



## ClearValue® Transportation - HyOx™ Engines – Cars, Trucks, Buses

**Opportunity** – Clean, powerful and efficient engines that offer both a power/torque increase and reduced operating cost due to improved efficiency and longer engine life.

ClearValue® HyOx™ Engines are a retooling of the Internal Combustion Engine (“ICE”) in use today. HyOx™ ICE provide up to ten (10) times the power and torque of the same ICE operating on gasoline or diesel, and up to twenty (20) times the same operating on natural gas. This improved performance comes in combination with increased engine efficiency. HyOx™ ICE provides a 40 to 50 percent operating efficiency, which is in stark contrast to



hydrocarbon engines that are only 15 to 25 percent. Further, HyOx™ ICE have no hydrocarbon deposits to wear engine parts; therefore, HyOx™ ICE last 2 and 3 times longer than hydrocarbon ICE between engine overhauls.

ClearValue® clean energy innovations are based upon hydrogen (“H<sub>2</sub>”) energy, most importantly on the combustion of pure H<sub>2</sub> and pure oxygen (“O<sub>2</sub>”), e.g. HyOx™ Combustion, the fuel of NASA rockets. HyOx™ Combustion provides powerful engines, that with ClearValue Innovations, are efficient as well. Internal combustion engines (“ICE”) are near fifty percent (50%) and turbines are



near seventy percent (70%) efficient, a stark contrast to hydrocarbon systems that are 15-20 and 30-35 %, respectively. A HyOx™ three (3) Liter V-6 can easily produce 1000 horsepower (“HP”) and foot-pound (“Ft-lb”) of torque. Further, a HyOx™ turbine produces in excess of sixty percent (60%) more electricity per mcf of natural gas than the best natural gas turbines available.



**Answering Critical Market Needs** – Humanity is challenged for pure water, safe nutritious food and clean energy. ClearValue® energy innovations are instrumental to solving these challenges. ClearValue® energy innovations are designed to provide significant value-in-use, thereby, obtaining success with via traditional business, marketing and sales techniques.

**Providing Value via Benefits** – The ClearValue® H<sub>2</sub> Energy Economy™ brings a value-add to the clean energy marketplace. **Zero/Negative Carbon Energy™ (“Energy”)** generates electricity (“e-”) at \$.02 to \$0.04 per kWhr, effectively competing with coal, natural gas, solar and wind, and H<sub>2</sub> at less than \$3/kilogram (“kg”), along with pure water and organic nutrients as byproducts (animal and fish protein supplement). **Zero Carbon Energy™** is **Energy** with natural gas or cracked oil as the raw material. And, **Negative Carbon Energy™** is **Energy** with bio-gas as the raw material. Most importantly, **Negative Carbon Energy™** makes waste-to-energy projects an economic practicality, having a return on investment (“ROI”) of greater than sixty percent (60%); this is critical, as, methane is the most egregious green-house gas (“GHG”), having fifty (50) times the impact of carbon dioxide (CO<sub>2</sub>), as stated by the United Nations (“UN”). Further, **Zero Carbon Energy™** provides the existing hydrocarbon industries a clean energy bridge to the future; to solve climate change, we simply cannot halt or significantly disrupt the worldwide flow and trade of crude oil and natural gas. If we do, people will starve, thereby creating wars. **Zero Carbon Energy™** provides humanity an ability to bridge a clean energy future without significant economic, human impact.

