

## GATEWAY PROJECT DESCRIPTION

The project is consistent with the 2012 Final Generic Environmental Impact Statement Findings Statement. It will consist of a hydrogen production facility powered by renewable hydropower produced by the Niagara River. The hydrogen facility located at 6840 Crosby Road occupies approximately 25 acres on the west side of the road, to the south of the intersection of Crosby Road and Stamp Drive. The figure below shows a conceptual layout of the facility, while the final design will likely differ in its detail, it does convey the general character of the site and identifies all the main components. These include an electrical substation in the northeast corner of the site fronting the road. A single story, sloped roof, hydrogen production building is located to the west of the substation and which on its north side has power supply equipment and on its south side cooling equipment located on concrete pads outside the building. Six horizontally mounted gas storage tanks run east-west on the south side of the production building. A water pre-treatment plant is located at the east end of the building. To the south of the storage tanks are three 100x175' concrete pads which house hydrogen liquefaction equipment consisting of some vertical cylindrical tanks 30 to 45' high. A small control room is located at the between the gas storage tanks just north of the liquefaction area. In the southeast corner of the site there is an office, operations and maintenance building with associated employee parking for 20 cars. The building will have a sloped roof in the same orientation as the hydrogen production building with a roof mounted solar energy array. An entrance driveway from Crosby Road is located south of the office building. It leads to a perimeter road that runs along the south, west and north edges of the site, reconnecting with the entrance road on the west side of the office building. The south side of the site adjacent the road will include truck weigh-scales and truck loading and parking spaces. Impermeable surfaces will be limited to concrete equipment pads, buildings, roads and parking lots. To the greatest extent possible permeable gravel or grass surface covering will be used. A stormwater retention pond will be located along the northern edge of the site to retain stormwater runoff onsite.

The project will be built in two phases. In phase 1 we will build a daily production capacity for approximately 40 tons (36,000 kg) of liquid hydrogen along with all the ancillary services (substation, water treatment plant, buildings, roads etc.) to support the full plant operation. In phase 2 which we expect to commence shortly after completion of phase 1 we will add an additional 40 tons of production capacity. Currently we plan for phase 1 to start production before the end of 2022 with phase 2 starting production in early to mid-2024.

