



## Zero Carbon™ Energy

**Earth's Atmosphere**, while supporting all life and affecting all weather, is as thin as the skin of an apple.

Humanity previously took the Earth's Atmosphere for granted. However, we have learned.

The United Nations, the U.S. Supreme Court and the Nobel Prize Committee, among others, recognize that Global Climate Change must be halted in to protect humanity from severe climatic events.

Robert Burness of the USGS says "We need to reduce emissions by 70% to protect our planet from dramatic climatic change".

NASA's Climate Scientist, James Hanson, stated before Congress in June of 2008, "We are at a point of planetary emergency... There are tipping points in the climate system which we are very close to, and if we pass them, the dynamics of the system take over and carry you to very large changes which are out of your control."



As of 2011, worldwide electricity production is 19,000 billion kWhr per year.

Electricity production is the single largest release of oxides of carbon, nitrogen and sulfur into the atmosphere. Oxides of carbon, CO<sub>x</sub>, primarily carbon dioxide, CO<sub>2</sub>, are demonstrated to reflect the Sun's energy in Earth's Atmosphere; thereby, heating Earth's Atmosphere. Oxides of nitrogen, NO<sub>x</sub>, are toxic to all life on earth, while catalyzing formation of ozone, which is also toxic to all life. Oxides of sulfur, SO<sub>x</sub>, create sulfuric acid in the Atmosphere, causing acid rain, affecting many plants and deforming Earth's Surface.

All of these facts are while use of coal, as a power plant fuel, produces oxides of mercury. These mercury molecules rain into Earth's lakes, rivers and oceans contaminating the food supply; while at this time, the amount of mercury in tuna is such that many physicians recommend a diet either limited or free of tuna ("Yes, goodbye to that tuna salad sandwich which we all became accustomed as children.")

The cleanest hydrocarbon fuel for electrical power production is natural gas, which produces ½ as much CO<sub>2</sub> as compared to coal; while, producing no oxides of mercury or sulfur. The CO<sub>2</sub> remains with oxides of nitrogen.

As of 2011, there are near 600 million cars, trucks and buses in operation worldwide.

Transportation is the second largest source of CO<sub>2</sub> and of oxides of nitrogen into Earth's Atmosphere.

Today, in America, there exists about 0.77 car for every citizen; while in the far east, there exists only 0.01 car for every citizen; and while, over 1/3 of Earth's population lives in the far east. Regardless of the Earth's environmental consequence, there is simply not enough oil in Earth to supply the transportation appetite of humanity. While at this time, it is known that ½ of Earth's oil reserves are depleted. Therefore, time is of essence to support humanity's need of transportation energy.

There is a significant need for an energy solution which is zero carbon, zero nitrogen, zero sulfur and zero mercury.



For our children we must do better.

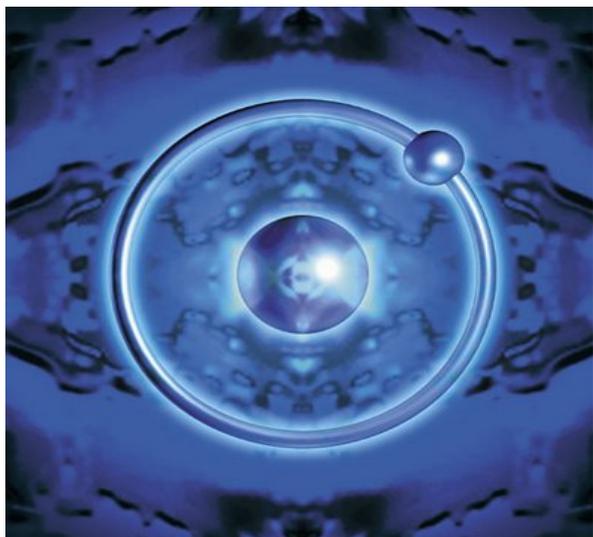
**ClearValue's® Zero Carbon™ Energy** is an innovative means to produce clean electrical power from a liquid or gas hydrocarbon. **Zero Carbon™ Energy** provides electrical power in excess of 60% conversion efficiency, hydrocarbon to electron; while, **Zero Carbon™ Energy** produces no CO<sub>x</sub>, NO<sub>x</sub> or SO<sub>x</sub>. In the production of electrical power, **Zero Carbon™ Energy** is a significant efficiency improvement over current hydrocarbon power generation means, which are at best 30% efficient. Therefore, whether oil, natural gas or propane fuel, **Zero Carbon™ Energy** can produce twice as much electrical energy per pound of fuel.

