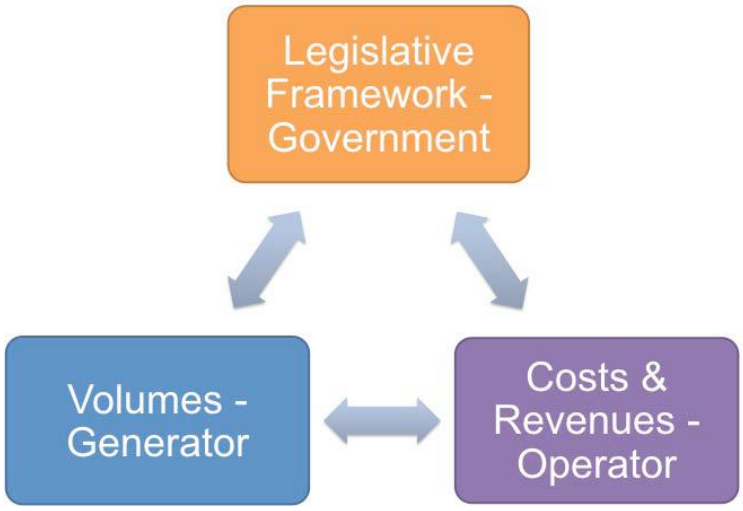
Financial Models in Waste Management

Introduction

The Hazardous Waste Assessment reports – developed during the previous project tasks (August 2016) – provided an estimate of the volume, sources and **types of hazardous wastes** that will need to be treated and disposed of. The aim of the current report is thus to present the **business case for the setting up of the hazardous waste management infrastructure**, also known as a Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF), and identify potential partners, donors and financing models for implementation. Sustainable hazardous waste management includes **not only ensuring sound environmental and social practices, but also sound economics and financials**. To facilitate this, the right **enabling conditions are crucial**. Once this enabling environment is in place, the waste sector can attract **various forms of investment** – from local, regional as well as international companies, funding agencies and governments.

Business Case Drivers

The business case for a hazardous waste facility is interlinked to three main elements – a strong legislative and compliance framework, sufficient volumes of hazardous wastes and cost recovery opportunities for the operator. Therefore, to ensure the TSDF is viable, a strong collaborative working relationship between the Government, hazardous waste generators and hazardous waste facility operator is essential



Influence of the legislative framework/ government:

A strong legislative framework for the proper disposal of hazardous waste with clearly allocated responsibilities and penalties for non-compliance is an essential condition that creates the demand for the environmentally sound disposal of hazardous waste, and the bedrock for a business case. The legislative framework may influence at several levels, both in terms of volumes of hazardous wastes requiring disposal and the requisite costs. It provides the basis for the categorization of hazardous waste as well as its treatment and disposal routes, penalties for noncompliance, and the inventory, compilation and update of national hazardous waste related data. Legislation and governmental decision-making also impact the costs and operational aspects of a TSDF by specifying minimum standards and technical requirements (e.g. permitting, licensing and monitoring requirements, environmental impact assessment (EIA) requirements, etc.). It also has the power to support the establishment and operation of a TSDF through siting and land acquisition, low cost land/lease models for the land, grants, loans and other subsidies to cover any viability gap.

Influence of waste volumes/ generators:

A TSDF normally needs sufficient waste volumes to be viable through economies of scale. The volume and type of hazardous waste generated is inherently linked to the costs and revenues of an operator as different types of wastes need different treatment and disposal operations (e.g. direct landfilling has very different costs in comparison to incineration). As larger volumes of hazardous waste are generated and disposed of improperly, there is greater pressure on the government for stringent legislation.

Influence of cost and revenues/operator:

The costs and revenue structure employed by an operator influences the willingness of generators to comply. If costs are too high, there will be greater tendency to avoid TSDF disposal, with lower volumes reaching the TSDF. An operator may also request the government to grant special terms and concessions, including lobbying, to secure monopoly catchment areas (i.e. areas where only one waste management facility is in operation, thus ensuring sufficient volumes of waste).

Overview

The costs of a TSDF are dependent on several factors, but are largely influenced by design criteria and specifications such as size, proposed infrastructures within and to support the TSDF including the essential and non-negotiable elements, as well as optional or "good-to-have" elements. Costs are divided into two categories, namely capital expenditure and operating expenditure. • Capital expenditure: Investment in plant and machinery that is depreciated over time.

