

Can a Fertilizer Be a Transportation Fuel?

Joel Tallaksen, Renewable Energy Scientist

Over the last several years, the West Central Research and Outreach Center has been developing a system to producing ammonia fertilizer using wind energy. This work is being done to help address two different regional needs; not being able to move all the electricity from wind turbines during peak production and the demand for ammonia fertilizers by the regions farmers. We have succeeded in building what we think is the world's first wind energy to ammonia facility. Based on the wind resource, there is a potential to build a large ammonia production infrastructure in West Central Minnesota and other areas in the Midwest.

The ammonia could be used in industry or as a means of storing energy. Last month, I had the opportunity to discuss our ammonia production system with the 'Ammonia as a Fuel' organization. They are interested in the potential of using liquid ammonia as an energy source for applications that use gas, diesel, or large electric motors. Ammonia (NH_3) stores energy in the bonds between nitrogen and hydrogen molecules. Though less energy dense than gasoline or diesel fuel, it does have considerable energy. There are currently two main methods of converting the energy in ammonia into forms that can be used in vehicles. The first is using a modified engine that can run on ammonia after preheating with another fuel. Though these engines are still in the experimental phase, there are some examples of over-the-road vehicles running on ammonia. A second method for using ammonia as a fuel is breaking the ammonia down into hydrogen and nitrogen, and then using the hydrogen in a fuel cell to produce electricity. The electricity can then power a standard electric motor, such as those found in hybrid vehicles and electric utility vehicles.

Should the economics of producing ammonia from wind power prove positive, the region would be in a good position to produce a value added fuel with its abundant wind resources. Over the next few years, WCROC will gather data on the economics of ammonia production and the viability of much larger wind to ammonia plants. Developing technology like this could add economic development, employment and a measure of energy independence to West Central Minnesota.



An Ammonia Fueling station could be similar to this compressed natural gas filling station in Sacramento, California. Specially designed nozzle for easily and safely dispensing fuel (top). Portable fueling station mounted on a Felling Trailer (Sauk Center, MN) platform (bottom).



National Public Lands Day

Amy Rager, Extension Educator, Fish, Wildlife & Conservation Education

Saturday, September 28 dawned a rainy gloomy day. Even this could not stop the 105 Minnesota Master Naturalist Volunteers who showed up braving the rain and cold to do good work for public good. Four sites around the state hosted volunteers in cooperation with Master Naturalist, Minnesota Valley Wildlife Refuge-Bloomington, Cold Water Spring-Fort Snelling, Vermillion State Park-Soudan, and Itasca State Park-Park Rapids.

Each location had a different task and flare for providing a volunteer service project. Projects included: worm surveys in the north woods of Vermillion State Park, Minnesota's newest state park, woody invasive removal at Minnesota Valley, and native garden upkeep at Cold Water Spring.

Volunteers at Itasca State Park worked with a group of U of M undergraduate students from John Loegering's class at Crookston to bud cap over 6000 trees in three and a half hours. Cold Water Spring planted 110 trees and 200 shrubs were added to the landscape.

All in all the volunteers provided a total of 1930 hours at a value of \$42,730.00 (independentsector.org). All volunteers received a free t-shirt and lunch for participating in the day. Sponsors included, National Park Service, US Fish & Wild Service, Minnesota State Parks, Minnesota Department of Natural Resources and University of Minnesota Extension.

