or in whole by the avoided cost of reeffill space that could be saved by recycling—about $36 per m^3 or $200 to $300 per ton for a non-sanitary reeffill at Jenrok—but only if there is need for such a reeffill, and there is no need for a reeffill with Disposal Option 10.

Opposition to BOS incineration together with the overseas recycling scheme would tie Majuro to a non-sanitary reeffill option for the garbage that cannot be recycled at any cost. Such a reeffill would produce large amounts of methane gas, which presents a risk of explosion and is about 20 times more potent as a greenhouse gas than CO^2 emissions from a BOS incinerator. A reeffill would also send toxic leachate seeping onto the reef from 80,000 tons of decomposing garbage.

If a reeffill is not acceptable, that would appear to force reconsideration of the BOS incinerator, but the recycling operation would cut the scale of the BOS by one third, which would likely destroy the financial viability of the electricity generation system. A smaller version of the BOS without electricity generation would incur net costs of about $370,000 more per year than Disposal Option 10. That extra $370,000 per year would be added to the subsidies required to support the overseas recycling scheme. Such subsidies would be paid either by local taxpayers and/or by foreign donors. Removing the need for those subsidies might present a problem only for people who benefit from maintaining aid dependency and from controlling the inflows of aid.

7. Conflicts of Interest (p. 9)

The TA raised the issue of conflict of interest between MICS and MAWC in the Inception Report and again in the Midterm Report. Those conflicts of interest have now increased substantially to the point that it is unclear where MICS operations and interests end and where MAWC operations and the public interest begin. Maintaining clear accounting records might be difficult under such conditions, so it would be important for the Office of the Auditor General to audit MAWC each year, and if MICS receives public funds or other public resources, to audit MICS as well.

8. Lessons Learned (pp. 10-11)

Rather than participating as a partner in TA activities, local and national governments expected the TA team to carry out TA activities on its own and then just inform the two governments at the end what they should do. Such a passive role for the host government is not a part of contemporary aid projects. With such thin support and participation by the host government, ADB might postpone a project or even cancel a project altogether.

The TA was left carrying out the stakeholder consultation and participation program largely by moving government solid waste management into the public spotlight and giving the public a forum to impress government with the need to carry out reforms. This is an awkward and difficult way to conduct a project, but it was fairly effective. It would not have been necessary if the goal had just been to provide a new technical solution, but a central purpose of the TA was to help improve governance by increasing ownership of and effective demand for improved waste management.

It is also too early to tell if the TA has helped significantly to increase effective demand for improved governance in the provision of a basic public service. It is apparent from past history in Majuro, however, that little public discussion of these issues would have taken place and few if any practical improvements would have been made without the TA.

Like the assessment of collection and disposal options, however, the proper question in assessing the TA strategy is not whether it is perfect, but whether it worked better than other available

options. In answering that question, the TA strategy of discussing matters of governance directly in the public arena is confirmed.

More particularly, the TA adopted the strategy of embedding the public discussion of governance issues in a practical program to design and assess improved institutional and technical solutions—in this case largely engineering solutions. The TA adopted this strategy because of the urgent need for such improved solutions, because such a combined governance and technical approach is more constructive, because questionable institutional and technical solutions had already been advanced in private, because of the public's understandable exhaustion with mere talk, and because technical solutions are attractive to government, to the public, and to overseas donors. This strategy of combining governance issues with engineering issues proved successful.

9. Aid Dependence (pp. 11-12)

With over 70% of all public spending in the RMI coming from overseas aid, the Marshall Islands is an extreme case of aid dependence. The effects of such dependence were clearly evident during the project as both local and national governments left the TA team to carry out virtually all project-related activities on its own. Rather than attempting to marshal local resources to best effect, government and even some public stakeholders appeared to judge the viability of different technical options by the likelihood of attracting donor funding.

Aid dependence was also evident in the two governments' apparent reluctance to reform wasteful government programs that now spend about $1.2 million per year while providing a very poor public service. The draft consensus collection and disposal options discussed above could provide a superior and sustainable service at little or no net cost to the public—yet neither the national government, the local government, nor MAWC seems anxious to move in that direction. In contrast, both governments have been quick to seek more aid to shore up the present system and quick to back a closely held NGO that can access more aid to do the same.

10. What Next? (pp. 11-12)

The next step is for MAWC to decide which options to pursue. Once the board decides, it has the obligation of informing the public, taking comments, and obtaining necessary permits.

Combining Collection Option 11 with Disposal Option 10 would provide a net savings of perhaps $900,000 per year to fund initial capital improvements of about $4.3 million. This is an ideal scenario for an ADB loan project. The present TA was originally intended to lead to such a project.

RepMar is delinquent on its current ADB loan portfolio and the government is making little progress on policy reforms, however, so government and ADB have agreed not to schedule new loans in the program period to 2011. One option might be for RepMar to make up the delinquent payments and implement needed policy reforms in order to access the ADB solid waste loan project.

Another option is for RepMar to withdraw its request to JICA for solid waste management support and instead request that JICA support one or more education infrastructure projects now earmarked for Compact funding, which could then free up idle Compact funds for immediate use on solid waste management.

ADB Solid Waste TA Final Report

1. Progress on Institutional Issues

Working with government and non-government stakeholders, the Technical Assistance (TA) team identified 11 major solid waste management issues the project might address (see Inception Report, June 2006, and Midterm Report, October 2006). Project implementation then focused on three types of those issues—institutional issues, collection issues, and disposal issues.

The TA developed and estimated costs for many options to address each issue and then worked with local stakeholders in three main rounds of consultations to develop consensus on which options local stakeholders preferred and to increase effective demand for reform. In the case of the institutional issue, the TA also helped to implement the option that local stakeholders selected.

ADB took the problem of poor solid waste management on Majuro to be mainly a problem of governance—including lack of ownership of the solid waste problem. As a result, the TA pressed the issue of institutional reform and ownership from the start of the project in late May, 2006.

Consensus was decided early in favor of centralizing all public solid waste management activities on Majuro in a stand-alone corporation to be called Majuro Atoll Waste Corporation (MAWC) and to be owned by RepMar and MALGov. Implementation of that decision has been slow. MAWC was finally incorporated and a board of directors appointed in the first week of February, 2007.