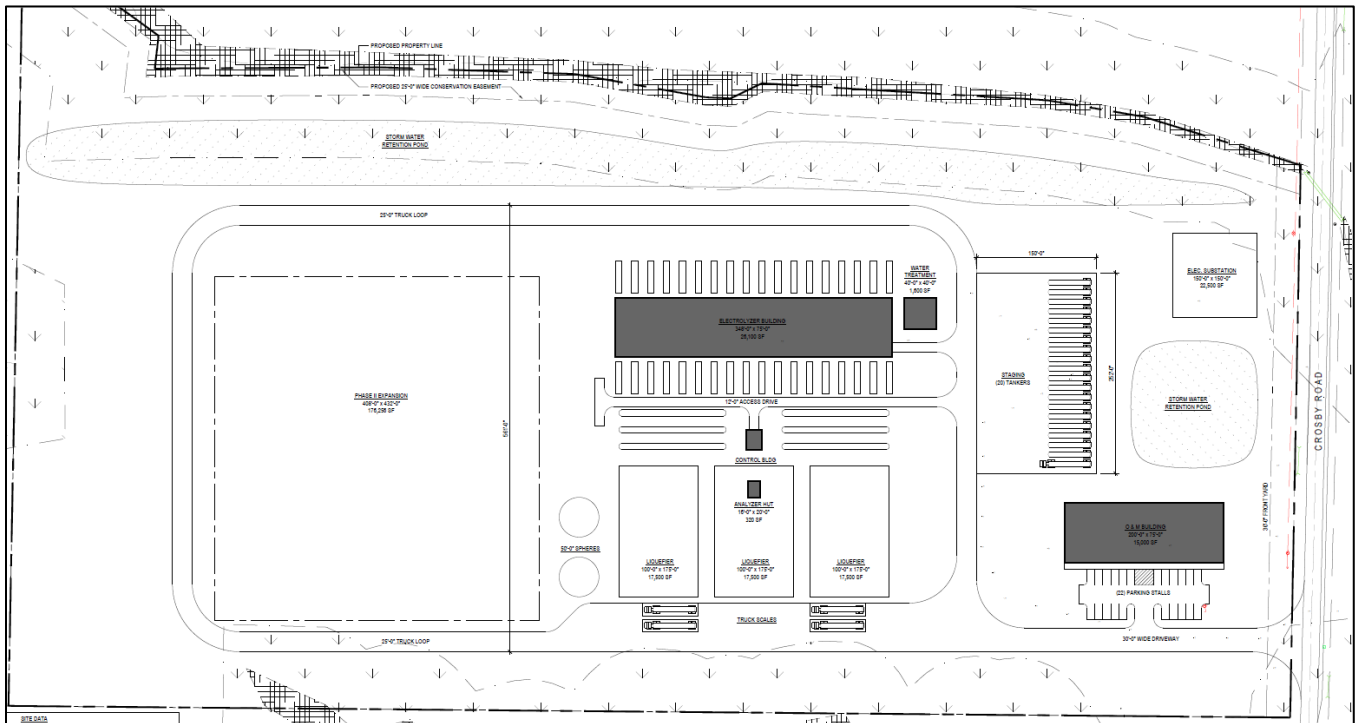


Figure 1 – Conceptual Site Layout

The Project will interconnect to a new National Grid 115kV transmission line that crosses Crosby Road just north of the site. The tap will be placed on the western side of the road at the crossing and two or three poles running south along the western edge of Crosby Road will deliver power to the facility substation. The project anticipates water and sewer service to be provided from the west side of Crosby Road.

The hydrogen will be produced by an electrolysis process where electricity is used to split water into its constituent elements hydrogen and oxygen. The pure oxygen has limited commercial value and will be exhausted to the atmosphere from vents in the hydrogen production building roof. The hydrogen is dried to remove residual water vapor and then cooled to below  $-253^{\circ}\text{C}$  ( $453^{\circ}\text{F}$ ) to transform it into a liquid. This cryogenic liquid is loaded into mobile tanker-trailers. Each tanker-trailer can transport approximately 4000 kg of liquified hydrogen. The hydrogen is distributed to Plug Power customer locations throughout the Northeast where it is used in warehouse/logistics operations and to fuel heavy-duty fuel-cell electric trucks. Initially it is anticipated that the delivery trucks may be diesel powered, but as hydrogen powered class-8 trucks become available, delivery of hydrogen fuel will be one of the first uses of these trucks. The Project will include the provision for adding a class-8 truck refueling pump to enable the distribution of zero-emission hydrogen from the facility into the fleet it serves. The facility will produce enough hydrogen to fill approximately 9 to 10 tanker trailers per day (raising to 18 to 20 when phase 2 starts production). This determines the average number of truck arrivals and departures over 24 hours.

Onsite stored hydrogen will consist of low-pressure, ASME 90,000 gallon tanks located between the electrolyzers and liquefaction plant capable of holding approximately 1.8 hours of production (2,700 kg in phase 1 raising to 5,400 kg in phase 2) to allow for maintenance of electrolyzers or liquefaction plant with limited impact to overall plant output. Storage tanks for liquid hydrogen will hold up to 9 days of production (324,000 kg in phase 1 rising to 648,000 kg in phase 2) and are used to buffer maintenance downtime of liquefaction equipment; variable arrival and dispatch of delivery trucks and as a strategic reserve to backstop supply throughout the Plug Power logistics network.

Hydrogen production from electrolysis requires ultra-pure water. Each electrolysis module includes a water-polishing unit that is sufficient to protect the unit from inadvertent exposure to impure water. However, a central water treatment plant located at the east end of the hydrogen production building will be used to purify the municipal grade water delivered by watermain to the facility. The water purification process will generate reject water that we propose to at least partially use for cooling purposes. Surplus reject water will be directed to the sewer. The quantity of reject water and will depend on the quality of the water we have to purify. The reject water will contain nothing except the dissolved solids that were contained in the original inlet water supply. A small amount of sanitary wastewater will be produced by the office building.

Electrical energy is the main feedstock for hydrogen production. A small substation located in the northeastern corner of the site will connect to the 115kV electrical service running along Crosby Road. Within the substation there will be two 100 MVA transformers to stepdown to 34.5kV which will be distributed underground to the electrolyzer power supply modules located along the north side of the hydrogen production building. Additional smaller transformers located within the substation will supply lower voltages to the ancillary equipment (4160/480/208V).

