



Part 4 : Financing Options

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Outline



- Introduction
- Financing Considerations
- Project Costs
- Project Revenues
- Project Financing
- Risk Management
- Summary



Introduction



- Ideally , Landfill gas projects should be economically sustainable
- Landfill gas projects may require investment or funding support from third parties
- Landfill gas projects have an additional benefit.. consideration of "non-price" factors such as environmental benefits to justify project economics

Financing Considerations



- Landfill gas project financing considerations
 - Planning Period
 - Financial Assessment Criteria
 - Project Quantities



Planning Period



- 15-years is typical for landfill gas projects
- Shorter planning period for small and closed landfills
- Longer planning period for larger operational sites

Financial Assessment Criteria



- Three main techniques for determining economic feasibility of LFGTE projects
 - Payback Method
 - Discounted Cash Flow Method (NPV)
 - Internal Rate of Return Method (IRR)
- Sensitivity analyses should be carried out to examine impacts of changes in project conditions



Project Quantities

- Establish project quantities on an annual basis by looking at
 - Landfill Gas Recovery Rate
 - ◆ Estimate rate annually
 - ◆ Estimate rate over the life of the project
 - Landfill Gas Utilization Rate
 - ◆ Estimate annually and over the life of the project
 - ◆ Plant capacity
 - ◆ On-line availability



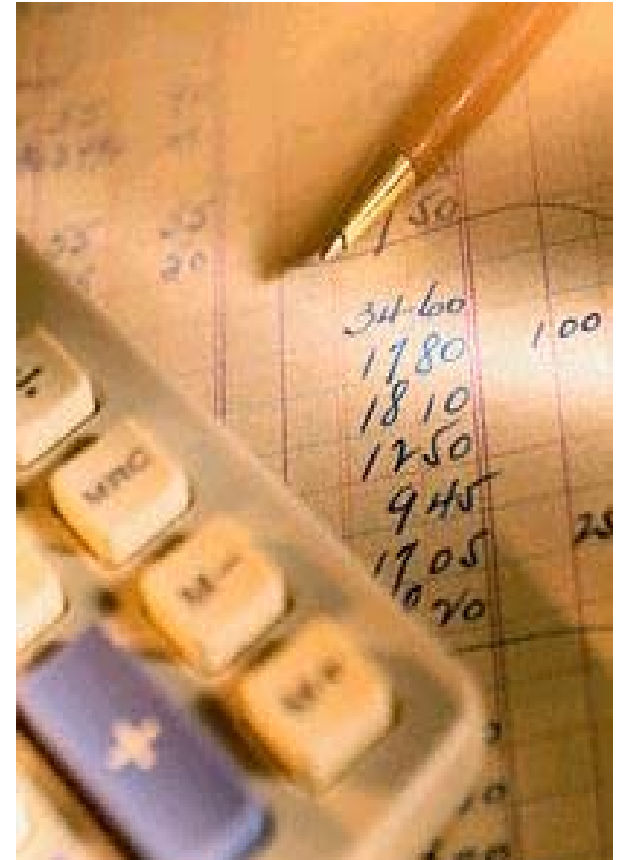
Project Quantities

- Project Quantities can also be determined by
 - Emission Reductions
 - ◆ Can be calculated annually and over the life of the project
 - ❖ LFG utilization
 - ❖ LFG flaring
 - ❖ Report in terms of CO_2 or CO_2 equivalent
 - Carbon Abatement
 - ◆ Calculate additional emission reductions benefits from the LFG TE project due to displacement of fossil fuels
 - ❖ Oil
 - ❖ Natural gas
 - ❖ Coal

Project Costs



- Capital costs
 - Landfill Improvements
 - LFG Collection System
 - LFG Utilization System
- Operation and Maintenance Costs
- Other Project Costs
 - Permitting Fees
 - Consultants