Legal establishment of the new corporation was an important step, and the MAWC board is now discussing future plans for the corporation. It is still unclear if or to what extent the corporation will be funded, however, and there has been no agreement between the two prospective owners on matters of funding or on the disposition of their current solid waste assets, staff, and budgets. Much remains to be done, and the degree of commitment by the two governments is not yet clear.

2. Draft Consensus on Collection and Disposal Options

Stakeholder consultations on collection and disposal options continued through December, 2006, at which time it appeared that a clear consensus had developed in favor of one collection option and one disposal option. Less attention was given, and thus less clarity achieved, on the question of whether or not, or how, to provide cash payments to consumers in order to get them to collect and turn in more materials for recycling. All collection and disposal options—including recycling options—were assumed to require an appropriate public awareness campaign, but details of those campaigns were not developed.

The consensus preferred collection option that emerged from the stakeholder consultations was Collection Option 11, which employs two small ($10m^3$ capacity) compactor trucks with mechanical bin lifters and $3m^3$ high-impact plastic bins with lids to collect solid waste from households and from participating commercial customers in the area from Rita to Laura (see Attachment 1 for details). MALGov would pay the cost of household collections (about $2.90 per household per month) using revenue from the local sales tax that MALGov levies partly for that purpose. Commercial customers would pay for whatever level of service they desired at cost—that is, with no cross subsidy between household and commercial customers. Collection Option 11 was preferred (usually unanimously) by all stakeholder groups consulted except for the Chamber of Commerce Executive Committee (which lobbied for several more expensive, *ad hoc* options) and OEPPC (which declined to express an opinion).

Note that the details developed under each collection option are largely for the purpose of comparing financial costs among options. Those details need not remain fixed once a preferred option is selected for implementation.

The frequency of collection might be changed, for example, or the size or material of the bins or the number of households sharing one bin might be changed. The number of households sharing one bin might be fewer in rural than in urban areas. The overall costs and the labor and equipment estimated for Collection Option 11 assume weekly collection using $3m^3$ bins, but service could be two or even three times per week using smaller bins with fewer households sharing one bin. Collection might be two or three times per week in urban areas, but only once per week in rural areas—with appropriate differences in bin sizes and the number of households sharing one bin. Similarly, bins of the same width, but less depth from front to back, might be used in crowded neighborhoods such as Jenrok and Small Island where there are fewer places to locate $3m^3$ bins.

All such changes would affect capital and operating costs. The financial effect of changes can be estimated easily using the project Collection Option spread sheets provided to MAWC. The important point for the collection system is to maintain a uniform bin width and style so one set of collection trucks can collect both commercial and household bins.

The consensus preferred disposal option that emerged from the stakeholder consultations was Disposal Option 10, which would employ a 24 ton/day Batch Oxidation System (BOS) "gasifier" incinerator with energy (heat) recovery to run a 340 kW generator to produce electricity that would be sold into the MEC power grid (see Attachment 1 and Attachment 5 for details). Disposal Option 10 was preferred (often unanimously) by every group except the Marshall Islands Conservation Society (MICS), which argued in favor of industrial-scale composting and shipping recyclable materials overseas, and OEPPC, which declined to express an opinion. Jenrok landowners and Majuro landowners were each consulted in a group meeting, and MALGov officers were present at both (Attachment 6, Midterm Report, and Attachment 2, Draft Final Report, list group consultation meetings).

Jenrok residents adjoining the ocean-side reef flat, which government had proposed as the site of a new dump, were consulted privately in a house-to-house survey because of their reluctance to attend public meetings or to express their views publicly. Details of that survey appear below in Attachment 2. In summary, the survey found: (1) no respondents knew of government plans dating back at least three years to develop a garbage dump on the reef flat at Jenrok, (2) less than half had experienced the high waves and flooding that devastated Jenrok in 1979, (3) three-quarters initially approved of reclaiming land at Jenrok because Jenrok is too crowded and needs more land, (4) all believed that traditional landowners (not government) own the reef flat, and (5) on discussing the risks, all thought that a reeffill dump would pose a serious risk to Jenrok residents.

3. Independent Assessment of Disposal Option 10: BOS Incinerator with Electricity Generation

The TA sought an independent assessment of Disposal Option 10 because the TA Team Leader (TL), who is not an engineer, had developed that concept design option in consultation with the manufacturer following a recommendation from USAKA engineers during a TA site visit to Kwajalein (see Attachment 4 for a list of people met outside group consultation meetings). USAKA is installing a 32 ton/day BOS incinerator—supplied by the same manufacturer—to replace its old controlled air incinerator. The engineering firm working on the TA was not aware of BOS technology, and the engineer working on the TA was not available during that period of the project.

As a result, the TL searched for and located a qualified engineer in the US with the necessary expertise to assess Disposal Option 10 at the level of a concept design. USAKA recommended a large engineering firm (John Zink, Inc.) in Tulsa, OK, which in turn recommended the consulting engineer eventually hired by the TL after canvassing more widely for candidates. The TL also visited the manufacturer on site in Bellingham, WA, and interviewed the president of the firm.

The TA received the draft report of the special engineering assessment in time for its summary comments to be included in the project Draft Final Report published in the *MI Journal* on February 1. The TA received the final report of the special engineering assessment in time for distribution at the public hearing on February 5. That final report closely follows the draft report. Some of the wording of the report is not entirely clear, and stakeholders are invited to contact the author for clarification (Attachment 3, below, contains cover letter, final report, resume, and contact details). In sum, the independent engineering assessment of the Option 10 concept design states that:

- The BOS "system will handle a wide variety of wastes with minimal maintenance."
- BOS "systems are relatively simple to operate, maintain and will handle a wide variety of waste materials. Most of the repairs can be easily handled by local craftsman."
- The BOS "is the optimal system to handle the waste stream generated on the Atoll."
- "Electric generation through energy recovery can be readily integrated into this system."

The engineer's report does not come to a specific conclusion in assessing the financial viability of the energy recovery option for generating electricity. In discussing this matter with the engineer, the TL was advised that a firm financial assessment would require the following:

- Engineering design parameters that are not yet developed in sufficient detail in a concept design. Those details will emerge in the detailed design of the system that would be produced in the next step if MAWC chooses to pursue Disposal Option 10.
- A detailed heat log (or history) of a similar system burning similar materials. Such a heat log may be obtained shortly from the manufacturer when tests are completed on a 25 ton/day BOS system with heat recovery that was recently installed in Iceland and perhaps from tests to be conducted soon on the 32 ton/day BOS unit now being installed at USAKA (contact details are provided in the project document binder discussed below).
- More accurate estimates than currently available of the volume and content of the Majuro waste stream that would be incinerated in the BOS unit.

