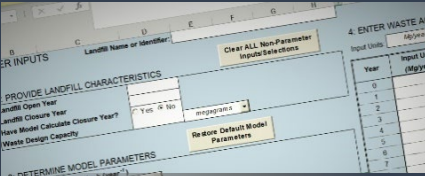




Landfill Gas Energy Basics



Landfill Gas Modeling



Project Technology Options



Project Economics and Financing



Landfill Gas Contracts and Regulations



Evaluating and Working with Project Partners



Best Practices for Landfill Gas Collection System Design and Installation



Best Practices for Landfill Gas Collection System Operation and Maintenance



LFG Energy Project Development Handbook

July 2021

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Units of Measure, Element Symbols, Constants and Variables

Btu	British thermal unit
cfm	Cubic feet per minute
CH ₄	Methane
CO ₂ e	Carbon dioxide equivalent
GGE	Gasoline gallon equivalent
gpd	Gallons per day
H ₂ S	Hydrogen sulfide
in. WC	inches of water column
k	Methane generation rate constant
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt-hour
L ₀	Potential methane generation capacity
lb/hr	Pounds per hour
m ³	Cubic meter
m ³ /Mg	Cubic meter per megagram
m ³ /yr	Cubic meter per year
Mg	Megagram
MMBtu	Million British thermal units
MMBtu/yr	Million British thermal units per year
MMTCO ₂ e	Million metric tons of carbon dioxide equivalent
MW	Megawatt
MWh	Megawatt-hour
psi	Pounds per square inch
psig	Pound-force per square inch gauge
scfm	Standard cubic foot per minute
SDR	Standard diameter ratio
yr	Year

Abbreviations and Acronyms

ARRA	American Recovery and Reinvestment Act
C&D	Construction and demolition
CAA	Clean Air Act
CFR	Code of Federal Regulations
CHP	Combined heat and power
CNG	Compressed natural gas
CPVC	Chlorinated polyvinyl chloride
CQA	Construction quality assurance
CWA	Clean Water Act
DSIRE	Database of State Incentives for Renewables & Efficiency
EG	Emission Guidelines
EPC	Engineering, procurement and construction
ESA	Energy sales agreement
FLIGHT	Facility Level Information on GreenHouse gases Tool
GCS	Gas collection system
GCCS	Gas collection and control system
GHG	Greenhouse gas
GHGRP	Greenhouse Gas Reporting Program
GIS	Geographic information systems
GWP	Global warming potential
HASP	Health and Safety Plan
HDPE	High-density polyethylene
IOU	Investor-owned utilities
IRR	Internal rate of return
LandGEM	Landfill Gas Emissions Model
LCFS	Low Carbon Fuel Standard
LFG	Landfill gas
<i>LFGcost-Web</i>	Landfill Gas Energy Cost Model
LMOP	Landfill Methane Outreach Program
LNG	Liquefied natural gas
MACT	Maximum achievable control technology
MSW	Municipal solid waste
NAAQS	National ambient air quality standards

NAESB	North American Energy Standards Board
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NMOC	Non-methane organic compound
NPDES	National Pollutant Discharge Elimination System
NPV	Net present value
NSPS	New Source Performance Standards
NSR	New Source Review
NYMEX	New York Mercantile Exchange
O&M	Operation and maintenance
OSHA	Occupational Safety and Health Administration
OTC	Over-the-counter
PFAS	Per- and polyfluoroalkyl substances
PPA	Power purchase agreement
PPE	Personal protective equipment
PSA	Power sales agreement
PSD	Prevention of Significant Deterioration
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act of 1976, as amended
REC	Renewable energy certificate
RFP	Request for proposal
RFS	Renewable Fuel Standard
RGGI	Regional Greenhouse Gas Initiative
RIN	Renewable Identification Number
RNG	Renewable natural gas
RPS	Renewable Portfolio Standard
RTC	Renewable thermal certificate
RTO	Regional transmission operator
RVO	Renewable volume obligation
SCADA	Supervisory control and data acquisition
SIP	State Implementation Plan
SOQ	Statement of Qualifications
SWANA	Solid Waste Association of North America
VFD	Variable frequency drive
WRRF	Water resource recovery facility