

# Poultry excrement could partially replace coal as a renewable energy source, study says

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While turkeys at Thanksgiving are an age-old custom, a new study shows that turkey excrement may have a future as a fuel for heat and electricity.

Treated excrement from turkeys, chickens and other [poultry](#), when converted to combustible solid biomass fuel, could replace approximately 10 percent of coal used in [electricity generation](#), reducing greenhouse gases and providing an [alternative energy source](#), according to a new study by Ben-Gurion University of the Negev (BGU) researchers.

While biomass accounts for 73 percent of [renewable energy production](#) worldwide, crops grown for energy production burden land, water and fertilizer resources. According to the researchers, "Environmentally safe disposal of poultry excrement has become a significant problem. Converting poultry waste to solid fuel, a less resource-intensive, [renewable energy source](#) is an environmentally superior alternative that also reduces reliance on fossil fuels."

According to the study in Elsevier's *Applied Energy*, researchers at the Zuckerberg Institute for Water Research at BGU evaluated two biofuel types to determine which is the more efficient poultry waste solid fuel.

They compared the production, combustion and [gas emissions](#) of biochar, which is produced by slow heating of the biomass at a temperature of 450°C (842°F) in an oxygen-free furnace with hydrochar. Hydrochar is produced by heating wet biomass to a much lower temperature of up to 250 °C under pressure using a process called hydrothermal carbonization (HTC). HTC mimics natural coal formation within several hours.

"We found that poultry waste processed as hydrochar produced 24 percent higher net energy generation," says student researcher Vivian Mau and Prof. Amit Gross, chair of the Department of Environmental Hydrology and Microbiology at BGU's Zuckerberg Institute. "Poultry waste hydrochar generates heat at high temperatures and combusts in a similar manner to coal, an important factor in replacing it as renewable

energy source."

For the first time, the researchers also showed that higher HTC production temperatures resulted in a significant reduction in emissions of methane (CH<sub>4</sub>) and ammonia (NH<sub>3</sub>) and an increase of carbon dioxide and carbon monoxide.

"This investigation helped in bridging the gap between hydrochar being considered as a potential [energy](#) source toward the development of an alternative renewable fuel," Gross explains. "Our findings could help significantly reduce greenhouse gas emissions associated with electricity generation and agricultural wastes. Field-scale experiments with HTC reactor should be conducted to confirm the assessments from this laboratory-scale study."

**More information:** Vivian Mau et al, Energy conversion and gas emissions from production and combustion of poultry-litter-derived hydrochar and biochar, *Applied Energy* (2017). [DOI: 10.1016/j.apenergy.2017.11.033](#)

Provided by American Associates, Ben-Gurion University of the Negev

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