

FACT SHEET: Biomass Incineration

Biomass Basics

Bioenergy is an umbrella term for "biomass" (incinerating for electricity production) and "biofuels" (converting to liquids for burning as transportation or heating fuels). The biomass term has meant burning of: municipal solid waste (trash), tires¹, construction/demolition wood waste, crop and animal wastes, energy crops, trees, gas from digestion of sewage sludge or animal wastes, and landfill gas.² Biomass can include any non-fossil fuel that is arguably "organic."

"Green" biomass (like energy crops) is often a foot in the door for more toxic waste streams. Plants that start off burning "clean wood chips" can easily turn to burning more contaminated fuels (which may be cheaper or even free), or get paid to take really dirty wastes like trash or tires. Economic pressures encourage use of these dirtier fuels.³

"Alternative" vs. "Renewable" vs. "Clean & Green"

All of the above terms are often used interchangeably, but can mean different things. Just the term "renewable" can mean different things in various state or federal energy bills, laws and programs. Non-profit groups and private energy certification programs all have their own definitions as well. While these terms generally mean "not fossil fuels and not nuclear," even coal technologies have been included in state and federal "alternative" and "renewable" energy policies.⁴ Almost universally, many sorts of incineration schemes have been included in the various renewable energy laws, usually in the guise of "biomass" and landfill gas. "Clean" and "green" are rarely, if ever, defined and are terms of general environmental benefit with no generally accepted meaning.⁵

Renewability does not usually mean clean or green. It's only used to describe whether an energy source is replenishable and replenished on some reasonably short time scale.⁶ Renewables aren't necessarily cleaner than other fuels. Since biomass incinerators are considered renewable, they are given an advantage over cleaner (but still quite polluting) fossil fuels like natural gas.⁷ Since all of these words have been abused to include polluting smokestack industries, no combination of these words can be counted on to convey only zero-emission technologies like wind and solar.

Renewable energy policies support incineration. There are five main advantages available to technologies that are labeled "renewable": tax credits, subsidies, research grants, renewable portfolio standards, and green pricing programs.

Biomass competes with wind, solar, hydroelectric and geothermal for the renewables market. Wind is becoming one of the cheapest energy sources altogether and is about 10 times cheaper than solar. Biomass (especially landfill gas) is the cheapest except for where there are good wind sites. We are likely to see many more biomass burners because they can be built in many more places than good wind sites can be found. Since there is already a market for incinerators (based on the economics of the waste industry), biomass competes most directly with wind, the cleanest and most promising power source. Eliminating biomass from renewables definitions means wind would get better funding.

Biomass = Combustion = Pollution

All biomass combustion technologies put pollution in the air in order to make "green energy." Even with the best air pollution controls, a single plant can still release millions of pounds of regulated pollutants each year.⁸ Environmental regulations are surprisingly weak and air pollution permits fail to require that any toxic emissions be monitored on a continuous basis.⁹ Air pollution controls only effectively transfer toxins from the air to the ash, which will eventually pollute soil and water where it is dumped. Most of the biomass wastes/fuels contain chlorine, creating dioxins¹⁰ (the most toxic chemicals known to science) when burned.

Anything that creates pollution in the course of producing electricity shouldn't be considered clean, green or renewable. Wind and solar, even though they have some environmental impacts in their construction don't have to keep polluting in order to make electricity. Even though environmentalists tend to think of "biomass" as grass and trees, the vast majority of what is actually proposed by industry (and of what is already benefiting from pro-biomass renewable policies) is trash incineration, construction & demolition wood waste incineration and landfill gas burning.

Waste Incineration

Waste incineration is the worst category of biomass. Providing increased waste disposal capacity worsens the waste problem by lowering the costs associated with waste generation. It also destroys resources (some of which are best recycled or composted), and turns them into toxic ash and toxic air emissions. Wastes that cannot be reused, recycled or composted cleanly ought to be stabilized through digestion, then landfilled rather than incinerated.

What makes waste dangerous is not its volume, but its toxicity. People don't usually die from waste falling on them, but exposure to toxic constituents of wastes can cause all sorts of health and environmental problems. When wastes are incinerated, their toxic constituents are liberated into breathable air emissions and the toxic ash contaminates groundwater. The ash that is left then has a higher surface area and is more dangerous in a landfill, where rainwater will leach out the toxins more readily than if the waste is left unburned. Incinerator ash has been promoted for such applications as ingredients in cement, fill for reclaiming mines, fertilizer, biochar¹¹ (charcoal), industrial tile and road base. These are more dangerous than landfilling, bringing contamination closer to where they can harm people.

Incineration has become a dirty word since activists have stopped hundreds of incinerators since the 1980s. Newer types (gasification, plasma arc and pyrolysis) claim not to be incinerators, but share the same fundamental problems.¹²

The Fuels

Trash incineration comprises 28% of existing "biopower" capacity in the U.S. In the extended Mid-Atlantic area (Virginia to New York), trash incineration makes up 66% of such capacity.¹³ Waste and energy corporations have a lot to lose if trash incineration is not considered renewable.

