



Draft Healthcare Medical Waste Investment Plan

Proposed Funded Project to assist countries to treat healthcare wastes efficiently and sustainably through the proper repair and operation of incinerators commissioned in Pacific Island Countries.

1. Background

Hazardous waste management in the Pacific requires attention to prevent poor practices from negatively impacting the region's environment, human health and well-being and the economy. Improving the management of healthcare waste contributes significantly to better outcomes for Pacific Islanders.

In general, treatment of medical waste in the Pacific region does not meet international standards. Disposal of hazardous healthcare wastes including expired pharmaceuticals, soiled bandages and dressings, contaminated sharps and other medical wastes is often carried out through low temperature combustion in pits within Pacific Island hospital compounds or by uncontrolled dumping in landfills. Improper disposal of medical wastes can result in contamination of water supplies or aquatic environments while burning of medical wastes at low temperatures releases toxic pollutants into the air. Landfill dumping of medical wastes results in an unacceptable risk to community health and expired drugs may be acquired by children or waste pickers if disposed in a landfill. An integrated framework to manage the disposal of expired pharmaceuticals and the progressive implementation of routine medical waste disposal using controlled high temperature incineration was the chosen preferred options for infection control and protection of the health of many smaller Pacific island communities.

Note that incinerators that can address healthcare waste are present at most ports (shipping and air) to manage quarantine waste, however the status of these incinerators is unknown.

Investments by the EU under the PacWaste and PacWastePlus programs

A) 2014-2018 – PacWaste initial investment

- The EU funded PacWaste program purchased twenty-six (26) high temperature waste incinerators plants to effectively treat all related waste categories in accordance with current international best practices, as specified by the Stockholm Convention (Pacific Hazardous Waste Management (PacWaste) Volume 1: Final Report, September 2018). {see Annex 1 for status}
- Healthcare waste management training.
- Baseline Study for the Pacific Hazardous Waste Management Project - Healthcare Waste For the 15 participating countries. The collection, collation, and review of data on the management of healthcare waste and best-practice options for its disposal in participating Pacific Island countries

B) 2018-2024 – PacWastePlus investment

- The EU has approved funding to execute repairs on six (6) incinerators.
 - Tungaru Hospital – Kiribati
 - Balau National Hospital - Palau
 - Helena Goldie Hospital - Solomon Islands
 - National Referral Hospital Honiara - Solomon Islands
 - Norsup Hospital - Vanuatu
 - Prince Ngu Hospital - Tonga



- Assessments have been completed on 15 more incinerators for needed repairs, note that some are still working. Current estimates indicate that \$519K is needed to complete all the repairs and upgrades. .

Niu'ui Hospital - Tonga
 Vaiola Hospital - Tonga
 Lolowai Hospital – Vanuatu
 Aitutaki Hospital – Cook Islands
 Lautoka Hospital – Fiji
 Pohnpei Hospital – FSM
 Nauru Hospital – Nauru
 Niue Fook Hospital – Niue
 Kiluufi Hospital – Solomons
 Kirakira Hospital – Solomons
 Niu'eiki Hospital – Tonga
 Princess Margaret – Tuvalu
 Lenakel Hospital – Vanuatu
 Vila Central – Vanuatu
 Northern Provincial – Vanuatu

EU funding and we are planning for the assessment of six (6) additional incinerators, no decisions yet on the possibility of funding their repair.

Baucau Referral Hospital, Timor-Leste – 2 units
 Suai Referral Hospital, Timor-Leste – 1 unit
 Maubisses Referral Hospital, Timor-Leste – 2 units
 London Hospital, Kiribati, Kiribati – 1 unit

Healthcare incinerator repair maintenance & assessment totals

Item	USD
Incinerators (PacWaste)	\$ 2,500K
Healthcare incinerator repair maintenance & Assessment for the PacWastePlus Programme (in pipeline)	\$ 324K
TOTAL	\$ 2,824K

Investments by the World Bank

- Provide funding to PNG for the installation and commissioning of 19 incinerators throughout the country
- Funding for the installation and commissioning in Fiji for large incinerator at Noboro Landfill
- Funding for two (2) healthcare waste incinerators in Samoa

Investments by Asian Development Bank

- Funding for the installation and commissioning of municipal waste incinerators on Ebeye in the Republic of the Marshall Islands

Investments by Australia

- Australia DFAT has indicated that they plan to purchase, install and commission three healthcare waste incinerators in the Kingdom of Tonga.



