Woody Biomass Incineration

Biomass: Expensive and Unnecessary

Burning woody "biomass" may technically be renewable, if trees are replanted, but it is not clean or needed. Forests are impacted by logging to feed biomass incinerators, even now clearing U.S. forests to feed power plants in Europe.

Through conservation, efficiency, wind, solar and energy storage, we can meet all of our energy needs without needing nuclear power, or the burning of biomass, waste or fossil fuels.[1,2] Biomass is one of the most expensive ways to make electricity, second only to trash incineration.[3] Renewable energy mandates and subsidies undermine clean energy (wind and solar) whenever they support biomass.

"Renewable" Doesn't Mean Clean

Burning biomass emits particulate matter (PM), nitrogen oxides (NO_X), carbon monoxide (CO), carbon dioxide (CO_2), sulfur oxides (SO_X), toxic heavy metals (such as arsenic, mercury, lead, cadmium and chromium), acid gases, dioxins and furans, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), other hazardous air pollutants (HAPs), and even radioactive pollutants.

A typical 50 megawatt biomass incinerator permitted between 2008 and 2012 has expected annual emissions of 230 tons of nitrogen oxides, 248 tons of carbon monoxide, 85 tons of particulate matter, 40 tons of volatile organic compounds, and 25 tons of hazardous air pollutants.[4] Emissions of toxic metals and dioxins can be even higher if more contaminated types of biomass are burned, such as painted or treated construction / demolition wood waste. EPA recognizes that even the best-performing biomass plants emit as much or more air pollution as coal plants.[5]

Dirtier Than Coal

By most of these measures (with notable exceptions on sulfur and mercury), burning biomass is as polluting or worse than burning coal, and far worse than natural gas. For some pollutants, this is because biomass is actually more contaminated than coal. In other cases, burning one ton of biomass may release less of a pollutant than burning one ton of coal, but since five tons of wood must be burned to create the same energy as one ton of coal, biomass can be more polluting per amount of energy produced. Air regulations on biomass facilities are also weaker, so even where burning five tons of trees would produce less pollution than one ton of coal, the air pollution from the tree burner may be greater because it is not required to capture as much of its pollution as the coal power plant must.

The latest EPA data shows that biomass emits 16% more NOx as bituminous coal, 50-60% more CO_2,[6] and similar levels of particulate matter – but biomass is worse for small particulate matter (PM10) and far worse for the finest and most dangerous particulate matter (PM2.5).[7] Dioxins (the most toxic chemicals known to science) are released at rates 7 times higher than coal, and 167 times higher if burning salt-laden wood, like marine pilings.[8] A comparison of air permit limits shows that biomass burners are being permitted to allow 50% more NOx, 500% more VOCs, 90% more PM and 25% more CO than coal power plants per unit of energy.[9]

The "Carbon-Neutral" Myth

Biomass burning releases 50% more CO_2 than coal, creating a carbon debt that is not overcome for decades. It takes 45 years of trees grown to replace those burned in order to suck up enough CO_2 so that the biomass is *as bad as* coal – and centuries before it can be called "neutral."[10] However, these trees are unlikely to be left undisturbed for so many decades, making "carbon-neutrality" a fantasy. Unfortunately, we do not have decades to waste. Biomass burning cooks the climate faster than coal, and the atmosphere reacts the same whether the extra pulse of CO_2 came from a "biogenic" source or not. It is critical that we avoid global warming tipping points in the coming decades.

Bait and Switchgrass – Burning Toxic Wastes

"Green" biomass is often a foot in the door for more toxic waste streams. Biomass incinerators that start off burning "clean wood chips" often seek to burn more contaminated fuels like construction / demolition wood waste, tires, plastics or trash, since the facilities can get paid to take these wastes, rather than pay for their fuel. Economic pressures encourage use of dirtier fuels.

Keeping Coal Alive

Biomass co-firing at existing coal power plants is often proposed to keep coal plants alive that would otherwise close due to the expense of pollution control upgrades. This is encouraged by the Clean Power Plan, renewable energy policies, and loopholes that ignore CO_2 from biomass.

