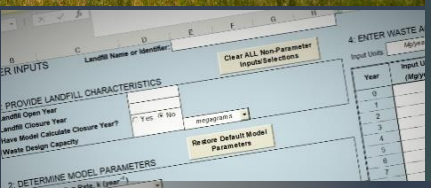

LANDFILL METHANE OUTREACH PROGRAM

LFG Energy Project Development Handbook

March 2020

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Units of Measure, Element Symbols, Constants and Variables

Btu	British thermal unit
cf	Cubic feet
cfm	Cubic feet per minute
CH_4	Methane
CO_2e	Carbon dioxide equivalent
GGE	Gallons of gasoline equivalent
gpd	Gallons per day
H_2S	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
M_i	Annual waste disposal rate
MMBtu	Million British thermal units
MMBtu/yr	Million British thermal units per year
mmscfd	Million standard cubic feet per day
$MMTCO_2e$	Million metric tons of carbon dioxide equivalent
MW	Megawatt
MWh	Megawatt-hour
psi	Pounds per square inch
psig	Pound-force per square inch gauge
Q_{CH4}	Estimated methane generation flow rate
scfm	Standard cubic foot per minute
SDR	Standard diameter ratio
yr	Year

Abbreviations and Acronyms

ARB	Air Resources Board
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
CREB	Clean Renewable Energy Bond
CQA	Construction quality assurance
CWA	Clean Water Act
DSIRE	Database of State Incentives for Renewables & Efficiency
EG	Emission Guidelines
EPA	U.S. Environmental Protection Agency
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
GEC	Green Energy Center
GHG	Greenhouse gas
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
LFG	Landfill gas
LFGcost-Web	Landfill Gas Energy Cost Model
LMOP	The U.S. Environmental Protection Agency's Landfill Methane Outreach Program
LNG	Liquefied natural gas
MACT	Maximum achievable control technology

MSW	Municipal solid waste
NAAQS	National ambient air quality standards
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
OPS	The U.S. Department of Transportation's Office of Pipeline Safety
OSHA	Occupational Safety and Health Administration
OTC	Over-the-counter
PM	Project manager
POTW	Publicly owned treatment works
PPA	Power purchase agreement
PPE	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
RPG	Renewable Portfolio Goal
RPS	Renewable Portfolio Standard
RTO	Regional transmission operators
RVO	Renewable volume obligation
SCADA	Supervisory control and data acquisition
SIP	State Implementation Plan
SOQ	Statement of Qualifications

SSM	Startup, shutdown, and malfunction
SWANA	Solid Waste Association of North America
Uniform Act	Uniform Relocation Assistance and Real Property Acquisitions Act of 1970
VFD	Variable frequency drive