Tires contain many toxic constituents, which make burning them hazardous. Halogens in tires cause hazardous emissions when burned such as dioxins, furans, PCBs, and chlorobenzenes. Toxic metals such as mercury, lead, arsenic and chromium are also released when burning tires.¹⁴ Many other hazardous air pollutants are released from burning tires with studies having shown tire burning to be dirtier than coal.¹⁵ While not widely promoted as biomass, tire burning has been considered in some federal biomass research programs¹⁶ and corporations have promoted tire incinerators as renewable energy facilities – seeking to benefit from state renewable energy mandates.¹⁷

Wood waste is a very broad category. It includes – but is not limited to – wood pallets, construction / demolition wood waste, land clearing and right-of-way tree trimmings, Christmas trees, tree and shrub trimmings, paper and lumber mill waste, and wood products industry wastes. It can even include trees that have been used to suck up toxic chemicals from contaminated soil in “phytoremediation” projects.¹⁸ Wood waste can come contaminated with wood preservatives, binders, paints, glues, chlorine bleach, plastic laminating materials, chlorinated adhesives, or phenol and urea formaldehyde resins, nails/staples, or other non-wood materials. Treated woods are usually coated with creosote, pentachlorophenol, or copper chromium arsenate (CCA).¹⁹ It is difficult to sort out treated wood (which can be up to 50% of wood waste) – even trained workers miss 30% of it.²⁰ Burning CCA-treated wood will release cancer-causing arsenic and chromium VI. Although arsenic is no longer used in new wood treatment,²¹ this will be a problem for decades to come. Most CCA wood is still in use and its presence in the waste stream is increasing.²² Since copper is a catalyst in dioxin formation,²³ a small bit of CCA wood will greatly increase dioxin emissions from wood burners.

Some wood burners that are permitted to be taking “clean” wood wastes have been allowed to accept a certain percentage of chlorinated wastes, since some wood waste suppliers are unable to completely isolate all vinyl-coated material.²⁴ In construction/demolition wastes, there is likelihood of PVC (polyvinylchloride²⁵) contamination from many sources common in building materials.²⁶ Wood burners also emit formaldehyde, acrolein, phenols, benzene, naphthalene (present in creosote), and PAHs, not to mention NOx, SOx, VOCs, and particulate matter. Wood storage piles present fire risks, and outdoor piles risk wetness from rain, which leads to higher emissions when burned.

Waste wood that is truly clean ought to be reused or made into paper, but not burned. Industrial wood burners, even if they start off burning a relatively “clean” supply of wood wastes, often end up seeking to burn more hazardous types of waste. In some cases, wood waste facilities have sought to burn wood tar waste.²⁷ In other cases, state agencies have allowed industrial wood burners to dispose of their oily water by spraying it on their wood fuel.²⁸ Some states actively encourage industrial wood burners to burn waste tires.^{29,30} It has been argued by some corporations that they need to co-fire tires in order to become “leaner and meaner” in the deregulated electric market.³¹ Many industrial wood burners are already permitted to burn tires, plastics, treated

wood waste, black liquor solids (toxic, chlorinated paper mill wastes) and/or other paper mill sludges.

Agriculture wastes include, but are not limited to, orchard tree crops, vineyard, grain, legumes, sugar, and other crop byproducts or residues as well as nuts, shells, hulls, and other food processing wastes. Crop wastes should be tilled back into the soil to promote soil health, tilth, fertility, and nurturing of the organisms remaining within the soil. Where this is impractical, crop residues ought to be composted or recycled into paper products, not destroyed in incinerators.

While **animal factory wastes** could include corporate hog factory wastes, dairy factory wastes, beef feedlot wastes, and more, these are usually too wet to be burned (though are used in digesters to provide “biomass” power).³² However, poultry litter (chicken and turkey manure and the wood chip bedding it falls on) is dry enough to be incinerated for electricity production. Britain’s Fibrowatt has proposed many throughout the U.S. and Europe.³³ They have successfully lobbied state and federal politicians to get poultry waste incineration included in renewable energy laws.³⁴ Due to weaker pollution control requirements on biomass incinerators, new poultry waste incinerators are more polluting than new coal plants for some of the major criteria air pollutants.³⁵ Community groups in several U.S. states and in other countries have organized to stop poultry waste incinerators, sometimes joined by farmer advocacy groups, since farmers see poultry litter as valuable fertilizer.

Energy crops are typically fast growing trees (like poplar or willow) or grasses like switchgrass. These are prime targets for genetic engineering. Biotech grass seed has been found to contaminate native grass as far as 13 miles away.³⁶ Switchgrass has been found to have 7 times as much chlorine as coal.³⁷ Chlorine in wheat straw has been found to have so much chlorine as to be corrosive to boilers.³⁸ There are no organic requirements for these crops. Toxic herbicides and wastes used as fertilizers have introduced contaminants to switchgrass crops,³⁹ that can be taken up by the crops. In phytoremediation schemes, plants suck up toxins from contaminated sites.⁴⁰ Contaminants are released when these trees and grasses are later burned.

Gas-based biomass includes digester gas and landfill gas. Digesters essentially compost waste in a vessel, producing a gas that is mostly methane. This can make sense for sewage sludge and animal wastes, but renewable energy policies shouldn’t subsidize waste management for animal factories.⁴¹ Landfill gas burning for energy is toxic and actually worse for global warming than not burning for energy. See our landfill gas factsheet for details.⁴²

Sustainable Ag and Zero Waste Solutions

Sustainable agriculture is an energy and climate solution, but not by growing and burning things. Biomass incineration is not a waste or energy solution, though, as it is the most polluting and energy-wasting way to manage materials.⁴³ “Zero waste” strategies (including reduce, reuse, recycle...) can nearly eliminate the need for landfills and incinerators, benefiting the climate and saving energy and materials.⁴⁴

References available in the web version.