Initial discussions around further investment of the proposed management facility

- Initial discussions have been underway about the need for such a facility with the EU (PacWastePlus) GIZ, World Bank staff in Fiji and UNEP. It is clear to all parties that the sustainability of this investment, and to provide a continue reduction in greenhouse emissions from the improper incineration of waste, will require a longer-term engagement.
- The EU continues to commit funding to gain a better understanding of the needs and to provide for repair and possible replacement of several incinerators.
- Recently the UNEP (GEF Islands) – committed \$1,000,000USD to a back stopping facility IF other donors come on board to support.

2. Proposed Outline

Goal: In light of the current global pandemic, to ensure the sustainability and on-going efficacy of existing (and known additions) to the network of high temperature healthcare waste incinerators. ¹

Activity: Create a “Facility” to undertake necessary maintenance and repairs of incinerators currently commissioned in the Pacific Island Countries to ensure that they operate at required efficiency and sustainability and meet the required outcomes.

Actions:

- A. Establishment of commitments from organisations to support this facility and with an MoU or other instrument define and agree on how donor investment will be managed.
- B. Determine if Pacific Island Countries (PIC) will co-finance this work. This will require a formal commitment for our partner PIC.
- C. Define the purpose and structures of the facility to accomplish a shared goal. This “term of reference” will include the design of actions required.
- D. Research into 1) how to ensure the current incinerators can reach minimum operational efficiency 2) what state they are in (and if they would want to be part of the Facility) and the funds needed to bring the incinerators back online efficiently and in a sustainable way.
- E. Prepare a Terms of Reference for a Contractor (Facility Operator) to oversee and execute this work. The Facility Operator tasks will include:
 - a. Ensure minimum operation for all participating incinerators.
 - b. Determine reporting needs, spare parts on site, in-country staff, costings to fly specialists if needed, etc.
 - c. Completion of required fabrication and procurement, and then repair of incinerators, repair report for each incinerator.
 - d. Ensure that repaired and installed incinerators continue to perform at optimum efficiency.
 - i. Necessary technical experts, back up equipment and spare parts, and travel funds to respond if an incinerator needs emergency repair.

¹ The standard incinerator range is designed in a way that all exhaust gas must pass through a secondary burner for complete re-burn of harmful gas components. Exhaust gases are then retained for a period of time at a high temperature (850 - 1200°C, depending on the application).

Dioxins, furans and similar gaseous components are only destroyed by homogeneous high temperature (> 850°C), excess of oxygen (>6 %), and sufficient residence time at high temperatures. The incinerators commissioned by PacWaste were designed to ensure all 3 conditions are met as a minimum. [Note: The three conditions above prevent dioxins from “cracking” into smaller but reactive dioxins, which can reform into new dioxin molecules, especially in the presence of heavy metals which can act as catalysts. (Reformation and “de novo” formation).]

