**Who is CHZ Technologies?**

Over the last 15 years, CHZ Technologies LLC, based in Austintown, Ohio, has successfully operated a hand-fed 7ton per day pilot plant in Germany that has processed carpet, tires, treated wood, various plastics, electronic wastes, auto shredder residue, composites and MSW, to generate clean synthesis gas. Our tests, as confirmed by external testing laboratories (such as the Fresenius Institute), show that no toxic compounds are in the synthesis gas and confirm that all potentially hazardous materials have been safely removed as inert salts. CHZ holds nine U.S. and international patents and a German patent for the process. The Thermolyzer has been permitted in Germany under Germany’s very strict environmental requirements.

**What does CHZ’s Thermolyzer do?**

The Thermolyzer can take any hydrocarbon-containing waste and convert it into a clean synthesis gas. The synthesis gas can be used as a boiler fuel for the production of steam energy or to produce power. Depending upon the waste feedstock, the synthesis gas can have a high hydrogen content, which can be separated for resale. If the waste feedstock contains metals, all metals are recovered for resale.

The process is a third-generation evolution of a slow pyrolysis process with patented modifications that set it totally apart from past efforts. Thermolyzer’s unique engineering design features overcome the limitations of prior pyrolysis technology.

**How does the technology work?**

The system indirectly heats the feedstock at a predetermined temperature in a very low-pressure chamber and gasifies all of the hydrocarbons. The gases include methane, hydrogen, carbon monoxide, carbon dioxide and other short chain compounds. The contaminants that are created during the conversion process are cracked and destroyed by scrubbers. The generated synthesis gas is also used to run the system, so it is self-sustaining. The process is continuous and designed to run 24/7. The synthesis gas has been approved for operation in specific internal combustion engines and commercial gas turbines. We have shown that it can produce electricity that can be used directly by a facility “behind-the-meter” for ~8¢/kWh. In most cases this is lower than the cost of power purchased from the electric grid. Recovered solids from the process include steel and carbon black from tires, precious metals from e-scrap, carbon fiber from composites and biochar from railroad ties all of which have merchant value. All add to the business case to support attractive returns.

**What are the markets for CHZ Technology and its Thermolyzer?**

In each market, the CHZ’s technology solves economic and environmental barriers. Below are markets that represent a potential for thousands of the CHZ units to be produced in the Youngstown region for U.S. and global markets.

• Tires

• Electronic waste

• Energy storage batteries (ABS plastic housing)

• Wind turbine blades

• Solar panels

• Municipal solid waste: mixed plastics (1-7), paper, food.

• Plastic/paper medical wastes

• Wooden railroad ties

• Wooden electric and telephone poles

• Plastic composites

• Auto shredder residue

• Carpet

**Where are the CHZ Thermolyzers built and how does this help with job creation?**

All CHZ’s Thermolyzer units will be built locally at Starr Manufacturing in Vienna, Ohio and will create manufacturing jobs that provide family sustaining wages. It establishes the Youngstown region as the global technology leader in sustainable recycling - advancing the circular economy.

**What are the economic benefits that create an incentive to recycle?**

• Because the hydrocarbon waste can be converted into useful energy (steam energy/syngas/hydrogen) and waste metals with economic value are recovered for resale, the technology creates an economic incentive to recycle rather than toss wastes into landfills, oceans and or rivers.

• In the case of plastics, because the process can handle mixed plastics (1-7), it avoids costly landfill sorting and accompanying GHG emissions. The financial benefits of producing energy and selling metals makes it a profit center rather than a cost.

• Avoids costly new landfills.

• CHZ units run 24/7, which creates a reliable source of power.

• CHZ power production is a form of distributed energy (DER). Distributed energy sources are valuable for improved reliability and operation of the electric grid, especially as we add significant quantities of wind and solar.

**What are the environmental benefits of using this technology?**

• The energy produced avoids/displaces use of fossil energy to produce steam energy, power or hydrogen, avoiding significant volumes of GHG and criteria pollutants.

• As an example, using plastic feedstock to produce power, the CHZ technology avoids over 90 percent of the GHG emissions as compared to using shale natural gas.

• The technology is energy efficient. It takes energy to start each unit. But, once started, it operates without any exterior energy source.

• Some waste materials contain chemicals that are harmful. The CHZ process destroys those chemicals and achieves CAA permitting quality.

• Placing wastes into landfills increases the potential for impacts to water quality. The use of CHZ technology avoids the potential for water contamination.

• Policy efforts to drive plastic companies to take back its products and recycle them is not an environmental solution. A GHG lifecycle analysis of that alternative would illustrate that it increases, not decreases GHG emissions. For example, sorting selective plastics from a landfill takes energy; trucking waste plastics from a landfill to a chemical plant takes energy; energy must be applied to the waste plastic in order to add it to virgin plastics.

**How does CHZ’s Thermolyzer impact the world?**

The Thermolyzer provides a reliable source of energy for energy deprived countries. Most countries do not have a source of domestic energy such as natural gas or even coal. Under-developed countries rely on wood, which is a source of deforestation. All of these countries have waste materials that could provide a reliable source of electricity for use in economic development and quality of life.

**Are there other companies that use this type of technology? Do you have competition in this field?**

Multiple existing incinerators, smelters, batch pyrolysis (producing oils as biodiesel), plasma furnaces and other direct flame systems are designed to burn the materials, capture the heat and attempt to treat hazardous emissions. These existing processes have met neither economic, performance, nor emission claims that the Thermolyzer has been carefully engineered and built to accomplish. Thermolyzer was designed over 15 years to carefully address each of the design, operation and performance limitations identified with prior systems. Thermolyzer economically processes all carbon containing hydrocarbons and most important, meets or exceeds the most stringent EPA regulations.