

# ClearValue® Negative/Zero Carbon Solutions

## Closing the loop for a climate-ready, clean Hydrogen Energy Economy™

### SUMMARY

#### Mission

To launch and implement the ClearValue® Hydrogen Energy Economy™ globally and provide clean energy, transportation, pure water and nutrients for the world, using a value-added, closed-loop, zero/negative carbon system.



#### Value Proposition

ClearValue® provides the answer for a clean hydrogen energy economy, by working in concert with the water cycle of nature. We are committed to addressing and solving the root causes and impacts of anthropogenic climate change.

ClearValue® goes beyond the mitigation of Greenhouse Gas (GHG) emissions to the actual

removal of methane from entry to the atmosphere. With over 100 patents worldwide that provide sustainable, competitive advantage, our technologies and processes remove carbon from entry to the atmosphere by cost-effectively converting:

- \* methane (CH<sub>4</sub>) and sunlight into hydrogen (H<sub>2</sub>), electricity (e-), water (H<sub>2</sub>O) and advanced nutrient systems
- \* within value-added closed-loop transportation and power solutions.



No oxides of carbon (CO<sub>x</sub>), nitrogen (NO<sub>x</sub>) or sulfur (SO<sub>x</sub>) are produced -- only H<sub>2</sub>O and nutrients. The ClearValue® Hydrogen Energy Economy™ outperforms other attempts, renders fuel cells, batteries and biofuels obsolete and is a biological/thermodynamic retooling of existing systems. This performance occurs at costs less than current systems.

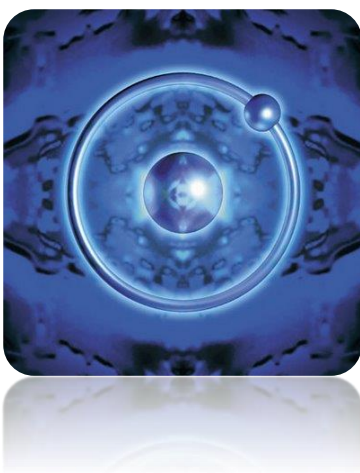
#### Technologies

Our three proprietary technologies close the renewable energy loop for power, transportation and nutrient production for city, rural and agricultural systems.

- \* **HyOx™** clean combustion engines produce no CO<sub>x</sub>, NO<sub>x</sub> or SO<sub>x</sub>, combusting only pure H<sub>2</sub> and oxygen (O<sub>2</sub>) to produce pure H<sub>2</sub>O, and are implemented with reduced time, training and tooling costs, further providing improved horsepower and efficiency, along with reduced operating cost, compared to hydrocarbon.
- \* **CONOX™** is a 3-dimensional (3d) photo-bio-reactor (PBR), capable of taking any point emission source and sunlight to produce O<sub>2</sub>, bio-fuels, protein nutrients, organic fertilizers or specialties within an 18 to 30 month pay-back.
- \* **Negative/Zero Carbon Energy™** is a closed loop energy solution that uses only sunlight and methane, producing no CO<sub>x</sub>, NO<sub>x</sub> or SO<sub>x</sub>, being infinitely scalable (kW-GW). **Negative** comprises bio-gas as its primary raw material; and, **Zero** comprises methane from a natural gas well or cracked oil as its primary raw material.

#### Competitive Position

The closest technology to HyOx™ is fuel cells, which are prohibitively expensive. As compared to hydrocarbon, HyOx™ engines are more powerful and efficient, thereby affording less operating cost. HyOx™ engines are also



longer lasting and provide greater driving distance as compared to fuel cell, electric and hydrocarbon engines. **HyOx™** provides much more rapid fueling and distance than electric vehicles, containing no precious or toxic metals.

The nearest technology to **CONOX™** is COx sequestration, which is very expensive and has efficacy questions. As compared to other algal attempts, **CONOX™** reduces the land required by 50x – 100x and provides complete control of PBR conditions, efficaciously providing a pure algae product.

**There is no known competitive technology to Negative/Zero Carbon Energy™.** The nearest technology would be hydrocarbon reforming or natural gas fueled electricity generation. In comparison, these produce COx and NOx. The resulting electricity from both is generated at ½ the efficiency and therefore twice the cost.

### Technical Risk

Every component of the **ClearValue® Hydrogen Energy Economy™** has been validated by primary or secondary research and patent examiner review (by US and international law, a patent is not attainable for an inoperable invention or a patent specification that does not teach one of ordinary skill in the art to practice). All that is needed is engineering and design, along with market validation and translation.



