Written by Administrator Thursday, 06 February 2014 10:06 -

One hour to make crude oil reports the Pacific Northwest National Laboratory News, 17 December 2013 and *Algal Research*, 29 September 2013, DOI: 10.1016/j.algal.2013.08.005. Engineers at Pacific Northwest National Laboratory (PNNL), Richland, Washington state, USA, have developed a process that converts algae into crude oil in one hour. Algae have already been used as raw material for producing biofuels, but previous processes have used dried algae, and involve using organic solvents, such as hexane, to extract oils. Drying the algae takes much energy, making the process expensive and inefficient.

The new process starts with an algal slurry, described by PNNL News as "a verdant green paste with the consistency of pea soup", which can be 80 to 90 percent water, and does not need the solvents. Instead, the PNNL researchers use hot water at high pressure to fragment the algae and convert most of the biomass into liquid and gas fuels. The process is called hydrothermal liquefaction (HTL) and runs at temperatures around 350 degrees C and a pressure of 20 MPa. The crude oil that results can be then refined into usable fuels, such as aviation fuel, gasoline or diesel fuel. The process also produces fuel gas, which can be made into natural gas or burned in an electricity generator. It also produces water and nutrients such as nitrogen, phosphorus, and potassium, which can be recycled and used to grow more algae.

Douglas Elliott, who led the research team explained: "It's a bit like using a pressure cooker, only the pressures and temperatures we use are much higher. In a sense, we are duplicating the process in the Earth that converted algae into oil over the course of millions of years. We're just doing it much, much faster".

## **PNNL News**

**Editorial Comment**: In spite of these engineers' belief in millions of years, their own experiments are proof that time does not create fossil fuels, process does. The temperature and pressure involved in the PNNL process may be greater than a kitchen pressure cooker, but they are possible in the natural world with a combination of volcanic activity and rapid deep burial of organic matter, which would have first occurred when the fountains of the great deep broke open at the beginning of Noah's flood. Prior to Noah's flood, in the original "very good world", there would have been an abundance of algae, (which includes seaweed as well as microscopic plants that make up the green sludge we normally think of as algae) in the seas, lakes and rivers, so there would have been plenty of raw material to be transformed by heat and pressure as one of the first blessings for the future to come out of God's judgement on our past. (Ref. organic chemistry, time)

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