4. Revised Concept Design and Financial Estimates for Disposal Option 10

The concept design and financial estimates for Disposal Option 10 changed significantly for the better last week when the manufacturer of the BOS incinerator presented a revised concept design for the heat recovery and electricity generation system. The previous design had employed an air-cooled condenser as a way to deal with the occasional water shortages on Majuro. The new concept design instead employs a water-cooled (rainwater and/or seawater) condenser—with the immediate result that electricity output would be increased 50 percent from 225 kW to 340 kW.

The design change would add only $50,000 to overall capital costs because the concept design presented by the TA already included the fairly modest capital and operating costs of a water-cooled system using rainwater catchments to back up a saltwater system. In preparing a new financial estimate for Disposal Option 10, the TA has now added a flat $200,000 to the estimated installation costs just to make the overall estimate more conservative.

The financial effect of adding $250,000 to first-year capital equipment and installation costs would be to increase the NPV of all disposal costs to a total of $347,000 per year. On the other hand, the effect of the design change would be to increase estimated revenue from electricity sales to $518,000 per year—leaving a net profit of $171,000 and a positive cash flow of $291,000 per year (see Attachment 5 for details). Each ton of solid waste would generate electricity valued at about $90. The estimated cost of generating electricity is about $0.05 per kWh when counting only costs of the steam boiler and generator system or a bit over $0.13 per kWh when counting costs of the BOS incinerator and electricity generation systems together.

It should be noted that the financial estimates for disposal options presented above and in Attachments 1 and 5 do not include the 50 percent share of MAWC administrative costs allocated to the disposal system (estimated at $60,000 per year), nor do they include any import tariffs, GRT, or profit margin. Such additional costs, if incurred, might reduce the overall net of the disposal system to roughly zero—meaning the total disposal system would operate at about zero net cost.

The overall financial position of government and the tax payer would be somewhat better still, however, because the financial position of MEC would also improve. Assuming that MEC would buy 2,592,000 kWh of electricity from MAWC at MEC's own avoided cost of production (about $0.20 per kWh), MEC would not be better or worse off buying and then reselling the electricity. But MEC could avoid burning 172,800 gallons of diesel if it bought and re-sold the electricity rather than generating the electricity itself, and MEC would then be free to sell that 172,800 gallons of diesel to visiting ships or to local wholesale customers earning a profit of about $121,000 per year. Thus, MEC's net financial position would improve by $121,000 per year, and the taxpayers' subsidy to MEC would be reduced by an equal amount.

By coincidence, $121,000 is also the estimated yearly net subsidy required under Collection Option 11 (see Attachment 1). When the $121,000 profit to MEC is included, it appears that the entire collection and disposal system could be operated at about zero net cost to taxpayers compared to the current budgeted government expenditure of $1.2 million.

5. Public Hearing on Draft Consensus Collection and Disposal Options

TA inputs were extended and publication of the Draft Final Report delayed from mid December 2006 to early February 2007. The extension and delay were to await government action on MAWC (action came on the day the project Draft Final Report went to press in the *MI Journal*) and to await completion of an independent engineering assessment of Disposal Option 10 (see above).

The intention of the TA had been to work with the board of directors and general manager of the new MAWC as project counterparts during the latter half of 2006. When September, October, November, and December passed without further action on the MAWC, the TA hoped at least to provide the board with the content and outcomes of the consultation program, together with the project technical data and financial estimates, in time to help the board choose which collection and disposal options it would propose to implement. The TA did not intend to and did not make any recommendation to the board or to other stakeholders on which options should be implemented.

According to the ideal project scenario, the MAWC board would publish its draft choices for public review and comment and then, with technical support from the TA, conduct a public hearing on that proposal. With input from the public hearing, the board would then make its final decisions and begin implementing its chosen options.

By the end of January, 2007, MAWC had not been incorporated and the board had not been constituted, so the TA itself published "*Ta Eo Am Lemnak?* What Do You Think? Consensus on Solid Waste Collection and Disposal Options for Majuro Atoll" as an insert in the *MI Journal* and on the www.Yokwe.net web site for public review and comment (see Attachment 1). Six major NGOs (MI Tourism Association, Youth-to-Youth in Health, MICNGOs, WUTMI, MI Chamber of Commerce, and Marshallese Business Association) sponsored the public hearing or "symposium."

In the meantime, the TA presented two technical briefings to the prospective board members of the still-unincorporated MAWC. The TA provided each prospective member with a binder containing hard copies and a CD containing electronic copies of all relevant project documents (see photo at right; see Attachment 6 for the table of contents). The same binder and CD were provided to the Minister of PW, the Mayor of Majuro, and each of the six NGOs that sponsored the public hearing.

The insert appeared in the *MI Journal* on February 1 and on Yokwe.net the following day. The public hearing was held at the Youth-to-Youth community hall at 4:30pm on Tuesday, February 6 (see photo, below). Nineteen people attended all or most of the meeting. About two-thirds of those people spoke, with roughly equal numbers being Marshallese and expatriate. The meeting was conducted partly in Marshallese and partly in English. Only two members of the MAWC board of directors attended the hearing, and both attended as representatives of NGOs rather than as board members.

The meeting was conducted as a public hearing with the express purpose to allow people to ask questions about and comment on the draft consensus options and to express their preferences for one option or another. Many of the participants who spoke at the meeting had not attended earlier consultation meetings and had not read the newspaper insert. The insert was known to be much longer than could be digested by most readers, but the project schedule left time for only one publication and one hearing, so the TA decided it best to get the entire document in front of the public rather than provide it only to MAWC.

No one spoke directly in favor of or against the draft consensus Collection Option 11. Most of the issues raised concerned matters that were handled satisfactorily in the earlier rounds of consultation and in the descriptions of the option published in the *MI Journal* (December 8, 2006, and February 8, 2007). Each question or comment was answered from information found in the *MI Journal* insert or other project documents that have been made available to stakeholders in the binders described above. Participants directed some comments at implementation details that are best left to the corporation's planning at a later date.