**Zero Carbon™ Energy** units are sized from 10 kW to 500 MW, while the larger units are more efficient than small. Such an energy generation efficiency and unit sizing makes distributed Energy a practicality.

Further, **Zero Carbon™ Energy** produces heated water for combined heat and power operation.

Further still, **Zero Carbon™ Energy** incorporates **ClearValue's® CONOX™** algae 3dPBR produces a natural organic product, which can be a source of food protein or of organic fertilizer.

Most importantly, **Zero Carbon™ Energy** economically produces hydrogen, which can be a clean transportation fuel.



**Zero Carbon™ Energy** incorporates **ClearValue's® HyOx™** hydrogen combustion technology. **HyOx™** provides an efficient and powerful means of hydrogen combustion, as well as, an effective means of hydrogen transportation storage.

**HyOx™** provides an efficient use of hydrogen; as, **HyOx™** is 50 to 70 % efficient converting hydrogen potential energy to engine mechanical energy. **HyOx™** is a significant improvement over hydrocarbon systems in use today, which are only 15 to 20 % efficient.

**HyOx™** is powerful, offering 100 to 400 ft-pound of torque, e.g. near 90 to 360 HP, per Liter of displacement.

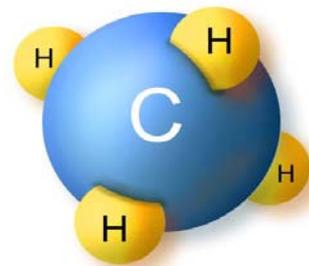
**HyOx™** provides an effective means in transportation to store hydrogen; as, **HyOx™** stores hydrogen cryogenically at little to no pressure.

Earth is abundant in natural gas, methane; while, America's landfills produce enough natural gas, that when converted to hydrogen, can power over 60 % of America's cars, trucks and buses. This is because, natural gas is simply natural. Natural gas is formed by biological decomposition of organic molecules, e.g. our trash.

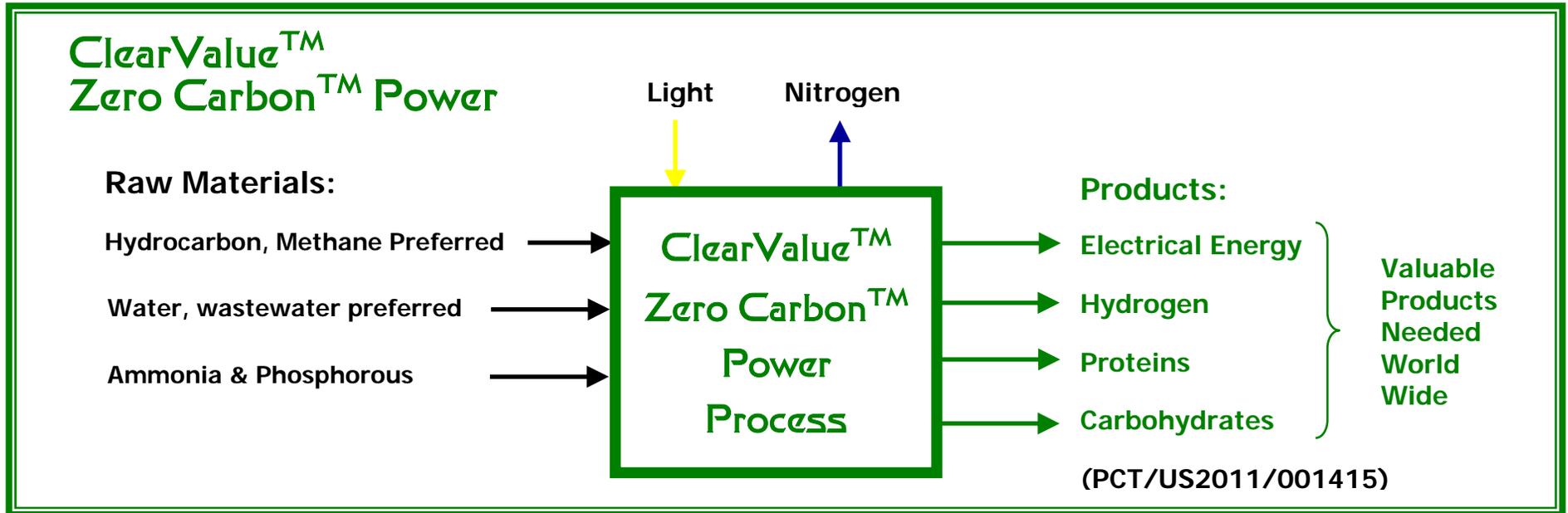
This is all while, natural gas, when released to Earth's Atmosphere is 21 times, that is 21 X, more of an issue to warm Earth's Atmosphere and cause climate change.

