

Alternative Uses for Sludge



United Sludge-Free Alliance

www.usludgefree.org

Compiled by Karen Feridun

	Syngas	Biogas	Biochar	Landfill Gas	Building Materials
What is It?	Syngas is a component in the production of synthetic fuels and chemicals. It is created by gasification and is composed of carbon monoxide and hydrogen. ⁱ	Biogas is gas produced when organic materials are digested in an anaerobic environment, meaning in the absence of oxygen.	Biochar is a man-made charcoal used as a very stable fertilizer. ⁱⁱ	The decomposition that takes place in landfills generates gas called Landfill Gas (LFG) that is about half methane and half carbon dioxide. The methane produced represents about 26% of all methane emissions.	Asphalt ⁱⁱⁱ , concrete ^{iv} , ceramics ^v , cement ^{vi} , aggregate/slag ^{vii} , bricks ^{viii}
Role of Sewage Sludge	When sewage sludge undergoes gassification, syngas is produced.	Sludge can be used to generate a form of biogas that is 60 – 70% methane and 30 – 40% carbon dioxide.	Biochar can be made from sludge that undergoes pyrolysis, eliminating the need to cut down trees which only creates a bigger problem with carbon.	After the sewage treatment process, the sludge that remains is sometimes incinerated. The ash is then put into landfills. Still more of the sludge is put into landfills directly.	Incinerated sewage sludge ash (ISSA), dried sludge, and sludge cakes have all been used to make construction materials.
Greenhouse Gases	Syngas on its own can be an alternative to coal to heat buildings; Syngas is a component of a host of cleaner fuels for transportation. ^{ix} Landfill Gas (LFG) constitutes about 26% of methane	The anaerobic process cuts down on the CO ₂ released into the environment. ^{xi}	Carbon is mineralized in the thermal process and is thereby retained in soil, not released into atmosphere; fewer trees are cleared to create fields. Biochar is used as a fertilizer, reducing	Methane when combined with syngas can be used to make fuel , thereby reducing the amount of methane emissions. (see Syngas)	

	emissions. If it can be captured, it can be used to create fuel, but the fuel isn't terribly efficient and leads to the release of pollutants into the environment. Those issues can be resolved by turning some of the LFG into Syngas and then combining it with the LFG.(see Landfill Gas) ^x		the use of nitrogen fertilizers which emit Nitrous Oxide.		
Renewable Energy	Syngas can be used on its own to generate electricity.	The gas can be used to provide the thermal energy needed for the treatment process itself and can be used to generate electricity and fuel. ^{xii}	Syngas created in process can in turn generate the electricity needed for the processing operations.	The methane from LFG when combined with Syngas can be used to produce efficient, clean fuel.	
Food Crisis			Biochar combined with other organic materials can create rich soil that lasts for centuries.		
Water Crisis			Biochar is porous, so it retains water, keeping soil moist.		
Additional Benefits	Syngas can be used to create synthetic natural gas,	The process of making biofuel can be managed locally	When Biochar is made, a third becomes biochar, a		The use of sewage sludge in building materials is often

	<p>ammonia, methanol, and synthetic petroleum fuel (dimethyl ether – synthesized gasoline and diesel fuel). The hydrogen in syngas can be used to power fuel cells or to propel fuel cell electric vehicles</p>	<p>so are no transportation costs.^{xiii}</p>	<p>third becomes syngas (see above) and a third becomes a crude oil substitute that can be used to make plastic.</p>		<p>regarded as an alternative method for disposing of it rather than as a way of getting the most benefit from it. Nevertheless, keeping sludge off of the soil and out of landfills is a benefit in and of itself and may be the best alternative a particular community has.</p>
<p>Contaminants</p>	<p>Researchers have been exploring cleanup technologies for Syngas to remove contaminants, like heavy metals, including this example using a high-temperature cleansing process.^{xiv}</p>		<p>Research is still being done to test the toxicity of heavy metals in biochar. Research in New South Wales has shown that some biochars tested within the guidelines for dioxins, PAHs, and heavy metals.^{xv} Still other research indicates biochar may actually reduce the bioavailability of the heavy metals contained within.^{xvi}</p>		<p>There are concerns over the presence of heavy metals in sludge used for construction, especially in the dried or cake form. Sludge ash (ISSA) is considered safer because leaching of heavy metals is not as much of a concern after incineration.</p>

-
- i <http://alternativefuels.about.com/od/researchdevelopment/a/whatisnyngas.htm>
- ii <http://www.ft.com/cms/s/2/67843ec0-020b-11de-8199-000077b07658.html>
- iii <http://www.tfhr.gov/hnr20/recycle/waste/ss2.htm>
- iv <http://www.pwri.go.jp/eng/activity/pdf/reports/ozaki.070603.pdf>
- v <http://www.srcosmos.gr/srcosmos/showpub.aspx?aa=11302>
- vi http://www.innovations-report.com/html/reports/materials_science/report-49744.html
- vii <http://www.azom.com/Details.asp?ArticleID=3023>
- viii <http://www.insinet.net/jasr/2008/1223-1229.pdf>
- ix <http://www.syngas.com.au/File/About%20Syngas.pdf>
- x <http://www.nacatsoc.org/20nam/abstracts/O-S4-08.pdf>
- xi http://www.entrepreneur.com/tradejournals/article/174012387_1.html
- xii http://www.democraticunderground.com/discuss/duboard.php?az=view_all&address=115x185582
- xiii http://www.democraticunderground.com/discuss/duboard.php?az=view_all&address=115x185582
- xiv http://www.rti.org/brochures/rti_syngas_cleanup.pdf
- xv <http://www.dpi.nsw.gov.au/research/topics/biochar>
- xvi http://www.biochar-international.org/images/NZSR64_1_Winsley.pdf