

The Balance-Method was developed at the Vienna University of Technology

It determines online

- (1) The ratio of the energy output from fossil and biogenic sources
- (2) The ratio of carbon content in the waste from fossil and biogenic sources
- (3) The ratio between carbon dioxide emissions from fossil and biogenic sources from Waste-to-Energy (WTE) plants.
- (4) The calorific value of the waste feed

The advantages of the Balance-Method compared to alternative methods include:

- Cost savings of more than 90 %
- Consideration of seasonal variation in the waste composition
- Temporal resolution of the results down to daily mean values
- Less than 5 % uncertainty of the results
- No need for new measurement systems
- Retrospective determination (if necessary operating data has been recorded)

Contacts to WTE operators in Austria using the Balance-Method to label the electricity generated

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# BALANCE-METHOD

**Cost-effective  
Determination of  
“Green” Energy and  
Fossil CO<sub>2</sub> Emissions  
from WTE Plants**



software for balance method

## Description

The Balance-Method is based on the mathematical solution of theoretical balance equations (for materials, substances and energy) and measured data, which are derived from conventional operating data of Waste-to-Energy plants (e.g. flue gas volume, steam production, mass of slag and ashes,...). In particular the following balance equations are used:

- Mass balance;
- Ash-balance;
- Carbon-balance;
- Energy-balance;
- O<sub>2</sub> consumption;
- Difference between O<sub>2</sub> consumption and CO<sub>2</sub> production.

The required operating data from the WTE plant for the calculation are:

- Waste mass;
- Mass of solid residues (bottom ash, filter ash and filter cake);
- Amount of flue gas;
- O<sub>2</sub> and CO<sub>2</sub> content in the flue gas;
- Steam production;
- Steam pressure and temperature;
- Temperature of the feed water;
- Energy efficiency of the boiler.

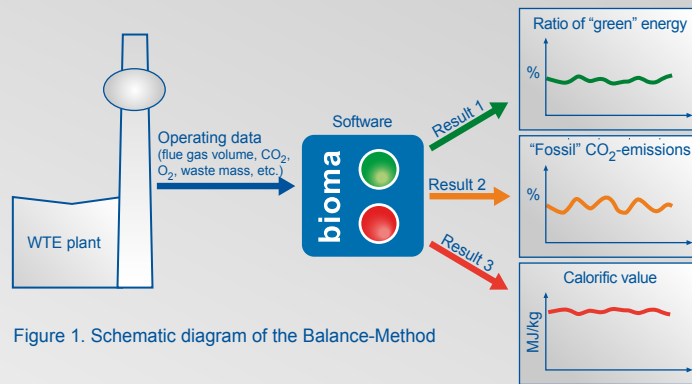


Figure 1. Schematic diagram of the Balance-Method

A European patent on the Balance-Method is pending- while an Austrian patent has already been granted.

### BIOMA software

offers automatical data processing and reporting.  
Download of trial version:  
[www.iwa.tuwien.ac.at/bioma](http://www.iwa.tuwien.ac.at/bioma)

### Field of application

Waste-to-Energy Plants (grate furnace, fluidised-bed furnace, rotary kiln).

### Results

The following charts illustrate the results of the Balance-Method for a WTE plant in Austria, which treats some 70 % Municipal Solid Waste and 30 % Industrial Wastes. The results are indicated by average values and standard deviations.

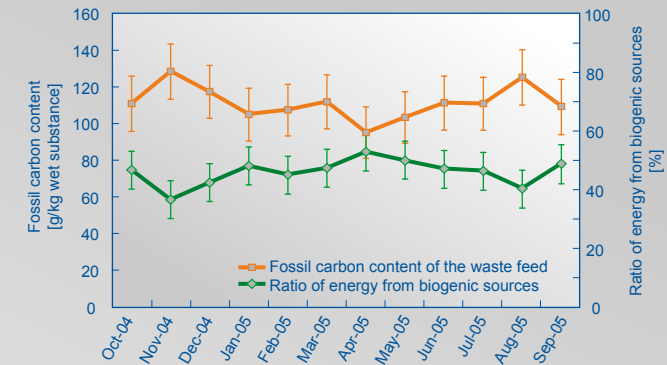


Figure 2. Trend of ratio of energy from biogenic sources and fossil carbon content of the waste feed throughout one year (monthly values)

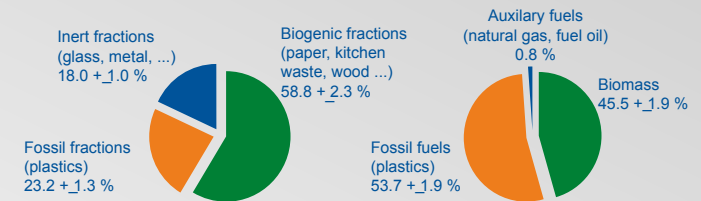


Figure 3. Ratio of mass fractions (left) and energy sources (right) of the waste feed of the WTE plant (annual values)

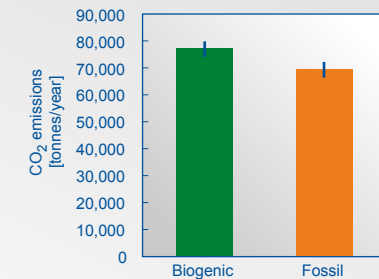


Figure 4. Annual biogenic and fossil CO<sub>2</sub> emissions from the WTE plant

