



## ClearValue® Power Generation - Negative/Zero Carbon Energy®

**Opportunity** – Clean efficacious power generation that is scalable from 20 kilo-Watt (“kW”) to 1 Giga-Watt (“GW”). Cost of power is \$0.02 to \$0.04 per kilo-Watt-hour (“kWhr”) and dependent on the cost of methane (“CH<sub>4</sub>”) or methanol (“COH<sub>4</sub>”). Installation, capital, cost is location dependent, yet can be planned from \$1.50/Watt (“W”) to \$3.00/W. Raw materials are CH<sub>4</sub> or COH<sub>4</sub> and Sunlight; byproducts are pure water and organic nutrients that are preferably used in protein food production. Power generated per unit area is near 10 to 15 X that of photo-voltaic (“PV”), producing 10 to 15 Mega-Watt (MW) per acre of light collection, depending on latitude. Therefore, if light collection area is limited, Zero/Negative Carbon Energy® is the solution.



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. Negative/Zero 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; alternatively, in markets where natural gas is high, methanol can be imported to control cost. 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, CH<sub>4</sub> 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.

**Water** - Pure H<sub>2</sub>O is a byproduct of Energy, where, hydrocarbons are converted into electricity and H<sub>2</sub>, along with pure water (“H<sub>2</sub>O”) and organic nutrients. All life needs mineralized H<sub>2</sub>O; therefore, the H<sub>2</sub>O from Energy is enhanced with minerals to support life. Otherwise, Energy produces a pure demineralized H<sub>2</sub>O.



Yes, from natural gas (preferred bio-gas, methane) and Sunlight is obtained clean power, clean H<sub>2</sub> fuel (if needed), pure water and nutritious food.



**Nutrients** – Organic nutrients are a by-product of **Energy**. All life needs nutrients; while, organic nutrients are a by-product of **Energy**. Further, ClearValue's proprietary anaerobic bio-solids digester process provides both  $\text{CH}_4$  for **Energy** and safe organic nutrients for food production. Safe and clean means to naturally recycle nutrients is how God and nature intended life on Earth to proceed. ClearValue's proprietary anaerobic bio-solids digester process is planned in combination with **Energy** in the **ClearValue<sup>®</sup> H<sub>2</sub> Energy Economy<sup>®</sup>**.

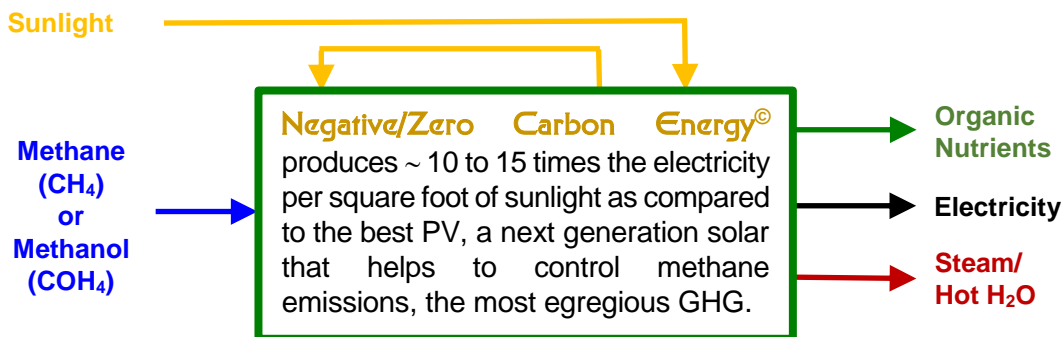
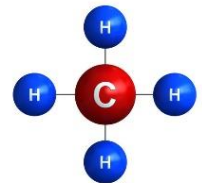
**Patent Summary** - The **ClearValue<sup>®</sup>** team has diligently innovated proprietary, viable and value-added solutions in  $\text{H}_2\text{O}$  purification, safe nutrient recycling and clean sustainable  $\text{H}_2$  energy. The team has been very successful to develop solutions in  $\text{H}_2\text{O}$  purification, macro and micro nutrient recycling, manufacture of  $\text{H}_2\text{O}$  purification chemistries, noxious odor control,  $\text{H}_2$  engines, algal sequestration/conversion of point source emissions, power generation and  $\text{H}_2$  production, along with,  $\text{H}_2$  management in Space Travel (NASA). ClearValue Technologies owns over 120 nationally issued and/or pending patents worldwide. All are resourced at [uspto.gov](http://uspto.gov) and [wipo.int](http://wipo.int).



**Negative/Zero Carbon Energy<sup>®</sup>** comprises four (4) pieces of equipment: 1) solar collection, that defines system



capacity, yet provides near 15 times the power per square foot as compared to PV; 2) reforming of  $\text{CH}_4$  or  $\text{COH}_4$  into  $\text{H}_2$  and  $\text{CO}_2$ , 3) CONOX<sup>®</sup> algae conversion of  $\text{CO}_2$  into  $\text{O}_2$ ; and 4) a HyOx<sup>®</sup> steam turbine/generator system that combusts the pure  $\text{H}_2$  and  $\text{O}_2$ , making pure  $\text{H}_2\text{O}$ , and generating e-. The HyOx<sup>®</sup> steam turbine/generator system can be a source of high temperature water or steam for combined heat and power ("CHP") systems.



**Energy** makes clean economical distributive power a practicality.

**Energy** via either **Negative Carbon Energy<sup>®</sup>** or **Zero Carbon Energy<sup>®</sup>** puts you in control of your power generation needs, while providing a significant ROI. And for locals where the central power generation authority remunerates for power provided to the power grid, **Negative/Zero Carbon Energy<sup>®</sup>** can further provide significant cash flow to your business. 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.



**Application** (urban buildings, commercial and multi-family residential) – Assuming a natural gas price/value (variable cost) of \$4/1000 SCF (current US industrial), 5.0% cost of capital (CoC) and 5.0% annual maintenance expense, along with ClearValue royalties, the total cost of power generation is near \$0.045/kWhr (\$0.019 (variable cost), \$0.070 (CoC), \$0.070 (maintenance) and \$0.012 (royalty)). Installation is estimated \$2/W or \$2M/MW (\$1.5/W to \$3.0/W); this is very location dependent and requires estimation by a local architect/engineering firm.

It is of critical note that due to the efficaciousness of **Negative/Zero Carbon Energy<sup>®</sup>** all commercial/multi-family residential structures are off the grid (except those of industrial activity); and those of ten (10) stories or less, produce totally clean power (No COX, NOX or SOX emissions, only water,  $\text{H}_2\text{O}$ ) and to the extent less than 10 stories is to the extent that clean power can be sold back to the grid (earnings are location/regulation dependent).