• Operating expenditure: Operation and maintenance costs involved in daily activities. In addition to the above, an important aspect for TSDFs is to sufficiently provision for any liabilities from environmental accidents as well as the safe management of the landfill post capping1, over typically a 30-year period. This is especially important in the case of bankruptcy of the TSDF operator. Cost recovery is an important aspect for financial sustainability of the TSDF. Most commonly, TSDFs rely on cost recovery under the polluter-pays principle. This may be supplemented by government funds raised through specific taxes. Revenue streams include user fees or tipping/gate fees, membership fees, compulsory fees on generators backed by legislation, as well as other supplementary sources of revenue for services such as transportation, chemical analysis, etc. International experience shows that most recent TSDFs, especially in South Asia, are based on Public-Private Partnership (PPP) models, typically with an initial corpus of financing through a combination of loans, grants and equity to launch the operation, with revenues through user fees. Government support can include concessional land lease terms, capital grants, low cost loans, etc. Other funding sources can be multilateral financial organizations such as the World Bank and Asian Development Bank, among others. Subsidized technical assistance is also given by various donor agencies.

Cost overheads

Pre-operative investments: These include expenses associated with pre-feasibility studies, technical reports, environmental impact assessments, fulfilling permitting procedures, etc. These are expenses necessary to start TSDF operations, and typically also include stakeholder consultation, information dissemination, education and communication activities, geo-technical assessments and laboratory analyses for siting suitability, as well as permitting/licensing costs. Land: Siting hazardous waste facilities is always controversial. Planning for hazardous waste infrastructure must account for the geography of hazardous waste generation and the cost of transportation from generators to treatment and disposal facilities. The

cost of land for a project can vary depending on whether it provided on lease or is purchased by the operator.

Administrative Buildings: For administrative offices, analytical laboratories, worker welfare, etc., as well as secured storage and handling areas for any temporary storage and pre-treatment/stabilization prior to landfilling or incineration.

Site development: Costs associated with construction including digging, landfill liner and leachate systems installation, etc. based on technical design specifications, national regulations and international best practices, as well as site-specific geological features.

Incinerator costs: Costs of installation of an incinerator, including furnace and pollution mitigation equipment such as flue gas cleaning stacks, measurement and monitoring systems. The cost of the incinerator depends on the type and capacity of the installation.

Plant and machinery: Costs of purchasing various plant and machinery for moving, handling and transporting hazardous wastes such as cranes, a weigh bridge, dumpers, trucks, etc.

Analytical laboratory: Costs of laboratory testing, sampling and analysis equipment, machines and instruments.

Other infrastructure: Includes costs for internal roads, a waste water and leachate treatment plant, wheel wash, green belt development, administrative support e.g. computers, software, etc.

Manpower costs: For management, administration, technical, security and ground staff for the operation of the TSDF.

Maintenance costs: The costs for maintenance of plant and equipment, including repairs, replacements, upgrades, etc. Maintenance is the biggest operating cost (generally 22 per cent of all operating costs2).

Fuel and utilities costs: Costs for fuel, including fossil fuels, alternative fuels (e.g. agro waste) and electricity to operate plant and machinery, the incinerator, etc. Water for process use and gardening.

Compliance and monitoring costs: Includes costs for statutory compliance with licensing and permitting requirements, monitoring costs of environmental parameters, external environmental audits, financial audits, etc.

Financing costs: Debt service or interest costs towards loans, bonds, etc., and other funding availed.

Closure costs: Capping costs, post-capping ongoing monthly monitoring and management costs, decommissioning of buildings and equipment, as well as provisions for worker pensions, retirement benefits, etc.

Liability: Funding for environmental remediation in case of any adverse incidents of pollutants being released, and consequential remediation costs and compensation as well as provisioning for sufficient funds for safe management post closure. This is typically through insurance and money set-aside in escrow accounts.

Ongoing community engagement: Corporate social responsibility (CSR) programmes, community support and local area development costs to bolster the social license to operate.

Ownership models and financing mechanisms

Public ownership: State-owned facilities for hazardous waste management that are built, owned and operated by the government.

Private ownership: Fully financed by private sector funds, potentially with limited government incentives such as subsidies.

