Project Replication and Scale-up

- Guidance and Examples -

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Abbreviations

ASH	Accra School of Hygiene
BAT	Best Available Techniques
BEP	Best Available Practice
BoQ	Bill of Quantity
CCTH	Cape Coast Teaching Hospital
GEF	Global Environment Facility
HCF	Health Care Facility
HCW	Healthcare Waste
HCWH	Health Care Without Harm
HCWM	Healthcare Waste Management
HIV	Human Immunodeficiency Virus
LRPs	Learning Resource Packages
MoH	Ministry of Health
NGO	Non-Governmental Organization
POPs	Persistent Organic Pollutants
PSH-H	Procurement Support Unit – Health
PV	Photo-Voltaic
SOP	Standard Operating Procedure
UNDP	United Nations Development Programme
UPOPs	Unintentional Persistent Organic Pollutants
WHO	World Health Organization

Background and purpose of this document

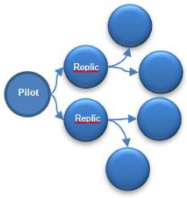
The regional component of the GEF-funded project entitled "Reducing UPOPs and Mercury Releases from The Health Sector in Africa" was launched in December 2015 and will end in April 2020. The overall objective of this full-size GEF funded project, implemented by UNDP in partnership with WHO and the NGO Health Care Without Harm (HCWH), is to implement best environmental practices and introduce non-incineration healthcare waste treatment technologies and mercury-free medical devices in four Sub-Saharan African countries (Ghana, Madagascar, Tanzania and Zambia) to reduce harmful releases from the health sector.

The project promotes best practices and techniques for healthcare waste management with the aim of minimizing or eliminating releases of Persistent Organic Pollutants (POPs) to help countries meet their obligations under the Stockholm Convention on POPs. The project also supports these countries in phasing-down the use of Mercury containing medical devices and products, while improving practices for Mercury containing wastes with the objective to reduce releases of Mercury in support of countries' future obligations under the Minamata Convention.

The project intends to achieve these objectives through 6 main project interventions:

1. Build national capacity to enable the assessment, planning, and implementation of healthcare waste management (HCWM) systems.
2. Develop/improve the national policy and regulatory framework pertaining to HCWM.
3. Provide available affordable systems that conform to Best Available Techniques (BAT) and other international standards:
    a. non-incineration HCWM systems and
    b. phasing out of mercury-containing devices
4. Demonstrate HCWM systems, recycling, mercury waste management and mercury reduction at project facilities.
5. Establish national HCWM training infrastructures.
6. Create awareness on HCWM

It can be expected that the gained experiences and good lessons learned from the above outlined project in the target countries can be used to develop replication and scaling-up plans. In contradiction to the road map of an exit strategy the replication and scaling-up approaches are aiming for future interventions after project finalisation:



- ✓ **Replication:** Applying project lessons and successful approaches or further demand from one location to another sites.

- ✓ **Scaling-up:** demonstration initiatives to work "upstream" of individual projects to broaden their scope of impact to a bigger scale.

A replication and scaling-up plan can be a useful tool for projects and its partners, and for other local organisations, in their campaigns and funding applications, or to help decide where co-funding could be spent, or project funds reallocated. Scaling-up and replication can be seen as two poles of a continuum or ideal types. In practice, they often overlap, and promoting and hindering factors are to a certain degree the same (WHO EURO, 2016).

1 Decision guide

A distinction can be made between three phases for replication and scaling up interventions:

1. Identify replication and scale-up areas.
2. Development of a replication / scaling-up plan.
3. Implement the intervention.

1.1 Identifying possible replication and scale-up interventions

The approach to be adopted for project replication or scale-up can arise from the demand which is identified by local, regional or national stakeholders or from the good lessons learned of a project and the benefits from these lessons. To identify adequate areas the following questions should be discussed:

i. What have been successful and sustainable project activities which can be easily replicated or scaled-up (good lessons learned)?
ii. Which are the gaps and further demands related to the project activities, which could not be covered by the project?
iii. Which have been the project activities with a large positive impact on the population and environment?