### Markets

In 2014, over 25k Trillion Watt hours (TWh) were generated globally: 86% was generated with fossil fuels and only 14% was sustainable or renewable. Electricity generating capacity is planned to increase to 37k TWh in 2030. Over 1.2B cars and trucks are in operation worldwide.

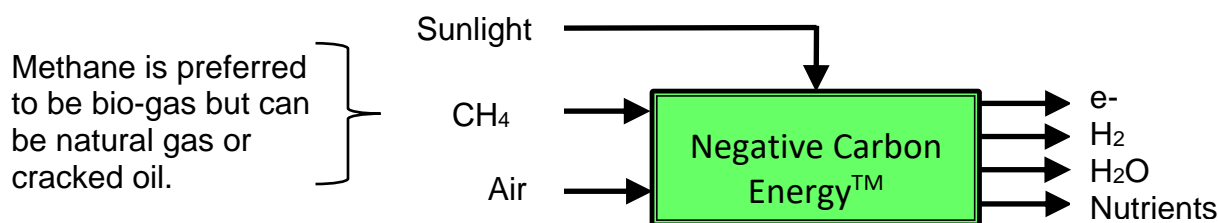
The universal appetite for energy only grows as developing countries seek the lifestyle of the developed world.

**ClearValue®** markets include power generation, transportation and agriculture, most importantly livestock production. Global market translation is to be performed via joint venture (JV) and licensing with technology flow provisions.



### Applications

**Power Generation - ClearValue®** power generation technology can be termed either zero or negative carbon energy, depending upon perspective. As on average, each person creates 2 pounds (lb) of organic waste per day, natural biological degradation of that waste produces near 14 billion lb of methane per day, and livestock production increases that figure to 20 billion lb methane per day which equates to near 4 Giga-ton (GT) per year; and as methane is 56 times the GHG of CO<sub>2</sub> (UN reference), man-made organic waste equates to 220 GT CO<sub>2</sub> equivalents per year; all while, humanity is trying to control only 35 GT of CO<sub>2</sub> emissions from fossil fuel use in power and transportation. Therefore, as compared to the natural status quo, **ClearValue®** terms its power generation technology **Negative Carbon Energy™**, as it removes otherwise equivalent CO<sub>2</sub> from Earth's atmosphere. However, as CO<sub>2</sub> is not physically removed from Earth's atmosphere, many purists may prefer the term **Zero Carbon Energy™**.



**Negative/Zero Carbon Energy™** produces electricity at \$0.02 to \$0.03 per kWhr, while providing pure H<sub>2</sub>, H<sub>2</sub>O and food nutrients. Bio-gas is the preferred source of methane, yet the methane can be natural gas or cracked oil, thereby providing the oil industry a bridge to humanity's clean hydrogen energy economy, the **ClearValue® Hydrogen Energy Economy™**.



Nutrients are preferred for livestock production with aquaculture most preferred, and where, organic waste therefrom is recycled as a methane source in bio-gas production.

**Negative Carbon Energy™** is in combination with wastewater treatment, solid-waste disposal and livestock production; yet, can be stand alone.

**Negative/Zero Carbon Energy™** is a clean energy source that can efficaciously provide an economic foundation.

**Negative/Zero Carbon Energy™** is a pure water source that can aid arid regions and island nations.

**Negative/Zero Carbon Energy™** is a **clear value**.

**Transportation - HyOx™** engines produce their own O<sub>2</sub>, only requiring H<sub>2</sub> fuel that is



preferred from **Negative/Zero Carbon Energy™**. As **HyOx™** engines are a thermodynamic redesign of the internal combustion engine, literally every vehicle produced or in use can be retooled to **HyOx™** technology, where a 300 CID V-6 can provide: near 50% efficiency (fuel to wheel energy), up to 1000 HP (more than most crankshafts can handle), 500 miles to refueling (cars and trucks today are 300 miles) and an engine life of



500,000 miles (compared to 250k miles). Retooling of cars, trucks, buses, motorcycles and locomotives is to be performed at a **ClearValue® HyOx™** re-assembly plant, where key component parts (engine and fuel systems) are to be removed, retooled and reassembled for **HyOx™** technology. On-site retooling is required for boats and ships, where, **HyOx™** provides significantly improved performance over that of methane and electric systems.