Public-Private Partnership (PPP): PPP is a specific form of project finance where a public service is funded and operated through a partnership of government and the private sector, typically structured under a long term concession arrangement, channeled to a Special Purpose Vehicle (SPV)3 In return, the company undertaking the project (project company) receives a pre-determined revenue stream over the life of the concession from which private sector investors extract returns. In the PPP model the investment is shared between the government and a private operator. A project under PPP may include all stages of the project's lifecycle, starting from conceptualization, design, construction of infrastructure where necessary, up to delivery of services and maintenance. In such projects, the private sector is the active party that undertakes the activities, depending on the model, starting from the stage of conception and up to the stage of operation and maintenance. Typically, the management is outsourced to a private operator who is given a concession by the government.

Two common models under PPP include:

1. **Build-Operate-Transfer (BOT):** Here the private sector manages the infrastructure on a build-operate-transfer basis. The private sector manages the infrastructure until a specified time, after which the government is responsible for its management.
2. **Build-Own-Operate-Transfer (BOOT**): This is an extended version of the BOT model. Under this model the ownership and management belongs to the private sector until a specified time. After expiry of the term, ownership and management is transferred to the government.

Case Studies – India

Alang

Location

The TSDF, started in 1999 in Alang, is developed largely for the disposal of hazardous wastes from the ship breaking yards. Most of the industries in and around the area are related to ship breaking, and mostly located within 10 kms of the TSDF. As the TSDF is owned by the Gujarat Maritime Board (GMB) that also leases the yards, the TSDF operator needs explicit permission to accept waste from other industries.

Capacity and Infrastructure

The TSDF has developed a high level of technical expertise, having been trained on several critical subjects such as asbestos management and permitting from European (French Navy) experts, and therefore has a high level of disposal standards and procedures.

Operator Model

The GMB is the owner of the land as well as the facility, having made the capex investment. While GMB retains ownership of the assets and plant, it contracts the day-to-day management and operation of the TSDF to a private sector operator that is operating the site since 2005.

Access to waste

The TSDF's main source of waste is from ship breaking industries in Alang that are within its captive catchment area. The waste handled by the TSDF in the recent years is shown in the table below:

Year	Landfilled (MT)	Incinerated (MT)	Bilge water (MT)	Total per year (MT)	Total ships beached at Alang
2013 - 2014	5'238	359	1'864	7'506	298
2014 - 2015	4'612	545	2'122	7'280	275

Table 3: Amount of hazardous waste disposed of in the Alang TSDF

Tipping Fees & Membership Cost

The TSDF charges a small, refundable one-time membership, and nominal annual membership fees from the ship breaking facilities. The most recent tipping fees charged by the TSDF (latest update on 1st April 2016) are given in the table below.

Disposal Pathway	Disposal Rate Per Ton (INR)	Disposal Rate Per Ton (USD)
Landfill	INR 371	USD 6
Incineration	INR 10388	USD 156
Bilge water	INR 1145	USD 17

Table 4: Tipping fees/ Gate fees for GEPIL TSDF in Alang (as of January 2017). Currency exchange rate: INR – USD (01.2017): 1 INR = 0.015 USD

Conclusion

The business case analysis showed that **the demand for hazardous waste disposal services exists, not only from ship breaking, but also from other**

industrial activities.
However, to make it a **commercially viable** and bankable business, several important framework **conditions** are necessary:

• The first, and potentially most important one is to **strengthen legislative frameworks** that give regulators better tools to monitor and enforce compliance, such as reporting requirements for wastes generated and disposal pathways – which requires the corresponding field control resources, permitting and licensing requirements, etc. linked to membership of a TSDF, and a legal basis for TSDF operators to charge for tipping fees. While a strong legislative framework backed by robust institutions is a necessary condition for any investor, it is not sufficient on its own, unless backed by a strong judicial mechanism to provide a fallback for law and judicial oversight of contractual breaches and imposition of fines and penalties.

• A second aspect of the commercial viability is the **capacity utilization of the TSDF**. The current model has been based on the values from the design document including the capacity of landfill and estimated lifetime of the TSDF. Given that the commercial viability is very sensitive to demand, the sizing of the facility needs to be appropriate so that it can meet the demand without incurring unnecessary costs of an idle facility.

• The third important ingredient is **the close collaboration** of a wide-range of stakeholders from government agencies, private sector, international development agencies and multilateral financial institutions, for example through the implementation of PPP, that allows a leveraging of both private and public sources of financing.

References:

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