

University of Business and Technology in Kosovo

UBT Knowledge Center

UBT International Conference

2020 UBT International Conference

Oct 31st, 5:15 PM - 6:00 PM

Pros and Cons for the Incineration of Solid Waste

Kostandin Kristo

University of Tirana, kostakosta63@yahoo.com

Follow this and additional works at: <https://knowledgecenter.ubt-uni.net/conference>



Part of the [Civil Engineering Commons](#)

Recommended Citation

Kristo, Kostandin, "Pros and Cons for the Incineration of Solid Waste" (2020). *UBT International Conference*. 261.

https://knowledgecenter.ubt-uni.net/conference/2020/all_events/261

This Event is brought to you for free and open access by the Publication and Journals at UBT Knowledge Center. It has been accepted for inclusion in UBT International Conference by an authorized administrator of UBT Knowledge Center. For more information, please contact knowledge.center@ubt-uni.net.

Pros and Cons for the Incineration of Solid Waste

ABSTRACT

According to the latest calculations , the world is currently producing about 1.3 billion tons of garbage every year .Putting that in perspective , if we took all the human beings on the planet and placed them on an impossibly gigantic scale ,their combined weight would only be one –quarter of that amount .

Dumping and burying everything in landfill is not a viable solution to our collective garbage disposal problems .

There simply isn't enough usable space , horizontally or vertically to safely deposit billions of tons of this heavily contaminated material on an annual basis .

Other solutions are needed and many people believe incineration facilities offer a cleaner , tidier and less land-consuming alternative .Even though they are not as common as landfills , municipal incineration plants have been around for a while , so there is nothing experimental or theoretical about this option .

But is incineration truly a legitimate or desirable alternative ?

That is a question with no definitive answer .

Keywords . Incinerator, landfill , dumping ,pros , cons.

Quick view for Pros and Cons of Waste Incineration .

PROS

1. Efficient use of space

2. [Elimination of groundwater contamination](#)
3. [Energy generation](#)
4. [Lower carbon footprint](#)
5. We can place waste incinerators almost anywhere.
6. Filters can help to trap many of the dangerous compounds that incinerators release.
7. It can be useful as a revenue generation tool.

CONS

1. The capital cost of building a waste incineration facility is quite high.
2. There is still the possibility of hazardous or toxic pollutants.
3. The use of incineration could create double disposal charges.
4. It would discourage the idea of recycling.
5. Incineration might encourage higher levels of waste production.
6. The effectiveness of incineration is rather minimal.
7. It tends to be an option that only works well in the developed world.
8. Incineration can release particles into the atmosphere.
9. There can be odor issues with incineration.

Process of solid waste incineration .

In the 21st century, incineration methodology has advanced far beyond its crude origins. In just the past few decades, large-scale municipal incinerators have become far more efficient in their capacity to reduce waste to manageable quantities, and to do so in a way that releases miniscule quantities of contaminants (toxic gases and/or particulate matter) into the air.

Modern incineration facilities can generate combustion temperatures of more than 850 degrees Celsius, which is the minimal level necessary for maximum efficiency in the destruction of potentially hazardous organic materials .

High-temperature, mass-scale incineration of solid waste produces ash, flue gases, and heat, and at the end of the burning cycle the total mass of solid waste left behind will be dramatically reduced.

Even at these higher temperatures, large-scale municipal incineration plants still produce poisonous byproducts, including dioxin (a cancer-causing agent) and heavy metals, which can be highly toxic even in minute traces.

However, scrubbing technology eliminates most of the contamination in flue gases before it is released, and only trace amounts of dioxin will exit smokestacks (most is removed or accumulates on the inside of the smokestack, where it can be removed later).

Large-scale modern solid waste incineration plants can process 250 tons or more of garbage per day, with emissions that are significantly less toxic than what incineration plants were producing a couple of decades ago.

Is incineration better than landfills?

In terms of their overall impact on the environment, and compared to landfills, incineration

plants have much to recommend them. Nevertheless, incineration still seems to be a classic example of a “second-best” solution: better than the worst, but a long way from the best we can do.

