

Waste-To-Energy

Made possible by the

OAT™

Optimized Anaerobic
Treatment Process

Treat Wastewater For **Profit**

- 💧 Does your business or community have a wastewater treatment facility?
- 💧 Would you like a positive return on investment from this operation?

If you said “yes” to either question, you’ve come to the right place today.

What makes OAT™ better?

It's the *only* process that combines:

- 💧 Two-phase Anaerobic Digestion
- 💧 Thermophilic Bacteria
- 💧 Staged Phase Treatment
- 💧 Fixed Growth Media
- 💧 Flow Recirculation
- 💧 pH and Temperature Control
- 💧 Essential Nutrient Addition

Bacteria Can Produce Fuel From Liquid & Solid Wastes.

- 💧 Solid waste landfills biologically generate methane gas (called *biogas*) as clear evidence of the ability of bacteria to produce fuel.
- 💧 Biogas is a mixture of carbon dioxide and methane gas. It has a heating value of about 25,000 kJ per cubic meter.
- 💧 Biogas can be used as a primary fuel or to generate electricity.

Wastewater Treatment Plants Use Bacteria

- 💧 Almost all wastewater treatment plants use bacteria to treat the water.
- 💧 Aerobic plants use aeration. They *consume* about 8,000 kJ per kg COD (Chemical Oxygen Demand) removed.
- 💧 WaterSmart's OAT™ anaerobic plant *generates* about 22,000 kJ/kg COD for an energy improvement of about 30,000 kJ/kg COD.

Wastes That Can Be Converted Into Biogas

- 💧 Municipal Wastewater
- 💧 Landfill Leachate
- 💧 Chemical Manufacturing
- 💧 Paper & Pulp Mills
- 💧 Sugar Mills
- 💧 Palm Oil Mills
- 💧 Breweries & Distilleries
- 💧 Fish & Food Processing
- 💧 Agricultural Solid Wastes
- 💧 Cardboard & Sawdust
- 💧 Ethanol Plants
- 💧 Rubber Plantations

...More Eligible Wastes

- 💧 Animal Feed Lot Wastes
- 💧 Dairy & Cheese Production
- 💧 Fruit & Vegetable Canning
- 💧 Pharmaceutical Wastes
- 💧 Rendering Plants
- 💧 Textile Manufacturing
- 💧 Municipal & Industrial Digester Sludge

A Renewable Energy Source

- 💧 These many wastes are generated each and every day in the normal course of living.
- 💧 The routine treatment or disposal of wastes is tremendously *expensive*.
- 💧 The OAT™ process, however, makes their treatment or disposal *profitable*, an extremely pleasant surprise.

Excess Biogas Produced

- 💧 The OAT process uses some of the biogas it generates to heat the wastewater being treated.
- 💧 The excess biogas can be sold, used to operate pumps, or generate electricity.
- 💧 The electricity can be used by the owner of the treatment plant, or perhaps sold to the local electric utility, or even to another business or city.

Positive Return On Investment

- 💧 When one generates a profit from the treatment of wastes, a *positive return on investment* (ROI) always results.
- 💧 Rather than a burden on society, wastes may now be viewed as an **asset**--an incredible reversal of common perception.
- 💧 Wastewater treatment plants of the patented OAT™ design can now pay for themselves!

Energy Costs

- 💧 Wastewater treatment is very expensive, particularly because of energy costs which increase at 3-5% every year.
- 💧 A typical biological wastewater treatment plant uses about 8,000 kJ per kg COD (Chemical Oxygen Demand) removed.
- 💧 WaterSmart's OAT process can produce up to 22,000 kJ/kg COD removed, for an *energy improvement* of about 30,000 kJ per kg COD.

Capital Equipment Costs

- 💧 Are also very expensive, on the order of US\$2K+ for every kg of COD treatment capacity.
- 💧 If ammonia, nitrate, phosphorus, or heavy metal removals are required, the associated costs are much higher.
- 💧 WaterSmart's OAT™ Anaerobic Treatment Plant costs about half as much as other anaerobic systems treating the same amount of COD or Volatile Solids.

Environmentally Sensible

- ◆ Korea's Sudokwon Landfill, the world's largest, has the motto: *"Don't Waste Wastes."*
- ◆ We share that view and believe wastes should be converted into something useful, like fuel or electricity, if it can be done so safely and economically.
- ◆ In so doing, waste volumes are greatly reduced to better manage the environment for ourselves and the next generation.

Odors?

Absolutely None!

- 💧 All treatment is carried out in closed vessels
- 💧 Hydrogen Sulfide is removed from produced biogas.

Environmental Damage? **Absolutely None!**

- 💧 No emissions to atmosphere
- 💧 Heavy metals removed as insoluble sulfides
- 💧 Organic constituents removed to innocuous levels
- 💧 Effluent contains nutrients which can be removed or beneficially used

Beneficial Byproducts

In addition to methane the OAT™ process generates other useful and potentially profitable by-products.

