Research on the Ecotoxicity of Burning Woody Biomass

Emissions from biomass plants are very hazardous. Besides the massive damage caused to the enviroment & wildlife it is also especially harmful to our own health.

Emissions from biomass burning contain particle pollution, nitrogen, hydrochloric acid, sulfur dioxide, hydrogen fluoride, ammonia, heavy metals and dioxins and furans.
These emissions cause diseases such as lung disease, hart failure and cancer. On average people die 13 months sooner due to particle pollution.

Nitrogen emissions destroys nature's biodiversity. It causes one plant to grow excessively and therefore other plants don't stand a chance. Nitrogen kills marine life and it gets into our drinking water which can cause cancer and Alzheimer's disease. Nitrogen also makes bones weak. Baby birds born in a nitrogen deposit area currently break their legs when they first try to walk.

Warning for quick fix that does not lead to the solution

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This document written by Johan Vollenbroek from the Mobilisation for the Environment organisation warns against another quick fix and states biomass power plants should be shut down immediately.

"...It often remains unmentioned that the excessively high nitrogen emissions in the Netherlands also cause billions in damage every year..."

"...The Dutch Environmental Assessment Agency estimates damage to health and nature between € 2.5 and 12.6 billion damage per year, of which more than half due to premature death and health damage..."

"...The critical deposition limit is exceeded in 70% of nature, what leads to natural damage and a reduction in rare plants and animal species..."

"...Measures that lead reduced nitrogen deposition in nature areas will therefore also lead to less health damage..."

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Serious Mismatches Between Science & Bioenergy Policy

2019-08-09-easac-serious-mismatches-continue-between-science-and-policy-in-forest-bioenergy-english.pdf

This report considers how current policy might be reformed to reduce negative impacts on climate and argue for a more realistic science-based assessment of the potential of forest bioenergy in substituting for fossil fuels. Since the length of time atmospheric concentrations of CO_2 increase is highly dependent on the feedstocks, the authors argue for regulations to explicitly require these to be sources with short payback period. Furthermore, they re-emphasize the reasons why current policy is achieving the opposite of that intended, and why the urgency of its revision has increased following the conclusion of the Paris Agreement.

"With the large investments already made in conversion and associated pellet mills and infrastructure (including bulk marine transport), substantial economic assets are dependent on this economic model continuing, and thus, stakeholder commitment to the climate neutrality argument is strong and likely to have been a factor in countering the scientific arguments presented to the European Parliament."

2019-03 \\ Scientific Thinktank GL

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2016-09 \\ LUNG

2016-06-14-ers-health-impacts-of-anthropogenic-biomass-burning-in-the-developed-world-english.pdf

2016-06 \\ ERS

ATTENTION!

We are analyzing reports and creating & posting new summaries every day. This is time consuming work but we will try to deliver multiple summaries per day. We are currently processing reports from 2019 and will work our way

"The IPCC accounting rules aggregating all forestry-related emissions to the LULUCF category have created a reward for countries importing biomass since, even though overall emissions are likely to have increased as a result of switching from coal to imported biomass, the country can count them as zero and report a reduction. Considerable economic assets are now locked into the converted coal-fired power stations, the transport infrastructure and the forest biomass supply chain which could be stranded if the simplistic assumption of carbon neutrality was corrected."

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EU Biomass Legal Case Main Arguments

2019-08-00-eu-biomass-legal-case-main-arguments-english.pdf

This legal document contains the main arguments in the EU Biomass Legal Case where the applicants seek annulment of the inclusion of "forest biomass" – essentially
trees, including, stems, stumps, branches and bark – as a renewable fuel within the
Renewable Energy Directive (recast) 2018.

"...Air pollution is a considerable health concern in the EU. A report from the European Environment Agency (EEA)26 concluded that in 2013, the estimated number of premature deaths in EU-28 attributed to PM2.5 (particulate matter 2.5 microns in diameter and below) NO2 (nitrogen dioxide) and O3 (ozone) exposure was 436,000, 71,000, and 16,000, respectively..."

