




Climate Change Technology Advancements

Hydrogen Manufacturing Efficiency



Technical specifications

MODEL	HysTAT™-10-10	HysTAT™-15-10	HysTAT™-10-25
Operating Pressure	10 Barg		
Max. Nominal Hydrogen Flow	10 Nm ³ /h	15 Nm ³ /h	25 Nm ³ /h
Hydrogen Flow range	40 - 100% (25 - 100% as an option)		
Hydrogen Purity (before HPS)	99.9% H ₂ O saturated, O ₂ < 1,000 ppm		
Hydrogen Purity (after HPS)	99.998% (99.999% as an option), O ₂ < 2ppm; N ₂ < 12ppm; Atm. Dew point: -60°C or -70°F / -73°C or -102°F as an option)		
Nr. of cell stacks	3		
Estimated AC power consumption (all included)	4.9 kWh/Nm ³ at full load		
Voltage	3 x 400 VAC ± 3% (3 x 480 or 575 VAC ± 3% as an option)		
Frequency	50 Hz ± 3% (60 Hz ± 3% as an option)		
Installed power	100 KVA	120 KVA	100 KVA
Max. cooling water T° (electrolyte)	40°C	40°C	30°C
Design flow cooling water (electrolyte)	2 m ³ /h		
Max. cooling water T° (gas cooling)	13°C		
Design flow cooling water (gas cooling)	0.15 m ³ /h		
Deminerzalized water consumption	< 1 liter/Nm ³ H ₂		
Electrolyte	H ₂ O + 30% wt. KOH		
Approx. Electrolyte Quantity	300 L		
Installation Requirements	Indoor, in dedicated building		
Ambient Temperature Range	-15°C to +40°C		
Dimensions Power Rack (LxWxH)**	1.7m x 1.80m x 2.0m		
Dimensions Power Rack (LxWxH)	0.3m x 0.2m x 2.2m		
Dimensions Control Panel (LxWxH)	1.0m x 0.2m x 2.1m		

Existing Technology

Hydrogen electrolysis has a waste stream of heat that has to be controlled normally by mechanical cooling. There is also a by product of compression that is needed to allow for efficient distribution of the gas and utilization as a fuel.

Oxygen is normally expelled into the atmosphere and not used. These unutilized by products add to the cost of hydrogen.

Hydrogen Electrolysis Co-Generation - Attacking Climate Change

Hydrogen is the perfect fuel. The gas is a component of water and when utilized in a fuel cell, is converted back into water after the reaction with ordinary air. Automobiles are the largest contributor to carbon emissions and this technology is focused on lowering the cost and adding local efficient distribution to make it compete with gasoline. <https://ssl.toyota.com/mirai/fcv.html>

Using Compression to Create Stored Gravitational Energy

Fluids and gases have a unique ability to reverse the force of gravity when a difference in density is present in the fluid. That is why warm air rises (it is less dense than cold air) and the cause of all weather patterns on the planet. In order to utilize this potential energy a displacement of water with the compressed gas is injected under water at a practical depth relative to the availability of the pressure to overcome the head pressure of the water. This displacement is possible with the compressed hydrogen/oxygen which is diverted below the water into an expandable containment system. This stored energy is accumulated during off peak power cycles and released during the peak period to generate power when the cost of power is the highest. This subsidy of power is added to the reaction to cut the new cost of



Free Cooling of the System When Utilizing a Body of Water

By utilizing a body of water, mechanical cooling is not required for the reaction as well as the other required processes of compression and refrigeration. The heat by product can also be used for heating the facility, treating water or adding to the stored gravitational energy when additional gases are added.



On Site Utilization of Oxygen to Raise Fish and Add to Tourism— a Smart City Concept

Since the design requires a body of water, the natural by product of oxygen could be used to grow fish since the concentration of fish requires well oxygenated water. Without the cost of additional compression the oxygen also be at a lower than market cost to subsidize the operation. Adding a fish farm to the facility also would create commerce and be a likely tourist component to the facility.

The nutrient rich water could also be utilized on site for a hydroponic organic greenhouse on site since the water and fertilizer would be free. The plants would filter the water and also consume carbon dioxide during the process and again add to the commerce and tourism aspect of the facility.

On Site Hydrogen Manufacturing and Auto Fuel Station

Distribution (transportation and compression) is a major cost of hydrogen for use in the automobile market. By manufacturing and distributing directly in the local market on site the cost is again lowered. By lowering the net cost to the consumer the hydrogen fuel cell becomes a practical cost effective and profitable alternative to fossil fuels.



Fuel Cells do not use batteries– the hydrogen is the stored energy. A chemical reaction between the fuel cell, hydrogen and simple air creates electricity with the by-product of water.

A Total Urban Smart City

With quarries located close to all urban areas across the country that are normally deligated for use as a dump after their useful life expectancy. Utilizing this concept and filling the empty quarry would result in a recreational area that would double as a hydrogen manufacturing distribution hub. With distribution of hydrogen and a practical cost the auto market would shift from both electric and gas and shift to fuel cells.



Urban fish farming requires substantial water and oxygen to keep the fish healthy. They also grao faster in warmer water. The hydrogen reaction has a by-product of both heat and oxygen to subsidize the production costs.