In sum, no significant objections were expressed against Collection Option 11. Many participants appeared to want the TA to be responsible for deciding which option to implement and then actually implementing that option. Some participants asked directly for that outcome or implicitly criticized the TA for not guaranteeing, enforcing, or itself implementing the option. Public frustration over lack of government action and the lack of visible participation by MALGov, RepMar, or MAWC in the meeting or in any other TA activity probably lent support to those views.

No one spoke directly in favor of the draft consensus Disposal Option 10: BOS Incinerator with Electricity Generation. Most of the issues raised again concerned matters that were handled satisfactorily in the earlier rounds of consultation and in the published descriptions of the option. Each question or comment was again answered from information provided in the *Journal* insert or from other project documents that have been made available to stakeholders in the project document binders described above. One participant noted that Majuro is crowded and that land reclamations could provide needed additional space, but the participant did not argue in favor of a reeffill option. Many participants again wanted to hold the TA responsible for deciding which option to implement and then guaranteeing, enforcing, or itself implementing that option.

Some participants—all expatriates working for or with MICS—argued explicitly or implicitly against Disposal Option 10 and any collection or disposal option that would hinder or not require industrial-scale composting as well as separating and shipping overseas all materials that could be recycled.

The public hearing did not have time to address the related issues of whether or how to provide cash incentives to induce people to collect and turn in more materials for recycling (see Section 4 of the *Journal* insert). Such a scheme had been proposed in 2005 and again in 2006 for UNDP funding, but UNDP apparently backed off upon learning that such a project would put existing commercial recycling companies out of business. Two TA consultation meetings had revealed strong opposition by local importers, retailers, and commercial recycling companies to options that would employ aid funds, special-use excise taxes, or other subsidies to a government-owned or licensed company to carry out recycling (except perhaps for hazardous materials), but little input had been received from the general public. MICS has now embarked on such a scheme.

MICS has recently received several large USDA and other grants to implement a subsidized composting and recycling scheme over the short to medium term, and MICS is reportedly seeking more grants for more capital equipment and operating expenses to broaden the scope and extend the term of the scheme. Together, the grants provide direct financial and other benefits to MICS personnel. Justification for the scheme would disappear if MAWC implemented Disposal Option 10. This would appear to place senior MICS personnel in a conflict of interest if they are also board members or senior personnel in MAWC.

In attempting to facilitate informed decision making, the TA has tried first to get the facts right and provide reasoned estimates of how much each option would cost and then consult with local stakeholders to explain the options to them, answer their questions, discuss and estimate costs for other options they might propose, and record their opinions and preferences. If MICS / MAWC or some other proponent decides to implement some new option, then in the interests of good governance, the proponent should also provide the facts and estimated costs to the public and show that the new proposal is in the best interests of the public.

The basic argument against Disposal Option 10 was the claim that it would increase global warming and discourage recycling. The TA did not reply directly during the public hearing, but instead replied in an open letter after the meeting. An edited version of that letter appears below.

6. Which Disposal Option is Best for the Environment and at What Cost?

During the public hearing, a visiting environmentalist from the US EPA in Oregon, who is working with MICS and RMI EPA to promote recycling, noted that he had checked with EPA offices on the west coast of the US—including the EPA office in Seattle near where the BOS incinerator is manufactured—and found that EPA has no objection to the BOS. Nevertheless, the visiting environmentalist and members of MICS appeared to reject the BOS option on the grounds that incineration produces greenhouse gases and discourages recycling.

The observation that a BOS incinerator produces carbon emissions (which are "greenhouse gases" that contribute to global warming) is true but irrelevant because every disposal option would produce carbon emissions. Sorting, packing, and shipping plastics and cardboard overseas would produce carbon emissions, for example, as would the actual recycling operations overseas and the local landfill or reeffill required for the remaining waste that cannot be recycled at any cost.

Whether or not incineration "discourages" recycling is also irrelevant because it begs the question of carbon emissions and the question of costs. If BOS incineration on Majuro reduces total carbon emissions and reduces costs—as appears to be the case—then people might think it proper to incinerate plastics and cardboard on Majuro rather than export them for recycling. Environmentalists might come to a different conclusion in Oregon, where electricity is very cheap and is produced largely by hydro-power, where a nearby company will purchase plastics and cardboard for recycling at little cost in shipping, and where the economy can support subsidies, but none of those conditions is the case in Majuro.

Thus, the appropriate question to ask is not whether a BOS incinerator produces carbon emissions or whether it discourages recycling, but "How much would each disposal option raise or lower total carbon emissions and at what cost on Majuro?" The people of Majuro need the information to answer that question in order to help them decide which option is best for them.

MEC burns very large quantities of diesel fuel to generate electricity at an average cost of about $0.30 per kWh, and it does so with relatively high levels of carbon emissions (among others). MEC also produces about 100 to 110 gallons of waste oil per day, which it burns in an old and unreliable incinerator that also produces high carbon emissions. In contrast, Disposal Option 10 would burn garbage to produce electricity with much less carbon (and other) emissions than MEC and at a cost of about $0.05 per kWh for just the heat recovery and electricity generation costs or $0.13 per kWh for both BOS incinerator and generation costs.

The BOS can also produce electricity by burning cleanly the waste oil from MEC, waste oil from Tobolar, and waste oil and paint from all other sources in the RMI (most of which now goes down the drain or into the ground), and it can produce electricity by burning tires. In doing so, Disposal Option 10 would further reduce the amount of diesel MEC burns and the amount of carbon emissions MEC produces. The net result would be to cut the amount of diesel and waste oil MEC burns by about 211,000 gallons per year, cut total carbon emissions and other pollutants in the energy production system, cut ground and water pollution from improper disposal of waste oils and paint, and remove thousands of old tires from the environment.

In contrast to the small overall profit estimated for Disposal Option 10 as described above in Section 4, the overseas recycling scheme requires subsidies of perhaps $100 per ton for cardboard, $300 per ton for plastics (TA rough estimates based on Alice Leney's UNDP report, *Ejjelok Kwopej*! Turning Rubbish into Resource, 2005, and on TA inquiries into current shipping

costs), and a large but unknown subsidy for shredding and recycling tires (note that both the recycling scheme and the BOS incinerator options include glass crushing equipment and operating costs to recycle glass on island as aggregate). Those subsidies might be offset in part or in whole by the avoided cost of reeffill space that could be saved by recycling—about $36 per m^3 or $200 to $300 per ton for a non-sanitary reeffill at Jenrok—but only if there is need for such a reeffill, and there is no need for a reeffill with Disposal Option 10.