See also: GUIDELINES ON BEST AVAILABLE TECHNIQUES AND PROVISIONAL GUIDANCE ON BEST ENVIRONMENTAL PRACTICES relevant to Article 5 and Annex C of the Stockholm Convention on Persistent Organic Pollutants: Section V.A - Part II Source category (a): Waste incinerators



- ii. Routine maintenance and operational needs, of the incinerators through to the end of the Contract, i.e., needed equipment replacement, fuel, travel [at least once per year] to undertake on-site repairs, etc.
- e. Continued communication, engagement and buy in by the hospitals. [In the past incinerators have failed, and the donors were not made aware of that fact.]
 - i. Monthly check in by Contractor on incinerator status with hospital point of contacts
 - ii. Monthly reporting on incinerator status and work by hospitals
- f. Evaluation of this healthcare waste investment [effectiveness of these incinerator investments]
 - i. Data collection [repair tracking, record keeping].
 - ii. Annual reporting/evaluation

3. Management Arrangements

3.1. Project Partners

GEF ISLANDS (funded by UNEP and the GEF Secretariat) will lead the project and will work closely with the following partners in delivering this project:

- 1) GEF ISLANDS [Project lead]
- 2) SPREP/PacWastePlus
- 3) World Bank
- 4) Asian Development Bank

4. Proposed Project Components and expected outcomes.

Project	Action	Expected outcome
Repair incinerators.	Completion of required fabrication and procurement, and then repair of incinerators; repair report for each incinerator	Working incinerators
Ensure incinerators perform at optimum efficiency.	a) Necessary technical experts, back up equipment and spare parts, and travel funds to respond if an incinerator needs emergency repair. b) Routine maintenance and operational needs, of the incinerators through to the end of the Contract, i.e., needed equipment replacement, fuel, travel [at least once per year] to undertake on-site repairs, etc.	Incinerators working effectively and sustainably [proper temperature, efficient fuel use, handling volume of waste required, needed repairs executed, etc.]
Engagement of hospitals.	a) Monthly check in by Contractor on incinerator status with hospital point of contact. b) Monthly reporting on incinerator status and work <u>by hospitals</u>	Hospitals engaged and committed to successful incinerator operation [Note: In the past incinerators have failed, and the donors were not made aware of that fact.]



Evaluation of this healthcare waste investment.	a) Data collection [repair tracking, record keeping] & b) Annual reporting/evaluation by <u>Contractor</u>	

5. Project Timeframes

Activity	Responsible Party	Year 1	Year 2	Year 3	Year 4	Year 5
Execute MOU with partners						
Execute discussions/negotiate agreements with PIC on co-financing						
Execute contract for Facility Operator						
TOR – drafting & review						
Execute Contract						
Completion of required fabrication and procurement, and then repair						
Repaired and installed incinerators to perform at optimum efficiency.						
Engagement and buy in by the hospitals						
Oversight of monthly status reports						
Outreach/capacity building @ hospitals						
Evaluation of this healthcare waste investment [effectiveness of these incinerator investments]						
TOR – drafting & review						
Execute Contract						

6. Project Budget Deliverables

Milestone Date	Milestone/Deliverables	Milestone Payment
	Approval of Inception Documents [fully executed Agreement and Preliminary Works Action Plan]	\$80,000 USD
	Completion of required fabrication and procurement for repair of fifteen (15) incinerators [See following spreadsheet]; repair report for each incinerator	\$519,000 USD
	Monthly remote check in and reporting on twenty-seven (26) incinerators [3 years X 11 Months X \$10K]	\$330,000 USD
	Yearly site visit, maintenance, and reporting on twenty-seven (26) Incinerator [3 years X \$10K travel/maintenance X 12 countries X 2 personnel]	\$480,000 USD



	Emergency Response [3 years - four responses per year @ \$5K travel & \$50K per repair/response)		\$600,000 USD
	Data collection, evaluation, and final report of effectiveness of technology to meet desired outcomes		\$20,000 USD
TOTAL			\$2,029,000 USD

