

Promoting and Developing Landfill Gas as an Energy Source in Nigeria

An Assessment of Landfills in Ibadan



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Why Promote LFG Utilisation?



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- To improve public health of Nigerian citizens through the installation of LFG collection systems at the landfills
 - To improve the quality of life for Nigerians by providing consistent electricity through the LFG to Electricity power plant
 - To help mitigate climate change through the reduction of greenhouse gas emissions

Energy Supply Challenges



- Energy demand far surpasses energy supply
 - Approx. 3000MW of generation capacity
 - Electricity consumption ~ 125kwh per capita
 - 45% of population has access to electricity
 - 30% PHCN; 70% Self Supply
 - Fossil fuels the prevalent energy supply source
 - Electricity tariff (MYTO) artificially low

Assessing LFG Potential in Ibadan



- Pre-feasibility study of active landfills
 - Evaluate technical considerations for LFG generation and collection
 - Determine the amount of landfill gas (LFG) capable of being generated at each site
 - Estimate the financial impact of LFG to Energy project development at each of the four sites
 - Identifies potential barriers to project implementation

Elements of Ibadan Study



- Survey and site visit to collect waste data
 - Disposal rates and waste composition data
 - Landfill area, depth, liner, soil cover
 - Disposal practices and site security
 - Distances to potential end users, electricity substations
- Application of data in US EPA LFG Model
- Highlight barriers to project development

LFG to Energy Revenues



- Revenues would be obtained from
 - Potential power sales to PHCN. The power grids are within close proximity (1km) of the landfills
 - Potential sales of medium Btu gas sales to end users for direct use
 - Sales of Carbon Emission Reductions (CERs) through CDM or other Carbon Finance mechanisms



Financing LFG to Energy Projects



- Overcoming budgetary constraints by leveraging available Financing mechanisms
 - Ecological Fund (National)
 - Carbon Finance
 - Bonds (Municipal / State)
 - Private Investments (Diaspora Bonds)
 - Climate Investment Funds (CTF)
 - MDB funds (IDA loans / credits)



LFG to Energy CDM Projects



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- 89 LFG projects registered as of Nov 2008
 - CDM Methodologies: ACM0001 and AMSIIG
 - Majority in Latin America
 - 2 in Africa (South Africa and Egypt)
 - Lagos LFG utilisation project (flaring)
 - World Bank financed
 - Pump test yet to be done



Landfill Gas Modeling for Ibadan



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- Model assigned appropriate values for model k , L_0 , and collection efficiency
 - Site specific waste composition data applied
 - Proxy region used for Ibadan's climate
 - Collection efficiency estimated based on landfill conditions e.g. depth, cover, fires, waste depth