Thus, instead of avoiding the cost of disposing plastics and cardboard in a reeffill, the overseas recycling scheme would avoid revenue that might be gained from incinerating them locally to generate electricity. Under Disposal Option 10, the cash revenue from incinerating cardboard, plastics, and tires here on Majuro to generate electricity would average about $90 per ton compared to losses of about $100 to $300 per ton for shipping them overseas for recycling. The ship-recyclables-overseas option also has significant health risks for the people hired to sort through the garbage (also check RMI health and sanitation laws).

Even if all plastic, cardboard, and tires were recycled, what would Majuro do with the remaining 3,000 tons per year of garbage that cannot be recycled at any cost? The ship-recyclables-overseas option would appear to tie Majuro to a non-sanitary reeffill option (the "sanitary" reeffill option does not appear technically feasible and is very expensive). Such a reeffill would produce large quantities of methane gas, which presents a risk of explosion and is about 20 times more potent as a greenhouse gas than CO^2 emissions from a BOS incinerator. Such a reeffill would also send toxic leachate seeping onto the reef from 80,000 tons of decomposing garbage, it would be more expensive than incinerating the garbage in a BOS, and it presents major land issues.

Consider also the costs and environmental impacts of the medical waste incinerator, which is an old-style controlled air incinerator that produces large amounts of toxic emissions, CO and CO^2 emissions, and toxic ash residue that should be disposed in a sanitary landfill. In contrast, the BOS incinerator can burn medical waste cleanly and safely with much lower carbon emissions, without significant amounts of toxic effluent, and with ash residue that is non-toxic, very small in quantity, and useful as concrete aggregate. Any option that rejects the BOS necessarily includes the added costs and environmental effects of burning medical waste in a controlled air incinerator.

A non-sanitary reeffill also appears to be one of the worst options for the environment and for public health. Unless recycling advocates want to embrace a non-sanitary reeffill option, that would appear to force re-consideration of the BOS incinerator for the 3,000 tons of garbage per year that cannot be recycled—but now with only half the savings of carbon emissions, all the environmental effects of waste oils and paint and the medical waste incinerator, and all the costs of the medical waste incinerator and the subsidies required by the overseas recycling scheme.

In addition, the recycling operation would cut the scale of the BOS incinerator by one third, which would likely destroy the financial viability of the electricity generation system and force adoption instead of a smaller version of Disposal Option 9: BOS Incinerator (no electricity generation) for the garbage that cannot be recycled. One result would be to force MEC back to burning an additional 211,000 gallons of fossil fuels per year, which could be avoided under Disposal Option 10.

The smaller version of Disposal Option 9 would incur net costs of about $370,000 more per year than Disposal Option 10: BOS with Electricity Generation. That extra $370,000 cost per year would result from and be added directly to the subsidies required to support the overseas recycling scheme. Such subsidies would have to be paid either by local taxpayers and/or by foreign donors. Removing the need for those subsidies might present a problem only for people who benefit from maintaining aid dependency and from controlling the inflows of aid.

MICS has begun recycling aluminum cans as part of its recycling scheme. MICS advised the TA recently that MICS / MAWC now plans to build an aluminum smelter. The owner/operator of one of the commercial metals recycling companies in Majuro would like to use an aluminum smelter to help reduce his shipping costs, but he has not done so because emissions from the smelter would not be environmentally acceptable. An environmentally acceptable smelter is very expensive. If MICS / MAWC plans to build a smelter, that would appear to imply that MICS / MAWC plans to recycle aluminum on a large scale, which implies in turn that its subsidised operation would compete directly against the two established and fully commercial recycling companies on Majuro.

7. Conflicts of Interest

The TA raised the issue of conflicts of interest between MICS and MAWC in the Inception Report (pp. 5, 6, 7) and again in the Midterm Report (pp. 10-11). While common in the RMI, such conflicts of interest in public decision-making are not in accord with principles of good governance. The TA made the following two recommendations in its Midterm Report (p. 11):

- Appoint individuals to the MAWC Board of Directors and appoint agents to carry out EIA on MAWC proposals who have neither conflicts of interest nor the appearance of conflicts of interest with MAWC operations and proposals.

- The solution would appear to be for MICS either to be represented on the Board of MAWC or to carry out EIA on MAWC development proposals or to act as a public advocate for particular options, but not to carry out two or more of those activities at the same time.

Principles of good governance lean heavily in favor of avoiding conflicts of interest and avoiding the appearance of conflicts of interest. Nevertheless, MICS conflicts of interest with MAWC have grown markedly since the Midterm Report.

Government has now appointed two founding members of MICS to the five-member board of MAWC (one is the president and principal employee of MICS). According to long-standing reports from within MICS and supported by public comments from the Minister of PW, the board of MAWC is likely soon to hire the current MICS operations manager to become interim general manager of MAWC, which would further compound the overlap between the two organisations. Also according to MICS, its members—including one or more of those who sit on the MAWC board—still likely plan to carry out EIA for pay on development proposals made by MAWC (after advising and receiving a waiver from the MAWC board for the conflict of interest).

Also according to MICS, it is now, and plans to continue in the future, pooling supplies, capital equipment, staff inputs, and funds with resources from MPW and/or MAWC in joint solid waste projects. In discussing such matters, MICS often used the term “we.” When the TA asked for clarification, the response was sometimes that “we” referred to MICS, sometimes to MAWC, and sometimes, perhaps, to both MICS and MAWC. Where do MICS operations and interests end and where do MAWC operations and the public interest begin?

Maintaining clear accounting records might be difficult under such conditions, so it would be important to ensure that the Office of the Auditor General audits MAWC each year and, if MICS receives public funds or other public resources, audits MICS as well.

8. Lessons Learned

MALGov was the Executing Agency for the TA but had virtually no involvement other than being consulted by the TA along with other stakeholders. With no direction from or significant involvement by the Mayor, the Minister of PW acted as *de facto* government contact for the TA, but the Minister's own involvement in the project was modest. MPW and MALGov solid waste staff did not cooperate with the TA in such matters as measuring solid waste volumes coming into the Jable dump even when directed to do so by the MPW. RMI EPA staff did cooperate well with the TA.

