

I ❤️ Landfills!

**Why? That's Where We
Make Energy And Other
Valuable Co-Products
From Municipal Solid
Wastes Through
Anaerobic Digestion
Technology**

Landfill Expansions

- 💧 Can Be Eliminated.
- 💧 New Landfill Construction Can Be Eliminated.
- 💧 Existing Landfills Can Be Eliminated.

There Are Over 50 Existing USA Located MSW-To-Energy Plants That Use Mass Burn Technology To Generate Electricity

- 💧 No Other Valuable Co-Products Are Produced.
- 💧 The Resulting Ash Must Be Landfill Disposed.
- 💧 The Plant's Owner/Operator Makes Very Little Profit.
- 💧 Consequently, Existing MSW-To-Energy Technology Is Held In Low Esteem.

One Major Reason For Low Profits: The High Moisture Content Of MSW

- 💧 The Efficiency of Incineration Technology Is **Greatly Diminished** By The Ever Present High Moisture Content Of MSW.
- 💧 Incineration Technology is a **Dry Process**.
- 💧 Co-Products Are Not Profitable, Not Viable, And Must Be Landfilled.

Anaerobic Digestion, However

- 💧 Is A **Wet Process** Which Actually *Requires* Moisture In Producing Methane Gas.
- 💧 Is Also Capable of Producing Electricity In **Addition To** Several Other Valuable Co-Products.
- 💧 And If Properly Designed, Is Also Capable Of Recycling 100% Of Its Residuals.
- 💧 No Products Left Over Require Landfill Disposal As 100% Are Beneficially Recycled!

Anaerobic Digestion

- 💧 Is Already Used By Municipalities To Make Methane To Fuel Generators.
- 💧 Is Used By Dairies And Swine Producers To Generate Electricity.
- 💧 Is Also Used By Food And Beverage Industry To Produce Energy.
- 💧 Can Be Used To Make Methane From Municipal Solid Wastes.

WaterSmart's MSW-To-Energy Anaerobic Treatment Process

- 💧 Has Been Properly Designed To Recycle 100% Of Its Residuals.
- 💧 Therefore, No Product Left Over Requires Landfill Disposal.

System Design

- 💧 MSW Is Mechanically Sorted To Remove Ferrous And Non-Ferrous Metals (Beer And Pop Cans) Which Are Sold To Ferrous and Non-Ferrous Metal Buyers.
- 💧 Everything Else Is Mechanically Reduced In Size To About 1/10th Of An Inch By Grinding.
- 💧 The Ground Material Is Then Mixed With Water Or Leachate And Added To The Anaerobic Digester.
- 💧 Is New To The Marketplace.

Each System Component Is Established Technology

- 💧 MSW Sorting To Remove Beer And Pop Cans.
- 💧 Size Reduction (Grinding).
- 💧 Slurry Mixing.
- 💧 Anaerobic Digestion Of MSW.
- 💧 Carbon Dioxide Purification & Compression.
- 💧 Methane Purification & Compression.
- 💧 CNG Fuel For Gas Generators.
- 💧 Reverse Osmosis Membrane Treatment.

Digester Co-Products

- 💧 Methane Gas
- 💧 Carbon Dioxide Gas
- 💧 Organic Fertilizer (Digestate)
- 💧 Liquid Fertilizer Concentrate
- 💧 Reverse Osmosis Permeate Water

Methane Gas

- 💧 Is Dried, Compressed, And Beneficially Used As A Fuel To Power *Gas Turbines* That Generate Electricity.
- 💧 The Waste Heat From The Gas Turbines Is Beneficially Used To Make Steam Which, In Turn, Is Used To Make Additional Electricity (Called Combined Cycle) Through *Steam Turbines*.
- 💧 The Compressed Gas (Called CNG) Can Also Be Used To Fuel Transportation Equipment.
- 💧 No Methane Gas From The Anaerobic Treatment Process Is Released To The Environment.

Carbon Dioxide Gas

- 💧 Is Purified, Liquefied, And Then Sold To The Marketplace As A Commodity.
- 💧 No Carbon Dioxide Gas From The Anaerobic Treatment Process Is Released To The Environment.
- 💧 Meets Food And Medical Grade Quality.

Solids Composition (From Digester)

- ◆ Ground Glass, Sand, Rubber, Leather, & Plastics.
- ◆ Highly Insoluble Sulfides Of Cadmium, Calcium, Copper, Iron, Lead, Manganese, Trivalent Chromium, And Zinc.
- ◆ Approximately 1-1-1 N-P-K (Nitrogen, Phosphorus, and Potassium).
- ◆ Qualifies As Class “A” Biosolids In Compliance With 40 CFR Part 503.
- ◆ Also Qualifies as an Organic Fertilizer.