"...Biomass power plants generally use emissions controls and thus emit less pollution on an energy-output basis than residential wood-burning, but the emission of hundreds of tonnes of pollution from a single smokestack makes them a health concern like any other power plant. Given the same emissions control efficiency on a heat-input basis, a wood-burning plant can emit more particulate matter per megawatt-hour than a coal plant, because biomass power plants tend to be less efficient than coal plants, and thus require more fuel to generate a given amount of electricity. This in turn emits more air pollution on an energy-output basis. This is especially true if the plant is burning green wood chips, because this material is around 50% water by weight, which reduces the efficiency of the power plant. However, particulate matter emissions from plants burning dried wood pellets do not tend to differ from coal emissions to the same degree..."

back into the hundreds of official research reports commissioned the last decade.

"...Even biomass burners with modern pollution controls emit significant pollution. A survey of permitted emissions at new biomass power plants built in the USA shows that emissions are significant even when using efficient fabric filters to capture PM. For instance, a new 70 MW wood-burning plant in New Hampshire is permitted to emit 37.1 tonnes of PM per year. Emissions data from a small wood-burning CHP plant in Belgium illustrate that wood-burning power plants can be disproportionately polluting. A plant at Ham is reported by the company to have a generating capacity of 9.6 MW. Reported emissions for 2016 include 55.5 tonnes of particulate matter (PM10, a calculated value) and 137 tonnes of NOx (a measured value). fuel storage yards at biomass power plants can also create pollution from wood dust, a known carcinogen..."

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Adverse Impact Biomass Power Plant Emission Standards

2019-03-26-mob-onderzoek-resultaat-opgeleverd-gemeenteraad-nadelige-invloed-biomassacentrale-emissienormen.pdf

This report is commissioned by the Mobilization for the Environment organization which won major court cases against the Dutch Government forcing them to take immediate action against climate change and pollution.

"...since 12 November 2018, stricter standards are in force... However, emission standards have been wrongly not been included for hydrochloric acid, sulfur dioxide, hydrofluoric acid, ammonia, heavy metals and dioxins and furans..."

"...Summary of the effects of replacing gas firing with wood firing:
1. Climate change is being strengthened or a negative effect on global warming.
2. A range of air pollutants will be blown out through the chimney such as nitrogen oxides, sulfur oxides, hydrochloric acid, hydrochloric acid, ammonia, mercury, cadmium and thallium, other heavy metals, and dioxins and furans, including ZZS substances for which the minimization obligation applies with ultimately a zero emission.
3. The air quality on site will deteriorate as a result of the far too wide emission standards in combination with the low chimney of only 20 m.
4. Deposition of nitrogen, sulfur oxides, hydrochloric acid, hydrochloric acid, ammonia, mercury, cadmium and thallium, heavy metals and dioxins and furans in nature areas is not, or insufficient, recognized.
5. The permitted emissions of NOx, SO2 and dust are broader than the European / Dutch requirements waste incineration plants. More than 20-year-old waste incineration plants show much lower emissions Ithan currently the

case for the biomass plants].
6. The HVC biomass plant in Alkmaar, which is more than ten years old, performs many times better than this one new installation of Bio Forte.
7. No licensing standards are included at all for ZZS substances. This is particularly true because the oven temperature around 400 gr. C is what facilitates dioxin formation.
8. The permitted emissions For NOx, SO2 and dust can and must be much sharper. For dust, the licensed emissions would be reduced by a factor of 10 if BAT were applied, which is a legal obligation..."

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APS Technologies More Polluting Than Fossil Fuels

2019-03-20-pfpi-aps-technologies-are-more-polluting-than-fossil-fuels-per-unit-of-energy-produced-and-should-not-be-subsidized-english.pdf

This document is a call from PFPI to legislators to support act H.853, an "Act to Assure the Attainment of Greenhouse Gas Emissions Goals in the Alternative Portfolio Standard (APS)", stating that "these technologies are more polluting than fossil fuels per unit of energy produced and should not be subsidized through Massachusetts' clean energy programs."
"Massachusetts established the Alternative Energy Portfolio Standard (APS) in 2009 to complement the state's Renewable Energy Portfolio Standard (RPS). While the RPS is designed to increase the use of renewable energy for electricity, the APS is intended to reduce greenhouse gas emissions from the heating sector. However, the inclusion of biomass and garbage incineration in the APS undermines this goal. "

"In December 2017 the House Committee on Global Warming and Climate Change convened an oversight hearing to review the proposed regulations. The Committee recommended that the proposed biomass provisions be delayed "until further calculations are made regarding the greenhouse gas and health impacts" and urged the DOER (MA Department of Energy Resources) to "reopen the public comment period on the recently changed provisions" made to the draft regulation after public review had concluded. Instead, DOER proceeded, only days later, to issue a new – and significantly weaker – regulation on December 29, 2017. As a direct result of these changes, the APS now subsidizes dozens of polluting wood pellet boilers across the state, as well as the state's oldest garbage incinerator."