"Clean Wood" Isn't Clean

Even "clean" wood, straight from a forest, is contaminated with pollutants that trees absorb from the environment and can become significant sources of toxic pollution when burned. Some trees are especially good at taking up mercury, particularly willow and poplar (two species widely promoted for biomass use). When accounting for the lack of mercury control requirements on biomass plants, a wood burning biomass plant can release more mercury per unit of energy than a coal power plant with mercury controls.

Lead, cadmium, copper, iron and zinc are also taken up by trees.[11,12] Pine and larch are well-known accumulators of lead, and willow is considered a hyperaccumulator of cadmium.[13] Lead and cadmium are highly toxic and large portions (23% of lead and 60% of cadmium) can escape pollution controls and get into the air when burned.[14] Copper, iron and zinc are catalysts for dioxin formation and will boost the toxicity of the air emissions and ash.[15] Researchers have found that toxic metal concentrations in normal wood ash are "disturbingly high" when tested[16] and would be classified as hazardous waste in Europe,[17] and have been turned away from normal landfills in Germany.[18]

When the small (12-megawatt) Bio Energy plant in Hopkinton, New Hampshire was burning clean wood chips, from 1983 to 2002, it annually emitted about 600 pounds of lead and 8 pounds of mercury, "apparently naturally occurring in trees or absorbed through the soil," according to the state Department of Environmental Services.[19]

Wood Waste

So-called "wood waste" is often promoted as woody biomass. This could include cuttings from lumber mills or unused portions of trees from logging operations. Diverting lumber mill wood waste to biomass burners displaces that wood from its previous use (often already burned on-site for biomass or reused in pulp or paper-making), causing indirect pressure on forests as new logging is needed to fill the replace that wood's previous use. Woody material considered "waste" from logging is not waste, but provides habitat for small mammals when left on the forest floor and should be left for the forest to recover.[20]

Construction / Demolition / Disaster Debris

Another common type of "wood waste" is construction and demolition debris (known as "C&D"). With help from global warming-induced natural disasters, an increasing amount of disaster debris now also fits in this category. Utility poles, railroad ties, wood pallets and marine pilings carry similar dangers. On average, 13% of C&D waste is wood. Much of that wood is contaminated, both with non-wood materials that isn't well-separated, and with toxic treated or painted wood.

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 chromated copper arsenate (CCA). Pentachlorophenol is a chlorinated compound that is contaminated with dioxin and creates more dioxin when burned. CCA, the most widely used wood treatment chemical, releases arsenic when burned and the chromium in the wood is converted to the toxic form (chromium VI) when burned. The copper in CCA (and in the new, arsenic-free, wood treatment chemicals) boosts dioxin when burned. It is difficult to sort out CCA-treated wood. Even where workers are specially trained to remove it, contamination rates of 9-10% have been found in the allegedly CCA-free wood piles. Contamination rates of 5% are enough for the ash to be considered hazardous waste, and rates of 1-2% still result in significant toxic metal emissions.[21] Although arsenic is no longer used in new wood treatment, this will be a problem for decades to come as it takes many years before treated wood hits the waste stream.[22]

Old painted wood can contain lead and mercury. While lead in paint was phased out in 1978 and mercury in 1991, this toxic painted wood can still end up in wood waste stream from demolition and remodeling of older homes. One biomass incinerator that threatened to reopen to burn C&D wood in Hopkinton, New Hampshire was permitted in 2003 to release an astounding 2.6 tons of lead per year and up to 31 pounds of mercury (nearly four times the mercury released when the plant burned "clean wood chips").[23,24]

Biomass Violations, Accidents & Nuisances

Biomass ash contains toxic metals and dioxins and should be handled as hazardous waste, not as fertilizer, though it sometimes is, resulting in contamination of farms.[25,26] A 2012 Wall Street Journal analysis found that 80% of U.S. biomass incinerators have been cited for air or water violations in the previous five years.[27] Fires and explosions at biomass plants and wood piles are common, and nuisances from odor, dust and noise are serious problems for biomass plant neighbors.

Medical & Health Professionals Speak Out

Numerous medical professionals have come out opposed to biomass incineration, due to the health effects of biomass air pollutants, including the American Academy of Family Physicians, American Lung Association, Washington State Medical Association and the Massachusetts Medical Society. Read their statements and others' online at: www.energyjustice.net/biomass/health/

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