Fact Sheet: STAMP Green Hydrogen Production Site

What is Green Hydrogen?

Hydrogen is the lightest and most common element in the universe. It is also a useful fuel that can be converted directly into electricity without creating pollution. Today, most hydrogen is made from natural gas which releases huge amounts of greenhouse gas into the air that causes climate change. This is called “grey” hydrogen because its source is not clean, and it harms the environment. However, if the hydrogen is produced using only renewable energy like solar, wind or hydroelectric then we call it “green” meaning no harmful greenhouse gases were created at any point in its manufacture or use.

Why do we need Green Hydrogen?

Uncontrolled climate change will damage our forests, wildlife, rivers, lakes, oceans, and economy in ways we cannot predict. Winters may get shorter, warmer and dryer, summers get much hotter. Climate change is caused by greenhouse gases from the burning of fossil fuels like coal, diesel, and gasoline. The only way to slow down and stop climate change is to stop burning these dirty fuels. But we use these fuels to grow our food, transport our goods and power our homes so we must have a replacement. Green Hydrogen is that replacement, it is the very best way to turn clean renewable energy into a fuel that can replace diesel for heavy duty transportation in trucks, trains, airplanes, and ships. It is the only way we can replace dirty fuels to make fertilizer, steel, and cement.

Why build the plant at STAMP?

Western New York is an area rich in renewable energy along with a skilled workforce. It is ideally located to service Plug Power’s customers with Green Hydrogen in the entire northeast region. By building our plant here the economic benefits of the transition from fossil fuels to clean energy will go to the people of Western New York as it becomes a center for clean fuel production and technology.

How is the Green Hydrogen made?

The process to make green hydrogen uses electricity to split water into hydrogen and oxygen in a machine called an electrolyzer. The process uses no chemicals, no fossil fuel, nothing except water and electricity. The only byproduct we produce is pure oxygen that is released to the air. In fact, this plant will produce about the same amount of oxygen each year as 18,500 acres of forest. The electrolyzer equipment we use is manufactured in Rochester NY. Hydrogen gas takes up a lot of space, so to make it easy to transport we cool it down until it becomes a liquid. The cooling process is like how a refrigerator works, just bigger. The process only uses electricity, there are no chemicals needed and no waste. At the end of the process, we load the liquid hydrogen onto tanker-trailers for delivery to our customers. We will use 100% zero-emission hydrogen powered trucks to haul our tankers. No fossil fuels are used or stored anywhere in the facility.

How much water do you need to make Green Hydrogen?

There is one pound of hydrogen and eight pounds of oxygen in every nine pounds of pure water. When you include purifying the water and some water vapor that is lost with the oxygen released then the actual amount is about 12 pounds of water for every pound of hydrogen. That is about 1.4 gallons of water for every pound of hydrogen. This plant will produce 75,000 kilograms per day, so it uses about 230,000 gallons per day. This is about the same amount of water that a large dairy farm would use. On the hottest days of the year, we also use some water for cooling, averaged over the year it adds about 14,000 gallons per day.

Is there any pollution or waste from a Green Hydrogen plant?

When we split water into hydrogen and oxygen, we release that oxygen to the air. Of course, oxygen is not pollution, it is what we all need to breath to stay alive. This facility discharges zero liquid process waste. We get clean drinking water from the County municipal water system. Just like the water from a faucet at home it contains a small amount of minerals. We need to remove these or they would clog up our electrolyzers and we use a water purification system to do this. This purification system is like a high-end water filter you would use at home, just bigger. It splits the water into two parts, a pure part that we use, and a part will with all the minerals. We then take that and evaporate the water – which is captured and goes back to our process, leaving just the solid minerals behind which are mostly salt. Once a week we will remove and dispose about one dumpster worth of this salty material. This is our only process waste; it is not dangerous. Of course, we have employees onsite and so have the usual sanitary waste from kitchens and bathrooms equivalent to about 2 households. This is transferred to a holding tank that is emptied regularly and sent to a wastewater treatment plant. At this facility, nothing goes into the ground, nothing goes into any creek, and only pure oxygen goes into the air.

Will the plant make noise?

The electric process to make hydrogen is silent. The only noise is from electric motors used to pump water and operate compressors. The compressors used in the cooling process are the loudest pieces of machinery in the plant and they are housed inside a building well away from the boundary of our site. We have completed noise studies that show even under worst case conditions the noise level from the plant will below the natural noise level at the boundaries of the STAMP site and well inside the limits that were established for STAMP.

How safe is a green hydrogen plant?

Hydrogen is a powerful energy source and like any energy source must be handled with strict adherence to fire codes, industry standards, best practices, and common sense. In comparison to other fuel gases such as propane which are heavier than air, allowing leaks to creep along the ground until they find a spark, hydrogen is so light that it rapidly disperses into the air. It does however ignite easily if it is trapped and allowed to mix with air, so our plant is designed to always provide a path for a hydrogen leak to escape. That is why the buildings have sloped & vented roofs.

The operation of large liquid hydrogen production plants is not new. For example, a large Praxair/Linde facility similar in scale to the Plug Power facility has safely operated for decades in Niagara Falls, NY. This facility is located less than 1600' from a residential neighborhood. Safety equipment and protocols for these types are facilities are well understood and there is deep industry knowledge in their use. There are about a dozen similar facilities around the country that have equally long safe operation records.

Plug Power is an active member of the Center for Hydrogen Safety and has more than twenty years' experience in the handling, storage and use of hydrogen with an excellent safety record. We have been working with local first responders since the early stages of the project to keep them informed and to ensure that when the plant comes online, they have all the training, knowledge and tools needed to keep themselves, the community, and the plant safe.

This facility is being designed and built to the highest safety standards with automated leak and fire detection, isolation, and shutoff with multiple redundant points of control. We have submitted a detailed safety plan as part of the environmental review that we will continue to refine and improve our plans as the plant is built and operated. We will conduct several external-expert safety reviews of the design during the design-build process. Lastly, in the unlikely event of an incident our facility is located almost half-a-mile from the next nearest structure and 2000' from our site's boundary and the closest boundary of the STAMP site.

Learn More:
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