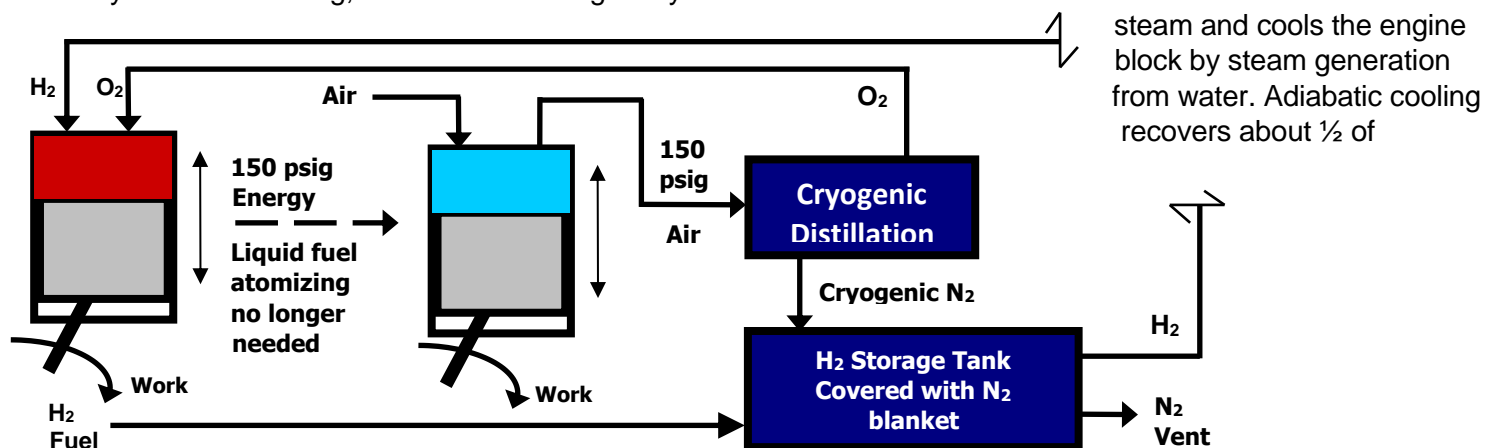
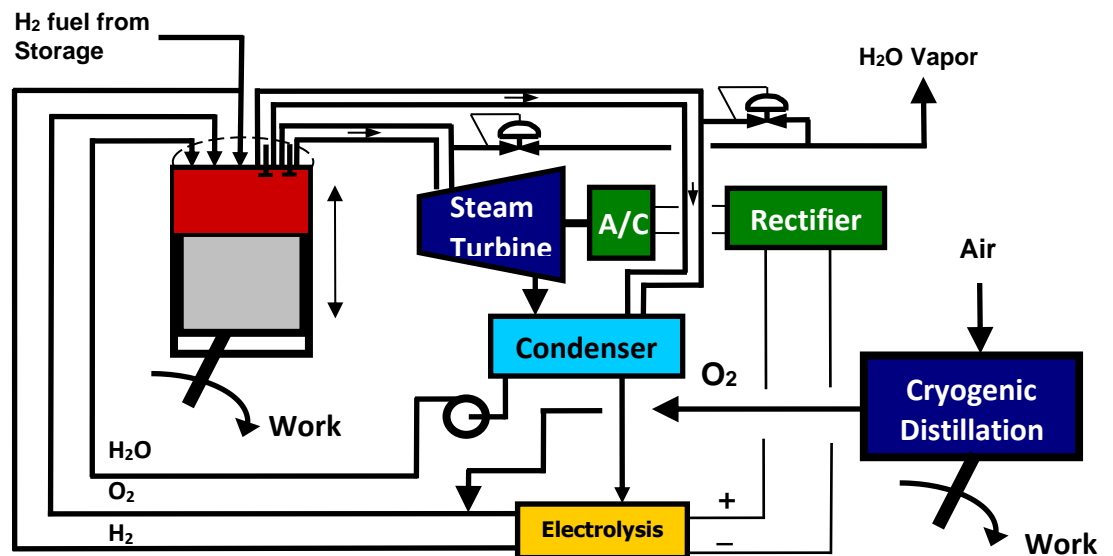
**Patent Summary** - The **ClearValue®** team has diligently innovated proprietary, viable and value-added solutions in H<sub>2</sub>O purification, safe nutrient recycling and clean sustainable H<sub>2</sub> energy. The team has been very successful to develop solutions in H<sub>2</sub>O purification, macro and micro nutrient recycling, manufacture of H<sub>2</sub>O purification chemistries, noxious odor control, H<sub>2</sub> engines, algal sequestration/conversion of point source emissions, power generation and H<sub>2</sub> production, along with, H<sub>2</sub> management in Space Travel (NASA). ClearValue Technologies owns over 120 nationally issued and/or pending patents worldwide. All are resourced at uspto.gov and wipo.int.



**HyOx™** ICE operate with pure H<sub>2</sub> and pure O<sub>2</sub>; there is no air or nitrogen ("N<sub>2</sub>") in the combustion chamber, thus providing increased power and torque. HyOx™ ICE only refuels with H<sub>2</sub>, obtaining O<sub>2</sub> during operation from the cryogenic distillation of air, which further provides cryogenic N<sub>2</sub>, a significant heat sink that allows HyOx™ ICE to maintain H<sub>2</sub> below its Joule Thompson Curve and thereby store H<sub>2</sub> at cryogenic temperatures and low pressure; such that the H<sub>2</sub> storage for HyOx™ ICE contains at least the same energy storage density as gasoline. Further, HyOx™ ICE improves engine efficiency by recycling at least 50 percent of otherwise

lost exhaust energy, enthalpy and entropy.

HyOx™ ICE recycles about ½ of lost exhaust energy by converting exhaust energy (enthalpy and entropy) into H<sub>2</sub> and O<sub>2</sub>, which are then returned to combustion. HyOx™ ICE further improves engine efficiency by incorporating adiabatic cooling in the combustion chambers. In a HyOx™ ICE, the combustion chambers are insulated, trapping otherwise lost heat energy, enthalpy. Said heat energy, enthalpy is removed by the addition of water to the combustion chamber, which by adiabatic cooling, both drives the engine by the creation of



otherwise lost energy that is lost during traditional water or air cooling of the engine block.

Licensing contracts with technology flow provisions are planned on a global basis. All international sales will be performed within a local JV, having a license comprising technology flow provisions.