Due to biological activity, Earth's ocean floors are abundant in a frozen and hydrated form of natural gas.

In conclusion, **Zero Carbon™ Energy** is an efficient and effective solution to humanity's energy challenge, while cleansing Earth's Atmosphere, and while, being an abundant near endless fuel supply.



# Zero Carbon™ Energy



**Zero Carbon Energy™** is an innovative and proprietary innovation, which is patent pending worldwide.

## **Zero Carbon Energy™:**

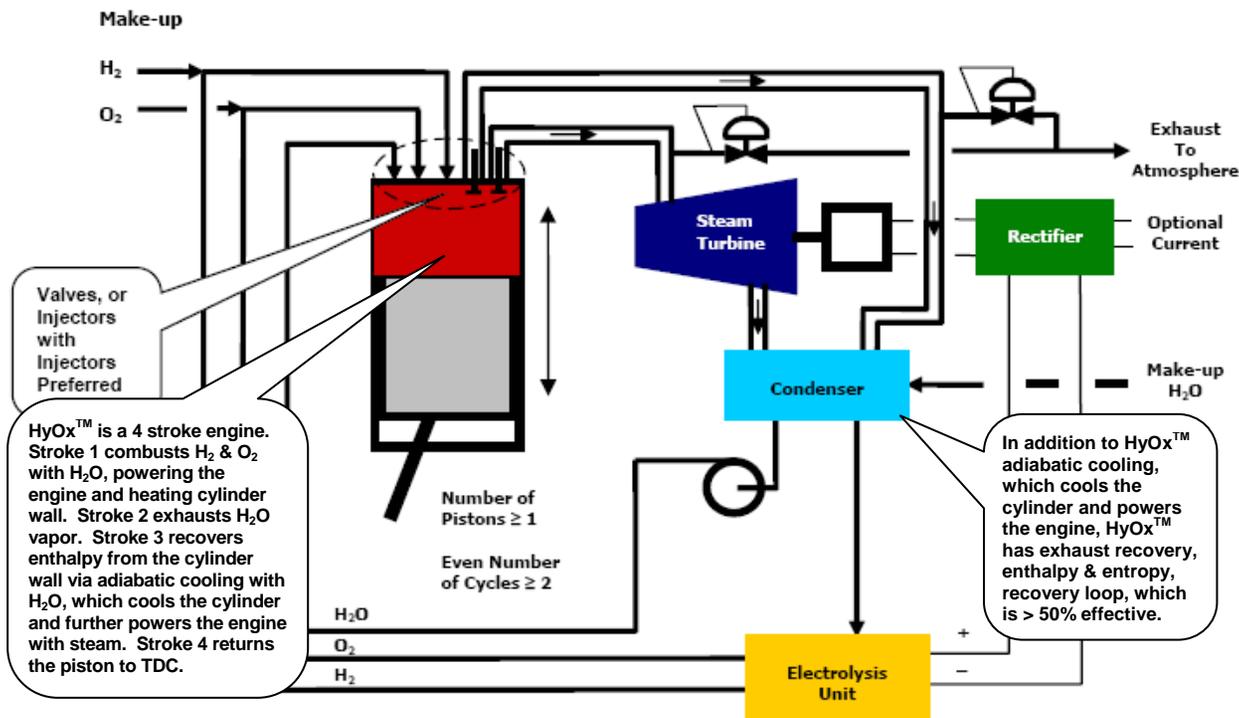
- Operates 24/7.
- Produces electrical Energy and water.
- 60% efficient Energy generation, hydrocarbon to electron, a doubling of conversion efficiency, 60% vs. 30%.
- Produces carbohydrates, proteins or organic fertilizer.
- Can produce specialty chemical feed stocks.
- Can produce hydrocarbon oils.
- Produces no toxic emissions or toxic product.
- Produces no CO<sub>x</sub>.
- Produces no NO<sub>x</sub>.
- Produces no SO<sub>x</sub>.
- Is a natural process.

## **Zero Carbon Energy™:**

- Requires a liquid or gas hydrocarbon source.
- Requires a water source.
- Requires an area to collect photons; land requirement is both Energy and latitude dependent.
- Avoids underground storage of CO<sub>2</sub>.
- Scalable from 1 kW to 500 MW units.
- Larger units more efficient than small.
- Is a practical distributed Energy generation solution.
- In most local, produces electrical Energy at less cost.
- Arrives with ClearValue™ technical support and service.
- Capital cost is competitive with natural gas combined cycle systems.