MALGov (and by default MPW) did not provide office space or counterpart staff as required under the TA. Instead, the TA operated alone out of a private office. This arrangement undermined the legitimacy and potential benefits of the TA by undermining public confidence in the practical utility of public participation and by confusing some government and public stakeholders into thinking that the TA itself was or should be responsible for making decisions and even implementing changes. Rather than participating as a partner in TA activities, local and national governments expected the TA team to carry out TA activities on its own and then just inform the two governments at the end what they should do. Such a passive role for the host government is not a part of contemporary aid projects.

With such thin evidence of support and participation by the host government (local and national), ADB might postpone a project until the agreed project arrangements are met or might even cancel a project altogether. This is a difficult question, however, because a primary goal of the TA was to increase effective stakeholders demand for improved waste management, and the limited government support for and involvement in the TA clearly demonstrates limited demand by two key stakeholders.

Because of weak government support and participation, the TA was left carrying out the stakeholder consultation and participation program largely by moving government solid waste management into the public spotlight and giving the public a forum to impress government with the need to carry out reforms. This is an awkward and difficult way to conduct a project, but it was fairly effective. It would not have been necessary if the goal had just been to provide a new technical solution, but as the name of the TA implies, its central purpose was to help improve governance by increasing ownership of and effective demand for improved waste management.

It is too early to tell if the new MAWC will materialize and become effective and whether it will avoid the conflict-of-interest trap. It is also too early to tell if the TA has helped significantly to increase effective demand for improved governance in the provision of a basic public service. It is apparent from past history in Majuro, however, that little public discussion of these issues would have taken place and few if any practical improvements would have been made without the TA.

Most ADB projects are designed on the assumption that the host government's interests coincide with the public's interests. This may not be the case, however, in projects that intend to increase effective public demand for reform because in such cases there is, by definition, little government demand for reform. Such projects are bound to be difficult, bound to be undermined by lack of government cooperation, and bound to achieve less than would otherwise be the case.

Like the assessment of collection and disposal options, however, the proper question in assessing the TA strategy is not whether it is perfect—in this case whether it worked especially well and smoothly or whether it produced rapid or dramatic improvements—but whether this strategy worked better than other available options. In answering that question, the TA strategy of discussing matters of governance directly in the public arena is confirmed.

More particularly, the TA adopted the strategy of embedding the public discussion of governance issues in a practical program to design and assess improved institutional and technical solutions—in this case largely engineering solutions. The TA adopted this strategy because of the urgent need for such improved solutions, because such a combined governance and technical approach is more constructive, because questionable institutional and technical solutions had already been advanced in private, because of the public's understandable exhaustion with mere talk, and because technical solutions are attractive to government, to the public, and to overseas donors. This strategy of combining governance issues with engineering issues proved successful.

As a side benefit, the strategy provided a public demonstration of how to carry out transparent design, assessment, and decision making on large infrastructure projects and how to use such public processes to help ensure that the ultimate decisions serve the best interests of an informed public. Whether this example will prevail in Majuro solid waste management remains to be seen.

9. Aid Dependence

With over 70% of all public spending in the RMI coming from overseas aid, the Marshall Islands is an extreme case of aid dependence (see O'Meara, 2006, "Can the Marshall Islands Avoid the 'Aid Curse'?" presented at ADB PARD workshop, Manila, November, 2006). The effects of such dependence were clearly evident during the project as both local and national governments left the TA team on its own to carry out virtually all project-related activities—with government thus depending entirely on donor inputs for technical design and assessment and even for consultation with local stakeholders that included their own government offices. Rather than attempting to manage local resources to best effect, government and even some public stakeholders appeared to judge the viability of different technical options by the ease of attracting donor funding.

Aid dependence was also evident in the two governments' apparent reluctance to reform wasteful government programs that now spend about $1.2 million per year while providing a very poor public service. The draft consensus collection and disposal options discussed above could provide a superior and sustainable service at little or no cost to the public—yet neither the national government, the local government, nor MAWC seems anxious to move in that direction. In contrast, both governments have been quick to seek more aid to shore up the present system and quick to back a closely held NGO that can access more aid to do the same.

Under such circumstances, an important part of the TA was coordinating with other donors. The TA was able to coordinate well with UNDP, SPREP, and JICA, and to a lesser extent with Compact funding, but that still left other generous donors—notably including ROC and USDA—working independently of and seemingly at cross purposes to the goals and participatory processes of the ADB TA. So much aid flows into the RMI from so many sources that it proved impossible for the TA working on the ground even to find out about all relevant programs. Such attempts will require more direct involvement at higher levels between ADB and its partner agencies.

10. What Next?

The TA provided information and analysis to help local stakeholders choose and then implement the options that will best serve the public interest. The MAWC board of directors is ultimately responsible for choosing which options to implement. The next step is thus for the MAWC board to make its decisions. Once the board decides, it has the obligation of informing the public, showing that its choices are in the public interest, taking public comments, and obtaining necessary permits.

Any need for additional funding or technical support for implementation depends partly on the options chosen. RepMar and MALGov already have enough financial resources to implement Collection Option 11 and Disposal Option 10 and to make them sustainable.

Together, RepMar and MALGov now budget about $1.2 million per year for solid waste management. Combining Collection Option 11 with Disposal Option 10 would likely require no more than a small fraction of that amount per year—and perhaps no net cost at all—which would leave a net savings of perhaps $1.0 million to $1.2 million per year to fund initial capital improvements of about $4.1 million. This is an ideal scenario for an ADB loan project, and the present TA was originally intended to lead to such a project.

Unfortunately, RepMar is delinquent on its ADB loan portfolio and government has made little progress on policy reforms, so government and ADB have agreed not to schedule new loans in the program period from 2007 to 2011. One option would thus be to make up the delinquent payments and implement policy reforms in order to access an ADB solid waste project loan as originally intended.

Another option might be to request support from JICA. JICA has been considering a request from government to build a new solid waste dump on the windward reef flat at Jenrok, but JICA may not be inclined to support such a project once it assesses the risks and the relative costs and benefits of that option. On the other hand, it seems unlikely that JICA would fund Disposal Option 10 because the design, capital equipment, construction, management oversight, and training all would likely come from the US. Another problem is that the annual JICA project cycle could not provide help until April 2008 at the earliest, which is too late.

The initial capital improvements might also be funded under Compact. Compact funding is currently earmarked mostly for education projects, but several of those projects are behind schedule with the funds sitting unused.