The four ‘Rs’—reusing, recycling, repurposing and reducing—offer a more effective answer to our ongoing garbage disposal dilemma. An ounce of prevention, as has often been said, is worth a pound of cure—and an ounce of incinerated trash is certainly easier to handle than a pound of raw garbage.

Recycling and waste reduction must be considered as our first line of defense to reduce our overall waste stream, and this also must include composting our organic waste instead of throwing it away. When we think about it, there truly is no “away,” as all waste must go somewhere. Many of the materials that are thrown away have the potential to be used to produce new items, and not reusing these materials is a large waste of resources.

Further reading: [Why Is Recycling Important?](#)

But there may still be good uses for incineration, even in a mostly “post-garbage” world.

There might be some things we can’t reuse or recycle no matter how hard we try, and incineration might be the most sensible choice when disposing of these products.

In locations where space is at a premium and the money is available to invest in state-of-the-art technology, municipal waste incineration plants are undoubtedly a superior alternative to landfills, and that may keep them relevant for a long time.

On the other hand, waste incineration in developing countries is not as practical neither economical as in developed countries, since a high proportion of waste in developing countries is composed of kitchen scraps. Such organic waste is composed of higher moisture content (40 to 70 percent) than waste in industrialized countries (20 to 40 percent), making it more difficult to burn. Ideally, this waste should be composted and used to enrich soil in

sustainable agriculture systems.

Waste not, want not: flexible solutions to our garbage dilemma

In the short-term, flexibility is essential method for effective waste management, as the situation in Sweden so aptly reveals.

In Sweden, only seven-tenths of one percent of the garbage they produce ends up in landfills (in the United States the percentage is 53 percent) [9].

Slightly more than half of the remainder is recycled (in the United States the percentage is 34.6 percent), and the rest is consumed by the 33 waste-to-energy incineration plants that supply heat and/or electric power to more than two million Swedish households [10].

In the Swedish example, garbage is actually viewed as an exploitable resource rather than a burden, and that attitude has led the country's citizens and political leaders to embrace both recycling and incineration.

Further reading: [Countries with the Most Sophisticated Waste Management](#)

The issue of waste incineration may not simply be a matter of “to incinerate” or “not to incinerate,” but perhaps we should instead be considering where it is appropriate to use incineration, where it is not appropriate to use, and how incineration technology can be a part of how we manage our waste disposal in the future. Even if it isn't the ultimate answer, large-scale incineration of waste could function as an intermediate step on our path to a more viable and sustainable future.

We also need to ensure that there are strict regulations concerning emissions from incinerators, and seek to implement the most effective technologies to eliminate as many of these pollutants as possible.

Our current reliance on landfills is highly unfortunate and leading us into a heaping, stinking mass of misfortune, and the sooner we can phase them out [the better off we will be](#).

The ideal scenario, of course, is to not produce any waste that endures, but to have an entire

system where materials are returned and utilized again in some way. That is what nature does, and that is what we also must learn to do.

16 Biggest Pros and Cons of the Incineration of Solid Waste

The number of landfills is growing rapidly as we seek more ways to control our habit of creating garbage. Proper management techniques can help many of the items we throw away to start decomposing, but there can also be a serious rodent problem in the places where we manage our refuse.

When we look toward the future of trash management, it is clear to see that continuing the landfill habit is not a viable choice. That's why evaluating these incineration pros and cons leads communities to a new solution that they might not have considered otherwise.

List of the Pros of Incineration

1. Incineration allows us to be more effective with how we use space.

If we were to start incinerating all of the trash that we produce each year, then we could reduce the total mass by up to 85% each year. The overall volume of what we create would also shrink by up to 95%. That's why smaller countries (as Albania) are looking at this option if they have not implemented it already. By providing a way to eliminate the bulk of what requires processing, it is possible to take care of current refuse needs while reducing the amount that is in storage having already been processed as well. After the incineration process is complete, the total mass of the remaining garbage can be reduced by up to 85 percent, while its volume may shrink by as much as 95 percent . In small countries, or in municipalities where landfills are full and additional space is scarce, this type of mass and volume reduction can be a godsend.