Carbon Dioxide, exhausted in a separate gaseous stream, has many industrial uses.

In addition the treated effluent itself has no pathogens or odor but does contain ammonia nitrogen (urea), phosphorus, and potassium which are the components of **liquid fertilizer!**

Greenhouse Gasses

OAT™ generated carbon dioxide can be scrubbed out in an alkaline scrubber or captured and sold.

A methane powered generator will, however, discharge small amounts of carbon dioxide when producing electricity.

If a fuel cell is used to make electricity, no additional carbon dioxide is made.

Noise...

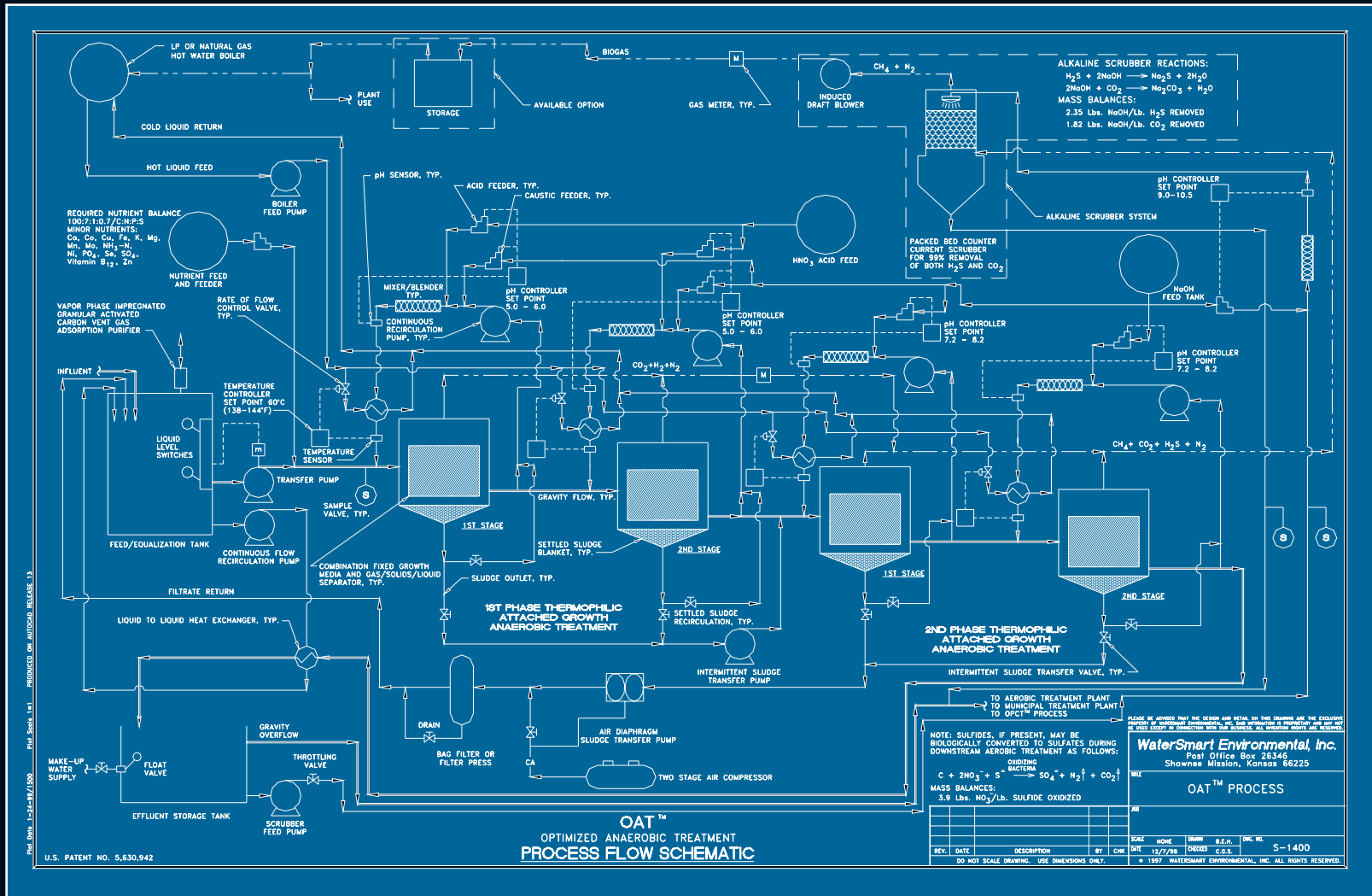
Practically none!

The loudest component is a biogas-powered generator-- similar to a truck engine.

