



## Fact Sheet: Yuma Green Hydrogen Production Site

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Rendering of a 45 metric-ton per day green hydrogen plant

### 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. As more markets adopt strict rules to reduce greenhouse gases, green hydrogen will become a valuable new fuel. Today, most hydrogen is made from natural gas which releases greenhouse gases, which due to concerns about climate change has led to more regulation. This is called “grey” hydrogen. However, if the hydrogen is produced using only renewable energy like solar, wind or hydroelectric then it is called “green” meaning no greenhouse gases were created at any point in its manufacture or use.

### How safe is a green hydrogen plant?

Hydrogen is a powerful energy source and like any energy source must be handled with common sense along with industry standards and best practices. In comparison to other fuel gases such as natural gas or 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. The same company recently opened a similar facility in Laporte, TX. Safety equipment and protocols for these types of 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 apparatus 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 maintain detailed safety plans that we continue to refine and improve as the plant is built and operated. We will conduct several external-expert safety reviews of the design during the design-build process.



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### 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.

### How much truck traffic will there be and where will the trucks go?

This facility generates 30 metric-tons of hydrogen per day. Each tanker can carry about 4.5 metric-tons. In the real world not every truck leaves full or comes back empty so we will likely average about 10 tanker visits per day, or about one every couple of hours. The tankers will be travelling to and from interstate 5 and highway 99. Hydrogen tankers have been in safe operation on the roads of California for decades and are designed to meet all DOT standards for the transport of flammable gas.

### 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 11,000 acres of forest. The electrolyzer equipment we use is manufactured in the USA. 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 kilogram of hydrogen and eight kilograms of oxygen in every nine kilograms of pure water. When you include purifying the water and some water vapor that is lost with the oxygen released then the actual amount used is about 15 kilograms of water for every kilogram of hydrogen. That is about 4 gallons of water for every kilogram of hydrogen. It is interesting to note that 4 to 6 gallons of water are needed for every gallon of gasoline produced. So, hydrogen water use is about the same (and likely less) than the existing fossil fuel supply, given that a gallon of gasoline has about the same energy content as a kilogram of hydrogen.

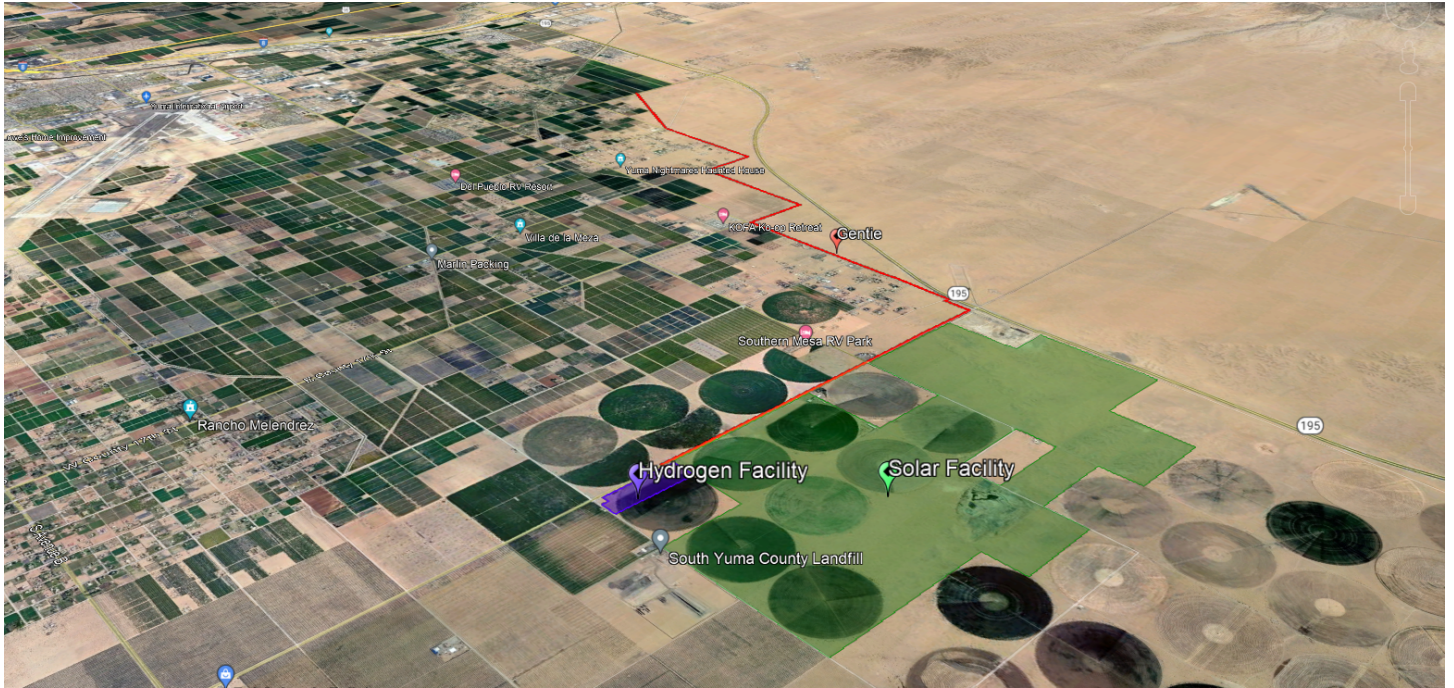
This plant will produce 30,000 kilograms per day, so it uses about 120,000 gallons per day. Water is a scarce and precious resource, and we must be careful that the transition from fossil fuels to clean energy does not impact our already stretched resources. This project will use far less water than was already being used on the site of the combined hydrogen and solar facilities.



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## Where is the proposed site?



The site is located on the south side of E County 19<sup>th</sup> St and east side of S Avenue 1 E. The hydrogen facility itself is approximately 47 acres located at the southeast corner of the intersection of these two routes. The solar facility that will power the hydrogen production will surround this industrial plant to the east and south.

## Why build the plant in Yuma County?

Yuma County is an area rich in solar energy resource along with a skilled workforce. It is ideally located to service Plug Power's customers with Green Hydrogen throughout the Southwest. By building our plant here, the economic benefits of the transition from fossil fuels to clean energy will go to the people in Yuma County as it becomes a center for clean fuel production and technology.

## How many jobs will be created?

The plant will have about 50 full time employees. Approximately half of those will be truck drivers. The rest will be split across three shifts. Those jobs will include plant operators and technicians, maintenance technicians, dispatchers and a plant manager. The average salary will be about \$70,000 per year plus full benefits. We expect almost all the employees to be from the local area.



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### 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. The water we get locally will contain some minerals such as salt. We need to remove this, or it 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 with all the minerals. We then take that and evaporate the water, leaving just the solid minerals and salt. 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 runs offsite, 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 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 be below the natural noise level at the boundaries of our proposed site.

### Will the plant cause light pollution?

The plant has normal perimeter lighting, outdoor lighting in loading, parking, and equipment areas. Nothing on the site exceeds the FAA limits requiring aviation warning lighting (red or white blinking lights). A similar though larger Plug facility located in western New York is in a designated dark sky area.

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