2. It reduces the issue of groundwater contamination around a landfill.

When you have precipitation fall on exposed garbage, then it creates a liquid that we call leachate. It is something that looks a lot like pea soup, and this thick slurry forms every time a landfill has rain or snow interact with it. This runoff needs to go somewhere, which

means there is a risk to the local water supply is there is a significant amount of moisture falling from the sky. Flash floods and severe storms could present severe problems to the local environment as well. Leachate is thick pea-soup-like slurry of liquid garbage, which is formed every time precipitation falls on landfill.

It is this contaminated mixture that can penetrate underground aquifers and pollute them with unsafe quantities of salts, heavy metals and volatile organic compounds, plus other toxic or corrosive chemicals or substances found in household trash.

When we use incineration for waste management instead of landfills, then we can reduce the risks of leachate almost entirely.

3. This waste management option gives us a power-generation opportunity.

There are more than 2,000 waste-to-energy power plants operating around our planet today. These facilities burn garbage at high temperatures to boil water so that steam generators can produce electricity. It operates in a similar way to coal-fired or biomass facilities. The average incineration plant can burn as much as 3 million tons of garbage each year while giving us the power that we need for our homes and businesses. It gives us a way to reduce our dependence on fossil fuels while taking some pressure off our landfills at the same time. As of 2016, there were approximately 2,200 waste-to-energy power plants in operation around the planet [6]. These facilities burn garbage at a high temperature

to boil water and power steam generators, which then [produces electricity](#) that can be distributed on the power grid.

On average, one such facility can burn up to 300 million tons of garbage per year, converting it into power that reduces the load on coal-fired power plants, which of course are a disaster for the environment .

4. It creates a lower carbon footprint for communities that use this technology.

When we burn any organic material, then the carbon in that item will release into the atmosphere. Having too much of it go up there can cause issues with global warming, and it could even be one of the reasons why we are seeing record temperatures on our planet today. When we incinerate trash, then we're going to emit a significant quantity of CO2 as we create electricity. Every ton of garbage that we eliminate using this method places the same amount of carbon dioxide into the air we breathe.

When we compare the carbon dioxide release to what landfills generate, the benefit is clear. We create a lot of methane with the traditional storage methods, a greenhouse gas that is up to 20 times more powerful than CO2. If we allow the organic matter in our landfills to break down on their current schedule, then the impact of the gases could accelerate the warming trend by up to 30%. The bad news is that when organic matter (the combustible part of garbage) is burned,

it still emits significant quantities of carbon dioxide, the most common greenhouse gas produced by human activity.

For each ton of garbage incinerated another ton of carbon dioxide is released into the atmosphere.

But this is still an improvement over landfills. When organic matter biodegrades in landfills it gives off methane, a greenhouse gas that traps heat in the Earth's atmosphere far more efficiently than carbon dioxide.

Calculations show that letting organic matter break down in landfills will contribute about 30 percent more to global warming than burning the equivalent matter in an incinerator—which is far from zero emissions, but still a step in the right direction .

Additional advantage is that waste incineration plants can be located near where waste is generated, which decreases the costs, energy and emissions associated with transporting waste.

5. We can place waste incinerators almost anywhere.

It is possible to place a waste incineration facility near where the trash generates, which

gives a community several ways to reduce the costs of refuse management. A closer

facility will reduce transportation costs, the impact of energy expenditures to create

electricity, and naturally cap the emissions that come from these activities all at the

same time.

6. Filters can help to trap many of the dangerous compounds that incinerators release.

The primary concern that most communities have with the incineration of solid waste is that it can release dioxin. Because they are usually the byproducts of industrial processes, their toxicity level depends on the number and positioning of the chlorine atoms. What we have also discovered is that effective filtration can make the potential for toxins become almost negligible. We can capture carbon from coal-fired power plants, which means we can do the same for this technology as well. Most of the pollutants can be collected and disposed of correctly so that the incineration plant falls into the recommended limits published by the Environmental Protection Agency.

