

# Clean Energy

## Objective:

To demonstrate the Galvanic Enhanced Electrolysis (G.E.E.) technology for hydrogen production used as fuel for gas burner power plants. This example demonstrates the economics of a new installation but the technology can also replace existing coal, oil and natural gas burners.

1. Self-sustaining hydrogen production with an efficiency greater than 100%.
2. Fully scalable. As the cell size increases the internal galvanic energy mass increases therefore delivering more internal power and increasing the output production and efficiency.
3. The internal galvanic energy provides most of the charge potential to split water into H<sub>2</sub> and O. The Oxygen Ion is captured by the Anodic electrolyte to increase the internal charge potential therefore generating more hydrogen.
4. The small external catalyst charge is supplied via a fuel cell converting about 3% of the produced hydrogen back to electricity.
5. Splitting sea water without much electrode decay. Oxidation does not occur at the Anode and conventional electrolyzer brute force electricity is not forced through the cell. These factors along with the anodic sea water based electrolyte all attribute to electrode longevity.

## Stats For Comparison:

This data is purely based on general public information related to existing power plants along with H2IL G.E.E. scale up calculations.

- The galvanic electrode consumption equated to less than \$10 per megawatt based on US\$500 for 1440 Kg of hydrogen delivering 47.5 megawatts of energy.
- The US\$500 is also the price H2IL pays for the metal. In a commercial solution this cost could be at greatly reduced as low as US\$6/megawatt.
- The construction comparison is based on a natural gas station built for or converted to hydrogen gas fueled. Fully self-sustaining, like that of nuclear reactors, without use of renewable energies.

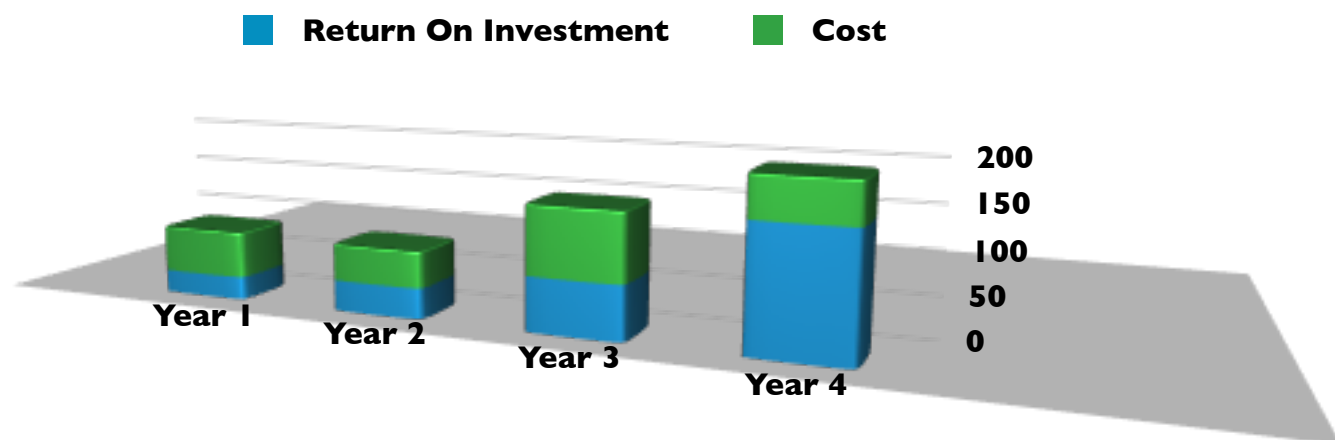
## Power generation comparison based on a 1000 MW plant:

	Nuclear	Natural Gas	G.E.E
Cost of Construction	6000/Kw	\$920/Kw	920/Kw
Construction Time	6 Years	2 Years	2 Years
Fuel Cost	\$64M/Year	\$450M/Year	87M/Year

NOTE: The H2IL cost of construction is based on a standard natural gas station construction. The H2IL technology is low cost to manufacture and would parallel the natural gas feed equipment. The burners would be fueled by hydrogen or there is also an option for dual fuel feed.

## Return on investment:

Note the quicker return on investment with an installation cost and time similar to that of a standard gas plant but fuel cost much lower than natural gas.



## Added Benefits:

### 1. Low cost fuel:

- Galvanic energy is harvested from abundant, low cost metals that dissolve over a long period of time and can be recycled to re-produce the electrodes.
- Unlike wind turbines and solar panels, there is no life expectancy to the serviced plant.
- Unlike nuclear reactors the hydrogen production can be ramped up rapidly to meet daily energy demands or dropped back to reduce galvanic metal consumption.

### 2. Environmental and safety advantages:

- No safety issues associated with nuclear power.
- No harmful byproducts.
- Zero Emissions with no CO<sub>2</sub>.
- Clean hydrogen based energy supports the international demand for sustainable clean energy.

## Other Applications:

- Renewable energy storage in hydrogen. When the renewables are dormant the self-sustaining hydrogen energy continues to be produced. This means a much smaller renewable installation for a given area OR a larger production than conventional electrolyzers that have a very low efficiency and stop running when the renewables are dormant.
- On-site fuel station self-sustaining hydrogen production for FCEV transportation and mobility.
- Commercial marine vessel hydrogen generation from sea water.
- Self-sustaining or renewable energy support for H<sub>2</sub> injection gas lines.
- Energy production for the developing HFC aviation industry.
- All other commercial applications currently using hydrogen.
- On-site production eliminates the need for transporting the gas via trucks or pipelines.

For more information please view the technology information site at [www.h2innovationlab.com](http://www.h2innovationlab.com)