



Landfills



Vortex Energy Group LLC
www.VortexEnergyGroup.com



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Landfills

Including Landfill Reclamation

When it comes to the disposal and elimination of waste products, there are only two methods... burn it or bury it. The method most used over the past several centuries is to take our waste, find a big hole, and bury it. With the advent of fire, incineration has become very prevalent, but has faced more scrutiny than landfilling over the past few decades. Not since the 1970's has there been any real change in technologies offered in terms of alternatives to landfilling. In fact, one of the largest landfills on the East Coast of the United States reached full capacity in 2013.

*In a joint study, the US EPA and the AQMD (Air Quality Management District) in California, agree to the fact that the overall harm produced by incineration is generally millions of times lower than the long-term harm caused by the original materials buried in the landfills. So, incineration was considered by the experts to be an environmentally safer method for waste disposal. With our patented technology and our unique solution, we can virtually eliminate, and to some degree, reverse the decades of harmful effects that landfills have had on our communities, our countryside, and our environment. That's **"GOING GREEN!"***

Reclamation

The other topic involving landfills is the reclamation of the land, and potential re-use of this precious resource. The current technology for landfill reclamation is to dig up the material, shred it, chemically neutralize it, and then re-bury it. In some cases, there is a clay "cap" or layer that is added to help contain future seepage, but that only prevents it from rising to the surface, not from leachates continuing to contaminate the ground water. The only things that can be used on that land are golf courses, parks, or playgrounds. Some have tried to build infrastructure on them, but they require constant methane gas monitoring and capture, to minimize the explosive hazard within the building.

Our technology can sit in a landfill, where they dig up the material, shred it, and we don't need to chemically neutralize it, and by combusting it, we will destroy 99.98% of the original combustible mass, all without putting any harmful emissions into the air.

Also with our solution, there is no restriction to only building golf courses and parks, but full construction of buildings and infrastructure is possible, because unlike current methods, there is new "clean," fresh fill brought in. With no contamination, there is no future issue with methane gas or other harmful gas emissions, and no problems from leachates, since all contaminated material is removed and replaced. We are truly stopping the continuous threat to our environment, and to public health.

