

Project Description

of the Gianyar Waste Recovery Project

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1 SHORT PROJECT SUMMARY

Bali, the beautiful "Island of Gods", suffers from increasing use of non-organic materials that pollute the formerly pristine environment. The project started 2004 with a 400 m² pilot plant, to establish all parameters needed to build a large scale waste recovery facility. In June 2008, the first phase of such a large facility with a capacity of 30 tons waste per day was completed.

In late 2009, the capacity was expanded to final 60 tons waste per day, enough to process all waste collected in the regency of Gianyar. The pilot plant was converted into the indoor section of an environmental park to educate young and old visitors.

The goal of this pioneering project is a sustainable model facility for solid waste management and cleaner environment. The low cost, low tech and low risk approach is easy to replicate. Aerobic composting avoids the strong greenhouse gas methane that otherwise would be generated in anaerobic landfills. This provides CDM carbon credits. Non-organic waste is recycled.



Industrial Scale Composting: Blowers assure an aerobic process that reduces greenhouse gasses



Environmental Park for the Young: Indoor and outdoor exhibits on climate change and waste

2 DETAILED PROJECT DESCRIPTION

Background

Bali, Indonesia's primary travel destination faces an escalating waste problem that already affects its tourist sector. In the formerly pristine environment, waste is now burned road-side or disposed indiscriminately in the countryside, rivers and canals, thus polluting also beaches and coral reefs. The waste problem in Bali, like elsewhere in Indonesia needs urgent attention.

The Rotary Club of Bali Ubud is addressing this problem and sponsors a model waste recovery facility that can be replicated elsewhere. It is supported by other Rotary Clubs, the Swiss and the Canadian Governments as well as the United Nations Environment Program and donors like the travel operator Kuoni. Bali often pioneers solutions for the rest of Indonesia, which makes it an ideal location for such an innovative project. For a comprehensive solid waste management solution, sufficient waste processing capacity must first be available. Only then should the collection system be improved, followed by public campaigning for proper waste preparation and sorting.

Project Objective

The goal of this pioneering project is to contribute towards a cleaner environment with a viable model for solid waste management that can be replicated in most of Indonesia's 494 regencies and municipalities. The low cost, low tech and low risk approach that needs no subsidies or tipping fees is ideally suited for developing countries.

During the ten year crediting period of the Clean Development Mechanisms (CDM), 153,000 tons CO₂-equivalents of the strong greenhouse gas methane will be avoided by composting 50 tons of organic waste per day, of which 81,000 tons are eligible for carbon credits. The CDM registration was received November 4, 2008. The carbon credits will be used to facilitate project replications.

Project Description

Pilot Facility on the Gianyar Regency's Landfill (February 2004 to June 2007)

In 2004, a pilot facility for waste recovery with a capacity of 4 tons/day was built in the village of Temesi on the old landfill. This pilot facility operated until June 2007 and had gained wide local and international attention and thus raised high expectations in a future large scale facility. In the pilot facility, the waste treatment procedures were optimized. The former pilot plant's state-of-the-art research station and fully equipped laboratory are still being used to continuously improve large scale forced aeration composting with the goal to produce a high quality product in a short and economic process cycle. The pilot operation received international academic support by visiting researchers.

Capacity Expansion to a Replicable Full Scale Model Facility (July 2007 to December 2009)

By 2007, all required input has been established to expand the capacity from 4 tons to 60 tons per day or 20,000 tons per year. The added capacity will allow processing all waste collected daily from the 500,000 inhabitants and tourists of the Gianyar Regency. The capacity expansion required investment into a new 4,800 m² roof-covered area. The roof is needed to protect waste separation and composting from tropical rain and sun.

In a first phase in late 2007, a 2,400 m² roof was built over the old landfill for waste separation and composting. It accommodates also a shredder for organics, a compost sieve and a blower system with air ducts for forced aeration composting. However with this first phase, only 30 of the 60 tons of waste delivered daily can be processed. The rest still had to go to the adjacent landfill.

Therefore, a second phase, finished in late 2009, provides further 2,400 m² covered area and additional processing equipment. These additions are necessary to separate all 60 tons of waste per day, to compost the organic waste and to store the recyclables and finished compost. Only a facility that processes all waste collected in the regency of Gianyar can serve as a credible model for replication in the other 494 regencies and municipalities.

The main waste fraction of 50 tons or 85 % consists of organics that are processed into 18 tons of compost per day. The compost is sold preferably to farmers to restore soil that is depleted by an overuse of chemical fertilizers. Another large use is gardening. A small 5 % fraction is non-organic waste that can be recovered and sold to recyclers. Only about 10 % of the collected waste is residue, which is dumped in the neighboring landfill after hazardous material has been removed for later safe disposal. This volume reduction to 10 % extends the useful life of the landfill by a factor 10.