Solids Management.

- 💧 May Be Sold To The Marketplace As An Organic Fertilizer At 30% Moisture Content.
- 💧 May Be Sold To The Marketplace As A Soil Conditioner or Soil Amendment At 30% Moisture Content.

Liquid Streams (From Digester)

- 💧 Liquid Fertilizer Concentrate.
- 💧 Reverse Osmosis Permeate Water.

Liquid Fertilizer Concentrate.

- 💧 Contains About 20-10-10 N-P-K In A Concentrated Water Solution.
- 💧 Can Also Contain Trace Amounts Of Aluminum, Magnesium, and Sodium Salts.
- 💧 Is Sold To The Marketplace.

Reverse Osmosis Permeate Water.

- 💧 Is Used As Boiler Water Make-Up In Making Steam For The Steam Turbines.
- 💧 Is Added To The MSW To Make A 5% Slurry.
- 💧 May Also Be Used For Aquifer Recharge To Repair Contaminated Groundwater.
- 💧 Excess Is Discharged Under An NPDES Permit.

Gas Management.

- 💧 No Digester Release Of Methane Gas To The Environment.
- 💧 No Digester Release Of Carbon Dioxide Gas To The Environment.
- 💧 Eliminating Digester Gas Releases To The Environment Accomplishes A 500%+ Reduction In Greenhouse Gas Emissions.
- 💧 At The Same Time Significant Carbon Dioxide Credits Are Generated, On The Order Of 85 Grams/kWh Generated.

Existing Landfill Site Itself

- 💧 May Be Simultaneously Mined In Its Entirety By Adding All Contents To The Digester.
- 💧 Depending On Size Of The Digester, Existing Landfill Site Could Completely Disappear In 5 To 10 Years And Thereafter Improved.
- 💧 One Such Improvement Could Be A Large Produce Greenhouse Farm Which Requires Organic Fertilizer, Liquid Fertilizer Concentrate, Carbon Dioxide Gas, Irrigation Water, And CNG For Climate Control.
- 💧 Our Love Of Landfills Is Therefore Temporary.

How Much Electricity Can Be Generated?

- 💧 The Answer Depends On The Amount Of MSW Processed.
- 💧 The Larger The Amount Processed, The More Electricity Is Generated.
- 💧 Whatever Is Generated Is **Green Power** Which Is In Significant Demand.

Your Landfill, USA

- 💧 If It Receives An Average Of 1,000 Tons Of MSW Each Day
- 💧 Which Contains 25% Moisture and 80% Organics which are 80% Volatile,
- 💧 One Can Install A 60 MW Green Power Combined Cycle Renewable Energy Generation Plant
- 💧 While Producing 100 Tons/Day Of CO₂
- 💧 200 Tons/Day Of Organic Fertilizer
- 💧 100 Tons/Day Of Liquid Fertilizer Concentrate
- 💧 16 Tons/Day Of Ferrous Metals
- 💧 1.2 Tons/Day Of Non-Ferrous Metals
- 💧 And 50,000 GPD Of RO Permeate Water

While Reducing Annual Greenhouse Emissions By

💧 825 Tons Of Sulfur Dioxide

💧 308 Tons Of Nitrogen Oxide, And

💧 183,500 Tons Of Carbon Dioxide

Benefits To The Landfill Operator

- 💧 Disposal Of Existing And Projected Refuse Increase Mandated By Population Growth and Economic Development Efforts.
- 💧 Freeze Tipping Costs At Existing Levels.
- 💧 Over Longer Term Reduce Content Of Existing Landfill.
- 💧 Meet Or Exceed Federal Air Quality Emission Regulations.
- 💧 Produce Revenue Stream Based On MSW Processed, i.e. Carbon Dioxide Credits Plus Shared Processing Fees.

Estimated Project Costs

- 💧 \$50 Million For Basic Power Plant
- 💧 \$60 Million To Eliminate The Existing Landfill In 10 Years

Construction Time

- 💧 3 Years Excluding Any Extensions Due To Permitting Requirements.
- 💧 Plants Are Installed On A Turn-Key, Bonded, And Insured Basis.
- 💧 MSW-To-Energy Technology Is Marketed As Build-Own-Operate.

For Project Feasibility Studies And Other Inquiries

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