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Europe's RED Policy is Built on Burning American Trees

2019-03-04-vox-europes-renewable-energy-policy-is-built-on-burning-american-trees-english.pdf

This Vox-article discusses how it came to be that Europe's banking on biomass to meet their obligations under the Paris agreement is causing forests to be felled in the US (and elsewhere) and how large scale deployment of biomass for energy is in fact failing to meet any carbon reduction targets at all.

"In November 2018, the heads of the US Department of Agriculture, the Department of Energy, and EPA released a joint statement affirming the carbon neutrality of biomass. Among the many benefits they listed for biomass from "managed forests," or tree plantations, were three that seemed almost Orwellian: "to promote environmental stewardship by improving soil and water quality, reducing wildfire risk, and helping ensure our forests continue to remove carbon from the atmosphere."

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Investor Report the Biomass Blind Spot

2019-02-06-shareaction-investor-report-the-biomass-blind-spot-english.pdf

Carbon emissions from burning wood have been ignored by utility companies and policy makers for two reasons. Firstly, because it is incorrectly seen as a "renewable" resource. The carbon emissions from combustion are assumed to be recaptured as trees regrow. However, at the point of combustion, wood emits more CO2 than coal. It takes decades for this carbon to be reabsorbed by forest growth. Given that we urgently need to reduce greenhouse gas (GHG) emissions over the short-term to reach a net zero energy system by 2050, biomass is not compatible with achieving this. The second reason is related to international carbon accounting rules. UNFCCC's reporting guidelines require GHG emissions related to bioenergy to be counted in the land-use sector, where the tree is felled rather than at the point of combustion. [...] This paper challenges the assumption that carbon is recaptured by forest regrowth, at the rates required to offset emissions from combustion. Converting natural forests into a managed or plantation forest reduces their stored carbon. In addition, the methods used to grow and harvest biomass feedstocks also have an enormous impact on how quickly forest carbon can recover."

"Currently, forests have more economic value when they are harvested, rather than left standing, because our economic system does not value forests' important role in carbon sequestration and climate mitigation."

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Covered in Smoke

2018-02-02-fern-covered-in-smoke-why-burning-biomass-threatens-european-health-report-english.pdf

This report contains new research by a leading independent expert draws attention to serious impacts on human health of burning solid biomass, mainly wood, for heating and power generation in the European Union.

"...The promotion of any combustion technology runs counter to efforts to improve air quality. Biomass burning is recognised as a significant source of fine particles (PM2.5) and polyaromatic hydrocarbons,and is also associated with emissions of oxides of nitrogen and various other pollutants linked to the substances present in the wood. Some of these pollutants can react in the atmosphere to form further pollutants, including 'secondary particles' (such as ammonium nitrate) and ozone, which are also damaging to health..."

"...The World Health Organisation's (WHO) 2013 HRAPIE (Health Response to Air Pollution in Europe) study identified several health impacts of PM2.5, NO2 and O3 for which evidence of causality and the exposure-response relationship were considered sufficiently robust that quantification should be undertaken to inform the development of EU policy..."

"...The European Environment Agency reports that there is a 'compliance gap' on air pollution at present, with respect to both the reduction of emissions and the meeting of ambient limit values.
- With respect to emissions, eleven Member States exceeded the National Emissions Ceiling (NEC) Directive for one or more pollutants in 2015: Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Ireland, Luxembourg, Spain and Sweden.26
- Projected emissions reported by 23 Member States show that 18 do not consider themselves on track towards meeting their reduction commitments set for 2020 for NOx, NH3 , NMVOCs, SO2 and/or PM2.5 on the basis of the policies and measures they currently have in place. Similarly, 22 Member States are not on track to meet one or more of their 2030 commitments.
- In 2014, 16 per cent of the EU-28 urban population was exposed to PM10 levels above the EU daily limit value with 8 per cent exposed to PM2.5 levels