Note: Success stories from other countries have also the potential to be replicated by another project country!

There might be a long list of possible future areas for replication and scale-up interventions. In this case these areas should be classified in a priority list. This can be done in a stakeholder meeting, in which the identified areas of activities are introduced, discussed and then agreed based on factors like:

⇒ Level of demand / impact (low hanging fruits)
⇒ Acceptance of the facilities / public involved in the activities
⇒ Commitment of stakeholder to implement / support the activities (e.g. authorities, facilities, private sector)
⇒ Available human resources
⇒ Available budget for implementation, operation and maintenance

1.2 Replication / Scaling-up Plan

Once an intervention is determined to be replicable or scalable and prioritised, then the next phase is to develop a replication or scaling-up plan. This plan addresses certain questions which need to be answered:

- Why have these interventions been chosen? –> Justification.
- What is the objective and the framework? -> Determining of an objective.
- What exactly are we going to do? -> Outline of interventions.
- Who are the relevant stakeholders? -> Identification of stakeholders
- How are we going to do it? -> Development of an implementation plan.

The replication and scale-up plan can be prepared and planned by using the following structure:

A. Justification
Justify why this specific project result should be replicated or scaled-up. Use the above-mentioned demand and / or good lessons learned approach. The justification outlines that replication / scaling up of project results is desirable, and feasible.

B. Objective and framework
The objective of the proposed replication / scaling up of project results is described and a clear framework of activities needs to be identified, which includes the timeframe and target authorities / facilities / districts / regions.

C. Outline of areas of activities / interventions
General activities which need to be conducted during the different phases of the project inception, planning, procurement, implementation and monitoring / evaluation.

D. Stakeholder involvement and support
Successful scaling up / replication generally requires the development of multi-stakeholder partnerships. Attention should be given on the continuum of potential partnerships between private, public, and civil society organizations and how different financing models can help make them work. The benefit of private partners is that they bring the discipline of the market to the table; public agencies can provide capital financing and assure a level regulatory playing field and supportive policy environment; civil society organizations can assure community engagement.

E. Work Plan

Phase	Activity	Responsibility	Timeline	Budget
Prepare	…	…	…	…
Planning				
Capacity Building				
Procurement				
Implementation				
Monitoring and Evaluation				

1.3 Promoting and Hindering Factors

It should be kept in mind that the set-up of replication or upscaling project interventions are positive or negative influenced by promoting or hindering factors. In accordance to a WHO study in 2016 (WHO Euro 2016) the most important *promoting* factors are:

- personal commitment of the project partners
- recognizable benefit for the population
- political support and
- experience of project partners.

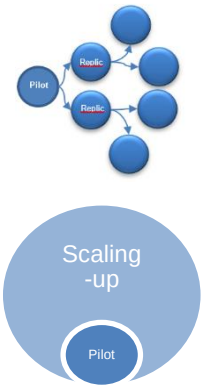
The main *hindering* factors have been identified as:

- financial issues and
- the amount of administrative work.

The linkage of promoting factors and project conditions confirm the importance of project partners' personal commitment, support by subsidy funds and adequate political support of replication and upscaling.

2 Exemplary replication areas UNDP GEF Africa project

Based on the project stakeholder discussion on good lessons learned and further demand, the following specific project activities have been identified to have a high potential to be successful and sustainable replicated:



1. Replication of capacity building on HCWM
2. Replication of the set-up of onsite waste treatment systems
3. Replication of the set-up centralised waste treatment facilities
4. Replication of Mercury Phasing out in health facilities
5. Scaling up of sustainable procurement
6. Replication of the use of biodigester in health facilities

2.1 Replication of Capacity Building on HCWM

Justification: Successful project activities – Ghana & Madagascar
The project's first step was to develop training materials and to undertake a training of Master Trainers in HCWM, where a total of 18 national experts were coached at the regional level in Nakuru, Kenya during a two-week course. In all four countries the project successfully assisted in establishment of national training programmes on HCWM that have been entrenched in the national training curricula for the health professionals.