**ClearValue® HyOx™** engines provide capability to convert the existing 2 Billion cars, trucks and motorcycles worldwide that currently operate with hydrocarbons, thereby affording local vehicle production via **ClearValue® HyOx™** re-assembly/re-tooling plants.

**ClearValue® HyOx™** engines can further provide efficacious refrigeration and air conditioning.

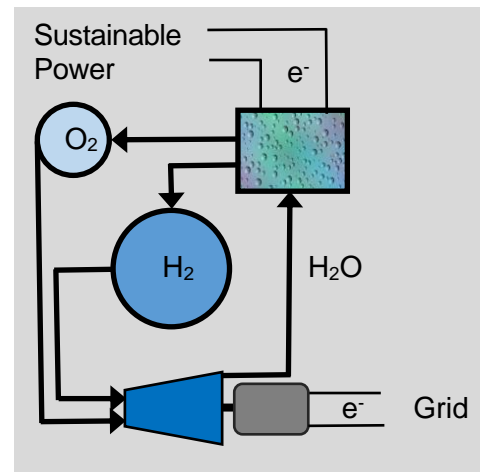
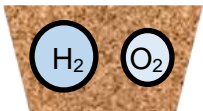
**Energy Transfer and Storage - HyOx™** provides efficacious energy transfer and volume storage for sustainable



systems, solar (photovoltaic and steam), wind and wave. Sustainable systems, while an excellent source of sustainable electrical energy, are often located distant from population centers or intermittent.

High voltage power lines lose about 1% of their power every 100 miles and therefore 10% every 1,000 miles; therefore, at 5,000 miles, energy losses of 50% should be planned for the most efficient high voltage power lines. In strong contrast, proper transfer of a gas uses 80 to 90% less energy (only 5 – 10 % energy loss in 5,000 miles), a significant improvement compared to high voltage wire. Further, H<sub>2</sub> and O<sub>2</sub> lines can be economically installed below ground; where in stark contrast, high voltage power lines must be expensively installed between steel towers about 100 feet above ground.

Vs.

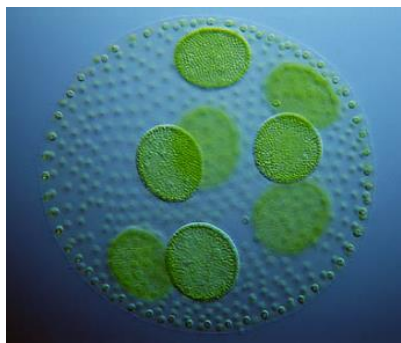


High volume energy storage is a challenge for sustainable energy sources (solar, wind and wave). As **ClearValue® HyOx™** turbines are 70+ % efficient (H<sub>2</sub> & O<sub>2</sub> to e<sup>-</sup>) and industrial grade electrolysis units are 90+ % efficient (e<sup>-</sup> of H<sub>2</sub>O to H<sub>2</sub> & O<sub>2</sub>), **ClearValue® HyOx™** technology provides energy storage, e<sup>-</sup> to e<sup>-</sup> (electrolysis of H<sub>2</sub>O to H<sub>2</sub> and O<sub>2</sub> followed by combustion of H<sub>2</sub> and O<sub>2</sub> to e<sup>-</sup>), that is 60+ % efficient.

**HyOx™** is a **ClearValue®**.



**Point Source Emission Control** – **CONOX™** is an original, innovative and proprietary algae 3dPBR that takes in sunlight to convert CO<sub>2</sub> into O<sub>2</sub> and needed nutrients. **CONOX™** produces pure algae from a reasonably sized



3dPBR that is enclosed (preferably underground), requires only 1/50 to 1/100 the photon collection area and provides complete operating control of:

- ✓ pH,
- ✓ Pressure,
- ✓ Temperature,
- ✓ Photon intensity,
- ✓ Algae concentration and removal,
- ✓ H<sub>2</sub>O loss,



- ✓ CO<sub>x</sub>, NO<sub>x</sub>, SO<sub>x</sub> and O<sub>2</sub> concentration, and
- ✓ Most importantly, contaminants.



In comparison, two dimensional (2d) systems, such as ponds and raceways, do not have these capabilities.

