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# Pyrolysis and Gasification of Waste are Old Technologies

- ▶ Pyrolysis and Gasification are not new technologies, nor is there anything advanced about them. They are traditional combustion technologies that operate using fossil fuels to burn waste to create char, ash, and gases.
- ▶ Pyrolysis and Gasification are technologies that have been in use since the beginning of the Industrial Age.
- ▶ Pyrolysis has been used by ancient cultures to create charcoal.

# Walt Disney Built a Pyrolysis Facility at Disney World To Burn Waste



in gasses that were burned off.

**Disney's Failed Trash Plant: The Solid Waste Energy Conversion Plant**

# Disney's Troubles With His Pyrolysis Plant

- ▶ Well the construction ran into some delays pushing the opening of the plant back a year, but in September of 1982 the SWEC plant began operations. However as Disney and the DOE would learn, it would be more expensive than they initially planned. According to a later study, the plant's flaws were that it would ultimately require more gas than originally intended to run, ended up using twice as much electricity as they planned for, and had troubles maintaining specific temperature zones needed for the process to work smoothly.

# Disney Closed His Pyrolysis Plant

## Prototype refuse-to-energy plant closed at Disney World

Disney officials said sending the refuse to a landfill would be cheaper than using the recycling system.

ORLANDO (UPI) — Walt Disney World officials have been forced to close a prototype garbage recycling plant they hoped would save them one million gallons of oil annually because of high costs.

The Solid Waste Energy Conversion Plant, which cost the U.S. government some \$15.5 million in construction and operating costs, was expected to turn 100 tons of garbage into usable steam each day — and save Disney money.

But the plant was only recycling some 85 tons of garbage daily and one federal official said it cost as much as \$2,000 a day to operate. Disney would not confirm that figure.

Disney officials will re-evaluate the system, which was closed this month, and may reopen the plant, said Bob Kohl, director of Disney's Reedy Creek Utilities Co. Inc. However, there are no

definitions of what the plant is doing, and so with the plant being of no benefit to either party, it was shut down.

than landfilling. You have to make it cost-effective."

Federal officials, who originally hoped to use the process to dispose of nuclear wastes in Idaho, have abandoned it in favor of a cheaper system.

"We're going to try something a little less expensive," said Carl Gertz, the federal government's project manager. "We think it could probably work if we put more money into it. We don't see an economic need."

Disney broke ground on the plant July 17, 1980, and began testing it last September. Disney officials, who have a successful record of using innovative technology, had hoped 20 percent of the steam generated by the plant could be used at Disney World's theme parks.

If the plant had worked, federal officials were planning to build an identical one in Idaho Falls, Idaho, where problems had developed with a nuclear waste disposal plant.

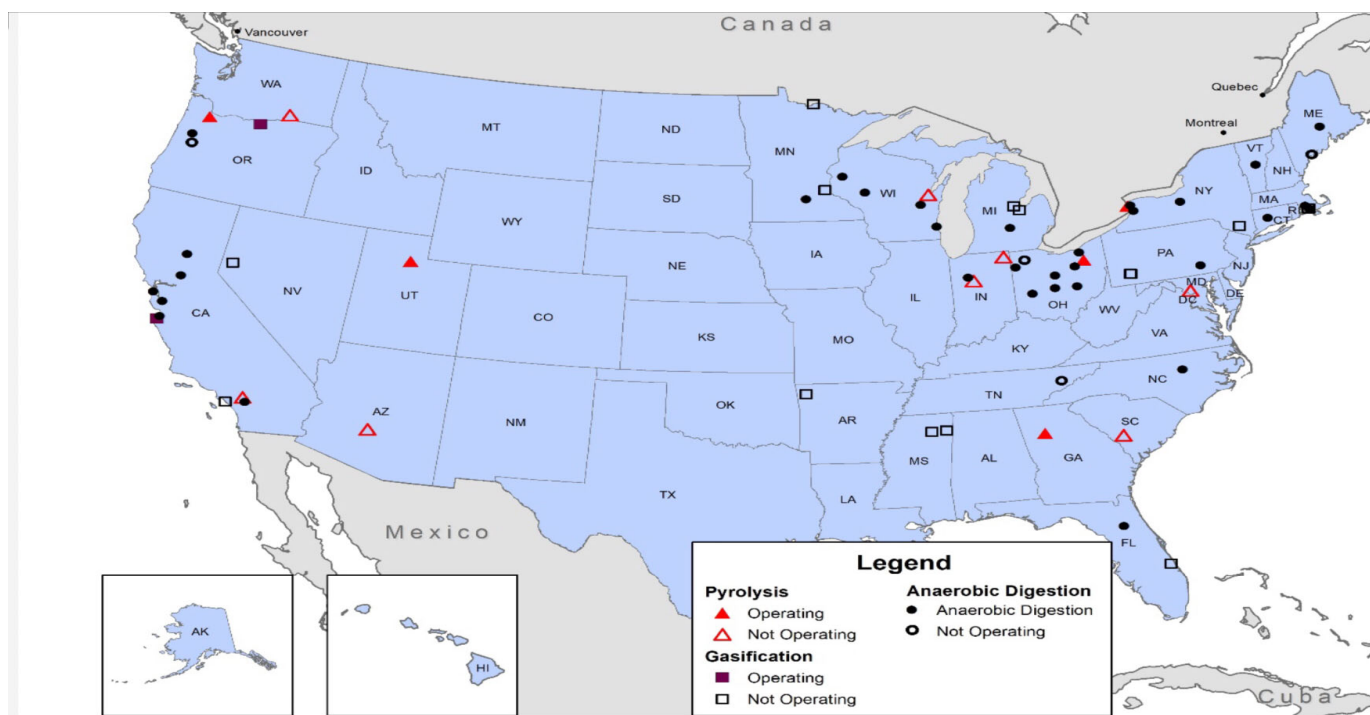
The energy conversion plant is one of about 40 so-called resource recovery systems in the country, said Don Walter, director of the U.S. Energy Department's division of Energy From Municipal Waste.