Following the initial training of master trainers in Kenya, in *Ghana*, the project liaised with the Schools of Hygiene of Accra, Sunyani and Ho for revision of the existing training curriculum and inclusion of current trends and international requirements for HCWM and are used. Two different curricula and modules for different target groups are available:

1. Hospitals, Civil society, Municipal and District Assemblies.
   - Accra School of Hygiene (ASH) used the modules in 2018 and 2019 for 52 to conduct training for trainees from hospitals, district and municipal assemblies as well as consultants working the environmental management. Facilitators for the training were drawn from the national experts and tutors from ASH.
2. Academia, Private waste managers, Environmental Health officers from Metropolitan, Municipal and District Assembly.
   - Based on this curriculum, future Environmental Health Officers, Occupational Therapists and Occupational Health and Safety Experts in Ghana must now follow a full semester course on HCWM which consists of 3 hours of training per week over a 16-week period. It is now part of the national curriculum that is also used by the West Africa Health Examination Board as a basis for HCWM trainings in West Africa.

With the support of the master trainers and national technical experts in *Madagascar*, three types of Learning Resource Packages (LRPs) for in-service staff were developed using the educational materials from the regional train-the-trainers workshop in Kenya.

1. For care providers: physicians, paramedics including nurses, midwives and laboratory technicians (in French)
2. For operators and support staff (in local language)
3. For national decision makers (relevant divisions at Ministry of Public Health) and hospital managers (in French)

As of November 2019, altogether 236 health workers from all 22 regional divisions of public health and environmental technicians were trained on BAT/BEP in HCWM. The trainees represented 13 out of 22 university hospitals, 14 of 16 regional referral hospitals and 8 of 90 district referral hospitals. The training curricula were introduced into 6 public training institutions for paramedics and private training institutions in 8 regions.

Main criteria to consider

The following main criteria need to be considered in specific for improving capacity on HCWM in the country:

- ⇒ Strong commitment of the relevant authorities and learning institutes
- ⇒ High level of knowledge and capacity on HCWM available in the country
- ⇒ Considering of all levels of institutions, health facilities and positions related to HCWM
- ⇒ Regular updating and revision of the training curricula

Available project tools and guidelines

- ⇒ Master Training materials
  - Syllabus
  - Presentations
  - Workshop materials
  - Photos and videos
  - Supporting materials
    - SOPs
    - Sample inspection scheme
    - Human Resource Planning
    - Tools
    - Standards
- ⇒ Training curricula and modules of the project countries Ghana and Madagascar
  - Curricula and modules on HCWM for two different target groups (Ghana)
  - LRPs for in-service staff (Madagascar)

All documents (Ghana: English; Madagascar: French) can be downloaded from the project webpage: www.greenhealthcarewaste.org

2.2 Replication of the set-up of onsite waste treatment systems

Justification: Successful project activities - Madagascar

The project provided non-incineration HCW treatment technology (autoclaves) to 17 HCFs in the four countries. One of these facilities in Madagascar is the CHRD Manjakandriana. It is a 40-bed district referral hospital located about 45 km east of Antananarivo. It serves about 270,000 inhabitants of the Manjakandriana district. It creates about 15 kg HCW/day, out of which about 5 kg is infectious waste.

The hospital has received one autoclave of 80 litre capacity with auxiliary equipment (water distiller, water booster pump, particle backwash filter, voltage stabilizer) and mechanical ground scales. Additionally, the hospital 240-litre wheelie bins for general waste, four containers for infection waste, one transport container for biohazardous waste, two transport bins, one bin trolley and one bin cart for infectious waste, waste bins for collection of recyclables, and a waste collection vehicle. PPE and tools have also been provided by the project.

To install the waste autoclaves, housing was constructed by the countries to avoid negative weather impacts and to ensure safety requirements. Furthermore, the supply of high voltage (3-phase) stable power of high capacity and the continues supply of water must be guaranteed.