**CONOX™** answers the point source emission challenge, while producing needed products from foodstuffs to fertilizer, having ability to provide a 15 to 24-month payback while:

- ✓ Growing about any algae strain, where, we custom purpose each strain for the desired end product.
- ✓ Producing specialty antioxidants and proteins for improved health.
- ✓ Growing high protein nutrients for healthy livestock production and fish farming.

- ✓ Producing natural nutrient rich fertilizers for growing produce.
- ✓ Producing bio-gasoline, diesel or kerosene.
- ✓ Producing about any specialty chemical product that has an algae strain source.

**CONOX™** turns carbon emissions, CO<sub>2</sub>, into profitable products, turning emissions control into a business profit center.

**CONOX™** is a **ClearValue®**.

**Agriculture** – There is probably no group of professionals who literally live with the ongoing impacts of climate change more than ranchers and farmers. The challenges of climate change influence their daily lives.

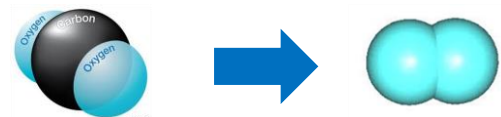
The **ClearValue® Hydrogen Energy Economy™** answers the daily challenges of farming and ranching in an economically viable and sustainable manner, while significantly



reducing the cost of operations. The 3 critical products needed by agriculture (H<sub>2</sub>O, nutrients and energy) are economically produced. Further, natural organic waste, which is currently an agricultural by-product, can be used as a raw material to produce H<sub>2</sub> fuel and thereby close the carbon energy loop, while reducing the cost of operations.

**ClearValue® Negative/Zero Carbon Energy™** uses sunlight and methane to produce e<sup>-</sup>, H<sub>2</sub>, H<sub>2</sub>O and a high protein nutritional supplement. On a ranch or farm, methane is produced by anaerobic digestion of the organic waste and can be supplemented by natural gas.

- ✓ **Negative/Zero Carbon Energy™** produces  $e^-$  at < \$0.03/kWhr.
- ✓ H<sub>2</sub> is produced at less than \$2/lb (\$0/lb if bio-gas is used).
- ✓ Pure H<sub>2</sub>O is produced.
- ✓ Nutrients produced are an excellent protein supplement for livestock production.



**ClearValue® Negative/Zero Carbon Energy™** can produce methane, prior to H<sub>2</sub> production, by anaerobically digesting organic waste. Digester sulfides are biologically converted into elemental sulfur; while, the solids are:

- ✓ Rendered pathogen free per US EPA 503 Regulations and therefore do not comprise vectors.
- ✓ Odor free (believe it or not); therefore, objectionable odor is eliminated.
- ✓ An excellent organic fertilizer to recycle nutrients.

**ClearValue® HyOx™** engines are efficacious. A ranch or farm needs machinery to be productive. **HyOx™** Engines:

- ✓ Are both powerful and efficient, capable of 1,000 ft-lb at 50% efficiency in just a V-6 engine (gasoline & diesel V-6 engines are only 200 – 500 ft-lb at 15 – 20%).
- ✓ Store H<sub>2</sub> cryogenically. **A tank of H<sub>2</sub> fuel can easily last a full day's work.**
- ✓ Produce no carbon deposits to wear engine parts, therefore, they last 2 to 3 times longer.
- ✓ Require less wrench time and therefore greater productivity.

**ClearValue® Hydrogen Energy Economy™** is an asset to agriculture, reducing or eliminating operating costs:

- ✓ With economic production of  $e^-$  and H<sub>2</sub>, along with use of powerful and efficient H<sub>2</sub> engines.
- ✓ By producing pure water.
- ✓ By producing high value nutrients that can be used for either livestock or agriculture production.

**Island, Rural, Marginal Urban Areas and Developing Nations** - Destruction of these habitats has already initiated massive migration of refugees. Displaced rural populations have been forced to resettle on the margins of urban areas in improvised settlements without adequate water or sanitation. This will only intensify with the changes in climate and political unrest to come. Any long-term solution to these macro problems must focus on the micro problems of each area. All of this demonstrates the urgent need to empower impoverished rural and marginal urban regions of the world.



The **ClearValue® Hydrogen Energy Economy™** addresses the energy, water and nutritional needs of these areas that currently lack

energy capacity and transmission infrastructure, where:

- Destruction of rural areas occur due to climate change, desertification, and other anthropogenic actions leading to unprecedented challenges for the environment and local communities.
- The cost of bringing energy and waste services to island nations is often prohibitively unaffordable by its citizens.
- In developing areas, population growth often leads to unplanned agglomerations of people that require sources of energy, water and nutrition capable of addressing community needs.
- Pure water is provided, a real asset for island nations and arid regions.



