

Waste from age-old paper industry becomes new source of solid fuel

February 12 2014

In today's search for renewable energy sources, researchers are turning to the hi-tech, from solar and hydrogen fuel cells, and the very low-tech. The latest example of a low-tech alternative comes from an age-old industry: paper. A new study, appearing in ACS' journal *Energy & Fuels*, reveals a sustainable way to turn the huge amounts of waste from paper production into solid fuel with the added bonus of diverting the sludge from overflowing landfills.

Chinnathan Areeprasert, Peitao Zhao and colleagues note that making paper, from debarking and chipping wood to the final steps of pulping and refining, creates a tremendous amount of wood fibers and other wastes. Sending this sludge to landfills can be problematic, because substances can leach out and pollute groundwater. But recently, researchers have been exploring ways to turn the planet's growing waste streams into useful products, such as fuel and fertilizer. One such process is called subcritical hydrothermal treatment (HTT), and it uses heat and pressure to break down and remove various components of a mixture. In one case, researchers used HTT to turn sewage into a clean, [solid fuel](#). Early studies show it can transform paper sludge into fuel as well. Areeprasert's team decided to figure out the best HTT conditions for this process, and to test them in a pilot plant.

They tried different temperatures and defined the optimal conditions for converting paper waste into fuel using HTT. The resulting product had a composition similar to coal. Importantly, the amount of energy that can be recovered from the fuel is higher than the energy required to make it.

The researchers conclude that this method for making [fuel](#) is both sustainable and lends itself to commercialization.

More information: "Alternative Solid Fuel Production from Paper Sludge Employing Hydrothermal Treatment" *Energy Fuels*, Article ASAP. [DOI: 10.1021/ef402371h](https://doi.org/10.1021/ef402371h)

Abstract

This paper aims to investigate the alternative solid fuel production from paper sludge employing hydrothermal treatment (HTT) in a lab-scale facility for implementation of the pilot-scale plant. The paper sludge was subjected to the HTT under subcritical hydrothermal conditions. In the lab-scale experiment, the temperature conditions were 180 °C, 200 °C, 220 °C, and 240 °C, respectively, while it was 197 °C in the pilot plant as the optimum condition. The holding time was 30 min in both cases. The hydrothermally produced solid fuel was evaluated for the fuel property, the water removal performance, and the mass distribution. Furthermore, the energy balance of the process was studied. The higher heating value of the HT pretreated paper sludge was slightly improved. In addition, the produced solid fuel had comparable H/C and O/C atomic ratios with that of coal, indicating the presence of carbonization during the HTT process. Using the mechanical dewatering, only 4.1% of moisture in the raw paper sludge can be removed while the solid fuel production from paper sludge by HTT at 200 °C showed 19.5% moisture reduction. According to the energy balance of the pilot plant, the recovered energy was significantly higher than the energy input, showing the feasibility of employing the HTT to produce alternative solid fuel from paper sludge.

Provided by American Chemical Society

Citation: Waste from age-old paper industry becomes new source of solid fuel (2014, February 12) retrieved 24 April 2024 from <https://phys.org/news/2014-02-age-old-paper-industry-source-solid.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.