During the preparatory work for the autoclave procurement, it was identified that CHRD Manjakandriana will not have sufficient budget for electricity to run the autoclave. Therefore, it was agreed that the project would compensate the extra electricity cost by setting up a photo-voltaic (PV) system of equal capacity as the expected extra electricity consumption of the waste treatment system. Consequently, solar PV panels of total 3 kW capacity based on a Silicon monocrystal technology was installed on the roof of the hospital operations building including four 200 Ampere batteries. The PV system was installed in summer 2018 and since then has been running well and providing about 25% of the total electricity consumption of the hospital and, ensures emergency electricity supply for the hospital during power cuts. Although the waste after autoclaving is non-hazardous, the placement of decontaminated waste on a dumpsite or landfill, without any change of physical form constituted a major concern. Therefore, in the 2nd phase of the project a small shredder system has been installed.

Investment costs of the intervention:

Infrastructure (housing)	$ 5.778
Electricity supply (Solar Panel)	$ 13.930
Autoclave (80 l) and auxiliary equipment (water distiller etc.)	$ 25.555
Waste logistic equipment (scale, bins etc.)	$ 6.457
Shredder	$ 22.000
Total	$ **73.720**

During a workshop of the national Technical Working Group, the responsibility of each entity involved in the management of healthcare waste was discussed and identified. Furthermore, the insurance of the availability of human and financial resources at each model hospital in the implementation of the HCWM Plan has been specified.

Main criteria to consider

The following main criteria need to be considered in specific:

- ⇒ Strong commitment of the relevant authorities and health facilities
- ⇒ Legal framework on HCWM is available and enforced

⇒ Sustainable availability of sufficient budget for operation and maintenance of the system
⇒ Capacity to repair and maintain the system is available in the country (service companies etc)
⇒ Monitoring system in place and enforced

Available project tools and guidelines

- ✓ Outline of a National Treatment Strategy
- ✓ Outline of a National HCWM Plan
- ✓ A set of technical specification and cost estimations for healthcare waste management equipment (autoclaves, autoclave testing materials, logistic equipment, shredder, occupational safety materials, etc.)
- ✓ Drawings for the needed infrastructure
- ✓ Pre-Installation checklists
- ✓ Commissioning test reports of autoclave after installation
- ✓ Data collection templates
- ✓ Fact sheet: Policy development
- ✓ Fact sheet: Demonstration of non-incineration waste treatment technologies in Africa
- ✓ Videos: overview about activities of the UNDP-GEF project
- ✓ Videos: Autoclave Maintenance of the JSD260 -JSD1300
  - Preparing for maintenance
  - Maintaining the water supply system
  - Maintaining the boiler
  - Maintaining the steering system
  - Maintaining the strainer
  - Testing the heating elements
  - Adjusting the pressure switch
  - Changing the filter of the vacuum breaker and the valves of the JSD1300
  - Maintaining the door of the JSD1300
  - Maintaining the printer
- ✓ Videos: Autoclave – Efficiency Testing of autoclaves
  - Testing the water quality
  - Bowie Dick Test
  - Challenge Test (Helix)
  - Chemical Indicator Test
  - Biological testing
  - Using a test pack
  - Thermometric testing
  - Carrying out a test cycle
  - Preparing a large autoclave for testing
  - Evaluation of a test cycle
  - Evaluation of a test cycle - Large autoclave
  - Evaluation of a thermometric testing

All documents can be downloaded from the project webpage:
www.greenhealthcarewaste.org

2.3 Replication of the set-up centralised waste treatment facilities

Justification: Successful project activities - Ghana

The project provided non-incineration HCW treatment technology (autoclaves) to 17 HCFs in the four countries. One of the facilities which received autoclaves and is working as a central waste treatment facility which serves additional 6 health facilities, is the Cape Coast Teaching Hospital (CCTH) in Ghana. It is a 400-bed capacity tertiary referral hospital situated at the northern part of Cape Coast. Originally it was established as a regional hospital and later transformed into a teaching hospital with the inception of the School of Medical Sciences in the University of Cape Coast. It generates on average 1.4 tonnes of infectious waste monthly (ranging from 1.2 to 1.9 tonnes). The hospital has received two autoclaves of each 250-litre capacity with auxiliary equipment (water softener, water booster pump, particle backwash filter, voltage stabilizer) and mechanical ground scales. Additionally, the hospital received equipment for collection of general and hazardous waste, including four 240-litre wheelie bins for general waste, four containers for infection waste, one transport container for biohazardous waste, two transport bins, one bin trolley and one bin cart for infectious waste, waste bins for collection of recyclables, and a waste collection vehicle. PPE and tools have also been provided by the project.

