BIGHANNA composter

# Dumped in landfill food waste rots, producing methane gas which is 21 times more damaging to our climate than CO2

The table where we show savings of GHG emissions in our brochure is:

| Model | T40 | T60 | T120 | T240 | T480 |
|---|---|---|---|---|---|
| Food waste kgs/week | 75-100 | 150-250 | 300-500 | 400-1200 | 800-2400 |
| GHG Emissions Landfilled $MTCO_2$ EQ | 8 | 20 | 40 | 95 | 191 |
| GHG Emissions Composted $MTCO_2$ EQ | -1 | -3 | -5 | -12 | -25 |
| Savings GHG Emissions $MTCO_2$ EQ | -9 | -22 | -46 | -107 | -216 |

## GHG Emissions when food waste is landfilled:

If the food waste is sent to landfill the food waste rots and produces methane gas 21 times more damaging to our climate than CO2. For our models this is equivalent of up to the following metric tons CO2EQ/year.

| Model | T40 | T60 | T120 | T240 | T480 |
|---|---|---|---|---|---|
| GHG Emissions Landfilled $MTCO_2$ EQ | 8 | 20 | 40 | 95 | 191 |

## GHG Emissions when food waste is composted:

By composting we eliminate completely methane as well as CO2 emissions (CO2 outside the natural carbon cycle). Using compost as a fertilizer provides us with the potential to enhance the growth of beneficial micro organisms in the soil in new or existing vegetation, allowing more respiration in our atmosphere. Thereby composting is considered to have a positive effect on our planet. Composting helps our planet to recover.

| Model | T40 | T60 | T120 | T240 | T480 |
|---|---|---|---|---|---|
| GHG Emissions Composted MTCO2 EQ | -1 | -3 | -5 | -12 | -25 |

## Total Savings of GHG Emissions:

Composting food waste on-site has a huge positive impact on our earth compared to sending the food waste to landfill. (In the calculation we use maximum capacity of Big Hanna. No emissions for transporting the food waste are included. Landfill where no LFG Recovery is installed is used.) Total savings of Metric tons CO2EQ/Year.

| Model | T40 | T60 | T120 | T240 | T480 |
|---|---|---|---|---|---|
| GHG Emissions Composted MTCO2 EQ | -9 | -22 | -46 | -107 | -216 |

Climate change is one of the most important issues facing the world today. It is now generally accepted that the gradual increase in average global temperatures is due to higher levels of greenhouse gases such as carbon dioxide and methane in the Earth's atmosphere as a result of human activities.

### Why is it bad for food waste to decompose in a landfill?

When food is disposed in a landfill it rots and becomes a significant source of methane - a potent greenhouse gas with 21 times the global warming potential of carbon dioxide. Landfills are a major source of human-related methane in the United States, accounting for more than 20 percent of all methane emissions. http://www.epa.gov/foodrecovery/

The Environmental Protection Agency (EPA) in Canada explains why not to put organic waste on landfill:

*"The decomposition of organic waste in landfills produces a gas which is composed primarily of methane, a greenhouse gas contributing to climate change. Landfill gas can be recovered and utilized*


*to generate electricity, fuel industries and heat buildings. There are two major benefits to recovering and utilizing landfill gas. The first is that capturing and combusting landfill gas prevents substances like methane from escaping to the atmosphere; the second is that using the energy from landfill gas can replace the use of non-renewable sources of energy such as coal, oil, or natural gas.*

*While landfill gas recovery is a method to deal with the organic materials already in landfills, diverting organic materials such as food and yard waste from landfills (using composting or anaerobic digestion) will reduce the production of methane in the first place, and can also generate renewable energy and useful products such as compost.*
*Below are documents that further illustrate the link between waste management activities and greenhouse gases."*
http://www.ec.gc.ca/gdd-mw/default.asp?lang=En&n=6F92E701-1

**The calculation**
We have based the calculations in the brochure on the something called "Waste Reduction Model" (WARM) available on the Environment Protection Agency's w in United States website: it is a tool for EPA created WARM to help solid waste planners and organizations track and voluntarily report greenhouse gas emissions reductions and energy savings from several different waste management practices. The Web-based version of WARM is updated from time to time the calculation are from spring 2017.
http://epa.gov/epawaste/conserve/tools/warm/index.html
http://epa.gov/epawaste/conserve/tools/warm/Warm_Form.html

**Benefits of composting and explanation of "Composting in WARM"**
*"Composting is a waste management practice for what the Waste Reduction Model (WARM) calls "organics" (materials of plant or animal origin such as food and leaves). Composting uses microbes to help organics decompose aerobically (i.e., in the presence of air) into a stable, soil-like material. The resulting compost is typically added to soil in order to improve its quality and provide nutrients to plants. The composting pathway in WARM is modeled on large-scale industrial composting, in which large heaps of compost are mechanically turned to ensure even distribution of air, heat, and moisture.*

*WARM does not model small-scale and backyard composting due to uncertainty caused by the wide range of practices used in those settings. WARM models composting for the following materials: polylactide (PLA), food scraps, yard trimmings, grass, leaves, branches, and mixed organics. The composting emission factor (EF) quantifies the greenhouse gas impact (in metric tons of carbon dioxide equivalents (MtCO2e)) per ton of organic materials processed into compost. In WARM, the net greenhouse gas impact from composting all types of organics is negative, implying that composting is a carbon sink—that composting stores more carbon in the soil than it emits to the air. ….."*
http://epa.gov/epawaste/conserve/tools/warm/pdfs/Composting_Overview.pdf

**Emissions from the Big Hanna and savings of the green house gases**
They write in "Composting in WARM" that "*Warm does not model small-scale and backyard composting…*" We want to make people aware of the savings and benefits of composting and therefore we put the GHG savings in the brochure as an example. Also pls note that the emissions from our units are tested showing non-methane production. One of the test made are:
The Department of Biological Applications and Technologies at University of Ioannina in Greece have studied the emissions from our Big Hanna - "START UP AND OPERATION OF A CONTINUOUS COMPOSTING UNIT OPERATED WITH CANTEEN SOLID WASTES: FOCUSING ON CARBON BALANCE" by E.Angeli, I. Zarkadas, I.Sainis, E.Voudrias ,G. Pilidis. Their conclusion is that "The bioreactor operated well as shown by the absence of leachates, non-methane production and carbon balance. "