Ash from refuse could become hydrogen gas

EurekAlert!

Every year, millions of tons of environmentally harmful ash is produced worldwide, and is mostly dumped in landfill sites or, in some countries, used as construction material. The ash is what is left when rubbish has been burnt in thermal power stations. A researcher from Lund University in Sweden has now developed a technique to use the ash to produce hydrogen gas. The method is presented in a new thesis.

The technique has significant potential: 20 billion litres of hydrogen gas a year, or 56 gigawatt-hours (GWh). Calculated as electricity, the energy is the equivalent of the annual needs of around 11 000 detached houses. Hydrogen gas is valuable and is viewed by many as an increasingly important energy source, for example as a vehicle fuel.

"The ash can be used as a resource through recovery of hydrogen gas instead of being allowed to be released into the air as at present. Our ash deposits are like a goldmine", said Aamir Ilyas, Doctor of Water Resources Engineering at Lund University and the developer of the technique.

Refuse incineration is a widespread practice in Europe. The technique involves placing the ash in an oxygen-free environment. The ash is dampened with water, whereupon it forms hydrogen gas. The gas is sucked up through pipes and stored in tanks.

It is the heavy, grit-like bottom ash that is used. In combustion, a lighter fly ash is also formed. The bottom ash remains in quarantine, in the open air, at the site for up to six months to prevent leaching of environmentally harmful metals and the risk of hydrogen gas being formed, since accumulation of hydrogen during indoor storage can result in explosion.

"A bonus is that this method removes the risk of hydrogen gas. It also reduces the strain on our landfill sites."

In some countries, processed bottom ash is sometimes used as a construction material for roads and buildings. This doesn't happen at present in Sweden because the ash contains hazardous substances that do not meet the Swedish Environmental Protection Agency's strict requirements. Usually it is used as top cover at landfills.

Today, hydrogen gas is mainly produced from natural gas. However, biogas, oil and coal can also be used as the raw material. Hydrogen gas is an important raw material in industry and is used in refineries and to manufacture ammonia. Hydrogen gas has the potential to produce electricity and heat and also to become a vehicle fuel; a number of car manufacturers are investing in hydrogen-powered

fuel cell cars. Hydrogen gas is not expensive, but because there is a lack of infrastructure for the production of the gas, the production and handling costs are high. However, these costs would decrease in the future once a production system is established.

"There will not be one universal solution that will be used to generate energy. We need to find a number of solutions", said Kenneth M. Persson, Professor of Water Resources Engineering and one of Aamir Ilyas's supervisors.

Original release: http://www.eurekalert.org/pub_releases/2013-03/lu-afr032513.php [1]

Source URL (retrieved on *12/21/2013 - 4:58am*):
http://www.ecnmag.com/news/2013/03/ash-refuse-could-become-hydrogen-gas

Links:
[1] http://www.eurekalert.org/pub_releases/2013-03/lu-afr032513.php