above the EU target value. However, when compared to the stricter WHO Air Quality Guideline values set to protect human health, approximately 50 per cent and 85 per cent of city dwellers were exposed to PM10 and PM2.5 concentrations exceeding the WHO's recommendations.
- In 2014, 7 per cent of the urban population in the EU-28 were exposed to NO2 concentrations above the identical WHO and EU standards.
- 20 and 88 per cent of the EU population were exposed to levels of Benzo[a]pyrene (BaP) above (respectively) the EU limit and the WHO guidelines in 2014. The difficulty in meeting limit values is highlighted by the fact that there is still non-compliance despite the limits entering into force as long ago as 2005 for PM10, 2010 for NO2 and 2012 for BaP. Adding to existing emission levels in any sector will clearly make this job harder..."

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Burning Biomass Creates Proven Harm to Human Health

2016-09-13-lung-health-organizations-letter-burning-biomass-creates-proven-harm-to-human-health-english.pdf

This report is commissioned by a dozen health organizations who oppose policies that
would encourage or expand the use of biomass for electricity production.

"...Burning biomass from any source generates immediate dangerous air pollution that puts health at risk..."

"...Among the most dangerous of these emissions is particulate matter, also known as soot. These particles are so small that they can enter and lodge deep in the lungs, triggering asthma attacks, cardiovascular disease, and even death.i Particulate matter can also cause lung cancer..."

"...Biomass combustion also creates nitrogen oxide emissions, which are harmful in their own right and also contribute to the formation of ozone smog and particulate matter downwind..."

"...Ground-level ozone pollution can trigger asthma attacks and cause premature death, and newer research shows possible links to reproductive and central nervous system harm..."

"...Burning biomass also creates carbon monoxide, which leads to headaches, nausea, dizziness, and in high concentrations, premature death;v and carcinogens, including benzene and formaldehyde..."

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Impacts of Anthropogenic Biomass Burning

2016-06-14-ers-health-impacts-of-anthropogenic-biomass-burning-in-the-developed-world-english.pdf

This report is commissioned by 22 universities and public health organizations worldwide and discusses the types of pollution released when burning woody biomass.

"...Studies have estimated that wood/biomass combustion contributes 10–30% or ~1–4 μg·m^{-3} to the annual average fine particle concentrations measured in different parts of Europe..."

"...In a few studies looking at woodsmoke tracers, significant differences (66–80%) were observed for potassium, calcium and zinc as well as 1,3-butadiene and benzene..."

"...The physicochemical properties of biomass combustion PM varies between different combustion conditions. As discussed in the online supplementary material, the heterogeneity of biomass PM characteristics is high. Accordingly, evaluation of the respiratory and cardiovascular toxicity of biomass emission PM is complex..."

"...Woodsmoke particles constitute a complex and variable mixture of organic-dominated particles, soot agglomerates and inorganic ash alkali particles; three particle types that differ considerably in shape, size, solubility and chemical composition..."

"...Overall, in vivo and in vitro experiments demonstrate that woodsmoke PM can induce inflammatory responses, cytotoxicity, genotoxicity, oxidative stress and immunosuppressive effects..."

"...Across Europe, the Renewable Energy Directive has set a goal to produce 20% of energy from renewable sources by 2020, increasing wood/biomass combustion for power generation. As mentioned in the Introduction, biomass combustion is expected to become the major source of primary PM emissions over the next 5–15 years. This will compromise efforts to reduce ambient PM concentrations to below the current WHO Air Quality Guidelines. This, in turn, will probably result in large numbers of avoidable, premature deaths across Europe over that time period...."

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All Research Papers on Deforestation & Woody Biomass

https://biomassmurder.org/research/index.html

We have collected and read all the research reports and official documents from the past decades and have started to make summaries for each subject and published the summaries on the following pages:

Biomass Research Abbreviations

Biomass Research Availability

Biomass Research Biodiversity

Biomass Research Carbon Dioxide

Biomass Research Certification

Biomass Research Ecotoxicity

Biomass Research Health Risks

Biomass Research Legal

Biomass Research Lobby Facts

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Biomass Research Subsidies

Biomass Research Sustainability

Biomass Research Whole Trees

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