Hydrogen production is organized in 90 kg per hour production units that are called a Track. Each Track is composed of three separate modules, a power supply module outside on the north side of the hydrogen production building; an electrolyzer module inside the building and a cooling module located outside on the south side of the building. Each module is approximately 40' long and 8' wide and is fabricated on a single metal skid that is laid onto a concrete pad. A Track is laid with the three modules end to end and then Tracks are laid parallel to each other. The Tracks are spaced 20' apart. Six Tracks produce approximately 500 kg per hour and match the input capacity of one unit of liquefaction production unit called a Train. Phase 1 will have 3 liquefaction Trains with a total of 18 Tracks. Phase 2 will add an additional 3 Trains and 18 Tracks. The number of Tracks determine the length of the hydrogen production building. With 18 Tracks at 20' spacing the phase 1 building will be approximately 360' long

with additional length for a small controls room on the eastern end. Phase 2 will replicate this building on the western end of the site.

The hydrogen production building serves to protect the electrolyzer modules and provide a safe environment for production of hydrogen. The building will have a concrete floor, steel frame and metal sides and roof. Large 25' wide rollup entrances are located at the east and west ends of the building. A small controls room is located at the east end of the building with its own entrances from the outside and to the inside of the hydrogen production hall. There will be emergency exits along the southern wall spaced about 100' apart. Electrical energy from the power supply modules is carried on heavy busbars that penetrate the north wall of the building. These busbars are enclosed in metal shrouds to protect them from weather outside and to protect accidental contact by personnel. The building interior is an explosion classified area (Class I, Division II, Group B) that requires specific certifications for all equipment installed within the space including for example lighting fixtures, switches, outlets and sensors. Hydrogen is the lightest element; hence any inadvertent release of the gas rapidly dissipates into the atmosphere where it is turned to water through natural processes. An important safety feature of the hydrogen production building is a sloping roof that eliminates any potential for escaped hydrogen to be trapped inside. The high side of the roof has vents that allow any escaped gas to safely and rapidly vent to the atmosphere.

Each electrolyzer track separately vents byproduct oxygen through a pipe that penetrates the roof above the electrolyzer and protrudes above the roof surface. The electrolyzer outputs hydrogen gas at a pressure of approximately 500 psi. This is transported by above-ground steel welded pipes that exit through the south wall of the building and are routed to the gas storage tanks and from there onto the liquefaction trains.

Each liquefaction train consists of a coldbox, which resembles a vertical tank about 40' high. The coldbox is serviced by two helium compressors located on pads nearby. Helium gas is used as a refrigerant gas and is not consumed in the process. A small amount is lost to leakage and must be replenished, and a small vertical gas tank holds a reserve supply of helium for that purpose. Liquid nitrogen used pre-cool the hydrogen at the start of the liquefaction process. There are small vertical liquid storage tanks for nitrogen. Each liquefaction train has a nitrogen re-liquefier that takes the cold nitrogen gas that has performed its pre-cooling task and then cools it back down to liquid form so it can be reused. This closed loop system greatly reduces the liquid nitrogen consumption onsite and eliminates many truck deliveries of liquid nitrogen that would be required without the re-liquefier. It is anticipated that there will be about one delivery truck of liquid nitrogen per train every two weeks on average.

The liquid hydrogen output of the liquefaction plant is transported by vacuum jacketed pipes to storage tanks. These tanks may be vertical or horizontal cylindrical tanks, or they could be spherical tanks depending upon the amount of liquid hydrogen stored onsite. Vertical cylindrical tanks could be about 40-50' high. A single very large spherical tank could be up to 100' high. The most likely location for these tanks is between phase 1 and phase 2 liquefaction or along the southern edge of the liquefaction trains depending on the type of tank selected.

During normal operations of the facility (at phase 1 capacity) about 10-15 employees will be onsite at any one time. On average there will be 10 truck filling operations per 24-hour period. Trucks will arrive at facility, be directed to one of 4 truck scales where various inspections and pre-filling operations will be carried out. The tractor will not be connected to the tanker during filling operations. Each tanker takes about 4 hours to fill at which point the tractor is reattached and the truck leaves the facility.

The perimeter of the facility will have security fencing and lighting. It will be monitored by security cameras that feed to a security station in the office building. Security personnel will be onsite at all times.

A stormwater retention pond is sited along the northern edge of the site. This will have no adverse impacts to the waterway within 100'. It will act as a buffer between the paved area of the site the wetland area helping to protect the full length of the creek from storm runoff.