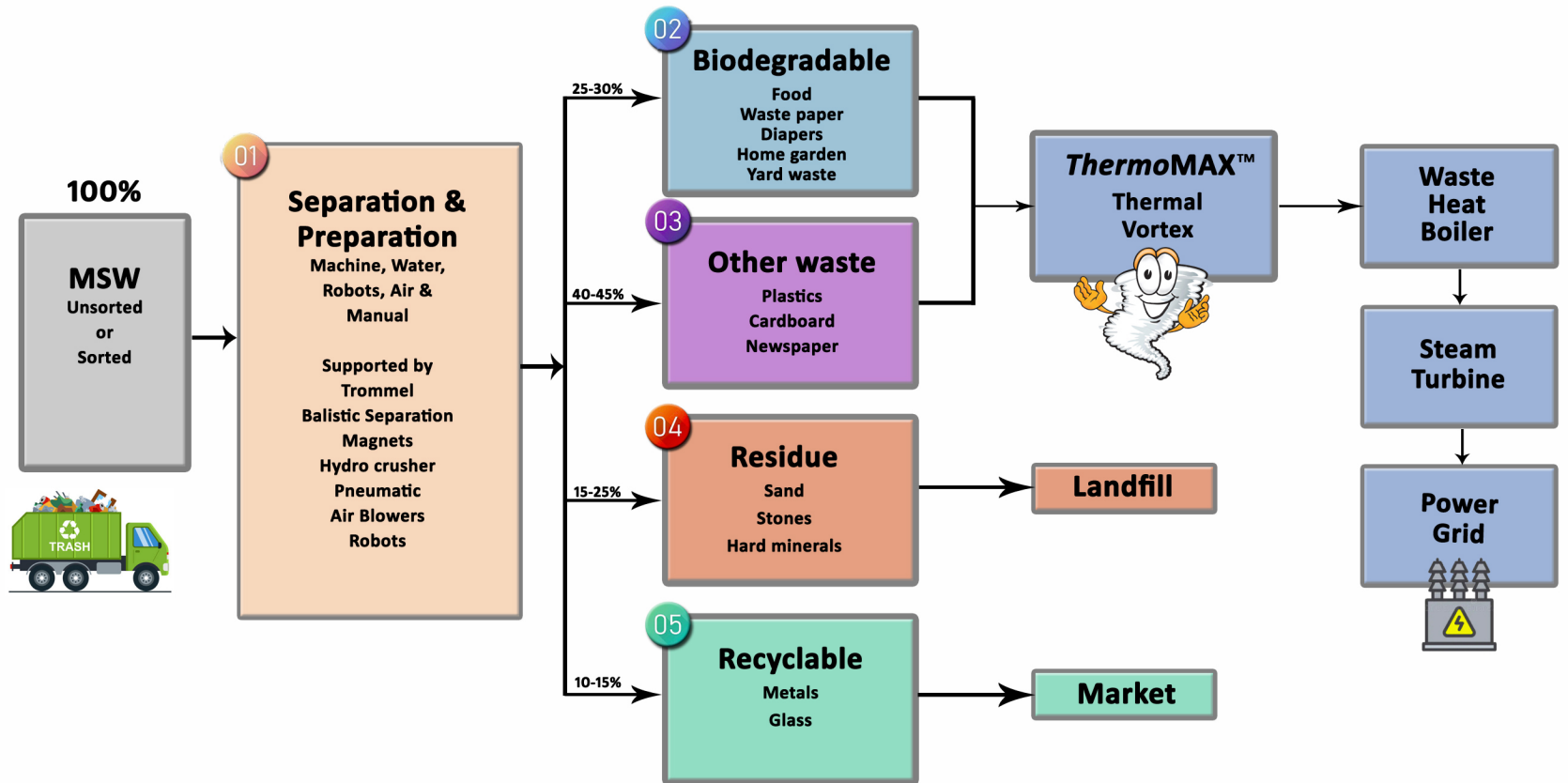
Our innovative system can make a real difference, offering a unique, environmentally safe, lower cost solution that is designed for implementation for small communities, landfills, and industrial complexes.

Innovative waste separation/sorting & processing



FRONT END

BACK END



- 01 The MSW delivered to the plant is being extensively sorted into four waste streams
- 02 25-30% of the MSW is biodegradable, which is shredded and pneumatically conveyed into the vortex unit
- 03 40-45% of the MSW is other waste materials, which is shredded and pneumatically conveyed into the vortex unit
- 04 15-25% of the MSW is residue or inert materials, which is delivered to a landfill as dry material
- 05 10-15% of the MSW is recyclable materials, which is separated and sold to the market

Land of Waste: American Landfills by State

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Land of Waste: American Landfills by State

Each American produces a whopping 1,700 pounds of waste every year, making the United States the world’s most wasteful country.

Approximately half of the country’s yearly waste will meet its fate in one of the more than 2,000 active landfills across the nation.

In this graphic by [Northstar Clean Technologies](#), we map and compare different states’ landfill waste per capita, using [data](#) from the U.S. Environmental Protection Agency.

States With Highest Tons of Waste Per Person

Upper Midwestern and eastern industrial states rank highly on the trash-per-capita list, with Michigan, Indiana, Pennsylvania, Illinois, and Ohio taking the top five spots.

The availability of cheap landfill space in Michigan attracts trucked-in garbage from out of state and even from Canada. That’s because, under the [Commerce Clause](#) of the U.S. Constitution, waste is considered a commodity, and states and counties cannot restrict its import or export from other states or even other countries.

The state also faces challenges with recycling. Michigan’s statewide recycling rate is around 18%, while the national recycling rate is 32%.

State	Tons of Waste in Landfills per Person
Michigan	66.5
Indiana	59.9
Pennsylvania	57.4
Illinois	54.8
Ohio	52.4
Wisconsin	51.8
California	50.4
Nevada	48.4

State	Tons of Waste in Landfills per Person
Colorado	47.0
Kentucky	46.8

Some states are accumulating new landfill waste faster than others. Indiana leads the nation with an annual “landfill waste acceptance rate” of 2.35 tons per year per resident.