7. It can be useful as a revenue generation tool.

It was announced in October 2018 that the Treasury in the UK was considering the imposition of a tax on waste incineration. London burns over 50% of the trash it produces each year compared to the 30% that enters a recycling program. For the rest

of the nation, 39% went to incinerators while 44% went into recycling. By creating small taxes on the power that gets generated from this process, it is an effective way to generate more revenue for the community to use for social needs.

List of the Cons of Incineration

1. The capital cost of building a waste incineration facility is quite high.

Incineration facilities must go through a series of site studies, permit evaluations, and construction efforts to create something usable. There might be infrastructure modifications that are necessary to facilitate a project like this as well since road access, water, and power are needed for a successful experience. There are labor and material expenses to think about too.

Although this technology will help most communities, states, or countries save money because it reduces the need for a landfill and reduces the environmental impact of the garbage, the costs

might be too high for some to handle. Incineration facilities accrue significant costs for site studies, permits, construction materials,

labor, and local infrastructure modification (providing water, power, road access, etc.).

In the long run, they may save cities, counties or societies money by reducing the need for landfills and by helping reduce the environmental impact of garbage disposal.

But that is small consolation for local or state governments with tight budgets, or for the taxpayers who that are expected to foot the bill for all new waste incinerator facilities costs.

2. There is still the possibility of hazardous or toxic pollutants.

Modern incineration plants have corrected the emissions problems that the previous generation

of facilities encountered when disposing of garbage. The levels of heavy metals and toxic items

like dioxin have been cut to a minimum, a positive when comparing them to the older facilities. It

is essential to remember that these items still occur when creating power with this method, so

there must be frequent testing for arsenic, mercury, and other problematic materials.

The fears that people have of toxic pollution are what will usually derail an incineration project

before the work is complete. You will also create significant levels of carbon dioxide, so each

community must weigh the benefits of disposal using this method with the potential

environmental consequences that could occur. Modern incineration plants have cut their

emissions of heavy metals and toxic poisons like

dioxin to a minimum, in comparison to older incineration facilities that were lax in this area.

But emissions still do occur, and substances like dioxin, mercury and arsenic are not completely safe for humans or animals at any level.

Fear of toxic pollution is one of the main reasons incineration projects tend to stall. Those who decry the influence of NIMBY—motivated opposition to municipal incineration plants overlook the fact that people’s concern about air quality are at least somewhat justified.

And even when using the best technologies, incineration plants remain prodigious emitters of carbon dioxide, the gas that is most responsible for [anthropogenic climate change](#).

3. The use of incineration could create double disposal charges.

We might be running out of space in our landfills, but it is also essential to remember that communities have already paid to process this garbage. When an incinerator becomes the top priority, then the only way to cut into the waste in the area is to process the refuse again. That means you’re paying twice to process the same garbage, which is the reason why some consumer prices can be high when using the energy created by this technology. Perhaps the most important objection to incineration of solid waste arises from the concept of opportunity costs—that is, the idea that the actions we take automatically preclude other actions, which might be more effective if we gave them the chance.

Some critics of incineration claim that incineration ultimately encourages more waste production because incinerators require large volumes of waste to keep the fires burning, and local authorities may opt for incineration over recycling and waste reduction programs.

According to advocates of the [“zero waste”](#) philosophy, incineration promoters are missing the forest through the trees—or perhaps more accurately, burning down the trees in a futile attempt to save the forest.

If we exploited every available opportunity to [recycle the plastic](#), metal, glass, rubber and other non-organic waste that gets discarded, and if we [composted as much of our excess](#) organic matters as we conceivably could, zero waste supporters say we could cut our garbage production by as much as 80 percent [8].

Through [reuse and repurposing](#), and detailed planning to reduce our creation of waste from the get-go, we could get rid of most of the rest, they argue—and for the most part they do so persuasively.

From a cost-efficiency standpoint, embracing the zero-waste philosophy would make a tremendous amount of sense, whether we could reach its most ambitious goals or not. It would change our collective mindset from reactionary to proactive, altering the fundamental practices and assumptions of our throw-away society—which incineration does not do.

4. It would discourage the idea of recycling.

If each community were to effectively recycle all of their metal, glass, rubber, and plastic waste, then we could cut the amount of garbage production we experience each year by as much as 80%. That means we could limit the pressure on our landfills naturally by being more eco-conscious about our daily activities.