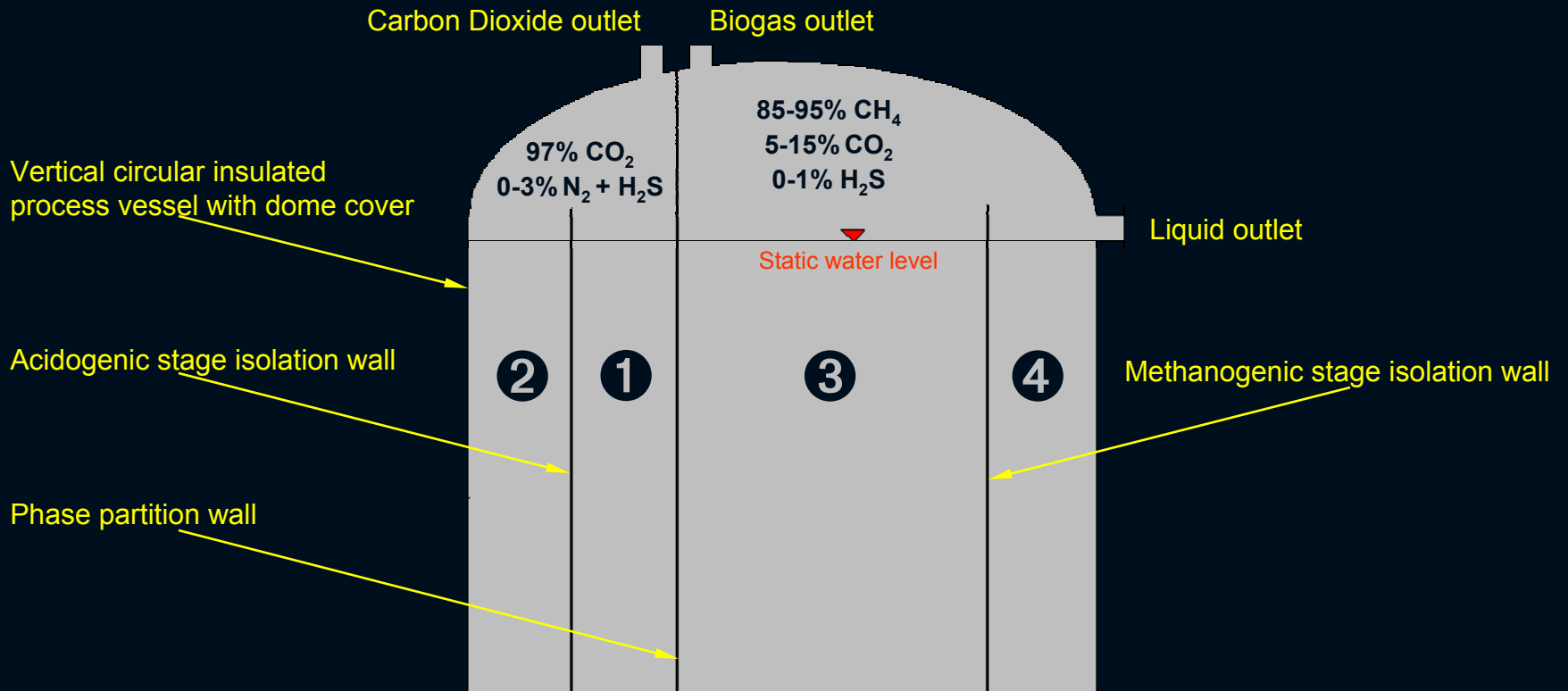
Sludge

0.01 pounds of solids produced for every pound of BOD removed--about 25% that of competitive anaerobic treatment plants! And OAT™ sludge qualifies as ***Class A Biosolids.***

The OAT™ Process



Single Vessel Design



① 1st stage acidogenic digester

② 2nd stage acidogenic digester

③ 1st stage methanogenic digester

④ 2nd stage methanogenic digester

Headworks

- 💧 Trash and grit removal.
- 💧 Grind or comminute the raw wastewater.
- 💧 No primary treatment required.
- 💧 Biosolids may be ground and added.
- 💧 Organic wastes may also be added.

Sophisticated Design But Easy To Operate

- 💧 Automatic controls simplify routine plant operations.
- 💧 Close process control translates into a high degree of treatment efficiency.
- 💧 Minimal plant operator skill required.

OAT Upgrades Available

- Existing anaerobic digesters may usually be upgraded to the OAT process thus saving project site construction and piping costs.
- A complete upgrade to the OAT process will increase the treatment capacity 10 times.
- Beneficial use or sale of the produced methane, electricity, Class A biosolids, and carbon dioxide makes the upgrade a positive ROI.

Summary

- 💧 Wastes can be beneficially converted into fuel or electricity.
- 💧 An efficient anaerobic treatment process results in a positive return on investment.
- 💧 The OAT™ process is the **most efficient** anaerobic treatment available worldwide.
- 💧 OAT™ plants are smaller, less expensive, do not smell, and generate a profit.

Additional Information

Handouts permit follow-up opportunity to learn more about using the OAT™ process for your waste-to-energy program.

Interested?