To install the waste autoclaves, housing was constructed by the countries to avoid negative weather impacts and to ensure safety requirements. Furthermore, the supply of high voltage (3-phase) stable power of high capacity and the continues supply of water need to be available.

The project provided a tricycle to CCTH that will be used for collection of the waste from HCFs within the cluster and transport for treatment at CCTH autoclaves. Although the waste after autoclaving is non-hazardous, the placement of decontaminated waste on a dumpsite or landfill, without any change of physical form constituted a major concern. Therefore, in the 2nd phase of the project a shredder system has been installed.

Investment costs of the intervention:

Infrastructure (housing)	$15.327
Electricity supply (3 phase cable)	$3.207
Water supply (piping)	$4.334
Autoclave (2x250 l) and auxiliary equipment (water softener etc.)	$125.643
Waste logistic equipment (scale, bins etc.)	$34.896
Tricycles (5)	$18.200
Shredder	$22.000
Total	**$223.607**

Main criteria to consider

The following main criteria need to be considered in specific:

- ⇒ Strong commitment of the relevant authorities and health facilities
- ⇒ Legal framework on HCWM is available and enforced
- ⇒ A full cost calculation for the operation and maintenance of the system is available and is accepted by the health facilities.

⇒ Capacity to repair and maintain the system is available in the country (service companies etc)
⇒ Monitoring system in place and enforced

Available project tools and guidelines

- ✓ Outline of a National Treatment Strategy
- ✓ Outline of a National HCWM Plan
- ✓ A set of technical specification and cost estimations for healthcare waste management equipment (autoclaves, autoclave testing materials, logistic equipment, shredder, occupational safety materials, etc.)
- ✓ Drawings for the needed infrastructure
- ✓ Pre-Installation checklists
- ✓ Commissioning test reports of autoclave after installation
- ✓ Data collection templates
- ✓ Fact sheet: Policy development
- ✓ Fact sheet: Demonstration of non-incineration waste treatment technologies in Africa
- ✓ Case Study: CHU JRA as model of the central treatment of healthcare waste in Madagascar
- ✓ Case study: Centralised waste treatment system (ZoomPak)

All documents can be downloaded from the project webpage:
www.greenhealthcarewaste.org

2.4 Replication of Mercury Phasing out in health facilities

Justification: Successful project activities - Zambia

The project has helped the Government with obligations under the Minamata Convention by conducting an inventory of mercury containing medical devices (thermometers and sphygmomanometers) in the model HCFs and by directly contributing to the phasing-out of these devices regulated under Article 4 of the Convention.
At the beginning of the project an intensive 2-weeks Master training on HCWM was conducted Kenya, which included raising awareness on the risks of mercury, objectives of the Minamata Convention and how to plan the phasing out of mercury in health facilities.

In order to assist the countries with development of their mercury-containing equipment exchange plan, the project prepared a guidance document "Recommendations on the replacement of mercury containing medical devices". This document included the specifications of mercury free thermometers and sphygmomanometers in accordance with international standards. Following this guidance, the national project teams conducted inventories of mercury-containing medical devices used in the pilot HCFs. Upon consultations with the national project teams, the regional component assembled a list of proposed mercury-free blood pressure instruments and thermometers and compiled Bill of Quantities (BoQs) for the requested mercury-free devices with the help of the equipment catalogue. Replacement of mercury-containing medical devices was successfully implemented in the 8 model facilities through two rounds of procurement of mercury-free equipment and all beneficiary model HCFs were declared using only mercury-free medical gadgets. The 8 pilot facilities in Zambia have received in total 1,764 mercury-free devices (digital thermometers and aneroid / automatic sphygmomanometers). About 26 kg of mercury has been phased out by the collected mercury containing devices.