States with Fewest Tons of Waste Per Person

More sparsely populated states such as Wyoming, Idaho, Maine, Vermont, and North and South Dakota, all rank among the states with the least landfill trash per resident.

Largely because it accepts considerably less trash by volume than most other states, Connecticut hosts the least buried trash per person, with only 8.7 tons per resident.

State	Tons of Waste in Landfills per Person
Connecticut	8.7
Massachusetts	16.3
Minnesota	18.0
Wyoming	18.0
North Dakota	21.4
Idaho	21.4
Maryland	21.5
South Dakota	22.1
Vermont	24.0
Maine	24.0

Food waste, plastics, and paper products make up more than half the garbage in U.S. landfills but other products like glass and metals, for example, can have a significant impact on the environment.

A Multi-Billion Dollar Opportunity

One of the major sources of waste is the construction industry. Every year, around 12 million tons of used [asphalt shingles](#) are dumped into landfills across North America. However, this material can be repurposed to create new materials like fiber, liquid asphalt, and construction aggregate, generating revenue while fighting climate change. In neighbor Canada, for example, recovering and reprocessing shingles is already a **\$1.3 billion** market. In this context, repurposing waste has not only become essential to minimizing waste, but also to creating new business opportunities going forward.

[Northstar Clean Technologies'](#) mission is to be the leader in the recovery and reprocessing of asphalt shingles in North America.

HOW TO FIGHT America's Landfill Crisis

The United States is the world's most wasteful country. Each American produces more than **1,700 pounds of waste a year**.

Americans produce **12%** of the world's trash despite accounting for just **4%** of the global population.

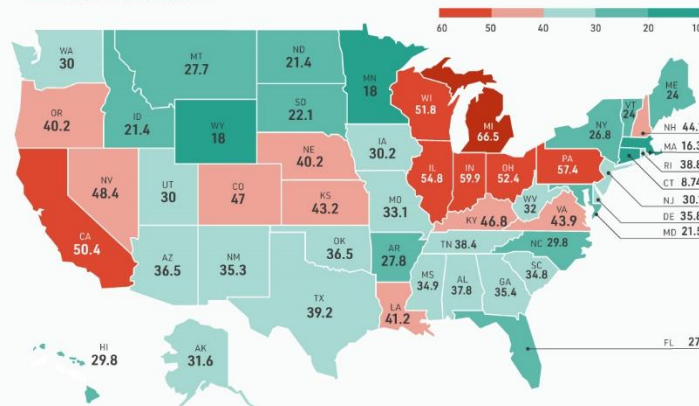
Source: Verisk Maplecroft, Environmental Protection Agency (EPA)



Approximately half of yearly waste will meet its fate in one of the more than **2,000 active landfills** across the country.

TONS OF WASTE IN LANDFILLS PER PERSON, BY STATE

Source: EPA, United States Census Bureau



One major source of waste is the construction industry.

These materials include aggregates such as concrete, asphalt, asphalt shingles, gypsum wallboard, wood, and metals.

Source: EPA, United States Department of Transportation



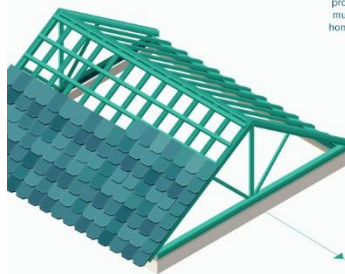
Total waste from construction-related projects is double the municipal waste from homes and businesses.



Over 20% of the United States waste stream is estimated to be construction and demolition waste.



Construction and demolition waste generation in the U.S. increased by 342% from 1990 to 2018.



While the United States is running short of landfill capacity, one perfect opportunity has been hiding in plain sight all along. Every year, **~12 million tons of used asphalt shingles are dumped into landfills** across the country.

There is a huge opportunity to repurpose this material, generate revenue for clean tech companies and help fight climate change.

Northstar Clean Technologies' mission is to be the leader in the recovery and reprocessing of asphalt shingles in North America.

The company's technology repurposes used asphalt shingles to create new materials.

Source: Northstar Clean Technologies



Liquid asphalt

Aggregate

Fiber



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Click here to learn more about repurposing discarded asphalt shingles.

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