There are numerous ways that we can take trash out of our waste processing cycles. Through

the practices of reuse and repurposing, it is entirely possible to create a society where zero waste becomes a possibility.

5. Incineration might encourage higher levels of waste production.

Incineration plants create power to manage steam turbines by burning the waste at high

temperatures. It requires a large volume of trash to keep those fires hot, which means come

communities might look at the idea of burning all of their refuse as a way to continue creating electricity. Some local authorities with this technology under their supervision have opted for

using incineration over waste reduction programs and recycling because of the desire to

maintain the availability of revenues.

6. The effectiveness of incineration is rather minimal.

When you compare incineration to landfill management, then the benefits of this idea tend to

shine. Reducing the volume of waste takes pressure off of the area so that it is easier to

manage the trash that comes through the system.

Landfills are also the only waste management effort that is worse than incineration for the environment. Communities often find that reducing, reusing, repurposing, and recycling efforts are far more effective at reducing costs. When you invest in more prevention and wisdom, then

the amount that can be saved is often greater than the revenues that an incineration plan generates by burning garbage for electricity.

7 It tends to be an option that only works well in the developed world.

Waste incineration can work well in the United States, Canada, and the countries of western Europe because of the industrialized nature of those societies. The refuse that comes from nations that are not as economically advanced see a high proportion of trash in the form of kitchen scraps. The moisture content in these items can be up to 70% higher than what you find in other forms of waste, making it much more of a challenge to burn it effectively. Those items should be composted to enrich the soil instead.

8. Incineration can release particles into the atmosphere.

Have you ever seen wood particulates release into the atmosphere when a campfire burns? When we incinerate trash, the highest temperatures possible are used because that approach reduces, but does not entirely eliminate, the threat of particulates that enter the atmosphere. This issue is one of the reasons why asthma and other breathing

issues can be more prevalent if there are homes in close proximity to a facility. If the toxins are not appropriately managed, then there could be severe health issues to consider.

Fly ash is the primary issue that impacts the environment from incineration. Even though there are air pollution control standards in place that require its capture, it may contain elements that are often classified as hazardous waste.

9. There can be odor issues with incineration.

Incineration facilities do an excellent job of removing odor issues from the surrounding community, but they do not eliminate smells entirely. When the wind is blowing in from the facility, then the smell of garbage can be overwhelming to some people. Landfills create a similar issue, but they also tend to be located further away from population centers whenever possible. This disadvantage can also create problems with property values, especially if the facility gets located in a neighborhood once the residential nature of the area is established.

Is Incineration a Viable Option to Consider?

Flexibility is essential for effective waste management techniques. Sweden proves this point well because only 0.7% of the garbage that the country produces will end up in a landfill. That figure is 53% in the United States.

Almost half of the waste that Sweden generates goes into recycling programs. The rest is consumed by over 30 waste-to-energy incineration plants that produce enough heat and electricity to meet the demands of over two million households. That means the country's perspective is that garbage is an exploitable resource instead of it being a burden.

That's why we must evaluate the pros and cons of incineration carefully. It could be a way for us to create a sustainable future while taking pressure off of our landfills. This option could also create a new set of problems that we have yet to anticipate with the emissions that this technology generates.

References

1. Sener S., Sener E., Nas B., J. Eng. Sci. and Design.1 (2011) 134 - 144.
2. Allen B.G., Caetano P., Costa C., Cummins, V., Donnelly J., Koukoulas S., O'Donnell V., Robalo C., Vendas, D., Intern. J. of Manag. and Landf. Sympa. (2003).
3. Gjoka K. Final processing and systematization of urban solid waste
4. Saaty T.L., J. Oper. Res. and Eco.2 (1993) 119–137.
5. Gemitzi A., Tsihrintzis V. A., Voudrias E., Petalas C., Stravodimos G. J. of Environ. Geo. 51 (2007) 797-811.
6. Kiker G. A., Bridges T. S., Varghese A., Seager T. P., Linkov, I., Integr. Environ. Assess. And Manag. 1 (2005) 95-108.