**ClearValue® Hydrogen Energy Economy™** is adaptable to even the smallest and isolated settlements, enabling them to use their own waste as a source for energy, water and nutrients. **Negative/Zero Carbon Energy™** units are planned from 10 kW to 1 GW. Providing energy, water and nutrition to the developing world is a **Clear Value**.

### Commercialization Plan

Of critical import is that the **ClearValue® Hydrogen Energy Economy™** is value-added, providing significant customer benefits; therefore, traditional marketing sales and service will drive market change. No carbon credits are necessary.



The **ClearValue® Hydrogen Energy Economy™** to be efficaciously translated worldwide via a Joint Venture (JV) and Licensing Program that comprises technology flow provisions. Each power plant and every vehicle re-assembly plant is to be built within a JV that is preferably a public-private partnership. This structure will provide for local political and legal support while providing local employment to thereby create local and joint ownership into the success of each JV. **ClearValue®** intellectual property and know-how is to be licensed to each JV, where, continued innovation is to be encouraged and flow back to the **ClearValue® Hydrogen Energy Economy™** network, where, each member will be contractually required to pay licensing fees and royalties to any other member for use of continued innovation. Contract technology flow provisions will be provided to both encourage continued innovation and limit or minimize intellectual property conflict. The world is in a crisis situation to solve climate change.

The **ClearValue® Hydrogen Energy Economy™** is to be introduced via market validation units and construction of a 10 MW power plant to complete an engineering technology (Schedule A) Package thereto.

As the **ClearValue® Hydrogen Energy Economy™** is value-added in both power and transportation, ClearValue plans to use capitalism as a tool to incentivize implementation. Capitalism and intellectual property can be used as tools for positive change, when applied correctly.

### The Company

The **ClearValue® Hydrogen Energy Economy™** was created from 20 years of intensive research and development in energy and water systems.

**ClearValue Combustion Systems, Inc. (Combustion)** is a commercialization vehicle for **HyOx™** engines.

**ClearValue Energy, Inc. (Energy)** is a commercialization vehicle for **CONOX™** and **Negative/Zero Carbon Energy™**.

**ClearValue Technologies, Inc. (Technologies)** is a holding company for intellectual Property that affords licenses of **HyOx™**, **CONOX™** and **Negative/Zero Carbon Energy™** Intellectual Property to **Combustion** and **Energy**.

**Combustion, Energy and Technologies** are Texas Corporations, each having 50 million shares of stock, ½ common and ½ referred at \$1/share par value.

### Management (Dream) Team

**Founder, President & CEO, Richard Haase**, Harvard MBA and B.S.Ch.E., has performed technology and business development for DuPont, GE, Exxon Chemical and NASA. **Dr. George Ulrich, Board Member**, DSc. Technology Transfer, a technology leader for NASA and USMC (Colonel). **Dr. Fadhil Salih, R&D Director**, Ph.D. Physics and Microbiology, is a main contributor to **CONOX™** and **Negative/Zero Carbon Energy™**. **Dr. Juan Blanco Ruiz, Director of International Development**, MArch in architecture, M.S.H.P in Historic Preservation, PhD in Urban Planning, along with considerable expertise in UN clean energy and habitat development. **Dr. John Smaardyk**, Ph.D. Physics, designed nuclear submarine propulsion and cooling systems and is a main contributor to **HyOx™**. *More than one hundred patents that provide sustainable and competitive advantages testify to the extent of this team's research and innovations.*

The extended team comprises experienced business and technology developers, physicists, chemists and engineers with backgrounds in the US Navy, NASA and industry with a track record of breakthrough technology discovery and implementation. Additional expertise includes architecture, urban planning, marketing, sales and business development.

The **ClearValue® Hydrogen Energy Economy™** is an approved humanitarian project in the IMF/World Bank/Sovereign Asset Backed Currency and Historic Bond Monetization Program; therefore, eventually and soon, **ClearValue®** will have significant commercialization capital.

**BARAK OBAMA, Address to Joint Session of Congress, February 24, 2009:**

**“To truly transform our economy, protect our security, and save our planet from the ravages of climate change, we need to ultimately make clean, renewable energy, the profitable kind of energy.”**