Government might withdraw its request to JICA for solid waste management support and instead request that JICA support one or more education infrastructure projects that are now earmarked for Compact funding, which would free up Compact funds for immediate use on solid waste management. This scenario would have the added advantages that Compact funds are available right now and that Compact infrastructure projects carry with them the technical design and monitoring assistance of a Project Management Unit.

Attachment 1: *MI Journal* Insert

Ta Eo Am Lemnak? What Do You Think?

Draft for Public Review and Comment

Solid Waste Collection and Disposal Options for Majuro Atoll

Attachment 2: Survey of Residents on Ocean Side of Jenrok

Dec 2006	House-to-house survey of households on the ocean side of Jenrok to ask residents their opinion about developing a garbage reeffill on the ocean reef flat at Jenrok. Sixteen households were surveyed in the Marshallese language. No landowners were surveyed (a consultation meeting with Jenrok landowners had already been held at MALGov). Households asked that their individual answers be kept confidential.	
	Questions:	Answers:
	1. Did you know that the Ministry of Public Works is planning to use the ocean reef as a site for the new dump?	No = 16 Yes = 0
	2. Where you affected by the waves of 1979? 9 yes 7 no	No = 7 Yes = 9
	3. Would you mind if a dump were located on the ocean side of your village?	No = 12 Yes = 4
	4. Who owns the reef flat? 16 landowners	Traditional Landowners = 16 Government = 0
	5. For those who answered “No” (they would not mind) on Question 3: What are the benefits of having a dump on Jenrok?.	Jenrok too crowded, need more land = 16
	6. If the 1979 waves hit again and there is a garbage dump on the ocean side, do you believe it would be a serious risk to Jenrok residents?	No = 0 Yes = 16

Attachment 3: Cover Letter, Final Report, and Resume of Incinerator Specialist Consulting Engineer

Attachment 4: Individuals Met Outside of Group Consultation Meetings Since the Draft Final Report

Government of the Marshall Islands

Hon. Matt Zackhras, Minister of Public Works
Smith Ysawa, Secretary of Public Works
Posesi Bloomfield, Attorney General
Greg Karken, MPW Solid Waste Management
Bruce Bilimon, Assistant Secretary, Office of International Development Assistance, MOF
Carl Hacker, Director of EPPSO
Stephen Bolland, AusAID Special Advisor, Office of the Chief Secretary
John Bungitak, Director of EPA

Majuro Atoll Local Government

Hon. Riley Albertter, Mayor
Titus Langrine, Acting Mayor
Jisam Kaisha, Executive Director, Parks & Recreation

NGOs

Carlos Domnick, Interim Chairman, Marshallese Business Association
Jack Neidenthal, President, Marshall Islands Chamber of Commerce
James McLean, Secretary, Marshall Islands Chamber of Commerce
Liz Rodick, Executive Committee, Marshall Islands Chamber of Commerce
Steve Why, Marshall Islands Conservation Society and Board of Directors, MAWC
Don Hess, Marshall Islands Conservation Society, MAWC Board of Directors, and Marshall Islands Chamber of Commerce
Roger Cooper, Marshall Islands Conservation Society
Alson Kelen, President, MICNGOs
Bill Weza, Chair, Marshall Islands Tourism Association
Francis Reimers, Marshall Islands Tourism Association ,and MAWC Board of Directors
Julia Alfred, Executive Director, Youth to Youth in Health

Other Private Sector

Giff Johnson, Editor, *Marshall Islands Journal*
Keith Takasuki, owner/operator, recycling company
Ben Graham, consultant
Scavengers at Jable dump

Japan

Kouhi Nakashima, Charge de Affairs, Japanese Embassy
Hideyuki Shiozawa, Economic and Cultural Affairs Adviser, Japan Embassy
Makato Oguma, JOCV Majuro Director
Chika Anzai, JOCV Deputy Director and Volunteer Coordinator
Hiromi Hironaka, SPREP Solid Waste Advisor (JICA)

USA

Hon. Clive Bishop, US Ambassador
Helen Reed-Rowe, US Embassy
Tom Mauss, US Embassy
Thomas Pfleeger, PhD, US EPA Environment Fellow, US Embassy, Majuro

Other International

Stephen Pollard, RMI Country Program Manager, ADB PARD (by email and telephone)
Tom Dutcher, President, EnerWaste Corp., Bellingham, WA (in person and by telephone and email)
Fridfinnur Einarsson, Mechanical Engineer and CEO, EnerWaste Europe Ltd. (by email)
Siggi Ragnarsson, Municipal Engineer and supervisor of BOS incinerator, Husavik, Iceland
Ross Turner, County Engineer and manager of BOS incinerator, Lincoln County, WY
Don Corwin, PE, Therm-A-Cor Consulting, Inc.
Mary Hess, Engineer, Anvil Corp., Bellingham, WA
Daniel Cramer, SMEC, Sydney, Australia
Mark Ricketts, SPREP solid waste officer, Apia (by email and in person)

Attachment 5: Revised Financial Estimates for Disposal Options

Disposal Options	Infrastructure & Capital Equip Costs Only Year 1	Average Operating Costs + Added Capital / Yr	Total All Costs NPV	Total All Costs NPV / Yr	Aver All Costs / T Waste	Average Revenue / Yr	Average Revenue / T Waste	Aver Net All Costs & Revenue NPV / Yr	Average Net All Costs & Revenue NPV $ / T Waste	Swing in MEC Balance Sheet / Yr NPV	Net Change to Government Balance Sheet NPV / Yr	Net to Govt Balance Sheet / T Waste
1. Riwut Non-Sanitary Reeffill No Sep	$ 2,015,000	$ 154,083	$ 2,679,438	$ 515,547	$ 91			($ 515,547)	($ 64)		($ 515,547)	($ 64)
2. Riwut Sanitary Reeffill No Sep	$ 3,758,400	$ 157,469	$ 4,607,325	$1,108,111	$ 196			($1,108,111)	($ 137)		($1,108,111)	($ 137)
3. Jenrok Non-Sanitary Reeffill No Sep	$ 3,284,000	$ 208,740	$ 5,284,003	$ 440,565	$ 78			($ 440,565)	($ 54)		($ 440,565)	($ 54)
4. Jenrok Non-Sanitary Reeffill w Sep	$ 3,284,000	$ 181,963	$ 5,872,482	$ 244,687	$ 43			($ 244,687)	($ 60)		($ 244,687)	($ 60)
5. Jenrok Sanitary Reeffill No Sep	$ 7,144,000	$ 203,781	$ 7,994,177	$ 833,164	$ 147			($ 833,164)	($ 103)		($ 833,164)	($ 103)
6. Jenrok Sanitary Reeffill w Sep	$ 7,144,000	$ 179,564	$ 9,219,321	$ 480,425	$ 85			($ 480,425)	($ 119)		($ 480,425)	($ 119)
7. Laura Sanitary Landfill w Sep	$ 3,330,904	$ 441,932	$ 9,384,265	$ 391,011	$ 69			($ 391,011)	($ 98)		($ 391,011)	($ 98)
8. Air Incinerator w Sanitary Landfill	$ 6,688,500	$ 569,042	$13,230,893	$ 661,545	$ 117			($ 661,545)	($ 117)		($ 661,545)	($ 117)
9. BOS Incinerator	$ 2,732,500	$ 114,375	$4,363,120	$ 218,156	$ 39			($ 218,156)	($ 38)		($ 218,156)	($ 38)
10. BOS Incinerator w 340kW Electricity Generation	$ 4,097,150	$ 227,155	$6,943,920	$ 347,196	$ 61	$518,400	$ 91	$ 171,204	$ 30	$120,960	$ 292,164	$ 52
11. Combined Composting	$ 530,000	$ 132,940	$2,077,009	$ 103,850	$ 18			($ 103,850)	($ 26)		($ 103,850)	($ 26)