Complementary Educational Center

To improve the value of frequent visits of schools, government officials, NGOs and other interested parties, the redundant 400 m² pilot plant building was transformed into the indoor section of an educational center. It focuses on climate change topics like energy saving, alternative energy, water issues and recycling. An outdoor section includes the waste recovery facility, wind and photovoltaic energy production, biogas from toilet waste, composting and renewable building material. The visits of schools with up to 350 students encouraged the development of interactive exhibits and activities.

Expected Results

An innovative low cost, low tech and low risk model for decentralized environmentally friendly solid waste processing, which is sustainable and can be replicated elsewhere.

Detailed results are:

- A decentralized and politically easy to implement viable model for waste recovery as alternative to expensive and often problematic centralized "Waste-to-Energy" facilities.
- Elimination of hazardous smoke, malodors, pests and toxic leachage, because the facility and the educational park are built on the restored 7 m deep old landfill. Thus the population of the host village warmly welcomed the project, in stark contrast to the usual opposition to waste facilities.
- Reduction of greenhouse gasses by eliminating the generation of the greenhouse gas methane in landfills by composting organic waste in the facility and future replicates.
- Recovery of non-renewable resources and promotion of renewable building material (bamboo).
- Reducing the waste volume going to the landfill by 90 %, thus extending its useful life.
- Poverty alleviation by creating over 150 new jobs, mainly for underprivileged people.
- Technology transfer and capacity building in a community empowerment project.
- Tools to replicate the large scale model waste recovery facility elsewhere.
- Raise the environmental conscience in regard to climate change, alternative energy, renewable resources and waste management, particularly in young visitors to the educational park.

Project Partners

The capacity expansions were implemented on behalf of the Rotary Club of Bali Ubud by the local GUS Foundation. Among the many resource partners are local and international institutions like SANDEC of the Swiss Federal Institute of Technology. The Regency of Gianyar also supports the project, e.g. by lending the land, in regulatory matters and by providing free health services.

Project Recognitions

In 2008, the project received a prestigious recognition from the United Nation Environment Program by being placed first among of 13 SHOWCASE PROJECTS that were selected from hundreds of projects in the Asia-Pacific region. In 2006, the President of Indonesia awarded the Regency of Gianyar with the ADIPURA trophy for Environmental Waste Management for this project.

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3 PROJECT HIGHLIGHTS

Project Goal

From its inception, the goal of this pioneering environmental project was to:

- Contribute towards a cleaner environment with a fully sustainable model facility for solid waste management that processes all 60 tons of waste collected daily in the Gianyar Regency of Bali in a low cost, low tech and low risk approach. Thus the Gianyar Regency will be the first in Indonesia that properly processes all collected waste.
- A viable model that can be replicated in most of Indonesia's 494 regencies and municipalities.
- Claim the greenhouse gas reductions under the Clean Development Mechanisms (CDM).

Innovative Aspects

Large scale managed waste separation of 60 tons per day and composting in a forced aeration process using blowers are new for Indonesia and open new attractive avenues for solid waste management. The research into innovative composting processes and the air delivery systems reduced the use of energy. Technology transfer allowed the local production of equipment and built technical capacity. All know-how is freely available from the website, facility visits or by attending planned seminars.

Cost/Benefit

Compared on a per ton basis, the USD 500,000 investment for this project is less than 20% of that needed for incineration, gasification or anaerobic closed vessel processes. The waste recovery and composting process is sustainable without subsidies, tipping fees or use of CDM carbon credits. A further benefit is capacity building and 150 new jobs. The project ownership and management was transferred to a foundation owned by the host village in a public-private partnership.

Replication Potential

Replication in many of the 494 regencies and municipalities is a primary project goal. The CDM Carbon Credits will actually be used to facilitate such replications. The low cost, low tech and low risk approach is easily manageable and avoids costly maintenance, making it highly suitable for developing countries. Contrary to projects in new locations, decentralized waste recovery facilities built on restored landfills are welcome by population because they reduce emissions and create much needed jobs. Visits of officials from all provinces of Indonesia organized by the Ministry of Public Work and from many NGOs underline the potential for replications, with some being already in the planning stage.

Environmental Impact

Waste Recovery Facility: By restoring the former landfill on which the facility and environment park is built, the project eliminates pests and problematic emissions from the former landfill. It also avoids significant amounts of greenhouse gasses. In addition, it reduces the need for landfill space by 90 %. Non-renewable resources like plastic, paper and metals are recycled. The 18 tons compost produced daily is preferably used to revitalize soil that is depleted by the excessive use of chemical fertilizers.

Climate Change: By avoiding the strong greenhouse gas methane that would otherwise be generated in a landfill, the project reduces greenhouse gases by 153,000 CO₂-equivalents during the first ten years of operation.

Educational Center: The objective of the center is to educate the young on climate change and waste topics. Interactive exhibits and activities create a strong impact. Schools often visit the center with up to 350 pupils. Some older students do their thesis in the park, the research station or the laboratory.

The redundant pilot plant building focuses on topics like recycling, energy saving, alternative energy, water issues and the avoidance of waterborne diseases. The outdoor section includes the waste recovery facility, wind and photovoltaic energy production, biogas from toilet waste, composting and renewable building material.