Awotan Site Visit





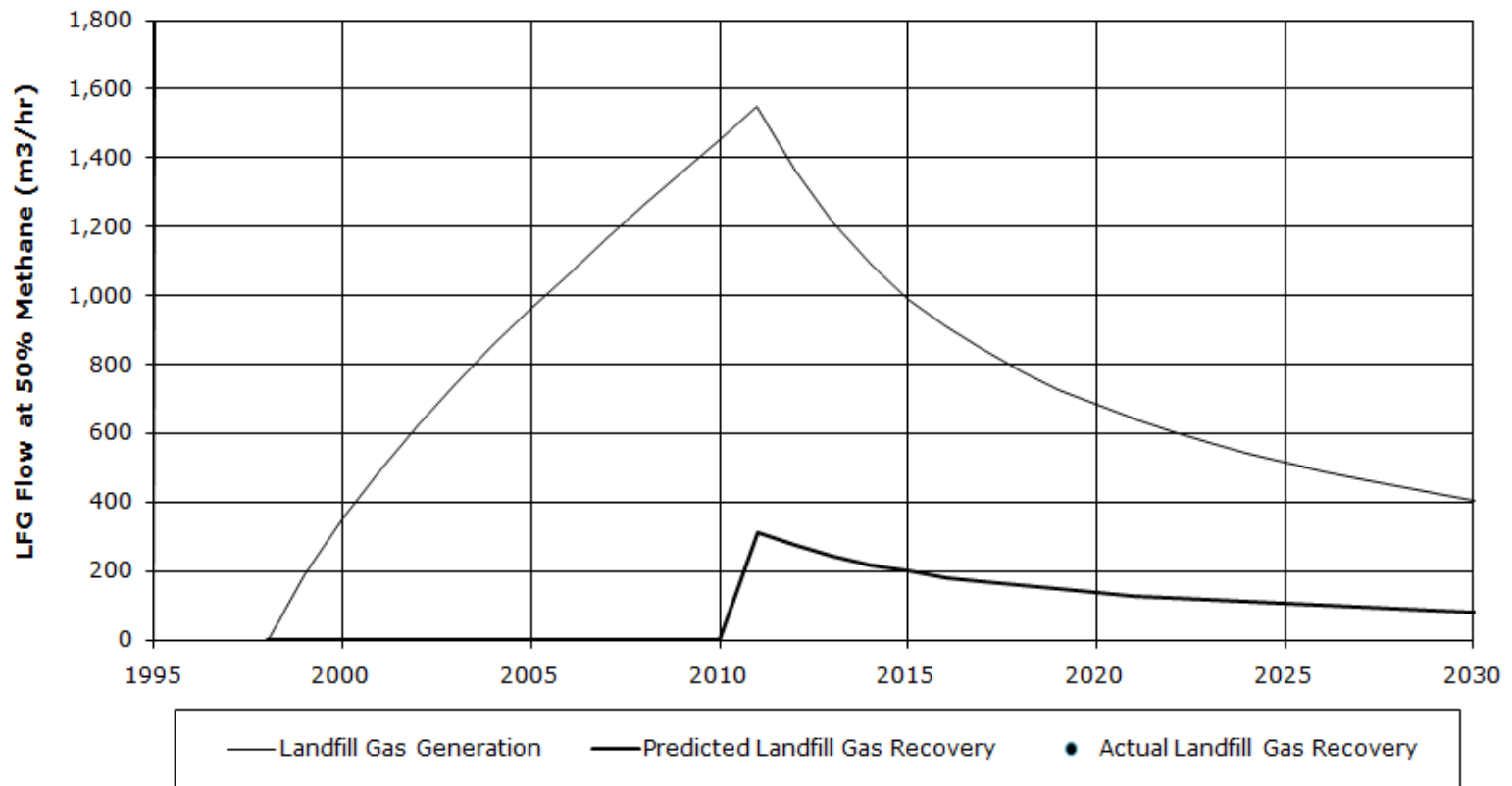
Awotan Landfill Data

- Awotan owned by the City of Ibadan
- Years of Operation: 1998 – 2010
- Site coverage: 51 acres (~ 20.3 Ha)
- Waste in Place: ~ 2,147,000 tons
- Estimated LFG generation: ~ 1550m³/hr
 - Collection efficiency: ~20%
- Project type: Electricity - 0.5MW
- CO₂e emission reductions: 178,000 tonnes