Attachment 6: Table of Contents of Background and Technical Documents Binder for Public Review

Front pocket: CD with all documents in electronic format

Front pocket: What Do You Think? Draft for Public Review and Comment (*MI Journal* 2/2/07)

1. Final Report

2. Draft Final Report (Dec 2006)

   Attachment 1: What Do You Think? Solid Waste Collection and Disposal Options for Majuro Atoll: Draft for Public Review and Comment (revised Jan 2006)

   Attachment A: Description of 11 Collection Options and 11 Disposal Options for Majuro Solid Waste Management

3. Solid Waste Current Situation Consultation PowerPoint Oct 06

   Solid Waste Institutional & Collection Options PowerPoint Oct 06

   Disposal Options Consultation PowerPoint Dec 06

4. Collection Cost Estimates

   Bar Charts

   Spread Sheets

5. Disposal Cost Estimates

   Bar Charts

   Spread Sheets

6. Sea Wall Report (SMEC)

7. Batch Oxidation System (BOS) (including):

   Contact Details for Relevant Persons

   BOS Technical Description (Planet Group)

   BOS Process Overview (EnerWaste Europe Ltd)

   BOS Preliminary Design Specifications (EnerWaste International Corp)

   BOS Plant Layout (EnerWaste International Corp)

   Proposal for BOS Gasifier – 24 ton/day (EnerWaste International)

   Resume: Tom Dutcher, President, EnerWaste International Corp.

   FOB Prices for smaller BOS from 1 t/d ($170,000) to 15 t/d ($530,000) and technical discussions of ash and fuel usage (Email from Tom Dutcher)

   Proposal for Electric Generation from BOS Gasifier 24 ton/day (EnerWaste International)

Emission Survey Monitoring Report (Feb 1993) for Lincoln County, WY, BOS (A. Lanfranco & Associates, Inc.)

Ash Test Analysis Results (Mar 2000) for Lincoln County, WY, BOS (Wyoming Analytical Laboratories, Inc.)

Email comments and Test Report Making Construction Bricks from MSW Ash from EnerWaste Mass Burn system (1995)

Email replies to questions (Tom Dutcher)

8. Review of Disposal Option 10: EnerWaste 24T BOS Incinerator with Energy Recovery for Electricity Production (Don Corwin, PE, Feb 07)

9. ADB TA Midterm Report (including):

   Executive Summary of Current Recommendations

   Status of Priority Issues Raised During the Inception Mission

10. Articles of Incorporation of Majuro Atoll Waste Company, Inc.

    By-Laws of Majuro Atoll Waste Company, Inc.

11. Cabinet Minute 16 Nov 06: Appointment of Board of Directors, dissolution of the Solid Waste Task Force, and designation of a Counterpart for the ADB TA 4653 (RMI)

    Cabinet Minute 20 Jul 06: Establishing a corporation to manage solid waste on Majuro Atoll

12. Scoping Proposal for an Environmental Impact Assessment for Identification of Majuro's New Municipal dump Site with Associated Reclamation, Revetment, Sand Mining, Waste Incineration and Closure of Rairok Dump site Majuro, Republic of the Marshall Islands (Marshall Islands Conservation Society for Ministry of Public Works, 2006)

    Update on draft EIA for operation and closure of Jable dumpsite (Marshall Islands Conservation Society, file dated 7/22/06)

13. ADB TA Inception Report (including):

    Priority Issues

    Attachment 3: ADB TA Advice to Solid Waste Task Force in Response to Questions Dated June 12 2006

    Attachment 4: Concept Design for the Jable Dump Site

    Attachment 5: Estimate of Current FY 06 Government Expenditure for Solid Waste Operations on Majuro

    Budget Summary Estimate for the Utility – FY 2007

    Administrative Budget Estimate for the Utility – FY 2007

    Operations Budget Estimate for the Utility – FY 2007

    Capital Budget Estimate for the Utility – FY 2007

14. Solid Waste Task Force Papers (including):

    Letter from Solid Waste Management Task Force to ADB TA Team requesting answers to 11 questions and replying to three issues raised (June 12, 2006)

    Solid Waste Task Force Minutes at Inception of ADB TA (June 9, 2006)

    Solid Waste Task Force Minutes at Inception of ADB TA (June 6, 2006)

15. ADB TA Project Design Documents and Terms of Reference (including):

    ADB TAR: RMI 32566 [TA 4653] Technical Assistance to the Republic of the Marshall Islands for Increasing Ownership of and Effective Demand for Improved Solid Waste Management (Sept 2005)

    TOR Engineer__additional_services[1]

16. Regulations Relating to Solid Waste (including):

    EPA Solid Waste Regulations 1989

    Majuro Atoll Local Government Ordinance No. 1986-16: Prohibition of Littering within the jurisdiction of Majuro Atoll Local Government

    Majuro Atoll Local Government Littering Act 1982

    RMI Revised Code Title 7, Chapter 1: Public Health, Safety and Welfare, including Section 101. Accumulation of Rubbish