**Pure water is a ClearValue™. Clean Energy is a ClearValue™.**  
**ClearValue™ innovations are pure water and clean Energy.**

HyOx™ is a thermodynamic innovation:



- Zero harmful emissions, no CO<sub>x</sub>, NO<sub>x</sub> or SO<sub>x</sub>.
- Highest fuel efficiency, 50+ %.
- Powerful torque, 100 ft-lb per cylinder; 200 ft-lb per Liter (3-inch cylinder).
- Long engine life, no carbon deposits.
- Lightweight, ½ Engine Size.
- Low maintenance, no fuel cells.
- Low pressure fuel storage.
- Low cost, combustion engine.
- High density fuel storage.

### How HyOx™ works

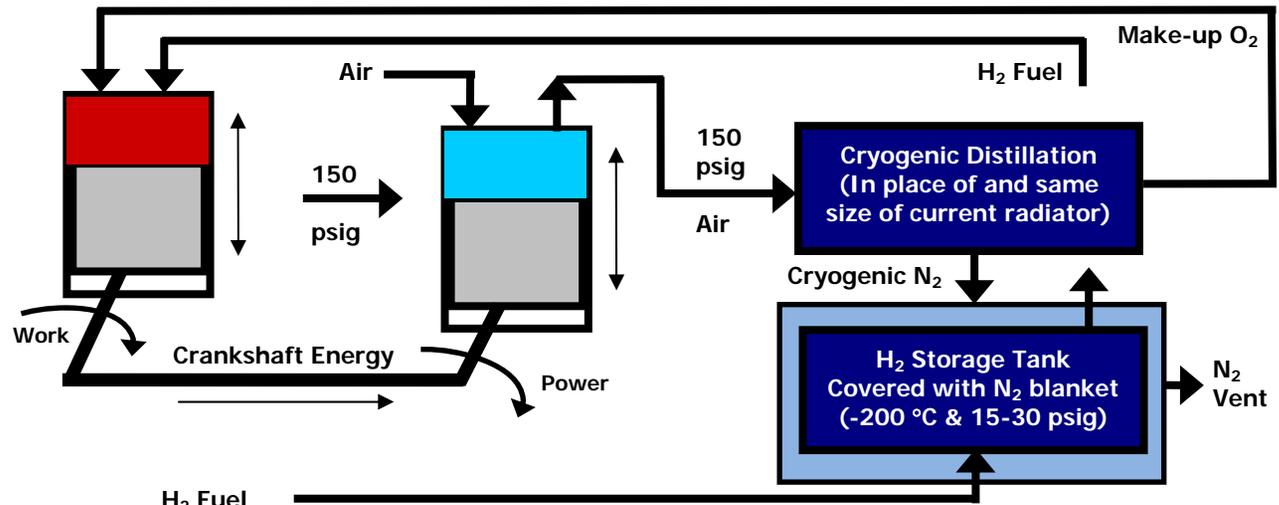
- Combust H<sub>2</sub> with pure O<sub>2</sub> and H<sub>2</sub>O.
- Adiabatically, H<sub>2</sub>O both cools and powers inside the cylinder.
- Lost exhaust energy is recycled.
- No compression stroke.
- O<sub>2</sub> obtained by air distillation.
- Cryogenic N<sub>2</sub> cools H<sub>2</sub> below Jt Curve.

Combustion of hydrogen with pure oxygen, along with adding water for cooling and power, provides a clean, efficient, powerful and lasting engine.

Otherwise lost energy (\$0.40 out of every dollar in today's automobiles and trucks) is made available with HyOx™. Nearly free oxygen is obtained by cryogenic distillation of air, which is created by an engine having no compression stroke.

### HyOx™ Commercial Benefits:

- 2 Years for Commercialization.
- Combustion engines are known.
- Combustion engines are easily implemented.
- Air distillation is known.
- Hydrogen cryogenic storage known.
- No fuel cells.
- 10X Distance per pound of fuel.
- In concert with Nature's Water Cycle.
- Eliminates fossil fuel dependency.
- **Five patents issued or pending WW.**
- **100 ft-lb per 3-inch cylinder.**
- **70+ % efficiency w/turbine design.**
- **50+ % efficiency in transportation.**
- **1500 ft-lb. possible from a 3L V6 engine; such is structurally difficult, yet, a nice challenge.**



(PCT/US03/11250, PCT/US06/48057 and U.S. Pub. 2005.0198958)