Landfill Improvements

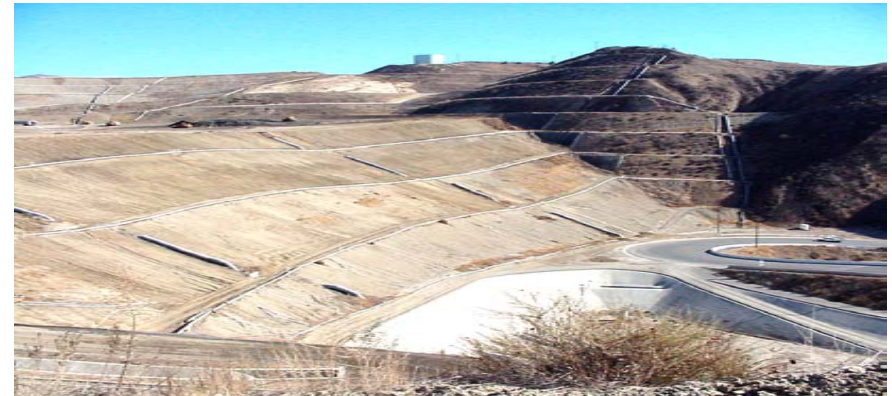
- Additional financial resources may be required to improve a landfill before a landfill gas project can proceed
 - Revising waste placement practices
 - Installing landfill capping
 - Improving storm water control
 - Controlling and managing leachate
 - Increasing slope stability
 - Providing adequate site access

LFG Collection Control System



- Capital costs may include:

- Vertical extraction wells
- Horizontal collectors
- Other collection points
- Laterals and headers
- Condensate system
- Blower/flare station
- Monitoring system



- Labor and other direct costs associated with operating and maintaining the LFG recovery system (typically approximately 10% of LFG system capital cost on an annual basis)

LFG Utilization System

- Capital costs may include
 - Power plant
 - Electrical interconnect
 - Pipeline
 - Equipment conversion
 - Utilities (water, sewer)
 - Offices
 - Equipment storage
 - Maintenance areas
- Labor and other direct costs associated with operating and maintaining the system
- Costs depend on utilization option and equipment selected



Other Project Costs



- Other project costs may include
 - System design
 - Legal
 - Royalty payments
 - Financing

Project Revenues



- Energy Sales
 - Plant capacity
 - Plant on-line availability
 - Energy price /contract
- Incentive Programs
 - Tax credits
 - Incentives that promote development of renewable energy sources
 - Grants/Loans
- Emission Reduction Credits
 - Additional revenue possible if an international market for emission reduction credits emerges

Project Financing



- Local Financing
 - Partnering with Local Organizations
 - In-Country Assistance
- International Financing Organizations



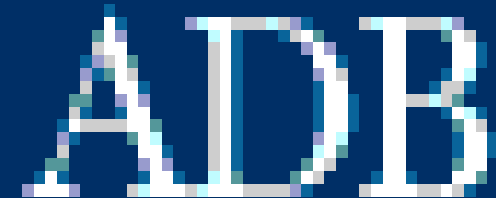
Local Financing

- Financing for landfill gas projects may be available through:
 - Local Organizations
 - Municipalities
 - Private Companies
 - Lending Institutions
- In-country assistance programs supporting
 - Energy Policy
 - Environmental Protection
 - Development of New Technologies

International Financing



- Financing may also be available from International organizations including:
 - World Bank
 - Multilateral Development Banks
 - U.S. Government Agency Programs
 - U.S. Initiative on Joint Implementation
 - United Nations





How To Obtain Funding

- Review types of assistance available
 - Grants
 - Loans
 - Loan Guarantees
 - Venture Capital Funds
 - Business Consulting Services
- Identify Funding Requirements
 - Program Objectives
 - Resource Allocation
- Select Sources of Funding



Project Risks: Technical

- Main Risk:
 - Quantity of organic waste
 - Landfill stability
 - Recovery of methane
 - Performance of the utilization system
- Mitigation Measures:
 - Focus on larger landfills
 - Assessment and analysis
 - Verify Landfill gas recovery rates
 - Use of proven technologies



Project Risks : Financial

● Main

Risk :

- Project revenue shortfall
- Availability of funding
- Project implementation and operation

● Mitigation

Measures :

- Obtain a long-term energy contract
- Involve project stakeholders
- Obtain technical support and training

Summary



- Landfill gas projects can provide a cost-effective means of controlling methane emissions from landfills
- Project revenue is primarily derived from the sale of the recovered energy
- May earn additional revenue from incentive programs or emission reduction credits



Summary, continued ...

- A sound project development strategy is important and should include
 - Capital costs
 - Potential revenue; and
 - Identification and mitigation of technical and financial risks
- A number of options may be available for additional project financing
 - Think creatively
 - Apply for assistance