Awotan LFG Model



Landfill Gas Generation and Recovery Projection Awotan, Ibadan



Abaeku Landfill Data

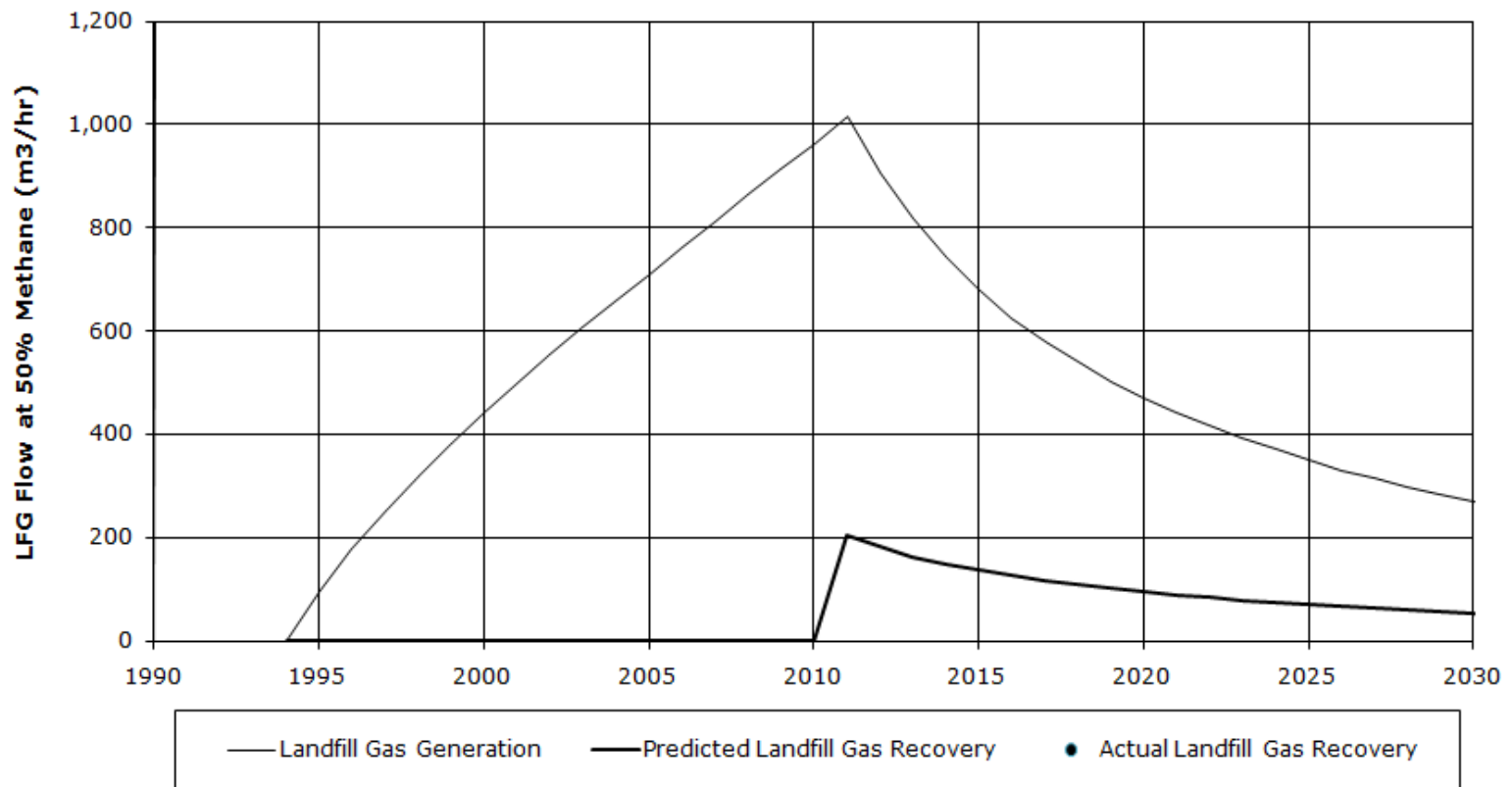


- Abaeku owned by the City of Ibadan
- Years of Operation: 1994 – 2010
- Site coverage: 24 acres (~ 9.4 Ha)
- Waste in Place: ~ 1,283,000 tons
- Estimated LFG generation: ~ 1015m³/hr
 - Collection efficiency: ~20%
- Project type: Electricity - 0.3MW
- CO₂e emission reductions: 121,000 tonnes

Abaeku LFG Model



Landfill Gas Generation and Recovery Projection Abaeku, Ibadan





Financial Evaluation Summary



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- LFG utilisation at Ibadan's active landfills seems economically feasible given an electricity tariff of \$0.20/kwh (4X current MYTO)
 - Positive IRR but negative NPV
 - Does not include cash revenues from CER sales
 - Additional revenues from Carbon financing
 - Positive NPV between \$0.7M and \$1.0M using a CER price of 10USD/tonne



Making LFG to Energy a Reality



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- Political will of both the Federal Ministries of Environment and Power
 - Resource commitment (financial and human)
 - Conduct feasibility studies and demo projects
 - Innovative Financing
 - Leveraging CDM and other similar incentives
 - Awareness campaigns at the community level
 - Improved quality of life

Next Steps for Ibadan



- LFG utilisation in Ibadan seems viable but is contingent upon the following:
 - Funding for technical assessment and pump test
 - Adoption of adequate site management practices
 - Landfill Cover / Cap implementation
 - Focused tipping areas versus wide area dispersal
 - Frequent compacting of waste
 - Extinguishing of site fires

Questions?



Thank You