The project was implemented in 2 phases. Based on the experiences of the first phase the procurement of mercury free devices was conducted on national level and not on international level, which was reducing the costs.

Costs of mercury free devices:

	1st project phase		**2nd project phase**		**Sum (USD)**
	Costs per unit (international procurement)	**Number**	**Costs per unit (national procurement)**	**Number**	
Mercury free aneroid sphygmomanometer	17.00 USD	208	13.70	150	**5,591.00**
Mercury free automatic sphygmomanometer	30.55 USD	213	24.67	100	**8,974.15**
Mercury free digital thermometer	2.55 USD	953	2.35	140	**2,759.15**
				Total	**17,324.30**

An agreement was concluded between ZEMA and MoH to locate an interim storage of mercury-containing devices within the MoH HQ estate in Lusaka. A converted 20' container was equipped with shelving, lighting, a spill response kit inclusive a containment area underneath its base in case of spills. It was licensed by ZEMA and designated to store all mercury-containing waste collected within the country.

The collected mercury-containing equipment was transported to the interim central storage facility. Zambia, like all other project countries, has banned procurement of mercury-containing devices for health care sector.

Main criteria to consider

The following main criteria need to be considered in specific:

- ⇒ Ban of the procurement of mercury containing thermometer and sphygmomanometer on national level
- ⇒ Purchase of non-mercury containing equipment on national level can reduce costs
- ⇒ National capacity on how to calibrate sphygmomanometer is available
- ⇒ Comprehensive awareness raising and training on the equipment for the medical staff
- ⇒ Strategy in place how to store and dispose the phased-out mercury containing devices.

Available project tools and guidelines

- ✓ Recommendations on the replacement of mercury containing medical devices and technical specifications
- ✓ Equipment catalogue: Specifications of mercury free thermometers and sphygmomanometers
- ✓ Storage infrastructure specifications
- ✓ Calibration guideline for Sphygmomanometer
- ✓ Mercury Safety Data Sheet
- ✓ Fact sheet: Policy development
- ✓ Fact sheet: Reducing Mercury Releases from the Health Sector

All documents can be downloaded from the project webpage:
www.greenhealthcarewaste.org

2.5 Scaling up of sustainable procurement

Justification: Successful project activities - UNDP
The project incorporated lessons learned from organization of procurement for multiple countries. In order to avoid problems originating from the countries' different procurement policies and procedures, a centralized procurement approach was adopted including procedure for common agreement on technical specification by all ultimate beneficiaries before issuing the procurement documents.

In order to ensure timely and cost-effective central procurement of non-incineration technologies, the Procurement Support Unit – Health (PSU – H) of the UNDP Nordic Office was designated to assume the central procurement function in order to benefit from the extensive experience and expertise in the procurement of health sector supplies and achieve cost reductions resulting from long-term agreements with health care equipment suppliers and bulk purchasing.

The supply of equipment and technical assistance with development of the HCWM systems were complemented by series of trainings that cut across all cadres of staff considered to be key stakeholders to operation of the HCWM systems, including doctors, nurses, cleaners, maintenance staff and liaison officers.

In order to minimize impact of instability of local utilities, the project invested in ensuring proper media supply by procuring a water treatment system and a voltage stabilizer for each autoclave supplied. Furthermore, the following provisions were included in the contract with the autoclave supplier:

- Provision of a spare parts package for 2,500 hours (to reduce waiting times for ordering and supply of spare parts);
- 10-year spare part guarantee (to ensure availability of original spare parts from the manufacturer); and
- After-sale service team in the country (to guarantee presence of a local agent of the equipment supplier in each beneficiary country).

Provision of equipment and tools for HCWM contributed to improvement of the practices on HCW classification, segregation, labelling, internal storage and transportation at the level of 27 designated model HCFs.