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Budget Assumptions

- 1) Initial assessment and repair work will be done within the 2021-2023 [three year] period
- 2) Costings are for the first three years of Contract execution
- 3) Initial assessment work completed under the PWP recent Contract variation (PWP-009-CON) for all healthcare incinerator [costs borne by PWP].
- 4) Costs to bring incinerators back online to factory specifications at \$519K USD based on costings (attached) under recent PWP repair contract (PWP-009-CON).
- 5) Total universe of incinerators for this work is twenty-six (26) in twelve (12) countries.
 - Although we note that ports, and airports are also likely to have incinerators that could be added to the project to increase economies of scale,
 - World Bank is proposing to install nineteen (19) incinerators in each hospital in Papua New Guinea (not including Port Moresby) which may also like to be included in the project,
 - World Bank and GIZ are working to install a large incineration facility in Fiji, which may also like to be included in the project.
- 6) Emergency response and repair to four (4) incinerators per year.
- 7) Assumed that this work will be executed under one Contract, with engagement [sub-contracts for in-country engagement as needed] undertaken by that one Contractor.
 - Possible system modifications could occur if there were specialist service providers sub-contracted in each country (i.e. electricians, metal workers, painters, etc.)
- 8) Assume that for year 2021 due to restricted travel [COVID19], maintenance of incinerators will occur in country – and that the international specialist will not travel to these countries, but instead provide remote training and support.
 - i. Completion of required fabrication and procurement, and then repair of incinerators, repair report for each incinerator
 - ii. Ensure that repaired and installed incinerators continue to perform at optimum efficiency.
 - a) Necessary technical experts, back up equipment and spare parts, and travel funds to respond if an incinerator needs emergency repair.
 - b) Routine maintenance and operational needs, of the incinerators through to the end of the Contract, i.e., needed equipment replacement, fuel, travel [at least once per year] to undertake on-site repairs, etc.
 - iii. Continued communication, engagement and buy-in by the hospitals.
 - a) Monthly check in by Contractor on incinerator status with hospital point of contacts
 - b) Monthly reporting on incinerator status and work by hospitals
 - iv. Evaluation of this healthcare waste investment [effectiveness of these incinerator investments]
 - a) Data collection [repair tracking, record keeping].
 - b) Annual reporting/evaluation



ANNEX 1 Current Status of PacWaste Incinerator

Country	Hospital	Purchased /Delivered	Installed	Commissioned	Operational	Current Status
Cook Islands	Aitutaki District Hospital	Inciner8	Yes	Yes	Yes	Installed and Operational. Used several times a week. Secondary burner is starting to become unreliable. No spares provided with incinerator. Unit appears to be well operated with regular in-house servicing. Manufacturers recommended yearly servicing not performed. Spare parts required. PPE requested is boots, overalls gloves & goggles. Additional training required for existing and new staff. OPERATIONAL (2021 assessment)
Fiji	Lautoka Hospital	ACE	Yes	Yes	Yes	Installed and Operational. Used for 2 burns per day. Spares provided 3 yrs. ago but more now required. PPE requested is heat resistant overalls. Additional training required for existing and new staff. OPERATIONAL (2021 assessment)
Federated States of Micronesia	Pohnpei Hospital	Inciner8	Yes	Yes	No	Installed but issues with secondary burner failure and subsequent smoke emissions. Relocated from hospital to dump site due to smoke emissions. Spare parts required. PPE requested is gloves, goggles and overalls. Additional training required for existing and new staff. NOT IN USE (2021 assessment)
Kiribati	London Hospital	Inciner8	No	No	No	Incinerator missing critical parts and cannot be completed in contract period
	Tungaru Hospital	Inciner8	Yes	Yes	No	Incinerator repair and re-commissioning - PWP-009-CON
Nauru	Nauru Hospital	Inciner8	Yes	Yes	No	Installed but determined to be faulty and no longer in use. The hospital does not have the capability to determine the faults with the incinerator. An attempt has been made to modify the secondary burner oil system and it appears that incinerator has had a secondary burner failure which is common issue to these units. Spare parts, PPE and training required. NOT IN USE (2021 assessment)
Niue	Niue Ffoo Hospital	Inciner8	Yes	Yes	No	Installed but issues with both primary and secondary burner failures. Concerned with overall corrosion of the unit. Main control panel has proven unreliable. Spare parts required. PPE requested is respirator masks, gloves, goggles, safety boots and overalls. Training required for existing and new staff. NOT IN USE (2021 assesment)