Only about 15 of them are operating, however, and the rest are being shut down. "Technically it works. It's just the economics that are the problem. We like the new technology that still requires some develop-

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Disney's Failed Trash Plant: The Solid Waste Energy Conversion Plant

## Turns Out Disney Was a Pyrolysis Pioneer: Dozens of Plants Have Been Built and Closed



**Figure ES- 1. Municipal solid waste conversion facilities.**

Since the 2012 EPA report, *State of Practice for Emerging Waste Conversion Technologies* (US EPA, 2012), AD has grown rapidly with more than 25 stand-alone facilities that accept multi-source food waste that process food and other organic fractions of MSW. Additionally, there are many more solely industrial

# Conversion/Transformation Technologies: 20 years of a checkered history

## ***Technology Landscape***

The following table provides an overview of conversion technologies and the potential portion of total US MSW generation that could potentially be managed with these technologies:

Technology	MSW Feedstocks Accepted by Operating Facilities	Portion of Total MSW	Residual Generation Requiring Disposal (by weight)	Number of Facilities Currently Operating in the US
Anaerobic Digestion	Food and yard waste	Approximately 28%	Approximately 5-10% <sup>a</sup>	25+ stand alone multi-source commercial facilities <sup>7</sup>
Gasification	MSW	Approximately 83% <sup>b</sup>	Greater than 10% <sup>c</sup>	2 operating facilities
Pyrolysis	Plastics	Approximately 13% <sup>b</sup>	Greater than 10%	4 operating facilities
WTE	MSW	100%	Approximately 15-25%	73 commercial facilities

WTE, waste-to-energy; MSW, municipal solid waste

<sup>a</sup>does not include digestate which typically is composted

<sup>b</sup>based on the usable fraction of the US average composition of MSW

<sup>c</sup>Gasification will have the same amount of ash potential as WTE but does not convert all the carbon; therefore, it will always have more solid residual than complete combustion as occurs in a WTE facility

# Public Subsidies of Pyrolysis/Gasification Technologies-4 Examples

- ▶ Macon, Georgia-Proposed Pyrolysis Technology relied on \$500 million in Economic Development Bonds
- ▶ Ashley, Indiana- Brightmark facility built with \$185 million in public bonds. It has yet to produce product and caught fire within months of ending construction.
- ▶ Reno, Nevada- Sierra Energy received \$10 million from the Department of Defense and the California Energy Commission.
- ▶ Disney World-the DOE spent \$15.5 million on this plant in 1980.



# Plastic Production is a Climate Bomb

- ▶ **As of 2020, the U.S. plastics industry is responsible for at least 232 million tons of CO<sub>2</sub>e gas emissions per year. This amount is equivalent to the average emissions from 116 average-sized (500-megawatt) coal-fired power plants.**
- ▶ The U.S. plastics industry's contribution to climate change is on track to exceed that of coal-fired power in this country by 2030. At least 42 plastics facilities have opened since 2019, are under construction, or are in the permitting process. If they become fully operational, these new plastics plants could release an additional 55 million tons of greenhouse gases—the equivalent of another 27 average-sized coal plants.



# Alternatives to Plastic Will Require Agricultural Inputs

- ▶ Natural fiber cloth
- ▶ Natural cloth can replace plastic bags. **Sustainable clothing** made from **organic cotton**, wool, **hemp**, or **bamboo** won't shed plastic fibers when washed. Felted or recycled wool is a versatile, safe, and compostable material for **children's toys**, household containers, and more.
- ▶ Bamboo
- ▶ This fast-growing renewable resource can replace plastic in items like **tableware** and **drinking straws**. It is lightweight, durable, and compostable.

# Agricultural Products Can Help Replace Plastics

- ▶ **Mushroom packaging.** A combination of agricultural waste and mycelium (mushroom) root, this home compostable product is “grown” on a hemp-flour mixture, and then dried to halt the growth process. It’s most commonly used to replace Styrofoam packaging.
- ▶ **Seaweed-based packaging** that comes in edible and biodegradable grades.
- ▶ **Pressed hay** is being used as egg cartons in Poland.

## Conclusion- Kansas Can Help Solve the Plastic Crisis

- ▶ The state of Kansas should be looking to be part of the sustainable long-term solutions to the plastic crisis.
- ▶ The state's natural endowment as an agricultural powerhouse and the clear need for hemp, bamboo and other agricultural products as replacements for many of the current uses of plastic is what the state should be considering supporting.