Sustainability of operation of the non-incineration technologies, is dependent on regular maintenance and timely repair of the installed equipment as well as accessibility and affordability of spare parts. The importance of ensuring availability of financial resources to keep the HCW management and treatment systems functional cannot be overemphasized.

The need to obtain approval of the UNDP Regional Procurement Committee and differences in the procedures for custom clearance of procured goods in the four countries added further delays to the project. It is not certain to what extent or if at all the originally planned centralized procurement under the custody of PSU-H of the UNDP Nordic Office would have solved the delays and difficulties in the procurement, as there could have been additional difficulties in communication between the procurement custodian and the four project teams.

Main criteria to consider
The following main criteria need to be considered in specific:

- ⇒ Preferred purchase of equipment on national level to reduce transport costs and emissions and safe time in the customs process.
- ⇒ Include an extensive spare part package
- ⇒ Include a 10-year spare part guarantee
- ⇒ Ensure that an after-sales team is available which has the capacity to repair and maintain the system is available in the country

Available project tools and guidelines

As a result, any difficulties with shipping, customs, import duties and so forth could be identified on the smaller and simpler procurement package.

- ✓ Catalogue of technical specification and cost estimations for HCWM equipment including spare parts and spare part guarantees
- ✓ Videos: Autoclave Maintenance
  - Preparing for maintenance
  - Maintaining the water supply system
  - Maintaining the boiler
  - Maintaining the steering system
  - Maintaining the strainer
  - Testing the heating elements
  - Adjusting the pressure switch
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All documents can be downloaded from the project webpage:
www.greenhealthcarewaste.org

2.6 Replication of the set-up of a Bio-digester

Justification: Successful project activities - Tanzania

The project supported pilot construction of a 32m³ biodigester for disposal of pathological wastes (placentas, food scraps and garden waste) and production of biogas in the Mwananyamala Hospital in Dar-es-Salaam, Tanzania. The investment costs of the biodigester constructed in this 252-bed hospital was approximately 14000 USD.

Since October 2018, the biodigester has been in full operation for treatment of pathological waste and the produced methane gas is used for heating water at the hospital's maternity ward. The Tanzania Project Implementation Unit has hired a national consultant for evaluation of the 1st year of the biodigester operation. The biogas production was measured at 2,5 m³/day.

In addition to harvesting the methane gas from the biodigester for water heating, the hospital saves energy that had previously been used for incineration of placentas waste. Total monetary benefits (value of biogas, saved energy for disposal of placenta and food wastes) were calculated at annual costs of TZS 3,285,000 (about 1,400 US$). As the energy output of the biodigester currently exceeds the need of the maternity ward, the national consultant suggested the excess biogas to be used for cooking in the hospital cafeteria that is under construction. The successful demonstration of the biodigester operation prompted construction of a double chamber biodigester at an additional HCF, namely the Sinza Hospital for Women and Children in Dar-es-Salaam.

Main criteria to consider

The following main criteria need to be considered in specific for setting up a bio-digester in a health facility:

- ⇒ Strong commitment of the health facility
- ⇒ Knowledge about the amount and kind of waste which will be treated
- ⇒ Sufficient space to set-up the biodigester
- ⇒ Identification of areas where the produced gas can be used (e.g. kitchen, bathroom)
- ⇒ Company constructing the bio-digester should be experienced in this area
- ⇒ Extensive training on the use, maintenance and monitoring of the biodigester

Available project tools and guidelines

- ✓ Bio-Digester – Design and technical details
- ✓ TORs for a Consultant to construct a biodigester
- ✓ Sketches of biodigester
- ✓ Biogas Plans for Hospitals – Assessment Report, 2017
- ✓ Feasibility Study for a Biogas Plant for the Digestion of Placentas at Sinza Hospital Dar es Salaam, 2019
- ✓ Biogas Plants at Sinza Hospitals in Dar Es Salaam - Supervision visit during construction and pressure test, 2020

All documents can be downloaded from the project webpage:
www.greenhealthcarewaste.org

3 References and further reading

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Further reading

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