Country	Hospital	Purchased /Delivered	Installed	Commissioned	Operational	Current Status
Palau	Balau Hospital	Inciner8	Yes	Yes	No	Incinerator repair and re-commissioning - PWP-009-CON
Solomon Islands	Honiara Hospital	ACE	Yes		No	Incinerator repair and re-commissioning - PWP-009-CON
	Gizo Hospital	ACE	No	No	No	Incinerator Installed - Consultant was threatened to be killed if operation was attempted
	Helena Goldie Hospital	Inciner8	Yes	Faulty	No	Incinerator repair and re-commissioning - PWP-009-CON
	Kiluufi Hospital	Inciner8	Yes	No	No	Installed but commissioned never completed. Issues with control system. Not used since installation engineer left site. No spares provided. PPE Requested. NOT IN USE (2021 assessment)
	Kirakira Hospital	Inciner8	Yes	No	No	Installed but not operated since this time due to lack of trained staff and concerns over a fuel leakage. Hospital also requested a stack height increase which indicates that smoke emissions may have been an issue when this unit was initially operated. Spare parts, PPE and training required. NOT IN USE (2021 assessment)
Timor-Leste	Bacau Referral Hospital	Inciner8	No	No	No	Unit has factory faults and cannot be installed- Chinese replacement unit to be commissioned (ACE) as per handover notes
	Suai Referral Hospital	Inciner8	No	No	No	Initial inspection underway to determine if incinerator can be installed
	Maubisses Referral Hospital	Inciner8	No	No	No	Initial inspection underway to determine if incinerator can be installed
Tonga	Vaiola Hospital	ACE	Yes	Yes	Yes	Installed and Operational. Recently provided with new burners and limited quantity of spare parts. Spares provided 3 yrs. ago but appear to have gone missing. Additional parts required as is PPE. Additional training recommended. OPERATIONAL (2021 assessment)
	Prince Ngu Hospital	Inciner8	Yes	faulty	No	Incinerator repair and re-commissioning - PWP-009-CON
	Niu'eiki Hospital	Inciner8	Yes	Yes	No	Installed but no longer in use due to electrical issues. Spare parts, PPE and training required. NOT IN USE (2021 assessment)
	Niu'ui Hospital	Inciner8	Yes	No	No	Installed but determined to be faulty and no longer in use. Unit has been impacted by local flooding and may be beyond salvaging. Spare parts, PPE and training required. NOT IN USE (2021 assessment)



Country	Hospital	Purchased /Delivered	Installed	Commissioned	Operational	Current Status
Tuvalu	Princess Margaret Hospital	Inciner8	Yes	Yes	No	Installed but unit had ongoing incinerator control system issues and has been nonoperational since 2017. Ministry of Health and Gender Services has elected to replace incinerator. NOT IN USE (2021 assessment)
Vanuatu	Vila Central Hospital	ACE	Yes	Yes	Yes	Installed and Operational. Recently provided with new burners and limited quantity of spare parts. Spares provided 3 yrs. ago but appear to have gone missing. Additional parts required as is PPE. Additional training recommended. OPERATIONAL (2021 assessment)
	Lenakel Hospital	Inciner8	Yes	Yes	No	Installed but not operated since commissioning, No spares provided. PPE and training requested. NOT IN USE (2021 Assessment)
	Northern District Hospital	Inciner8	Yes	Yes	No	Installed but unit had ongoing incinerator control system issues and has been non-operational since 2018. NOT IN USE (2021 assessment)
	Norsup Hospital	Inciner8	Yes (missing fuel tank)	No	No	Incinerator repair and re-commissioning - PWP-009-CON
	Lolowai Hospital	Inciner8	Yes	Yes-with issues	Unk.	Installed with various issues with fuel supply and burners. Spare parts required. PPE requested is gloves, goggles and overalls. Additional training required for existing and new staff. Believed to Be NOT IN USE (2021 assessment)