

Central-Eastern Europe GMI Landfill Gas Model

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Model Overview & Purpose

- **Excel spreadsheet LFG model to be provided on GMI website**
 - Model is designed for Central & Eastern European countries
 - Countries included: Ukraine, Poland, Serbia, and Bulgaria
 - Flexible enough to be used for other countries in the region as needed
- **Purpose of an LFG generation and recovery model**
 - Tool to estimate potential benefits of collecting and using LFG for energy recovery and other uses
 - Form of capacity building

GMI's Country-Specific LFG Models

- EPA first recognized need for country-specific models in 2003 (Mexico Model v. 1)
- 2007: GMI's Central America Biogas Model
- 2009-10: GMI released several country-specific LFG models:
 - Ecuador LFG Model
 - China LFG Model
 - Mexico LFG Model Version 2
 - Ukraine LFG Model
 - Thailand and Philippines LFG Models (2010)
 - Colombia LFG Model (2010)
- 2013: Central-Eastern Europe LFG Model

Benefits of GMI's Country-Specific LFG Models

- No other existing models (LandGEM, IPCC) are wholly suitable for many countries
- GMI models incorporate country and local site conditions, climate, waste composition, and actual LFG recovery data
- GMI models make it easy for the non-expert to produce accurate estimates of LFG generation and recovery
- Country stakeholders like them because:
 - They recognize that it is an important tool for evaluating potential LFG projects
 - They get a state-of-the-practice model

Basic Elements of a Regional LFG Model

- **A group of countries can be served by a regional LFG model**
 - Share similar geography and climate
 - Similar site characteristics, waste profiles
 - Share LFG project development experiences and goals
 - Example: Central America Model
- **Regional model advantages**
 - Cost savings developing one model instead of several
 - Can apply actual project data from multiple countries to regional model
 - Countries without active projects benefit

Central-Eastern Europe Model

- **Incorporates aspects of Ukraine and Colombia models**
 - Ukraine data (waste composition and climate) incorporated
 - Colombia model (latest) structure allows model flexibility to apply to varying climates and regions
- **Model uses simple user inputs and automatic calculations to estimate LFG generation and recovery**
 - Annual waste disposal estimates
 - The rate at which waste decays and produces LFG
 - The total amount of methane a metric tonne (Mg) of waste produces
 - Estimated efficiency of the LFG collection system
 - Model performs separate calculations for different waste categories

Summary of GMI LFG Model Features

- **Inputs worksheet**
 - User answers a series of questions about the site
 - Model automatically calculates model input values for: waste disposal rates, k , L_0 , MCF, fire adjustment, and collection efficiency
- **Disposal & LFG Collection worksheet**
 - Shows annual disposal and collection efficiency estimates calculated by the model
 - Allows the user to input site-specific waste disposal estimates, collection efficiency, actual LFG collection, and baseline LFG collection
- **Waste Composition worksheet**
 - Shows waste composition values assigned to each state
 - Allows user to input site specific waste composition data
- **Output Table worksheet**
 - Shows model results in table format
- **Output Graph worksheet**
 - Shows model results in graph format

Next Steps?

- **Test model with new flow data and collection efficiency evaluations**
- **More regional LFG models?**
 - Level of effort depends on:
 - Amount of data and accessibility
 - Number of states and data variability (climate, waste composition) between states
 - Number of landfills with operating systems that are evaluated for model “calibration” (testing), and whether site visits are conducted